Volume II: Appendices

Final

Environmental Impact Statement

LAND ACQUISITION AND AIRSPACE ESTABLISHMENT

to

Support Large-Scale Marine Air Ground Task Force Live Fire and Maneuver Training

Marine Corps Air Ground Combat Center
Twentynine Palms, CA

July 2012

Volume II:

APPENDICES

LIST OF APPENDICES

APPENDIX A
AGENCY CORRESPONDENCE

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Appendix A

Agency Correspondence Table of Contents

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DEPARTMENT OF THE NAVY
HEADQUARTERS UNITED STATES MARINE CORPS
2 NAVY ANNEX
WASHINGTON, DC 20380-1775

IN REPLY REFER TO
5000
MROC

FEB 07 2003

MROC DECISION MEMORANDUM 11-2003

Subj: 10 DECEMBER 2002 MARINE REQUIREMENTS OVERSIGHT COUNCIL (MROC) MEETING: JOINT NATIONAL TRAINING CENTER

1. At 1345 on 10 December 2002, the MROC convened. Attendees were:

Members	**Organization**
Gen Nyland	ACMC
LtGen Parks	M&RA
LtGen Bedard	PP&O
LtGen Hanlon	MCCDC
LtGen Magnus	P&R
LtGen Kelly	I&L
LtGen Hough	AVN
Also in Attendance	
BGen Paxton	P&R

2. Purpose. The Commanding General of Training and Education Command, MajGen Thomas S. Jones presented a decision brief to obtain MROC approval for a Marine Corps Joint National Training Center (JNTC) resource strategy proposal and to identify Marine Corps JNTC decision points.

3. Presentation Summary.

a. Background information. Defense Planning Guidance 2004 (DPG-04) directed that all DoD Components transition to a transformed training regimen by the end of FY05, with the goal of at least 25% of major training exercises being joint. OSD, Joint Forces Command (JFCOM), and Service efforts were directed towards establishing a JNTC that supports Service, interoperability, and joint level training no later than 1 October 2004. Subsequently, OSD directed that the initial JNTC event would take place during May 2003.

b. JNTC Thrusts. OSD, JFCOM, and the Services developed four "Thrusts" to further training transformation and JNTC implementation.

(1) Thrust 1: Improved horizontal training, which will build on existing Service interoperability training.

(2) Thrust 2: Improved vertical training, which will link component/joint command and staff planning and execution.

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(3) Thrust 3: Integration exercises, which will enhance existing joint exercises to address joint interoperability training in a joint context.

(4) Thrust 4: Functional training, which will provide a dedicated joint training environment for functional warfighting and complex joint tasks.

c. The initial "Thrust 1" JNTC exercise will be held at the National Training Center, Ft. Irwin, California, the MAGTFTC, 29 Palms, California, and Nellis Air Force Base, Nevada during May 2003. This exercise supports the regional approach as presented by the Marine Corps. The initial "Thrust 3" JNTC exercise will be an enhanced Roving Sands Exercise during June 2003.

d. The May 2003 JNTC exercise will set the precedent for future JNTC exercises and is an opportunity to showcase Marine Corps capabilities and requirements. Competing visions between OSD/JFCOM and the Services make the success of the May 2003 exercise crucial to current and future Marine Corps interests. To capitalize on resource and training opportunities provided by OSD, MROC support is critical. TECOM has been successful in championing the May 2003 JNTC exercise as a regional exercise and the Marine Corps should use it as an opportunity to showcase capabilities and requirements.

e. Marine Corps JNTC Resource Strategy. The following training and resource initiatives are needed to enhance Marine Corps training. They will enable the Marine Corps to meet OSD's training transformation guidance and serve to enhance both the near-term and long-term participation in the JNTC. Four components of the strategy are designated as key Marine Corps JNTC decision points.

(1) Decision Point #1: Deployable Virtual Training Environment (DVTE). DVTE provides MOS specific simulators/weapons systems. Although it is characterized as a training system, its deployability makes it suitable for use during actual operational rehearsals. OSD is committing $2M to support a CACCTUS/DVTE demonstration during the May 2003 JNTC event. The estimated cost, which is not currently programmed, for fielding DVTE to the BSSGs, MEUs, Battalions, Squadrons, and schools is $23.4M over the FYDP.

(2) Decision Point #2: Range instrumentation System (RIS), which includes Position Location Instrumentation (PLI), Multiple Integrated Laser Engagement System (MILES), targetry, and the overall systems integration architecture. Only MILES is currently funded. The proposed PLI capability includes the Integrated GPS Radio System (IGRS) and Blue Force Tracking (BFT). IGRS is a training system that provides locations information with playback capabilities. BFT is an operational system that provides only location information. OSD plans to provide $750K for MAGTFTC IGRS instrumentation in support of the May 2003 JNTC Event. Marine Corps funding needed to support May 2003

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Subj: 10 DECEMBER 2002 MARINE REQUIREMENTS OVERSIGHT COUNCIL (MROC) MEETING: JOINT NATIONAL TRAINING CENTER

Event RIS requirements consists of $450K for BFT and $4.6M for targetry. TECOM proposes to analyze the training value of BFT and IGRS, and use that analysis to develop a recommendation for Marine Corps training PLI.

(3) Decision Point #3: Simulation center upgrades (Note: The MAGTF Training Command (MAGTFTC) Simulation Center upgrade is designated Decision Point 3). $250K is needed for MAGTFTC Simulation Center upgrades for the May 2003 JNTC Event. OSD may be willing to fund half of the requirement. An additional $330K would be required to upgrade the remaining Marine Corps simulation centers.

(4) Decision Point #4: Land expansion to support MOUT and MEB-training. MajGen Jones indicated that the MOUT and MEB-Training Universal Needs Statements have been completed and are being forwarded to MCCDC.

(5) Combined Arms Command and Control Tactical Upgrade System (CACCTUS). CACCTUS provides the technology required to simultaneously link live, virtual, and constructive training. $60M is currently programmed over the FYDP to provide CACCTUS to all three MEFs, Quantico, and MAGTFTC.

(6) Military Operations in Urban Terrain (MOUT) facility.

(7) MEB training.

(8) CAX enhancements.

(9) Combined Arms Staff Trainer (CAST) upgrades.

f. The following table summarizes Marine Corps mid/long-term unfunded JNTC requirements:

ITEM	FY04	FY05	FY06	FY07	FY08	FY09
DVTE	$8.0M	$4.4M	$1.9M	$2.9M	$4.4M	$1.9M
PLI(BFT)	TBD	TBD	TBD	TBD	TBD	TBD
Simulation Center Upgrades	$300K	$150K	$150K	$150K	$150K	$150K
JNTC Targets[1]	$4.3M	$4.2M	$8.5M			
Total JNTC	$12.6M	$8.8M	$10.6M	$3.1M	$4.6M	$2.1M
Other Targets[2]	$29.9M	$11.0M	$35.0M	$18.5M	$22.1M	$31.1M
TOTAL	$42.5M	$19.8M	$45.6M	$21.6M	$26.7M	$33.2M

[1] JNTC Targets are targets specifically for the CAX/JNTC at MAGTFTC.
[2] Other Targets are requirements for targets at ranges at remaining Marine Corps bases.

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Subj: 10 DECEMBER 2002 MARINE REQUIREMENTS OVERSIGHT COUNCIL (MROC) MEETING: JOINT NATIONAL TRAINING CENTER

g. Recommendation. That the MROC support TECOM's comprehensive JNTC resource strategy by:

(1) Funding near-term TECOM initiatives needed for the May 2003 JNTC exercise.

(2) Authorizing and supporting mid and long-term unfunded JNTC initiatives to compete during PR-05.

4. MROC Discussion.

a. The presentation actually combines Three topics: A Commandant-directed review of the status of training initiatives; the MAGTFTC MOUT Facility and MEB Training initiatives, which were last discussed by the MROC on 13 August 2002 (MROCDM 43-2002 refers); and, the OSD JNTC initiative.

b. JNTC Thrusts 1 through 3 will be implemented concurrently. Therefore, the Marine Corps may be simultaneously resourcing requirements to achieve all three.

c. Training initiatives (e.g., range upgrades and modernization) have not generally faired well in the POM process. They affect all Advocates, but are not owned by an individual Advocate. The MROC agreed that a failure to invest in needed training initiatives will result in the Marine Corps falling further behind the other Services in terms of training. To rectify this problem, range investment must become a focus for PR-05. Senior leaders must provide guidance to their PEG/PWG members to prioritize range investment.

d. Failure to showcase our training initiatives at the May 2003 Event and shape the JNTC debate could place our training facilities (e.g., MAGTFTC) at risk. TECOM will coordinate with P&R to identify an affordable FY-03 funding level and timeline to support the May 2003 JNTC Event that will allow us to showcase our training initiatives, shape the JNTC debate, and leverage OSD funding.

e. The MROC deferred discussion on the MOUT Facility and MEB Training initiatives until the Commandant's conceptual approval is obtained. MCCDC will obtain the Commandant's approval as soon as practical, now that the UNS's have been completed (MROCDM 43-2002 of 6 September 2002 contains the original tasking). I&L will discuss project management-related issues (e.g., HQMC/MARFOR/MAGTFTC roles and responsibilities, management team composition and location, etc.) with MARFORPAC/MAGTFTC. As soon thereafter as practical, I&L will brief the MROC on the proposed management team and Environmental Impact Statement (EIS) funding requirements (e.g., the minimum funding needed to begin the EIS, total funding required by FY, etc.). The presentation will also summarize the major elements of the initiatives and MROC decisions to date.

Subj: 10 DECEMBER 2002 MARINE REQUIREMENTS OVERSIGHT COUNCIL (MROC) MEETING: JOINT NATIONAL TRAINING CENTER

5. MROC Decisions.

a. The MROC supports TECOM's JNTC resource strategy and authorized the unfunded mid/long-term training initiatives identified in the brief to compete as PR-05 initiatives.

b. The MROC urged those involved in the upcoming PR-05 process to provide guidance to their representatives to prioritize range investment initiatives during the deliberations.

c. To satisfy short-term May 2003 JNTC Event requirements, TECOM will identify a timeline and coordinate with P&R to determine an affordable FY-03 funding level that will allow us to showcase our training initiatives, shape the JNTC debate, and leverage OSD funding. TECOM, supported by P&R, will obtain the Commandant's approval for the May 2003 JNTC Event strategy after consulting with ACMC.

d. The MROC deferred discussion on the MOUT Facility and MEB Training initiatives pending resolution of the short-term May 2003 JNTC Event funding issues and the following actions:

(1) MCCDC will obtain the Commandant's conceptual approval for the MOUT Facility and MEB Training initiatives as soon as practical.

(2) I&L will discuss project management-related issues (e.g., HQMC/MARFOR/MAGTFTC roles and responsibilities, management team composition and location, etc.) with MARFORPAC/MAGTFTC. As soon thereafter as practical, I&L will brief the MROC on the proposed management team and Environmental Impact Statement (EIS) funding requirements (e.g., the minimum funding needed to begin the EIS, total funding required by FY, etc.). The presentation will also summarize the major elements of the initiatives and MROC decisions to date.

WLNyland

W. L. NYLAND

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INTERAGENCY AGREEMENT
BETWEEN
MARINE CORPS INSTALLATIONS - WEST
AND
CALIFORNIA STATE OFFICE BUREAU OF LAND MANAGEMENT
GOVERNING COORDINATION OF
MARINE CORPS MILITARY TRAINING ACTIVITIES ON
BUREAU OF LAND MANAGEMENT LAND IN CALIFORNIA

I. PARTIES TO THE AGREEMENT

This Interagency Agreement (herein Agreement) is made by and between the United States Marine Corps (herein USMC) and the California State Office, Bureau of Land Management (herein BLM) to provide for the coordination of Marine Corps training activities on land under the management and control of the BLM in the State of California.

II. PREAMBLE

WHEREAS USMC trains military personnel in the State of California to maintain mission ready status in their assigned units;

WHEREAS USMC has evolving training needs that require the use or acquisition of non-Department of Defense land within the State of California for the foreseeable future;

WHEREAS USMC preference is for the use or acquisition of other Federal public lands within the State of California to meet its training needs;

WHEREAS BLM is responsible for and has jurisdiction over the use and management of certain public lands within the State of California;

WHEREAS BLM is responsible for processing public land withdrawal applications from other Federal agencies and is responsible for submitting preliminary findings and recommendations on such applications to the Secretary of the Interior per 43 C.F.R. Part 2300;

WHEREAS BLM has unique knowledge of the public lands under its control and has the expertise essential to USMC for evaluating appropriate parcels of land to meet USMC training needs;

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WHEREAS USMC and BLM recognize the importance of government-to-government relations with American Indians and the participation of American Indians in any consideration of USMC use or acquisition of BLM controlled land in the State of California;

WHEREAS the Economy Act (31 USC 1535, as amended) allows a Federal agency to enter into an agreement with another Federal agency for services;

WHEREAS USMC will require the cooperation, coordination, and assistance of BLM in any use or acquisition of BLM land for USMC military training, including compliance with the National Environmental Policy Act (NEPA), 42 U.S.C. §§ 4321-4370f, for environmental analyses and the Engle Act, 43 U.S.C. §§ 155-158, for public land withdrawals;

NOW, THEREFORE, the parties agree to work cooperatively in the following manner:

III. AUTHORITY FOR ENTERING INTO THIS AGREEMENT

The parties enter into this Agreement in accordance with Sections 155-158 of the Engle Act of 1958 (43 USC §§ 155-158), 10 USC § 5013, and the Economy Act (31 USC § 1535).

IV. PURPOSE

The purpose of this Agreement is to facilitate the use or acquisition of BLM controlled land in the State of California by USMC for military training purposes while meeting the requirements of the National Environmental Policy Act, the Federal Land Policy and Management Act, and the Engle Act.

V. RESPONSIBILITIES

1. USMC and BLM together will:

a. Cooperate on any environmental analysis of a proposed use or acquisition of BLM controlled land by USMC for military training in compliance with NEPA;

b. When applicable, follow procedures necessary to withdraw public land for military purposes per the Engle Act and compliance with NEPA.

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c. Establish separate interagency agreements covering specific individual projects relating to USMC use or acquisition of BLM controlled land in the State of California.

d. Exchange relevant unclassified information in an open, timely, and cooperative manner.

2. USMC will:

a. Communicate the execution of this Agreement to those elements throughout its chain of command working to complete tasks associated with any project involving the use or acquisition of BLM controlled land within the State of California for military training purposes.

b. Designate a point of contact for the implementation of this Agreement.

c. Act as the Lead Agency for any NEPA documents produced in support of USMC proposed use or acquisition of BLM controlled land in the State of California.

3. BLM will:

a. Communicate execution of this Agreement to the appropriate district, state and headquarters offices of the Department of the Interior.

b. Designate a point of contact for the implementation of this Agreement.

c. Act as a Cooperating Agency for any NEPA documents produced in support of USMC proposed use or acquisition of BLM controlled land in the State of California.

VI. FINANCIAL ADMINISTRATION

1. Subject to availability of funds, USMC agrees to reimburse BLM for all costs incurred in furtherance of the bona fide needs of the USMC, including the prevailing indirect cost rate under this Agreement or any subsequent agreement, for analyses associated with any use or acquisition of BLM administered land in the State of California by USMC for military training purposes. BLM shall remain responsible for all costs associated with the mission funded activities of the BLM. BLM will provide an initial cost estimate within 30 days of the execution of any project specific agreement entered into by the Parties to this

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Agreement; this cost estimate will itemize the types of expenses (e.g., personnel, travel, etc.).

2. USMC shall prepare a Statement of Work to describe the assistance needed and use a Military Interdepartmental Purchase Requests (MIPR) to authorize the expenditure of a fixed amount of funds by BLM on a reimbursable basis. The USMC financial point of contact will be specified on each MIPR. BLM shall sign and return acceptance forms to confirm their ability to provide the services requested. BLM will notify USMC on a quarterly basis when expenditures occur and provide expenditure records when requested by USMC.

3. BLM will base salary expenditures for governmental employees according to General Schedule plus fringe benefits and leave surcharge. Travel expenses will comply with Federal Travel Regulations.

VII. DISPUTE RESOLUTION

1. Either Party to this Agreement may provide the other Party written notice of a dispute concerning the implementation of this Agreement. The Parties will attempt to resolve any such dispute informally.

2. If disputes cannot be informally resolved after 15 days following written notice of a dispute, either signatory of this Agreement may request elevation of the matter to their higher headquarters for resolution by issuing a written statement of dispute.

VIII. CONDITIONS - Both parties understand and mutually agree:

1. Implementation of this Agreement is of mutual benefit;

2. BLM will not undertake any activities at the expense of USMC in advance of the complete execution of necessary funding documents;

3. This Agreement does not constitute a commitment of funds, and that performance under this agreement by either party is dependant upon lawful appropriation, availability, and allocation of funds by proper authorities;

4. This Agreement may be modified or amended only by mutual agreement of the parties in writing and signed by each of the parties hereto;

5. USMC and BLM shall execute separate sub-agreements for any services beyond the scope of this Agreement;

6. Any documents or data exchange between the Parties to the Agreement will not be released to a third party unless the designated representative of the party that generated the document or data approves the release;

7. Nothing herein contained shall be construed as limiting or affecting in any way the vested or delegated authority of the USMC and BLM;

8. This agreement becomes effective when signed by all parties and shall remain in full force and effect until terminated by either party upon 45 days notice, in writing, given to the other party.

MICHAEL R. LEHNERT
Major General, USMC
Commanding General
Marine Corps Installations - West

15 Sep 08
Date

MICHAEL POOL
Director
California State Office
Bureau of Land Management

9/12/08
Date

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STATE OF CALIFORNIA

Edmund G. Brown, Jr., *Governor*

NATIVE AMERICAN HERITAGE COMMISSION
915 CAPITOL MALL, ROOM 364
SACRAMENTO, CA 95814
(916) 653-6251
Fax (916) 657-5390
Web Site www.nahc.ca.gov
e-mail: ds_nahc@pacbell.net

March 17, 2011

Brigadier General H.S. Clardy, III
United States Marine Corps
Department of Navy
Box 788100 Marine Corps Air Ground Task Force Training Command
Twentynine Palms, CA 92278-8100

Re: Request for Comments and Sacred Lands File search and Native American Contacts list for the **NEPA draft Environmental Impact Statement (DEIS) for the 29Palms Training Land Acquisition/Airspace Establishment Project;** located north of the City of Twentynine Palms; San Bernardino County, California

Dear Brigadier General Clardy:
:

The Native American Heritage Commission (NAHC) is the California State 'Trustee Agency' pursuant to Public Resources Code §21070 for the protection of California's Native American Cultural Resources. The NAHC is also a 'reviewing agency' for environmental documents prepared under the National Environmental Policy Act (NEPA; 42 U.S.C. 4321 *et seq*), 36 CFR Part 800.3, .5 and are subject to the Tribal and interested Native American consultation requirements of the National Historic Preservation Act, as amended (Section 106) (16 U.S.C. 470). The provisions of the Native American Graves Protection and Repatriation Act (NAGPRA) (25 U.S.C. 3001-3013) and its implementation (43 CFR Part 10.2), and California Government Code §27491 apply to this project if Native American human remains are inadvertently discovered.

The NAHC is of the opinion that the federal standards, pursuant to the above-referenced Acts and the Council on Environmental Quality (CSQ; 42 U.S.C. 4371 *et seq*) are similar to and in many cases more stringent with regard to the 'significance' of historic, including Native American items, and archaeological, including Native American items than the California Environmental Quality Act (CEQA.). In most cases, federal environmental policy require that any project that causes a substantial adverse change in the significance of an historical resource, that includes archaeological resources, is a 'significant effect' requiring the preparation of an Environmental Impact Statement (EIS).

The NAHC Sacred Lands File (SLF) search resulted in; **Native American cultural resources were not identified**, based on information you provided. NAHC "Sacred Sites,' are defined by the Native American Heritage Commission and the California Legislature pursuant to California Public Resources Code §§5097.94(a) and 5097.96.

Also, the absence of evidence of archaeological items does not indicate that they do not exist at the subsurface and/or when groundbreaking activity occurs.

Native American cultural resources near the APE. Culturally affiliated tribes are to be consulted to determine possible project impacts. Early consultation with Native

American tribes in your area is the best way to avoid unanticipated discoveries once a project is underway.

Enclosed are the names of the nearest tribes that may have knowledge of cultural resources in the project area. A list of Native American contacts is attached to assist you. It is advisable to contact the persons listed and seek to establish a 'trust' relationship with them; if they cannot supply you with specific information about the impact on cultural resources, they may be able to refer you to another tribe or person knowledgeable of the cultural resources in or near the affected project area.

Lack of surface or subsurface evidence of archeological resources does not preclude the existence of archeological resources. Lead agencies should consider avoidance, in the case of cultural resources that are discovered. A tribe or Native American individual may be the only source of information about a cultural resource; this is consistent with the NHPA Section 106 Guidelines amended in 2009.

NEPA regulations provide for provisions for accidentally discovered archeological resources during construction and mandate the processes to be followed in the event of an accidental discovery of any human remains in a project location other than a 'dedicated cemetery. Even though a discovery may be in federal property, California Government Code §27460 should be followed in the event of an accidental discovery of human remains during any groundbreaking activity; in such cases California Government Code §27491 and California Health & Safety Code §7050.5 may apply.

If you have any questions about this response to your request, please do not hesitate to contact me at (916) 653-6251.

Sincerely,

Dave Singleton

Dave Singleton
Program Analyst

Attachment: Native American Contacts list for Consultation

Native American Contact List
San Bernardino County
March 17, 2011

Ramona Band of Cahuilla Mission Indians
Joseph Hamilton, Chairman
P.O. Box 391670
Anza , CA 92539
admin@ramonatribe.com
(951) 763-4105
(951) 763-4325 Fax
Cahuilla

Fort Mojave Indian Tribe
Tim Williams, Chairperson
500 Merriman Ave
Needles , CA 92363
(760) 629-4591
(760) 629-5767 Fax
Mojave

San Manuel Band of Mission Indians
James Ramos, Chairperson
26569 Community Center Drive
Highland , CA 92346
(909) 864-8933
(909) 864-3724 - FAX
(909) 864-3370 Fax
Serrano

Colorado River Reservation
Ginger Scott, Acting Cultural Contact
26600 Mojave Road
Parker , AZ 85344
symi@rraz.net
(928) 669-9211
(928) 669-5675 Fax
Mojave
Chemehuevi

Twenty-Nine Palms Band of Mission Indians
Darrell Mike, Chairperson
46-200 Harrison Place
Coachella , CA 92236
tribal-epa@worldnet.att.net
(760) 775-5566
(760) 808-0409 - cell - EPA
(760) 775-4639 Fax
Chemehuevi

AhaMaKav Cultural Society, Fort Mojave Indian
Linda Otero, Director
P.O. Box 5990
Mohave Valley AZ 86440
(928) 768-4475
LindaOtero@fortmojave.com
(928) 768-7996 Fax
Mojave

Chemehuevi Reservation
Charles Wood, Chairperson
P.O. Box 1976
Chemehuevi Valley CA 92363
chair1cit@yahoo.com
(760) 858-4301
(760) 858-5400 Fax
Chemehuevi

Morongo Band of Mission Indians
Michael Contreras, Cultural Heritage Prog.
12700 Pumarra Road
Banning , CA 92220
(951) 201-1866 - cell
mcontreras@morongo-nsn.
gov
(951) 922-0105 Fax
Cahuilla
Serrano

his list is current only as of the date of this document.

istribution of this list does not relieve any person of the statutory responsibility as defined in Section 7050.5 of the Health and Safety Code, ection 5097.94 of the Public Resources Code and Section 5097.98 of the Public Resources Code.

his list is only applicable for contacting local Native Americans with regard to cultural resources for the proposed EPA draft Environmental Impact Statement (DEIS) for the 29Palms Training Land Acquisition/Airspace Establishment Project, nited States Marine Corps, Department of the Navy.

Native American Contact List
San Bernardino County
March 17, 2011

San Manuel Band of Mission Indians
Ann Brierty, Policy/Cultural Resources Departmen
26569 Community Center. Drive Serrano
Highland , CA 92346
(909) 864-8933, Ext 3250
abrierty@sanmanuel-nsn.gov
(909) 862-5152 Fax

Ernest H. Siva
Morongo Band of Mission Indians Tribal Elder
9570 Mias Canyon Road Serrano
Banning , CA 92220 Cahuilla
siva@dishmail.com
(951) 849-4676

Fort Mojave Indian Tribe
Nora McDowell, Cultural Resources Coordinator
500 Merriman Ave Mojave
Needles , CA 92363
g.goforth@fortmojave.com
(760) 629-4591
(760) 629-5767 Fax

Serrano Nation of Indians
Goldie Walker
P.O. Box 343 Serrano
Patton , CA 92369

(909) 862-9883

Fort Mojave Indian Tribe
Esadora Evanston, Environmental Coordinator
500 Merriman Ave Mojave
Needles , CA 92363
region9epa@ftmojave.com
(760) 326-1112
(760) 629-4591
(760) 629-5767 Fax

is list is current only as of the date of this document.

stribution of this list does not relieve any person of the statutory responsibility as defined in Section 7050.5 of the Health and Safety Code, ection 5097.94 of the Public Resources Code and Section 5097.98 of the Public Resources Code.

is list is only applicable for contacting local Native Americans with regard to cultural resources for the proposed EPA draft Environmental Impact Statement (DEIS) for the 29Palms Training Land Acquisition/Airspace Establishment Project, ited States Marine Corps, Department of the Navy.

STATE OF CALIFORNIA – THE NATURAL RESOURCES AGENCY

EDMUND G. BROWN, JR., *Governor*

OFFICE OF HISTORIC PRESERVATION
DEPARTMENT OF PARKS AND RECREATION
1725 23rd Street, Suite 100
SACRAMENTO, CA 95816-7100
(916) 445-7000 Fax: (916) 445-7053
calshpo@parks.ca.gov
www.ohp.parks.ca.gov

April 18, 2011

Reply in Reference To: USMC060919A

Major William M. Rowley
Director, NREA
Marine Air Ground Task Force Training Command
Marine Corps Air Ground Training Center
Box 788100
Twentynine Palms, CA 92278-8100

Re: Section 106 Consultation for Land Acquisition and Airspace Establishment, Marine Corps Air Ground Training Center, Twentynine Palms, CA

Dear Major Rowley:

Thank you for initiating consultation regarding the United States Marine Corps (USMC) efforts to comply with Section 106 of the National Historic Preservation Act of 1966 (16 U.S.C. 470f), as amended, and its implementing regulation found at 36 CFR Part 800. You are consulting under the *Programmatic Agreement between the United States Marine Corps and the California State Historic Preservation Officer Regarding Operation, Maintenance, Training and Construction at the United States Marine Air Ground Task Force Training Command, Marine Corps Air Ground Combat Center, Twentynine Palms, California.*

Pursuant to 36 CFR Part 800.14(b)(1)(ii) and 36 CFR Part 800.14(b)(1)(iv), the USMC is requesting my concurrence for their use of the above mentioned Programmatic Agreement (PA) for the acquisition of approximately 170,000 acres Bureau of Land Management, public and state land. It is my understanding that the USMC will identify properties eligible for National Register inclusion and determine the effects of future undertakings on historic properties using an Integrated Cultural Resources Management Plan. Furthermore, the USMC is invoking this PA for the purposes of land acquisition only and will determine if future undertakings apply to the PA or to Subpart B of 36 CFR Part 800.

At this time I have no objection to your use of the PA for the purposes of this land transfer.

Thank you for seeking my comments and considering historic properties as part of your project planning. If you have any questions or concerns, please contact Ed Carroll of my staff at (916) 445-7006 or at email at ecarroll@parks.ca.gov.

Sincerely,

Susan K Stratton for

Milford Wayne Donaldson, FAIA
State Historic Preservation Officer

MOJAVE air quality management district DESERT

Mojave Desert Air Quality Management District
14306 Park Avenue, Victorville, CA 92392-2310
760.245.1661 • fax 760.245.2699
Visit our web site: http://www.mdaqmd.ca.gov
Eldon Heaston, Executive Director

March 1, 2011

Naval Facilities Engineering Command, Southwest
Attn: 29Palms EIS Project Manager
1220 Pacific Highway
San Diego, CA 92132-5190

PROJECT: DRAFT ENVIRONMENTAL IMPACT STATEMENT (EIS) FOR THE 29PALMS TRAINING LAND ACQUISITION/AIRSPACE ESTABLISHMENT STUDY

Dear 29Palms EIS Project Manager:

The Mojave Desert Air Quality Management District (MDAQMD) has received the Draft Environmental Impact Statement (EIS) for the 29Palms Training Land Acquisition/Airspace Establishment Study. This Environmental Impact Statement (EIS) evaluates the potential environmental impacts associated with the proposed establishment of a large-scale training range facility at the Marine Corps Air Ground Combat Center at Twentynine Palms, California (the "Combat Center") that would accommodate sustained, combined-arms, live-fire, and maneuver training for all elements of a Marine Expeditionary Brigade (MEB). To implement the proposed action, the Marine Corps would acquire additional land adjacent to the Combat Center, establish and modify military Special Use Airspace (SUA) above the proposed MEB-sized training range, and conduct the specified MEB training.

The District has reviewed the DEIS, and concurs that the Special Conservation Measures for Air Quality will avoid or minimize potential impacts of fugitive dust emissions developed for the proposed project. The District has also reviewed the conformity determination for the project and has proposed to include VOC and NO_x increase emissions into the next ozone SIP revision for the Mojave Desert Air Basin (MDAB).

Thank you for the opportunity to participate in the development of this planning document. If you have any questions regarding this letter, please contact me at (760) 245-1661, extension 6726, or Tracy Walters at extension 6122.

Sincerely,

Alan J. De Salvio
Supervising Air Quality Engineer

AJD/tw 29P Land-Air Aq Project

City of Adelanto | Town of Apple Valley | City of Barstow | City of Blythe | City of Hesperia | City of Needles | County of Riverside | County of San Bernardino | City of Twentynine Palms | City of Victorville | Town of Yucca Valley

United States Department of the Interior

BUREAU OF LAND MANAGEMENT
Barstow Field Office
2601 Barstow Road
Barstow, CA 92311
www.ca.blm.gov/barstow

In Reply Refer To:
CACA 50194
CA-680. 20

MAY 29 2009

MAGTFTC, MCAGCC
ATTN: Land Expansion Program Manager
Box 788104, Building 1554, Room 138
Twenty-nine Palms, CA 92278-8104

APPLICATION SUMMARY OF PROPOSED EXPANSION OF MARINE COPRS AIR TO GROUND COMBAT CENTER AT 29 PLAMS, CALIFORNIA

Dear Joe:

The following is a summary of the actions that have taken place as part of the BLM's Segregation Process for the Proposed Expansion of Marine Corps Air to Ground Combat Center (MCAGCC) at 29 Palms, California.

SEGREGATION APPLICATION RECEIVED

The Department of the Navy, U.S. Marine Corps Air to Ground Combat Center at 29 Palms, California submitted an application to the Barstow Field Office of the Bureau of Land Management (BLM) on August 4, 2008 for a proposed expansion of the installation. The application was to withdraw 365,906 acres of Public Lands, and approximately 507 acres of Federal subsurface mineral estate from all forms of appropriation under the public land laws, including surface entry, mining, mineral leasing under the Mineral Act of 1947.

This withdrawal would provide the USMC at MCAGCC at 219 Palms, California the opportunity to evaluate the best alternative that meets both the needs of MCAGCC, and is the least intrusive on the environment and the Off Highway Vehicle Community in the 29 Palms area. Appendix A

FEDEREAL REGISTER NOTICE

The BLM published a Notice of Proposed Legislative Withdrawal and Opportunity for Public Meeting: California. This notice was published in the *Federal Register, Volume 73, No. 179* on Monday, September 15, 2008. This Notice provided a ninety day comment period from September 15 through December 15, 2008 for stakeholders to express their views about the impacts of the proposed expansion.

The U.S. Navy, MCAGCC published a Notice of Intent to Prepare an Environmental Impact Statement (EIS) in the *Federal Register, Volume 73, No. 211 on Thursday, October 30, 2008.* The publication of this document started the Official Segregation Date for the project. The segregation is for two years, and expires on October 30, 2010. The Segregation may be renewed upon request by the USMC. Appendix B

SEGREGATION DATES:

The Segregation is effective from September 15, 2008 through September 15, 2010. The Segregation may be renewed at the request of MCAGCC.

PUBLIC MEETINGS:

The BLM held two Segregation meetings to inform the public of the BLM's responsibility related to the segregation request. The meeting dates were announced in the Federal Register, and local newspapers. The first meeting was held on September 23, 2008 at the Twenty-nine Palms Junior High School, Hays Gym, 5798 Utah Trail, Twenty-nine Palms, CA. The second meeting was held on September 24, 2008 at the Hilton Garden Inn, 12603 Mariposa Road, Victorville, CA.

The meetings were held in an Open House Format with posters describing the National Environmental Policy Act (NEPA) process; BLM's requirements with on the Segregation Process; and MCAGCC's proposed expansion alternatives and maps of these alternatives. Attendance of interested parties at each meeting ranged from 50 to 150 people. Interested parties were provided the opportunity submit written comments at each location and were provided a physical address and e-mail addresses to submit comments at a later date. Appendix D

SUMMARY OF COMMENTS:

The BLM Segregation Comment Period ran from September 15, 2008 through December 15, 2008. The BLM received over 500 written comments, 898 e-mail comments, and a few faxed comments.

OHV Community Opposed to Expansion: 898 e-mails and approximately 500 written comments opposed to the expansion.

Mining Interests: Five comments concerned about their leases. There are over 75 mining leases in the segregation area, but most are held by one or two individuals.

Residential Property Owners: Approximately 10 residents were concerned about noise and dust associated with the expansion. They were also concerned with loss of property values.

Local Communities: Two local communities, Apple Valley, and Yucca Valley, passed resolutions against the proposed expansion.

Alternative Energy Issues: Three alternative energy companies; FPL, Sterling Energy, and Opti-solar have submitted comments about the potential impacts to their pending energy projects.

Small Business Concerns: There were several comments from small business owners from the communities around Johnson Valley who sell to the OHV community. They are very concerned about the loss of income if the proposed expansion is successful.

Miscellaneous comments: One stakeholder was concerned with the loss of use of a dirt runway in the Johnson Valley Expansion Area.

Should you require any further information on this project, please contact Mickey Quillman, BLM, Barstow Field Office, Resource Manager at (760) 252-6020.

Sincerely,

Mickey Quillman

for Roxie C. Trost
Field Manager

Enclosures:
Appendix A, B, C and D
Third Party List

This summary filed in Withdrawal Case file: CACA50194, 29 January, 2009.
This summary and all information in appendix forwarded to Military for inclusion in administrative record for EIS on 29 January, 2009 along with copy of transmittal letter.

United States Department of the Interior

BUREAU OF LAND MANAGEMENT
Barstow Field Office
2601 Barstow Road
Barstow, CA 92311
www.ca.blm.gov/barstow

OCT 0 3 2010

In Reply Refer To:
/1791(P)
CA-680.21

Chris Proudfoot
Project Manager
Twenty Nine Palms MCAGCC
Bldg 1554, Box 788106
Twenty Nine Palms, CA 92278-8106

Re: Assumptions for Twenty-Nine Palms Marine Corps Air Ground Combat Center Land Acquisition EIS Analysis

Sir:
Per your request, enclosed are the assumptions BLM has agreed to utilize for the MCAGCC Land Acquisition Draft EIS analysis, based on discussions between BLM and MCAGCC staff and the EIS technical consultants, and our follow-up meeting of September 21-22, 2010.

Contact Mickey Quillman of my management staff at (760) 252-6020 if you have any further questions or need clarification of these assumptions.

Sincerely,

Roxie C. Trost

Roxie C. Trost
Field Manager

Enclosures:
Summary of Assumptions

c.c: Craig Bloxham, Principal
TEC Inc.
1819 Cliff Drive, Ste F
Santa Barbara, CA 93109

Baseline Assumptions and/or Variables Held Constant for All Alternatives:

- **Baseline Visitors - West:** In the west area, all analyses will assume an *average* total of 300,000 visitor-days per year (all recreation, not just OHV) as a baseline. As described in the PDEISv1, this is an estimate provided in 2010 by BLM, based on RMIS statistics for organized events and estimates of casual use. Projected changes through 2015 are provided in the Table on p.6.
- **Baseline Visitors – East and South:** For purposes of this analysis, 800 visitor-days per year (all recreation, not just OHV) was assumed for the south study area and 500 visitor-days per year was assumed for the east area: all visits to the south area assumed to be single-day visits and all by local area residents only; 10% of visitor-days to the east area assumed to be multi-day use, also by local area residents.
- **Purpose of Visits - West:** For west area, assume 17% of the visitor-days/year are directly linked to organized race events ("event-related") and would not occur if race events were not held 83% of visitor-days are "dispersed-use" (including casual use unrelated to race events plus would-be race spectators that would still recreate in the area even if races were displaced.
- **Day Use vs. Overnight – West:**
  - For both dispersed-use and event-related groups, assume 20% of visitor-days/year are by single-day users (arrive and depart same day) and the other 80% of visitor-days/year are multi-day visits.
  - Assume an *average* of 2.5 days/2 nights duration for all multi-day visits.
- **Average Group Size:** Assume the *average* group size is 3 people for both dispersed-use and event-related trips. This means that there is an average of one main transport vehicle for each 3 visitors to and from the recreational area.
- **Origin of Visitors within the County:**
  - For day-use visits, assume the origin of users is 50% from "local" area (within 50 miles of JV); 30% from elsewhere in San Bernardino County; and 20% from outside the County.
  - For multi-day trips, assume the origin of visitors is 20% from "local" area; 20% from elsewhere in San Bernardino County; and 60% from outside the County.
- **Visitor Spending Patterns:**
  - "Local" visitors spend 100% of the cost of the trip "locally" (within 50 miles of JV).
  - Visitors from elsewhere in San Bernardino County spend 60% "locally" and 40% elsewhere in the County.
  - Visitors from outside the County spend 30% "locally," 10% in the rest of San Bernardino County, and 60% outside of San Bernardino County.

Alternative 1 Assumptions:

- **Displacement of Event-Related Visits:** Based on input from the BLM Recreation Branch Chief, the analysis assumes that 100% of organized races (and race-related visits as defined above) would be eliminated from JV under Alt 1 and none of these displaced events would be accommodated at other venues in the County (in reality some race events may be able to proceed in a reduced or truncated form, or be held elsewhere, but for the sake of a conservative analysis, it is assumed that no current JV race events would be held anywhere in the County).
- **Displacement of Dispersed-Use Visits:**
  - Assume that 75% of the baseline dispersed-use visitor-days in JV (as defined above) would be displaced by Alt 1. The other 25% of dispersed-use visitor-days would continue in JV because some popular areas within the OHV Area (on the remaining 17,628 acres or roughly 9% of the OHV Area) would remain available to the public.
  - Assume that 90% of the dispersed-use that would be displaced by Alternative 1 (i.e., 90% of the 75% displaced) would shift to other recreational resources in San Bernardino County. The other 10% of the displaced JV dispersed-users would stay outside the County.
  - For AQ – assume 90% of the displaced visitors that would shift elsewhere in the County (90% of the 90% of the 75%) would stay within the Ozone non-attainment area (the other 10% could go to areas such as Dumont or Spangler, but these are more remote from local areas and the LA Basin.
- **Origin of Displaced Visitors within the County:**
  - For day-use visits remaining in the county under Alt 1, assume the origin of users is 65% from the "local" area (within 50 miles of JV); 25% from elsewhere in San Bernardino County; and 15% from outside the County.
  - For multi-day trips remaining in the county, assume the origin of visitors is 20% from "local" area (within 50 miles of JV); 20% from elsewhere in San Bernardino County; and 60% from outside the County.

Alternative 2 Assumptions:

- **Displacement of Event-Related Visits:** assume that 60% of the organized races in JV (including "King of the Hammers" in its current form) would be eliminated under Alt 2, along with 60% of the strictly "event-related" visits. The displaced race events would not be absorbed at other County venues.
- **Displacement of Dispersed-Use Visits:**
  - o Assume that 25% of the baseline dispersed-use visitor-days in JV (as defined above) would be displaced by Alt 2. The other 75% of dispersed-use visitor-days would continue in JV. Approximately 78,470 acres or roughly 41% of the existing JV OHV area would remain available for public recreation year-round.
  - o Assume that 90% of the dispersed-use that would be displaced by Alternative 2 (i.e., 90% of the 25% displaced) would shift to other recreational resources in San Bernardino County. The other 10% of the displaced JV dispersed-users would stay outside the County.
  - o For AQ – assume 90% of the displaced visitors that would shift elsewhere in the County (90% of the 90% of the 25%) would stay within the Ozone non-attainment area (the other 10% could go to areas such as Dumont or Spangler, but these are more remote from local areas and the LA Basin).
- **Origin of Displaced Visitors within the County:** (same as baseline)
  - o For day-use visits remaining in the county under Alt 2, assume the origin of users is 50% from "local" area (within 50 miles of JV); 30% from elsewhere in San Bernardino County; and 20% from outside the County.
  - o For multi-day trips remaining in the county, assume the origin of visitors is 20% from "local" area (within 50 miles of JV); 20% from elsewhere in San Bernardino County; and 60% from outside the County.

Alternative 4 & 5 Assumptions: *(assumes no restrictions on alcohol in the RPAA in considering visitation changes).*

- **Displacement of Event-Related Visits:** Assume that 15% of the organized races in JV (not the"King of the Hammers" event) would be eliminated under Alt 4 or 5, along with 15% of the strictly "event-related" visits. The displaced race events would not be absorbed at other County venues.
- **Displacement of Dispersed-Use Visits:**
  - o Assume that 15% of the multi-day dispersed-use and 30% of the single-day dispersed-use in JV would be displaced by Alt 4 or 5. The other 85% of multi-day and 70% of single-day dispersed-use would continue in JV during the 10 months of restricted public access each year.
  - o Assume that 90% of the dispersed-use that would be displaced by Alt 4 or 5 (i.e., 90% of the 15% or 30% displaced) would shift to other recreational resources in San Bernardino County. The other 10% of the displaced JV dispersed-users would stay outside the County.
  - o For AQ – Assume 90% of the displaced visitors that would shift elsewhere in the County (90% of the 90% of the 15 or 30%) would stay within the Ozone non-attainment area (the other 10% could go to areas such as Dumont or Spangler, but these are more remote from local areas and the LA Basin).
- **Origin of Displaced Visitors within the County:** (same as baseline)
  - o For day-use visits remaining in the County under Alt 4 or 5, assume the origin of users is 50% from "local" area (within 50 miles of JV); 30% from elsewhere in San Bernardino County; and 20% from outside the County.

o For multi-day trips remaining in the County, assume the origin of visitors is 20% from "local" area (within 50 miles of JV); 20% from elsewhere in San Bernardino County; and 60% from outside the County.

Alternative 6 Assumptions: *(assumes no restrictions on alcohol in the RPAA in considering visitation changes).*

- **Displacement of Event-Related Visits:** assume that 60% of the organized races in JV (not including some modified form of "King of the Hammers") would be eliminated under Alt 6, along with 60% of the strictly "event-related" visits. The displaced race events would not be absorbed at other County venues.
- **Displacement of Dispersed-Use Visits:**
    - Assume that 30% of the dispersed-use (both multi- and single-day) in JV would be displaced by Alt 6. The other 70% of dispersed-use would continue in JV during the 10 months of restricted public access each year.
    - Assume that 90% of the dispersed-use that would be displaced by Alternative 6 (i.e., 90% of the 30% displaced) would shift to other recreational resources in San Bernardino County. The other 10% of the displaced JV dispersed-users would stay outside the County.
    - For AQ – Assume 90% of the displaced visitors that would shift elsewhere in the County (90% of the 90% of the 30%) would stay within the Ozone non-attainment area (the other 10% could go to areas such as Dumont or Spangler, but these are more remote from local areas and the LA Basin).
- **Origin of Displaced Visitors within the County:** (same as baseline)
    - For day-use visits remaining in the county under Alt 6, assume the origin of users is 50% from "local" area (within 50 miles of JV); 30% from elsewhere in San Bernardino County; and 20% from outside the County.
    - For multi-day trips remaining in the County, assume the origin of visitors is 20% from "local" area (within 50 miles of JV); 20% from elsewhere in San Bernardino County; and 60% from outside the County.

Baseline JV Visitor-Days per Year - 2015 Projection

	Dispersed-Use		Organized Race Events		Total Use	
Year	#visitor-days	% Annual Increase	Other than King of Hammers	King of Hammers	Visitor-Days	% Annual Increase
2008	127,000		80,763	720	208,483	
2009	142,000	11.8%	80,763	30,270	253,033	21.4%
2010	165,147	16.3%	80,763	45,438	291,348[1]	15.1%
2011	173,404	5.0%	80,763	45,438	299,605	2.8%
2012	182,075	5.0%	80,763	45,438	308,276	2.9%
2013	191,178	5.0%	80,763	45,438	317,379	3.0%
2014	200,737	5.0%	80,763	45,438	326,938	3.0%
2015	210,774	5.0%	80,763	45,438	336,975	3.1%

[1]Rounded up to 300,000 for the analysis.

UNITED STATES MARINE CORPS
MARINE AIR GROUND TASK FORCE TRAINING COMMAND
MARINE CORPS AIR GROUND COMBAT CENTER
BOX 788100
TWENTYNINE PALMS, CALIFORNIA 92278-8100

IN REPLY REFER TO:
5800
G-4
February 13, 2012

Ms. Roxie Trost
Field Office Manager
United States Department of Interior
Bureau of Land Management
Barstow Field Office
2601 Barstow Road
Barstow, CA 92311

Dear Ms. Trost,

Thank you for your comments of January 19, 2012, on the preliminary Final Environmental Impact Statement (FEIS) addressing the Land Acquisition and Airspace Establishment project at the Marine Corps Air Ground Combat Center, Twentynine Palms, CA. As described in the enclosure, we have reviewed BLM's comments and made necessary changes and clarifications to address each of your specific concerns. In addition, the enclosure addresses a second set of BLM comments received via email from Celeste Mitchell in your Headquarters Office on February 6, 2012.

The BLM continues to be a critical Cooperating Agency on this project. The Barstow Field Office in particular has been invaluable throughout the NEPA process and we are grateful for your assistance. We appreciate BLM's continued efforts to provide insights and valued comments that have assisted us in making the analysis as accurate and thorough as possible. Your team's knowledge of the off-highway vehicle (OHV) issues in our region has been a critical component in our analysis. We will continue to ensure BLM concerns are fully addressed.

As you are aware, we are scheduled to publically distribute the FEIS in late April 2012. A Record of Decision (ROD) would then follow in late June 2012. The Department of the Navy (DON) may select any of the six action alternatives or determine to select the no action alternative. As we continue the process, we will coordinate with BLM to draft the proposed withdrawal legislation.

We have attached our specific responses to your comments. Please contact us if you have other comments that you would like us to address. Again, thank you for the professional cooperation in this challenging initiative to train Marines as best as possible well into the future.

I can be reached at chris.proudfoot@usmc.mil or 760-830-7683.

Sincerely,

Chris Proudfoot

Changes resulting from BLM comments:

1) 4.2-6, paragraph 2. The document states that additional recreation areas in southern California have been identified as alternative sites that may attract the OHV activities that would be displaced from Johnson Valley.

Comment 1: Appendix M states that Stoddard Valley has a potential increase of 84,962 visitor days under Alternative 1 and 33,985 under Alternative 6. It goes on to state that some overcrowding will occur, but the document fails to address the direct impacts to the vegetation and desert tortoise habitat in this area due to the increased OHV activities. Increased use will also diminish the OHV experience for all users. The document must address these issues. Similar analysis is needed for each of the listed OHV areas within Appendix M.

DON Change to FEIS:

Per 40 CFR 1508.8: "Indirect effects, which are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable." The Marine Corps has determined that closing a portion of the JV to OHV use is a direct impact; OHV users displaced to other locations is an indirect impact. The FEIS does not treat indirect or cumulative effects as lesser than direct effects. Additionally, the Biological section, page 4.10-15, highlights the indirect impacts to these other designated OHV areas.

2) 4.2.2.4, paragraph 2: Potential Mitigation Measures
The document states: "…….Designating lands for OHV use is a reasonable mitigation measure and it is identified here to encourage the BLM and the State of California to consider designating additional lands for this purpose in future Resource Management Plans….."

Comment 2: The lands administered by the BLM are designated for specific purposes: including, Wilderness Areas; Conservation Areas; Areas of Special Environmental Concern (ACECs), Desert Wildlife Management Areas, etc. At this time, there are literally no lands available to designate as a replacement OHV area.

DON Change to FEIS:

Delete sentence referenced and change paragraph to read:

"Numerous public comments on the Draft EIS stated the Marine Corps should designate or obtain other lands in the region to mitigate the loss of OHV area in the Johnson Valley. The Marine Corps does not have the jurisdiction or capability to designate or obtain other lands for OHV use and could not commit to such measures as part of the Record of Decision (ROD) for this action. The State of California has management jurisdiction over state lands. The BLM has management jurisdiction over public lands which are designated for specific purposes. BLM has informed the Marine Corps that at this time there are no lands available to designate as a replacement OHV area."

3) 4.2.3.1 West Study Area, Page 4.2-10, paragraph 3.

See Comment 1.
See DON response for Comment 1.

4) 4.2.3.4 East Study Area Potential Mitigation, paragraph 2.

See Comment 1.
See DON response and changes for Comment 2.

5) <u>4.2.5.4 Alternative 4, Potential Mitigation Measures, page 4.2-17, paragraph 4.</u>

See Comment 2.
See DON response and changes for Comment 2.

6) <u>4.2.6 Alternative 5 Impacts, page 4.2-19, 2nd paragraph</u>.

"..........................Designating lands for OHV use is a reasonable mitigation measure, and is identified here to **alert** BLM and encourage them to consider this during future development of Resource Management Plans. ...."
See Comment 1.
See DON response and changes for Comment 2.

7) <u>4.2.7 Alternative 6, page 4.2-21, paragraph 3.</u>

See Comment 1.
See DON response and changes for Comment 2.

8) <u>4.2.7, page 2.2-22, paragraph 1, Reference Appendix M.</u>

See Comment 1.
See DON response and changes for Comment 2

9) <u>4.2.7.4, page 4.2-23 Potential Mitigation Measures, paragraph 2.</u>

See Comment 2.
DON response and changes for Comment 2 will be made here as well

Comment Matrix

February 3, 2012

Land Acquisition and Airspace Establishment EIS
Marine Corps Air Ground Combat Center
Twentynine Palms, CA

#	Page	Section/ Line/ Phrase/ Word	Reviewer	Comment	Response
1.	Executive Summary		Stifel	This section needs to incorporate all of the comments #3-24	Any changes made to Section 4.2 as a result of comments below will be transferred to the Executive Summary as appropriate.
2.	All Chapters and Appendices		Stifel	All Chapters and Appendices need to incorporate all of the comments #3-24	Any changes made to Section 4.2 as a result of comments below will be transferred to other sections as appropriate.
3.	general		Stifel	The draft Final EIS is not acceptable to BLM in its current form. BLM requests another review opportunity after all of BLM's comments are addressed adequately. The draft Final EIS cannot be released to the public until BLM approves it as a cooperating agency.	The Marine Corps will continue to work with the BLM Barstow Field Office (FO) to resolve BLM comments on the Final EIS analysis.
4.	general		Stifel	The BLM requested a Word version of the draft EIS on multiple occasions. The draft Final EIS is over 1,000 pages long. It is a gargantuan task to try to keep up with all of the comments, edits, and substantive changes that BLM has identified as needed without access to a Word version. In addition, this draft Final EIS does not include line numbers, so comments are almost impossible to keep clear. As a cooperating agency, BLM expects reasonable opportunity to contribute to the substance of the document. The USMC failed to provide this opportunity.	The EIS document addresses a proposed action that covers very large land and airspace areas, complex military operations, and a controversial withdrawal of a popular recreation area. The USMC has worked closely and productively with the BLM Barstow FO throughout the EIS process for more than 3 years. BLM has reviewed the 4 internal versions of the Draft EIS, and 2 internal versions of the Final EIS. The Marine Corps greatly appreciates the valuable insights, comments, and cooperation that BLM has provided as a Cooperating Agency.
5.	general		Stifel	Due to the cumbersome nature of the draft Final EIS (1,000+ page PDF file), BLM does not have the capacity to capture every place in the document where edits are needed. So BLM chose to focus on section 4.2. However, the ripple effect of the significant problems and failures illustrated in BLM's comments on Section 4.2 wash throughout the document and appendices.	BLM Barstow FO staff has contributed valuable insights, data, and review comments influencing all portions of the EIS throughout the NEPA process. Any changes made to Section 4.2 as a result of comments below will be transferred to other sections as appropriate.
6.	Throughout document	"indirect impacts"		In multiple places throughout the draft Final EIS, the analysis describes impacts to other nearby OHV areas as "indirect". The impacts will be DIRECT, not indirect. If a major interstate closes, vehicles move to other	Per 40 CFR 1508.8: direct effects "are caused by the action and occur at the same time and place. Indirect effects are caused by the action and are

#	Page	Section/ Line/ Phrase/ Word	Reviewer	Comment	Response
				roads. The other roads are DIRECTLY impacted by the interstate closure. If 300,000+ visitor use days are terminated, then impacts to nearby areas will be DIRECT, since these users will find alternative places to go.	later in time or farther removed in distance, but are still reasonably foreseeable." The USMC has determined that closing a portion of Johnson Valley to OHV use would be a direct impact; OHV users displaced to other locations would be an indirect impact. The FEIS does not treat indirect or cumulative effects as lesser than direct effects.
7.	Throughout document	Unique aspects of Johnson Valley	Stifel	The draft Final EIS mentions size as the "unique" aspect of Johnson Valley. Size is one of the attributes that makes Johnson Valley unique. However, it is not the only aspect. The types of extreme rock crawling opportunities that are available to recreational users of Johnson Valley cannot be found elsewhere. This aspect should be mentioned every time Johnson Valley's unique character is mentioned. Also, the terrain in Johnson Valley provides a multi-faceted experience (rock crawling, sand dunes, lake bed, solitary trails, and long distance loops) that is not available elsewhere in California, or possibly all of the US. Finally, the sheer size of Johnson Valley is important for several reasons. The scale of this OHV area provides opportunities for solitary experiences that are impossible to find elsewhere. The vast acreage of Johnson Valley allows race organizers to build challenging and long (50-75 miles) loop courses that challenge racers uniquely. Johnson Valley's large size and varied terrain encourage dispersed recreation and solitary opportunities. The loss of Johnson Valley could result in OHV trespass on public and private lands where that use is not appropriate. Further, it is unclear that there are any large tracts of private lands available for acquisition where OHV use may be realistically available. Table 4.2-2 lists nearby OHV areas. A major weakness of the OHV study (Appendix M) and EIS is the assumption that all OHV areas are interchangeable. OHV areas are not interchangeable. Johnson Valley offers experiences that cannot be replicated at other OHV areas. To highlight this point with an example: if you take a Class IV river away from kayakers and offer them 10 flat water rivers instead, you have not mitigated the loss of their whitewater opportunities. The assumption of interchangeability used in the OHV use analysis fails to understand this distinction.	In Sections 3.2 and 4.2 the EIS does acknowledge many other factors and features that contribute to the uniqueness of Johnson Valley OHVA. In fact, many of the other unique features are noted in the determination that impacts to Recreation would be significant. However, in response to this comment, selective text additions/edits are being incorporated where appropriate to avoid giving the reader the impression that the vast size of Johnson Valley is its only unique feature. Appendix M (Displaced OHV Recreation Study) also states that OHV areas are not interchangeable and of equal quality or attractiveness to OHV enthusiasts that have varying types of vehicles and prefer varying types of riding conditions. However, in response to this comment, similar text is being added as appropriate in Section 4.2 to also stress this point. While the differing characteristics of other OHV areas was one of several factors used to project a potential distribution of displaced activity, there were no available data to quantify JVOHV visitor-days by type of vehicle or preference in riding conditions, so the projected allocation could not directly link type of activity to specific alternative riding areas. We have had multiple discussions of this issue with BLM Barstow FO staff and this limitation in the approach was clearly identified in the Appendix M study.
8.	Throughout document	Mitigatio n for	Stifel	The USMC has submitted an application to withdraw BLM's Public Lands for military needs. The USMC has identified an area with enormous public	According to 40 CFR 1505.2(c), the requirement regarding mitigation is to "State whether all

#	Page	Section/ Line/ Phrase/ Word	Reviewer	Comment	Response
		OHV displacement		OHV recreation as the area that the USMC needs to meet their training mission. Currently, Johnson Valley is designated as an appropriate and suitable location for OHV activity by BLM. If the USMC needs Johnson Valley for military purposes, then the USMC must develop and implement any mitigation needed as part of USMC withdrawal action. Since the USMC action will remove these OHV lands from the public portfolio, USMC has the obligation to mitigate the adverse impacts of their actions. If the USMC cannot mitigate for the loss of Johnson Valley and OHV recreation and the draft Final EIS determines that mitigation is necessary then alternatives that adversely impact OHV recreation in Johnson Valley cannot be selected as the preferred alternative. If mitigation is necessary and the USMC will not mitigate, then either the No Action alternative or Alternative 3 (no impact on OHV recreation) must be the preferred alternative. BLM makes recreation and travel management decisions at the land use planning level. Areas are designated as open, limited, or closed for motorized recreation based on both public demand for recreation and protection of other resources. The areas that are currently unavailable for OHV recreation were designated as unavailable in order to protect other resources, or because they were otherwise unsuitable for OHV recreation. BLM has neither the land nor the resources to mitigate the USMC action. Rather than placing the mitigation obligation on BLM, the logical recommendation by BLM would be to recommend an alternative such as "No Action" that would obviate the need for mitigation.	practicable means to avoid or minimize environmental harm from the alternative selected have been adopted, and if not, why they were not." In this case, the significant impacts to Recreation cannot be mitigated "by practicable means" – i.e., the USMC has no jurisdiction to designate or obtain other lands for OHV use and the BLM has informed the USMC that at this time there are no lands available to designate as a replacement OHV area. These conditions are acknowledged in the EIS in compliance with the law. The impacts of each alternative on all physical, natural, cultural, and socio-economic resources, including the potential for mitigation, will be considered by the Department of the Navy in its Record of Decision (ROD). Ultimately, Congress will make the final decision about proceeding with the proposed action.
9.	4.2-2	1st line	Stifel	"minimize impacts on recreational users" – as noted in this sentence, it is the USMC's task to minimize impacts as part of Alternative development and selection.	As noted in Section 2.3.3 of the EIS, the USMC considered public concerns about recreational impacts throughout the process of alternatives development, including carrying forward one alternative (#3) in the EIS that would not include Johnson Valley, and 3 other alternatives (#4, 5, and 6) that would permit restricted public access to Johnson Valley for approximately 10 months of the year when military operations are not being conducted. Alternative 6 was developed as a result of the scoping process specifically to reduce impacts to recreation in the West Study Area.

#	Page	Section/ Line/ Phrase/ Word	Reviewer	Comment	Response
10.	4.2-2	4.2.2	Stifel	Impacts to alternative sites due to OHV displacement are DIRECT, not indirect. All references to "indirect" need to be struck for areas (OHV, public lands, private lands, wildernesses, etc) within a ~2 hour drive and replaced with "direct". The analysis fails to address direct impacts at other nearby areas to vegetation, desert tortoise, and other species. Adding hundreds of thousands of visitor days to other areas in San Bernardino County will have a direct impact on the quality of recreational experiences. In addition to adverse recreation impacts, resources will suffer and degrade as well. The draft Final EIS must include analysis of these impacts (adverse impacts on T&E species, diminished user experiences, degraded resources, increased erosion, trail damage, etc) in other nearby areas. At this point, the draft Final EIS fails to analyze these significant direct impacts sufficiently.	Per 40 CFR 1508.8: direct effects "are caused by the action and occur at the same time and place. Indirect effects are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable." The USMC has determined that closing a portion of Johnson Valley to OHV use would be a direct impact; OHV users displaced to other locations would be an indirect impact. The FEIS does not treat indirect or cumulative effects as lesser than direct effects. Additionally, the Biological section, page 4.10-15, highlights the indirect impacts to these other designated OHV areas. In response to this comment, text is being added to Section 4.2 (Recreation) to direct the reader to Section 4.10 (and other sections as appropriate) for discussion of biological or other impacts that would occur in areas that would attract displaced OHV activity.
11.	4.2-3	4.2.2.1	Stifel	Strike "impede" in the last paragraph and replace with "terminate" or other clearer language. Impede suggests that access is possible but inconvenient. If Alt 1 is implemented, then access will be stopped completely. For example, a traffic jam impedes access and a road closure terminates access. This Alternative terminates access.	In response to this comment, text has been revised in the last paragraph of this page to read: "Therefore, implementation of Alternative 1 would prevent the use of 91% of the existing recreational resources within the Johnson Valley OHV Area." In response to Comments 1 and 2 above, similar changes will be made in other parts of the document as appropriate.
12.	4.2-5		Stifel	90% of displaced users would go elsewhere in San Bernardino County to do OHV recreation. That is not "indirect" impact. That is DIRECT impact on those other areas. See comment #10. Approximately 267,073 visitor days would be displaced by Alternative 1which is not an indirect impact. (page 4.2-6).	Please see the response to Comment #10 above.
13.	4.2-5		Stifel	Strike "impede" and replace w/ "terminate". Implementing Alternative 1 will TERMINATE access to the Rock pile.	In response to this comment, the text has been revised to read: "Proposed land acquisition under Alternative 1 would also restrict access to the Rock Pile and the informal memorial site …" In response to Comments 1 and 2 above, similar changes will be made in other parts of the document as appropriate.

#	Page	Section/ Line/ Phrase/ Word	Reviewer	Comment	Response
14.	4.2-6		Stifel	Visitor days of use at other San Bernardino areas would increase by 188,804 days. That is not an indirect impact. That impact will be DIRECT. Strike all references to "indirect" and replace with "direct".	Please see the response to Comment #10 above.
15.	4.2-6		Stifel	Most major events at the remaining OHV areas will probably be eliminated. Strike "could" and replace w/ "will probably".	The word "could" has been deleted and replaced with "would probably" -- similar changes will be made in other parts of the document as appropriate.
16.	4.2-7	First 4 lines	Stifel	Overcrowding and displacement WILL cause a decrease in satisfaction. Strike "may" and replace with "will".	All instances of "may" in this context are being deleted and replaced with "would likely" throughout the document.
17.	4.2-7	5th line	Stifel	Strike "may" and replace w/ "will". Recreational opportunities WILL decrease.	Please see response to Comment #16 above.
18.	4.2-7		Stifel	Strike "indirect" & replace w/ "direct". Strike "potential" and replace w/ "probable"	Please see response to Comment #10 regarding the first suggested change. The word "potential" in this context is being changed to "probable" throughout the document.
19.	4.2-7		Stifel	Impacts on Stoddard Valley events are not indirect. They are DIRECT impacts.	Please see response to Comment #10 above.
20.	4.2-7	SCMs	Stifel	Why did the language for impacts on other OHV areas use qualifiers such as "may, could, potential, indirect", yet when the document describes SCMs, it uses language such as "would minimize, would contribute, would reduce, would help limit"? These measures are extremely limited in scope and have little chance of success.	In all such instances referencing SCMs, words such as "minimize" are being changed to "reduce"
21.	4.2-7 & 8	SCMs	Stifel	The draft Final EIS asserts that these SCMs "would minimize" the occurrence of illegal OHV use on public and private lands. Are there studies to back up this assertion? Please cite them. Illegal OHV trespass is an on-going headache for all land managers across the US. The language used in this draft Final EIS is very strong and conclusive with regards to the efficacy of these SCMs. Please cite examples of reductions in OHV trespass due to similar efforts in other places. "Implementation of the SCMs would reduce these impacts to a less than significant level" – that is a stunning claim. Where is the documentation to back up this statement? Land managers all over the country should be borrowing these SCMs if this claim is true. Displacing 300,000+ visitor use days "may" "indirectly" impact other areas and resources, but a little education, signs, and coordination (aka SCMs) "will" make illegal OHV use drop to "less than significant level"?	In response to this comment, all such instances referencing the SCMs are being revised to use the word "reduce" instead of "minimize." Measures such as the ones proposed as SCMs have been used in related situations by numerous law enforcement agencies and have essentially become industry standards. Several reports by such agencies have recognized these types of measures as being very successful in reducing illegal OHV activity. Text and references regarding the successful use of such measures are being added to the EIS as appropriate to support the statement that these measures would help to reduce potential impacts associated with an anticipated increase in illegal OHV activity.

U.S. Department of Transportation
Federal Aviation Administration

December 4, 2006

Colonel Ben Hancock
Commanding Officer
Marine Corps Air Station
P.O. Box 99100
Yuma, Arizona 85369-9100

Dear Colonel Hancock:

Since 2000, traffic in Los Angeles Air Route Traffic Control Center (ZLA) airspace has increased by 9.68 %, a rate of nearly 300,000 operations a year. In addition to the rise and demand for civil aircraft ATC services, we are seeing increased requests for more Special Use Airspace (SUA). While we support the military's need for airspace to test and train in, activation of existing SUAs has created choke points all across Southern California. The result has been increased workload on the system and greater potential for delays for all system users.

We have completed a thorough review of the proposed expansion of restricted area R2501 and associated HOTEL and TANGO. Operations Managers, Front Line Managers and Staff Support Personnel at ZLA have determined that the delegation of the subject airspace to Yuma ATC would create a significant adverse impact to other system users and increase controller workload. We are also concerned that delegating the HOTEL and TANGO areas to USMC/Yuma will only serve to create a buffer zone for operations within R-2501. The proposal does not adequately address the problem of spill outs from R2501 nor does it add tangible benefits of ATC services to all users of the National Airspace System.

Given the aforementioned concerns, we do not support the current airspace expansion proposal, however we are eager to discuss your plan for ATC services in the R2501 airspace.

Sincerely,

Kevin Stark
Air Traffic Manager, Los Angeles ARTC Cente

UNITED STATES MARINE CORPS
MARINE AIR GROUND TASK FORCE TRAINING COMMAND
MARINE CORPS AIR GROUND COMBAT CENTER
BOX 788100
TWENTYNINE PALMS, CALIFORNIA 92278-8100

5000
CG
OCT 0 8 2008

Ms. Nancy B. Kalinowski
Director, Office of System Operations Airspace and Aeronautical Information Management (AIM)
Federal Aviation Administration
800 Independence Ave., SW
Washington, DC 20591

Dear Ms. Kalinowski:

SUBJECT: COOPERATING AGENCY INVITATION

Pursuant to the National Environmental Policy Act (NEPA), the Department of the Navy (DON) is preparing an Environmental Impact Statement (EIS) to study proposed land acquisition and airspace establishment alternatives to meet Marine Corps Marine Expeditionary Brigade (MEB) sustained, combined arms, live-fire and maneuver training requirements. I invite the Federal Aviation Administration (FAA) to actively participate with the DON as a federal cooperating agency in the preparation of analyses and documentation required by NEPA. With FAA's cooperation and expertise, DON's goal is to prepare an EIS that is fully sufficient, in both scope and content, for decision-making relative to Special Use Airspace.

The Marine Corps is the nation's expeditionary force in readiness and must train as it fights to successfully deploy Marines immediately anywhere in the world to meet United States national defense requirements. Based upon the capabilities of our adversaries, the increased ranges of new weapons and battlefield transportation systems, and continuously-improved warfighting doctrine, the Marine Corps created MEB training requirements to ensure our Marines deploy with the realistic training they require to win in combat.

Currently, no Department of Defense facility is large and capable enough to provide MEB sustained, combined arms, live-fire and maneuver training. The Marine Corps Air Ground Combat Center at Twentynine Palms, California, would best provide the training. However, it currently has insufficient military range land and associated airspace to meet MEB training requirements. This is why the DON's EIS is studying alternatives to meet MEB training requirements.

The DON requested the Bureau of Land Management to withdraw approximately 421,270 acres of land, known as the Western, Southern, and Eastern expansion areas from the Public Domain on behalf of the DON, United States Marine Corps for use as a military training range by the United States Marine Corps. The enclosure depicts the study area locations.

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CG
OCT 08 2008

If the FAA accepts this invitation to participate as a cooperating agency in the EIS, I would appreciate your office designating an FAA point of contact to, among other things, work with staff and stakeholders to disclose relevant information early in the analytical process, apply available technical expertise and staff support, avoid duplication of effort, and address intergovernmental issues.

I appreciate your consideration of this request and look forward to your response. Should you have questions or need additional information, please contact Mr. Joseph Ross, Land Acquisition Program Manager, Marine Corps Air Ground Combat Center/Marine Air Ground Task Force Training Command, at: (760)830-7683 or by e-mail at: joseph.ross@usmc.mil.

Sincerely,

R. J. ABBLITT
Chief of Staff
U.S. Marine Corps

Enclosure: 1. Study Area Map

cc.:
LtCol D.K. Switzer
Federal Aviation Administration
ANM-903
1601 Lind Ave SW
Renton, WA 98057

2

U.S. Department
of Transportation
Federal Aviation Administration

DEC 04 2008

Mr. R. J. Abblitt
Chief of Staff
U. S. Marine Corps
Marine Air Ground Task Force Training Command
Marine Corps Air Ground Combat Center
P.O. Box 788100
Twentynine Palms, CA 92278-8100

Dear Mr. Abblitt:

Thank you for your letter of October 8, 2008 requesting the Federal Aviation Administration participate as a Cooperating Agency in the Environmental Impact Statement (EIS) for the proposed land acquisition and airspace establishment to meet Marine Corps Marine Expeditionary Brigade (MEB) sustained, combined arms, live-fire and maneuver training requirements.

The FAA is pleased to participate in the EIS process in accordance with the National Environmental Policy Act of 1969 as amended, and it's implementing regulations. Since the proposal contemplates Special Use Airspace (SUA), the FAA will cooperate following the guidelines described in the Memorandum of Understanding between the FAA and the Department of Defense Concerning SUA Environmental Actions, dated October 4, 2005.

Modification of the SUA in the State of California resides under the jurisdiction of the Western Service Area, Operations Support Group, in Renton, Washington; therefore the Western Service Area will be the primary focal point for matters related to both airspace and environmental matters. Mr. Clark Desing is the Manager of the Operations Support Group. FAA Order 7400.2, Chapter 32 indicates these processes should be conducted in tandem as much as possible; however, they are separate processes. Approval of either the aeronautical process or the environmental process does not automatically indicate approval of the entire proposal.

A copy of the incoming correspondence and this response is being forwarded to Mr. Desing. At your earliest convenience, please contact the Western Service Area at (425) 203-4500 to be assigned airspace and environmental points of contact for further processing of your proposal.

Sincerely,

Rodger A. Dean
Acting Director, System Operations Airspace & Aeronautical Information Management
Air Traffic Organization

UNITED STATES MARINE CORPS
COMMANDER, U.S. MARINE CORPS BASES, PACIFIC
CAMP H. M. SMITH, HI 96861-5001

IN REPLY REFER TO:
11000
G-4/0958
20 OCT 2009

From: Commander, U.S. Marine Corps Bases, Pacific
To: Deputy Commandant, Installations and Logistics (LF)

Subj: 29 PALMS LAND ACQUISITION/AIRSPACE ESTABLISHMENT IN SUPPORT OF LARGE-SCALE MAGTF LIVE FIRE AND MANEUVER TRAINING SPACE

Ref: (a) MCATS Tasker G4.9261.2 dtd 18 Sep 09
(b) Description of Proposed Action and Alternatives v3 dtd 16 Sep 2009

1. Reference (a) requested review, comment and concurrence on reference (b). I concur with the Description of Proposed Action and Alternatives and fully support continued planning and preparation of the Draft Environmental Impact Statement.

2. My POC is Mr. Bob Pedigo, Facilities Director, at (808) 477-8778 or robert.pedigo@usmc.mil.

K. J. STALDER

Copy to:
DC, CDI
CG, MCI West
CG, MCAGCC 29 Palms

UNITED STATES MARINE CORPS
MARINE CORPS INSTALLATIONS WEST
BOX 555200
CAMP PENDLETON, CALIFORNA 92055-5200

IN REPLY REFER TO:
1000
MGN/afp
20 Feb 10

Mr. Mark Kuck
Suport Manager, Airspace and Procedures
Los Angeles Air Route Traffic Control Center
2555 E. Ave P
Palmdale, CA, 93550

Dear Mr. Kuck,

As you know, the United States Marine Corps is presently conducting feasibility studies for the possible land and airspace expansion of the Marine Corps Air Ground Combat Center (MCAGCC) Twentynine Palms. In accordance with standard procedures the Federal Aviation Administration (FAA) is a cooperating agency in this effort. In order to facilitate planning and minimize the effects on the existing airspace structure, a Special Use Airspace (SUA) Feasibility and Alternatives Assessment is being developed for the areas surrounding the MCAGCC Twentynine Palms range complex. This feasibility and alternatives assessment is intended to improve our ability to provide a high quality SUA proposal to the FAA for its review and ultimate decision. It will also allow us to shape our proposal to minimize potential impacts to non-participating aircraft and to the environment.

To facilitate the assessment, I request that the airspace operations and related data identified in the attachment be provided to Marine Corps Installations West (Attn G-3/RAC) at the above letterhead address. The data is essential for developing a comprehensive assessment and will be used in various models and analysis tools. In areas where the requested data is not available, please note such in your response. If in your opinion any of the requested data would require your staff to conduct data analysis which you deem inappropriate at this juncture, please so note and provide the raw data with your response.

Your response by 20 March, 2010 will be most appreciated and will ensure that we complete the assessment in a timely manner. Please contact our Regional Airspace Coordinator, LtCol Aaron Potter at 760.763.6403 if you have questions or need additional information regarding this request. Thank you in advance for your assistance.

Sincerely,

M.G. Naylor
M. G. NAYLOR

U.S. Department
of Transportation
Federal Aviation
Administration

Federal Aviation Administration

1601 Lind Avenue Southwest
Renton, Washington 98057

MAY 18 2011

Naval Facilities Engineering Command, Southwest
ATTN: 29 Palms EIS Project Manager
1220 Pacific Highway
San Diego, CA 92132-5190

Dear Major General Jackson:

Thank you for the opportunity to comment on the 29 Palms Training Land Acquisition and Airspace Establishment Draft Environmental Impact Statement (EIS). Please note our ability to perform a detailed analysis of the EIS is limited by the absence of an accompanying Draft Aeronautical Proposal for Special Use Airspace (SUA). Development and submittal of a Draft Aeronautical Proposal initiates an aeronautical study by the FAA on impacts to the National Airspace System (NAS), which can influence the ultimate configuration of the proposed airspace.

SUA proposals are subject to both environmental and aeronautical processing requirements. Although they are distinct and separate actions, they require closely coordinated efforts. The aeronautical study can significantly impact the environmental study, leading to unnecessary costs and delays. Similarly, the environmental study can significantly impact the aeronautical study.

We highly encourage your team to continue development of a Draft Aeronautical Proposal in coordination with the Los Angeles Air Route Traffic Control Center, as our preliminary observation of the airspace proposed in the six alternatives of the EIS indicate some possible complications with existing uses of the NAS. A coordinated approach will lead to a mutually acceptable airspace agreement that will enable the USMC to accomplish their mission while minimizing the impact to other airspace users.

The FAA agreed to be a cooperating agency on the Land Acquisition and Airspace Establishment Environmental Impact Statement (EIS) on December 4, 2008. It is important to note the FAA's participation as a cooperating agency in the SUA proposal only applies to the environmental study; it does not obligate the FAA to create or modify SUA. The FAA will not make a final decision on the SUA proposal until both the aeronautical and environmental proposals are submitted and processed in accordance with applicable policy and regulations. There may be a significant delay without compliance to these requirements.

We look forward to continuing the positive and long lasting relationship the FAA has with all of your facilities.

Sincerely,

Ronald G. Beckerdite
Director, Western Service Center

U.S. Department
of Transportation
**Federal Aviation
Administration**

Los Angeles Air Route Traffic Control Center
2555 East Ave P
Palmdale, CA 93550

September 22, 2011

Major Richard Callahan
ATC Training & Readiness Officer
Regional Airspace Coordinator
Marine Corps Installations West
MCB Camp Pendleton, CA 92055-5200

Major Callahan,

This letter is in response to the United States Marine Corp (USMC) Installations West Twentynine Palms (TNP) land and airspace initiatives as discussed in our joint meeting at Los Angeles ARTC Center on August 8, 2011.

As discussed, Los Angeles ARTC Center cannot support the establishment of permanent airspace as proposed.

The strategic location of the land and airspace assets identified in your proposal is vital to our nation's economy and critical to promoting safety and efficiency within the National Airspace System (NAS). The proposal has far reaching implications which would impede upon the FAA's ability to control aircraft into and out of the Southern California Basin, as well as the San Diego and Las Vegas Terminal Areas. It is essential we do not infringe upon our ability to promote the service of air traffic control within this geographical area.

Additionally, we cannot support the delegation of approach control airspace within and adjacent to the R2501 Complex. Such airspace configuration requires clear and specific responsibilities for ATC Services not delineated in the proposal. The strategic location of this complex necessitates stringent requirements be established to ensure safety, avoid spill-outs, and increase collaborative joint-use.

This decision reaffirms previous decisions regarding this issue communicated to the USMC on December 4, 2006, and reconfirmed on May 22, 2008. (See attachments.)

Los Angeles ARTC Center has a proud history in working with Department of Defense (DOD) entities. Although we are unable to support the USMC proposal, I assure you we understand the importance of the geographic location of this airspace and land infrastructure for training purposes.

In closing, I want to express our willingness to assist the USMC in a dynamic method to accomplish the mission objectives associated with Large Force Exercises which you have previously communicated. I also want to express our gratitude to you and the men and women of the United States Marine Corp for your dedication and service to our nation.

Sincerely,

Johnnie W. Garza

Johnnie W. Garza
Air Traffic Manager
Federal Aviation Administration
Los Angeles ARTC Center

U.S. Department
of Transportation
Federal Aviation Administration

DEC 04 2008

Mr. R. J. Abblitt
Chief of Staff
U. S. Marine Corps
Marine Air Ground Task Force Training Command
Marine Corps Air Ground Combat Center
P.O. Box 788100
Twentynine Palms, CA 92278-8100

Dear Mr. Abblitt:

Thank you for your letter of October 8, 2008 requesting the Federal Aviation Administration participate as a Cooperating Agency in the Environmental Impact Statement (EIS) for the proposed land acquisition and airspace establishment to meet Marine Corps Marine Expeditionary Brigade (MEB) sustained, combined arms, live-fire and maneuver training requirements.

The FAA is pleased to participate in the EIS process in accordance with the National Environmental Policy Act of 1969 as amended, and it's implementing regulations. Since the proposal contemplates Special Use Airspace (SUA), the FAA will cooperate following the guidelines described in the Memorandum of Understanding between the FAA and the Department of Defense Concerning SUA Environmental Actions, dated October 4, 2005.

Modification of the SUA in the State of California resides under the jurisdiction of the Western Service Area, Operations Support Group, in Renton, Washington; therefore the Western Service Area will be the primary focal point for matters related to both airspace and environmental matters. Mr. Clark Desing is the Manager of the Operations Support Group. FAA Order 7400.2, Chapter 32 indicates these processes should be conducted in tandem as much as possible; however, they are separate processes. Approval of either the aeronautical process or the environmental process does not automatically indicate approval of the entire proposal.

A copy of the incoming correspondence and this response is being forwarded to Mr. Desing. At your earliest convenience, please contact the Western Service Area at (425) 203-4500 to be assigned airspace and environmental points of contact for further processing of your proposal.

Sincerely,

Rodger A. Dean
Acting Director, System Operations Airspace & Aeronautical Information Management
Air Traffic Organization

U.S. Department
of Transportation
Federal Aviation Administration

Los Angeles Air Route Traffic Control Center
2555 East Ave P
Palmdale, CA 93550

December 19, 2011

Major Richard Callahan
ATC Training & Readiness Officer
Regional Airspace Coordinator
Marine Corps Installations West
MCB Camp Pendleton, CA 92055-5200

Major Callahan,

Los Angeles Center (ZLA) is in receipt of COMMCICOM message DTG: 151512Z Dec 11.

The document references your visit to ZLA on November 21, 2011 and implies that an "agreement" to the delegation of airspace to MCAS Yuma CERAP was reached and even offers a "target date of implementation" of March 2012. It is also described as a "phase of Radar Regionalization." These statements are inaccurate.

The stated purpose of your visit to ZLA on November 21, 2011 was to deliver your latest proposal regarding the USMC Land Expansion project, not for discussion of Radar Regionalization project, Yuma CERAP, or the delegation of airspace.

During the presentation of the USMC Land Expansion proposal, ZLA reiterated a consistent message of support for large force exercises. I also advised that historical agreements supporting these exercises would need to be updated, redefined, and negotiated. ZLA advised that these agreement negotiations would take considerable lead time. At no point were there any agreements as to the timeline, airspace, or procedures to enable these exercises.

Any future agreements reached regarding Large Force exercises do not imply concurrence with the USMC Land Expansion project and/or Radar Regionalization. Any Letter of Agreement regarding Large Force exercises must comply with all FAA regulations, orders, and procedures.

In addition, due to our upcoming ERAM implementation, a moratorium is in place on any new projects, automation, or airspace actions. As previously discussed, any new project or automation would require a "waiver" from the national ERAM program office to perform any work not associated with the ERAM program. ZLA has not yet applied for a waiver.

Having conferred with the Air Traffic Manager, the meeting scheduled for January 20, 2012 is cancelled.

Miscommunication as described will only harm the relationship that we have worked so hard to build over the last several months. Only through true collaboration and communication can we ensure continued support of the USMC training mission.

Mark G. Kuck
Airspace and Procedures Support Manager
Los Angeles ARTCC

UNITED STATES MARINE CORPS
MARINE AIR GROUND TASK FORCE TRAINING COMMAND
MARINE CORPS AIR GROUND COMBAT CENTER
BOX 788100
TWENTYNINE PALMS, CALIFORNIA 92278-8100

5090
4F/C-08-351
04 SEP 08

Ms. Diane K. Noda
Field Supervisor
U.S. Fish and Wildlife Service
Ventura Field Office
2493 Portola Road, Suite B
Ventura, CA 93003

Dear Ms. Noda:

The United States Marine Corps is studying alternatives for a proposed land acquisition and air space establishment project to meet Marine Corps sustained, combined arms, live-fire and maneuver training requirements. An Environmental Impact Statement (EIS) will be developed for the proposed project in compliance with the requirements of the National Environmnetal Policy Act (NEPA). We believe the EIS analysis will necessitate consultation under section 7 of the Endangered Species Act, and my office will coordinate this effort at the Combat Center. In anticipation of consultation, we would appreciate the U.S. Fish and Wildlife Service provide the Training Command with a point of contact with your office so that we may work together to address Endangered Species Act requirements in partial fulfillment of NEPA documentation.

The Natural Resources and Environmental Affairs point of contact for this project is Dr Marie Cottrell. If you have any questions, she may be contacted at: (760) 830-5200 or at email address: marie.cottrell@usmc.mil.

Sincerely,

JAMES LESSARD
Director, NREA

ROUTING SHEET						Date: 9/9/08
OPERATION CODE						SUBJECT: FWS - POC for EIS
X Originator or Office Affixing routing sheet A Appropriate Action B Signature C Comment/Recommend D Concurrence		E F G H (Other)				SUSPENSE DATE:

RTG	OPR CODE	ADDRESSEES	DATE IN	DATE OUT	INITIAL	COMMENTS/NOTES
	B	DIVISION HEAD	9/18	9/18	[illegible]	Jim Please sign & return to me Duan
		DEPUTY DIVISION HEAD				
		NATURAL RESOURCES OFFICE	9/19	9/9	M	
		ENVIRONMENTAL AFFAIRS SUPERVISOR				
		POLLUTION PREVENTION MANAGER				
		ADMINISTRATIVE OFFICER				
		OFFICE AUTOMATION ASSISTANT	9/9/08	9/9/08	CH	
	X	ORIGINATOR (print name): Brian Henen	9/9/08	9/9/08	BH	

Path: C/Bobbie/Excel/Routing sheet NREA 9/9/2008

ROUTING SHEET	Date: 9/9/08
OPERATION CODE	SUBJECT: FWS - POC for EIS

X Originator or Office Affixing routing sheet
A Appropriate Action
B Signature
C Comment/Recommend
D Concurrence
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H (Other)

SUSPENSE DATE:

RTG	OPR CODE	ADDRESSEES	DATE IN	DATE OUT	INITIAL	COMMENTS/NOTES
	B	DIVISION HEAD	9/18	9/18	[illegible]	Jim Please sign & return to me Brian
		DEPUTY DIVISION HEAD				
		NATURAL RESOURCES OFFICE	9/9	9/9	[illegible]	
		ENVIRONMENTAL AFFAIRS SUPERVISOR				
		POLLUTION PREVENTION MANAGER				
		ADMINISTRATIVE OFFICER				
		OFFICE AUTOMATION ASSISTANT	9/9/08	9/9/08	CH	
	X	ORIGINATOR (print name): Brian Henen	9/9/08	9/9/08	BH	

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Ventura Fish and Wildlife Office
2493 Portola Road, Suite B
Ventura, California 93003

IN REPLY REFER TO:
81440-2011-TA-0255

April 1, 2011

B.R. Norquist
United States Marine Corps
Marine Air Ground Task Force Training Command
Marine Corps Air Ground Combat Center
Box 788100
Twentynine Palms, California 92278-8100

Subject: Acknowledgment of Request to Initiate Formal Consultation on Expansion of the Marine Corps Air, San Bernardino County, California

This letter acknowledges our receipt of your request, dated February 18, 2011, and received by our office on February 22, 2011, for initiation of formal consultation, pursuant to section 7 of the Endangered Species Act of 1973, as amended. The Marine Corps proposes to initiate consultation on the expansion of the Marine Corps Air Ground Combat Center at Twentynine Palms, and its effects on the federally threatened desert tortoise (*Gopherus agassizii*). The proposed action would expand military training onto 167,971 acres of land currently managed by the Bureau of Land Management to the west and south of the existing installation. It would also modify the location and type of some training activities that occur on the existing installation and provide for public access to 38,137 acres of the western expansion area.

On March 17, 2011, we met with members of your staff to discuss additional information that we would need to complete consultation, and we agreed to provide written comments on the biological assessment that you submitted with the request for consultation (see attached). On March 29, 2011, we discussed further aspects of the project related to desert tortoise translocation strategies and mitigation measures. Based on our mutual recognition of additional information and planning necessary to complete a formal consultation on a project of this complexity, we have determined that there is not sufficient information to initiate consultation at this time.

We look forward to working with you on the issues outlined in the attached comments and the additional items that we will need to initiate formal consultation. If you have any questions please contact Brian Croft of my staff at (909) 382-2677.

Sincerely,

Carl T. Benz
Assistant Field Supervisor

cc: Brian Henen, NREA, Marine Corps Air Ground Combat Center, Twentynine Palms
Marie Cottrell,NREA, Marine Corps Air Ground Combat Center, Twentynine Palms

Enclosure: Summary of Comments on draft biological assessment for the Marine Corps Air Ground Combat Center Expansion

Summary of Comments on draft biological assessment for the Marine Corps Air Ground Combat Center Expansion

Primary Issues:

- The biological assessment (BA) focuses on the proposed training activities following expansion, but it does not provide much detail on continuation or modification of existing training on the installation or in the expansion areas.
- The take estimated in the biological assessment is based on assumptions that are arbitrary and not supported by any specific rationale (i.e., 50 percent and 10 percent mortality rates).
- The biological assessment does not propose mitigation to offset the loss of habitat associated with expanded training activities.
- The biological assessment only provides a cursory assessment of the effects associated with displacement of off-highway (OHV) activities from Johnson Valley to other areas.
- The biological assessment provides an estimate for disturbance, but it appears to focus on Marine Expeditionary Brigade (MEB) training exercises and may not adequately consider additional training and maintenance activities that could result in disturbance.
- Estimates for population size provided in the biological assessment are based primarily on TRED surveys and not on the U.S. Fish and Wildlife Service (Service) protocol.
- There is no discussion of how this action and consultation affects other existing land use plan consultations (e.g., California Desert Conservation Area Plan, Johnson Valley OHV Area Management Plan, and Stoddard Valley OHV Area Management Plan).

Specific Comments:

Page ES-1:

- **Fourth Paragraph:** This description indicates use of Marine Corps Air Ground Combat Center (MCAGCC) proper for MEB exercises. If and/or how would training on MCAGCC proper change from what is currently considered in the base-wide biological opinion? The BA currently indicates that some activities will move to the expansion, but there is no information to use in analysis of those existing activities.

- **Last Paragraph:** During a given MEB exercise, would you have three battalions operating with this level of personnel and equipment (i.e., 3600 to 6000 personnel and 600 tracked and wheeled vehicles total)?

Page ES-2:

- **First Paragraph:** Did the Marine Corps request an official species list from the Service? If so, can you site that letter in the BA?

- **Last Paragraph:** The BA predicts 121 to 189 adults taken in expansion and 33 to 525 adults taken on MCAGCC over 50 years. The BA needs to provide similar estimates for smaller size classes. It also needs to provide better justification for assumptions used to derive this estimate (i.e., 50 percent mortality in high-intensity disturbance areas, 10 percent in moderate

- intensity areas, and none in low intensity areas). Please remove the word take and insert the terms injured or killed. If you have information to support estimates for additional types of take, please identify estimates for those (i.e., harm, harass, etc.).

- **Last Paragraph:** Has the marine Corps developed a proposed method for offsetting mitigation? If so, what are the measures that you would take to offset adverse effects that you are unable to minimize through the protective measures?

Page 1-1:

- How will you address the effects that airspace establishment might have on golden eagles? Although this is not pertinent to consultation, you should address this issue if mortality is likely to occur, so that you can avoid violation of the Bald and Golden Eagle Protection Act. Can the Marine Corps develop an Avian and Bat Protection Plan to reduce the likelihood of take under this statute?

Page 1-3:

- **Section 1.1 (entire section):** The action area description should identify the acreage involved. This would include acreages for Stoddard Valley OHV area and any other areas where we may have OHV displacement. To the extent that information exists or reasoned assumptions can be made, the BA needs to indicate the current status of the populations in these areas.

- **Section 1.1 (entire section):** To the extent that information exists or reasoned assumptions can be made, the BAs analysis of effects also needs to include some discussion of the predicted magnitude of adverse effects to other desert tortoise habitat and populations due to OHV displacement?

- **Section 1.1 (entire section):** The BA needs to address the public use of the restricted public access area (RPAA) and the adverse effects associated with it. The BA appears to focus entirely on the military training aspects of the expansion area and does not provide significant information on the type or predicted amount of OHV use that will occur in the RPAA.

- **Section 1.2:** The communications tower north of the western expansion appears to be in the Ord-Rodman Critical Habitat Unit based on the maps in the BA. Is this tower in critical habitat? If so, the BA needs to analyze whether the 4 acres of disturbance associated with it has the primary constituent elements of critical habitat and analyze the direct effects to critical habitat.

- **Page 1-12:**

- **Section 1.8:** Will the West Mojave Plan be amended to address the change in status for the Johnson Valley OHV area? How will consultation for this change be addressed? Will it all occur through this consultation with the Marine Corps?

Page 1-14:

- **Section 1.10:** Have the Marines discussed these biological opinions with the BLM and determined how amendment to these land use plans (OHV area management plans and CDCA Plan) would proceed relative to the withdrawal? How would consultation on those changes proceed?

Page 1-15:

- **Section 1.11; Last Sentence of First Paragraph:** The BA should consider effects to critical habitat within the action area if expansion into the Johnson Valley OHV area could result in increased illegal OHV use in critical habitat (e.g., Ord-Rodman Critical Habitat Unit), then we need to analyze effects to critical habitat in the BA.

Page 2-3:

- **General Comment:** Was the abundance of desert tortoise sign a consideration in placement of the MEB and company objectives? If the location is not set, we strongly recommend consideration of sign density in identifying the location to avoid excessive take. We would assume, and the BA asserts, that these locations and some buffer around these locations would have permanent habitat loss by the end of the 50-year analysis span. Is restoration/reclamation of these locations planned at the end of the 50-year span?

- **Second Paragraph:** The project description indicates the use of temporary target arrays and excavations for trenches and fighting positions. Would these be placed in the same location each time or would new disturbance be required for each MEB exercise? If they would be stationary locations, where would these locations be and how large of a disturbance area is required to install each one? If they are not, does the habitat disturbance estimate that you provide later in the BA account for these disturbances? In addition, do the habitat disturbance estimates account for disturbance associated with range maintenance activities, "building block" exercises, or "workup" exercises?

- **Third Paragraph:** Can you identify which roads would require regrading and improvement, and how much surface disturbance would be associated with this activity?

- **Third Paragraph:** Can you more specifically identify the location of the target arrays and the new roads that would be built to maintain them? How much surface disturbance would be associated with these? Is this surface disturbance considered in the estimated amount of surface disturbance that you provide later in the BA?

- **Section 2.2 (Entire Section):** For all activities listed above (MEB, objectives, target arrays, roads, etc.) please describe the maintenance required (i.e., number of personnel, frequency and type of maintenance activities, etc.). What about EOD activities in the training ranges? How is this disturbance accounted for?

- **Section 2.3 (General Comment):** What type of restoration and reclamation programs will be implemented and what level of successful habitat restoration do you anticipate over that period?

- **Section 2.3; First Paragraph:** Are there specific locations (target areas), where air and ground live-fire would occur? What level of disturbance do you anticipate for live-fire activities?

Page 2-4:

- **Section 2.3.2; First Paragraph:** The project description indicates numerous activities associated with training exercises. For these activities, are there fixed locations where disturbance would be focused regardless of the training scenario or would these locations change over the 50-year term? If they would change, does the analysis of habitat disturbance and take that is provided later in the BA reasonably capture the locations where disturbance would occur?

- **Section 2.3.2; Bulleted List:** For the description of the MEB-level training exercises: How many personnel and pieces of equipment? How many bivouac locations (set or different each time)? Off-road travel?

Page 2-5:

- **Second Full Paragraph:** You indicate that "building block" exercises would be consistent with what currently occurs at the training center. The BA does not appear to describe these activities. Describing them in this BA would make things much easier for consultation.

Page 2-9:

- **Section 2.3.4; Last Sentence:** Is it safe to assume that during MEB training there would be almost continual use of the main access routes? If not, can we estimate a frequency of use for logistical support for MEB, work-up, and building block exercises? In addition, how much use of access roads will be needed during maintenance activities?

- **Section 2.3.5; Entire Section:** Are staging and support areas in fixed locations where disturbance would be permanent, or would they move around and disturb different locations each time? If so, is this disturbance truly addressed in the analysis of disturbance and take provided later in the BA.

Page 2-11:

- **Section 2.3.10:** Does the BA anticipate or predict the changes that will occur in use of the area by OHVs? Will it now be concentrated in the RPAA? If the Marine Corps will be managing the recreation activities within the RPAA, we need to know what those activities will be (type, frequency, intensity, location, etc.), and you need to provide an analysis of the adverse effects associated with those activities? The changes in OHV uses and other recreation in Johnson Valley need to be addressed through consultation.

Page 3-1:

- **Chapter 3; General Comment:** This section does not seem to identify mitigation that the Marines will implement to offset take and loss of habitat associated with increased military training effects under the expansion proposal. The BA should identify they measures that the Marine Corps will take to offset adverse effects to the desert tortoise.

Page 3-2:

- **Section 3.2.1.1; Item 3:** How does this relate to the proposed action, which seems to indicate substantial cross-country maneuvers, irregular bivouac sites, etc.? Is this realistic given the proposed changes to training?

Page 4-1:

- **Chapter 4; General Comment:** This section needs to include all areas directly or indirectly affected by the action. If we predict that OHV activity in Johnson Valley will shift to other OHV areas or to other BLM lands, we need to describe those lands and analyze the effects.

Page 4-12:

- **Section 4.8.2:** If any current information on baseline extent of weed infestations exists, please provide it for the expansion areas and current installation?

Page 5-1:

- **Chapter 5; General Comment:** This section provides no information on the status of populations in areas that would be affected by the proposed action due to displacement of OHV activities. If we think that displacement of OHV activity to Stoddard Valley (as the BA asserts) or to other closer areas (Ord-Rodman Critical Habitat Unit) will occur, we need to provide that information on the populations in those areas, so we can analyze effects and develop an environmental baseline.

Page 5-8:

- **Section 5.1.4.1:** Can the analysis in the BA use the Service protocol formula with the data from the late-90s to determine an estimate, so that we are using the same estimation method on both expansion and installation? In addition, the BA later indicate that Alice Karl was able to scale down the TRED survey information from the study area to the actual preferred alternative area, but she was not able to do the same by using the data in the Service protocol. There was no explanation given for this.

- **Section 5.1.4.1; Second Sentence:** Relative to what? Historic abundance? Current abundance? Relative abundance in the training area? I would think that the upper abundance classes in this table are pretty rare across the range today? We need more explanation on how this model was used to determine density.

Page 6-1:

- **Section 6.2:** Is there some way to characterize what portion of the training center would be affected by ordinance explosions? While noise may not be a major issue, explosions have the potential to directly kill desert tortoises or collapse burrows. It would be good to define how much of the training center and expansion might be affected by these activities.

Page 6-3:

- **Section 6.3; Last Paragraph:** Is there any way to provide information on the extent of non-native species on the current base or on Fort Irwin, so we can get a sense of how widespread weeds are likely to become?

Page 6-8:

- **Section 6.5.1; General Comment:** Do we have any information on current trends that we can use in the analysis? Do we have any information on population recruitment? Will anticipated recruitment offset losses identified here? If not, can we quantify an effect on population trends within the action area over the 50-year term?

- **Section 6.5.1; General Comment:** This analysis does not appear to account for disturbance associated with "work up" and "building block" exercises as well as disturbance associated with existing training activities and maintenance of ranges.

- **Section 6.5.1; Last Three Sentences of First Paragraph:** If we are talking full habitat loss in high-intensity areas, I am not sure how we get to these figures. Translocation should be considered as a means of reducing take in these locations. Translocation should involve pre-translocation collection of data on density and disease prevalence within the recipient site population. It should also include extensive post-translocation effectiveness monitoring for at least 10 to 15 years to determine success of the translocation efforts. This should involve monitoring of the translocated and recipient site populations as well as a control population.

- In addition, effectiveness monitoring should look at other environmental variables to inform the analysis.

Page 6-9:

- **Section 6.5.2; General Comment:** We need more out of this analysis? What is the current baseline in these areas (habitat and populations)? How will that baseline change due to increased OHV use? What about displacement to areas other than OHV areas?

Page 6-11:

- **Section 6.8; Second Paragraph:** If we think that displacement of users to critical habitat will occur, we have to do a critical habitat analysis to address the effects. We need information on environmental baseline and potential effects for those areas.

Page 8-1:

- **Last Paragraph:** What would the anticipated recruitment be in this population over that time period? Would these individuals be replaced? How would reproductive output for the population as a whole be affected?

Page C-9:

- **General Comment:** I think we would have to assume that a much larger portion of the individuals would be taken than predicted here (i.e., 50 percent in heavily degraded and 10 percent moderately degraded areas) either through direct mortality/injury or through harm and harassment that would lead to injury/mortality over the course of 50 years. If we are to use these values, we need to provide a rationale that is supported in the literature or through other observations.

- **Bulleted List:** Does it make sense to assume that no take would occur in low-intensity disturbance areas?

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Ventura Fish and Wildlife Office
2493 Portola Road, Suite B
Ventura, California 93003

IN REPLY REFER TO:
08VEN00-2011-TA-0573

October 18, 2011

Major W.M. Rowley
Marine Air Ground Task Force Training Command
Marine Corps Air Ground Combat Center
United States Marine Corps
Box 788100
Twentynine Palms, California 92278-8100

Subject: Acknowledgment of Request to Initiate Formal Consultation on Expansion of the Marine Corps Air Ground Combat Center, San Bernardino County, California

Dear Major Rowley:

This letter is in follow-up to our letter to you dated September 16, 2011, in which we stated that we could not initiate formal consultation on the expansion of the Marine Corp's Air Ground Combat Center to address likely adverse effects to the federally threatened desert tortoise (*Gopherus agassizii*). We stated that the information provided in your revised biological assessment, dated July 12, 2011, still lacked sufficient information we need to complete our biological analysis, and we identified the specific information needed. Upon receipt of that letter, Marie Cottrell of your staff notified us that the Marine Corps would like us to initiate consultation without designating a completion date. The Marine Corps acknowledges that given the complexity of the project, we would not be able to meet the normal timeline for completing the biological opinion and that they would like to pursue a consultation agreement.

Based on this understanding we are initiating consultation. We have assigned log number 8-8-11-F-65 to this consultation. Please refer to this number in future correspondence on this consultation. Based on our discussion with Ms. Cottrell, we will consider September 21, 2011, as the date we initiated formal consultation. We are currently organizing and analyzing the information you have provided to date. During our meeting on November 9, 2011, we can draft a consultation agreement that describes the remaining information we need to complete formal consultation and a timeline for doing so. We can also discuss ways we may be able to assist you in obtaining and organizing the information and any other aspects of the translocation plan and proposed action that may require resolution.

We look forward to continuing to work with you. If you have any questions, please contact Brian Croft of my staff at (909) 382-2677.

Sincerely,

Carl T. Benz
Assistant Field Supervisor

cc: Brian Henen, NREA, Marine Corps Air Ground Combat Center, Twentynine Palms
Marie Cottrell, NREA, Marine Corps Air Ground Combat Center, Twentynine Palms

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Ventura Fish and Wildlife Office
2493 Portola Road, Suite B
Ventura, California 93003

IN REPLY REFER TO:
08EVEN00-2012-TA-0140

January 17, 2012

Major W.M. Rowley, Director
Natural Resources and Environmental Affairs Division
Building 1451
Marine Corps Air Ground Combat Center
Twentynine Palms, California 92278

Subject: Preliminary Recommendations Regarding Mitigation for the U.S. Marine Corps' Land Acquisition and Air Space Establishment Project at the Marine Corps Air Ground Combat Center, Twentynine Palms, California.

Dear Major W.M. Rowley:

On November 9, 2011, the U.S. Fish and Wildlife Service (Service) met with the U.S. Marine Corps (Marines) to discuss the section 7 consultation for their Land Acquisition and Air Space Establishment Project at the Marine Corps Air Ground Combat Center (MCAGCC), Twentynine Palms, California. At this meeting, the Service agreed to provide recommendations to the Marines regarding a preliminary mitigation strategy that it could consider including as part of its expansion proposal. This letter provides Service recommendations regarding appropriate mitigation to offset unavoidable effects to the conservation of the Mojave population of the desert tortoise (*Gopherus agassizii*). These recommendations are not Service requirements and are only intended to aid the Marines in development of a conservation strategy that will fulfill their obligations under section 7(a)(1) of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 et seq.) (Act).

The proposed land acquisition would expand military training from the existing MCAGCC installation onto 167,971 acres of primarily public land managed by the Bureau of Land Management. This expanded training would potentially result in the loss of 27,050 acres of desert tortoise habitat from the Western Mojave Recovery Unit and would result in the degradation of approximately 101,327 acres of desert tortoise habitat (Marines 2011). The Marines have estimated that as many as 5,197 adult desert tortoises and a substantial number of juvenile desert tortoises occur within the habitat that would be lost or degraded. The Marines have proposed to translocate desert tortoises from affected habitats. Given the experimental nature of desert tortoise translocation and its uncertain outcome, we cannot reasonably predict how many of these individuals may die following translocation. All of these effects would occur within a desert tortoise recovery unit that that is currently in a state of substantial population decline (Tracy et al. 2004) and experiencing increasing threats due to expanded renewable energy development and other human activities. Given these effects, the Marines have acknowledged that substantial mitigation is needed to reduce the effects of this action on the recovery of the desert tortoise.

The attached document provides the rationale supporting the preliminary mitigation strategy, the methodology, and our recommendations. It provides a preliminary funding target of $41,057,843 and a list of desert tortoise recovery actions that the Service is recommending the Marines implement or support with these funds. The implementation of these actions would require coordination with the Bureau of Land Management, other land owners, the Service, and other agencies and organizations. Because part of the methodology for calculating the preliminary funding target involved use of older estimates of undeveloped land prices in the West Mojave Desert, we recommend that the Marine Corps assess current land values to determine if this funding target needs to be changed.

In addition, the attached document provides a discussion of use of the Desert Tortoise Recovery Office's (DTRO) spatial decision support system (SDSS) for later analysis of the preliminary mitigation strategy during the section 7 consultation. Preliminary outputs from this analysis will provide critical, semi-quantitative assessments of the adequacy of the mitigation strategy that would be of vital importance in the biological opinion's jeopardy analysis.

We look forward to discussing these recommendations with you during the consultation process. If you have any questions regarding these recommendations, please contact Brian Croft of my staff at (909) 382-2677.

Sincerely,

Diane K. Noda

Diane K. Noda
Field Supervisor

Attachment

Literature Cited:

Tracy, C.R., R.C. Averill-Murray, W.I. Boarman, D. Delehanty, J.S. Heaton, E.D. McCoy, D.J. Morafka, K.E. Nussear, B.E. Hagerty, and P.A. Medica. 2004. Desert Tortoise Recovery Plan Assessment. Report to the U.S. Fish and Wildlife Service, Reno, Nevada.

U.S. Marine Corps. 2011. Final biological assessment: Land acquisition and airspace establishment to support large-scale Marine air ground task force live-fire and maneuver training. Marine Corps Air Ground Combat Center, Twentynine Palms, California.

Preliminary Mitigation Recommendations for the Marine Corp Air Ground Combat Center's Land Acquisition and Air Space Establishment Project

Prepared by: Brian Croft, Fish and Wildlife Biologist, U.S. Fish and Wildlife Service, Ventura Fish and Wildlife Office, Ventura, California

January 6, 2012

RELATIVE IMPORTANCE OF MCAGCC EXPANSION AREAS TO DESERT TORTOISES

In the West Mojave Recovery Unit, the Service considers areas with desert tortoise densities of 2.7 adult desert tortoises per square kilometer or greater to be functioning at a level similar to that of the Tortoise Conservation Areas (TCAs) identified in the recovery plan (Service 2011). This density is within one standard deviation of the average TCA density for the West Mojave Recovery Unit. Proposed high-disturbance areas (i.e., complete habitat loss) in the Marine Corp Air Ground Combat Center (MCAGCC) expansion areas overlap areas with densities greater than 2.7 adult desert tortoises per square kilometer. This affected population is also adjacent to and contiguous with populations in the Ord-Rodman Desert Wildlife Management Area (DWMA; i.e., TCA) and Cleghorn Lakes Wilderness. The MCAGCC proposal would not only affect populations that are currently functioning at a relatively high level within the expansion areas, but it would likely affect desert tortoise populations in the adjacent TCA and wilderness area by intensifying the level of human disturbance and population/habitat loss on the boundaries of these protected areas.

METHOD FOR IDENTIFICATION OF PRELIMINARY MITIGATION RATIOS AND FUNDING RECOMMENDATIONS

To assess the effects of these disturbances on desert tortoise recovery, we performed a GIS analysis to determine the density of desert tortoises within the high and moderate disturbance areas identified by the Marines in the biological assessment (Marines 2011). This analysis provided information on whether the proposed disturbance areas would affect areas that function at a level similar to a TCA (see map below). This information was then used to develop a preliminary mitigation funding target for the MCAGCC expansion.

We used the mitigation strategy developed for the Bureau of Land Management's (BLM) West Mojave Plan (Bureau 2005) as a guide for development of the MCAGCC recommendations. In the West Mojave Plan, the BLM requires compensation at a ratio of 5 to 1 for habitat loss within DWMAs and 1 to 1 for habitat loss outside of DWMAs. Because DWMAs are a type of TCA, a 5 to 1 mitigation ratio was applied to all areas of high disturbance that overlap desert tortoise densities greater than 3 adult desert tortoises per square kilometer because these areas are functioning at a level similar to the DWMAs in the West Mojave. In areas where proposed high disturbance areas overlap desert tortoise densities of less than 3 adult desert tortoises per square kilometer, a 1 to 1 mitigation ratio was applied because these areas are likely of lower value to conservation than a TCA/DWMA. For areas of moderate disturbance, a mitigation ratio of 1 to 1 was applied regardless of desert tortoise density because it is assumed that desert tortoises could persist in these areas at some level.

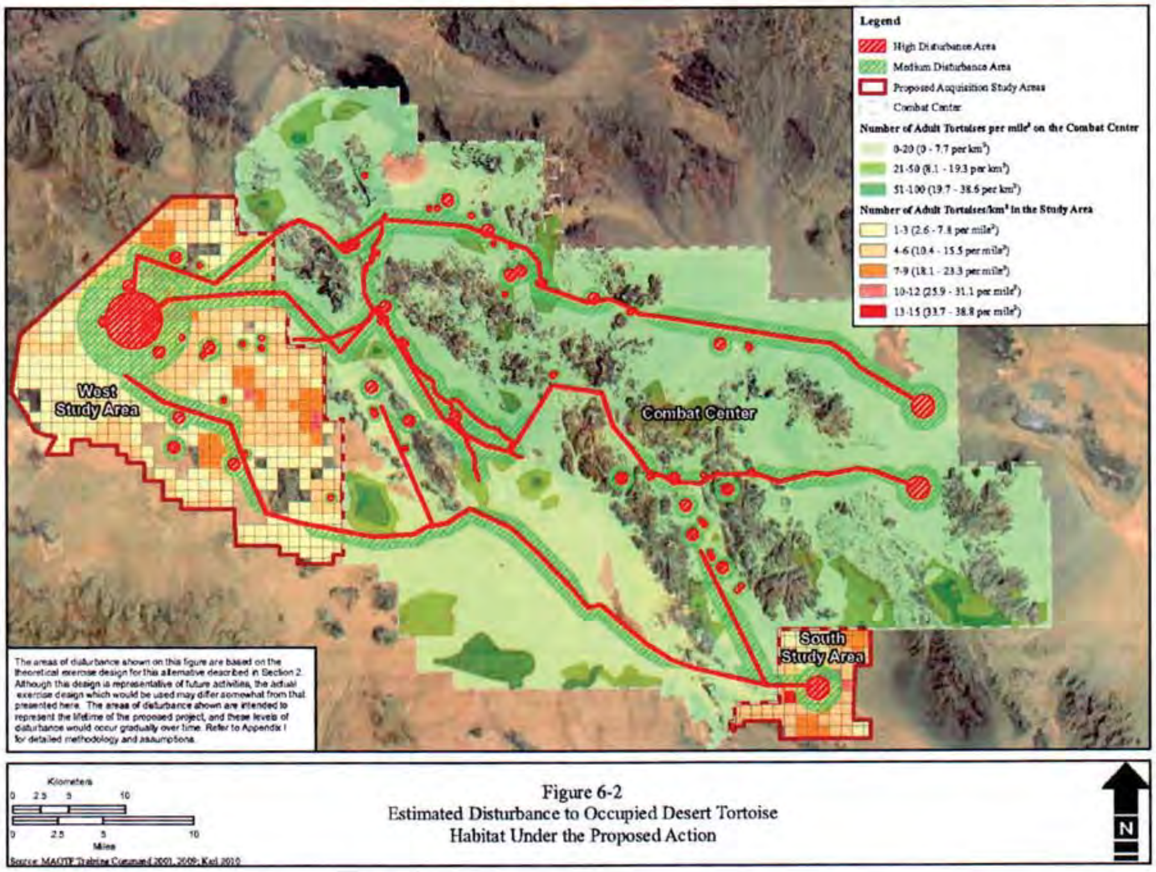

Figure 6-2
Estimated Disturbance to Occupied Desert Tortoise
Habitat Under the Proposed Action

This map, taken from the Marine Corps biological assessment (Marines 2011), identifies the areas of high and moderate disturbance associated with the proposed expansion and provides information on the density of desert tortoises within the expansion areas.

After applying the mitigation ratio, a land value of $770 per acre was multiplied by the total acreage of mitigation required. This value is based on an analysis of land values performed in 2002 for the West Mojave Plan. In addition to accounting for the habitat disturbance in the mitigation calculation, mitigation credit was given for the special use areas that the Marines would set aside within the expansion areas. These areas would be off limits to training activities that require travel off of existing trails (Marines 2011). The table in the following section shows how the mitigation ratios and land value were applied to develop the funding target.

PRELIMINARY MITIGATION RATIOS AND FUNDING RECOMMENDATIONS

Our total preliminary mitigation funding recommendation for the expansion is $41,057,843 (see table).

Study Area	Impact Areas	Density (tortoises/km2)	Area (acres)	Ratio Multiplier	Mitigation Acres	Mitigation Cost ($770 per acre)
WSA	Alt 6 High	0	400.3401384	0	0	$0
WSA	Alt 6 High	1-3	3490.089816	1	3490	$2,687,369
WSA	Alt 6 High	4-6	4620.044787	5	23100	$17,787,172
WSA	Alt 6 High	7-9	1132.97467	5	5665	$4,361,952
WSA	Alt 6 High	10-12	9.235484431	5	46	$35,557
WSA	Alt 6 Med	NoData	6.75848106	1	7	$5,204
WSA	Alt 6 Med	0	1172.193078	0	0	$0
WSA	Alt 6 Med	1-3	11624.78134	1	11625	$8,951,082
WSA	Alt 6 Med	4-6	15172.53064	1	15173	$11,682,849
WSA	Alt 6 Med	7-9	2147.904836	1	2148	$1,653,887
WSA	Alt 6 Med	10-12	1247.683943	1	1248	$960,717
WSA	Total-High & Med Impact		**41024.54**		**62501**	
WSA	Proposed Special Use	0	470.4457494	0	0	$0
WSA	Proposed Special Use	1-3	4502.849672	-1	-4503	-$3,467,194
WSA	Proposed Special Use	4-6	5396.026278	-1	-5396	-$4,154,940
WSA	Proposed Special Use	7-9	1645.934198	-1	-1646	-$1,267,369
WSA	Total-Proposed Special Use		**12015.26**		**-11545**	
SSA	Alt 6 High	1-3	467.9110325	1	468	$360,291
SSA	Alt 6 High	4-6	415.8077164	5	2079	$1,600,860
SSA	Alt 6 High	7-9	24.09193828	5	120	$92,754
SSA	Alt 6 Med	1-3	332.4823967	1	332	$256,011
SSA	Alt 6 Med	4-6	1884.077991	1	1884	$1,450,740
SSA	Alt 6 Med	7-9	400.9392566	1	401	$308,723
SSA	Alt 6 Med	13-15	0.418884286	1	0	$323
SSA	Total-High & Med Impact		**3525.73**		**5285**	
SSA	Proposed Special Use	4-6	1372.62202	-1	-1373	-$1,056,919
SSA	Proposed Special Use	7-9	1250.744676	-1	-1251	-$963,073
SSA	Proposed Special Use	10-12	296.300504	-1	-296	-$228,151
SSA	Total-Proposed Special Use		**2919.67**		**-2920**	
Total Expansion Mitigation Estimate					**53322**	**$41,057,843**

PRELIMINARY RECOMMENDATIONS REGARDING MITIGATION ACTIONS

We recommended the following as potential actions that the Marines could carry out or fund to mitigate the effects associated with the MCAGCC expansion:

1. Acquire unprotected private lands and fund in perpetuity conservation management of these lands in the West Mojave's DWMAs (Ord-Rodman, Superior-Cronese, or Fremont-Kramer DWMAs).
2. Provide funding for increased law enforcement presence in the West Mojave's DWMAs to improve enforcement of protections for the desert tortoise and its habitat in these areas.
3. Provide funding to the BLM for habitat restoration on routes that it has designated as closed in its West Mojave travel management plan. Emphasis should be placed on funding these projects on closed routes within the West Mojave's DWMAs.
4. Provide BLM with funding for illegal dump clean ups in the Western Mojave Desert with an emphasis placed on cleanup of illegal dumps in the West Mojave's DWMAs.
5. Fence roads and railways with desert tortoise exclusion fencing in the West Mojave to eliminate direct mortality. The desert tortoise recovery plan estimates that approximately 155 miles of road and railway need fencing in the West Mojave recovery unit. All fencing projects should be coordinated with Caltrans and must provide for underpasses to reduce population fragmentation.
6. Provide funding for mapping of non-native invasive weeds within West Mojave DWMAs through remote sensing and/or ground surveys.
7. Provide funding for eradication of non-native invasive weeds in West Mojave DWMAs.
8. Provide funding for erection of three strand smooth wire fencing in areas where high human use or urbanization occurs adjacent to West Mojave DWMAs. These areas could include OHV areas, urban interfaces, camping areas, etc. Proper signing of this fencing is also needed.
9. Provide funding for the signing and fencing of the boundaries of West Mojave DWMAs.
10. Provide funding for regional control of the common raven in the West Mojave as outlined in the U.S. Fish and Wildlife Service's raven management plan.
11. Buy grazing allotments within desert tortoise habitat in the West Mojave Desert and work with the BLM to close these allotments.
12. Fund habitat restoration in areas degraded by past cattle grazing in West Mojave DWMAs.
13. Fund necessary surveys and studies to identify depleted areas for experimental desert tortoise population augmentation in the West Mojave.
14. Fund line distance sampling and demographic monitoring needed to measure progress towards recovery objectives for the desert tortoise.

SPATIAL DECISION SUPPORT SYSTEM

The Marine Corps has agreed to fund the DTRO to use the SDSS to assess the effects of the proposed expansion and the preliminary mitigation strategy. The Service would use preliminary outputs from the SDSS model during the section 7 consultation process to help in the analysis of the mitigation proposed by the Marine Corps. The Marine Corps can also use these outputs to support decision making regarding the need for additional mitigation. DTRO is working with the Marine Corps to obtain the necessary GIS data layers for the SDSS analysis.

Literature Cited:

Bureau of Land Management, County of San Bernardino, and City of Barstow. 2005. Final environmental impact report and statement for the West Mojave Plan, a habitat conservation plan and California Desert Conservation Areas Plan amendment. Bureau of Land Management, California Desert District, Moreno Valley, California.

U.S. Fish and Wildlife Service. 2011. Revised recovery plan for the Mojave population of the desert tortoise (*Gopherus agassizii*). U.S. Fish and Wildlife Service, Pacific Southwest Region, Sacramento, California. 222pp.

U.S. Marine Corps. 2011. Final biological assessment: Land acquisition and airspace establishment to support large-scale Marine air ground task force live-fire and maneuver training. Marine Corps Air Ground Combat Center, Twentynine Palms, California.

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4F/c-12-0085
FEB 29 2012

Brian Croft
Fish and Wildlife Biologist
U.S. Fish and Wildlife Service
602 Tippecanoe Avenue
San Bernardino, California 92408

Subject: PROPOSED *GOPHERUS AGASSIZII* COMPENSATION ACTIONS FOR THE UNITED STATES MARINE CORPS (USMC) LAND ACQUISITION AND AIR SPACE ESTABLISHMENT PROJECT

Dear Mr Croft:

Thank you again for the Preliminary Recommendations regarding mitigation for the USMC Land Acquisition and Air Space Establishment Project. We reviewed the preliminary recommendations and propose the following actions to compensate for the project's effect on *Gopherus agassizii*. The USMC proposes to perform a combination of three cohesive actions synergistic with the substantive, proposed conservation measures of the Biological Assessment and the findings from the Off Highway Vehicle (OHV) Displacement Report. The proposed actions are:

1. Survey, monitor and assess the size, structure (demographics), health of and threats to populations of *Gopherus agassizii* in the Cleghorn Lakes & Rodman Mountains Wilderness Areas. Both wilderness areas will be assessed every five years for 30 years, at a schedule of either 20% per year or 100% every five years. These efforts would complement proposed translocation efforts, including control site monitoring in the wilderness areas, and provide population and threat analyses to help measure progress towards recovery.

2. Subject to law enforcement agreements with appropriate landowners and federal agencies, provide increased law enforcement (e.g., Conservation Law Enforcement Officers (CLEO)) presence and patrols in and around Marine Corps Air Ground Combat Center (MCAGCC), the proposed acquisition areas, and nearby resource areas (e.g., Rodman Mountains Wilderness and Ord-Rodman Critical Habitat Unit (CHU) for *Gopherus agassizii*). This would be implemented

either through increases in organic USMC resources or interagency agreements with other federal agencies (i.e. Bureau of Land Management (BLM), USFWS) to provide for at least two CLEOs that would focus their efforts on patrolling the wilderness and critical habitat areas and related translocation areas. See Preliminary Recommendation #2.

3. Evaluate, design and implement fencing, barriers and signing of areas where high human use occurs in or near the project areas (see Preliminary Recommendation #8). The USMC will coordinate with the BLM, USFWS & California Department of Fish and Game (CDFG) in identifying priority routes and areas for closure and subsequent patrol and enforcement by USMC CLEOs. It is prudent to consider areas near the Project that may be vulnerable to displaced OHV activity (e.g., Rodman Mountains Wilderness and Ord-Rodman CHU) that could affect the proposed translocation of *Gopherus agassizii*.

We will refine the proposed compensatory actions in relation to field surveys (tortoise health, density and risk or threats) in 2012 to 2014, analyses via the Spatial Decision Support System, and recommendations from the USFWS.

The 2012-2014 surveys will expand immensely upon the natural resource surveys presented in the Draft Environmental Impact Statement and Biological Assessment (BA). They will also complement ongoing tortoise habitat modeling of MCAGCC, the project study areas and proposed translocation control and recipient sites.

Combining Action #1 with the long term and scope of monitoring in the *G. agassizii* translocation (see General Translocation Plan) will add more than 70,000 acres of tortoise habitat (Cleghorn Lakes and Rodman Mountains Wilderness Areas), health, threat and demographic monitoring above the scope of the Translocation Plan. These actions and the proposed Conservation Measures of the BA should synergistically advance *G. agassizii* recovery objectives.

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The proposed Special Use Areas should offer considerable protection to "quality" tortoise habitat (e.g., tortoise densities greater than three tortoises per square kilometer), so higher density areas merit a greater credit ("mitigation credit"; 17 Jan 2012 USFWS letter). We estimated credits and mitigation acreage totals using 5:1 and 3:1 mitigation credits for these areas (Table 1).

We look forward to discussing these proposed compensations with you. Please feel free to contact Marie Cottrell and Brian Henen at Natural Resources and Environmental Affairs (NREA) directly with your questions and comments.

Sincerely,

W. M. ROWLEY
Major, USMC
Director, NREA

Cc: Diane Noda
Carl Benz

Table 1. Preliminary calculations of impact and conservation acreages for the West and South Study Areas (WSA & SSA, respectively) of the Land Acquisition and Airspace Establishment EIS. Marine Corps (MC) estimates are similar to USFWS estimates (17 Jan 2012) except for greater compensation ratios (5:1 & 3:1) for proposed Special Use Areas (SUA).

				USFWS			MC		
Study Area	**Impact Areas**	**tort (#/km2)**	**acres**	**ratio**	**acres**	**5:1**	**acres**	**3:1**	**acres**
WSA	Alt 6 High	0	400.3	0	0.0	0	0.0	0	0.0
WSA	Alt 6 High	1-3	3490.1	1	3490.1	1	3490.1	1	3490.1
WSA	Alt 6 High	4-6	4620.0	5	23100.2	5	23100.2	5	23100.2
WSA	Alt 6 High	7-9	1133.0	5	5664.9	5	5664.9	5	5664.9
WSA	Alt 6 High	10-12	9.2	5	46.2	5	46.2	5	46.2
WSA	Alt 6 Med	No data	6.8	1	6.8	1	6.8	1	6.8
WSA	Alt 6 Med	0	1172.2	0	0.0	0	0.0	0	0.0
WSA	Alt 6 Med	1-3	11624.8	1	11624.8	1	11624.8	1	11624.8
WSA	Alt 6 Med	4-6	15172.5	1	15172.5	1	15172.5	1	15172.5
WSA	Alt 6 Med	7-9	2147.9	1	2147.9	1	2147.9	1	2147.9
WSA	Alt 6 Med	10-12	1247.7	1	1247.7	1	1247.7	1	1247.7
WSA	**Total Hi & Med**		**41024.5**		**62501.0**		**62501.0**		**62501.0**
WSA	Proposed SUA	0	470.4	0	0.0	0	0.0	0	0.0
WSA	Proposed SUA	1-3	4502.9	-1	-4502.9	-1	-4502.9	-1	-4502.9
WSA	Proposed SUA	4-6	5396.0	-1	-5396.0	-5	-26980.1	-3	-16188.1
WSA	Proposed SUA	7-9	1645.9	-1	-1645.9	-5	-8229.7	-3	-4937.8
WSA	**Total SUA**		**12015.3**		**-11544.8**		**-39712.7**		**-25628.7**
SSA	Alt 6 High	1-3	467.9	1	467.9	1	467.9	1	467.9
SSA	Alt 6 High	4-6	415.8	5	2079.0	5	2079.0	5	2079.0
SSA	Alt 6 High	7-9	24.1	5	120.5	5	120.5	5	120.5
SSA	Alt 6 Med	1-3	332.5	1	332.5	1	332.5	1	332.5
SSA	Alt 6 Med	4-6	1884.1	1	1884.1	1	1884.1	1	1884.1
SSA	Alt 6 Med	7-9	400.9	1	400.9	1	400.9	1	400.9
SSA	Alt 6 Med	13-15	0.4	1	0.4	1	0.4	1	0.4
SSA	**Tot Hi & Med**		**3525.7**		**5285.3**		**5285.3**		**5285.3**
SSA	Proposed SUA	4-6	1372.6	-1	-1372.6	-5	-6863.1	-3	-4117.9
SSA	Proposed SUA	7-9	1250.7	-1	-1250.7	-5	-6253.7	-3	-3752.2
SSA	Proposed SUA	10-12	296.3	-1	-296.3	-5	-1481.5	-3	-888.9
SSA	**Total SUA**		**2919.7**		**-2919.7**		**-14598.3**		**-8759.0**
Total Mitigation Estimate					**53321.9**		**13475.4**		**33398.6**
delta							**39846.5**		**19923.3**

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Brian Croft
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U.S. Fish and Wildlife Service
602 Tippecanoe Avenue
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Subject: PROPOSED COMPENSATION FOR EFFECTS ON *GOPHERUS AGASSIZII* BY THE USMC LAND ACQUISITION AND AIR SPACE ESTABLISHMENT PROJECT

Dear Mr Croft:

Please consider this letter pursuant to our 29 February 2012 proposal, SSIC 4F/c-12-0085, and subsequent discussions with Carl Benz, USFWS - Ventura Field Office, to address and refine compensation measures for the Project's effects on *G. agassizii*. This letter proposes additional compensation and provides further details to those provided in the 29 February 2012 letter.

The USMC proposes four actions synergistic with the conservation measures proposed in the Biological Assessment (Appendix 1). The proposed actions are:

1. Establish Category 1 Special Use Areas (SUA) in MCAGCC's Sunshine Peak and Lavic Lake Range Training Areas. The USMC MAGTFTC will designate 8901 acres of the Sunshine Peak and Lavic Lake Training Areas as Category 1 SUA to help protect high, moderate and low tortoise density areas on MCAGCC (Table 1). The criteria of a Category 1 SUA can be found in the Biological Assessment, Section 3.2.2.3. The SUA designations result in a net acreage benefit when using a 5:1 mitigation credit ratio, and more than halves the mitigation acreage when using the 3:1 credit ratio for 'high' value lands.

2. Monitor and assess the demographics, size, health of and threats to populations of *Gopherus agassizii* in the Cleghorn Lakes Wilderness, Rodman Mountains Wilderness, and the Ord-Rodman Critical Habitat Area. More than 70,000 acres will be assessed every five years for 30 years. These efforts would complement proposed translocation efforts, including control site monitoring in the wilderness areas, and provide population and threat analyses to help measure progress towards recovery.

3. Subject to law enforcement agreements with appropriate landowners and federal agencies, provide increased law enforcement presence and patrols in and around MCAGCC, the proposed acquisition areas, and nearby resource areas (e.g., Rodman Mountains Wilderness and Ord-Rodman Critical Habitat Unit for *Gopherus agassizii*). This would be implemented through increases in organic USMC resources to provide for at least two Conservation Law Enforcement Officers (CLEO) that would focus their efforts patrolling, enforcing mandates and protecting these areas and related translocation areas. See Preliminary Mitigation Recommendation #2.

4. Monitor, fence, erect barriers, and install signs in areas where high human use occurs in or near the project areas. The USMC will coordinate with the BLM, USFWS & CDFG in identifying priority routes and areas for subsequent patrol and enforcement by USMC CLEOs. It is prudent to consider areas near the project that may be vulnerable to displaced OHV activity that could affect the proposed translocation. This compensation adds to fencing for the proposed SUA in the West and South Study Areas (Appendix 1).

We will refine the proposed compensatory actions in relation to field surveys in 2012 to 2014, analyses via the Spatial Decision Support System (SDSS), and recommendations from the USFWS.

The proposed SUA should offer considerable protection to tortoise habitat with densities greater than three tortoises per square kilometer, so these areas merit a greater credit ('mitigation credit'; 17 Jan 2012 USFWS letter). There is a net benefit to tortoises with the establishment of the four SUAs (including Sunshine Peak & Lavic Lake), and the mitigation credit ratio of 5:1. Assuming a mitigation credit ratio of 3:1, the combination of proposed SUA and Compensation Measures completely compensate for the impact acreages in the 17 January 2012 analysis.

We look forward to discussing these proposed compensations with you. Please feel free to contact NREA (Marie Cottrell & Brian Henen) directly with your questions and comments.

Sincerely,

MAJOR W. M. ROWLEY
DIRECTOR, NREA

Cc: Diane Noda
Carl Benz

Table 1. Estimated impact and conservation acreages for the West and South Study Areas (WSA & SSA, respectively) and Sunshine Peak and Lavic Lake Training Areas (MCAGCC). Marine Corps (MC) estimates are similar to USFWS estimates (17 Jan 2012) except for greater compensation ratios (5:1 & 3:1) for proposed Special Use Areas (SUA).

			USFWS				MC		
Study Area	Impact Areas	tort (#/km2)	acres	ratio	acres	5:1	acres	3:1	acres
WSA	Alt 6 High	0	400.3	0	0.0	0	0.0	0	0.0
WSA	Alt 6 High	1-3	3490.1	1	3490.1	1	3490.1	1	3490.1
WSA	Alt 6 High	4-6	4620.0	5	23100.2	5	23100.2	5	23100.2
WSA	Alt 6 High	7-9	1133.0	5	5664.9	5	5664.9	5	5664.9
WSA	Alt 6 High	10-12	9.2	5	46.2	5	46.2	5	46.2
WSA	Alt 6 Med	No data	6.8	1	6.8	1	6.8	1	6.8
WSA	Alt 6 Med	0	1172.2	0	0.0	0	0.0	0	0.0
WSA	Alt 6 Med	1-3	11624.8	1	11624.8	1	11624.8	1	11624.8
WSA	Alt 6 Med	4-6	15172.5	1	15172.5	1	15172.5	1	15172.5
WSA	Alt 6 Med	7-9	2147.9	1	2147.9	1	2147.9	1	2147.9
WSA	Alt 6 Med	10-12	1247.7	1	1247.7	1	1247.7	1	1247.7
WSA	Total Hi & Med		41024.5		62501.0		62501.0		62501.0
WSA	Proposed SUA	0	470.4	0	0.0	0	0.0	0	0.0
WSA	Proposed SUA	1-3	4502.9	-1	-4502.9	-1	-4502.9	-1	-4502.9
WSA	Proposed SUA	4-6	5396.0	-1	-5396.0	-5	-26980.1	-3	-16188.1
WSA	Proposed SUA	7-9	1645.9	-1	-1645.9	-5	-8229.7	-3	-4937.8
WSA	Total Proposed SUA		12015.3		-11544.8		-39712.7		-25628.7
SSA	Alt 6 High	1-3	467.9	1	467.9	1	467.9	1	467.9
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SSA	Alt 6 Med	1-3	332.5	1	332.5	1	332.5	1	332.5
SSA	Alt 6 Med	4-6	1884.1	1	1884.1	1	1884.1	1	1884.1
SSA	Alt 6 Med	7-9	400.9	1	400.9	1	400.9	1	400.9
SSA	Alt 6 Med	13-15	0.4	1	0.4	1	0.4	1	0.4
SSA	Tot Hi & Med		3525.7		5285.3		5285.3		5285.3
SSA	Proposed SUA	4-6	1372.6	-1	-1372.6	-5	-6863.1	-3	-4117.9
SSA	Proposed SUA	7-9	1250.7	-1	-1250.7	-5	-6253.7	-3	-3752.2
SSA	Proposed SUA	10-12	296.3	-1	-296.3	-5	-1481.5	-3	-888.9
SSA	Total Proposed SUA		2919.7		-2919.7		-14598.3		-8759.0
SP & LL*	Proposed SUA	low	1760.0	-1	-1760.0	-1	-1760.0	-1	-1760.0
SP & LL**	Proposed SUA	moderate	3709.0	-1	-3709.0	-2.5	-9272.5	-1.5	-5563.5
SP & LL***	Proposed SUA	high	3432.0	-1	-3432.0	-5	-17160.0	-3	-10296.0

		-8901.0	-28192.5	-17619.5
	USFWS orig	53321.9		
Total Expansion Mit Estimate	with SP&LL	44420.9	-14717.1	15779.1

* low densities from 1997 data (Woodman 2001) where densities < 2 per square kilometer

**For this acreage, we used areas where 1997 tortoise densities were 2 to 8 tortoises per square kilometer; and conservatively estimated (halved) the mitigation credit ratios

***For this acreage we used areas where 1997 densities (Woodman 2001) were 8 to 39 tortoises per square kilometer (Biological Assessment)

Appendix 1. Proposed Conservation Measures of the Biological Assessment

The Biological Assessment (DON-USMC 2011) identified six conservation measures that the USMC would implement in addition to those from the existing Biological Opinion (USFWS 2002) and the four proposed above for compensation.

1. Special Use Areas - The USMC MAGTFTC would establish 14950 acres (Table 1) of Category 1 SUA in the West and South Study Areas. These would have approximately 80 km of fencing to prevent tortoises from returning to high- and medium- impact areas (side towards USMC training), but have smooth wire fencing to sustain genetic mixing with neighboring tortoises (outward side, towards Ord-Rodman DWMA, Rodman Mountains Wilderness Area and Cleghorn Lakes Wilderness Area), yet protect tortoises from intruders. CLEO patrols and other NREA staff would maintain these fences while CLEOs would enforce regulations forbidding human access.
2. Translocation Program - The USMC MAGTFTC would translocate 1100 adult desert tortoises, plus the juveniles also detected, from the high and medium impact areas to SUA in the West & South Study Areas, Sunshine Peak-Lavic Lake SUA, and BLM land (Ord-Rodman DWMA) north of the West Study Area. These animals would benefit from the fencing (Item #1, above). All of these animals would receive health assessments prior to translocation. Translocation and control tortoises would also have health assessed every five years for 30 years. Demographic monitoring (Preliminary Mitigation Recommendation #14) would continue on translocation sites, control sites, and the Cleghorn Lakes and Rodman Mountain Wilderness Areas (Proposed Compensation #2) for 30 years at 5 year intervals.
3. Headstarting tortoises - A tortoise headstart facility, like TRACRS, would be established in one SUA of the West Study Area. This is proposed for at least 10 years of operation, and supports Population Augumentation of the Recovery Plan.
4. Monitoring - The USMC MAGTFTC will monitor the translocated tortoises and headstart tortoises for 30 years (per USFWS recommendation) to evaluate program success. The proposed compensation #2 is in addition to this measure proposed in the Biological Assessment, and would help monitor (population demography; Preliminary Mitigation Recommendation #14) important Wildnerness Areas (i.e., Rodman Mountain and Cleghorn Lakes) and monitor the health/disease and other threats to these tortoise populations.
5. OHV Displacement Analysis - The DON-USMC (2011) analyzed the effects the project would have in displacing OHV activity. The Rodman Mountains and environs of the West Study Area will likely experience increased illegal OHV activity, which is one reason why compensation items 3&4 are proposed. Compensation Items 3&4 are also synergistic with establishment of the SUA, and the translocation plan.
6. BLM OHV Area Plans - These plans will require revision, and should benefit from the increased protection (fencing, road closures, CLEO patrols) and monitoring (demography and disease incidence) associated with the proposed compensation and translocation plan.

APPENDIX B
CURRENT TRAINING AREAS AND FIXED RANGES

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Table B-1. Combat Center Training Areas

Training Area	Acres	Description
Acorn	17,369	The Acorn Training Area is located in the southwestern area of Marine Corps Air Ground Combat Center at Twentynine Palms, CA (Combat Center) and is used as a non-live-fire maneuver area. A Special Use Area #1* is located at the southeastern portion of the Acorn Training Area, while a Special Use Area #2** is located at the southwestern portion and extends into the Sand Hill Training Area to the south. A second Special Use Area #2** is located at the northwestern portion of the Acorn Training Area and extends into the Emerson Lake Training Area.
America Mine	20,808	The America Mine Training Area is located on the eastern boundary of the Combat Center and is used for patrolling, mortar firing, infantry training, and light armored vehicle training. America Mine has a restricted sensitive fuse area only accessible by EOD personnel. America Mine is composed of both mountainous (37%) and rolling terrain.
Black Top	50,894	The Black Top Training Area is located on the northern boundary of the Combat Center and is used for tank gunnery, artillery and small arms training, and major exercises. Black Top Training Area is mostly gently sloping and only 13% of this area is mountainous or rough.
Bullion	28,129	The Bullion Training Area is located to the west of America Mine Training Area and is used for aviation bombing and strafing, gunnery practice, artillery, and infantry maneuvers. Range is contained within the Bullion Training Area. Approximately 44% of the Bullion Training Area is mountainous. A Special Use Area #2** is located at the southern portion of the Bullion Training Area.
Cleghorn Pass	36,358	The Cleghorn Pass Training Area is located in the southeastern area of the Combat Center and is used for small arms, tank gunnery, light armored vehicle live-fire, and maneuvers. Cleghorn Pass contains several Fixed Ranges: Range 400, Range 410, Range 410A, Range 500, and a Battle Site Zero (BZO) Range. The Armor Multi-Purpose Range Complex, used for tank exercises, is located within Range 500. About 40% of the area within the Cleghorn Pass Training Area is mountainous or rough.
Delta	29,791	The Delta Training Area is located in the central area of the Combat Center and is used for live-fire maneuvers and major exercises. Live fire is limited due to safety considerations. Heavy use occurs during pre-Combined Arms Exercise (CAX) and by tenant commands. About 48% of the Delta Training Area is gently sloping and 52% is mountainous. A Special Use Area #1* is located at the southern boundary of the Delta Training Area. This Special Use Area extends into the Prospect Training Area.
East	6,502	The East Training Area is located in the southern area of the Combat Center, east of Mainside, and is used for non-live-fire activities, live-fire activities that impact in Prospect and Delta Training Areas, and as a staging area for major exercises. The majority of the East Training Area is gently sloping and only 12% is mountainous.
Emerson Lake	32,287	The Emerson Lake Training Area is located at the western boundary of Combat Center and is used for tank maneuvers, aviation bombardment, and aerial targetry. Principal use occurs during Enhanced Mojave Viper and Final Exercises. Approximately 70% of the land is gently sloping and the remaining is composed of low rolling terrain (only 13% is mountainous or rough). A Special Use Area #1* and a Special Use Area #2** are located at the western and southwestern portion of the Emerson Lake Training Area, respectively. The Special Use Area #2** extends into the Acorn Training Area to the south.

Table B-1. Combat Center Training Areas

Training Area	Acres	Description
Gays Pass	18,316	Gays Pass Training Area is located in the northwestern area of the Combat Center and is used for ground-based, live-fire exercises and artillery. Principal use occurs during Enhanced Mojave Viper and Final Exercises. Gays Pass is characterized by gently sloping land and mountains on either side (approximately 44% is mountainous).
Gypsum Ridge	18,265	The Gypsum Ridge Training Area is a non-live-fire training area located in the southwestern area of the Combat Center and is used for bivouac and wheeled vehicle maneuvers. This area is used as a staging area for CAX Final Exercises. Gypsum Ridge consists of low rolling terrain and includes the northern section of Deadman Lake (a dry lake bed). The Gypsum Ridge Training Area has a Special Use Area #1* in its southeastern section.
Lava	22,925	The Lava Training Area is located in the center of the Combat Center, to the north of the Cleghorn Pass Training Area, and is used primarily for battalion tactical training (including both ground-based and combined ground/air live-fire) and artillery. Principal use occurs during Enhanced Mojave Viper and Final Exercises. The Lava Training Area has exposed lava rock and consists of 26% mountainous or rough terrain. A Special Use Area #1* exists within the southwestern section of the Lava Training Area, while a second Special Use Area #1* is located at the southeastern edge and extends into the Lead Mountain Training Area. A Restricted Area exists in Lava Training Area for petroglyph sites containing Indian rock art up to 10,000 years old and is off limits to all personnel.
Lavic Lake	56,985	The Lavic Lake Training Area is located in the northwestern portion of the Combat Center and is used for aviation training exercises and live-fire maneuvers with major exercises. Principal use occurs during CAX Final Exercises. Most of the area is gently sloping and made up of lava rock. About 17% of the terrain is mountainous or rough. A Special Use Area #1* is located at the northern portion and a Special Use Area #2** is located at the northwestern portion of the Lavic Lake Training Area. A Special Use Area #2**extends into the Sunshine Peak Training Area to the west.
Lead Mountain	53,314	Located at the far northeastern boundary of the Combat Center, Lead Mountain Training Area is used for aviation, artillery, and ground-based live-fire. A dummy airfield is located in the southern portion of the Training Area. Principal use occurs during CAX Final Exercises. Lead Mountain Training Area is composed mostly of gently sloping land and only 8% of the terrain is rough. Three Special Use Area #1* exist within the Lead Mountain Training Area. The first is located at the southwestern edge and is shared with the Lava Training Area, the second is located at the northern section, and the third is at the western section where a radio repeater station is located. Two Special Use Area #2** also exist within the Lead Mountain Training Area; one is located at the western section and the other borders the eastern boundary of Dry lake.
Main Side	5,263	Mainside is located at the southern boundary of the Combat Center and includes administration, housing, maintenance, supply and support, and community facilities. Live fire is limited due to safety considerations. Mainside is periodically used for Military Operations on Urban Terrain (MOUT) training.
Maumee Mine	16,141	The Maumee Mine Training Area is located at the northwestern boundary of the Combat Center and is used for artillery and maneuver training exercises. Principal uses of this area occur during CAX Final Exercises. This area is 19% mountainous.

Table B-1. Combat Center Training Areas

Training Area	Acres	Description
Noble Pass	24,314	The Noble Pass Training Area is located in the center of the Combat Center and is used for aviation and/or ground-based live-fire, tank maneuvers, infantry training, and CAX's with some artillery use. This area is approximately 59% mountainous.
Prospect	13,189	The Prospect Training Area is located just north of the East Training Area in the southern portion of Combat Center and is used for battalion and company level training. Principal use of this area occurs during Enhanced Mojave Viper and by tenant commands. Approximately 22% of the Prospect Training Area is mountainous. A Special Use Area #1* is located at the northwestern section of the Prospect Training Area, extending into the Delta Training Area.
Quackenbush Lake	42,037	The Quackenbush Training Area is located east of the Emerson Lake Training Area, at the western section of the Combat Center. This area is used for ground-based live-fire, artillery, aviation training, and maneuvers. Heavy use occurs during Pre-CAX, Final Exercises, and by tenant units. Approximately 13% of the terrain is mountainous. A Special Use Area #2** is located at the eastern border of the Quackenbush Lake Training Area. This Special Use Area extends slightly into the northwestern portion of the Range Training Area.
Rainbow Canyon	25,348	The Rainbow Canyon Training Area is located to the west of the Black Top Training Area in the northwestern section of the Combat Center. It is used as a live-fire and maneuver area. Principal use occurs during Enhanced Mojave Viper and Final Exercises. Range 601 (Sensitive Fuse Impact Area), an abandoned air-to-ground range, is located within the Rainbow Canyon Training Area.
Range	2,158	The Range Training Area is located in the central part of the Combat Center and is used for training using fixed ranges and Sensitive Fuse Areas. Approximately 19% of the Range Training Area is mountainous or consists of rough terrain. A Special Use Area #2* *is located at the northwestern portion of the Range Training Area, extending into the Quackenbush Lake Training Area.
Sand Hill	15,810	The Sand Hill Training Area is located at the far southwestern border of the Combat Center and is used for maneuvers. Portions of the Exercise Support Base and Expeditionary Airfield (EAF), as well as Assault Landing Zone (ALZ) Sand Hill, are located within the Sand Hill Training Area. Portions of three Special Use Area #1* occupy the northeastern end and a Special Use Area #2** occupies the majority of the western and southern parts of the Training Area. Live-fire is not conducted due to proximity to Mainside which is located to the east.
Sunshine Peak	22,858	The Sunshine Peak Training Area is located at the far northwestern area of the Combat Center. This area is seldom used. When used, its primary use is an emergency aerial ordnance drop zone (DZ). This area is considered a "No Fire/Maneuver Area." Sunshine Peak is a restricted sensitive fuse area only accessible by EOD personnel. Approximately 38% of the Sunshine Peak Training Area is mountainous. A Special Use Area #1* is located at the southeastern portion, while a Special Use Area #2** occupies the northern portion of the Sunshine Peak Training Area, extending into the Lavic Lake Training Area.

Table B-1. Combat Center Training Areas

Training Area	Acres	Description
West	9,966	The West Training Area is located in the southern area of the Combat Center, northwest of Mainside. Portions of DZ Sand Hill, the EAF, and Exercise Support base, as well as the ALZ are located within the West Training Area. No live-fire maneuvers occur at the West Training Area. This area is used as a staging area for major exercises. Most of the West Training Area consists of gently sloping terrain. A Special Use Area #1* occupies the northern section, while a Special Use Area #2** occupies the southern edge of the West Training Area.

** Special Use Area #1 are sites designated as no impact, no mechanized maneuver areas. These sites are set aside for the purpose of protecting and studying important biological and cultural resources.*
*** Special Use Area #2 are sites designated for different qualities of environmental sensitivity. While there are no limitations to training specified for these areas, units are cautioned to be aware of the sensitive natural and cultural resources located within these areas.*
Source: MAGTF Training Command 2010, MAGTF Training Command 2007, MAGTF Training Command 2009, Headquarters Marine Corps 2008

Table B-2. MCAGCC Fixed Ranges

Range	Training Area	Description
1	Range	Known distance rifle range.
1A	Range	Unknown distance rifle range.
2	Range	Known distance pistol range.
2A	Range	Unknown distance pistol range.
3	Range	Rifle field expedient.
3A	Range	Multipurpose rifle and pistol range.
051	Range	Explosive Ordnance Disposal (EOD) special use range for testing of equipment.
100	TA East	Squad Maneuver Range; this range is a land navigation training course.
101	Range	Tank Main Gun Training Range (miniaturized scale). This live-fire range is designed for armor units to fire subcaliber training devices at scaled targets. Range 101 is also used as a small arms and pistol range.
102	Range	Squad Maneuver Range. The Compass Course is also a non-live-fire land navigation course.
103	Range	Squad Defensive Firing Range. This live-fire range is designed to improve defensive tactics by incorporating changing deployment requirements and scenarios.
104	Range	Anti-Mechanized/Grenade Range. Range 104 is designed to develop the confidence of unit members in their abilities to use grenades and special weapons.
105	Range	Gas chamber training occurs within Range 105.
105A	Range	BZO Range. A BZO range is a 200 foot (50 meter) course for calibrating weapons.
106	Range	Range 106 is a Mortar Range. Units practice firing live mortars.
106A	Range	Grenade Range
107	Range	Infantry Squad Assault Range; this range is designed to improve offensive tactics during changing deployment requirements and scenarios.
108	Range	Infantry Squad Battle Course; this live-fire range features quick-reaction scenarios such as ambushes, raids, and reconnaissance.
109	Range	Anti-Armor Live-Fire Tracking Range. Range 109 is designed primarily for use by DRAGON or TOW weapons systems.
110	Range	MK-19 Range; this live-fire range is used for firing of the MK-19 machine gun.

Table B-2. MCAGCC Fixed Ranges

Range	Training Area	Description
110A	Range	M203 Grenade Range
111	Range	Military Operations on Urban Terrain (MOUT) Assault Course. Used to train units for MOUT operations and features automated stationary and moving targets.
112	Range	Explosive Ordnance Disposal Training Range. Range 112 is restricted to Marine Corps Air Ground Combat Center at Twentynine Palms, CA (Combat Center) EOD units for destroying dud and Grade III ordnance, as well as training with and testing special EOD tools and equipment.
113	Range	Multi-Purpose Machine Gun BZO/EMP Range. This live fire range is designed for offensive and defensive machine gun practice.
113A	Range	BZO Range. A BZO range is a 200 foot (50 meter) course for calibrating weapons.
114	Range	Combat Engineer Demolition Range. This range is designed for company training in most types of mine training.
200	Range	Non-live-fire MOUT (Military Operations on Urban Terrain) area.
205	Prospect & Delta	Live-fire Convoy Operations Course. This range is designed for training on obstacles and threats while traveling in a convoy.
205A	Prospect	Live-fire MOUT Facility located within Range 205 designed for training with pistols, rifles, machine guns and grenades.
210	Bullion	Live-fire MOUT facility. This range is used for aerial and ground artillery with multiple caliber pistol and rifle maneuvers, simulation, grenade and machine gun training for coordinated ground and air strike training.
215	Range	Non-live-fire MOUT consisting of a small urban complex.
220	Quackenbush	Combined Arms MOUT. Range is designed to replicate any urban or suburban area in many potential deployment locations throughout the world.
225	Range	Urban complex
400	Cleghorn Pass	Company Live Fire and Maneuver Range. Range 400 is designed for company sized live-fire attacks on enemy strongholds.
401	Range	Company Live Fire and Maneuver Range
410	Cleghorn Pass	Rifle Platoon Attack Range. Range 410 is designed for rifle platoons to attack enemy positions and practice wire breaching and trench clearing procedures.
410A	Cleghorn Pass	Rifle Platoon Attack Range. This range is designed to provide a rifle platoon the opportunity to conduct a minefield breach and a dismounted, live attack against an enemy squad.
500	Cleghorn Pass	Armor Multi-purpose Range Complex. Provides the sites and supporting facilities for armor and anti-armor training.
601	Rainbow Canyon	Sensitive Fuse Impact Range. This range is restricted to critical fuse and ordnance that can be delivered by indirect fire weapons or aircraft; therefore, only accessible by EOD personnel.
620	Quackenbush	Urban Array aviation training area used for collateral damage assessments only.
630	Quackenbush	Mock city used for training on air delivered ordnance.
700	Mainside	Physical Fitness Training center – pneumatic mortar range
705	Mainside & West	Combat Vehicle Operator Training Course
705A	Mainside & West	Advanced Combat Vehicle Operator Training Course
800	West	Improvised Explosive Device Range. This non-live-fire range is used for training in IED detection.

Source: MAGTF Training Command 2010, Headquarters Marine Corps 2008.

Range Protocols

- Safety Briefs. The following briefs related to ordnance, hazardous materials, and scrappers are required to be given by personnel designated by the Marine Air Ground Task Force (MAGTF) Training Command, G-3 prior to entering the range and training areas at the Combat Center (MAGTF Training Command 2010):
  - Explosive Ordnance Disposal (EOD) Unexploded Ordnance (UXO);
  - Hazardous Materials (Natural and Cultural Resources); and
  - Scrappers.
- Training. Standard Operating Procedure (SOP) Range/Training Areas and Airspace (RTAA) 1017, Scrappers, is followed if someone is seen or suspected of scrapping in the training areas.
- Requiring that battalion task forces fire only non-dud producing munitions until they cross into the current Combat Center property so that any land acquired in Johnson Valley would be available for civilian use following a sweep of the range to remove military munitions and debris. Table 2-15 lists various types of non-dud producing munitions that would be used.
- The Combat Center requires that it be kept informed of any accident or incident that constitutes a serious or significant event that may require notification to higher headquarters Reportable Incidents. Examples of accidents or incidents requiring a report to the Range Control Officer are listed in SOP RTAA 1011, Training Accidents and Incident Reporting; 1. General; 4. Reportable Incidents (MAGTF Training Command 2010), and also in incident-specific SOPs:
  a. Aircraft or motorized vehicle accidents (also 1012. Aircraft Accidents).
  b. Unintentional jettison of any material from an aircraft.
  c. Actual medical evacuations (MEDEVACs) (1013. MEDEVAC Procedures).
  d. Ordnance released or dropped in the wrong area.
  e. Accidental/negligent discharges.
  f. Missing, lost, or stolen munitions.
  g. Serious injury or death.
  h. Anything that is liable to create interest or inquiries from the local civilian community.
- Training. SOP RTAA 2001, Environmental Constraints Applicable To All Training Activities: 1) General. Training areas and land use restrictions must be considered in operational staff planning, while hazardous material and waste management must be considered as a basic logistical requirement. As a rule, material taken into a training area must be removed from the training area. 2) Spill Prevention, Containment, and Clean Up.
- Training. SOP RTAA 2003, Police of Training Areas; General – what it is, how it can be recovered, where to take it. Disposal – of garbage, recyclables, hazardous materials, food waste, and unused ammo.
- Training. SOP RTAA Chapter 5 Exercises and Key Events.
- Training. SOP RTAA 5001 Exercise, 6. Exercise Clean Up:

a. An appropriate clean-up will be scheduled following the end of any exercise.

b. A post-exercise inspection of the training area will be conducted following completion of an exercise by the exercise force representatives and Range Training Area Maintenance Section. The exercise force shall not depart the Combat Center until the RTAA is in a proper state of police. This includes any numbered ranges and observation posts that were used by the exercise force.

c. All exercise force EOD personnel will conduct ordnance residue cleanup and UXO clearance sweeps with Combat Center EOD personnel during post exercise cleanup as required.

- SOP RTAA 6024 Police of Tank/Amphibious Assault Vehicle/Light Assault Vehicle, and Other
  - Vehicle Crossings.
- SOP RTAA Chapter 7 Ammunition and Explosives.

References

Headquarters Marine Corps. 2008. Range Environmental Vulnerability Assessment. Marine Corps Air Ground Combat Center Twentynine Palms. Prepared by Malcolm Pirnie Inc. November 2008.

Marine Air Ground Task Force (MAGTF) Training Command. 2007. Marine Air Ground Task Force Training Command Twentynine Palms, California, Integrated Natural Resources Management Plan and Environmental Assessment, Fiscal Years 2007-2011.

_____. 2009. Combat Center Order 5090.1D.

_____. 2010. Standard Operating Procedures For Range/Training Areas and Airspace (SOP for RTAA). Combat Center Order Number 3500.4H. August 6, 2010

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APPENDIX C
PUBLIC INVOLVEMENT

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64604 Federal Register / Vol. 73, No. 211 / Thursday, October 30, 2008 / Notices

mailed to the USPTO, for a total postage cost of approximately $107,453 per year.

The recordkeeping costs for this collection are associated with submitting maintenance fee payments, forms, and petitions online through the USPTO Web site. It is recommended that customers who submit fee payments and documents online print and retain a copy of the acknowledgment receipt as evidence of the successful transaction. The USPTO estimates that it will take 5 seconds (0.001 hours) to print a copy of the acknowledgment receipt and that approximately 214,556 maintenance fee payments, forms, and petitions will be submitted online, for a total of 215 hours per year for printing this receipt. Using the paraprofessional rate of $100 per hour, the USPTO estimates that the recordkeeping cost associated with this collection will be approximately $21,500 per year.

The total non-hour respondent cost burden for this collection in the form of filing fees, postage costs, and recordkeeping costs is estimated to be $614,571,323 per year.

IV. Request for Comments

Comments are invited on: (a) Whether the proposed collection of information is necessary for the proper performance of the functions of the agency, including whether the information shall have practical utility; (b) the accuracy of the agency's estimate of the burden (including hours and cost) of the proposed collection of information; (c) ways to enhance the quality, utility, and clarity of the information to be collected; and (d) ways to minimize the burden of the collection of information on respondents, *e.g.*, the use of automated collection techniques or other forms of information technology.

Comments submitted in response to this notice will be summarized or included in the request for OMB approval of this information collection; they also will become a matter of public record.

Dated: October 24, 2008.

Susan K. Fawcett,

Records Officer, USPTO, Office of the Chief Information Officer, Customer Information Services Group, Public Information Services Division.

[FR Doc. E8–25886 Filed 10–29–08; 8:45 am]

BILLING CODE 3510–16–P

DEPARTMENT OF DEFENSE

Department of the Navy

Notice of Intent To Prepare an Environmental Impact Statement for the Proposed Acquisition of Lands and Establishment of Airspace Contiguous to the Marine Corps Air Ground Combat Center, Twentynine Palms, CA

AGENCY: Department of the Navy, DoD.

ACTION: Notice.

SUMMARY: Pursuant to section (102)(2)(c) of the National Environmental Policy Act of 1969 (42 U.S.C. 4332(2)(c)), as implemented by the Council on Environmental Quality Regulations (40 CFR parts 1500–1508), the Department of the Navy announces its intent to prepare an Environmental Impact Statement (EIS) to study alternatives for meeting Marine Corps Marine Expeditionary Brigade (MEB) sustained, combined arms, live-fire and maneuver training requirements. The proposed action is to request the withdrawal of federal public lands, acquire state and privately owned lands, and to seek the establishment of Special Use Airspace with the effect of expanding the Marine Corps Air Ground Combat Center (MCAGCC), Twentynine Palms, California. The Department of the Navy will prepare the EIS in cooperation with the Bureau of Land Management and Federal Aviation Administration.

DATES: All written, oral, or telephonic comments regarding the scope of issues that the Department of the Navy should consider during EIS preparation must be received before January 31, 2009. Three public scoping meetings have been scheduled and the meeting locations are as follows:

1. December 3, 2009, 5 p.m. to 9 p.m., Twentynine Palms, CA;
2. December 4, 2009, 5 p.m. to 9 p.m., Victorville, CA;
3. December 5, 2009, 5 p.m. to 9 p.m., Ontario, CA.

ADDRESSES: Written comments or requests for inclusion on the EIS mailing list may be submitted to Project Manager (*Attn:* Mr. Joseph Ross), Box 788104, Bldg 1554, Rm 138, MAGTFTC/MCAGCC, Twentynine Palms, CA 92278–8104. Public meeting locations are as follows:

1. Twentynine Palms Junior High School, Hay's Gym, 5798 Utah Trail, Twentynine Palms, CA;
2. Hilton Garden Inn Victorville, 12603 Mariposa Road, Victorville, CA;
3. Convention Center, 2000 E. Convention Center Way, Ontario, CA.

FOR FURTHER INFORMATION CONTACT: Project Manager (*Attn:* Mr. Joseph Ross), Box 788104, Bldg 1554, Rm 138, MAGTFTC/MCAGCC, Twentynine Palms, CA 92278–8104; *phone:* 760–830–3764; *e-mail: SMBPLMSWEBPAO@usmc.mil.*

SUPPLEMENTARY INFORMATION: Each of the three scoping meetings will consist of an informal, open house session with information stations staffed by Marine Corps representatives. Public comment forms will be available and gathered at the information stations, and a stenographer will be available to take oral comments for inclusion in the record. Details of the meeting locations will be announced in local newspapers. Additional information concerning meeting times and the proposed alternatives will be available on the EIS Web site located at *http://www.29palms.usmc.mil/las.*

The meetings are designed to solicit input from agencies and the affected public regarding issues or interests that should be studied or the reasonable alternatives that should be considered for study to meet Marine Corps Marine Expeditionary Brigade (MEB) sustained, combined arms, live-fire and maneuver training requirements. The public is welcome to comment orally or by written comment forms at the meeting; or, by sending a letter to Mr. Joe Ross, Project Manager, 29Palms Proposed Training Land/Airspace Acquisition Project, MAGTFTC/MCAGCC, Bldg 1554, Box 788104, Twentynine Palms, CA 92278–8104; by an e-mail to *SMBPLMSWEBPAO@usmc.mil;* or by voice mail at 760–830–3764.

The EIS will consider alternatives for the proposed acquisition of training land and accompanying Special Use Airspace sufficient to meet the training requirements for three MEB battalions, as a Ground Combat Element, and a correspondingly sized Air Combat Element to simultaneously maneuver for 48–72 hours, using combined-arms and live fire with their supporting Logistics Combat Element and Command Element. To meet MEB training requirements which utilize weapons systems and platforms currently and foreseeable in the Marine Corps inventory, more contiguous military range land and airspace than is now available for training anywhere in the United States would be required.

The requirement for MEB training reflects a shift in doctrine that emerged in the 1990s that placed the MEB as the premier fighting force that would be deployed to world crises in the foreseeable future. The Marine Corps studied locations nationwide that might meet the training requirements and concluded that the Southwest Region range complex is the best location to meet them. This study further determined that expansion at MCAGCC would be necessary to meet the sustained MEB training requirement for a three battalion Ground Combat Element to maneuver to a single objective. MCAGCC is the Marine Corps' service-level training facility for Marine Air Ground Task Force training, the place through which nearly all Marine Corps units rotate for training before deployment.

The Marine Corps is studying various alternatives to meet MEB training requirements at MCAGCC Twentynine Palms, CA. At this time, it is anticipated that the EIS will evaluate five action alternatives and the No Action Alternative. The EIS will also consider any other reasonable alternatives that are subsequently identified during scoping or the preparation of the document. The Marine Corps will also evaluate opportunities for co-use of the land, as part of the evaluation of alternatives. The following is a summary of the alternatives that are currently proposed to be studied in the Environmental Impact Statement.

Alternative 1 would add approximately 188,000 acres to the West of the base and approximately 22,000 acres to the South of the base, and accompanying Special Use Airspace. During a MEB training exercise, three battalions would begin movement in a westerly direction from different starting positions in the current MCAGCC range complex area and converge on a single objective in the western part of what is called "Johnson Valley," conducting live-fire from ground- and air-based combat elements throughout the training exercise. During non-MEB training periods, any newly acquired installation lands would be used for live-fire, combined arms training and other military training of smaller units. With regard to any Special Use Airspace, this alternative would establish Restricted Airspace over the Western Area to accommodate live-fire from aviation and surface units. Special Use Airspace over the proposed Southern expansion area would need to be converted from Military Operational Airspace to Restricted Airspace.

Alternative 2 would add approximately 112,000 acres to the West of the base, the same 22,000 acres to the South as in Alternative 1, and accompanying Special Use Airspace. During a MEB training exercise, three battalions would begin movement in a westerly direction from different starting positions in the current MCAGCC range complex area and converge on a single objective in the center of what is called "Johnson Valley," conducting live-fire from ground- and air-based combat elements throughout the training exercise. During non-MEB training periods, any newly acquired installation lands would be used for live-fire, combined arms training and other military training of smaller units. With regard to Special Use Airspace, this alternative would establish Restricted Airspace over the Western Area to accommodate combined arms live-fire from aircraft in support of the Ground Combat Element and would determine whether the current Special Use Airspace over the proposed Southern expansion area would need to be converted from Military Operational Airspace to Restricted Airspace.

Alternative 3 would add the same 22,000 acres of land in the South as would be added in Alternatives 1 and 2 and would add approximately 228,000 acres to the East of the base. During a MEB training exercise, two battalions would begin movement from starting positions to the east of the MCAGCC current range complex and travel together in a westerly direction before separating for individual movement once aboard the current MCAGCC. The third battalion would begin movement in a westerly direction from a starting position in the southern portion of the current range complex. All three battalions would maneuver toward a single objective in the northwest portion of the current range complex. The two battalions that would start in the proposed new areas to the east would conduct live-fire from ground- and air-based combat elements once aboard the current MCAGCC range complex, and the third battalion would be able to conduct live fire from ground- and air-based combat elements throughout the training exercise. During non-MEB training periods, any newly acquired installation lands to the east would be used for live small arms fire and other military training of smaller units, and any newly acquired installation lands in the south would be used for live-fire, combined arms training and other military training of smaller units. In this alternative, it is possible that no additional Special Use Airspace would need to be established, or that any current Special Use Airspace would need to be modified.

Alternative 4 would add the same 188,000 acres to the west of the current installation and approximately 22,000 acres to the south of the installation as are contained in Alternative 1. During a MEB training exercise, three battalions would begin movement in an easterly direction from different starting positions in what is called "Johnson Valley" and assault different objectives in the eastern portion of the current range complex and in the proposed southern expansion area. Live-fire training in the western expansion area would be limited to non-dud producing ordnance, with dud-producing ordnance only targeted within the current range boundary. Non-MEB training events would be subject to the same restrictions. With respect to Special Use Airspace, this alternative would establish Restricted Airspace over the Western and Southern Areas to accommodate combined arms live-fire from aviation and surface units.

Alternative 5 would add the same 188,000 acres of land to the west of the base as in Alternatives 1 and 4. During a MEB training exercise, three battalions would begin movement in an easterly direction from separate starting positions in "Johnson Valley." Two battalions would attack separate objectives in the current range complex, and the third battalion would attack the Combined Arms Military Operations in Urban Terrain (CA MOUT) facility in the current range complex. Live-fire training in the western expansion area would be limited to non-dud producing ordnance, with dud-producing ordnance only targeted within the current range boundary. Non-MEB training events would be subject to the same restrictions. With respect to Special Use Airspace, this alternative would establish Restricted Airspace over the Western Area to accommodate combined arms live-fire from aviation and surface units.

The No Action Alternative would seek no additional lands and no additional or changes to Special Use Airspace associated with MCAGCC's current range complex. During a MEB exercise, the three battalions of the ground combat element would commence their operations aboard the current MCAGCC range complex in the eastern and central areas of the base, moving towards a single objective in the northwest corner of the current MCAGCC, undertaking live-fire and combined arms actions throughout, except as restrained by on-base administrative controls.

The Department of the Navy is initiating the scoping process to identify community interests and local issues to be addressed in the EIS. Federal, state and local agencies, Native American Indian Tribes and interested individuals are encouraged to provide oral and/or written comments regarding the scope of the EIS to develop reasonable alternatives and/or to identify specific issues or topics of environmental concern that the commenter believes should be considered.

The EIS will evaluate potential environmental effects associated with action alternatives and the No Action Alternative. Potential issues include, but are not limited to: Land use, recreation, energy development, air quality, airspace/air traffic, biological resources, cultural resources, mining/minerals, socioeconomics and noise.

A mailing list has been assembled to facilitate preparation of the EIS. Those on this list will receive notices and documents related to EIS preparation. This list includes local, state, and federal agencies with jurisdiction or other interests in the alternatives. In addition, the mailing list includes adjacent property owners, affected municipalities, and other interested parties such as conservation and off-highway vehicle organizations. Anyone wishing to be added to the mailing list may request to be added by contacting the EIS project manager at the address provided above.

Dated: October 24, 2008.

T.M. Cruz,

Lieutenant Commander, Judge Advocate Generals Corps, U.S. Navy, Federal Register Liaison Officer.

[FR Doc. E8–25845 Filed 10–29–08; 8:45 am]

BILLING CODE 3810–FF–P

DEPARTMENT OF EDUCATION

Notice of Proposed Information Collection Requests

AGENCY: Department of Education.

SUMMARY: The IC Clearance Official, Regulatory Information Management Services, Office of Management, invites comments on the proposed information collection requests as required by the Paperwork Reduction Act of 1995.

DATES: Interested persons are invited to submit comments on or before December 29, 2008.

SUPPLEMENTARY INFORMATION: Section 3506 of the Paperwork Reduction Act of 1995 (44 U.S.C. Chapter 35) requires that the Office of Management and Budget (OMB) provide interested Federal agencies and the public an early opportunity to comment on information collection requests. OMB may amend or waive the requirement for public consultation to the extent that public participation in the approval process would defeat the purpose of the information collection, violate State or Federal law, or substantially interfere with any agency's ability to perform its statutory obligations. The IC Clearance Official, Regulatory Information Management Services, Office of Management, publishes that notice containing proposed information collection requests prior to submission of these requests to OMB. Each proposed information collection, grouped by office, contains the following: (1) Type of review requested, e.g. new, revision, extension, existing or reinstatement; (2) Title; (3) Summary of the collection; (4) Description of the need for, and proposed use of, the information; (5) Respondents and frequency of collection; and (6) Reporting and/or Recordkeeping burden. OMB invites public comment.

The Department of Education is especially interested in public comment addressing the following issues: (1) Is this collection necessary to the proper functions of the Department; (2) will this information be processed and used in a timely manner; (3) is the estimate of burden accurate; (4) how might the Department enhance the quality, utility, and clarity of the information to be collected; and (5) how might the Department minimize the burden of this collection on the respondents, including through the use of information technology.

Dated: October 24, 2008.

Angela C. Arrington,

IC Clearance Official, Regulatory Information Management Services, Office of Management.

Office of Elementary and Secondary Education

Type of Review: New.

Title: Reading First Expenditure Study.

Frequency: Annually.

Affected Public: Not-for-profit institutions; State, Local, or Tribal Gov't, SEAs or LEAs.

Reporting and Recordkeeping Hour Burden:

Responses: 4,420.

Burden Hours: 13,260.

Abstract: The U.S. Department of Education Reading First program has no formal mechanism for grantees to report on specific uses of grant funds. The proposed surveys will collect data on the use and allocation of Reading First grants from current State educational agencies (SEA) grantees and their local educational agencies (LEA) subgrantees. Collecting such information will help satisfy the informational needs of key stakeholders, and inform future grant-making efforts.

Requests for copies of the proposed information collection request may be accessed from *http://edicsweb.ed.gov*, by selecting the "Browse Pending Collections" link and by clicking on link number 3844. When you access the information collection, click on "Download Attachments" to view. Written requests for information should be addressed to U.S. Department of Education, 400 Maryland Avenue, SW., LBJ, Washington, DC 20202–4537. Requests may also be electronically mailed to *ICDocketMgr@ed.gov* or faxed to 202–401–0920. Please specify the complete title of the information collection when making your request.

Comments regarding burden and/or the collection activity requirements should be electronically mailed to *ICDocketMgr@ed.gov*. Individuals who use a telecommunications device for the deaf (TDD) may call the Federal Information Relay Service (FIRS) at 1–800–877–8339.

[FR Doc. E8–25894 Filed 10–29–08; 8:45 am]

BILLING CODE 4000–01–P

DEPARTMENT OF EDUCATION

National Assessment Governing Board; Meeting

AGENCY: Department of Education, National Assessment Governing Board.

ACTION: Notice of open meeting and partially closed meetings.

SUMMARY: The notice sets forth the schedule and proposed agenda of a forthcoming meeting of the National Assessment Governing Board. This notice also describes the functions of the Board. Notice of this meeting is required under Section 10(a)(2) of the Federal Advisory Committee Act. This document is intended to notify members of the general public of their opportunity to attend. Individuals who will need special accommodations in order to attend the meeting (i.e., interpreting services, assistive listening devices, materials in alternative format) should notify Munira Mwalimu at 202–357–6938 or at *Munira.Mwalimu@ed.gov* no later than November 10, 2008. We will attempt to meet requests after this date, but cannot guarantee availability of the requested accommodation. The meeting site is accessible to individuals with disabilities.

DATES: November 20–22, 2008.

Times

November 20

Committee Meetings:

Ad Hoc Committee on NAEP Testing and Reporting on Students with Disabilities and English Language Learners: Open Session—2 p.m. to 4 p.m.

Executive Committee: Open Session—4:30 p.m. to 5 p.m.; Closed

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DEPARTMENT OF DEFENSE

Department of the Navy

Notice of Intent To Prepare an Environmental Impact Statement for the Proposed Acquisition of Lands and Establishment of Airspace Contiguous to the Marine Corps Air Ground Combat Center, Twentynine Palms, CA; Correction

AGENCY: Department of the Navy, DoD.

ACTION: Notice; correction.

SUMMARY: The Department of the Navy published a document in the **Federal Register** on October 30, 2008, announcing its intent to prepare an Environmental Impact Statement for the Proposed Acquisition of Lands and Establishment of Airspace Contiguous to the Marine Corps Air Ground Combat Center, Twentynine Palms, California. The original publication contained incorrect dates.

FOR FURTHER INFORMATION CONTACT: Project Manager (Attn: Mr. Joseph Ross), Box 788104, Bldg. 1554, Rm. 138, MAGTFTC/MCAGCC, Twentynine Palms, CA 92278–8104; phone: 760–830–3764; e-mail: *SMBPLMSWEBPAO@usmc.mil*.

Correction

1. In the **Federal Register** of October 30, 2008, in FR Doc. E8–25845, on page 64604, in the second column, correct the **DATES** caption to read as follows:

DATES: All written, oral, or telephonic comments regarding the scope of issues that the Department of the Navy should consider during EIS preparation must be received before January 31, 2009. Three public scoping meetings have been scheduled and the meeting locations are as follows:

1. December 3, 2008, 5 p.m. to 9 p.m., Twentynine Palms, CA;

2. December 4, 2008, 5 p.m. to 9 p.m., Victorville, CA;

3. December 5, 2008, 5 p.m. to 9 p.m., Ontario, CA.

Dated: November 14, 2008.

T.M. Cruz,

Lieutenant Commander, Judge Advocate General's Corps, U.S. Navy, Federal Register Liaison Officer.

[FR Doc. E8–27693 Filed 11–20–08; 8:45 am]

BILLING CODE 3810–FF–P

DEPARTMENT OF DEFENSE

Department of the Navy

Notice of Closed Meeting of the Chief of Naval Operations (CNO) Executive Panel

AGENCY: Department of the Navy, DoD.

ACTION: Notice.

SUMMARY: The CNO Executive Panel will report on the findings and recommendations of the Subcommittee "The Navy & The Nation" to the Chief of Naval Operations. The matters to be discussed during the meeting are: Campbell-Ewald Advertising contract, Branding project, and marketing & recruiting methods; CNO's Engagement and long-range schedule. Each topic under each of these headings relates solely to the internal personnel rules and practices of the agency; discloses privileged/confidential trade secrets, commercial, and financial information; pertains to the CNO's classified "SECRET" long-range schedule, and discusses information the premature disclosure of which would be likely to significantly frustrate the fair bidding process for a major DON contract which makes this information exempt from open meeting disclosure pursuant to 5 U.S.C. sections 552b(c)(1) and (4).

DATES: The meeting will be held on December 15, 2008, from 9 a.m. to 11 a.m.

ADDRESSES: The meeting will be held at Center for Naval Analyses (CNA), Room 1A01, 4825 Mark Center Drive, Alexandria, VA 22311.

FOR FURTHER INFORMATION CONTACT: LCDR Eric Taylor, CNO Executive Panel, 4825 Mark Center Drive, Alexandria, VA 22311, telephone: 703–681–4909.

SUPPLEMENTARY INFORMATION: Pursuant to the provisions of the Federal Advisory Committee Act, as amended (5 U.S.C. App.), these matters constitute classified information that is specifically authorized by Executive Order to be kept secret in the interest of national defense and is, in fact, properly classified pursuant to such Executive Order.

Accordingly, the Secretary of the Navy has determined in writing that the public interest requires that all sessions of this meeting be closed to the public because they will be concerned with matters listed in sections 552b(c)(1) and (4) of title 5, United States Code.

Individuals or interested groups may submit written statements for consideration by the Chief of Naval Operations Executive Panel at any time or in response to the agenda of a scheduled meeting. All requests must be submitted to the Designated Federal Officer at the address detailed below. If the written statement is in response to the agenda mentioned in this meeting notice then the statement, if it is to be considered by the Panel for this meeting, must be received at least five days prior to the meeting in question.

The Designated Federal Officer will review all timely submissions with the Chief of Naval Operations Executive Panel Chairperson, and ensure they are provided to members of the Chief of Naval Operations Executive Panel before the meeting that is the subject of this notice. To contact the Designated Federal Officer, write to Executive Director, CNO Executive Panel (N00K), 4825 Mark Center Drive, 2nd Floor, Alexandria, VA 22311–1846.

Dated: November 14, 2008.

T.M. Cruz,

Lieutenant Commander, Office of the Judge Advocate General, U.S. Navy, Federal Register Liaison Officer.

[FR Doc. E8–27694 Filed 11–20–08; 8:45 am]

BILLING CODE 3810–FF–P

DEPARTMENT OF EDUCATION

Arbitration Panel Decision Under the Randolph-Sheppard Act

AGENCY: Department of Education.

ACTION: Notice of arbitration panel decision under the Randolph-Sheppard Act.

SUMMARY: The Department of Education (Department) gives notice that, on August 26, 2008, an arbitration panel rendered a decision in the matter of *Teresa Alcorn* v. *Kentucky Office for the Blind, Case no. R-S/07-3*. This panel was convened by the Department under 20 U.S.C. 107d-1(a), after the Department received a complaint filed by the petitioner, Teresa Alcorn.

FOR FURTHER INFORMATION CONTACT: You may obtain a copy of the full text of the arbitration panel decision from Suzette E. Haynes, U.S. Department of Education, 400 Maryland Avenue, SW., room 5022, Potomac Center Plaza, Washington, DC 20202–2800. *Telephone:* (202) 245–7374. If you use a telecommunications device for the deaf (TDD), you may call the Federal Relay Service (FRS) at 1–800–877–8339.

Individuals with disabilities may obtain this document in an alternative format (e.g., Braille, large print, audiotape, or computer diskette) on request to the contact person listed under **FOR FURTHER INFORMATION CONTACT**.

land, 1,640 acres of private land, and 1,600 acres of private surface estate with Federal mineral estate patented under the Stock Raising Homestead Act. The mine area is located almost entirely in Three Rivers Resource Area of Burns District BLM with 35 acres in Vale District BLM.

An interdisciplinary approach will be used to develop the EIS in order to consider the variety of resource issues and concerns identified through the scoping process. Disciplines involved in the planning process will include (but not be limited to) those with expertise in air quality, American Indian traditional practices, biological soil crusts, cultural heritage, fire management, fisheries, grazing management, migratory birds, minerals, noxious weeds, recreation, soils, transportation/roads, vegetation, visual resources, water quality, riparian zones, wildlife, and wilderness characteristics.

Public Participation

Cooperating agencies having specific expertise or interests in the project are invited to participate. The public and interest groups will have every opportunity to participate during formal comment periods. In addition, public meetings will be held during the public comment period for the Draft EIS. Public meetings will be held in Burns, Oregon, and Vale, Oregon, plus other communities if the interest warrants. Early participation is encouraged and will help determine the future management of the Celatom Mine. Meetings and comment deadlines will be announced through the local news media and the Burns BLM Web site (*http://www.blm.gov/or/districts/burns*). Written comments will be accepted throughout the planning process at the address above. Before including your address, phone number, e-mail address, or other personal identifying information in your comment, you should be aware that your entire comment—including your personal identifying information—may be made publicly available at any time. While you can ask us in your comment to withhold your personal identifying information from public review, we cannot guarantee that we will be able to do so.

Background Information

The Celatom Mine currently consists of three open pit mines located within four miles of each other in Harney and Malheur Counties, Oregon. One mine is on land managed by BLM's Burns District; another mine is on land managed by the State of Oregon, and the third mine is on private land. EP Minerals excavates diatomaceous earth during the summer, stockpiles ore and waste rock in the vicinity of each mine, and hauls the ore approximately 60 miles year-round to their mill located on private land west of Vale, Oregon. Some ore is stockpiled at a site on land administered by BLM in the vicinity of the mill. Mill waste is backhauled to the mine site and used in backfilling the open pits as part of reclamation.

Brendan J. Cain,

Acting Burns District Manager.

[FR Doc. E8–21491 Filed 9–12–08; 8:45 am]

BILLING CODE 4310–33–P

DEPARTMENT OF THE INTERIOR

Bureau of Land Management

[CA–680–1430–ET; CACA 50194]

Notice of Proposed Legislative Withdrawal and Opportunity for Public Meeting; California

AGENCY: Bureau of Land Management, Interior.

ACTION: Notice of withdrawal application and segregation.

SUMMARY: The Act of February 28, 1958 (43 U.S.C. 155–158), sometimes referred to as the Engle Act, places on the Secretary of the Interior the responsibility to process Department of Defense applications for national defense withdrawals, reservations or restrictions aggregating 5,000 acres or more for any one project or facility. These withdrawals, reservations or restrictions may only be made by an act of Congress, except in time of war or national emergency declared by the President or the Congress and except as otherwise expressly provided in the Act of February 28, 1958.

The U.S. Department of the Navy, in accordance with the Engle Act, has filed an application requesting the Secretary of the Interior to process a proposed legislative withdrawal and reservation of public lands for military training exercises involving the Marine Corps Air Ground Combat Center at Twentynine Palms, San Bernardino County, California. The proposal seeks the transfer of jurisdiction and the withdrawal of approximately 365,906 acres of public lands and approximately 507 acres of Federal subsurface mineral estate from all forms of appropriation under the public land laws, including surface entry, mining, mineral leasing, and the Materials Act of 1947.

This notice temporarily segregates for two years the public lands and mineral estate described from settlement, sale, location, or entry under the public land laws, including the mining laws, and the operation of the mineral leasing laws and the Materials Act of 1947. In addition, the surface estate of the 507 acres of mineral estate and the surface and mineral estate of an approximately 72,186 acres of other non-federally owned property in the proposed withdrawal area, if they should be acquired by or returned to the United States by any means, would also be included in the proposed withdrawal and subject to the temporary segregation authorized by this notice.

DATES: Comments should be received on or before December 15, 2008. In addition, at least one public meeting will be held during the comment period to help the public understand both the proposed action and the decision-making processes. The public meeting will be announced at least 30 days in advance through local news media, public notices, mailings, and agency Web sites.

ADDRESSES: Comments should be sent to Roxie Trost, Field Manager, Barstow Field Office, 2601 Barstow Road, Barstow, California 92311.

FOR FURTHER INFORMATION CONTACT: Roxie Trost, BLM Barstow Field Office, 760–252–6000; or Joseph Ross, USMC MCAGCC, 760–830–7683.

SUPPLEMENTARY INFORMATION: Acting on behalf of the U.S. Marine Corps (USMC), the Department of the Navy has filed an application with the Bureau of Land Management (BLM) requesting the Secretary of the Interior to process a legislative withdrawal pursuant to the Engle Act (43 U.S.C. 155–158). The proposal would withdraw the following areas, as described below, and located adjacent to the exterior boundaries of the USMC's Marine Corps Air Ground Combat Center (MCAGCC), located in Twentynine Palms, California:

1. *Federally owned surface and mineral estate:* Subject to valid existing rights, the following described federally owned surface and mineral estate are withdrawn from settlement, sale, location or entry under the public land laws, including the mining laws, and to the operation of the mineral leasing laws and the Materials Act of 1947:

All Are San Bernardino Meridian

Western Expansion Area

T. 4 N., R. 2 E.,
 Sec. 1, all;
 Sec. 2, lots 3 to 90, inclusive.
T. 5 N., R. 2 E.,
 Secs. 1 to 2, all, inclusive;
 Secs. 11 to 14, all, inclusive;
 Secs. 23 to 26, all, inclusive;
 Sec. 35, all.
T. 6 N., R. 2 E.,

Sec. 1, SE¼;
Sec. 12, E½;
Sec. 13, all;
Secs. 23 to 26, all, inclusive;
Sec. 35, all.
T. 4 N., R. 3 E.,
Sec. 1, lots 1 and 2 of NE¼, lots 1 and 2 of NW¼, NW¼SW¼, and SE¼;
Sec. 2, all;
Sec. 3, E½ of lot 1 of NE¼, lot 2 of NE¼, lot 2 of NW¼, and S½S½;
Sec. 4, lots 1 and 2 of NE¼, lots 1 and 2 of NW¼, SW¼, and S½SE¼;
Secs 5 to 6, all, inclusive;
Sec. 7, E½;
Secs. 8 to 9, all, inclusive;
Sec. 10, N½N½;
Sec. 11, N½ and SW¼;
Sec. 12, N½ and SE¼;
Sec. 13, S½;
Sec. 14, SE¼;
Sec. 15, N½.
T. 5 N., R. 3 E.,
Secs. 2 to 6, all, inclusive;
Sec. 8, E½;
Secs. 9 to 15, all, inclusive;
Sec. 16, N½ and SE¼;
Sec. 17, NE¼;
Sec. 21, E½;
Secs. 22 to 28, all, inclusive;
Sec. 29, NE¼;
Sec. 33, all;
Sec. 34, W½;
Sec. 35, NE¼; and the following whole or partial sections which are all protracted
Sec. 7, all;
Sec. 8, W½;
Sec. 16, SW¼;
Sec. 17, NW¼ and S½;
Secs. 18 to 20, all, inclusive;
Sec. 21, W½;
Sec. 29, NW¼ and S½;
Secs. 30 to 32, all, inclusive;
Sec. 34, E½;
Sec. 35, NW¼ and S½;
Sec. 36, SW¼.
T. 6 N., R. 3 E.,
Sec. 1, all except for S½ of lot 4;
Secs. 2 to 3, all, inclusive;
Sec. 4, all except for Mineral Survey no. 6716;
Secs. 5 to 9, all, inclusive;
Secs. 10 to 11, all except for Mineral Survey no. 6717, inclusive;
Secs. 12 to 15, all, inclusive;
Secs. 17 to 24, all, inclusive;
Secs. 26 to 30, all, inclusive;
Sec. 31, all except for Mineral Survey no. 5878;
Secs. 32 to 35, all, inclusive.
T. 3 N., R. 4 E.,
Sec. 1, all.
T. 4 N., R. 4 E.,
Secs. 1 to 15, all, inclusive;
Sec. 17, all;
Sec. 18, N½;
Sec. 20, N½;
Secs. 21 to 27, all, inclusive;
Sec. 28, N½;
Secs. 34 to 35, all, inclusive.
T. 5 N., R. 4 E.,
Secs. 2 to 11, all, inclusive;
Sec. 12, all except for Mineral Survey no. 6336;
Sec. 13, E½, E½E½NW¼, E½SW¼, and E½W½SW¼;
Secs. 14 to 16, all, inclusive;
Sec. 17, NW¼ and S½;
Secs. 18 to 24, all, inclusive;
Sec. 25, N½, SW¼, and W½SE¼;
Sec. 26, lots 1 to 4, inclusive, NW¼, and SE¼;
Sec. 27, N½ and SW¼;
Secs. 28 to 33, all, inclusive;
Sec. 34, W½;
Sec. 35, E½;
Sec. 36, all; and the following partial sections which are all protracted
Sec. 26, SW¼;
Sec. 27, SE¼;
Sec. 34, E½;
Sec. 35, W½.
T. 6 N., R. 4 E.,
Secs. 1 to 15, all, inclusive;
Secs. 17 to 24, all, inclusive;
Sec. 26, all;
Secs. 27 to 28, all except for Mineral Survey nos. 3000 and 3980, inclusive;
Secs. 29 to 35, all, inclusive;
Sec. 36, N½ and SW¼.
T. 3 N., R. 5 E.,
Secs. 1 to 3, all, inclusive;
Sec. 4, lots 1 to 12, inclusive;
Secs. 5 to 6, all, inclusive;
Sec. 9, lots 1 and 2, W½NE¼, NE¼NW¼, E½NW¼NW¼, E½W½NW¼NW¼, W½SW¼NW¼NW¼, NE¼SW¼NW¼, W½SW¼NW¼, W½SE¼SW¼NW¼, E½SE¼NW¼, W½NW¼SE¼NW¼, and E½SW¼SE¼NW¼;
Sec. 10, lots 1 to 7, inclusive, SW¼NE¼, S½ NW¼, and W½SW¼.
Sec. 11, all;
Sec. 12, lots 1 to 12, inclusive, NE¼NE¼SE¼, E½W½NE¼SE¼, E½NE¼NW¼SE¼, E½W½NW¼SE¼, W½SE¼NW¼SE¼, W½E½SW¼SE¼, NW¼SW¼SE¼, SW¼SE¼SE¼, and W½SE¼SE¼SE¼.
T. 4 N., R. 5 E.,
Secs. 2 to 9, all, inclusive;
Secs. 11 to 12, all, inclusive;
Sec. 16, all; and the following sections which are all protracted
Sec. 10, all;
Secs. 13 to 35, all, inclusive.
T. 5 N., R. 5 E.,
Secs. 4 to 5, all, inclusive;
Sec. 6, lots 1 to 10, inclusive, SE¼NW¼, E½SW¼, N½SE¼, and SW¼SE¼;
Sec. 7, lots 1 to 4, inclusive, lots 6 to 7, inclusive, S½NE¼, SE¼NW¼, E½SW¼, and SE¼;
Sec. 8, all;
Secs. 14 to 15, all, inclusive;
Secs. 18 to 20, all, inclusive;
Secs. 22 to 23, all, inclusive;
Secs. 26 to 28, all, inclusive;
Secs. 30 to 32, all, inclusive;
Secs. 34 to 35, all, inclusive.
T. 6 N., R. 5 E.,
Secs. 17 to 20, all, inclusive;
Secs. 29 to 32, all, inclusive.

Southern Expansion Area

T. 2 N., R. 9 E.,
Sec. 25, all;
Sec. 26, all except for N½NW¼SW¼SW¼;
Sec. 27, E½ except for W½SE¼SE¼SE¼;
Sec. 34, S½NE¼NE¼NE¼, SE¼NE¼NE¼, W½NE¼NE¼, NW¼NE¼, N½SW¼NE¼, W½SE¼SE¼NE¼, W½SW¼SW¼NE¼, N½N½SE¼NE¼, E½NW¼, E½NE¼NE¼SW¼, W½W½NW¼SE¼, W½SE¼NE¼SW¼, NE¼NE¼SW¼, SW¼NE¼SW¼, N½NE¼SE¼, SE¼NE¼SE¼, E½SW¼NE¼SE¼;
Sec. 35, N½ except for N½NE¼NE¼NE¼ and S½SW¼NW¼NE¼.
T. 2 N., R. 10 E.,
Secs. 2 to 11, all, inclusive;
Sec. 14, that portion lying north and west of the boundary of the Cleghorn Lakes Wilderness Area;
Sec. 15, all;
Secs. 17 to 22, all, inclusive;
Sec. 23, that portion lying west of the boundary of the Cleghorn Lakes Wilderness Area;
Sec. 26, that portion lying west and south of the boundary of the Cleghorn Lakes Wilderness Area;
Secs. 27 to 35, all, inclusive.

Eastern Expansion Area

T. 4 N., R. 11 E.,
Secs. 1 to 2, all, inclusive;
Secs. 11 to 12, all, inclusive;
Sec. 14, all.
T. 5 N., R. 11 E.,
Secs. 1 to 2, all, inclusive;
Secs. 11 to 14, all, inclusive;
Secs. 23 to 26, all, inclusive;
Sec. 35, all.
T. 6 N., R. 11 E.,
Sec. 35, that portion lying south of the Historic Route 66 Corridor.
T. 3 N., R. 12 E.,
Secs. 1 to 3, all, inclusive;
Secs. 10 to 15, all, inclusive;
Secs. 22 to 24, all, inclusive;
Sec. 25, that portion lying west of the boundary of the Sheephole Valley Wilderness Area;
Secs. 26 to 27, all, inclusive;
Sec. 34, that portion lying north and east of the boundary of Cleghorn Lakes Wilderness Area;
Sec. 35, all, inclusive.
T. 4 N., R. 12 E.,
Secs. 1 to 8, all, inclusive;
Secs. 10 to 12, all, inclusive;
Secs. 14 to 15, all, inclusive;
Sec. 18, all except for Mineral Survey no. 5802;
Sec. 19, N½ except for Mineral Survey nos. 5802 and 5805;
Sec. 21, E½;
Secs. 23 to 27, all, inclusive;
Sec. 28, E½;
Secs. 34 to 35, all, inclusive.
T. 5 N., R. 12 E.,
Sec. 2, that portion lying south of the Historic Route 66 Corridor;
Secs. 3 to 4, those portions lying south of the Historic Route 66 Corridor except for the lands conveyed to U. S. Gypsum Company by patent number 1000677, inclusive;
Sec. 5, lots 3 to 4, inclusive, lots 15 to 22, inclusive, and lots 31 to 38, inclusive;
Sec. 6, that portion lying south of the Historic Route 66 Corridor;
Sec. 7, all;
Sec. 8, all except for the land conveyed to U. S. Gypsum Company by patent number 1000678;

Sec. 9, all;
Secs. 10 to 11, all except the lands conveyed to U. S. Gypsum Company by patent number 1000677, inclusive;
Secs. 12 to 15, all, inclusive;
Sec. 17, all except the lands conveyed to U. S. Gypsum Company by patent number 1000678;
Sec. 18, all;
Secs. 19 to 20, all except the lands conveyed to U. S. Gypsum Company by patent number 1000678, inclusive;
Secs. 21 to 27, all, inclusive;
Sec. 28, N½ and SW¼;
Secs. 29 to 30, all except the lands conveyed to U. S. Gypsum Company by patent number 1000678, inclusive;
Secs. 31 to 35, all, inclusive.

T. 3 N., R. 13 E.,
Sec. 4, that portion lying west of the Sheephole Valley Wilderness Area;
Secs. 5 to 7, all, inclusive;
Sec. 8, that portion lying west of the Sheephole Valley Wilderness Area;
Secs. 17 to 19, those portions lying west of the Sheephole Valley Wilderness Area, inclusive.

T. 4 N., R. 13 E.,
Secs. 1 to 4, all, inclusive;
Secs. 6 to 15, all, inclusive;
Secs. 17 to 22, all, inclusive;
Secs. 23 to 24, those portions lying northwesterly of the Sheephole Valley Wilderness Area, inclusive;
Sec. 27, that portion lying northwesterly of the Sheephole Valley Wilderness Area;
Secs. 28 to 32, all, inclusive;
Secs. 33 to 34, that portion lying northwesterly of the Sheephole Valley Wilderness Area, inclusive.

T. 5 N., R. 13 E.,
Secs. 2 to 4, all, inclusive;
Secs. 6 to 8, all, inclusive;
Secs. 10 to 12, all, inclusive;
Secs. 13 to 14, all, inclusive;
Secs. 18 to 20, all, inclusive;
Sec. 22, W½;
Secs. 23 to 28, all, inclusive;
Secs. 30 to 32, all, inclusive;
Secs. 34 to 35, all, inclusive.

T. 3 N., R. 14 E.,
Secs. 1 to 2, all, inclusive;
Secs. 3 to 4, those portions lying east of the Sheephole Valley Wilderness Area, inclusive;
Sec. 10, that portion lying east of the Sheephole Valley Wilderness Area;
Secs. 11 to 13, all, inclusive;
Secs. 14 to 15, those portions lying east of the Sheephole Valley Wilderness Area, inclusive;
Sec. 23, that portion lying east of the Sheephole Valley Wilderness Area;
Sec. 24, all;
Secs. 25 to 26, those portions lying east of the Sheephole Valley Wilderness Area, inclusive;
Sec. 36, that portion of NW¼ lying east of the Sheephole Valley Wilderness Area.

T. 4 N., R. 14 E.,
Secs. 6 to 8, all, inclusive;
Secs. 10 to 12, all, inclusive;
Secs. 14 to 15, all, inclusive;
Secs. 17 to 18, all, inclusive;
Sec. 20, that portion lying northeasterly of the Sheephole Valley Wilderness Area;
Secs. 21 to 24, all, inclusive;
Sec. 25, that portion lying northwesterly of the Cadiz Dunes Wilderness Area;
Secs. 26 to 28, all, inclusive;
Sec. 29, that portion lying northeasterly of the Sheephole Valley Wilderness Area;
Secs. 33 to 35, all, inclusive.

T. 5 N., R. 14 E.,
Secs. 1 to 4, all, inclusive;
Secs. 6 to 7, all, inclusive;
Sec. 10, all;
Sec. 11, E½NE¼NE¼, W½NE¼, NW¼, and S½;
Sec. 12, all;
Secs. 14 to 15, all, inclusive;
Secs. 30 to 31, all, inclusive.

T. 2 N., R. 15 E.,
Secs. 4 to 5, all, inclusive;
Secs. 6 to 8, those portions lying northeasterly of the Sheephole Valley Wilderness Area, inclusive.

T. 3 N., R. 15 E.,
Sec. 15, that portion lying west of the Cadiz Dunes Wilderness Area;
Secs. 18 to 20, all, inclusive;
Sec. 22, that portion lying west of the Cadiz Dunes Wilderness Area;
Secs. 25 to 28, all, inclusive;
Secs. 30 to 32, all, inclusive;
Sec. 34, N½;
Sec. 35, N½ and SE¼.

T. 4 E., R. 15 E.,
Secs. 1 to 4, all, inclusive;
Sec. 5, all except for railroad rights-of-way;
Secs. 6 to 8, all, inclusive;
Sec. 9, all except for railroad rights-of-way;
Secs. 10 to 15, all, inclusive;
Secs. 18 to 21, all, inclusive;
Secs. 22 to 25, those portions lying northwesterly or northeasterly of the Cadiz Dunes Wilderness Area, inclusive;
Secs. 28 to 30, those portions lying northwesterly or northeasterly of the Cadiz Dunes Wilderness Area, inclusive;
Sec. 32, that portion lying northeasterly of the Cadiz Dunes Wilderness Area.

T. 5 N., R. 15 E.,
Secs. 1 to 4, all, inclusive;
Secs. 6 to 7, all, inclusive;
Sec. 9, SE¼SE¼;
Secs. 10 to 15, all, inclusive;
Secs. 19 to 35, all, inclusive.

T. 3 N., R. 16 E.,
Sec. 3, that portion lying northeasterly of the pipeline authorized by CACA 14013 and lying northwesterly of the Old Woman Mountains Wilderness Area.

T. 4 N., R. 16 E.,
Secs. 4 to 5, those portions lying southwesterly of the Old Woman Mountains Wilderness Area, inclusive;
Secs. 6 to 8, all, inclusive;
Sec. 9, that portion lying southwesterly of the Old Woman Mountains Wilderness Area;
Sec. 16, that portion lying southwesterly of the Old Woman Mountains Wilderness Area;
Secs. 17 to 20, all, inclusive;
Secs. 21 to 22, those portions lying southwesterly of the Old Woman Mountains Wilderness Area, inclusive;
Secs. 27, that portion lying southwesterly of the Old Woman Mountains Wilderness Area;
Sec. 28, all;
Sec. 29, all except for that portion contained in railroad right-of-way containing 17 acres;
Secs. 30 to 32, those portions lying northeasterly of the Cadiz Dunes Wilderness Area, inclusive;
Sec. 33, that portion lying northeasterly of the Cadiz Dunes Wilderness Area except for that portion contained in railroad right-of-way containing 14.55 acres;
Sec. 34, that portion lying southwesterly of the Old Woman Mountains Wilderness Area.

T. 5 N., R. 16 E.,
Secs. 6 to 7, those portions lying westerly of the Old Woman Mountains Wilderness Area, inclusive;
Secs. 18 to 20, those portions lying westerly of the Old Woman Mountains Wilderness Area, inclusive;
Sec. 29, that portion lying westerly of the Old Woman Mountains Wilderness Area;
Secs. 30 to 31, all, inclusive;
Sec. 32, that portion lying westerly of the Old Woman Mountains Wilderness Area.

Northern Expansion Area

T. 6 N., R. 7 E.,
Sec, 12, all.

T. 7 N., R. 7 E.,
Sec. 24, all.

The areas described aggregate 365,906 acres, more or less.

2. *Federally owned mineral estate and non-federally owned surface estate.*

Subject to valid existing rights, the following described federally owned mineral estate is hereby withdrawn from settlement, sale, location or entry under the public land laws, including the mining laws, and to the operations of the mineral leasing laws and the Materials Act of 1947:

All Are San Bernardino Meridian

Southern Expansion Area

T. 2 N., R. 9 E.,
Sec. 26, N¼NW¼SW¼SW¼;
Sec. 27, W½SE¼SE¼SE¼;
Sec. 35, N½NE¼NE¼NE¼ and S½SW¼NW¼NE¼.

Eastern Expansion Area

T. 5 N., R. 12 E.,
Sec. 5, lot 1 of NE¼, W½ of lot 1 of NW¼, lots 5 and 6 inclusive, SE¼NW¼, and S½.

The areas described aggregate 507 acres, more or less.

In the event, the non-federally owned surface estate, of the approximately 507 acres described above, returns to public ownership, those lands would be subject to the terms and conditions of this withdrawal as described above.

3. *Non-federally owned surface and mineral estate.*

The following described non-federally owned lands are located within the proposed boundaries of the proposed withdrawal areas:

(a) Privately owned surface and mineral estate:

All Are San Bernardino Meridian

Western Expansion Area

T. 5 N., R. 2 E.,
Sec. 36, all.
T. 6 N., R. 2 E.,
Sec. 36, all.
T. 4 N., R. 3 E.,
Sec. 10, S½N½ and S½;
Sec. 11, SE¼;
Sec. 12, SW¼;
Sec. 13, N½.
T. 5 N., R. 3 E.,
Sec. 1, all;
Sec. 36, N½ and SE¼.
T. 6 N., R. 3 E.,
Sec. 1, S½ of lot 4;
Sec. 4, that land described by metes and bounds in patent number 04–67–0117 and containing 180.445 acres, more or less;
Secs. 10 to 11, that land described by metes and bounds in patent number 04–68–0173 and containing 20.104 acres, more or less, inclusive;
Sec. 25, all;
Sec. 31, that land described by metes and bounds in patent number 994392 and containing 41.322 acres, more or less;
Sec. 36, all.
T. 4 N., R. 4 E.,
Sec. 16, N½ and SE¼;
Sec. 18, S½;
Sec. 36, all.
T. 5 N., R. 4 E.,
Sec. 1, all;
Sec. 12, E½NE¼ and N½SE¼;
Sec. 13, W½NW¼, west 20 rods of the E½NW¼, and W½W½SW¼;
Sec. 17, NE¼;
Sec. 25, lots 1 to 8, inclusive, and E½SE¼.
T. 6 N., R. 4 E.,
Sec. 16, all;
Sec. 25, all;
Secs. 27 to 28, that land described by metes and bounds in patent numbers 24783, 38438, and 38980, and containing 151.250 acres, more or less, inclusive;
Sec. 36, SE¼.
T. 3 N., R. 5 E.,
Sec. 4, W½NW¼NE¼SW¼, NW¼NE¼SW¼, W½SE¼NE¼SW¼, E½NE¼SW¼SW¼, W½NE¼SW¼SW¼, E½SW¼SW¼SW¼, W½SE¼SW¼SW¼, and W½SE¼SE¼SW¼;
Sec. 9, W½NW¼NW¼NW¼, E½SE¼SW¼NW¼, E½NW¼SE¼NW¼, and W½SW¼SE¼NW¼;
Sec. 12, SE¼NE¼SE¼, W½W½NE¼SE¼, NW¼NE¼NW¼SE¼, SE¼SE¼NW¼SE¼, W½W½NW¼SE¼, E½E½SW¼SE¼, SW¼SW¼SE¼, N½SE¼SE¼, SW¼SE¼SE¼, and E½SE¼SE¼SE¼.
T. 4 N., R. 5 E.,
Sec. 1, all;
Sec. 36, all.
T. 5 N., R. 5 E.,
Sec. 6, SE¼SE¼;
Sec. 7, lot 5;
Sec. 9, all;
Sec. 17, all;
Sec. 21, all;
Sec. 29, all;
Sec. 33, all.

Southern Expansion Area

T. 2 N., R. 9 E.,
Sec. 26, N½NW¼SW¼SW¼;
Sec. 27, W½SE¼SE¼SE¼;
Sec. 34, N½NE¼NE¼NE¼, E½SW¼SW¼NE¼, E½SE¼SW¼NE¼, S½N½SE¼NE¼, N½S½SE¼NE¼, S½SW¼SE¼NE¼, W½NE¼NE¼SW¼, E½SE¼NE¼SW¼, S½S½, E½W½NW¼SE¼, E½NW¼SE¼, and W½SW¼NE¼SE¼;
Sec. 35, N½NE¼NE¼NE¼, S½SW¼NE¼NE¼, and S½;
Sec. 36, all.
T. 2 N., R. 10 E.,
Sec. 36, all.

Eastern Expansion Area

T. 4 N., R. 11 E.,
Sec. 13, all.
T. 5 N., R. 11 E.,
Sec. 36, all.
T. 6 N., R. 11 E.,
Sec. 35, that portion lying south of the Historic Route 66 Corridor.
T. 3 N., R. 12 E.,
Sec. 36, that portion lying west of the boundary of the Sheephold Valley Wilderness Area.
T. 4 N., R. 12 E.,
Sec. 9, all;
Sec. 13, all;
Secs. 16 to 17, all, inclusive;
Secs. 18 to 19, that land described by metes and bounds in patent numbers 973412 and 968382, and containing 82.310 acres, more or less, inclusive;
Sec. 22, all;
Sec. 36, all.
T. 5 N., R. 12 E.,
Sec. 1, all;
Secs. 3, 4, 10, and 11, all the lands conveyed to U. S. Gypsum Company by patent number 1000677, containing 480 acres, inclusive;
Sec. 5, lot 1 of NE¼, W½ of lot 1 of NW¼, W½ of lot 2 of NE¼, W½ of lot 2 of NW¼, and S½;
Secs. 8, 17, 19, 20, 29, and 30, all the lands conveyed to U. S. Gypsum Company by patent number 1000678, containing 1, 342.40 acres, inclusive;
Sec. 16, all;
Sec. 28, SE½;
Sec. 36, all.
T. 4 N., R. 13 E.,
Sec. 5, all;
Sec. 16, all.
T. 5 N., R. 13 E.,
Sec. 1, all;
Sec. 5, all;
Sec. 9, all;
Sec. 13, all;
Secs. 16 to 17, all, inclusive;
Sec. 21, all;
Sec. 22, E½;
Sec. 29, all;
Sec. 33, all;
Sec. 36, SW½.
T. 3 N., R. 14 E.,
Sec. 36, that portion lying east of the Sheephole Valley Wilderness Area.
T. 4 N., R. 14 E.,
Secs. 1 to 5, all, inclusive;
Sec. 9, all;
Sec. 13, all;
Sec. 16, all;
Sec. 36, that portion lying east of the Sheephole Valley Wilderness Area.
T. 5 N., R. 14 E.,
Sec. 5, all;
Secs. 8 to 9, all, inclusive;
Sec. 11, W½NE¼NE¼ and SE¼NE¼;
Sec. 13, all;
Secs. 16 to 29, all, inclusive;
Secs. 32 to 36, all, inclusive.
T. 3 N., R. 15 E.,
Sec. 17, all;
Sec. 21, all;
Sec. 29, all;
Sec. 33, all;
Sec. 34, S½.
T. 4 N., R. 15 E.,
Secs. 16 to 17, all, inclusive;
Sec. 33, that portion lying northwesterly of the Sheephole Valley Wilderness Area.
T. 5 N., R. 15 E.,
Sec. 5, all;
Sec. 8, all;
Sec. 9, N½, SW¼, N½SE¼, and SW¼SE¼;
Secs. 17 to 18, all, inclusive.
T. 4 N., R. 16E
Sec. 29, that portion contained in railroad right-of-way containing 17 acres;
Sec. 33, that portion contained in railroad right-of-way containing 14.55 acres.
T. 5 N., R. 16 E.,
Sec. 29, that portion lying southwesterly of the Old Woman Mountains Wilderness Area.

Northern Expansion Area

T. 6 N., R. 7 E.,
Sec. 1, all;
Sec. 13, all.

The areas described aggregate 64,407 acres, more or less.

(b) State of California owned surface and mineral estate:

All Are San Bernardino Meridian

Western Expansion Area

T. 4 N., R. 3 E.,
Sec. 1, NE¼SW¼ and S½SW¼;
Sec. 3, SW¼NE¼, S½NW¼, and N½S½;
Sec. 4, N½SE¼;
Sec. 14, N½;
Sec. 15, S½.
T. 6 N., R. 3 E.,
Sec. 16, all.
T. 4 N., R. 4 E.,
Sec. 16, SW¼;
Sec. 19, E½E½;
Sec. 20, S½;
Sec. 28, S½;
Sec. 29, E½.
T. 5 N., R. 5 E.,
Sec. 16, all.

Southern Expansion Area

T. 2 N., R. 10 E.,
Sec. 16, all.

Eastern Expansion Area

T. 5 N., R. 13 E.,
Sec. 36, N½ and SE¼.

T. 3 N., R. 15 E.,
Sec. 16, that portion lying southwesterly of the Cadiz Dunes Wilderness Area.
T. 5 N., R. 15 E.,
Sec. 16, all;
Sec. 36, all.

Northern Expansion Area

T. 7 N., R. 7 E.,
Sec. 36, all.

The areas described aggregate 7,779 acres, more or less.

In the event that these non-federally owned lands return to public ownership in the future, they would be subject to the terms and conditions described above in ''1. Federally owned surface and mineral estate.''

The purpose of the proposed legislative withdrawal is to withdraw and reserve the lands for use as a military training range, involving live-fire exercises, necessary for national security. The legislative withdrawal would provide sufficient area for realistic integrated training to a Marine Expeditionary Brigade (MEB) sized Marine Air Ground Task Force, the USMC's premier force for responding to smaller scale contingencies. Effective training of MEBs is critical to ensuring the full spectrum of military operations. The withdrawal would be established by an Act of Congress, and approved by the President. The duration of the legislative withdrawal would be determined by Congress. The Department of the Navy has indicated that the use of a right-of-way or cooperative agreement would not provide adequate authorization for safety and control of access for the use of these lands due to the broad scope of military training exercises.

The USMC analyzed alternative sites in three regions of the United States (*i.e.,* Middle Atlantic Coast—North Carolina and Virginia; Gulf of Mexico—Florida and Louisiana; and Southwest—California and Arizona). The USMC concluded that expanding the USMC's MCAGCC, located in Twentynine Palms, California was the only reasonable and feasible option. The lands hereinabove described, have been selected by the USMC for the proposed legislative withdrawal, because they are located adjacent to the existing exterior boundaries of the USMC's MCAGCC, located in Twentynine Palms, California. The application and the records relating to the application can be examined by interested persons at the BLM Barstow Field Office, 2601 Barstow Road, Barstow, California 92311.

On or before December 15, 2008, all persons who wish to submit comments, suggestions, or objections in connection with the proposed legislative withdrawal may present their views in writing to the BLM, Field Manager, Barstow Field Office, 2601 Barstow Road, Barstow, California 92311.

Comments, including names and street addresses of respondents, will be available for public review at the BLM Barstow Field Office at the address above during regular business hours.

Before including your address, telephone number, e-mail address, or other personal identifying information in your comment, you should be aware that your entire comment—including your personal identifying information—may be made publicly available at any time. While you can ask us in your comment to withhold from public review your personal identifying information from public review, we cannot guarantee that we will be able to do so.

This withdrawal proposal will be processed in accordance with the regulations set forth in 43 CFR part 2300.

Until September 15, 2010, the lands will be segregated as specified above unless the withdrawal application is denied or canceled or the withdrawal is approved prior to that date. Land uses currently authorized or permitted may continue during the segregation period. If the proposed legislative withdrawal has been submitted to Congress but not enacted into law by the end of the 2-year segregation period, consideration will be given to entertaining an application for a temporary withdrawal in aid of pending legislation.

During the segregation period, BLM may, after consulting with the USMC, allow uses of a temporary nature that are compatible with the military purposes for which the land is being withdrawn.

(Authority: 43 CFR 2310.3–1(b)(1))

Dated: September 9, 2008.

Thomas Pogacnik,

Acting Deputy State Director, Natural Resources (CA–930), Bureau of Land Management.

[FR Doc. E8–21397 Filed 9–12–08; 8:45 am]

BILLING CODE 3810–FF–P

DEPARTMENT OF THE INTERIOR

Bureau of Land Management

[NM–920–1310–08; TXNM 118200]

Notice of Proposed Reinstatement of Terminated Oil and Gas Lease TXNM 118200

AGENCY: Bureau of Land Management, Interior.

ACTION: Notice of Reinstatement of Terminated Oil and Gas Lease.

SUMMARY: Under the Class II provisions of Title IV, Public Law 97–451, the Bureau of Land Management (BLM) received a petition for reinstatement of oil and gas lease TXNM 118200 from the lessee, Woodward Development LLC, for lands in Houston County, Texas. The petition was filed on time and was accompanied by all the rentals due since the date the lease terminated under the law.

FOR FURTHER INFORMATION CONTACT: Lourdes B. Ortiz, BLM, New Mexico State Office, at (505) 438–7586.

SUPPLEMENTARY INFORMATION: No valid lease has been issued that affect the lands. The lessee agrees to new lease terms for rentals and royalties of $10.00 per acre or fraction thereof, per year, and 16⅔ percent, respectively. The lessee paid the required $500.00 administrative fee for the reinstatement of the lease and $166.00 cost for publishing this Notice in the **Federal Register**. The lessee met all the requirements for reinstatement of the lease as set out in Sections 31(d) and (e) of the Mineral Leasing Act of 1920 (30 U.S.C. 188). We are proposing to reinstate lease TXNM 118200, effective the date of termination, June 1, 2008, under the original terms and conditions of the lease and the increased rental and royalty rates cited above.

Before including your address, phone number, e-mail address, or other personal identifying information in your comment, you should be aware that your entire comment—including your personal identifying information—may be made publicly available at any time. While you can ask us in your comment to withhold your personal identifying information from public review, we cannot guarantee that we will be able to do so.

Dated: September 9, 2008.

Lourdes B. Ortiz,

Land Law Examiner, Fluids Adjudication Team.

[FR Doc. E8–21413 Filed 9–12–08; 8:45 am]

BILLING CODE 4310–FB–P

DEPARTMENT OF THE INTERIOR

Bureau of Land Management

[NM–920–1310–08; TXNM 118211]

Notice of Proposed Reinstatement of Terminated Oil and Gas Lease TXNM 118211

AGENCY: Bureau of Land Management, Interior.

exploration and recreational off-highway vehicle use contribute to habitat decline in the absence of active management, maintenance and restorative activities.

• The distribution and abundance of traditional/edible, medicinal plants is declining. There is a continued decrease in pinion tree vigor and pine nut production as stand densities increase.

• The unresolved eligibility status and ongoing degradation of the National Historic Pony Express Trail which bisects the 3-Bars Project Area, needs to be considered and mitigated appropriately in the EIS. These and other areas of prehistoric and historic use have not been fully recorded or analyzed within the project area.

The BLM will use the NEPA commenting process to satisfy the public involvement requirements for Section 106 of the National Historic Preservation Act (16 U.S.C. 470f) as provided for in 36 CFR 800.2(d)(3). Native American Tribal consultations will be conducted in accordance with policy, and Tribal concerns will be given due consideration. Federal, State, and local agencies, as well as individuals, organizations or tribes that may be interested or affected by the BLM's decision on this project are invited to participate in the scoping process and, if eligible, may request or be requested by the BLM to participate as a cooperating agency.

Before including your address, phone number, e-mail address, or other personal identifying information in your comment, you should be aware that your entire comment—including your personal identifying information—may be made publicly available at any time. While you can ask us in your comment to withhold your personal identifying information from public review, we cannot guarantee that we will be able to do so.

Douglas W. Furtado,

Field Manager, Mount Lewis Field Office.

[FR Doc. 2010–1335 Filed 1–22–10; 8:45 am]

BILLING CODE 4310–HC–P

DEPARTMENT OF THE INTERIOR

Bureau of Land Management

[LLCON01000 L07770000 XX0000]

Notice of Public Meeting, Northwest Colorado Resource Advisory Council Meeting

AGENCY: Bureau of Land Management, Interior.

ACTION: Notice of public meeting.

SUMMARY: In accordance with the Federal Land Policy and Management Act (FLPMA) and the Federal Advisory Committee Act of 1972 (FACA), the U.S. Department of the Interior, Bureau of Land Management (BLM) Northwest Colorado Resource Advisory Council (RAC) will meet as indicated below.

DATES: The Northwest Colorado RAC has scheduled its first 2010 meeting for February 25, 2010. Meetings for the remainder of 2010 will be scheduled at this meeting.

ADDRESSES: The Northwest Colorado RAC meeting will be held in Silt, Colorado, at the BLM Field Office, 2300 River Frontage Rd.

The meeting will begin at 8 a.m. and adjourn at approximately 3 p.m., with public comment periods regarding matters on the agenda at 10 a.m. and 2 p.m.

FOR FURTHER INFORMATION CONTACT: David Boyd, Public Affairs Specialist, Colorado River Valley Field Office, 2300 River Frontage Road, Silt, CO, (970) 876–9008.

SUPPLEMENTARY INFORMATION: The Northwest Colorado RAC advises the Secretary of the Interior, through the Bureau of Land Management, on a variety of public land issues in Colorado.

Topics of discussion during Northwest Colorado RAC meetings may include the BLM National Sage Grouse Conservation Strategy, working group reports, recreation, fire management, land use planning, invasive species management, energy and minerals management, travel management, wilderness, wild horse herd management, land exchange proposals, cultural resource management, and other issues as appropriate.

These meetings are open to the public. The public may present written comments to the RACs. Each formal RAC meeting will also have time, as identified above, allocated for hearing public comments. Depending on the number of persons wishing to comment and time available, the time for individual oral comments may be limited.

Steve Bennett,

Acting Designated Federal Officer for the Northwest Colorado RAC.

[FR Doc. 2010–1298 Filed 1–22–10; 8:45 am]

BILLING CODE P

DEPARTMENT OF THE INTERIOR

Bureau of Land Management

[LLCAD08000.L14300000.ET0000; CACA 50194]

Notice of Partial Cancellation of Proposed Withdrawal; California

AGENCY: Bureau of Land Management, Interior.

ACTION: Notice.

SUMMARY: The U.S. Department of the Navy (Navy) has requested partial cancellation of its application of August 13, 2008, which requested the Secretary of the Interior to process a proposed legislative withdrawal and reservation of public lands and public mineral estate for its use. These lands were to be withdrawn on behalf of the proposed expansion of the U. S. Marine Corps' Air Ground Combat Center at Twentynine Palms. The Navy has requested that the Bureau of Land Management (BLM) remove approximately 33,488 acres of public lands from its application. The initial application was for the transfer of jurisdiction and the withdrawal of approximately 365,906 acres of public land and approximately 507 acres of Federal subsurface mineral estate from all forms of appropriation under the public land laws, including surface entry, mining, mineral leasing, and the Materials Act of 1947. This notice terminates the temporary two-year segregation from settlement, sale, location, or entry under the public land laws, including the mining laws, and the operation of the mineral leasing laws and the Materials Act of 1947 of the public lands and mineral estate described below. In addition, the initial application provisionally identified the surface estate of 507 acres of federally-owned mineral estate and the surface and mineral estates of approximately 72,186 acres of non-federally owned property in the proposed withdrawal area. If these acres were ever acquired by or returned to the United States by any means, they were also to be included in the proposed withdrawal and subject to the temporary segregation authorized by the initial notice. The Navy has requested that the BLM remove surface and mineral estates of approximately 28,871 acres of the non-federally owned property.

DATES: *Effective Date:* January 25, 2010.

FOR FURTHER INFORMATION CONTACT: Roxie Trost, Field Manager, BLM Barstow Field Office, 2601 Barstow Road, Barstow, California 92311, (760) 252–6000; or Joseph Ross, Range Expansion Program Manager, USMC MAGTFTC, MCAGCC, Bldg. 1554, Box

788106, Twentynine Palms, California 92278–8106, (760) 830–7683.

SUPPLEMENTARY INFORMATION: A Notice of Proposed Legislative Withdrawal and Opportunity for Public Meeting was published in the **Federal Register** on September 15, 2008 (73 FR 53269) in response to the initial application from the Navy. Based on a review of the lands proposed for withdrawal, the Navy has requested that the following described lands and interest in lands be removed from its application:

1. *Federally-owned surface and mineral estate:*

San Bernardino Meridian

Western Expansion Area.

T. 4 N., R. 2 E.,
Sec. 2, lots 3 to 90, inclusive.
T. 6 N., R. 2 E.,
Sec. 1, SE¼;
Sec. 12, E½.
T. 4 N., R. 3 E.,
Sec. 11;
Sec. 13, S½;
Sec. 14, SE¼;
Sec. 15, N½.
T. 3 N., R. 4 E.,
Sec. 1.
T. 4 N., R. 4 E.,
Secs. 34 to 35, inclusive.
T. 3 N., R. 5 E.,
Sec. 9, W½NE¼, NE¼NW¼, E½NW¼NW¼, E½W½NW¼NW¼, W½SW¼NW¼NW¼, NE¼SW¼NW¼, W½SW¼NW¼, W½SE¼SW¼NW¼, E½SE¼NW¼, W½NW¼SE¼NW¼, and E½SW¼SE¼NW¼;
Sec. 10, SW¼NE¼, S½ NW¼, and W½SW¼;
Sec. 12, NE¼NE¼SE¼, E½W½NE¼SE¼, E½NE¼NW¼SE¼, E½W½NW¼SE¼, W½SE¼NW¼SE¼, W½E½SW¼SE¼, NW¼SW¼SE¼, SW¼SE¼SE¼, and W½SE¼SE¼SE¼.

Southern Expansion Area.

T. 2 N., R. 9 E.,
Sec. 34, N½SW¼NE¼, W½SE¼SE¼NE¼, W½SW¼SW¼NE¼, N½N½SE¼NE¼, E½NE¼NE¼SW¼, W½W½NW¼SE¼, W½SE¼NE¼SW¼, NE¼NE¼SW¼, SW¼NE¼SW¼, N½NE¼SE¼, SE¼NE¼SE¼, E½SW¼NE¼SE¼.

Eastern Expansion Area.

T. 5 N., R. 11 E.,
Secs. 1 and 2, secs. 11 to 14, inclusive, and secs. 23 to 26, inclusive.
T. 6 N., R. 11 E.,
Sec. 35, that portion lying south of the Historic Route 66 Corridor.
T. 5 N., R. 12 E.,
Sec. 2, that portion lying south of the Historic Route 66 Corridor;
Secs. 3 to 4, those portions lying south of the Historic Route 66 Corridor except for the lands conveyed to U. S. Gypsum Company by patent number 1000677, inclusive;
Sec. 5, lots 3 and 4, lots 15 to 22, inclusive, and lots 31 to 38, inclusive;
Sec. 6, that portion lying south of the Historic Route 66 Corridor;
Sec. 7;
Sec. 8, all except for the land conveyed to U. S. Gypsum Company by patent number 1000678;
Sec. 9;
Secs. 10 and 11, all except the lands conveyed to U. S. Gypsum Company by patent number 1000677, inclusive;
Secs. 12 to 15, inclusive;
Sec. 17, all except the lands conveyed to U. S. Gypsum Company by patent number 1000678;
Sec. 18.
T. 5 N., R. 13 E.,
Secs. 2, 3, 4, 6, 7, 8, 10, 11, 12, 14, 15 and 18.
T. 3 N., R. 14 E.,
Sec. 23, that portion lying east of the Sheephole Valley Wilderness Area;
Sec. 24;
Secs. 25 and 26, those portions lying east of the Sheephole Valley Wilderness Area;
Sec. 36, that portion of NW¼ lying east of the Sheephole Valley Wilderness Area.
T. 5 N., R. 14 E.,
Secs. 1 to 4, inclusive, secs 6, 7 and 10;
Sec. 11, E½NE¼NE¼, W½NE¼, NW¼, and S½;
Secs. 12, 14 and 15.
T. 2 N., R. 15 E.,
Secs. 4 and 5;
Secs. 6 to 8, those portions lying northeasterly of the Sheephole Valley Wilderness Area, inclusive.
T. 3 N., R. 15 E.,
Sec. 15, that portion lying west of the Cadiz Dunes Wilderness Area;
Secs. 18, 19 and 20;
Sec. 22, that portion lying west of the Cadiz Dunes Wilderness Area;
Secs. 25 to 28, inclusive, secs. 30, 31 and 32;
Sec. 34, N½;
Sec. 35, N½ and SE¼.
T. 5 N., R. 15 E.,
Secs. 1 to 4, inclusive, and secs. 6 and 7;
Sec. 9, SE¼SE¼.
T. 5 N., R. 16 E.,
Sec. 29, that portion lying westerly of the Old Woman Mountains Wilderness Area.

Northern Expansion Area.

T. 6 N., R. 7 E.,
Sec. 12.
T. 7 N., R. 7 E.,
Sec. 24.

The areas described aggregate 33,488 acres, more or less, in San Bernardino County.

2. *Non-federally-owned surface and mineral estate:*

(a). Privately-owned surface and mineral estate:

San Bernardino Meridian

Western Expansion Area.

T. 4 N., R. 3 E.,
Sec. 10, S½N½ and S½;
Sec. 11, SE¼;
Sec. 12, SW¼;
Sec. 13, N½.
T. 4 N., R. 4 E.,
Sec. 18, S½;
Sec. 36.
T. 3 N., R. 5 E.,
Sec. 9, W½NW¼NW¼NW¼, E½SE¼SW¼NW¼, E½NW¼SE¼NW¼, and W½SW¼SE¼NW¼;
Sec. 12, SE¼NE¼SE¼, W½W½NE¼SE¼, NW¼NE¼NW¼SE¼, SE¼SE¼NW¼SE¼, W½W½NW¼SE¼, E½E½SW¼SE¼, SW¼SW¼SE¼, N½SE¼SE¼, SW¼SE¼SE¼, and E½SE¼SE¼SE¼.

Southern Expansion Area.

T. 2 N., R. 9 E.,
Sec. 34, N½NE¼NE¼NE¼, E½SW¼SW¼NE¼, E½SE¼SW¼NE¼, S½N½SE¼NE¼, N½S½SE¼NE¼, S½SW¼SE¼NE¼, W½NE¼NE¼SW¼, E½SE¼NE¼SW¼, S½S½, E½W½NW¼SE¼, E½NW¼SE¼, and W½SW¼NE¼SE¼;
Sec. 35, N½NE¼NE¼NE¼, S½SW¼NE¼NE¼, and S½;
Sec. 36.
T. 2 N., R. 10 E.,
Sec. 36.

Eastern Expansion Area.

T. 6 N., R. 11 E.,
Sec. 36, that portion lying south of the Historic Route 66 corridor.
T. 3 N., R. 12 E.,
Sec. 36, that portion lying west of the boundary of the Sheephole Valley Wilderness Area.
T. 5 N., R. 12 E.,
Sec. 1;
Secs. 3, 4, 10, and 11, all the lands conveyed to U.S. Gypsum Company by patent number 1000677, containing 480 acres, inclusive;
Sec. 5, lot 1 of NE¼, W½ of lot 1 of NW¼, W½ of lot 2 of NE¼, W½ of lot 2 of NW¼, and S½;
Secs. 8 and 17, all the lands conveyed to U.S. Gypsum Company by patent number 1000678, inclusive.
T. 5 N., R. 13 E.,
Secs. 1, 5, 9, 13, 16 and 17.
T. 4 N., R. 14 E.,
Sec. 36, that portion lying east of the Sheephole Valley Wilderness Area.
T. 5 N., R. 14 E.,
Secs. 5, 8, and 9;
Sec. 11, W½NE¼NE¼ and SE¼NE¼;
Secs. 13, 16, 17 and 18.
T. 3 N., R. 15 E.,
Secs. 17, 21, 29, and 33;
Sec. 34, S½.
T. 5 N., R. 15 E.,
Secs. 5 and 8;
Sec. 9, N½, SW¼, N½SE¼, and SW¼SE¼;
Secs. 17 and 18.
T. 5 N., R. 16 E.,
Sec. 29, that portion lying southwesterly of the Old Woman Mountains Wilderness Area.

Northern Expansion Area.

T. 6 N., R. 7 E.,
Secs. 1 and 13.

The areas described aggregate 24,837 acres, more or less, in San Bernardino County.

(b). State-of-California-owned surface and mineral estate:

San Bernardino Meridian

Western Expansion Area.

T. 4 N., R. 3 E.,
Sec. 14, N½;
Sec. 15, S½.

Eastern Expansion Area.

T. 3 N., R. 15 E.,
Sec. 16, that portion lying southwesterly of the Cadiz Dunes Wilderness Area.
T. 5 N., R. 15 E.,
Sec. 16.

Northern Expansion Area.

T. 7 N., R. 7 E.,
Sec. 36.

The areas described aggregate 4,034 acres, more or less, in San Bernardino County.

At 10 a.m. on February 24, 2010, the lands described above in "1. *Federally-owned surface and mineral estate*" will be opened to all forms of appropriation under the public land laws generally, subject to valid existing rights, the provisions of existing withdrawals, other segregations of record, and the requirements of applicable law. All valid applications received at or prior to 10 a.m. on February 24, 2010, shall be considered as simultaneously filed at that time. Those received thereafter shall be considered in the order of filing.

At 10 a.m. on February 24, 2010, the lands described above in "1. *Federally-owned surface and mineral estate*" of this order will be opened to location and entry under the United States mining laws—subject to valid existing rights, the provisions of existing withdrawals, other segregations of record, and the requirements of applicable law. Appropriation of land described in this order under the general mining laws prior to the date and time of restoration is unauthorized. Any such attempted appropriation, including attempted adverse possession under 30 U.S.C. 38 (2006), shall vest no rights against the United States. Acts required to establish a location and to initiate a right of possession are governed by state law where not in conflict with Federal law. The BLM will not intervene in disputes between rival locators over possessory rights since Congress has provided for such determinations in local courts.

At 10 a.m. on February 24, 2010, the lands described above in "1. *Federally-owned surface and mineral estate*" of this order will be opened to the operation of the mineral leasing laws and the Materials Act of 1947—subject to valid existing rights, the provisions of existing withdrawals, other segregations of record, and the requirements of applicable law.

Authority: 43 CFR 2310.1–4(a) and 43 CFR 2310.2–1(c).

Thomas Pogacnik,

Deputy State Director, Natural Resources (CA–930), Bureau of Land Management.

[FR Doc. 2010–1416 Filed 1–22–10; 8:45 am]

BILLING CODE 3810–FF–P

DEPARTMENT OF THE INTERIOR

Bureau of Land Management

[LLOR931000.L63100000.HD0000]

Privacy Act of 1974; as Amended; Notice To Amend an Existing System of Records

AGENCY: Bureau of Land Management, Interior.

ACTION: Notice of Amendment to an Existing System of Records.

SUMMARY: Pursuant to the provisions of the Privacy Act of 1974, as amended, the Department of the Interior (DOI) is issuing a public notice of its intent to amend the Bureau of Land Management "Mineral and Vegetal Material Sales"—Interior, (BLM)–16 notice. The amendment includes a change in the system name from "Mineral and Vegetal Material Sales" to "Timber Sale Information System (TSIS)." The amendment includes an update to the record content for Special Forest Products and incorporates the Stewardship Contracting Information Database (SCID) as a module of TSIS. The amended system of records is captioned "Interior–BLM–16" and is titled "Timber Sale Information System (TSIS)."

DATES: Comments must be received by March 8, 2010.

ADDRESSES: Any person interested in commenting on this amendment may do so by: submitting comments in writing to Privacy Act Officer, Oregon State Office, P.O. Box 2965, Portland, Oregon 97208; hand-delivering comments to Oregon State Office, 333 SW. 1st Avenue, Portland, Oregon 97204; or e-mailing comments to *Sherrie_Reid@blm.gov.* Before including your address, phone number, e-mail address, or other personal identifying information in your comment, you should be aware that your entire comment—including your personal identifying information—may be made publicly available at any time. While you can ask us in your comment to withhold your personal identifying information from public review, we cannot guarantee that we will be able to do so.

FOR FURTHER INFORMATION CONTACT: Deputy State Director, Division of Resource Planning, Use and Protection (OR930), U.S. Department of the Interior, Bureau of Land Management, Oregon State Office, 333 SW. 1st Avenue, Portland, Oregon 97204.

SUPPLEMENTARY INFORMATION: The Bureau of Land Management maintains the TSIS system of records. The purpose of this system is to track timber sale contract administration and accounting; Special Forest Products (SFP) sales and permits; and the use of procurement contracts and agreements for removing vegetal products from public lands through stewardship contracting authorized under the Omnibus Appropriations Bill of 2003, (Pub. L. 108–7, Section 323). Authorization for TSIS and its components fall under the Clinger-Cohen Act of 1996, OMB Circular A–130 "Management of Federal Information Resources", and the Oregon and California Lands Act of 1937. The system also provides data for reporting accomplishments. The amendments to the system will be effective as proposed at the end of the comment period (the comment period will end 40 days after the publication of this notice in the **Federal Register**), unless comments are received which would require a contrary determination. The DOI will publish a revised notice if changes are made based upon a review of the comments received.

Beverly E. Walker,

Privacy Act Officer, Bureau of Land Management.

System Name

Timber Sale Information System (TSIS)—Interior, BLM–16

SYSTEM LOCATION:

U.S. Department of the Interior, Bureau of Land Management, Oregon State Office, 333 SW. 1st Avenue, Portland, Oregon 97204.

CATEGORIES OF INDIVIDUALS COVERED BY THE SYSTEM:

Purchasers of vegetal materials. Purchasers refer to those individuals that purchase vegetative materials, and enter into timber sales and stewardship contracts; and include, but are not limited to, the following descriptive terminology: individual buyers or permittees, partnerships, corporations or contractors.

CATEGORIES OF RECORDS IN THE SYSTEM:

The record contains customer information on timber purchasers, contact person(s) for timber purchasers of special forest products, and stewardship agreement recipients verify, or state) under penalty of perjury that the foregoing is true and correct. Executed on (date). (Signature)'.

CONTESTING RECORD PROCEDURES:

The Air Force rules for accessing records, and for contesting contents and appealing initial agency determinations are published in Air Force Instruction 33–332, Privacy Act Program; CFR part 806b; or may be obtained from the system manager.

RECORD SOURCE CATEGORIES:

Special Orders and information extracted from Personnel Data System (automated record system) and Unit Personnel Record Group from Military Personnel Record System.

EXEMPTIONS CLAIMED FOR THE SYSTEM:

None.

[FR Doc. 2011–4435 Filed 2–28–11; 8:45 am]

BILLING CODE 5001–06–P

DEPARTMENT OF DEFENSE

Department of the Army; Corps of Engineers

Inland Waterways Users Board

AGENCY: Department of the Army, U.S. Army Corps of Engineers, DoD.

ACTION: Notice of open meeting.

SUMMARY: In Accordance with 10(a)(2) of the Federal Advisory Committee Act (Pub. L. 92–463), announcement is made of the forthcoming meeting.

Name of Committee: Inland Waterways Users Board (Board).

Date: April 1, 2011.

Location: The Westin New Orleans Canal Place, 100 Rue Iberville, New Orleans, Louisiana 70130 at 504–566–7006 or 1–888–627–8180.

Time: Registration will begin at 8:30 a.m. and the meeting is scheduled to adjourn at approximately 1 p.m.

Agenda: The Board will be provided the status of the funding for inland navigation projects and studies and the status of the Inland Waterways Trust Fund, the funding status for Fiscal Year (FY) 2011 and the FY 2012 budget, consider the implementation of the Inland Marine Transportation System (IMTS) Investment Strategy report recommendations, as well as be updated on the work being performed by the Hurricane Projection Office.

FOR FURTHER INFORMATION CONTACT: Mr. Mark R. Pointon, Headquarters, U.S. Army Corps of Engineers, CECW–ID, 441 G Street, NW., Washington, DC 20314–1000; Ph: 202–761–4691.

SUPPLEMENTARY INFORMATION: The meeting is open to the public. Any interested person may attend, appear before, or file statements with the committee at the time and in the manner permitted by the committee.

Dated: February 24, 2011.

David B. Olson,

Federal Register Liaison Officer, U.S. Army Corps of Engineers.

[FR Doc. 2011–4499 Filed 2–28–11; 8:45 am]

BILLING CODE 3720–58–P

DEPARTMENT OF DEFENSE

Department of the Navy

Notice of Public Meetings for the Draft Environmental Impact Statement for Land Acquisition and Airspace Establishment at Marine Corps Air Ground Combat Center Twentynine Palms, CA

AGENCY: Department of the Navy, DoD.

ACTION: Notice.

SUMMARY: Pursuant to section (102)(2)(c) of the National Environmental Policy Act (NEPA) of 1969, and regulations implemented by the Council on Environmental Quality (40 Code of Federal Regulations [CFR] parts 1500–1508), Department of Navy (DoN) NEPA regulations (32 CFR part 775) and U.S. Marine Corps (USMC) NEPA directives (Marine Corps Order P5090.2A, changes 1 and 2), the DoN has prepared and filed with the U.S. Environmental Protection Agency (EPA) a Draft Environmental Impact Statement (EIS) that evaluates potential environmental impacts associated with the proposed establishment of a large-scale training range at the Marine Corps Air Ground Combat Center ("Combat Center") at Twentynine Palms, California. This proposed action would accommodate sustained, combined-arms, live-fire and maneuver training exercises for all elements of a Marine Expeditionary Brigade (MEB).

With the filing of the Draft EIS, the DoN is initiating a 90-day public comment period and has scheduled three public open house meetings to receive oral and written comments on the Draft EIS. Federal, state and local agencies and interested parties are encouraged to provide comments in person at any of the public open house meetings, or in writing anytime during the public comment period. This notice announces the dates and locations of the public meetings and provides supplementary information about the environmental planning effort.

DATES: The Draft EIS public review period will begin February 25, 2011, and end on May 26, 2011. The USMC is holding three informational open house style public meetings to inform the public about the proposed action and the alternatives under consideration, and to provide an opportunity for the public to comment on the proposed action, alternatives, and the adequacy and accuracy of the Draft EIS. USMC representatives will be on hand to discuss and answer questions on the proposed action, the NEPA process and the findings presented in the Draft EIS. Public open house meetings will be held:

(1) Tuesday, April 12, 2011, 5 p.m. to 9 p.m., at Copper Mountain College, Bell Center Gym, 6162 Rotary Way, Joshua Tree, CA 92252.

(2) Wednesday, April 13, 2011, 5 p.m. to 9 p.m., at Ontario High School Gym, 901 W. Francis St., Ontario, CA 91762.

(3) Thursday, April 14, 2011, 5 p.m. to 9 p.m., at Hilton Garden Inn, Mirage/Sahara Conference Center, 12603 Mariposa Road, Victorville, CA 92395.

Attendees will be able to submit written comments at the public meetings. A stenographer will be present to transcribe oral comments. Equal weight will be given to oral and written statements. All statements, oral transcription and written, submitted during the public review period will become part of the public record on the Draft EIS and will be responded to in the Final EIS. Comments may also be submitted by U.S. mail or electronically via the project Web site provided below.

ADDRESSES: A copy of the Draft EIS is available at the project Web site, *http://www.marines.mil/unit/29palms/las,* and at the local libraries identified at the end of this notice. Comments on the Draft EIS can be submitted via the project Web site or submitted in writing to: Naval Facilities Engineering Command Southwest, ATTN: 29Palms EIS Project Manager, 1220 Pacific Highway, San Diego, CA 92132–5190. All comments must be postmarked or received by May 26, 2011, to ensure they become part of the official record. All timely comments will be responded to in the Final EIS.

FOR FURTHER INFORMATION CONTACT: Chris Proudfoot, Program Manager Land Acquisition at 760–830–3764 or *SMBPLMSWEBPAO@usmc.mil.*

SUPPLEMENTARY INFORMATION: A Notice of Intent (NOI) to prepare the EIS was published in the **Federal Register** on October 30, 2008 (Vol. 73, No. 211, p. 64604), and a correction notice was published in the **Federal Register** on November 21, 2008 (Vol. 73, No. 226, p. 70626), to correct an error in the original October 30, 2008, NOI regarding the scheduled dates for the public scoping meetings.

Proposed Action

The proposed action includes three fundamental and interrelated components: Acquisition of Land contiguous to the existing Combat Center to provide a sufficient area for realistic MEB-sized sustained, combined-arms, live-fire, and maneuver training that meets at least a minimum threshold level of MEB training requirements within appropriate margins of safety.

Modification and Establishment of Special Use Airspace to enable full integration of MEB-sized Aviation Combat Element operations and both air- and ground-delivered live-fire ordnance use within appropriate margins of safety.

Expanded Training implemented as a full-scale MEB Exercise conducted twice per year for 24 continuous days each. Current levels of proficiency training (Building Block training) may be conducted (up to a single battalion in size) when MEB Exercises are not being conducted.

Purpose and Need

The proposed action is needed for the USMC to conduct sustained, combined-arms live-fire and maneuver field training exercises for a MEB-sized Marine Air Ground Task Force (MAGTF) consisting of three battalion task forces and associated command, aviation and combat logistics support elements. These training requirements, drawn from a November 2006 Marine Requirements Oversight Council decision to validate the need for a MEB-sized MAGTF training area, stem from the USMC Strategy 21 commitment to increasingly employ MEBs as the primary contingency response force. Marine Expeditionary Brigades must be capable of performing a variety of missions throughout the spectrum of conflict because they will encounter complex situations containing asymmetric threats, nonlinear battlefields, and unclear delineation between combatants and noncombatants. To overcome these challenges and operate effectively, MEBs must be able to conduct maneuver-intensive operations over extended distances, supported by closely coordinated precision fires, aviation-delivered ordnance, and sustained, focused logistical support. The proposed action is needed because existing training bases, facilities, ranges, and live-fire ground and air maneuver areas are inadequate to support MEB-sized training exercises. An effective MEB-sized exercise requires live-fire and maneuver training space (and associated airspace) for three battalions, while the USMC's largest training site (the Combat Center) can only accommodate live-fire and maneuver training for up to two battalions. Current training capabilities and methods offer only limited practical experience and cannot provide realistic training opportunities that enhance the capability to rapidly and effectively integrate all elements of the large-scale MAGTF into a single cohesive force. In addition, because most of the training areas aboard the Combat Center are fully committed during traditional combined arms training (which occurs over 250 days per year), Building Block training for home station and external units are sometimes diminished in scope, forcing units to add remediation events to combat pre-deployment training to satisfy prerequisites for combat certification. The proposed action is needed to resolve training range deficiencies so that MEB training can be accommodated in accordance with the 2006 Marine Requirements Oversight Council decision and the pre-deployment readiness directives of USMC Order 3502.6, and so that Marines are able to train as they will fight.

Alternatives Considered in the Draft EIS

The Draft EIS examines six action alternatives and the No-Action Alternative. The six action alternatives all have the same three fundamental components: acquisition of additional training land, establishment and modification of airspace, and a new field exercise program of sustained, combined-arms, live-fire and maneuver training that meets at least the minimum threshold requirements for training a MEB. Under all alternatives, acquired airspace would be returned to Federal Aviation Administration (FAA) control to be made available for commercial and general aviation when not being used by the USMC. In addition, three of the action alternatives (Alternatives 4, 5 and 6) would allow for restricted public access for recreational use on a portion of the acquired land in the west study area (Johnson Valley) when military training activities are not being conducted.

Each of the six action alternatives would involve limited construction activities, including: installation of up to three communications towers (similar to existing towers located within the Combat Center); periodic placement and redistribution of temporary target arrays; temporary ground excavation associated with normal vehicle and infantry maneuver operations (*e.g.,* for trenches, fighting positions, etc.); some re-grading or other improvement/maintenance of existing unpaved access roads; and the development of up to 35 miles of new unpaved access roads. Under Alternative 3 only, four concrete tank crossings would be constructed across North Amboy Road. No other permanent fixtures or infrastructure would be constructed, demolished or modified under any of the six action alternatives.

Additional personnel would be required to manage the land/airspace areas and expanded training capability under each action alternative. The increase in military and civilian personnel would vary by alternative, and are estimated to be between 59 and 77 additional personnel. In addition, during each proposed MEB Exercise, an estimated 10,000 to 15,000 Marines would reside at the existing Exercise Support Base within the Combat Center.

Alternative 1 would add approximately 201,657 acres to the existing Combat Center (180,353 acres to the west of the base and 21,304 acres to the south of the base). This alternative would establish new Restricted Area airspace over the acquired lands to the west to accommodate live-fire from aviation and surface units, establish new Military Operations Area airspace, and modify lateral and vertical dimensions of existing Military Operations Areas in other parts of the project area.

Alternative 2 would add approximately 134,863 acres to the existing Combat Center (113,558 acres to the west of the base and the same 21,304 acres to the south as in Alternative 1). Proposed training activities and airspace requirements would be similar to Alternative 1 but would align with the smaller acquisition area of Alternative 2.

Alternative 3 would add approximately 198,580 acres to the existing Combat Center (177,276 acres to the east of the base and the same 21,304 acres to the south as in Alternative 1). This alternative would establish new Restricted Area airspace over the acquired lands to the east to accommodate live-fire from aviation and surface units, establish new Military Operations Area airspace, and modify lateral and vertical dimensions of existing Military Operations Areas in other parts of the project area.

Alternative 4 would add approximately 201,657 acres to the existing Combat Center (180,353 acres to the west of the base and the same 21,304 acres to the south as in Alternative 1) and accompanying Special Use Airspace. Proposed training activities and airspace requirements would be similar to Alternative 1. The western expansion area would be a Restricted Public Access Area, available to the public for 10 months of the year when not used by the USMC.

Alternative 5 would add the same 180,353 acres of land to the west of the base as in Alternatives 1 and 4 but no additional land to the south. Proposed training activities and airspace requirements would be similar to Alternative 1 and 4. The western expansion area would be a Restricted Public Access Area, available to the public for 10 months of the year when not used by the USMC.

Alternative 6 (Preferred Alternative) would add approximately 167,971 acres to the existing Combat Center (146,667 acres to the west of the base and the same 21,304 acres to the south as in Alternative 1) and accompanying Special Use Airspace. Of the western land acquisition, approximately 108,530 acres would be exclusive USMC Use, while the remaining 38,137 acres would be a Restricted Public Access Area, available to the public 10 months per year when it is not being used by the USMC. Proposed training activities and airspace requirements would otherwise be similar to Alternative 1.

The No Action Alternative would seek no additional lands and no additions or changes to Special Use Airspace associated with the Combat Center's current range complex.

Environmental Effects Identified in Draft EIS

Potential impacts were evaluated in the Draft EIS under all alternatives for the following resources: land use, recreation, socioeconomics and environmental justice, public health and safety, visual resources, transportation and circulation, airspace management, air quality, noise, biological resources, cultural resources, geological resources and water resources.

The Draft EIS includes mitigation measures, special conservation measures, and features of project design to avoid or minimize potential impacts. The proposed action would fully comply with regulatory requirements for the protection of environmental resources. A Biological Assessment has been prepared for submittal to the U.S. Fish & Wildlife Service in compliance with Section 7 of the Endangered Species Act. In addition, the USMC is coordinating with the California State Historic Preservation Office on Section 106 of the National Historic Preservation Act, and with the Mojave Desert Air Quality Management District on the Clean Air Act.

The proposed action would result in unavoidable impacts related to land use (due to inconsistencies with federal and local land use plans and policies, incompatibility with mining claims and leases, and the acquisition of privately-owned land), recreation (due to the loss of recreational use of the Johnson Valley Off-Highway Vehicle [OHV] Area), socioeconomics (due to decreased spending and income from OHV and other recreational activities, and impacts to existing commercial and private aircraft flight routes), public health and safety (due to potential public contact with munitions constituents or other hazards under Alternatives 4, 5 and 6), air quality (due to air emissions from construction and training activities), biological resources (due to the likelihood of training exercise-related incidental take of desert tortoises), cultural resources (due to the potential loss of archeological sites, even if mitigated through data recovery), geological resources (due to compaction of soils, disruption of surface crust, shearing of soil profiles, and soil particle dispersion as dust due to military activities), and water resources (due to increased demand for potable groundwater supplies).

Schedule: The Notice of Availability (NOA) publication in the **Federal Register** and local print media starts the 90-day public comment period for the Draft EIS. The DoN will consider and respond to all written, oral and electronic comments, submitted as described above, in the Final EIS. The DoN intends to issue the Final EIS in November 2011, at which time an NOA will be published in the **Federal Register** and local print media. A Record of Decision is expected to be published in April 2012.

Copies of the Draft EIS can be found on the project Web site, *http://www.marines.mil/unit/29palms*/las or at the following locations:

(1) Newton T. Bass Apple Valley Branch Library, 14901 Dale Evans Parkway, Apple Valley, CA 92307.

(2) Barstow Branch Library, 304 E. Buena Vista St., Barstow, CA 92311.

(3) Joshua Tree Library, 6465 Park Blvd., Joshua Tree, CA 92252.

(4) Lucerne Valley Janice Horst Branch Library, 33103 Old Woman Springs Road, Lucerne Valley, CA 92356.

(5) Needles Branch Library, 1111 Bailey Ave., Needles, CA 92363.

(6) Ovitt Family Community Library, 215 E. C St., Ontario, CA 91764.

(7) Sacramento Public Library Central Branch, 828 I Street, Sacramento, CA 95814.

(8) San Bernardino County Library, 104 W. Fourth St., San Bernardino, CA 92415.

(9) Twentynine Palms Library, 6078 Adobe Road, Twentynine Palms, CA 92277.

(10) Victorville City Library, 15011 Circle Drive, Victorville, CA 92395.

(11) Yucca Valley Branch Library, 57098 29 Palms Highway, Yucca Valley, CA 92284.

Dated: February 18, 2011.

D. J. Werner,

Lieutenant Commander, Office of the Judge Advocate General, U.S. Navy, Federal Register Liaison Officer.

[FR Doc. 2011–4461 Filed 2–28–11; 8:45 am]

BILLING CODE 3810–FF–P

DEPARTMENT OF EDUCATION

Training and Information for Parents of Children With Disabilities Office of Special Education and Rehabilitative Services; Overview Information; Training and Information for Parents of Children With Disabilities; Notice Inviting Applications for New Awards for Fiscal Year (FY) 2011.

Catalog of Federal Domestic Assistance (CFDA) Numbers: 84.328C and 84.328M.

Note: This notice invites applications for two separate competitions. For key dates, contact person information, and funding information regarding each competition, see the chart in the *Award Information* section of this notice.

Dates:

Applications Available: See chart.

Deadline for Transmittal of Applications: See chart.

Deadline for Intergovernmental Review: See chart.

Full Text of Announcement

I. Funding Opportunity Description

Purpose of Program: The purpose of this program is to ensure that parents of children with disabilities receive training and information to help improve results for their children.

Priorities: In accordance with 34 CFR 75.105(b)(2)(iv) and (v), these priorities are from allowable activities specified in the statute, or otherwise authorized in the statute (see sections 671, 672 and 681(d) of the Individuals with Disabilities Education Act (IDEA)). Each of the absolute priorities announced in this notice corresponds to a separate competition as follows:

Absolute priority	Competition CFDA No.
Community Parent Resource Centers	84.328C

Mexico; Pueblo of Zia, New Mexico; Salt River Pima-Maricopa Indian Community of the Salt River Reservation, Arizona; San Carlos Apache Tribe of the San Carlos Reservation, Arizona; Shoshone Tribe of the Wind River Reservation, Wyoming; Shoshone-Bannock Tribes of the Fort Hall Reservation of Idaho; Shoshone-Paiute Tribes of the Duck Valley Reservation, Nevada; Southern Ute Indian Tribe of the Southern Ute Reservation, Colorado; Tohono O'odham Nation of Arizona; Ute Indian Tribe of the Uintah & Ouray Reservation, Utah; Ute Mountain Tribe of the Ute Mountain Reservation, Colorado, New Mexico & Utah; White Mountain Apache Tribe of the Fort Apache Reservation, Arizona; Yavapai-Apache Nation of the Camp Verde Indian Reservation, Arizona; Yavapai-Prescott Tribe of the Yavapai Reservation, Arizona; Ysleta Del Sur Pueblo of Texas; Zuni Tribe of the Zuni Reservation, New Mexico; and the Southern Paiute Consortium, a non-federally recognized Indian group, that this notice has been published.

Dated: September 8, 2010.

Sherry Hutt,

Manager, National NAGPRA Program.

[FR Doc. 2010–22786 Filed 9–13–10; 8:45 am]

BILLING CODE 4312–50–S

DEPARTMENT OF THE INTERIOR

Bureau of Indian Affairs

Land Acquisitions; Nisqually Indian Tribe

AGENCY: Bureau of Indian Affairs, Interior.

ACTION: Notice of final agency action to transfer title from the United States to the Nisqually Tribe as mandated by Congress.

SUMMARY: The Assistant Secretary—Indian Affairs accepts the transfer of the approximately 179.14 acres, more or less, in trust for the Nisqually Indian Tribe of Washington, from the United States Army Corps of Engineers.

FOR FURTHER INFORMATION CONTACT: Ben Burshia, Bureau of Indian Affairs, Chief, Division of Real Estate Services, MS–4639–MIB, 1849 C Street, NW., Washington, DC 20240, telephone no. (202) 208–7737.

SUPPLEMENTARY INFORMATION: This notice is published in the exercise of authority delegated by the Secretary of the Interior to the Assistant Secretary—Indian Affairs by 209 DM 8.

Pursuant to subsection (a)(1) of section 2837 of the National Defense Authorization Act for Fiscal Year 2002, Public Law 107–107, 115 Stat. 1012, 1315–1316, as amended by Section 2852 of the Ronald W. Reagan National Defense Authorization Act for Fiscal Year 2005, Public Law 108–375, 118 Stat. 1811, 2143–2144, as amended by Section 2862 of the National Defense Authorization Act for Fiscal Year 2010, Public Law 111–84, 123 Stat. 2190, 2694, the Assistant Secretary—Indian Affairs, on behalf of the Department of the Interior, Bureau of Indian Affairs, has accepted the custody and administrative accountability for approximately 179.14 acres of land at the Fort Lewis Military Reservation, Thurston County, Washington, subject to the terms, conditions, reservations, and restrictions as described in the transfer letter, to be held in trust for the Nisqually Indian Tribe of the Nisqually Reservation.

Legal Description of the Property Acquired

The property acquired includes all of the following described tracts of land comprising a net area of 179.14 acres of land, more or less, situated within Thurston County, Washington, to wit: Two parcels of land in Section 33 in Township 18 North, Range 1 East, Willamette Meridian, in Thurston County, Washington, more particularly described as follows:

Parcel 1:

That portion of Tract A–1 (described below) being in the northwest quarter (NW¼) of Section 33 of Township 18 North, Range 1 East, Willamette Meridian, lying northerly of the north right-of-way line of Yelm Highway SE and southwesterly of the southwest right-of-way line of Olympia-Yelm Road being State Highway 510 (formerly 5–1); and

Parcel 2:

That portion of Tract A–1 (described below) being in the northwest quarter (NW¼) and the southwest quarter of the northeast quarter (SW¼NE¼) of Section 33, of Township 18 North, Range 1 East, Willamette Meridian, and that portion of Tract A–2 (described below) being the north half of the northeast quarter (N½NE¼) and the southeast quarter of the northeast quarter (SE¼NE¼) of Section 33, of Township 18 North, Range 1 East, Willamette Meridian, lying northerly of the north right-of-way line of Olympia-Yelm Road being State Highway 510 (formerly 5–1).

The aggregate total acres for the two parcels are 179.14 acres, more or less.

Tract A–1

The southwest quarter of the northeast quarter (SW¼NE¼), the southwest quarter (SW¼), the northwest quarter (NW¼), and the west half of the southeast quarter (W½SE¼) of Section 33 in Township 18 North, Range 1 East, Williamette Meridian, in Thurston County, Washington.

Tract A–2

The north half of the northeast quarter (N½NE¼), the southeast quarter of the northeast quarter (SE¼NE¼), and the northeast quarter of the southeast quarter (NE¼SE¼) of Section 33 in Township 18 North, Range 1 East, Williamette Meridian, in Thurston County, Washington.

Dated: September 3, 2010.

Larry Echo Hawk,

Assistant Secretary—Indian Affairs.

[FR Doc. 2010–22845 Filed 9–13–10; 8:45 am]

BILLING CODE 4310–W7–P

DEPARTMENT OF THE INTERIOR

Bureau of Land Management

[LLCAD08000–L14300000–ET0000; CACA 51737]

Notice of Proposed Withdrawal and Opportunity for Public Meeting; California

AGENCY: Bureau of Land Management, Interior.

ACTION: Notice.

SUMMARY: The Assistant Secretary of the Interior for Land and Minerals Management proposes to withdraw, on behalf of the Bureau of Land Management (BLM), approximately 507 acres of reserved Federal minerals from the United States mining laws including the mineral and geothermal leasing and mineral materials laws, and 332,421 acres of Federal lands from settlement, sale, location, and entry under the public land laws, including the United States mining laws, and the mineral and geothermal and mineral materials laws for a period of 5 years. The withdrawal would protect the lands and preserve the status quo of the lands and mineral estate included in the proposed training land acquisition/airspace establishment project of the United States Marine Corps (USMC) Air Ground Combat Center (MCAGCC), Twenty-nine Palms, California, pending the processing of an application for withdrawal for military purposes under the Engle Act. The application also includes 43,315 acres of non-Federal lands located within the proposed boundaries of the proposed

withdrawal areas, and in the event that they return to Federal ownership in the future, the lands would be subject to the terms and conditions described below. The Federal and non-Federal lands are located in San Bernardino County.

DATES: Comments must be received on or before December 13, 2010.

ADDRESSES: Comments should be sent to Ms. Roxie Trost, Barstow Office Field Manager, Bureau of Land Management, 2601 Barstow Road, Barstow, California 92311.

FOR FURTHER INFORMATION CONTACT: Ms. Roxie Trost, Barstow Office Field Manager, Bureau of Land Management, 760–252–6000 or Mr. Rusty Lee, Needles Office Field Manager, Bureau of Land Management, at 760–326–7000.

SUPPLEMENTARY INFORMATION: The Assistant Secretary for Land and Minerals Management proposes to withdraw the following described Federal lands and mineral estate from settlement, sale, location, and entry under the public land laws, including the United States mining laws, and from the operation of the mineral and geothermal leasing laws and the Materials Act of 1947, subject to valid existing rights, to protect the lands and preserve the status quo pending action on an application for withdrawal of the lands for military purposes under the Engle Act:

1. Federally Owned Surface and Mineral Estate

San Bernardino Meridian

Western Acquisition Area

T. 4 N., R. 2 E.,
Sec. 1.
T. 5 N., R. 2 E.,
Secs. 1 and 2;
Secs. 11 to 14, inclusive, and Secs. 23 to 26, inclusive;
Sec. 35.
T. 6 N., R. 2 E.,
Sec. 13;
Secs. 23 to 26, inclusive;
Sec. 35.
T. 4 N., R. 3 E.,
Sec. 1, lots 1 and 2 of NE¼, lots 1 and 2 of NW¼, NW¼;SW¼, and SE¼;
Sec. 2;
Sec. 3, E½ of lot 1 of NE¼, lot 2 of NE¼, lot 2 of NW¼, and S½S½;
Sec. 4, lots 1 and 2 of NE¼, lots 1 and 2 of NW¼;, SW¼, and S½SE½;
Secs 5 and 6;
Sec. 7, E½;
Secs. 8 and 9;
Sec. 10, N½N½;
Sec. 12, N½ and SE¼.
T. 5 N., R. 3 E., partly unsurveyed.
Secs. 2 to 35, inclusive;
Sec. 36, SW¼.
T. 4 N., R. 4 E.,
Secs. 1 to 15, inclusive;
Sec. 17;
Sec. 18, N;½
Sec. 20, N½;
Secs. 21 to 27, inclusive;
Sec. 28, N½.
T. 5 N., R. 4 E., partly unsurveyed.
Secs. 2 to 11, inclusive;
Sec. 12, all except for Mineral Survey No. 6336;
Sec. 13, E½, E½E½NW¼, E½SW¼, and E½W½SW¼;
Secs. 14, 15, and 16;
Sec. 17, NW¼ and S½;
Secs. 18 to 24, inclusive;
Sec. 25, N½, SW¼, and W½SE¼;
Sec. 26, lots 1 to 4, inclusive, W½, and SE¼;
Secs. 27 to 36, inclusive.
T. 6 N., R. 4 E.,
Secs. 1 to 15, inclusive, and Secs. 17 to 24, inclusive;
Sec. 26;
Secs. 27 and 28, all except for Mineral Survey Nos. 3000 and 3980;
Secs. 29 to 35, inclusive;
Sec. 36, N½ and SW¼.
T. 3 N., R. 5 E.,
Secs. 1, 2, and 3;
Sec. 4, lots 1 to 12, inclusive;
Secs. 5 and 6;
Sec. 9, lots 1 and 2;
Sec. 10, lots 1 to 7, inclusive;
Sec. 11;
Sec. 12, lots 1 to 12, inclusive.
T. 4 N., R. 5 E., partly unsurveyed.
Secs. 2 to 35, inclusive.
T. 5 N., R. 5 E.,
Secs. 4 and 5;
Sec. 6, lots 1 to 10, inclusive, SE¼NW¼, E½SW¼, N½SE¼, and SW¼SE¼;
Sec. 7, lots 1 to 4, inclusive, lots 6 and 7, S½NE¼, SE¼NW¼, E½SW¼, and SE¼;
Sec. 8;
Secs. 14, 15, 18, 19, 20, 22, 23, 26, 27, 28, 30, 31, 32, 34, and 35.
T. 6 N., R. 5 E.,
Secs. 17 to 20, inclusive, and Secs. 29 to 32, inclusive.

Southern Acquisition Area

T. 2 N., R. 9 E.,
Sec. 25;
Sec. 26, all except for N½NW¼SW¼SW¼;
Sec. 27, E½ except for W½SE¼SE¼SE¼;
Sec. 34, S½NE¼NE¼NE¼, SE¼NE¼NE¼, W½NE¼NE¼, NW¼NE¼, and E½NW¼;
Sec. 35, N½ except for N½NE¼NE¼NE¼ and S½SW¼NW¼NE¼.
T. 2 N., R. 10 E.,
Secs. 2 to 11, inclusive;
Sec. 14, that portion lying north and west of the boundary of the Cleghorn Lakes Wilderness Area;
Sec. 15 and Secs. 17 to 22, inclusive;
Sec. 23, that portion lying west of the boundary of the Cleghorn Lakes Wilderness Area;
Sec. 26, that portion lying west and south of the boundary of the Cleghorn Lakes Wilderness Area;
Secs. 27 to 35, inclusive.

Eastern Acquisition Area

T. 4 N., R. 11 E.,
Secs. 1, 2, 11, 12, and 14.
T. 5 N., R. 11 E.,
Sec. 35.
T. 3 N., R. 12 E.,
Secs. 1, 2, and 3;
Secs. 10 to 15, inclusive;
Secs. 22, 23, and 24;
Sec. 25, that portion lying west of the boundary of the Sheephole Valley Wilderness Area;
Secs. 26 and 27;
Sec. 34, that portion lying north and east of the boundary of Cleghorn Lakes Wilderness Area;
Sec. 35.
T. 4 N., R. 12 E.,
Secs. 1 to 8, inclusive;
Secs. 10, 11, 12, 14, and 15;
Sec. 18, all except for Mineral Survey No. 5802;
Sec. 19, N½ except for Mineral Survey Nos. 5802 and 5805;
Sec. 21, E½;
Secs. 23 to 27, inclusive;
Sec. 28, E½;
Secs. 34 and 35.
T. 5 N., R. 12 E.,
Secs. 19 and 20, all except the lands conveyed by Patent No. 1000678;
Secs. 21 to 27, inclusive;
Sec. 28, N½ and SW¼;
Secs, 29 and 30, all except the lands conveyed by Patent No. 1000678;
Secs. 31 to 35, inclusive.
T. 3 N., R. 13 E.,
Sec. 4, that portion lying west of the Sheephole Valley Wilderness Area;
Secs. 5 and 7;
Secs. 8, 17, 18, and 19, those portions lying west of the Sheephole Valley Wilderness Area.
T. 4 N., R. 13 E.,
Secs. 1 to 4, inclusive, Secs. 6 to 15, inclusive, and Secs. 17 to 22, inclusive;
Secs. 23, 24, and 27, those portions lying northwesterly of the Sheephole Valley Wilderness Area;
Secs. 28 to 32, inclusive;
Secs. 33 and 34, that portion lying northwesterly of the Sheephole Valley Wilderness Area.
T. 5 N., R. 13 E.,
Secs. 13, 19, and 20;
Sec. 22, W½;
Secs. 23 to 28, inclusive, Secs. 30, 31, 32, 34, and 35.
T. 3 N., R. 14 E.,
Secs. 1 and 2;
Secs. 3, 4, and 10, those portions lying east of the Sheephole Valley Wilderness Area;
Secs. 11, 12, and 13;
Secs. 14 and 15, those portions lying east of the Sheephole Valley Wilderness Area.
T. 4 N., R. 14 E.,
Secs. 6, 7, 8, 10, 11, 12, 14, 15, 17, and 18;
Sec. 20, that portion lying northeasterly of the Sheephole Valley Wilderness Area;
Secs. 21 to 24, inclusive;
Sec. 25, that portion lying northwesterly of the Cadiz Dunes Wilderness Area;
Secs. 26, 27, and 28;
Sec. 29, that portion lying northeasterly of the Sheephole Valley Wilderness Area;
Secs. 33, 34, and 35.
T. 5 N., R. 14 E.,
Secs. 30 and 31.

T. 4 N, R. 15 E.,
Secs. 1 to 4, inclusive;
Sec. 5, all except for railroad rights-of-way;
Secs. 6, 7 and 8;
Sec. 9, all except for railroad rights-of-way;
Secs. 10 to 15, inclusive, and Secs. 18 to 21, inclusive;
Secs. 22 to 25, those portions lying northwesterly or northeasterly of the Cadiz Dunes Wilderness Area, inclusive;
Secs. 28 to 30, those portions lying northwesterly or northeasterly of the Cadiz Dunes Wilderness Area, inclusive;
Sec. 32, that portion lying northeasterly of the Cadiz Dunes Wilderness Area.
T. 5 N., R. 15 E.,
Secs. 10 to 15, inclusive, and Secs. 19 to 35, inclusive.
T. 3 N., R. 16 E.,
Sec. 3, that portion lying northeasterly of the pipeline authorized by CACA 14013 and lying northwesterly of the Old Woman Mountains Wilderness Area.
T. 4 N., R. 16 E.,
Secs. 4 and 5, those portions lying southwesterly of the Old Woman Mountains Wilderness Area;
Secs. 6, 7 and 8;
Sec. 9, that portion lying southwesterly of the Old Woman Mountains Wilderness Area;
Sec. 16, that portion lying southwesterly of the Old Woman Mountains Wilderness Area;
Secs. 17 to 20, inclusive;
Secs. 21 and 22, those portions lying southwesterly of the Old Woman Mountains Wilderness Area;
Secs. 27, that portion lying southwesterly of the Old Woman Mountains Wilderness Area;
Sec. 28;
Sec. 29, all except for that portion in railroad right-of-way containing 17 acres;
Secs. 30, 31, and 32, those portions lying northeasterly of the Cadiz Dunes Wilderness Area;
Sec. 33, that portion lying northeasterly of the Cadiz Dunes Wilderness Area except for that portion contained in railroad right-of-way containing 14.55 acres;
Sec. 34, that portion lying southwesterly of the Old Woman Mountains Wilderness Area.
T. 5 N., R. 16 E.,
Secs. 6 and 7, those portions lying westerly of the Old Woman Mountains Wilderness Area;
Secs. 18, 19, and 20, those portions lying westerly of the Old Woman Mountains Wilderness Area;
Secs. 30 and 31;
Sec. 32, that portion lying westerly of the Old Woman Mountains Wilderness Area.

The areas described aggregate 332,421 acres, more or less in San Bernardino County.

2. *Non-Federal Surface Estate and Federal Mineral Estate*

San Bernardino Meridian

Southern Acquisition Area

T. 2 N., R. 9 E.,
Sec. 26, N½NW¼SW¼SW¼;
Sec. 27, W½SE¼SE¼SE¼;
Sec. 35, N½NE¼NE¼NE¼ and S½SW¼NW¼NE¼.

Eastern Acquisition Area

T. 5 N., R. 12 E.,
Sec. 5, lot 1 of NE¼, W½ of lot 1 of NW¼, lots 5 and 6 inclusive, SE¼NW¼, and S½.

The areas described aggregate 507 acres, more or less in San Bernardino County.

3. *Non-Federal Lands*

The following described lands are located within the boundaries of the proposed withdrawal areas. In the event the United States subsequently acquires these lands, they would be subject to the terms and conditions of the withdrawal as described above. The Federal interest would be subject to the terms and conditions of the withdrawal as described above:

(a). Non-Federal Surface and Mineral Estate:

San Bernardino Meridian

Western Acquisition Area

T. 5 N., R. 2 E.,
Sec. 36.
T. 6 N., R. 2 E.,
Sec. 36.
T. 5 N., R. 3 E.,
Sec. 1;
Sec. 36, N½ and SE¼.
T. 6 N., R. 3 E.,
Sec. 1, S½ of lot 4;
Sec. 4, that land described by metes and bounds in Patent No. 04–67–0117 and containing 180.445 acres, more or less;
Secs. 10 to 11, that land described by metes and bounds in Patent No. 04–68–0173 and containing 20.104 acres, more or less;
Sec. 25;
Sec. 31, that land described by metes and bounds in Patent No. 994392 and containing 41.322 acres, more or less;
Sec. 36.
T. 4 N., R. 4 E.,
Sec. 16, N½ and SE¼.
T. 5 N., R. 4 E.,
Sec. 1;
Sec. 12, E½NE¼ and N½SE¼;
Sec. 13, W½NW¼, west 20 rods of the E½NW¼, and W½W½SW¼;
Sec. 17, NE¼;
Sec. 25, lots 1 to 8, inclusive, and E½SE¼.
T. 6 N., R. 4 E.,
Sec. 16, and 25;
Secs. 27 to 28, that land described by metes and bounds in Patent Nos. 24783, 38438, and 38980, and containing 151.250 acres, more or less;
Sec. 36, SE¼.
T. 3 N., R. 5 E.,
Sec. 4, W½NW¼NE¼SW¼, NW¼NE¼SW¼, W½SE¼NE¼SW¼, E½NE¼SW¼SW¼, W½NE¼SW¼SW¼, E½SW¼SW¼SW¼, W½SE¼SW¼SW¼, and W½SE¼SE¼SW¼;
T. 4 N., R. 5 E.,
Secs. 1 and 36.
T. 5 N., R. 5 E.,
Sec. 6, SE¼SE¼;
Sec. 7, lot 5;
Secs. 9, 17, 21, 29, and 33.

Southern Acquisition Area

T. 2 N., R. 9 E.,
Sec. 26, N½NW¼SW¼SW¼;
Sec. 27, W½SE¼SE¼SE¼.

Eastern Acquisition Area

T. 4 N., R. 11 E.,
Sec. 13.
T. 5 N., R. 11 E.,
Sec. 36.
T. 4 N., R. 12 E.,
Secs. 9, 13, 16, and 17;
Secs. 18 to 19, that land described by metes and bounds in Patent Nos. 973412 and 968382, and containing 82.310 acres, more or less;
Sec. 22, and 36.
T. 5 N., R. 12 E.,
Secs. 19, 20, 29, and 30, all the lands conveyed by Patent No. 1000678, containing 1,342.40 acres, more or less;
Sec. 16;
Sec. 28, SE¼;
Sec. 36.
T. 4 N., R. 13 E.,
Sec. 5 and 16;
T. 5 N., R. 13 E.,
Sec. 21;
Sec. 22, E½;
Sec. 29 and 33;
Sec. 36, SW¼.
T. 3 N., R. 14 E.,
Sec. 36, that portion lying east of the Sheephole Valley Wilderness Area.
T. 4 N., R. 14 E.,
Secs. 1 to 5, inclusive, secs. 9, 13, and 16.
T. 5 N., R. 14 E.,
Secs. 19 to 29, inclusive, and secs. 32 to 36, inclusive.
T. 4 N., R. 15 E.,
Secs. 16 to 17, inclusive;
Sec. 33, that portion lying northwesterly of the Sheephole Valley Wilderness Area.
T. 4 N., R. 16 E.,
Sec. 29, that portion contained in railroad right-of-way containing 17 acres;
Sec. 33, that portion contained in railroad right-of-way containing 14.55 acres.
T. 5 N., R. 16 E.,
Sec. 29, that portion lying southwesterly of the Old Woman Mountains Wilderness Area.

The areas described aggregate 39,570 acres, more or less in San Bernardino County.

(b). State of California owned surface and mineral estate:

San Bernardino Meridian

Western Acquisition Area

T. 4 N., R. 3 E.,
Sec. 1, NE¼SW¼ and S½SW¼;
Sec. 3, SW¼NE¼, S½NW¼, and N½S½;
Sec. 4, N½SE¼.
T. 6 N., R. 3 E.,
Sec. 16.
T. 4 N., R. 4 E.,
Sec. 16, SW¼;
Sec. 19, E½E½;
Sec. 20, S½;
Sec. 28, S½;
Sec. 29, E½.
T. 5 N., R. 5 E.,
Sec. 16.

Southern Acquisition Area

T. 2 N., R. 10 E.,
Sec. 16.

Eastern Acquisition Area

T. 5 N., R. 13 E.,

Sec. 36, N½ and SE¼.

The areas described aggregate 3,745 acres, more or less in San Bernardino County.

The purpose of the proposed withdrawal is to protect and preserved the status quo of the lands pending action on an application for withdrawal for military purposes under the Engle Act. Currently, the lands are not being used for military training purposes.

The use of a right-of-way or cooperative agreement would not prohibit new mineral location.

The proposed withdrawal would not require water.

There are no suitable alternative sites. The USMC analyzed lands elsewhere in the United States and concluded that the lands located adjacent to MCAGCC were the best site for the proposed training.

On or before December 13, 2010, all persons who wish to submit comments, suggestions, or objections in connection with the proposed withdrawal may present their views in writing to the BLM, Barstow Field Office Manager at the address indicated above.

Comments, including names and street addresses of respondents, will be available for public review at the BLM Barstow Field Office at the address above during regular business hours. Individual respondents may request confidentiality. Before including your address, phone number, e-mail address, or other personal identifying information in your comment, be advised that your entire comment—including your personal identifying information—may be made publicly available at any time. While you can ask us in your comment to withhold from public review your personal identifying information, we cannot guarantee that we will be able to do so.

Notice is hereby given that a public meeting will be afforded in connection with the proposed withdrawal. A notice of the time and place of the public meeting will be published in the **Federal Register** and a local newspaper at least 30 days before the scheduled date of the meeting.

This withdrawal proposal will be processed in accordance with the regulations set forth in 43 CFR Part 2300.

For a period of 2 years from the date of publication of this notice in the **Federal Register**, the lands will be segregated from settlement, sale, location and entry under the public land laws, including the United States mining laws, and from the operation of the mineral and geothermal leasing laws and the Materials Act of 1947 unless the application is denied or canceled or the withdrawal is approved prior to that date.

Licenses, permits, cooperative agreement, or discretionary land use authorizations of a temporary nature which will not significantly impact the values to be protected by the withdrawal may be allowed with the approval of the authorized officer of BLM during the segregative period.

Authority: 43 CFR 2310.3–1(a), (b)(1) and (2).

Karla D. Norris,

Associate Deputy State Director, CA–930.

[FR Doc. 2010–22817 Filed 9–13–10; 8:45 am]

BILLING CODE 3810–FF–P

INTERNATIONAL TRADE COMMISSION

[USITC SE–10–027]

Government in the Sunshine Act Meeting Notice

AGENCY HOLDING THE MEETING: United States International Trade Commission.

TIME AND DATE: September 20, 2010 at 1 p.m.

PLACE: Room 101, 500 E Street, SW., Washington, DC 20436, Telephone: (202) 205–2000.

STATUS: Open to the public.

MATTERS TO BE CONSIDERED:

1. Agenda for future meetings: none.
2. Minutes.
3. Ratification List.
4. Inv. No. 731–TA–125 (Third Review) (Potassium Permanganate from China)—briefing and vote. (The Commission is currently scheduled to transmit its determination and Commissioners' opinions to the Secretary of Commerce on or before September 30, 2010.)
5. Inv. Nos. 731–TA–1082 and 1083 (Review)(Chlorinated Isocyanurates from China and Spain)—briefing and vote. (The Commission is currently scheduled to transmit its determinations and Commissioners' opinions to the Secretary of Commerce on or before September 30, 2010.)
6. Outstanding action jackets: none.

In accordance with Commission policy, subject matter listed above, not disposed of at the scheduled meeting, may be carried over to the agenda of the following meeting.

By order of the Commission.

Issued: September 10, 2010.

William R. Bishop,

Hearings and Meetings Coordinator.

[FR Doc. 2010–23055 Filed 9–10–10; 4:15 pm]

BILLING CODE 7020–02–P

DEPARTMENT OF JUSTICE

[OMB Number 1103–0016]

Justice Management Division; Agency Information Collection Activities: Proposed Collection; Comments Requested

ACTION: 30-Day Notice of Information Collection Under Review: Certification of Identity.

The Department of Justice (DOJ), Justice Management Division, Facilities and Administrative Services Staff (JMD/FASS) will be submitting the following information collection request to the Office of Management and Budget (OMB) for review and approval in accordance with the Paperwork Reduction Act of 1995. The proposed information collection is published to obtain comments from the public and affected agencies. This proposed information collection was previously published in the **Federal Register** Volume 75, Number 133 page 39972 on July 13, 2010, allowing for a 60 day comment period.

The purpose of this notice is to allow for an additional 30 days for public comment until October 14, 2010. This process is conducted in accordance with 5 CFR 1320.10.

Written comments and/or suggestions regarding the items contained in this notice, especially the estimated public burden and associated response time, should be directed to The Office of Management and Budget, Office of Information and Regulatory Affairs, Attention Department of Justice Desk Officer, Washington, DC 20503. Additionally, comments may be submitted to OMB via facsimile to (202)–395–5806.

Written comments and suggestions from the public and affected agencies concerning the proposed collection of information are encouraged. Your comments should address one or more of the following four points:

—Evaluate whether the proposed collection of information is necessary for the proper performance of the functions of the agency, including whether the information will have practical utility;

—Evaluate the accuracy of the agencies estimate of the burden of the proposed collection of information, including the validity of the methodology and assumptions used;

—Enhance the quality, utility, and clarity of the information to be collected; and

—Minimize the burden of the collection of information on those who are to letters, in the **Federal Register**. Since February 2008, EPA has included its comment letters on EISs on its Web site at: *http://www.epa.gov/compliance/nepa/eisdata.html.* Including the entire EIS comment letters on the Web site satisfies the Section 309(a) requirement to make EPA's comments on EISs available to the public. Accordingly, on March 31, 2010, EPA discontinued the publication of the notice of availability of EPA comments in the **Federal Register**.

EIS No. 20110044, Draft EIS, FHWA, CA, Yerba Buena Island Ramps Improvement Project on Interstate 80 (I–80), Proposals to Replace the Existing Westbound on- and off-ramp, Funding, San Francisco County, CA, Comment Period Ends: 04/11/2011, Contact: Greg Kolle 916–498–5852.

EIS No. 20110045, Final EIS, NRC, ID, Eagle Rock Enrichment Facility, Construct, Operate, and Decommission, Proposed Facility would Enrich Uranium for Use in Commercial Nuclear Fuel for Power Reactors, Bonneville County, ID, Review Period Ends: 03/28/2011, Contact: Stephen Lemont 301–415–5163.

EIS No. 20110046, Draft Supplement, USFS, CA, Salt Timber Harvest and Fuel Hazard Reduction Project, Additional Analysis and Supplemental Information, Proposing Vegetation Management in the Salt Creek Watershed, South Fork Management Unit, Hayfork Ranger District, Shasta-Trinity National Forest, Trinity County, CA, Comment Period Ends: 04/11/2011, Contact: Joshua Wilson 530–226–2422.

EIS No. 20110047, Draft Supplement, USN, CA, Hunters Point (Former) Naval Shipyard Disposal and Reuse, Supplement Information on the 2000 FEIS, Implementation, City of San Francisco, San Francisco County, CA, Comment Period Ends: 04/12/2011, Contact: Ronald Bochenek 619–532–0906.

EIS No. 20110048, Draft EIS, DOE, 00, Disposal of Greater-Than-Class C (GTCC) Low-Level Radioactive Waste and GTCC–Like Waste, Proposed Development, Operation, and Long-Term Management of a Disposal Facility, Comment Period Ends: 06/27/2011, Contact: Arnold Edelman 301–903–7238.

EIS No. 20110049, Draft EIS, USFWS, HI, Palmyra Atoll National Wildlife Refuge Rat Eradication Project, Proposing to Restore and Protect the Native Species and Habitats, Implementation, Northern Line Islands, Honolulu, HI, Comment Period Ends: 04/11/2011, Contact: Ben Harrison 503–231–6177.

EIS No. 20110050, Final EIS, USACE, 00, Missouri River Commercial Dredging, Proposal to Extract Sand and Gravel from the Missouri River, U.S. Corps of Engineers Section 10 and 404 Permits, Kansas City, Central Missouri and Greater St. Louis, Missouri, Review Period Ends: 03/28/2011, Contact: Cody Wheeler 816–389–3739.

EIS No. 20110051, Draft EIS, USN, CA, Marine Corps Air Ground Combat Center Project, Land Acquisition and Airspace Establishment to Support Large-Scale MAGTF Live-Fire and Maneuver Training Facility, San Bernardino County, CA, Comment Period Ends: 04/11/2011, Contact: Chris Proudfoot 760–830–3764.

EIS No. 20110052, Draft EIS, USFS, 00, PROGRAMMATIC—National Forest System Land Management Planning, Proposing a New Rule at 36 CFR Part 219 Guide Development, Revision, and Amendment of Land Management Plans for Unit of the National Forest System, Comment Period Ends: 05/25/2011, Contact: Brenda Halter-Glenn 202–260–9400.

EIS No. 20110053, Final EIS, USACE, 00, PROGRAMMATIC—Ohio River Mainstem System Study, System Investment Plan (SIP) for Maintaining Safe, Environmentally Sustainable and Reliable Navigation on the Ohio River, IL, IN, OH, KY, PA and WV, Review Period Ends: 03/28/2011, Contact: Dr. Hank Jarboe 513–684–6050.

EIS No. 20110054, Revised Draft EIS, FTA, CA, Crenshaw Transit Corridor Project, Updated Information on a New Evaluation of Maintenance Sites, Proposals to Improve Transit Services, Funding, Los Angeles County Metropolitan Transportation Authority (LACMTA), Los Angeles County, CA, Comment Period Ends: 04/11/2011, Contact: Ray Tellis 213–202–3950.

Amended Notices

EIS No. 20100468, Draft EIS, USACE, MS, Mississippi River Gulf Outlet (MRGO) Ecosystem Restoration Study, To Develop a Comprehensive Ecosystem Restoration Plan to Restore the Lake Borgne, Implementation, LA, Comment Period Ends: 03/04/2011, Contact: Tammy Gilmore 504–862–1002. Revision to FR Notice 12/17/2010: Extending Comment Period from 02/14/2011 to 03/04/2011.

Dated: February 22, 2011.

Cliff Rader,

Environmental Protection Specialist, NEPA Compliance Division, Office of Federal Activities.

[FR Doc. 2011–4255 Filed 2–24–11; 8:45 am]

BILLING CODE 6560–50–P

ENVIRONMENTAL PROTECTION AGENCY

[EPA–HQ–OPP–2011–0082; FRL–8863–3]

Notice of Receipt of Several Pesticide Petitions Filed for Residues of Pesticide Chemicals in or on Various Commodities

AGENCY: Environmental Protection Agency (EPA).

ACTION: Notice.

SUMMARY: This notice announces the Agency's receipt of several initial filings of pesticide petitions proposing the establishment or modification of regulations for residues of pesticide chemicals in or on various commodities.

DATES: Comments must be received on or before March 28, 2011.

ADDRESSES: Submit your comments, identified by docket identification (ID) number and the pesticide petition number (PP) of interest as shown in the body of this document, by one of the following methods:

- *Federal eRulemaking Portal: http://www.regulations.gov.* Follow the on-line instructions for submitting comments.
- *Mail:* Office of Pesticide Programs (OPP) Regulatory Public Docket (7502P), Environmental Protection Agency, 1200 Pennsylvania Ave., NW., Washington, DC 20460–0001.
- *Delivery:* OPP Regulatory Public Docket (7502P), Environmental Protection Agency, Rm. S–4400, One Potomac Yard (South Bldg.), 2777 S. Crystal Dr., Arlington, VA. Deliveries are only accepted during the Docket Facility's normal hours of operation (8:30 a.m. to 4 p.m., Monday through Friday, excluding legal holidays). Special arrangements should be made for deliveries of boxed information. The Docket Facility telephone number is (703) 305–5805.

Instructions: Direct your comments to the docket ID number and the pesticide petition number of interest as shown in the body of this document. EPA's policy is that all comments received will be included in the docket without change and may be made available on-line at *http://www.regulations.gov,* including any personal information provided, unless the comment includes information claimed to be Confidential the deadline for receipt of comments, or presented at the public hearing, will be considered by EPA before taking final action on the submitted APDES program revision.

Public Comment on the Program Revision. EPA and ADEC encourage public participation in this program revision process. EPA requests the public to review the program revision that ADEC has submitted and provide any comments relevant to the proposed one-year extension for transfer of Phase IV. EPA will consider all comments on the APDES program revision in its decision.

Authority: This action is taken under the authority of Section 402 of the Clean Water Act as amended, 42 U.S.C. 1342. I hereby provide public notice of the State of Alaska APDES program revision in accordance with 40 CFR 123.62.

Dated: May 5. 2011.

Dennis McLerran,

Regional Administrator, Region 10.

[FR Doc. 2011–11728 Filed 5–12–11; 8:45 am]

BILLING CODE 6560–50–P

ENVIRONMENTAL PROTECTION AGENCY

[ER–FRL–8996–9]

Environmental Impacts Statements; Notice of Availability

Responsible Agency: Office of Federal Activities, General Information (202) 564–1399 or *http://www.epa.gov/compliance/nepa/.*

Weekly receipt of Environmental Impact Statements.

Filed 05/02/2011 through 05/06/2011. Pursuant to 40 CFR 1506.9.

Notice

In accordance with Section 309(a) of the Clean Air Act, EPA is required to make its comments on EISs issued by other Federal agencies public. Historically, EPA met this mandate by publishing weekly notices of availability of EPA comments, which includes a brief summary of EPA's comment letters, in the **Federal Register**. Since February 2008, EPA has included its comment letters on EISs on its Web site at: *http://www.epa.gov/compliance/nepa/eisdata.html.* Including the entire EIS comment letters on the Web site satisfies the Section 309(a) requirement to make EPA's comments on EISs available to the public. Accordingly, on March 31, 2010, EPA discontinued the publication of the notice of availability of EPA comments in the **Federal Register**.

EIS No. 20110140, Final EIS, USFS, OR, Fremont-Winema National Forests Invasive Plant Treatment, Propose to Treat up to 8,700 Acres of Invasive Plant Infestation Per Year, Klamath and Lake Counties, OR, *Review Period Ends:* 06/13/2011, *Contact:* Glen Westlund 541–883–6743.

EIS No. 20110141, Draft EIS, USFS, 00, Nationwide Aerial Application of Fire Retardant Project, Proposing to Continue the Aerial Application of Fire Retardant on National Forest System Lands, Implementation, *Comment Period Ends:* 06/27/2011, *Contact:* Glen Stein 208–869–5405.

EIS No. 20110142, Draft EIS, USA, 00, Fort Benning Training Land Expansion Program, to Reduce the Army's Training Land Shortfall, GA and AL, *Comment Period Ends:* 06/27/2011, *Contact:* Jill Reilly-Hauck 210–424–8346.

EIS No. 20110143, Final EIS, BLM, CA, Palen Solar Power Plant Project, Construction, Operation and Decommission a Solar Thermal Facility on Public Lands, Approval for Right-of-Way Grant, Possible California Desert Conservation Area Plan Amendment, Riverside County, CA, *Review Period Ends:* 06/13/2011, *Contact:* Allison Shaffer 760–833–7100.

EIS No. 20110144, Final EIS, USAF, NV, Nellis Air Force Base (AFB), Proposes to Base 36 F–35 Fighter Aircraft, Assigned to the Force Development Evaluation (FDE) Program and Weapons School (WS) Beddown, Clark County, NV, *Review Period Ends:* 06/13/2011, *Contact:* Nick Germanos 757764–9334.

Amended Notices

EIS No. 20110051, Draft EIS, USN, CA, Marine Corps Air Ground Combat Center Project, Land Acquisition and Airspace Establishment to Support Large-Scale MAGTF Live-Fire and Maneuver Training Facility, San Bernardino County, CA, *Comment Period Ends:* 05/26/2011, *Contact:* Chris Proudfoot 760–830–3764.

Revision of FR Notice Published 02/24/2011: Extending Comment Period from 04/11/2011 to 05/26/2011.

EIS No. 20110080, Draft EIS, USN, WA, Trident Support Facilities Explosives Handling Wharf (EHW–2), Construction and Operating, Naval Base Kitsap Banorg, Silverdale, WA, *Comment Period Ends:* 05/17/2011, *Contact:* Christine Stevenson 360–396–0080.

This document is available on the Internet at: *https://www.nbkeis.com/ehw/Welcome.aspx.*

Revision to FR Notice Published 03/18/2011: Extending Comment Period from 05/02/2011 to 05/17/2011.

Dated: May 10, 2011.

Robert W. Hargrove,

Director, NEPA Compliance Division, Office of Federal Activities.

[FR Doc. 2011–11810 Filed 5–12–11; 8:45 am]

BILLING CODE 6560–50–P

FEDERAL COMMUNICATIONS COMMISSION

Information Collection Being Reviewed by the Federal Communications Commission

AGENCY: Federal Communications Commission.

ACTION: Notice and request for comments.

SUMMARY: The Federal Communications Commission, as part of its continuing effort to reduce paperwork burden invites the general public and other Federal agencies to take this opportunity to comment on the following information collection(s), as required by the Paperwork Reduction Act (PRA) of 1995. Comments are requested concerning: (a) Whether the proposed collection of information is necessary for the proper performance of the functions of the Commission, including whether the information shall have practical utility; (b) the accuracy of the Commission's burden estimate; (c) ways to enhance the quality, utility, and clarity of the information collected; (d) ways to minimize the burden of the collection of information on the respondents, including the use of automated collection techniques or other forms of information technology; and (e) ways to further reduce the information collection burden on small business concerns with fewer than 25 employees.

The FCC may not conduct or sponsor a collection of information unless it displays a currently valid OMB control number. No person shall be subject to any penalty for failing to comply with a collection of information subject to the Paperwork Reduction Act (PRA) that does not display a valid OMB control number.

DATES: Written Paperwork Reduction Act (PRA) comments should be submitted on or before July 11, 2011. If you anticipate that you will be submitting PRA comments, but find it difficult to do so within the period of time allowed by this notice, you should advise the FCC contact listed below as soon as possible.

PRESS ADVISORY

United States Marine Corps

Division of Public Affairs

Date:	Nov. 25, 2008
Contact:	HQMC Media Branch, POC: Capt Amy Malugani
Telephone:	(703) 614-4309

USMC HOSTS OPEN HOUSES FOR PROPOSED LAND EXPANSION

HEADQUARTERS MARINE CORPS (Nov. 25, 2008) – The Department of the Navy is in the initial stages of preparing an Environmental Impact Statement (EIS) to study potential environmental effects associated with a range of reasonable alternatives (including 'no action' alternative) for the proposed acquisition of lands and establishment of special-use airspace bordering the Marine Corps Air Ground Combat Center (MCAGCC), Twentynine Palms, Calif.

As part of the National Environmental Policy Act (NEPA) process, the Marine Corps will host three scoping meetings in Southern California. Meetings will be in open house format allowing interested parties to view information boards and handouts, speak with project representatives and submit written and oral comments on issues and alternatives for consideration in the Draft EIS (by Jan. 31, 2009). For additional information please reference the project website www.29palms.usmc.mil/las.

Open-house meeting locations, times and dates are as follows:

Wednesday, Dec. 3, 2008, 5 to 9 p.m.
Twentynine Palms Junior High School
5798 Utah Trail
Twentynine Palms, CA 92277

Thursday, Dec. 4, 2008, 5 to 9 p.m.
Hilton Garden Inn
12603 Mariposa Road
Victorville, CA 92395

Friday, Dec. 5, 2008, 5 to 9 p.m.
Ontario Convention Center
2000 E. Convention Center Way
Ontario, CA 91764

Comment Mailing Address:
MAGTFTC, MCAGCC
ATTN: Land Acquisition Program
Box 788104, Bldg 1554, Rm 138
Twentynine Palms, CA 92278-8104
E-mail: SMBPLMSWEBPAO@usmc.mil

Marine Corps to Study Potential Land Acquisition

MARINE CORPS AIR GROUND COMBAT CENTER, TWENTYNINE PALMS, Calif. - The Office of the Secretary of Defense has recently granted approval for the Marine Corps to proceed with a study for possible land acquisition near the Marine Corps Air Ground Combat Center here as part of the training capability modernization program.

During the study, the Marine Corps analyze land along the contiguous boundaries of the combat center for possible acquisition, as well as looking into any airspace requirements that may be needed to support training in the respective area.

The first step in the process is undertaking an environmental impact review and assessment, a process that will involve a great deal of input from the local community.

“We are committed to working with our neighbors and stakeholders as partners throughout the environmental and other studies required in the land acquisition planning process,” said Brig. Gen. Melvin Spiese, Combat Center commanding general.

It is imperative that Marines receive the most realistic training before deploying into a combat environment which demands split-second life or death decisions. The land parcel additions would allow Marines to train as they fight at a large-scale Marine Air Ground Task Force level.

“As we further investigate the potential for acquiring the land and training airspace necessary for achieving our modern training requirements, we will continue to be a good neighbor and a good steward of our base’s natural resources, habitat and cultural resources,” said Speise.

For additional questions please Headquarters Marine Corps Public Affairs (703) 614 4309.

-USMC-

NATIONAL SYSTEM OF PUBLIC LANDS U.S. DEPARTMENT OF THE INTERIOR **BUREAU OF LAND MANAGEMENT NEWS RELEASE**
California Desert District

Release Date: 01/26/10
Contacts: Stephen Razo, (951) 697-5217, srazo@ca.blm.gov
David Briery , (951) 687-5220, dbriery@ca.blm.gov
News Release No. CA-CDD-10-30

Navy Requests Partial Cancellation for Marine Corps Land Withdrawal

The U.S. Department of the Navy has requested the Bureau of Land Management (BLM) remove approximately 33,488 acres of public lands from its application to withdraw the lands for the proposed expansion of the U.S. Marine Corps' Air Ground Combat Center at Twentynine Palms.

The partial cancellation, published in the January 25, 2010 Federal Register, is available on line at www.blm.gov/ca and includes the legal descriptions of the areas affected. The cancellation is effective Feb. 24, 2010.

A previous notice published September 15, 2008, segregated the public lands involved for two years, making them unavailable for settlement, sale, and location of claims under the mining laws.

The Department of the Navy, as required by the 1958 Engle Act, filed the application requesting the Secretary of the Interior to process a proposed legislative withdrawal of public lands for military training and exercises involving the Marine Corps Air Ground Combat Center at Twentynine Palms.

The initial application was for the transfer of jurisdiction of 365,906 acres of federal land, 64,407 acres of privately owned land and 7,779 acres of state owned land to the Department of the Navy for the Marine Corps base expansion. In addition to the 33,488 acres of federal land being removed from the application, 24,837 acres of privately owned land and 4,034 acres of state land are being removed from the application.

--BLM--

California Desert District 22835 Calle San Juan de Los Lagos, Moreno Valley, CA 92553

Last updated: 01-26-2010

U.S. Department of the Interior
Bureau of Land Management
News Release

For Immediate Release: September 14, 2010 CA-CDD-10-104
Contacts: Stephen Razo (951) 697-5217; e-mail srazo@ca.blm.gov

BLM Seeks Comments on Proposed Marine Corps Withdrawal

The Bureau of Land Management (BLM) is seeking public comments on a proposal to withdraw for five years 332,000 acres of public land adjacent to the Marine Corps' Air Ground Combat Center at Twentynine Palms from settlement, sale, and location of mining claims to preserve the status quo while the Marines complete environmental studies on a long-term proposal to expand the base, which requires legislative approval.

BLM Barstow Field Manager Roxie Trost said the lands remain open to public access and recreation use while these studies are underway. She explained that the lands have been segregated or unavailable for settlement, sale, and location of mining claims since September 2008, when the Marines began the legislative withdrawal process to expand the base in San Bernardino County. Today's action provides more time for the preparation of an environmental impact statement on the base expansion proposal. A draft EIS is expected to be released in January 2011.

A 90-day comment period on the proposal closes December 13, 2010. Comments should be sent to Ms. Roxie Trost, BLM Barstow Office Field Manager, 2601 Barstow Road, Barstow, California 92311. A notice of the proposed withdrawal was published in today's Federal Register, and is available online at http://www.blm.gov/ca/st/en/info/fed_reg_archives.html

In 2008, the Department of the Navy filed an application requesting the Secretary of the Interior to process a proposed withdrawal of public lands for military training and exercises. Several thousand comments were received generally supporting military operations, but others expressing concerns about loss of public access into Johnson Valley, a popular off-highway vehicle recreation area. Those comments will be addressed in the draft EIS.

For more information, contact Ms. Roxie Trost, BLM Barstow Office Field Manager, 760-252-6000 or Mr. Rusty Lee, BLM Needles Office Field Manager, at 760-326-7000.

-BLM-

PRESS ADVISORY

United States Marine Corps

Division of Public Affairs

Date:	November 23, 2009
Contact:	HQMC Media Branch, POC: Capt Brian Block
Telephone:	(703) 614-4309

HEADQUARTERS MARINE CORPS (November 23, 2009) – The Marine Corps continues to study reasonable alternatives for potential land acquisition and airspace establishment to meet its Marine Expeditionary Brigade sustained, combined-arms live-fire and maneuver training requirements at Marine Corps Air Ground Combat Center Twentynine Palms, California.

Approximately 20,000 stakeholder comments were received on the alternatives that were presented to the public during the public scoping period held from October 2008 through January 2009. These comments and other stakeholder input have helped the Marine Corps further refine the issues and study alternatives. An additional alternative, Alternative Six, has now been developed that accommodates public access to some of the lands in the West Study Area when Marines are not using the area for training.

A range of reasonable alternatives (Alternatives One through Six), as well as the No-Action Alternative, has been finalized for inclusion in the Environmental Impact Statement.

The Marine Corps and the Department of the Navy are scheduled to publish a Draft EIS evaluating alternatives for meeting our MEB training requirements in September 2010. Following this release, there will be a 90-day public comment period.

A final EIS that takes into account public comments will be issued in July 2011. A Record of Decision will be made public in October 2011, after which any request for public land withdrawal to support MEB training will be submitted to Congress. Any non-federal lands acquired would be purchased at fair market value. Any request for establishment of related special use airspace would be presented to the Federal Aviation Administration for rule making.

Maps depicting the study areas, the study alternatives and other project information on the project may be viewed at the MCAGCC web site, http://www.29palms.usmc.mil/las/. This site is regularly updated to reflect the most recent project developments and information.

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Marine Air Ground Task Force Training Command
Marine Corps Air Ground Combat Center
Twentynine Palms, California 92278 (760) 830-3760
Fax: (760) 830-5474

For Immediate Release **Release No: PR-110224NM1**

29PALMS TRAINING LAND ACQUISITION/AIRSPACE ESTABLISHMENT DRAFT EIS AVAILABLE FOR PUBLIC REVIEW: U.S. MARINE CORPS INVITES PUBLIC COMMENT

MARINE CORPS AIR GROUND COMBAT CENTER, TWENTYNINE PALMS, Calif. (Feb. 25, 2011) – In accordance with the National Environmental Policy Act (NEPA) of 1969, the Department of the Navy, on behalf of the Marine Corps, has prepared a Draft Environmental Impact Statement (EIS) for the 29 Palms Training Land Acquisition/Airspace Establishment Study. Potential environmental impacts associated with the proposed expansion of the training range at the Marine Corps Air Ground Combat Center ("Combat Center") at Twentynine Palms, Calif., are evaluated in the Draft EIS. This proposed action would accommodate sustained, combined-arms, live-fire and maneuver training exercises for all elements of a Marine Expeditionary Brigade (MEB). The Department of the Navy has prepared the Draft EIS in cooperation with the Bureau of Land Management and Federal Aviation Administration.

The Marine Corps will hold three informational open house style public meetings to inform the public about the proposed action and the alternatives under consideration, and to provide an opportunity for the public to comment on the proposed action, alternatives, and the adequacy and accuracy of the Draft EIS. There will not be a formal presentation; however, Marine Corps representatives will be on hand to discuss and answer questions on the proposed action, the NEPA process and the findings presented in the Draft EIS. Public open house meetings will be held:

Date: **Tuesday, April 12, 2011**
Time: 5 to 9 p.m.
Location: Copper Mountain College
Bell Center Gym
6162 Rotary Way
Joshua Tree, Calif.

Date: **Wednesday, April 13, 2011**
Time: 5 to 9 p.m.
Location: Ontario High School Gym
901 W. Francis St.
Ontario, Calif.

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Date:	**Thursday, April 14, 2011**
Time:	5 to 9 p.m.
Location:	Hilton Garden Inn Mirage/Sahara Conference Center 12603 Mariposa Road Victorville, Calif.

The proposed action is needed because current Marine Corps training bases, facilities, ranges, and live-fire ground and air maneuver areas are inadequate to support MEB-sized training exercises. Changes in MEB training requirements call for more military range land and airspace than is now available anywhere in the United States. The Center for Naval Analyses studied locations nationwide and concluded that the Combat Center is the only location with sufficient land and airspace potential to meet MEB training requirements.

The Combat Center is the Marine Corps' service-level training facility for Marine Air Ground Task Force training. More than 90 percent of Marines deploying to combat receive pre-deployment training at the Combat Center.

To download a copy of the EIS or to find the locations of information repositories where hard copies are available for review, please visit www.marines.mil/unit/29palms/las.

Comments may be submitted at a public meeting or in writing. A stenographer will be available for those wanting to submit an oral comment at the meeting. All written comments must be postmarked or received by **May 26, 2011**, to be considered in the Final EIS. Written comments may be submitted via the website at www.marines.mil/unit/29palms/las or mailed to:

Naval Facilities Engineering Command, Southwest
ATTN: 29Palms EIS Project Manager
1220 Pacific Highway
San Diego, CA 92132-519

Information related to the EIS is available on the project website at www.marines.mil/unit/29palms/las.

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News Release

For Release: September 15, 2008
Contacts: Stephen Razo (951) 697-5217; e-mail srazo@ca.blm.gov
CA-CDD-08-65

Public Meetings Planned for Twentynine Palms Marine Corps Withdrawal Application

The Bureau of Land Management and the Marine Corps will host public meetings on October 23 and 24 to present the proposal for possible expansion of the Twentynine Palms Marine Corps Base and to discuss the legislative withdrawal process of the public lands in San Bernardino County. The locations, times, and formats for the meetings will be announced in the near future.

A Federal Register notice published today segregates the public lands identified by the Marines for possible expansion for two years. Under the segregation, the lands are no longer available for settlement, sale, and location of claims under the mining laws. However, the lands remain open to public access and recreation use.

The notice, available online at http://www.blm.gov/ca/st/en/info/fed_reg_archives.html also explains the withdrawal process, which requires full environmental and public review and congressional approval as required by the 1958 Engle Act. The publication of the Federal Register notice begins a 90-day comment period regarding the proposed withdrawal.

After the comment period, the Marine Corps will be preparing a draft environmental impact statement (EIS) for further public review to identify a range of alternatives for meeting the Corps' training requirements and analyzing the environmental impacts.

"We realize members of the public have concerns and questions about the proposed withdrawal and what the segregation means," said Roxie Trost, BLM's Barstow Field Office manager. "These meetings will provide a first-hand opportunity to have the proposal and subsequent opportunities for full public involvement explained," she said.

The Department of the Navy, in accordance with the Engle Act, filed an application requesting the Secretary of the Interior to process a proposed withdrawal of public lands for military training and exercises involving the Marine Corps Air Ground Combat Center at Twentynine Palms. The proposal seeks to withdraw approximately 366,000 acres of federal public land and, if eventually acquired, approximately 72,000 acres of non-federally owned property within the proposed withdrawal area.

-BLM-

Last updated: 09-16-2008

News Release

For Release: December 1, 2008
Contact: Stephen Razo 951-697-5217; email: srazo@ca.blm.gov
CA-CDD-09-15

Scoping Meetings Scheduled for Proposed 29 Palms Marine Base (MCAGCC) Expansion

The Department of the Navy, Department of Defense, issued a notice of intent (NOI) on October 30, 2008 for the preparation of a draft environmental impact statement (EIS) to study alternatives for expansion of the boundaries and airspace of the Marine Corps Air Ground Combat Center in Twentynine Palms, San Bernardino County, CA. The Bureau of Land Management (BLM) is a cooperating agency in the draft EIS.

Three open-house public scoping meeting have been scheduled:

1) December 3, 2008, 5-9 pm at Twentynine Palms Junior High School, Hay's Gym, 5798 Utah Trail, Twentynine Palms, CA;
2) December 4, 2008, 5-9 pm at Hilton Garden Inn Victorville, 12603 Mariposa Road, Victorville, CA; and
3) December 5 2008 5-9 pm at the Ontario Convention Center, 2000 E. Convention Center Way, Ontario, CA.

The open house will include personnel to discuss the purpose and need for the project, draft alternatives for public consideration and comment, information on how the process will proceed, a mailing list sign-up, a package of information to take with you and make later comments. A public recorder will also be present to receive initial scoping comments at the meetings on the issues and alternatives that should be examined as part of the environmental analysis. Public input will be considered in the preparation of the environmental document. Written comments will become part of the public record, in accordance with the National Environmental Policy Act (NEPA) and Administrative Procedures Act.

The MCAGCC has segregated approximately 366,000 acres of public lands to evaluate various expansion options. An additional 72,000 non-federally owned acres are also within the boundaries of one or more of the alternatives currently under development. The proposed project would provide additional lands within the MCAGCC for additional Marine Corps force-on-force training to accommodate identified needs. Representatives from the Department of the Navy, MCCAGC, and BLM will be present to answer questions.

Written or email comments may be sent to Mr. Joseph Ross, 29Palms Proposed Training Land/Airspace Acquisition Project, MAGTFTC/MCAGCC, Bldg 1554, Box 788104, Bldg 1554, Rm 138, MAGTFTC/MCAGCC, Twentynine Palms, CA 92278–8104; by voice mail at: 760–830–3764; or by e-mail at: SMBPLMSWEBPAO@usmc.mil.

For further information, and for new information as the EIS is developed and the process proceeds, see the project website at www.29palms.usmc.mil/las

BLM contact is Roxie Trost, Barstow Field Office (760) 252-6000.

-BLM-

California Desert District Office – 22835 Calle San Juan de Los Lagos, Moreno Valley, CA 92553- (951) 697-5217

Last updated: 12-09-2008

The U.S. Marine Corps invites you to participate in the 29Palms Training Land Acquisition/Airspace Establishment EIS Process and Draft Conformity Determinations

The Department of the Navy, on behalf of the U.S. Marine Corps and in cooperation with the Bureau of Land Management and Federal Aviation Administration, has prepared a Draft Environmental Impact Statement (EIS) to evaluate the potential environmental impacts associated with the proposed expansion of the training range at the Marine Corps Air Ground Combat Center (Combat Center) at Twentynine Palms, Calif. The proposed action would accommodate training exercises for all elements of a Marine Expeditionary Brigade.

The U.S. Marine Corps wants your input!

OPEN HOUSE PUBLIC MEETINGS

Joshua Tree:	Ontario:	Victorville:
April 12, 2011 5-9 P.M. Copper Mountain College Bell Center Gym 6162 Rotary Way Joshua Tree, Calif.	April 13, 2011 5-9 P.M. Ontario High School Gym 901 W. Francis St. Ontario, Calif.	April 14, 2011 5-9 P.M. Hilton Garden Inn Mirage/Sahara Conference Center 12603 Mariposa Rd. Victorville, Calif.

There will not be a formal presentation.

Submit written comments to:
Naval Facilities Engineering Command, Southwest
ATTN: 29Palms EIS Project Manager
1220 Pacific Highway
San Diego, CA 92132-5190
Website: www.marines.mil/unit/29palms/las

Comments on the Draft EIS must be received or postmarked by May 26, 2011, for consideration in the Final EIS.

For more information visit: www.marines.mil/unit/29palms/las

The Marine Corps has also completed a Clean Air Act conformity evaluation, as prescribed by Mojave Desert Air Quality Management District (MDAQMD) Rule 2002 and the U.S. Environmental Protection Agency's General Conformity Rule. The conformity evaluation covers proposed emissions that would occur at the Combat Center and within the Mojave Desert Air Basin (MDAB). The conformity evaluation demonstrates that the federal action conforms to the applicable ozone (O_3) and respirable particulates (PM_{10}) State Implementation Plan for the MDAB. In accordance with section 2002(F)(2) of MDAQMD Rule 2002, the Draft O_3 and PM_{10} Conformity Determinations resulting from these evaluations are available for the next 30 days for review by interested parties on the project website at **www.marines.mil/unit/29palms/las**. Written comments may be submitted to the Pacific Highway address. **Comments on the Conformity Determinations must be postmarked by March 28, 2011.**

The U.S. Marine Corps invites you to participate in the Proposed 29Palms Training Land/ Airspace Acquisition Project

The Department of the Navy is in the initial stages of preparing an Environmental Impact Statement (EIS) for the proposed acquisition of lands and establishment of airspace contiguous to the Marine Corps Air Ground Combat Center, Twentynine Palms, California.

The EIS will consider a range of reasonable alternatives for the proposed action sufficient to meet Marine Expeditionary Brigade training requirements.

The U.S. Marine Corps wants your input!

Attend an open house scoping meeting to let the Marine Corps know what issues and interests you have for consideration in the development of the EIS.

PUBLIC SCOPING MEETINGS

Twentynine Palms:	Victorville:	Ontario:
Dec. 3, 2008	Dec. 4, 2008	Dec. 5, 2008
5 to 9 p.m.	5 to 9 p.m.	5 to 9 p.m.
Twentynine Palms Jr. High, Hays Gym	Hilton Garden Inn	Ontario Convention Ctr.
5798 Utah Trail	12603 Mariposa Road	2000 E. Convention Ctr. Way
Twentynine Palms, CA 92277	Victorville, CA 92395	Ontario, CA 91764

Submit written comments to: MAGTFTC, MCAGCC, ATTN: Land Acquisition Program Manager, Box 788104, Building 1554, Room 138, Twentynine Palms, CA 92278-8104; or e-mail to: SMBPLMSWEBPAO@usmc.mil

Comments must be received by Jan. 31, 2009
for consideration in the Draft EIS.

For more information visit: http://www.29palms.usmc.mil/las

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APPENDIX D
AIRSPACE MANAGEMENT

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This Airspace Management Appendix (1) describes the National Airspace System classifications and defines common aeronautical terms associated with airspace use; (2) provides a comparison of the current and proposed airspace configurations; (3) describes the representative baseline use of the Combat Center region Special Use Airspace (SUA); and (4) describes the projected SUA use under the proposed action and alternatives. The appendix data provides the basis for summary information provided in the Airspace Management sections, such as Sections 3.6 and 4.6. More detailed information on live-fire activities that would occur within new/modified Special Use Airspace (SUA) is outlined for each alternative in Chapter 2 of the EIS. In addition, Appendix E describes MEB Exercise vehicles, aircraft, and weapons in further detail, while Appendix F provides representative ammunition identification and hazard information.

D.1 National Airspace System Description

Navigable airspace over the U.S. is categorized as either controlled or uncontrolled. Controlled airspace is that airspace within which all aircraft operators are subject to certain pilot qualifications, operating rules, and equipment requirements outlined in the Federal Aviation Administration's (FAA's) "General Operating and Flight Rules" (14 Code of Federal Regulations [CFR] Part 91). By contrast, uncontrolled airspace is outside the parameters of controlled airspace where aircraft are not subject to those operating and flight rules.

Controlled airspace is defined in FAA Order 7400.2 as being "airspace of defined dimensions within which Air Traffic Control (ATC) service is provided to Instrument Flight Rules (IFR) flights and to Visual Flight Rules (VFR) flights in accordance with the airspace classification." For IFR operations in controlled airspace, a pilot must file an IFR flight plan and receive an appropriate ATC clearance.

Controlled airspace is designated as Class A, B, C, D, and E, while uncontrolled airspace is designated as Class G, as described below.

Class A airspace, generally, is that airspace from 18,000 feet above mean sea level (MSL) up to and including 60,000 feet or Flight Level (FL) 600. Flight levels are altitudes MSL based on the use of a directed barometric altimeter setting, and are expressed in hundreds-of-feet. Therefore, FL600 is equal to approximately 60,000 feet MSL. Class A airspace includes the airspace overlying the waters within 12 nautical miles (NM) of the coast of the 48 contiguous States and Alaska (U.S. Department of Transportation FAA 2008).

Class B airspace, generally, is that airspace from the surface to 10,000 feet MSL around the nation's busiest airports. The primary purpose of this class is to reduce the potential for midair collisions in the airspace surrounding those airports with high density air traffic operations. The actual configuration of Class B airspace is individually tailored but essentially resembles an inverted wedding cake consisting of a surface area and two or more layers, and is designed to contain all published instrument procedures for the runway environment (U.S. Department of Transportation FAA 2008).

Class C airspace, generally, is that airspace from the surface to 4,000 feet above the airport elevation (charted in MSL) surrounding those airports that have an operational control tower, are serviced by a radar approach control, and that have a certain number of IFR operations or passenger enplanements. Although the actual configuration of Class C airspace is individually tailored, it usually consists of a surface area with a 5 NM radius, and an outer circle with a 10 NM radius that extends from 1,200 feet to 4,000 feet above the airport elevation (U.S. Department of Transportation FAA 2008). The primary purpose of Class C airspace is to improve aviation safety by reducing the risk of midair collisions in the terminal area and enhancing the management of air traffic operations therein.

Class D airspace, generally, is that airspace from the surface to 2,500 feet above the airport elevation (charted in MSL) surrounding those airports that have an operational control tower. The configuration of each Class D airspace area is individually tailored and when instrument procedures are published, the airspace will normally be designed to contain the procedures. Arrival extensions for instrument approach procedures may be designated as Class D or Class E airspace (U.S. Department of Transportation FAA 2008).

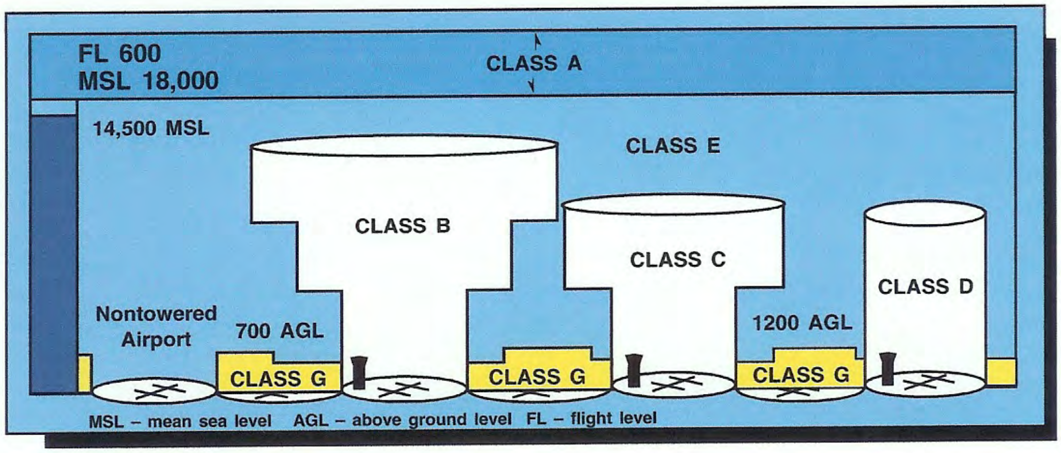
Class E airspace consists of the following seven types of airspace that are not considered to be A, B, C, or D classes as defined above.

- **Surface Area Designated for an Airport.** When so designated, the airspace will be configured to contain all instrument procedures.
- **Extension to a Surface Area.** These airspace areas serve as extensions to Class B, C, and D surface areas designated for an airport. This airspace provides controlled airspace to contain standard instrument approach procedures without imposing a communications requirement on pilots operating under VFR.
- **Airspace Used for Transition.** These areas begin at either 700 or 1,200 feet above ground level (AGL) for use in transitioning aircraft to/from the terminal or enroute environment.
- **En Route Domestic Airspace Areas.** These areas extend upward from a specified altitude to provide controlled airspace where there is a requirement for IFR enroute ATC services, but where the Federal airway system is inadequate.
- **Federal Airways.** Federal Airways (Victor Routes) are Class E airspace areas, and, unless otherwise specified, extend upward from 1,200 feet to, but not including, 18,000 feet MSL.
- **Other.** Unless designated at a lower altitude, Class E airspace begins at 14,500 feet MSL up to, but not including, 18,000 feet MSL overlying: a) the 48 contiguous States, including the waters within 12 miles from the coast of the 48 contiguous States; b) the District of Columbia; c) Alaska, including the waters within 12 miles from the coast of Alaska, and that airspace above FL600; d) excluding the Alaska peninsula west of 160°00’00” west longitude, and the airspace below 1,500 feet above the surface of the earth unless specifically so designated.
- **Offshore/Control Airspace Areas.** This includes airspace areas beyond 12 NM from the coast of the U.S., wherein ATC services are provided (U.S. Department of Transportation FAA 2008).

Class G is airspace that has not been designated as Class A, B, C, D, or E airspace. This is considered uncontrolled airspace in which ATC does not have authority over aircraft operations. This airspace follows the contours of the earth’s surface with vertical altitude limits up to 700 feet AGL, 1,200 feet AGL, or 14,500 feet MSL, as applicable. VFR general aviation pilots are the primary users of this airspace (U.S. Department of Transportation 2008).

Figure D-1 provides graphic representation of the different airspace classifications.

Figure D-1. Controlled and Uncontrolled Airspace Depictions



Airspace and Aeronautical Terms

Special Use Airspace (SUA) is airspace of defined dimensions identified by an area on the surface of the earth wherein activities must be confined because of their nature and/or wherein limitations may be imposed on aircraft operations that are not part of those activities. Types of SUA include Alert Areas, Controlled Firing Areas, Military Operations Areas (MOAs), Prohibited Areas, Restricted Areas, and Warning Areas.

Military Operations Area (MOA) is airspace of defined vertical and lateral limits established outside Class A airspace to separate and segregate certain non-hazardous military activities from IFR traffic and to identify for VFR traffic where these activities are conducted (Pilot/Controller Glossary 2008). Class A airspace covers the continental U.S. and limited parts of Alaska, including the airspace overlying the water within 12 NM of the U.S. coast. It extends from 18,000 feet MSL up to, and including, 60,000 feet MSL (Pilot/Controller Glossary 2008). MOAs are considered "joint use" airspace. Non-participating aircraft operating under VFR are permitted to enter a MOA, even when the MOA is active for military use. Aircraft operating under IFR must remain clear of an active MOA unless approved by the responsible Air Route Traffic Control Center (ARTCC). Flight by both participating and VFR non-participating aircraft is conducted under the "see-and-avoid" concept, which stipulates that "when weather conditions permit, pilots operating IFR or VFR are required to observe and maneuver to avoid other aircraft. Right-of-way rules are contained in CFR Part 91" (Pilot/Controller Glossary 2008). The responsible ARTCC provides separation service for aircraft operating under IFR and MOA participants. The "see-and-avoid" procedures mean that if a MOA were active during inclement weather, the general aviation pilot could not safely access the MOA airspace.

Air Traffic Control Assigned Airspace (ATCAA) is airspace of defined vertical and lateral limits, assigned by ATC, for the purpose of providing air traffic segregation between the specified activities being conducted within the assigned airspace and other IFR air traffic (Pilot/Controller Glossary 2008). This airspace, if not required for other purposes, may be made available for military use. ATCAAs are frequently structured and used to extend the horizontal and/or vertical boundaries of MOAs.

Restricted Area is designated airspace that supports ground or flight activities that could be hazardous to non-participating aircraft. A Restricted Area is airspace designated under 14 CFR Part 73, within which the flight of aircraft, while not wholly prohibited, is subject to restriction. Most restricted areas are designated "joint-use" and IFR/VFR operations in the area may be authorized by the controlling ATC facility when it is not being utilized by the using agency (Pilot/Controller Glossary 2008).

Military Training Routes (MTRs) are flight corridors developed and used by the Department of Defense (DoD) to practice high-speed, low-altitude flight, generally below 10,000 feet MSL. Specifically, MTRs are airspace of defined vertical and lateral dimensions established for the conduct of military flight training at airspeeds in excess of 250 knots indicated airspeed (Pilot/Controller Glossary 2008). MTRs are developed in accordance with criteria specified in FAA Order 7610.4. They are described by a centerline (often with defined horizontal limits on either side of the centerline) and vertical limits expressed as minimum and maximum altitudes along the flight track. MTRs are identified as Visual Routes (VR) or Instrument Routes (IR).

Air Refueling Routes (ARs) are high-altitude flight paths within which air refueling operations are conducted. Air refueling operations are assigned specific flight paths and altitudes where potential conflicts with nonparticipating aircraft are very unlikely. ARs are not shown on civilian aeronautical charts.

Airspace for Special Use (ASU) is used to collectively identify airspace that is not classified as SUA but is of defined dimensions wherein activities must be confined because of their nature, and/or wherein limitations may be imposed on aircraft operations that are not a part of those activities. ASU includes MTRs, ATCAAs, aerial refueling track/anchors (AR), slow routes (SR), and low-altitude tactical navigation areas (LATNs).

Flight Level (FL). Manner in which altitudes at 18,000 feet MSL and above are expressed, as measured by a standard altimeter setting of 29.92 inches of mercury.

References for Airspace System Definitions

Pilot/Controller Glossary. 2008. Federal Aviation Administration Pilot/Controller Glossary, February 14, 2008.

U.S. Department of Transportation, Federal Aviation Administration (FAA). 2008. Aeronautical Information Manual, February 14, 2008.

U.S. Department of Transportation, Federal Aviation Administration (FAA). 2008. FAA Order 7400.2G, Procedures For Handling Airspace Matters. April 10, 2008.

U.S. Department of Transportation, Federal Aviation Administration (FAA). 2009. FAAH-8083-25, Pilot's Handbook of Aeronautical Knowledge.

U.S. Department of Transportation, Federal Aviation Administration (FAA). 2009. Order JO 7400.8R, Special Use Airspace, February 5, 2009.

D.2 Current and Proposed Special Use Airspace Configuration Descriptions

Table D.2-1 notes the published times of use and controlling agency for the existing SUA. Table D.2-2 describes the existing Combat Center SUA, as published in *FAA Order JO 7400.8R, Special Use Airspace*, and, for comparison, the SUA additions and modifications proposed in Chapter 2 to support MEB Exercise operations under each alternative.

Table D.2-1. Special Use Airspace Times of Use and Controlling Agency

Airspace	Designated Times of Use	Controlling or Scheduling Agency
R-2501	Continuous	Los Angeles ARTCC
Sundance MOA	Intermittent by NOTAM	Los Angeles ARTCC
Bristol MOA	0700-1500 Mon-Fri; other times by NOTAM	Los Angeles ARTCC
Turtle MOA	0600-1600 Mon-Fri; other times by NOTAM	Los Angeles ARTCC

Notes: ARTCC = Air Route Traffic Control Center; MOA = Military Operations Area; NOTAM = Notice to Airmen

Table D.2-2. Existing and Proposed Alternative Special Use Airspace Configurations

Airspace	Existing	Alternative 1, 4, 5, and 6 Proposed	Alternative 2 Proposed	Alternative 3 Proposed
R-2501 N/S/E/W	• Surface to unlimited	• No Change	• No Change	• No Change
Proposed Restricted Area R-XXXX	• Non-existent	• Surface (over controlled lands) to FL400 • Subdivided into East and West sectors	• Same as Alternative 1 with reduced boundaries	• Not proposed
Proposed Johnson Valley MOA/ATCAA	• Non-existent	• 3,000 feet AGL up to, but not including, FL180 • ATCAA from FL180 to FL400	• Same as Alternative 1 with reduced boundaries	• Not proposed
Sundance MOA	• 500 feet AGL up to, and including, 10,000 feet MSL • No overlying ATCAA	• Extend existing lateral boundaries • Raise floor to 1,500 feet AGL • Raise ceiling up to, but not including, FL180 • Establish ATCAA from FL180 to FL400	• Same as Alternative 1	• Same as Alternative 1
Bristol MOA/ATCAA	• 5,000 feet MSL up to, but not including, FL180 • ATCAA from FL180 to FL220	• Lower floor to 1500 feet AGL • Raise ATCAA ceiling to FL400	• Same as Alternative 1	• Reclassify MOA/ ATCAA as Restricted Area R-XXXXA • 5,000 feet MSL to FL400
Proposed CAX MOA/ATCAA	• Not designated – occasional use between FL190 and FL220 per LOA with FAA	• Establish Low MOA from 1,500 feet up to 8,000 feet MSL • Establish ATCAA from FL180 to FL400	• Same as Alternative 1	• Establish as Restricted Area R-XXXXB • 5,000 feet MSL to FL400
Turtle MOA/ATCAA	• MOA 11,000 feet MSL up to, but not including, FL180 • ATCAA from FL180 to FL220	• Turtle A MOA/ATCAA from 11,000 feet MSL to FL220 • Turtle B ATCAA from FL220 to FL400 • Turtle C MOA from 1,500 AGL to 11,000 feet MSL	• Same as Alternative 1	• Lower floor to 1,500 feet AGL • Raise ATCAA ceiling to FL400

Notes: CAX = Combined Arms Exercise; MOA = Military Operations Area; ATCAA = Air Traffic Control Assigned Airspace; FL = Flight Level; AGL = above ground level; MSL = mean sea level; LOA = Letter of Agreement

D.3 Representative Baseline Airspace Use

This section describes the representative baseline use of the existing Combat Center Expeditionary Airfield (EAF) and the Center SUA, to include the Turtle MOA/ATCAA. This baseline reflects the representative annual number of aircraft operations typically conducted by the different aircraft types at the EAF and within R-2501, and the Bristol MOA/ATCAA, Sundance MOA, and Turtle MOA/ATCAA.

The EAF operations consist of the takeoffs and landings, touch and go landings, and low approaches that are typically conducted in an airfield environment, to include Camp Wilson and Drop Zone (DZ) Sandhill, whereas each are counted as two operations. These operations are shown in Table D.3-1.

Table D.3-1. Representative Annual Baseline Airfield Operations

Aircraft	EAF[1]			Camp Wilson			Drop Zone Sandhill			Total			
	Day	Eve	Night	Day	Eve	Night	Day	Eve	Night	Day	Eve	Night	Total
FA-18A/C	10	6	10	0	0	0	0	0	0	10	6	0	16
F-18E/F	10	6	0	0	0	0	0	0	0	10	6	0	16
AV-8B	23	12	0	0	0	0	0	0	0	23	12	0	35
UC-35	21	22	0	0	0	0	0	0	0	21	22	0	43
C-20	21	22	0	0	0	0	0	0	0	21	22	0	43
C-17	6	6	0	0	0	0	0	0	0	6	6	0	12
C-12	167	171	3	0	0	0	0	0	0	167	171	3	341
UAV	0	0	0	0	0	0	88	132	0	88	132	0	220
E-2/C-2	10	0	0	0	0	0	0	0	0	10	0	0	10
C-130	5	5	0	0	0	0	0	0	0	5	5	0	10
CH-53E	211	217	4	10	7	0	8	12	0	229	236	4	469
MV-22B	991	597	152	0	0	0	54	34	11	1045	631	163	1839
AH-1	190	198	4	0	0	0	0	0	0	190	198	4	392
UH-1	190	198	4	0	0	0	0	0	0	190	198	4	392
SAR	128	131	3	0	0	0	0	0	0	128	131	3	262
H-60	22	22	0	0	0	0	0	0	0	22	22	0	44
Total	2005	1613	180	10	7	0	150	178	11	2165	1798	181	4144

Notes: [1]Includes aircraft arrival, departure, and touch and go operations. Eve = Evening.
Source: U.S. Department of the Navy (DoN) 2009 with MV-22 operations prorated.

SUA operations are expressed in terms of a sortie operation which is a one flight training mission conducted by a single aircraft from takeoff to landing. In quantifying airspace use, each sortie operation is normally accounted for in each SUA area in which it operates during the course of that single sortie mission. This baseline serves as a benchmark for comparison with the projected operations and assessing any potential impacts that may result from the proposed alternatives.

Tables D.3-2 and D.3-3 reflect the annual cumulative sorties by aircraft type for the R-2501 North, South, East, and West subsections; the Bristol MOA/ATCAA; and Sundance MOA. Baseline sortie data is not available for the Turtle MOA/ATCAA. More specific details on aircraft performance for current and projected sortie operations are provided in Appendix H, Noise: Description, Effects and Modeling Data.

Table D.3-2. Representative Annual Baseline Aircraft Sortie-Operations for R-2501 N/S/E/W

Aircraft Type	R-2501 N				R-2501S				R-2501 E				R-2501 W			
	Day	Eve	Night	Total	Day	Eve	Night	Total	Day	Eve	Night	Total	Day	Eve	Night	Total
F/A-18 C/D	1,075	18	-	1093	1,371	23	-	1,394	1,062	17	-	1,079	1,016	17	-	1,033
F-5E	36	-	-	36	44	-	-	44	35	-	-	35	3	-	-	3
KC-130	340	18	-	358	433	23	-	456	335	17	-	352	322	17	-	339
AV-8B	645	250	-	895	821	319	-	1,140	636	247	-	883	611	237	-	848
AH-1	876	214	54	1,144	1,119	275	69	1,463	867	212	53	1,132	829	203	51	1,083
UH-1	359	-	-	359	458	-	-	458	354	-	-	354	339	-	-	339
CH-53E	537	18	-	555	684	23	-	707	530	17	-	547	508	17	-	525
MV-22 [1]	22	12	4	38	4	1		5	30	11		41	48	23	4	75
UAS	161	18	107	286	206	23	137	366	159	17	105	282	152	17	101	270
Total	4,066	575	187	4,790	5,142	688	206	6,036	4,028	546	159	4,733	3,891	547	158	4,596

Note: [1] MV-22 sorties are flown on perimeter routes to landing and assault zones located within the SUA and do not typically include other mission activities. Eve = Evening

Source: DoN2009.

Table D.3-3. Representative Annual Baseline Sortie-Operations for the Sundance, Bristol, and Turtle MOAs

Aircraft Type	Sundance MOA				Bristol MOA/ATCAA				Total R-2501 and MOA Sortie				Turtle MOA/ATCAA No data available – see text			
	Day	Eve	Night	Total	Day	Eve	Night	Total	Day	Eve	Night	Total	Day	Eve	Night	Total
F/A-18 C/D	100	2	-	102	232	5	-	237	4,856	82	-	4938				
F-5E	3	-	-	3	7	-	-	7	158	-	-	158				
KC-130	32	2	-	34	75	5	-	80	1,537	82	-	1,619				
AV-8B	60	23	-	83	140	54	-	194	2,913	1,130	-	4,043				
AH-1	83	20	5	108	192	47	12	251	3,966	971	244	5,181				
UH-1	34	-	-	34	79	-	-	79	1,623	-	-	1,623				
CH-53E	50	2	-	52	116	5	0	121	2,425	82	-	2,507				
MV-22[1]	6	1		7	6	1		7	4	1		5				
UAS	15	2	10	27	35	5	23	63	728	82	484	1,294				
Total	387	53	15	455	888	123	35	1,044	18,412	2,518	740	21,670				

Notes: MOA = Military Operations Area; ATCAA = Air Traffic Control Assigned Airspace; Eve = Evening

Source: DoN 2009.

D.4 Projected Special Use Airspace Use

Projected annual use of the Combat Center airspace is based on the estimated number of sorties that would be conducted by the different participating aircraft types for Marine Expeditionary Brigade (MEB) and Enhanced Mojave Viper (EMV) Exercises and tenant/transient activities. These projections are based on a Marine Air Ground Task Force (MAGTF) G3 analysis of the flight training requirements for each of these mission activities over a typical 12-month period. Aircraft flight profiles and sortie operations within each SUA area would vary somewhat based on the land acquisitions and ground-based activities proposed under each alternative.

Aircraft types shown in the projected data differ somewhat from the baseline due to newer generation aircraft that will be fully operational within the timeframe of the proposed MEB Exercise operations. For example, it was estimated that the F-35 will represent approximately 10 percent of F-18 sorties and 25 percent of AV-8 sorties. The MAGTF G3 data was adjusted accordingly to account for F-35 sorties.

Table D.4-1 provides a summary of the estimated total sorties that would be conducted by participating aircraft during the single and annual MEB Exercise events. Also included are EMV and tenant/transient operations that typically would be conducted in the Combat Center airspace throughout the year when an MEB Exercise is not scheduled. These sortie estimates would be generally the same for all airspace configurations proposed under the different alternatives.

Table D.4-1. Estimated Annual Sorties for all Combat Center Exercise and Training Activities

Aircraft Type	MEB Exercise		EMV Exercise		Tenant/Transient and Other Military Training	Cumulative Annual Total
	Single Exercise	Total Twice Annual	Single Exercise	Total Eight Annual		
AV-8B	150	300	90	720	603	1,623
FA-18	242	484	150	1,200	996	2,680
F-35	76	152	46	368	308	828
Joint FW	2	4	16	128	0	132
AH/UH-1	546	1,092	336	2,688	2,236	6,016
CH-53	116	232	114	912	677	1,821
MV-22	134	268	100	800	632	1,700
Joint RW	160	320	84	672	0	992
EA-6B	37	74	19	152	134	360
KC-130	68	136	40	320	270	726
Joint AR	18	36	4	32	0	68
UAS	120	240	46	368	460	1,068
Total	**1,669**	**3,338**	**1,046**	**8,368**	**6,351**	**18,057**

Notes: MEB = Marine Expeditionary Brigade; EMV = Enhanced Mojave Viper

Sortie Estimate Assumptions

Sortie estimates for the Combat Center SUA are based on the following data and assumptions that were derived from the MAGTF G3 operational analyses of the proposed and ongoing Combat Center operations.

1. MAGTF G3 analyses identified MEB Exercise Work-up and Final sortie projections for each daily activity and airspace use based on anticipated aircraft participants and training mission requirements. These analyses also identified daily flight windows (hours of use) for the existing and proposed airspace and altitude blocks that would typically be utilized during the Work-up and Final flight activities. Airspace use tables are based on the sortie totals and airspace to be utilized (as indicated by flight windows) for the MEB Exercise Work-up and Final phases.

2. Mission activities would occur over a 24-hour period that is divided into day, evening, and night timeframes for noise modeling purposes. The average distribution (percentage) of aircraft sorties conducted within time periods during the Work-up and Final phases is assumed to be as follows:

Work-up: Day (70%) Evening (25%) Night (5%)
Final: Day (50% Evening (12%) Night (38%)

3. The nature of the MEB Exercise mission activities would generally require most aircraft types to maneuver, to some extent, throughout all Combat Center airspace during the course of an exercise flight operation. For that reason, the same number of sorties is shown in multiple areas for each aircraft, where appropriate, for all alternatives and associated airspace configurations. The time spent, altitudes used, and profiles flown within each SUA area would differ somewhat, depending on the air and ground mission scenarios performed each day.

4. Table D.4-2 presents a general estimate of the percentage of sortie duration time an aircraft would typically operate within each SUA area for the alternative airspace proposals. These percentages are based on the above assumptions and the annual total hours of use shown in the MAGTF G3 analysis summary for each airspace area.

5. These assumptions were used uniformly for the MEB, EMV, and tenant/transient estimates since it is anticipated that all Combat Center activities would make full use of the proposed land acquisition and airspace capabilities.

Table D.4-2. Sortie Duration Distribution in Existing/Proposed Airspace

Existing/Proposed Airspace	Percentage of Sortie Duration in SUA	
Alternatives 1, 2, 4, 5, and 6		
	Work-up	**Final**
R-2501	40	27
Proposed Restricted Area R-XXXX	19	24
Proposed Johnson Valley MOA/ATCAA	19	24
Bristol MOA/ATCAA	22	15
Proposed Expanded Sundance MOA/ATCAA	Not used	4
Proposed CAX MOA/ATCAA	Not used	3
Turtle MOA/ATCAA	Not used	3
Total	100	100
Alternative 3		
R-2501	25	25
Bristol Restricted Area	23	23
CAX Restricted Area	17	17
Proposed Expanded Sundance MOA/ATCAA	19	19
Turtle MOA/ATCAA	16	16
Total	100	100

Note: SUA = Special Use Airspace; MOA = Military Operations Area; ATCAA = Air Traffic Control Assigned Airspace; CAX = Combined Arms Exercise

MEB Exercise Estimates

Tables D.4-3 through D.4-6 reflect the estimated number of aircraft sortie-operations that would be conducted during the MEB Exercise Work-up and Final phases under the different alternatives for the day, evening, and night time periods. Throughout all tables, Joint FW refers to other Service fighter type aircraft such as F-16s; Joint RW refers to other Service helicopters such as an H-60; and Joint AR refers to other Service Aerial Refueling aircraft such as a KC-135 or K-10.

Table D.4-3. Estimated MEB Exercise Sortie-Operations for Single Work-up Period - Alternatives 1, 2, 4, 5, and 6

Aircraft Type	• R-2501 • Proposed RA R-XXXX and Johnson Valley MOA/ATCAA				Proposed Bristol MOA/ATCAA Modification				Proposed Modifications • Sundance MOA/ATCAA • CAX Corridor MOA/ATCAA • Turtle MOA/ATCAA			
	Day	Eve	Night	Total	Day	Eve	Night	Total	Day	Eve	Night	Total
AV-8B	80	29	6	114	80	28	6	114	-	-	-	-
FA-18	109	39	8	155	109	38	8	155	-	-	-	-
F-35	39	14	3	55	39	13	3	55	-	-	-	-
Joint FW	1	1	0	2	1	1	0	2	-	-	-	-
AH/UH-1	298	107	21	426	-	-	-	-	-	-	-	-
CH-53	73	26	5	104	-	-	-	-	-	-	-	-
MV-22	81	29	6	116	-	-	-	-	-	-	-	-
Joint RW	95	34	7	136	-	-	-	-	-	-	-	-
EA-6B	20	7	1	28	20	7	1	28	-	-	-	-
KC-130	35	13	3	50	35	12	3	50	-	-	-	-
Joint AR	0	0	0	0	-	-	-	-	-	-	-	-
UAS	59	21	4	84	59	21	4	84	-	-	-	-
Total	890	320	64	1270	343	120	25	488	-	-	-	-

Notes: MOA = Military Operations Area; ATCAA = Air Traffic Control Assigned Airspace; CAX = Combined Arms Exercise

Table D.4-4. Estimated MEB Exercise Sortie-Operations for Single Final Period - Alternatives 1, 2, 4, 5, and 6

Aircraft Type	• R-2501 • Proposed RA R-XXXX and Johnson Valley MOA/ATCAA • Sundance MOA/ATCAA Modification • Bristol MOA/ATCAA Modification				New CAX Corridor MOA/ATCAA				Turtle MOA/ATCAA Modification			
	Day	Eve	Night	Total	Day	Eve	Night	Total	Day	Eve	Night	Total
AV-8B	18	9	9	36	18	9	9	36	18	9	9	36
FA-18	43	22	21	86	43	22	21	86	43	22	21	86
F-35	11	6	5	22	11	6	5	22	11	6	5	22
Joint FW	9	2	7	18	9	2	7	18	-	-	-	-
AH/UH-1	60	30	30	120	60	30	30	120	-	-	-	-
CH-53	6	3	3	12	6	3	3	12	-	-	-	-
MV-22	9	5	4	18	9	5	4	18	-	-	-	-
Joint RW	12	6	6	24	12	6	6	24	-	-	-	-
EA-6B	5	2	2	9	5	2	2	9	5	2	2	9
KC-130	10	4	4	18	10	4	4	18	9	4	8	18
Joint AR	9	5	4	18	9	5	4	18	9	5	4	18
UAS	18	9	9	36	18	9	9	36	18	9	9	36
Total	201	101	97	399	201	101	97	399	113	57	58	225

Notes: MOA = Military Operations Area; ATCAA = Air Traffic Control Assigned Airspace; CAX = Combined Arms Exercise

Table D.4-5. Estimated MEB Exercise Sortie-Operations for Single Work-Up Period - Alternative 3

Aircraft Type	R-2501				Sundance MOA/ATCAA Modification				New Bristol Restricted Area				New CAX Corridor Restricted Area				Turtle MOA/ATCAA Modification			
	Day	Eve	Night	Total	Day	Eve	Night	Total	Day	Eve	Night	Total	Day	Eve	Night	Total	Day	Eve	Night	Total
AV-8B	80	28	6	114	80	28	6	114	80	28	6	114	80	28	6	114	80	28	6	114
FA-18	109	38	8	155	109	38	8	155	109	38	8	155	109	38	8	155	109	38	8	155
F-35	39	13	3	55	39	13	3	55	39	13	3	55	39	13	3	55	39	13	3	55
Joint FW	1	1	0	2	1	1	0	2	1	1	0	2	1	1	0	2	1	1	0	2
AH/UH-1	298	107	21	426	298	107	21	426	298	107	21	426	298	107	21	426	298	107	21	426
CH-53	73	26	5	104	73	26	5	104	73	26	5	104	73	26	5	104	73	26	5	104
MV-22	81	29	6	116	81	29	6	116	81	29	6	116	81	29	6	116	81	29	6	116
Joint RW	95	34	7	136	95	34	7	136	95	34	7	136	95	34	7	136	95	34	7	136
EA-6B	20	7	1	28	20	7	1	28	20	7	1	28	20	7	1	28	20	7	1	28
KC-130	35	12	3	50	35	12	3	50	35	12	3	50	35	12	3	50	35	12	3	50
Joint AR	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
UAS	59	21	4	84	59	21	4	84	59	21	4	84	59	21	4	84	59	21	4	84
Total	890	316	64	1270	890	316	64	1270	890	316	64	1270	890	316	64	1270	890	316	64	1270

Notes: MOA = Military Operations Area; ATCAA = Air Traffic Control Assigned Airspace; CAX = Combined Arms Exercise

Table D.4-6. Estimated MEB Exercise Sortie-Operations for Single Final Period - Alternative 3

Aircraft Type	R-2501				Sundance MOA/ATCAA Modification				New Bristol Restricted Area				New CAX Corridor Restricted Area				Turtle MOA/ATCAA Modification			
	Day	Eve	Night	Total	Day	Eve	Night	Total	Day	Eve	Night	Total	Day	Eve	Night	Total	Day	Eve	Night	Total
AV-8B	18	9	9	36	18	9	9	36	18	9	9	36	18	9	9	36	18	9	9	36
FA-18	43	22	21	86	43	22	21	86	43	22	21	86	43	22	21	86	43	22	21	86
F-35	11	6	5	22	11	6	5	22	11	6	5	22	11	6	5	22	11	6	5	22
Joint FW	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
AH/UH-1	60	30	30	120	60	30	30	120	60	30	30	120	60	30	30	120	-	-	-	-
CH-53	6	3	3	12	6	3	3	12	6	3	3	12	6	3	3	12	-	-	-	-
MV-22	9	5	4	18	9	5	4	18	9	5	4	18	9	5	4	18	-	-	-	-
Joint RW	12	6	6	24	12	6	6	24	12	6	6	24	12	6	6	24	-	-	-	-
EA-6B	5	2	2	9	5	2	2	9	5	2	2	9	5	2	2	9	5	2	2	9
KC-130	10	4	4	18	10	4	4	18	10	4	4	18	10	4	4	18	9	4	8	18
Joint AR	9	5	4	18	9	5	4	18	9	5	4	18	9	5	4	18	9	5	4	18
UAS	18	9	9	36	18	9	9	36	18	9	9	36	18	9	9	36	18	9	9	36
Total	201	101	97	399	201	101	97	399	201	101	97	399	201	101	97	399	113	57	58	225

Notes: MOA = Military Operations Area; ATCAA = Air Traffic Control Assigned Airspace; CAX = Combined Arms Exercise

Table D.4-7 reflects MAGTF G3 estimates of the percentage of time each aircraft type typically operates within the indicated altitude strata described in Chapter 2. Table D.4-8 includes a further estimate of the percentage of time at which aircraft operate within the lower altitudes.

Table D.4-7. Typical Altitude Distributions for Aircraft Types

Aircraft Type	Surface up To, but not including, 8,000 feet MSL	8,000 feet MSL up to, but not including, 14,000 feet MSL	14,000 feet MSL up to, but not including, 18,000 feet MSL	18,000 feet MSL up to, but not including, FL270	FL270 up to FL400
F/A18	5-10%	30%	60%		5%
F-35	5-10%	30%	60%		5%
AV-8	5-10%	30%	60%		5%
EA-6B	0	0	0	100%	0
KC-130	10%	0	95%	0	0
Joint FW	5-10%	30%	60%		5%
AH-1	100%	0	0	0	0
UH-1	100%	0	0	0	0
CH-46	100%	0	0	0	0
CH-53	100%	0	0	0	0
MV-22	60%	40%	0	0	0
Joint RW	100%	0	0	0	0
Joint AR	0	0	0	100%	0
UAS	80%	20%		0	0

Notes: MSL = mean seal level; FL = Flight Level

Table D.4-8. Typical Lower Altitude Distributions for Aircraft Types

Aircraft Type	Typical Altitude Distribution by Percentage within Altitude Range (feet AGL with average ground elevation of 4,000 feet MSL)									
	Average Sortie Duration (minutes)	Surface - 500 feet	500 - 1,000	1,000 - 3,000'	3,000 – 4,000	Surface – 4,000	4,000 - 10,000	10,000 - 14,000	14,000 - 24,000	24,000 - 36,000
AV-8B	78	5	1	1	2		29	57		5
F/A-18C/D	90	5	1	1	2		29	57		5
F-35B*	90	5	1	1	2		29	57		5
Joint FW	90	5	1	1	2		29	57		5
AH-1/ UH-1	90	70	20	9	1					
CH-53	90	70	20	9	1					
MV-22	120	49	14	6	1		30			
Joint RW	120	70	20	9	1					
EA-6B	120								100	
KC-130	180					2.5	2.5	95		
Joint AR	240								100	
UAS	600					80	20			

Notes: AGL = above ground level; MSL = mean sea level

Tables D.4-9 and D.4-10 show the aircraft sortie altitude distributions for the MEB Exercise Work-up and Final periods based on Table D.4-7 estimates for each aircraft type. Tables D.4-11 through D.4-20 provide similar estimates for future EMV exercises and tenant/transient sortie-operations.

Table D.4-9. Estimated Single MEB Exercise Sortie-Operations by Airspace/Altitude Distribution - Alternatives 1, 2, 4, 5, and 6

Aircraft	Existing and Proposed Special Use Airspace by Altitude Stratifications																
	R-2501		Proposed Restricted Area R-XXXX/ Johnson Valley MOA/ATCAA				Proposed Sundance MOA/ATCAA Modification		Bristol MOA/ATCAA Modification			New CAX Corridor MOA/ATCAA			Turtle MOA/ATCAA Modification		
	Surface to not incl. 14,000	14,000 - FL270	Surface to not incl. 8,000	8,000 to not incl. 14,000	14,000 to not incl. FL270	FL270- FL400	Surface to not incl. 14,000	14,000 - FL270	Surface to not incl. 14,000	14,000 to not incl. FL270	FL270 - FL400	Surface to not incl. 14,000	14,000 to not incl. FL270	FL270 - FL400	5,000 to not incl. 11,000	11,000- FL180	FL180- FL400
MEB Exercise Work-up Period (training days 1-19; no flight activity on days 10 and 18)																	
AV-8B	114	114	114	114	114	0	0	0	0	114	0	0	0	0	0	0	0
FA-18	155	155	155	155	155	0	0	0	0	155	0	0	0	0	0	0	0
F-35	55	55	55	55	55	0	0	0	0	55	0	0	0	0	0	0	0
Joint FW	2	2	2	2	2	0	0	0	0	2	0	0	0	0	0	0	0
AH/UH-1	426	0	426	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CH-53	104	0	104	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MV-22	116	0	116	116	0	0	0	0	0	0	0	0	0	0	0	0	0
Joint RW	136	0	136	0	0	0	0	0	0	0	0	0	0	0	0	0	0
EA-6B	0	28	0	0	28	0	0	0	0	28	0	0	0	0	0	0	0
KC-130	3	47	3	0	47	0	0	0	0	47	0	0	0	0	0	0	0
Joint AR	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
UAS	84	84	84	84	84	0	0	0	0	84	0	0	0	0	0	0	0
Total	1195	485	1195	526	485	0	0	0	0	485	0	0	0	0	0	0	0
MEB Exercise Final Period (flight training days 20-22)																	
AV-8B	36	36	36	36	36	36	36	36	36	36	36	36	36	36	0	36	0
FA-18	86	86	86	86	86	86	86	86	86	86	86	86	86	86	0	86	0
F-35	22	22	22	22	22	22	22	22	22	22	22	22	22	22	0	22	0
Joint FW	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	晉
AH/UH-1	120	0	120	0	0	0	120	0	120	0	0	120	0	0	0	0	0
CH-53	12	0	12	0	0	0	12	0	12	0	0	12	0	0	0	0	0
MV-22	18	18	18	18	0	0	18	0	18	0	0	18	0	0	0	0	0
Joint RW	24	0	24	0	0	0	24	0	24	0	0	24	0	0	0	0	0
EA-6B	0	9	0	0	9	0	0	9	0	9	0	0	9	0	0	9	0
KC-130	1	17	1	0	17	0	1	17	1	17	0	1	17	0	0	17	0
Joint AR	0	18	0	0	18	0	0	18	0	18	0	0	18	0	0	18	0
UAS	36	36	36	36	36	0	36	36	36	36	0	0	36	0	0	36	0
Total	355	242	355	198	224	144	355	224	355	224	144	319	224	144	0	224	0

Note: MOA = Military Operations Area; ATCAA = Air Traffic Control Assigned Airspace; CAX = Combined Arms Exercise; FL = Flight Level; MEB = Marine Expeditionary Brigade

Table D.4-10. Estimated Single MEB Exercise Sortie-Operations by Airspace/Altitude Distribution - Alternative 3

Aircraft	Mission Altitude Distribution within Existing and Proposed Special Use Airspace												
	R-2501		Sundance MOA/ATCAA Modification		New Bristol RA Modification			New CAX RA			Turtle MOA/ATCAA Modification		
	Surface to not incl. 14,000	14,000 - FL270	Surface to not incl. 14,000	14,000 - FL270	Surface to not incl. 14,000	14,000 to not incl. FL270	FL270 - FL400	Surface to not incl. 14,000	14,000 to not incl. FL270	FL270 - FL400	5,000 to not incl. 11,000	11,000 to not incl. FL180	FL180 - FL400
MEB Exercise Work-up Period (training days 1-19; no flight activity on days 10 and 18)													
AV-8B	114	114	114	114	114	114	0	114	114	0	114	114	0
FA-18	155	155	155	155	155	155	0	155	155	0	155	155	0
F-35	55	55	55	55	55	55	0	55	55	0	55	55	0
Joint FW	2	2	2	2	2	2	0	2	2	0	2	2	0
AH/UH-1	426	0	426	0	426	0	0	426	0	0	426	0	0
CH-53	104	0	104	0	104	0	0	104	0	0	104	0	0
MV-22	116	0	116	0	116	0	0	116	0	0	116	116	0
Joint RW	136	0	136	0	136	0	0	136	0	0	136	0	0
EA-6B	0	28	0	28	0	28	0	0	28	0	0	28	0
KC-130	3	47	3	47	3	47	0	3	47	0	3	0	0
Joint AR	0	0	0	0	0	0	0	0	0	0	0	0	0
UAS	28	28	28	28	28	28	0	28	28	0	28	28	0
Total	1,139	429	1,139	429	1,139	429	0	1,139	429	0	1,139	498	0
MEB Exercise Final Period (flight training days 20-22)													
AV-8B	36	36	36	36	36	36	36	36	36	0	36	36	0
FA-18	86	86	86	86	86	86	86	86	86	0	86	86	0
F-35	22	22	22	22	22	22	22	22	22	0	22	22	0
Joint FW	0	0	0	0	0	0	0	0	0	0	0	0	0
AH/UH-1	120	0	120	0	120	0	0	120	0	0	120	0	0
CH-53	12	0	12	0	12	0	0	12	0	0	12	0	0
MV-22	18	0	18	0	18	0	0	18	0	0	18	18	0
Joint RW	24	0	24	0	24	0	0	24	0	0	24	0	0
EA-6B	0	9	0	9	0	9	0	0	9	0	0	0	0
KC-130	1	17	1	17	1	17	0	1	17	0	1	17	0
Joint AR	0	18	0	18	0	18	0	0	18	0	0	18	0
UAS	36	36	36	36	36	36	0	36	36	0	36	36	0
Total	355	224	355	224	335	224	144	355	224	0	355	233	0

Note: MOA = Military Operations Area; ATCAA = Air Traffic Control Assigned Airspace; CAX = Combined Arms Exercise; FL = Flight Level; MEB = Marine Expeditionary Brigade

Table D.4-11. Estimated Single EMV Sortie-Operations for Work-Up Period - Alternatives 1, 2, 4, 5, and 6

Aircraft Type	• R-2501 • Proposed Restricted Area R-XXXX and Johnson Valley MOA/ATCAA • Sundance MOA/ATCAA Modification • Bristol MOA/ATCAA Modification				• New CAX MOA/ATCAA • Turtle MOA/ATCAA Modification NOT USED			
	Day	Eve	Night	Total	Day	Eve	Night	Total
AV-8B	51	18	4	73	-	-	-	-
FA-18	85	30	6	121	-	-	-	-
F-35	26	10	2	38	-	-	-	-
Joint FW	5	2	1	8	-	-	-	-
AH/UH-1	193	69	14	276	-	-	-	-
CH-53	71	26	5	102	-	-	-	-
MV-22	59	21	4	84	-	-	-	-
Joint RW	48	17	3	68	-	-	-	-
EA-6B	12	4	1	17	-	-	-	-
KC-130	1	1	0	2	-	-	-	-
Joint AR	0	0	0	0	-	-	-	-
UAS	29	10	3	42	-	-	-	-
Total	575	205	41	823	-	-	-	-

Notes: MOA = Military Operations Area; ATCAA = Air Traffic Control Assigned Airspace; CAX = Combined Arms Exercise; Eve = Evening

Table D.4-12. Estimated Single EMV Sortie-Operations for Final Period - Alternatives 1, 2, 4, 5, and 6

Aircraft Type	• R-2501 • Proposed Western Restricted Area and MOA/ATCAA • Sundance MOA/ATCAA Modification • Bristol MOA/ATCAA Modification • Proposed CAX MOA/ATCAA				Turtle MOA/ATCAA Modification			
	Day	Eve	Night	Total	Day	Eve	Night	Total
AV-8B	9	2	6	17	9	2	6	17
FA-18	15	3	11	29	15	3	11	29
F-35	4	1	3	8	4	1	3	8
Joint FW	4	1	3	8	4	1	3	8
AH/UH-1	30	7	23	60	-	-	-	-
CH-53	6	1	5	12	-	-	-	-
MV-22	8	2	6	16	-	-	-	-
Joint RW	8	2	6	16	-	-	-	-
EA-6B	1	0	1	2	-	-	-	-
KC-130	4	1	3	8	4	1	3	8
Joint AR	2	1	1	4	-	-	-	-
UAS	6	2	4	12	6	2	4	12
Total	97	23	72	192	42	10	30	82

Notes: MOA = Military Operations Area; ATCAA = Air Traffic Control Assigned Airspace; CAX = Combined Arms Exercise; Eve = Evening

Table D.4-13. Estimated Single EMV Sortie-Operations for Work-up Period - Alternative 3

Aircraft Type	• R-2501 • Sundance MOA/ATCAA Modification • New Bristol Restricted Area • New CAX Restricted Area				Turtle MOA/ATCAA Modification			
	Day	Eve	Night	Total	Day	Eve	Night	Total
AV-8B	51	18	4	73	51	18	4	73
FA-18	85	30	6	121	85	30	6	121
F-35	26	10	2	38	26	10	2	38
Joint FW	5	2	1	8	5	2	1	8
AH/UH-1	193	69	14	276	-	-	-	-
CH-53	71	25	4	102	-	-	-	-
MV-22	59	21	4	84	-	-	-	-
Joint RW	48	17	3	68	-	-	-	-
EA-6B	12	4	1	17	12	4	1	17
KC-130	1	1	0	2	-	-	-	-
Joint AR	0	0	0	0	-	-	-	-
UAS	29	10	3	42	24	8	2	34
Total	575	205	41	823	203	72	16	291

Notes: MOA = Military Operations Area; ATCAA = Air Traffic Control Assigned Airspace; CAX = Combined Arms Exercise; Eve = Evening

Table D.4-14. Estimated Single EMV Sortie-Operations for Final Period - Alternative 3

Aircraft Type	• R-2501 • Sundance MOA/ATCAA Modification • New Bristol Restricted Area • New CAX Restricted Area				Turtle MOA/ATCAA Modification			
	Day	Eve	Night	Total	Day	Eve	Night	Total
AV-8B	9	2	6	17	9	2	6	17
FA-18	15	3	11	29	15	3	11	29
F-35	4	1	3	8	4	1	3	8
Joint FW	4	1	3	8	4	1	3	8
AH/UH-1	30	7	23	60	-	-	-	-
CH-53	6	1	5	12	-	-	-	-
MV-22	8	2	6	16	-	-	-	-
Joint RW	8	2	6	16	-	-	-	-
EA-6B	1	0	1	2	1	0	1	2
KC-130	4	1	3	8	4	1	3	8
Joint AR	2	1	1	4	2	1	1	4
UAS	6	2	4	12	6	2	4	12
Total	97	23	72	192	33	9	22	64

Notes: MOA = Military Operations Area; ATCAA = Air Traffic Control Assigned Airspace; CAX = Combined Arms Exercise; Eve = Evening

Table D.4-15. Estimated Single EMV Exercise Sortie-Operations by Airspace/Altitude Distribution - Alternatives 1, 2, 4, 5, and 6

Aircraft	Existing and Estimated Special Use Airspace by Altitude Stratifications																
	R-2501		Proposed Restricted Area R-XXXX/ Johnson Valley MOA/ATCAA				Proposed Sundance MOA/ATCAA Modification		Bristol MOA/ATCAA Modification			New CAX Corridor MOA/ATCAA			Turtle MOA/ATCAA Modification		
	Surface to not incl. 14,000	14,000 - FL270	Surface to not incl. 8,000	8,000 to not incl. 14,000	14,000 to not incl. FL270	FL270-FL400	Surface to not incl. 14,000	14,000 - FL270	Surface to not incl. 14,000	14,000 to not incl. FL270	FL270 - FL400	Surface to not incl. 14,000	14,000 to not incl. FL270	FL270 - FL400	5,000 to not incl. 11,000	11,000-FL180	FL180-FL400
EMV Work Up Period (training days 1-19; no flight activity on days 13 and 19)																	
AV-8B	73	73	73	73	73	0	73	73	73	73	0	0	0	0	0	0	0
FA-18	121	121	121	121	121	0	121	121	121	121	0	0	0	0	0	0	0
F-35	38	38	38	38	38	0	38	38	38	38	0	0	0	0	0	0	0
Joint FW	8	8	8	8	8	0	8	8	8	8	0	0	0	0	0	0	0
AH/UH-1	276	0	276	0	0	0	276	0	276	0	0	0	0	0	0	0	0
CH-53	102	0	102	0	0	0	102	0	102	0	0	0	0	0	0	0	0
MV-22	84	0	84	84	0	0	84	0	84	0	0	0	0	0	0	0	0
Joint RW	68	0	68	0	0	0	68	0	68	0	0	0	0	0	0	0	0
EA-6B	0	17	0	0	17	0	0	17	0	17	0	0	0	0	0	0	0
KC-130	2	0	2	0	30	0	30	30	0	30	0	0	0	0	0	0	0
Joint AR	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
UAS	34	34	34	34	34	0	34	34	34	34	0	0	0	0	0	0	0
Total	806	291	806	358	321	0	834	321	804	321	0	0	0	0	0	0	0
EMV Final Period (flight training days 20 and 21)																	
AV-8B	17	17	17	17	17	17	17	17	17	17	17	17	17	17	0	17	0
FA-18	29	29	29	29	29	29	29	29	29	29	29	29	29	29	0	29	0
F-35	8	8	8	8	8	8	8	8	8	8	8	8	8	8	0	8	0
Joint FW	8	8	8	8	8	8	8	8	8	8	8	8	8	8	0	8	0
AH/UH-1	60	0	60	0	0	0	60	0	60	0	0	60	0	0	0	0	0
CH-53	12	0	12	0	0	0	12	0	12	0	0	12	0	0	0	0	0
MV-22	16	0	16	16	0	0	16	0	16	0	0	16	0	0	0	0	0
Joint RW	16	0	16	0	0	0	16	0	16	0	0	16	0	0	0	0	0
EA-6B	0	2	0	0	2	0	0	2	0	2	0	0	2	0	0	0	0
KC-130	8	8	2	0	8	0	2	8	2	8	0	2	8	0	0	8	0
Joint AR	0	0	0	0	4	0	0	4	0	4	0	0	4	0	0	0	0
UAS	12	12	12	12	12	0	12	12	12	12	0	12	12	0	0	12	0
Total	186	84	180	90	88	62	180	88	180	88	62	180	88	62	0	82	0

Notes: MOA = Military Operations Area; ATCAA = Air Traffic Control Assigned Airspace; CAX = Combined Arms Exercise; FL = Flight Level; EMV = Enhanced Mojave Viper

Table D.4-16. Estimated Single EMV Period Sortie-Operations by Airspace/Altitude Distribution - Alternative 3

Aircraft (Total Sorties)	Current and Estimated Future Special Use Airspace by Altitude Stratifications												
	R-2501		Sundance MOA/ATCAA Modification		New Bristol Restricted Area Modification			New CAX Restricted Area			Turtle MOA/ATCAA Modification		
	Surface to not incl. 14,000	14,000 - FL270	Surface to not incl. 14,000	14,000 - FL270	Surface to not incl. 14,000	14,000 to not incl. FL270	FL270 - FL400	Surface to not incl. 14,000	14,000 to not incl. FL270	FL270 - FL400	5,000 to not incl. 11,000	11,000 to not incl. FL180	FL180 - FL400
EMV Work Up Period (training days 1-19; no flight activity on days 13 and 18)													
AV-8B	73	73	73	73	73	73	0	73	73	0	0	73	0
FA-18	121	121	121	121	121	121	0	121	121	0	0	121	0
F-35	38	38	38	38	38	38	0	38	38	0	0	38	0
Joint FW	8	8	8	8	8	8	0	8	8	0	0	8	0
AH/UH-1	276	0	276	0	276	0	0	276	0	0	0	0	0
CH-53	102	0	102	0	102	0	0	102	0	0	0	0	0
MV-22	84	0	84	0	84	0	0	84	0	0	0	0	0
Joint RW	68	0	68	0	68	0	0	68	0	0	0	0	0
EA-6B	0	17	0	17	0	17	0	0	17	0	0	17	0
KC-130	2	0	2	0	0	30	0	2	0	0	0	0	0
Joint AR	0	0	0	0	0	0	0	0	0	0	0	0	0
UAS	42	42	42	42	42	42	0	42	42	0	0	42	0
Total	814	299	814	299	812	329	0	814	299	0	0	299	0
EMV Final Period (flight training days 20-21)													
AV-8B	17	17	17	17	17	17	0	17	17	17	17	17	17
FA-18	29	29	29	29	29	29	0	29	29	29	29	29	29
F-35	8	8	8	8	8	8	0	8	8	8	8	8	8
Joint FW	8	8	8	8	8	8	0	8	8	8	8	8	8
AH/UH-1	60	0	60	0	60	0	0	60	0	0	0	0	0
CH-53	12	0	12	0	12	0	0	12	0	0	0	0	0
MV-22	16	0	16	0	16	0	0	16	0	0	0	0	0
Joint RW	16	0	16	0	16	0	0	16	0	0	0	0	0
EA-6B	0	2	0	2	0	2	0	0	2	0	2	0	2
KC-130	2	8	2	8	2	8	0	2	8	0	8	8	8
Joint AR	0	0	0	4	0	4	0	0	4	0	0	0	4
UAS	12	12	12	12	12	12	0	12	12	0	12	12	12
Total	180	84	180	88	180	88	0	180	88	62	84	82	88

Notes: MOA = Military Operations Area; ATCAA = Air Traffic Control Assigned Airspace; CAX = Combined Arms Exercise; FL = Flight Level; EMV = Enhanced Mojave Viper

Table D.4-17. Estimated Annual Tenant/Transient Sortie-Operations - Alternatives 1, 2, 4, 5, and 6

Aircraft Type	• R-2501 • Proposed Restricted Area R-XXXX and Johnson Valley MOA/ATCAA				Bristol MOA/ATCAA Modification				• Sundance MOA/ATCAA Modification • Proposed CAX MOA/ATCAA • Turtle MOA/ATCAA Modification			
	Day	Eve	Night	Total	Day	Eve	Night	Total	Day	Eve	Night	Total
AV-8	426	152	30	608	426	152	30	608	-	-	-	-
F-18	700	250	51	1,001	700	250	51	1,001	-	-	-	-
F-35	225	80	16	321	225	80	16	321	-	-	-	-
AH/UH-1	1,569	560	112	2,241	-	-	-	-	-	-	-	-
CH-53	477	170	35	682	-	-	-	-	-	-	-	-
MV-22	446	154	37	637	-	-	-	-	-	-	-	-
EA-6B	94	34	6	134	94	34	6	134				
KC-130	189	68	13	270	189	68	13	270	-	-	-	-
UAS	281	100	20	401	281	100	20	401	-	-	-	-
Total	4,407	1,568	320	6,295	1,915	684	136	2,735	-	-	-	-

Notes: MOA = Military Operations Area; ATCAA = Air Traffic Control Assigned Airspace; CAX = Combined Arms Exercise; Eve = Evening

Table D.4-18. Estimated Annual Tenant/Transient Sortie-Operations - Alternative 3

Aircraft Type	• R-2501 • Sundance MOA/ATCAA Modification • New Bristol Restricted Area • New CAX Restricted Area • Turtle MOA/ATCAA Modification			
	Day	Eve	Night	Total
AV-8	426	152	30	608
F-18	700	250	51	1,001
F-35	225	80	16	321
AH/UH-1	1,569	560	112	2,241
CH-53	477	170	35	682
MV-22	446	154	37	637
EA-6B	94	34	6	134
KC-130	189	68	13	270
UAS	281	100	20	401
Total	4,407	1,568	320	6,295

Notes: MOA = Military Operations Area; ATCAA = Air Traffic Control Assigned Airspace; CAX = Combined Arms Exercise; Eve = Evening

Table D.4-19. Estimated Annual Tenant/Transient Sortie-Operations by Aircraft/Airspace/Altitude Block - Alternatives 1, 2, 4, 5, and 6

Aircraft	Current and Estimated Future Airspace Use by Altitude Strata																
	R-2501		Proposed Restricted Area R-XXXX/ Johnson Valley MOA/ATCAA				Proposed Sundance MOA/ATCAA Modification		Bristol MOA/ATCAA Modification			New CAX Corridor MOA/ATCAA			Turtle MOA/ATCAA Modification		
	Surface to not incl. 14,000	14,000 - FL270	Surface to not incl. 8,000	8,000 to not incl. 14,000	14,000 to not incl. FL270	FL270-FL400	Surface to not incl. 14,000	14,000 - FL270	Surface to not incl. 14,000	14,000 to not incl. FL270	FL270 - FL400	Surface to not incl. 14,000	14,000 to not incl. FL270	FL270 - FL400	5,000 to not incl. 11,000	11,000-FL180	FL180-FL400
AV-8	608	608	608	608	608	0	0	0	0	608	0	0	0	0	0	0	0
F-18	1001	1001	1001	1001	1001	0	0	0	0	1001	0	0	0	0	0	0	0
F-35	321	321	321	321	321	0	0	0	0	7	0	0	0	0	0	0	0
AH/UH-1	2241	0	2241	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CH-53	682	0	682	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MV-22	637	0	637	637	0	0	0	0	0	0	0	0	0	0	0	0	0
EA-6B	0	134	0	0	134	0	0	0	0	0	0	0	0	0	0	0	0
KC-130	14	256	14	0	256	0	0	0	0	256	0	0	0	0	0	0	0
UAS	401	401	401	401	401	0	0	0	0	401	0	0	0	0	0	0	0
Total	5905	2721	5905	2968	2721	0	0	0	0	2273	0	0	0	0	0	0	0

Notes: MOA = Military Operations Area; ATCAA = Air Traffic Control Assigned Airspace; CAX = Combined Arms Exercise; FL = Flight Level

Table D.4-20. Estimated Annual Tenant/Transient Sortie-Operations by Aircraft Type/Airspace/Altitude Block - Alternative 3

Aircraft	Current and Estimated Future Airspace Use by Altitude Strata												
	R-2501		Sundance MOA/ATCAA Modification		New Bristol Restricted Area Modification			New CAX Restricted Area			Turtle MOA/ATCAA Modification		
	Surface to not incl. 14,000	14,000 - FL270	Surface to not incl. 14,000	14,000 - FL270	Surface to not incl. 14,000	14,000 to not incl. FL270	FL270 - FL400	Surface to not incl. 14,000	14,000 to not incl. FL270	FL270 - FL400	5,000 to not incl. 11,000	11,000 to not incl. FL180	FL180 - FL400
AV-8	608	608	608	608	15	15	0	608	608	0	608	608	0
FA-18	1001	1001	1001	1001	18	18	0	1001	1001	0	1001	1001	0
F-35	321	321	321	321	7	7	0	321	321	0	321	321	0
AH/UH-1	2241	0	2241	0	2241	0	0	2241	0	0	2241	0	0
CH-53	682	0	682	0	682	0	0	682	0	0	682	0	0
MV-22	637	0	637	0	637	0	0	637	0	0	637	637	0
EA-6B	0	134	0	134	0	134	0	0	134	0	0	134	0
KC-130	14	256	14	256	14	256	0	14	256	0	14	256	0
UAS	401	401	401	401	401	401	0	401	401	0	401	401	0
Total	5905	2721	5905	2721	4015	831	0	5905	2721	0	5905	3358	0

Notes: MOA = Military Operations Area; ATCAA = Air Traffic Control Assigned Airspace; CAX = Combined Arms Exercise; FL = Flight Level

Tables D.4-21 and D.4-22 provide a summary of the daily average sorties and flight windows (hours of use) for the MEB Exercise Work-up and Final activities under all alternatives. Again, flight profiles may differ somewhat with the proposed airspace SUA and modifications proposed for each alternative. These tables also include, for comparison, the daily average sorties and flight windows for MEB Building Block training and other ongoing military flight activities that would also utilize the existing and proposed airspace as required throughout the year when MEB exercises are not scheduled.

Table D.4-21. Average Daily Airspace Use for MEB Exercises and Other Non-MEB Military Flight Activities - Alternatives 1, 2, 4, 5, and 6

Airspace Use	Airspace Unit						
	Existing R-2501	Proposed Restricted Area R-XXXX	Proposed Johnson Valley MOA/ ATCAA	Proposed Sundance MOA/ ATCAA	Proposed Bristol MOA/ ATCAA	Proposed CAX MOA/ ATCAA	Proposed Turtle MOA/ ATCAA
MEB Exercise Scenario (48 days/year)							
Average Daily Sorties							
[1]MEB Work Up	74	74	74	0	74	0	0
[2]MEBFinal	133	133	133	133	133	133	133
[3]Average Daily Flight Window (hours day/night)							
MEB Work Up	9/3	9/3	9/3	0	4/0	0	0
MEB Final	12/12	12/12	12/12	12/12	12/12	12/12	12/12
Non-MEB Tenant/Transient (160 days/year)							
Average Daily Sorties							
All Days	14/7	14/7	14/7	0	14/7	0	0
[3]Average Daily Flight Window (hours day/night)							
All Days	10/1	10/1	10/1	0	10/1	0	0
[4]Other Military Flight Activities (270 days/year)							
Average Daily Sorties							
All Days	49	49	49	7	25	7	7
[3]Average Daily Flight Window (hours day/night)							
All Days	8/3	8/3	8/3	2/1	4/2	1/1	1/1

Notes:
1. The Work-up phase of the MEB Exercise includes training days 1-19; however, flight activity would not occur during training days 10 and 18. The average daily sorties calculation does not include those two training days.
2. The Final phase of the MEB Exercise includes training days 20-22; flight activity would occur during all three of these training days.
3. The daily flight window is the continuous span of time (hours) each day during which flight operations would typically occur from start to finish. This is the duration of time the airspace would be scheduled to accommodate these operations. Where indicated, this flight window may be divided between day (0700-2200 hrs) and night (2200-0700 hrs) operations to fulfill night time training requirements.
4. Other military flight activities may include major training exercises and basic proficiency training and would be conducted within the designated airspace during those periods when the twice annual MEB exercises would not be scheduled (approximately 270 days each year).

MOA = Military Operations Area; ATCAA = Air Traffic Control Assigned Airspace; CAX = Combined Arms Exercise; MEB = Marine Expeditionary Brigade

Table D.4-22. Average Daily Airspace Use for MEB Exercises, Non-MEB Tenant/Transient Training, and Other Military Flight Activities - Alternative 3

Airspace Use	Airspace Unit				
	Existing R-2501	Proposed Sundance MOA/ATCAA	Proposed Bristol Restricted Area	Proposed CAX Restricted Area	Proposed Turtle MOA/ATCAA
MEB Exercise Scenario (48 days/year)					
Average Daily Sorties					
[1]MEB Work Up	74	74	74	74	74
[2]MEB Final	133	133	133	133	133
[3]Average Daily Flight Window (hours day/night)					
MEB Work Up	9/3	9/3	9/3	9/3	9/3
MEB Final	12/12	12/12	12/12	12/12	12/12
Non-MEB Tenant/Transient (160 days/year)					
Average Daily Sorties					
All Days	14/7	14/7	14/7	14/7	14/7
[3]Average Daily Flight Window (hours day/night)					
All Days	10/1	10/1	10/1	10/1	10/1
[4]Other Military Flight Activities (270 days/year)					
Average Daily Sorties					
All Days	49	49	49	49	49
[3]Average Daily Flight Window (hours day/night)					
All Days	8/3	5/2	7/2	6/2	5/2

Notes:

1. The Work-up phase of the MEB Exercise includes training days 1-19; however, flight activity would not occur during training days 10 and 18. The average daily sorties calculation does not include those two training days.
2. The Final phase of the MEB Exercise includes training days 20-22; flight activity would occur during all three of these training days.
3. The daily flight window is the continuous span of time (hours) each day during which flight operations would typically occur from start to finish. This is the duration of time the airspace would be scheduled to accommodate these operations. Where indicated, this flight window may be divided between day (0700-2200 hrs) and night (2200-0700 hrs) operations to fulfill night time training requirements.
4. Other military flight activities may include major training exercises and basic proficiency training and would be conducted within the designated airspace during those periods when the twice annual MEB exercises would not be scheduled (approximately 270 days each year).

MOA = Military Operations Area; ATCAA = Air Traffic Control Assigned Airspace; CAX = Combined Arms Exercise; MEB = Marine Expeditionary Brigade

D.5 Projected Annual Airspace Use (Estimated Hours of Use)

The MAGTF G-3 Western and Eastern Analyses provide an estimate of the annual hours each existing and proposed SUA area and altitude block would be used for the MEB Exercise and Build-up training missions, EMV exercises, and other military training activities throughout the year. These totals are based on typical daily flight windows that would range between 8-15 hours during the MEB Exercise Work-up and Building Block activities and would extend over a 24-hour period during the Final exercise phase. Actual scheduling and duration of the airspace on a daily basis would vary, depending on the nature of the exercise and training missions, the number of aircraft participants, and the day/evening/night timeframes in which those activities would need to occur.

Tables D.5-1 and D.5-2 provide estimates of the total hours each MOA/ATCAA and restricted area and associated altitude blocks may be activated under all alternatives to support individual periods throughout the year when the two annual MEB Exercises, MEB Building Block training, eight annual EMV exercises, and all other tenant/transient training activities would be conducted. It is important to note that these airspace areas and altitude blocks would be scheduled and used in combination with each other for many of these activities; therefore, the total estimated hours for each area/altitude would be concurrent.

D.5-1. Annual Flight Windows (Hours of Use) for Alternatives 1,2, 4, 5, and 6

Airspace Unit	Altitude Block	MEB Exercise Total Annual Hours	EMV Total Annual Hours	Tenant/Transient and other Military Training Total Annual Hours
R-2501	Surface -13,000 MSL	552	2,016	811
	14,000 - FL270	552	2,016	811
Restricted Area R-XXXX (Alt 2 Partial Restricted Area)	Surface – 7,000 MSL	456	2,016	1,295
	8,000 -13,000 MSL	456	1,632	743
	14,000 - FL270	456	1,632	644
	FL270 – 400	24	64	8
Johnson Valley MOA/ATCAA (Alt 2 Partial MOA/ATCAA)	Surface – 7,000 MSL	456	2,016	1,295
	8,000 -13,000 MSL	456	1,632	743
	14,000 - FL270	456	1,632	644
	FL270 – 400	24	64	8
Extended Sundance MOA/ATCAA	1,500 AGL – 13,000 MSL	144	320	0
	14,000 - FL270	144	416	8
Expanded Bristol MOA/ATCAA	Surface – 13,000 MSL	144	576	0
	14,000 - FL270	240	1,168	635
	FL270 – FL400	24	64	0
CAX Corridor MOA/ATCAA	Surface – 13,000 MSL	144	192	0
	14,000 – FL270	144	384	0
	FL270 – FL400	24	64	0
Turtle MOA/ATCAA	3,000 AGL – 10,000 MSL	0	0	0
	11,000 MSL - FL180	144	384	0
	FL180 - FL270	0	0	0
Total		**5,040**	**18,288**	**7,645**

Notes: MEB = Marine Expeditionary Brigade; EMV = Enhanced Mojave Viper; MSL = mean sea level; FL = Flight Level; MOA = Military Operations Area; ATCAA = Air Traffic Control Assigned Airspace; CAX = Combined Arms Exercise; AGL = above ground level

Table D.5-2. Annual Flight Windows (Hours of Use) for Alternatives 3

Airspace Unit	Altitude Block	MEB Exercise Total Annual Hours	EMV Total Annual Hours	Tenant/Transient and other Military Training Total Annual Hours
R-2501	Surface -13,000 MSL	552	2,016	1,552
	14,000 - FL270	552	2,016	1,499
Partial Expanded Sundance MOA/ATCAA	1,500 AGL – 13,000 MSL	412	1,088	1,216
	14,000 - FL270	332	896	1,112
Expanded Bristol MOA/ATCAA	Surface – 13,000 MSL	552	1,344	1,512
	14,000 - FL270	552	1,680	1,491
	FL270 – FL400	24	0	8
CAX Corridor MOA/ATCAA	Surface – 13,000 MSL	536	960	1,546
	14,000 – FL270	536	960	1,665
	FL270 – FL400	16	32	8
Turtle MOA/ATCAA	3,000 AGL – 10,000 MSL	440	384	1,610
	11,000 MSL - FL180	252	736	1,530
	FL180 - FL270	8	32	0
Total		**4,764**	**12,144**	**14,749**

Notes: MEB = Marine Expeditionary Brigade; EMV = Enhanced Mojave Viper; MSL = mean sea level; FL = Flight Level; AGL = above ground level; MOA = Military Operations Area; ATCAA = Air Traffic Control Assigned Airspace; CAX = Combined Arms Exercise

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APPENDIX E
MEB EXERCISE VEHICLES, AIRCRAFT, AND WEAPONS

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Combat Vehicles

<u>Medium Tactical Vehicle Replacement (MTVR)</u>

- Six-wheel drive all-terrain vehicles
- Engine: Turbocharged 6-cylinder diesel, 425 horsepower
- Maximum Speed: 65 miles per hour
- Maximum Range: 300 miles
- Dimensions: Length 26.2 feet, Width 8.2 feet
- Combat Weight: 32,500 pounds

<u>High Mobility Multipurpose Wheeled Vehicle (HMMWV)</u>

- Light military truck
- Engine: Diesel, 8-cylinder, 6.5 liter, Naturally Aspirated, 150 horsepower at 3600 revolutions per minute
- Maximum Speed: 55 miles per hour (Governed at gross weight)
- Range: 275 - 337 miles
- Dimensions: Length 15 to 17 feet, Width 7 feet
- Weight: 7,700 to 9,280 pounds

<u>Logistics Vehicle System (LVS)</u>

- Modular assortment of eight-wheel drive all-terrain vehicles
- Engine: Turbocharged Detroit Diesel V8 (8V92TA)
- Maximum Speed: 57 miles per hour
- Maximum Range: 300 miles
- Dimensions: Length 38 feet, Width 8 feet
- Curb Weight: 40,300 pounds
- Payload Capacity: 20,000 to 46,000 pounds

Internally Transportable Vehicle (ITV)

- 4-wheeled vehicle designed to fit inside and be transported by the MV-22 Osprey
- Engine: 4-cylinder gasoline; 71 horsepower at 2,500 revolutions per minute
- Maximum Speed: 60 miles per hour
- Dimensions: Length 11 feet, Width 5.3 feet
- Weight: 4,000 pounds (plus 2,000-pound payload capacity)

Source: www.marinecorpstimes.com 2009.

M60A1 Bridge Vehicle

- Armored vehicle used for launching and retrieving a 60-foot scissors-type bridge
- Engine: 12-cylinder diesel AVOS-1790-20
- Maximum Speed: 30 miles per hour
- Maximum Range: 290 miles
- Dimensions: Length 32 feet, Width 13.1 feet
- Combat Weight: 56.6 tons

Amphibious Assault Vehicle (AAV)

- Fully tracked amphibious landing vehicle
- Engine: Cummings VT400, 4 Cycle, 8-cylinder, 90'Vee, Water Cooled, Turbocharged, Multifuel
- Maximum Speed: Land 45 miles per hour, Water 8.2 miles per hour
- Maximum Range: 300 miles
- Dimensions: Length 26.7 feet, Width 10.7 feet
- Combat Weight: 60,758 pounds

Light Armored Vehicle (LAV)

- Eight-wheeled amphibious armored personnel carrier
- Variants: LAV with TOW system; LAV-C2/L/R; LAV-25; LAV-M
- Engine: 275 horsepower Detroit Diesel 6V53T
- Maximum Speed: 62 miles per hour
- Maximum Range: 410 miles
- Dimensions: Length 21.2 feet, Width 8.2 feet
- Combat Weight: 28,200 pounds

M88A2 HERCULES Recovery Vehicle

- Recovery vehicle for main battle tanks
- Engine: 12-cylinder diesel 750 horsepower at 2400 revolutions per minute
- Maximum Speed: 30 miles per hour
- Maximum Range: 300 miles
- Dimensions: Length 29.3 feet, Width 11.3 feet
- Combat Weight: 70 tons

High Mobility Artillery Rocket System (HIMARS)

- Mobile launcher attached to a 5-ton medium tactical vehicles (FMTV) truck chassis
- Engine: 6-cylinder diesel 280 horsepower at 2600 revolutions per minute
- Maximum Speed: 53 miles per hour
- Maximum Range: 300 miles
- Dimensions: Length 23 feet, Width 8 feet
- Weight: 24,000 pounds

Source: www.globalsecurity.org 2009.

Abrams M1A1 Main Battle Tank

- Well armed, heavily armored, and highly mobile tank designed for modern armored ground warfare
- Engine: AGT-1500 turbine engine, 1500 horsepower
- Maximum Speed: 42 miles per hour (Governed)
- Maximum Range: 275 miles
- Dimensions: Length (Gun Forward) 32 feet, Width 12 feet
- Combat Weight: 68 tons

Aircraft

AV-8B Harrier

- Subsonic attack aircraft
- Engine: single Pegasus turbofan engine with two intakes and four vectorable nozzles
- Maximum Speed: .89 Mach (662 miles per hour) at sea level
- Range: 1,200 nautical miles
- Dimensions: Wingspan 30 feet 4 inches, Length: 46 feet 4 inches
- Loaded Weight: 22,950 pounds

F/A-18 Hornet

- Carrier-capable multi-role fighter jet
- Engine: Two General Electric F404-GE-400 (or 402) turbofans
- Maximum Speed: Mach 1.8 (1,190 miles per hour) at 40,000 feet
- Combat Radius: 290 nautical miles on hi-lo-lo-hi mission
- Dimensions: Wingspan 40 feet, Length 56 feet
- Loaded Weight: 37,150 pounds

MV-22

- Vertical takeoff and landing tiltrotor aircraft
- Engine: Two AE1107C Rolls-Royce Allison, 6,150 shaft horsepower (4,586 kilowatts)
- Maximum Speed: 305 knots
- Maximum Range: 879 nautical miles
- Dimensions: Length 57 feet 4 inches, Width with rotors 84 feet 7 inches
- Maximum Takeoff Weight: 60,500 pounds

KC-130

- In-flight refueling and tactical transport aircraft
- Engine: Four Allison T56-A-16; 4,910 shaft horsepower per engine
- Maximum Speed: 315 knots
- Maximum Range: 1,000 nautical mile radius with 45,000 pounds of fuel; 2,875 nautical miles with 38,258 pounds of cargo
- Dimensions: Wingspan 132 feet 7 inches, length 97 feet 9 inches
- Operating Weight: 83,300 pounds

RQ-4 Global Hawk (Tier II)

- Unmanned aerial vehicle
- Engine: One Allison Rolls-Royce AE3007h turbofan engine
- Cruise Speed: 404 miles per hour
- Endurance: 36 hours
- Dimensions: Wingspan 116 feet 2 inches, Length 44 feet 5 inches
- Weight: 22,900 pounds

Source: www.globalsecurity.org 2009.

EA-6B Prowler

- Electronic Warfare Aircraft
- Engine: Two Pratt & Whitney J52-P408 turbofan engines
- Maximum Speed: .99 mach
- Maximum Range: 850 nautical miles (combat configuration)
- Dimensions: Wingspan 53 feet, Length 59 feet
- Maximum Weight: 61,500 pounds

Source: www.globalsecurity.org 2009.

AH-1 Cobra

- Attack helicopter
- Engine: Two General Electric T700-GE-401 Turboshaft engines (1,690 horsepower each)
- Maximum Speed: 170 knots (195 miles per hour)
- Range: 317 nautical miles
- Dimensions: Rotor diameter 48 feet, Length overall (rotors turning) 58 feet
- Maximum Takeoff Weight: 14,700 pounds

UH-1 Huey

- Utility helicopter
- Engine: Pratt and Whitney T400-CP-400
- Speed: 121 knots at sea level
- Range: 172 nautical miles
- Dimensions: Rotor Diameter 48 feet, Length 57.3 feet
- Maximum Takeoff Weight: 10,500 pounds

<u>CH-53E</u>

- Heavy-lift transport helicopter
- Engine: Three T64-GE-416 turboshaft engines, 4,380 shaft horsepower (3,270 kilowatts) each
- Maximum Speed: 170 knots
- Maximum Range: 540 nautical miles
- Dimensions: Rotor Diameter 79 feet, Length 99 feet 5 inches
- Maximum Takeoff Weight: 73,500 pounds

Combat Engineer Support Vehicles

<u>Medium Crawler Tractor (MCT)</u>

Source: John Deere (www.deere.com) 2009.

- Used in combat and combat support
- Engine: 200 horsepower, turbocharged 6-cylinder diesel
- Weight: 40,000 pounds
- 128- to 168-inch blade

<u>Assault Breacher Vehicle</u>

- A tracked, armored engineer vehicle (M1A1 chassis) specifically designed for conducting in-stride breaching of minefields and complex obstacles
- Engine: AGT-1500 turbine engine, 1500 horsepower
- Maximum Speed: 42 miles per hour (Governed)
- Maximum Range: 275 miles
- Dimensions: Length (Gun Forward) 32 feet Width 12 feet
- Combat Weight: 63 tons

Combat Excavator (John Deere 200LC)

- Engine: John Deere 6068 H; 159 horsepower, 6-cylinder diesel
- Transport Length: 31.25 feet
- Transport width: 10.5 feet
- Weight: 49,940 pounds
- Bucket Capacity: 0.52 to 1.43 cubic yards

Grader (CAT 120H)

- Engine: CAT 3126B; 125 to 140 net horsepower 6-cylinder diesel
- Weight: 27,880 pounds
- Blade width: 12 feet

Tractor, Rubber Tired, Articulated Steering, Multipurpose Vehicles (TRAM)

- 4-wheel drive loader
- Engine: John Deere 6076A; 185 horsepower at 2,200 revolutions per minute, 6-cylinder diesel
- Maximum Speed: 26 miles per hour
- Dimensions: Length 27 feet, Width 9 feet
- Weight: 35,000 pounds

<u>D7 Bulldozer</u>

- Primary earthmover for construction of survivability positions and antitank ditches
- Engine: 200 horsepower Cat 3306T diesel
- Speed: 6 miles per hour
- Dimensions: Length 22 feet 9 inches, Width 12 feet
- Weight: 50,000 pounds

<u>Armored Backhoe</u>

- Specifications not found

<u>Extended Boom Forklift</u>

- Four-wheel drive, rubber-tired forklift
- Optimal lifting range of 4,000 to 11,000 pounds
- Maximum Speed: 35 miles per hour
- Maximum Range: 425 miles

Light Capacity Rough Terrain Truck Forklift (LRTF)

- Telescopic boom, 4-wheel drive, crab and circle steering modes
- Engine: B2566 diesel
- Dimensions: Length 19 feet, Width 6.7 feet, Height 7.4 feet
- Weight: 13,450 pounds
- Loads up to 50,070 pounds

Weapons

155-millimeter Howitzer

- Towed artillery piece
- Weight: 15,760 pounds (M-198)
- 4 rounds per minute.
- Firing Range: The maximum range is 18,100 meters when firing standard 95-pound M107 HE and M864 DPICM projectiles, and 30,000 meters when firing 97-pound M549 RAP rounds.

M58 Linear Demolition Charge (LDC)

- System includes the MK 155 MOD 0/1 hydraulically elevated launch rail and container frame mounted to a M353 trailer chassis
- Provides responsive, explosive minefield/obstacle clearing capability
- Clears an 8 meter x 100 meter lane when detonated

Javelin

- "Fire and forget" shoulder fired, antitank missile.
- Disposable launch tube
- Range: 2,000 meters (maximum); 75 meters (minimum)
- Weight: 45.5 pounds (launcher and missile)
- Length: 3.5 feet

Source: www.army.mil 2009.

Rocket Launcher

- Shoulder-Launched Multipurpose Assault Weapon (SMAW)
- Functions to destroy bunkers and other fortifications during assault operations.
- Range: 500 meters (tank sized target); 250 meters (1x2 meter target)
- Weight: 30.5 pounds (ready-to-fire); 16.6 pounds (launcher)
- Length: 54 inches (ready-to-fire); 29.9 inches (launcher)t

TOW Launcher

- Tube-launched, Optically-tracked, Wire command-link guided (TOW)
- Can be mounted on several types of vehicles or tri-pod mounted.
- Disposable launch tube
- Range: 3,750 meters (maximum); 65 meters (minimum)
- Weight: 47.1 pounds (missile); 204.6 pounds (launcher)
- Length: 3.8 feet

Notes: TOW mounted on LAV.

.50 Caliber Machine Gun

- Heavy machine gun
- Can be mounted on several types of vehicles or tri-pod mounted.
- Belt-fed ammunition
- Weight: 83.8 pounds (gun); 127.9 pounds (with tripod)
- Length: 65 inches

M240B Machine Gun

- Medium machine gun
- Can be used by ground forces or mounted on several types of vehicles.
- Fed from disintegrating belts; uses 7.62 millimeter cartridge.
- Weight: 27.6 pounds
- Length: 49 inches

MK-19 Grenade Launcher

- Belt-fed automatic 40 millimeter grenade launcher
- Vehicle or tripod mounted.
- Weight: 72.5 pounds
- Length: 43.1 inches

60 millimeter Mortar (M224)

- Lightweight Mortar
- Smooth bore, muzzle loading, high-angle-of-fire weapon.
- Weight: 46.5 pounds
- Length: 40 inches
- Range: 3,500 meters (maximum effective); 70 meters (minimum)

81 millimeter Mortar (M252)

- Medium weight Mortar
- Smooth bore, muzzle loading, high-angle-of-fire weapon.
- Weight: 91 pounds
- Length: 50 inches
- Range: 5,935 meters (maximum effective); 83 meters (minimum)

120 millimeter Mortar (M120)

- Medium weight Mortar
- Smooth bore, muzzle loading, high-angle-of-fire weapon.
- Weight: 91 pounds
- Length: 50 inches
- Range: 5,935 meters (maximum effective); 83 meters (minimum)

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APPENDIX F
REPRESENTATIVE AMMUNITION IDENTIFICATION AND HAZARD INFORMATION

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This appendix provides representative ammunition identification and hazard information for munitions used for training at Marine Corps Air Ground Combat Center at Twentynine Palms, CA (Combat Center). The exact type, platform, nomenclature (e.g., Cartridges 75 millimeter [mm], 81mm Mortar, 81mm High Explosive [HE] M821), whether the device is dud-producing (yes/no), photograph, description of use, and hazards are listed for each. When an item of ammunition is "fired" and fails to function properly, it is referred to as a "dud." It usually remains on the range where it may be found. A "non-dud producing" item of ammunition, a "No" in the column, either presents no residual explosive hazard – such as a solid rifle projectile, or the procedures for its use cause the operator to resolve any "dud" condition and remove or eliminate any hazard that may be presented. Procedures for use of explosive demolition charges, Bangalore torpedoes, hand grenades, etc., prescribe a process to eliminate the hazard if they fail to function. Live-fire training allows for dud and non-dud producing munitions use in any exclusive military use area. Only non-dud producing munitions would be fired in the Restricted Public Access Areas.

Hazard Information is defined as follows:

Anti-disturbance – Fuze may detonate the item if it detects vibration, movement, etc.

Clockwork/Mechanical Time – Item is functioned by a clock mechanism. If a dud, the clockwork may be jammed. Jarring, striking, or moving the item may start the clock and cause the item to function.

Cocked striker – The item contains a spring loaded firing pin. If a dud, the firing pin may be jammed. Jarring, striking, or moving the item may cause it to function.

Ejection – The item contains a charge that, when functioned, ejects various smaller components from the item case that may cause injury if they strike a person.

Electrical – Item contains a source of electricity.

Electromagnetic Radiation (EMR) – Radio waves, lightning, etc. may cause the item to function.

Fire – Exposure to flame or high heat may cause the propellant or explosive to burn or detonate.

Fragmentation – Functioning of the item produces pieces of metal moving away from the item location at extremely high velocity in all directions, just as fast or "faster than a speeding bullet."

High Explosive (HE) – Item contains a material that may detonate and produce blast overpressure, secondary results of a detonation include intense heat and fragmentation.

High Pressure (Accumulator) – Item contains a pressure vessel that may contain liquid or gas under high pressure.

Impact – Striking the item on or in the vicinity of the primer may cause it to function.

Incendiary – Item contains a material that, if ignited, burns with intense heat and bright flame.

Intense Light – Item is an illumination round, the light from which may cause temporary or permanent eye damage.

Jet – Item contains a shaped charge that forms a "jet" of molten metal when it functions that can travel a significant distance.

Lucky (Piezoelectric) – Fuze of the item contains a crystal that when struck generates an electric charge that functions the item. Jarring, striking, or moving the item may cause the item to function. Changes in temperature can also cause the item to function.

Magnetic – Fuze may detonate the item if movement of magnetic material in the vicinity of the item is detected.

Mechanical – Item contains springs, etc., that are designed to move part of the item. Functioning may result in injury to personnel in close proximity.

Missile – Item contains a "rocket" motor that, if ignited, may project it forward at high velocity.

Movement – Physically moving or striking the item may cause it to function.

Projection – Item contains a motor that, if functioned, may cause it to become a projectile.

Proximity (Variable Time [VT]) – Item fuze includes a sensor designed to detect the ground and detonate the munition a distance above it. In a dud, if the fuze is still functioning, it could detect an approaching animal or person as the ground and detonate the item.

Shock – Dropping or striking the item may cause it to function.

Smoke – Item produces a thick smoke, that may be white or colored, that may result in respiratory issues if inhaled for long periods. It also reduces visibility in the area.

Static – The discharge of static electricity may cause the item to function.

Red Phosphorus (RP) - Item contains white phosphorus that burns with intense heat and bright light when exposed to air (oxygen).

Wait Time – Item remains active for a period of time after it is functioned, usually due to the presence of a battery. Item may function until battery power is interrupted or drained down.

White Phosphorus (WP) – Item contains white phosphorus that burns with intense heat and bright light when exposed to air (oxygen).

Cartridge, 5.56mm

Representative Weapon Platform, Department of Defense Identification Code (DODIC), and Nomenclature:

Platform	*DODIC*	*Nomenclature*
M16A2 Rifle	A059	Cartridge, 5.56mm Ball M855 Clipped
M16A2 Rifle	A063	Cartridge, 5.56mm Tracer M856
SAW	A064	Cartridge, 5.56mm 4 Ball M855/1 Tracer M856 Linked

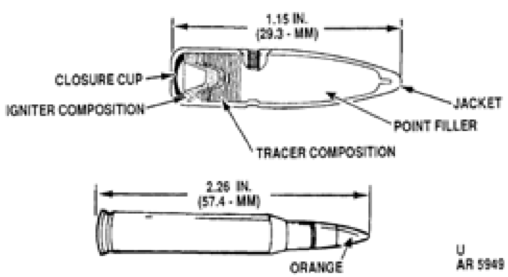
Appearance:

M855 and M856 cartridges linked for use with Squad Automatic Weapon (SAW)

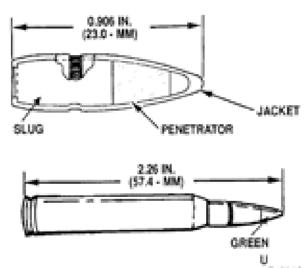
Description:

M855 North Atlantic Treaty Organization (NATO) 5.56mm ball cartridge: While the cartridge was designed to be fired from the newer, heavy barreled M-16A2 assault rifle and M-4 carbine, it may be fired out of older M-16 models without severe degradation of accuracy. The M855 can be identified by its green painted tip.

M856 NATO 5.56mm tracer cartridge: Introduced with the M855, the M856 is the tracer variant of the M855. The M856 can be identified by its orange painted tip.



CARTRIDGE, 5.56MM, TRACER



CARTRIDGE, 5.56MM, BALL, M855

Hazards:

Cartridge, 5.56mm
Fire

Cartridge, 7.62mm

Representative Weapon Platform, DODIC, and Nomenclature:

Platform	*DODIC*	*Nomenclature*
M240G Machine Gun	A131	Cartridge, 7.62mm 4 Ball M80/1 Tracer M62 Linked
GAU 2B/A Mini-gun	A165	Cartridge, 7.62mm 4 Ball M80/1 Tracer M62 Linked

Appearance:

M80 7.62MM Ball cartridge

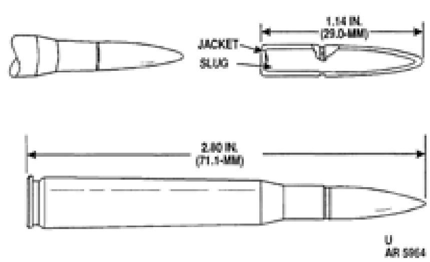
M80 and M62 cartridges linked for use with M240G

Description:

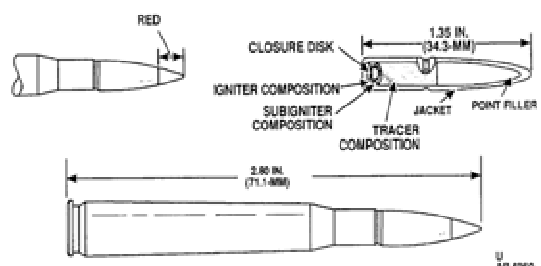
M80 NATO 7.62mm ball cartridge: The M80 is the standard 7.62mm ball cartridge. The M80 can be identified by its unpainted (copper) tip.

M62 NATO 7.62mm ball/tracer cartridge: The M62 is the tracer variant of the M80. It is, in all respects, identical to the M80. The M62 can be identified by its orange painted tip.

The standard ammunition mix for machine gun use (M-60) is four ball (M80) cartridges followed by one tracer (M62). Some mini-gun ammunition is loaded with low light level tracer ammunition.



CARTRIDGE, 7.62MM, BALL, M80



CARTRIDGE, 7.62MM, TRACER, M62

Hazards:

Cartridge, 7.62mm
Fire

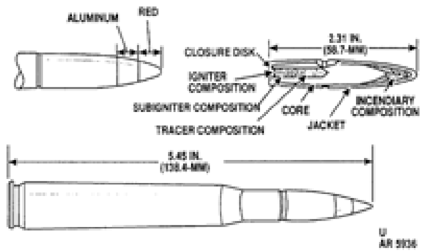
Cartridge, Caliber .50

Representative Weapon Platform, DODIC, and Nomenclature

Platform	*DODIC*	*Nomenclature*
Cal .50 Machine Gun	A557	Cartridge, Caliber .50 4 Ball M2/1 Tracer M10
OH-58 Helicopter	A576	Cartridge, Caliber .50 4 Armor Piercing Incendiary (API)/1 Armor Piercing Incendiary Tracer (API-T) Cartridge Linked

Appearance:

Various .50 Caliber cartridges



Cartridge, Caliber .50 4 Armor Piercing Incendiary

Description:

The caliber .50 cartridge consists of a cartridge case, primer, propelling charge, and the bullet. The term bullet refers only to the small-arms projectile. There are eight types of ammunition issued for use in the caliber .50 machine gun. The tips of the various rounds are color-coded to indicate their type. The ammunition is linked with the M2 or M9 metallic links for use in the machine gun.

Hazards:

Cartridge, Caliber 0.50
Fire

Cartridge, 20mm Aircraft Linked

Representative Weapon Platform, DODIC, and Nomenclature:

Platform	*DODIC*	*Nomenclature*
Aircraft		Cartridge, 20mm Aircraft Linked

Appearance:


Description:

M55A2 ***Target-practice.*** The M55A2 TP ammunition is used for gunnery training and test firing in lieu of the service round. It has a hollow cavity projectile body without a fuze (inert). The nose of the round is constructed of aluminum and is swaged to the projectile body.

M220 ***Target-practice.*** Except for the addition of a tracer element, the M220 TP-T is very similar physically and ballistically to the M55A2. Tracer burnout usually occurs at a range of approximately 1,500 meters (± 100 meters).

M56A3/A4 ***High-explosive incendiary (HEI).*** Functioning with both explosive and incendiary effect, the M56A3/A4 HEI is intended for use against ground targets, including lightly armored vehicles. This thin-walled steel projectile can produce casualties to exposed personnel within a ± 2 meter radius. It has a base plate which prevents ignition of the incendiary mixture by propellant gases. The M56A3/A4 is assembled with a single-action M503A3 point-detonating fuze. The explosive charge is 165 grains (.37 ounces); the incendiary charge is 20 grains. The HE mix and the incendiary mix are combined into one pellet in the A3 HEI. To improve the fire-start capability of the A4, the incendiary pellet is inserted into the projectile and then the HE pellet is added.

M242/M242A1 ***HEI-tracer.*** Except for the addition of a tracer element, the M242/M242A1 HEI-T is basically the same structurally and functionally as the M56A3/A4.

M53 ***Armor-piercing incendiary.*** The M53 API is intended for use against lightly armored targets. It functions with a combined incendiary and has a penetrating effect. The body of the projectile is constructed of solid steel; the nose is constructed of an aluminum alloy. The explosive charge is 65 grains (.14 ounce).

M246/M246A1 ***HEI with tracer and self-destruct feature.*** The M246/M246A1 HEI-T-SD is intended for use against aerial targets. It has an HEI charge, a self-destruct relay charge, and a tracer element. It is assembled with an M503A3 point detonating fuze. The tracer burns for about 5 seconds whereupon the relay charge ignites and detonates the HEI charge low order. If impact with the target occurs before self-destructing, the PD fuze causes the HEI charge to detonate high order. The M246 has the HE and incendiary mix combined as one pellet; the M264A1 has the HE and incendiary charge loaded as separate pellets.

M51A2/XM254 ***Dummy.*** The M51A2 is an inert round of solid metal construction and is used for non-firing system loading and system checkout. The XM254 is constructed of plastic, which reduces wear on gun components

Hazards:

Cartridge, 20mm Aircraft Linked
High Explosive (HE)
Incendiary
Fragmentation
Fire

Cartridge, 25mm Aircraft Linked

Representative Weapon Platform, DODIC, and Nomenclature:

Platform	*DODIC*	*Nomenclature*
Aircraft		Cartridge, 25mm Aircraft Linked

Appearance:

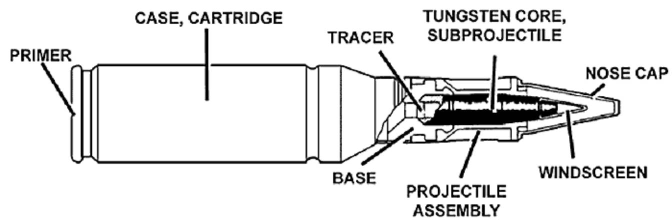


Figure 2-8. M791 APDS-T.

Description:

The 25x137mm caliber/.98425 inch is one of the standard sizes of cannon and autocannon ammunition for NATO forces. The round itself has a length of approximately 223 mm (8.6 inches). The 25mm round can be used in both an anti-materiel and anti-personnel fashion. When operating in an infantry mode, a 25mm weapon armed with HE rounds can effectively kill large numbers of opposing troops either in the open or in light fortifications. When operating in an anti-materiel mode, a 25mm weapon armed with AP rounds can disable many aircraft and vehicles, including some main battle tanks.

The United States (U.S.) military uses 25mm weapons in their AV-8B Harrier, AC-130 gunship, M2 Bradley, LAV-25, F-35 Lightning II, and as a standard ship-based munition in the MK-38 autocannon.

Hazards:

Cartridge, 25mm Aircraft Linked
High Explosive (HE)
Incendiary
Fragmentation
Fire

Cartridge, 25mm

Representative Weapon Platform, DODIC, and Nomenclature:

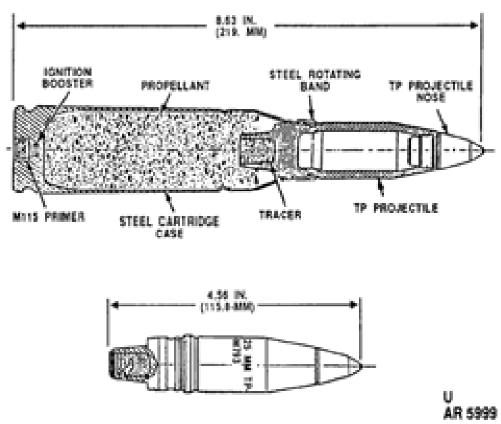
Platform	*DODIC*	*Nomenclature*
Bushmaster Cannon	A976	Cartridge, 25mm Target Practice Tracer (TPT) M793 Linked

Appearance:

CARTRIDGE, 25MM, TARGET PRACTICE-TRACER, M793

Description:

The cartridge case contains an M115 primer. The 25-MM, TP-T, M793 is a spin stabilized target practice round with a tracer. The projectile is blue with white markings. The cartridge case is olive drab with black markings.



Hazards:

Cartridge, 25mm, M793
Smoke/Incendiary
Fire

Cartridge, 40mm

Representative Weapon Platforms, DODIC, and Nomenclature:

Platform	*DODIC*	*Nomenclature*
M203 Grenade Launcher	B519	Cartridge, 40mm Target Practice (TP) M781
M203 Grenade Launcher	B535	Cartridge, 40mm Illumination White Star Parachute M583
MK-19 Grenade Launcher	B576	Cartridge, 40mm Target Practice (TP) M385A1 Linked

Appearance:

40MM TP M781 and M385A1

Various 40MM Signal and Illumination Cartridges

40MM TP M781 Dud

40MM TP M385 Dud

Description:

The M203 grenade launcher uses several fixed-type, low-velocity 40mm rounds. The M203 fires HE, illuminating, signaling, CS, and training ammunition. All M203 grenade launcher rounds are fixed rounds.

The M781 TP round is blue zinc or aluminum with white markings. It is used for practice and produces a yellow or orange signature on impact.

The M583 illumination round is white with black markings. It is used for illumination and signals and is lighter and more accurate than comparable hand-held signal rounds. The parachute attached to the round deploys upon ejection to lower the candle at 7 feet per second. The candle burns for about 40 seconds.

The MK-19 fires six types of cartridges: M430I/M430A1 HE dual-purpose grenades, M383 HE grenade, M385A1/M918 training practice, and M922/M922A1 dummy rounds. The M385A1 is an inert round with a propellant charge.

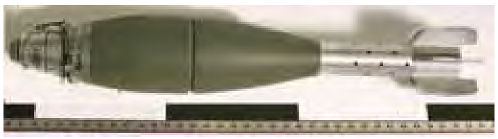
Hazards:

M781 Hazard	*M583 Hazards*	*M385 Hazard*
None	Ejection	None
	Explosive (HE)	
	Fire	
	Smoke/Incendiary	

Cartridge, 60mm

Representative Weapon Platform, DODIC, and Nomenclature:

Platform	*DODIC*	*Nomenclature*
60mm Mortar	B630	Cartridge, 60mm Smoke WP M302/E1/A1/A2
60mm Mortar	B643	Cartridge, 60mm HE M888
60mm Mortar	B647	Cartridge, 60mm Illumination M721



60MM M888

60MM M302 Dud Round

Expended 60MM M721

Description:

Mortar ammunition is considered semi-fixed because the propelling charge is adjustable. On 60mm rounds, bags of granular or horseshoe-shaped propellant are attached to the fins or boom. All 60mm mortar rounds, except training rounds, have three major components - a fuze, body, and tail fin with propulsion system assembly.

The M302 projectile contains a WP filler to produce screening or spotting smoke. Currently, manufactured projectiles have a light-green body with one yellow band below the gas-check bands; identification markings appear in light red. Projectiles of earlier manufacture have a gray body, with one yellow band and yellow markings. The fins are unpainted aluminum.

The M888 projectile contains a HE charge; the body is painted olive drab green with yellow markings.

The M721 projectile contains a base-ejected, parachute-suspended illuminant charge. The cartridge is painted white, except for the fin assembly which is unpainted aluminum. Nomenclature and manufacturing data are stenciled in black.

Hazards

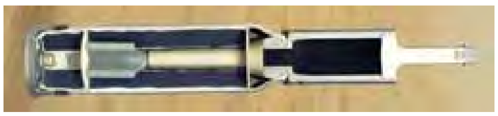
M302 White Phosphorous	*M888 High Explosive*	*M721 Illumination*
Explosive (HE)	EMR	Cocked-Striker
Fragmentation	Explosive (HE)	Ejection
Movement	Fragmentation	Explosive (HE)
White Phosphorus (WP)	Movement	Fire
	Proximity (VT)	Fragmentation
	Static	Smoke/Incendiary

Cartridge, 120mm

Representative Weapon Platform, DODIC, and Nomenclature:

Platform	*DODIC*	*Nomenclature*
Tank, M1A1 Abrams	C784	Cartridge, 120mm Target Practice Tracer (TPT) M831.A1/E2
Tank, M1A1 Abrams	C785	Cartridge, 120mm Target Practice Cone Stabilized Discarding SABOT (TPCSDS) M865

Appearance:



M831 TP-T

M865 TPCSDS

Description:

The M831A1 is an Army TP-T projectile fired from smoothbore guns. The M831A1 projectile is similar in appearance to the M831 projectile except for the fins being replaced by a stabilizer. The M831 and M831A1 are electrically-primed cartridges containing TP-T projectiles. The fin and boom on the M831 have been replaced by a stabilizer with six equally spaced slots on the M831A1, which spins the projectile in flight. The TP-T projectiles do not contain main charge explosives or fuzing. The projectile is painted blue with nomenclature markings in white. The M831A1 has three forward-pointing arrows stamped 120 degrees apart in the spike and four forward-pointing arrows stenciled 90 degrees apart on the white obturator band. The M831A1 bourrelet is not segmented.

The 120mm M865 Target Practice, Cone Stabilized, Discarding Sabot - Tracer (TPCSDS-T) cartridge may be found in the field with either the cone with holes or slotted cone. This is a gun fired, target practice projectile. The projectile is painted blue with white markings. The cone is unpainted. The sabot is aluminum and the core (penetrator) is steel.

Hazards:

M831 TP-T	*M865 TPCSDS-T*
Smoke/Incendiary	Smoke/Incendiary

Cartridge, 81mm

Representative Weapon Platform, DODIC, and Nomenclature:

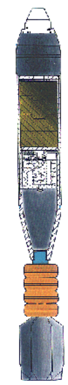
Platform	*DODIC*	*Nomenclature*
81mm Mortar	C868	Cartridge, 81mm HE M821
81mm Mortar	C870	Cartridge, 81mm Smoke RP M819
81mm Mortar	C871	Cartridge, 81mm Illumination M853/A1

Appearance:

81MM HE Dud Round

M821 HE

M819 RP



M853 Illum

Description:

The M821A2 and M821A1 HE Cartridges are designed for use with the M252 81mm Mortar System and are used against personnel, bunker, and light materiel targets. The high fragmentation steel projectile is loaded with Composition B explosive. The bodies are painted olive drab with yellow markings.

The M819 is a fin-stabilized, base-ejecting, mortar-fired projectile used to provide screening smoke. The body and tail cone are painted light green. The body has a stenciled brown band and black markings. The boom and fins are unpainted aluminum.

The M853 is a fin-stabilized projectile containing a base-ejected, parachute-suspended illuminating charge. The body and tail cone are painted white. The ignition cartridge housing and fins are unpainted aluminum. Nomenclature, lot number, and date of manufacture are stenciled in black. A warning notice appears in red on the body of the projectile.

Hazards:

M819 Smoke RP	*M821 HE*	*M853 Illumination*
Cocked-Striker	Electromagnetic Radiation (EMR)	Cocked-Striker
Ejection	Explosive (HE)	Ejection
Explosive (HE)	Fragmentation	Explosive (HE)
Fragmentation	Movement	Fire
Smoke/Incendiary	Proximity (VT)	Fragmentation
	Static Electricity	Smoke/Incendiary

Cartridge and Launcher, 84mm M136 AT4

Representative Weapon Platform, DODIC, and Nomenclature:

Platform	*DODIC*	*Nomenclature*
Marine	C995	Cartridge and Launcher, 84mm M136 AT4

Appearance:

84MM M136 Rocket

Description:

The M136 AT4 is a recoilless rifle used primarily by Infantry Forces for engagement and defeat of light armor. The recoilless rifle design permits accurate delivery of an 84mm HE Anti-Armor (HEAA) warhead, with negligible recoil. The M136 AT4 is a lightweight, self-contained, anti-armor weapon consisting of a free-flight, fin-stabilized, rocket-type cartridge packed in an expendable, one-piece, fiberglass-wrapped tube. The M136 AT4 is man-portable and is fired from the right shoulder only.

Hazards:

M136 AT4
Explosive (HE)
Fragmentation
Jet (HEAT or Shaped Charge)
Lucky (Piezoelectric)
Movement

Projectile, 155 mm

Representative Weapon Platform, DODIC, and Nomenclature:

Platform	*DODIC*	*Nomenclature*
155mm Howitzer	D505	Projectile, 155mm Illumination M485 Illumination
155mm Howitzer	D528	Projectile, 155mm Smoke WP M825 Series
155mm Howitzer	D544	Projectile, 155mm HE M107 (Composition B))
155mm Howitzer	D579	Projectile, 155mm High-Explosive Rocket-Assisted (HERA) M549A1 (trinitrotoluene [TNT])

Appearance:

Projectile, Illum M485

Projectile, WP M825

Projectile, HE M107

Projectile, HERA M549A1

Description:

The 155mm diameter projectiles offer a wide range of options for battlefield usage. Separate loading ammunition is used in 155mm howitzers. Separate loading ammunition has four separate components: primer, propellant, projectile, and fuze. The four components are issued separately. Upon preparation for firing, the fuze is threaded into the projectile, and the projectile and propellant are loaded into the howitzer in two separate operations.

The M485 projectile contains a parachute-suspended illuminating candle. The projectiles are painted olive drab with white markings. They may have one white band depending upon when they were manufactured.

The M825 series consists of WP smoke projectiles. The projectile and canister are painted light green with markings stenciled in red. The projectile has a yellow band around the ogive.

The M107 is a HE projectile painted olive drab with yellow markings.

The M549A1 is a high-explosive rocket-assisted (HERA) projectile used in howitzers to provide extended-range artillery fire. The projectile is painted olive drab with yellow stenciling. The rotating band and white plastic obturator are unpainted.

Hazards:

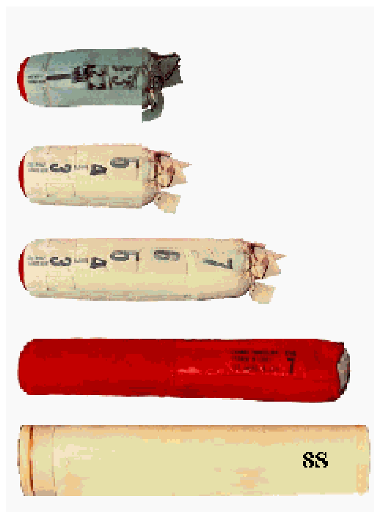
M485 Illumination	*M825 WP*	*M107 HE*	*M549A1 HERA*
Cocked-Striker	Clockwork/Mechanical Time	Cocked-Striker	Cocked-Striker
Ejection	Cocked-Striker	EMR	EMR
Explosive (HE)	Explosive (HE)	Explosive (HE)	Explosive (HE)
Fire	Fragmentation	Fragmentation	Fragmentation
Fragmentation	Movement	Movement	Movement
Intense Light	White Phosphorus (WP)	Static	Proximity (VT)
Smoke/Incendiary			Static

Charge, Propellant 155 mm

Representative Weapon Platform, DODIC, and Nomenclature:

Platform	*DODIC*	*Nomenclature*
155mm Howitzer	D540	Charge, Propelling 155mm Green Bag M3A1
155mm Howitzer	D532	Charge, Propelling 155mm Red Bag M203 Series
155mm Howitzer	D533	Charge, Propelling 155mm White Bag M119 w/o Primer
155mm Howitzer	D541	Charge, Propelling 155mm White Bag M4 Series

Appearance:



Green Bag, M3A1 (Top Two)

White Bag, M4A2 (Third from Top)

Charge 7RB, M119A2 Red Bag (Fourth from Top)

M203 (Bottom)

Description:

Separate loading ammunition is used in 155mm howitzers. Separate loading ammunition has four separate components: primer, propellant, projectile, and fuze. The four components are issued separately. Upon preparation for firing, the projectile and propellant are loaded into the howitzer in two separate operations. Separate loading ammunition propellants are issued as a separate unit of issue in sealed canisters to protect the propellant. The amount of propellant to be fired with artillery ammunition is varied by the number of propellant increments. The charge selected is based on the range to the target and the tactical situation.

Green Bag, M3A1, propellant is designed for firing charges 1 through 5. The propellant is fastened together with four cloth straps sewn to the base and hand tied on top of increment 5. The igniter pad (3.5 ounce CBI) is located on the base increment. The entire M3A1 propellant contains approximately 5.5 pounds of single perforated neutral burning powder. There are flash reducers containing potassium sulfate or potassium nitrate sewn forward of charges 1 (2 ounce pad), 4 and 5 (1 ounce pad each). The flash reducers limit breech flare back, muzzle flash, and blast over-pressure.

White Bag, M4A2 propellant is designed for charges 3 through 7. Their basic configuration is the same as Green Bag propellant. The M4A2 contains approximately 13 pounds of multi-perforated (Progressive burn) propellant. A flash reducer pad containing 1 ounce of potassium nitrate or potassium sulfate is sewn to the base increment.

Charge 8WB, M119 - This single increment, multi-perforated, white bag charge with a perforated igniter core tube extending through the center of the propellant with a flash reducer sewn to the forward end. It can only be used in the long tube 155mm howitzers (M19 series and the M198). Store horizontally due to the central, perforated igniter core tube. Cannot fire rocket-assisted projectiles using M119 due to the design of the flash reducer.

Charge 8WB, M119A1, is exactly the same as the M119 except for the donut-shaped flash reducer sewn to the forward end. This design of the flash reducer precludes ignition of the rocket motor for Rocket Assisted Projectile (RAP).

Charge 7RB, M119A2, is a single increment 7 red bag charge for firing in 155mm howitzers that have the M185 and M199 cannon tubes. The forward end of the charge has a 3-ounce lead foil liner and four pockets sewn longitudinally to the circumference. Each of the four pockets contains 4 ounces of potassium sulfate to act as a flash reducer. Charge 7RB can be used interchangeably with charge 8WB with a minor difference in muzzle velocity. The M119A2 was created to correspond with existing North American Treaty Organization (NATO) firing tables.

M203 propellant is a zone 8S charge designed to provide extended range for the M198, M19A5/A6 howitzers. The M203 propellant charge is a single increment, red bag charge with a central igniter core extending through its entire length and a donut-shaped flash reducer at the forward end of the charge. The M203 is used only with the M549A1 (TNT loaded) RAP, the M825 felt wedge, and the M864 base bleed projectiles.

M203A1 Propellant also a single increment base ignited charge. The outer casing is a solid combustible material. There is still an igniter pad at the base of the propellant, and it contains .7 ounces of black powder and 1 ounce of CBI. The propellant is not made up of granules; it consists of 28 pounds of slotted, stick propellant. The M203A1 charge is fired only with the M549A1 (TNT loaded), RAP, M825 felt wedge, and M864 projectiles in the M198 and M109A5/6 howitzers. The reasons for design of the M203A1 propelling charge are: 1) cooler burning, less flash, blast, and tube wear. 2) Casing form is more durable causing for less igniter core damage. 3) For automatic loading systems, it allows fewer mechanical problems.

Hazards:

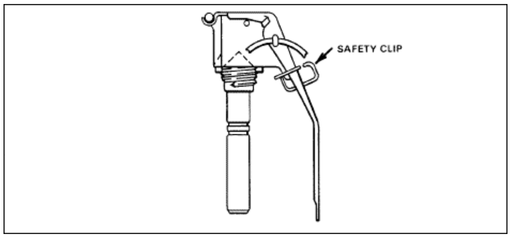
M3A1 Green Bag	*M203 Red Bag*	*M119 White Bag*	*M4 White Bag*
Static Electricity	Static Electricity	Static Electricity	Static Electricity
Fire	Fire	Fire	Fire

Fuze, Hand Grenade

Representative Weapon Platform, DODIC, and Nomenclature

Platform	*DODIC*	*Nomenclature*
Individual Marine	G878	Fuze, Hand Grenade M228

Appearance:



Description:

Detonating fuzes explode within the grenade body to initiate the main explosion of the filler substance. Detonating fuzes include the M213 and M228.

Hazards:

Fuze, Hand Grenade
Cocked Striker
Explosive (HE)
Fragmentation
Fire

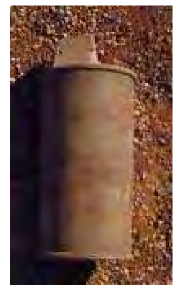
Grenades, Smoke

Representative Weapon Platform, DODIC, and Nomenclature:

Platform	*DODIC*	*Nomenclature*
Individual Marine	G930	Grenade, Hand Smoke HC AN-M8
Individual Marine	G940	Grenade, Hand Smoke Green M18
Individual Marine	G945	Grenade, Hand Smoke Yellow M18

Appearance:

AN-M8 HC Smoke



M18 Green/Yellow Smoke

Description:

The AN-M8 is a hand-thrown, burning, HC-smoke grenade which may also be launched by ground or airborne grenade launchers.

The M18 is a hand-thrown, smoke grenade which emits red, yellow, or violet smoke for 50 to 90 seconds. The M18 may also emit green smoke. These grenades use a pyrotechnic, delay-igniting fuze which provides an approximate 2-second delay.

Hazards:

AN-M8 HC Smoke	*M18 colored Smoke*
Cocked-Striker	Cocked-Striker
Explosive (HE)	Explosive (HE)
Fire	Fragmentation
Fragmentation	Smoke/Incendiary
Smoke/Incendiary	Fire

Shoulder Launched Multi-Purpose Assault Weapon (SMAW)

Representative Weapon Platforms, DODIC, and Nomenclature:

Platform	*DODIC*	*Nomenclature*
Individual Marine	HX05	Rocket, Assault 83mm MK-1 High Explosive SMAW
Individual Marine	HX07	Rocket, Assault 83mm MK-8 HEAA SMAW

Appearance

MK-1 HE SMAW

MK-8 HEAA SMAW Dud

Description:

This is a folding-fin HEAA surface-to-surface rocket and launcher. The tactical rocket uses an MK-259 Mod 0 impact fuze. The tactical rocket has a black rocket motor with an off-white fiberglass exhaust cone, a black warhead with markings stenciled in yellow, a gold-colored target sensor, and unpainted aluminum fins. The practice rocket has a black rocket motor with an off-white fiberglass exhaust cone, a light-blue plastic warhead, and unpainted aluminum fins. The rocket case is olive drab with manufacturing data and other markings stenciled in yellow. The encased tactical round, the MK-6 Mod 0, is encircled by three 38-millimeter (1.50-inch) bands, one black and one yellow at the front of the case, and a brown one at the rear.

There are two training configurations, a practice rocket, and a trainer. The practice rocket is identical to the tactical rocket, except for an inert warhead. The rocket is black; the rocket case, olive drab with yellow markings and manufacturing data, and a 38-millimeter (1.50-inch) yellow band.

Hazards:

MK-1	*MK-8*
Explosive (HE)	Explosive (HE)
Fragmentation	Fragmentation
Missile	Jet (HEAT or Shaped Charge)

Mine Clearing Line Charge (MICLIC) Rocket Motor and Line Charge

Representative Weapon Platform, DODIC, and Nomenclature:

Platform	*DODIC*	*Nomenclature*
MICLIC	J143	Rocket Motor, 5 inch MK22-2/3/4
MICLIC	M913	Charge, Demolition, HE Linear M58

Appearance:

MK22 Rocket Motor and M58 Line Charge on Launch Platform

Charge, Demolition, HE Linear M58 Showing Blocks of C4 Explosive

Rocket Motor, 5 inch MK22-2/3/4 for Linear Demolition Charge

Description:

MK-22 Rocket Motor: Major internal components for both rocket motors include a star-perforation propellant grain, a salt sleeve, an igniter, and a nose plug. The rocket motors main features consist of the rocket motor tube, cable guide, front closure, nose plug, lockpin, towing bridle assembly, and two button-lug bands. The MK-22-series rocket motors are painted gray and have a brown band around the forward end. Markings are stenciled in black.

M58 Line Charge: These are rocket-projected explosive line charges used to breach anti-tank and/or anti-personnel minefields or other obstacles to provide a path for tanks, vehicles, and personnel. The service line charges use the M1134-series fuzes. The rocket motors and line charges are electrically initiated.

Hazards:

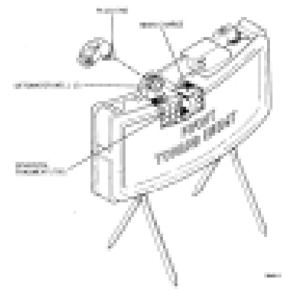
MK-22 Rocket Motor	*M58 Line Charge*
Ejection	Explosive (HE)
EMR	
Explosive (HE)	

M18A1 Claymore Mine

Representative Weapon Platform, DODIC, and Nomenclature:

Platform	*DODIC*	*Nomenclature*
Individual Marine	K143	Mine, Anti-personnel M18A1 w/ Firing Device (Claymore)

Appearance:



Description:

The M18A1 is a directional fragmentation mine, widely copied by other nations. The inert practice version of the mine is designated M68. The plastic body encloses 700 steel ball bearings embedded in a plastic matrix; these fragments are backed by plastic explosive. The fragmentation face is convex horizontally to direct the fragments and concave vertically to control vertical dispersion. The M18A1 mine is olive drab with raised lettering on the front and black markings on the rear.

Hazards:

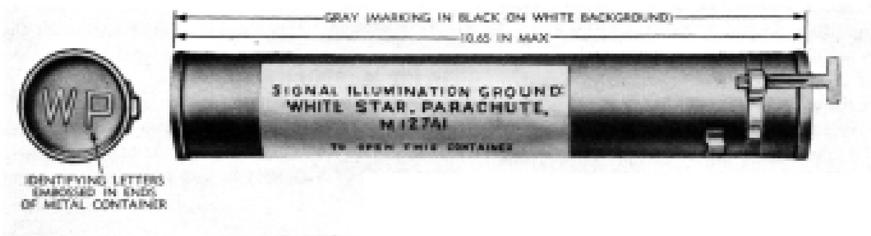
M18A1 Claymore Mine
Explosive (HE)
Frag

Signal Flares and Smoke

Representative Weapon Platforms, DODIC, and Nomenclature:

Platform	*DODIC*	*Nomenclature*
Individual Marine	L312	Signal Illumination White Star Parachute M127/A1
Individual Marine	L314	Signal Illumination Green Star Cluster M125/A1/E1
Individual Marine	L324	Signal, Smoke Green Parachute M128A1

Appearance:



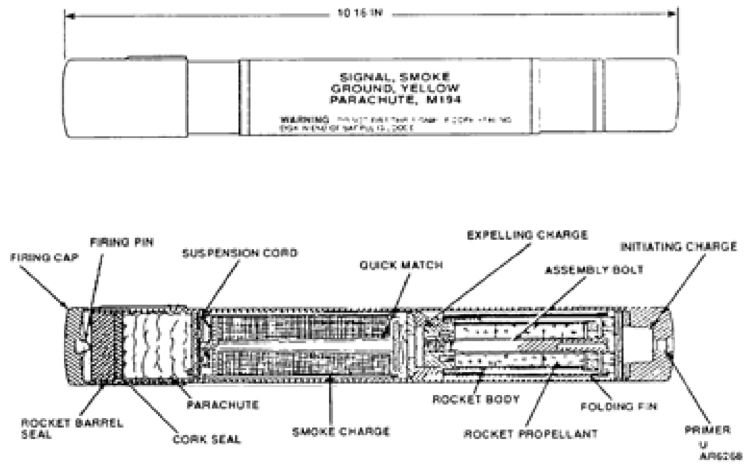
M127 Series Signal Flare

Description:

The M127 signal is rocket propelled and fin stabilized. The expendable type launcher is integral with the signal and hence for firing does not require a grenade launcher attached to a rifle firing a special cartridge. It produces a white or red star.

The M125 series signals are made of cardboard and contain a small black powder charge to eject the star cluster flare.

The M128 series parachute smoke signal consists of a parachute suspended smoke composition element and a rocket motor propulsion assembly enclosed in a hand-held aluminum launching tube. The base of the tube contains a primer and an initiating charge.



Typical Signal, Smoke Ground, Parachute Diagram

Hazards:

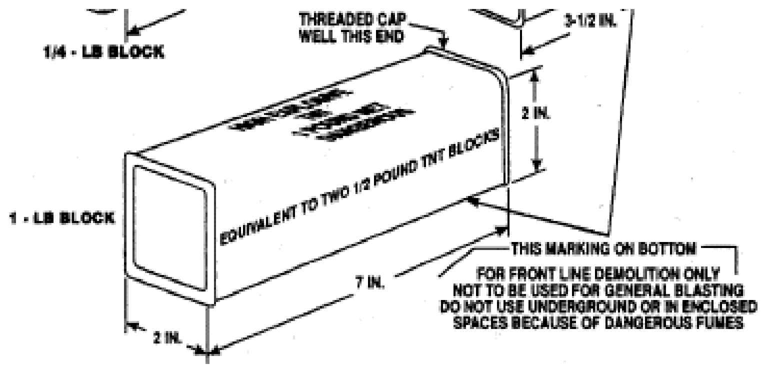
M127 Series	*M125 Series*	*M128 Series*
Fire	Ejection	Fire
Smoke/Incendiary	Smoke/Incendiary	Smoke/Incendiary

Demolition Charges

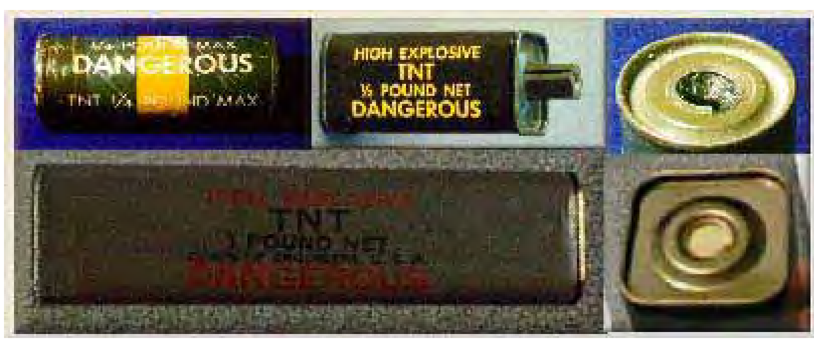
Representative Weapon Platform, DODIC, and Nomenclature:

Platform	*DODIC*	*Nomenclature*
Individual Marine	M032	Charge, Demolition Charge 1 pound TNT
Individual Marine	M039	Charge, Demolition Cratering 40 pound
Individual Marine	M421	Charge, Demolition Shaped M3 Series 40 pound
Individual Marine	ML25	Charge, Demolition Flex Linear M59 Series c-4

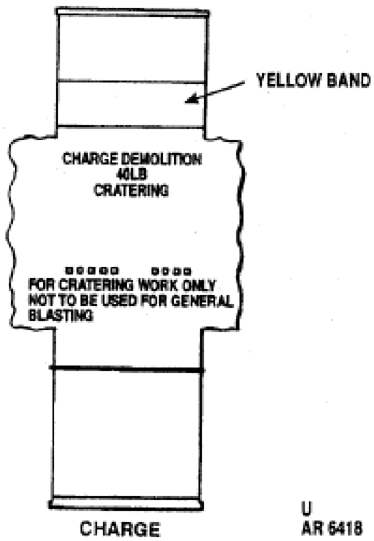
Appearance:



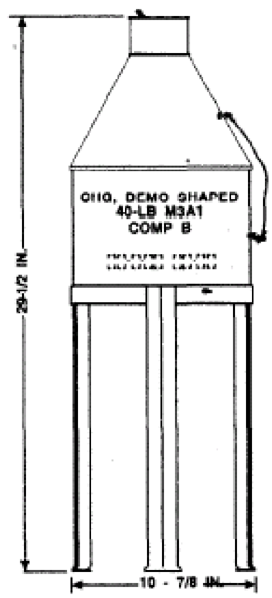
TNT 1 pound Charge



TNT Block Demolition Charges



40 pound Cratering Charge



40 pound Shaped Charge

Flexible Linear Shape Charge Samples

Description:

TNT block demolition charges are issued in three sizes. The 1/4-pound block demolition charge is in a cylindrical waterproof cardboard container, and the 1/2-pound and 1-pound block demolition charges are in rectangular waterproof cardboard containers. All three have metal ends with a threaded cap well in one end.

The 40-pound cratering demolition charges are watertight cylindrical metal containers with approximately 39 pounds of H-6 explosive. A semicircular angle is located on the top of the container for handling the charge or lowering it into a hole.

Shaped demolition charges used in military demolition operations are tapered top cylindrical blocks of HEs having a lined, conical cavity in one end which directs the cone liner material into a narrow jet for penetrating metal, concrete, earth, or other materials. A carrying handle is attached to each charge.

Hazards:

1 pound Charge Hazards	*40 pound Cratering Charge Hazards*	*40 pound Shaped Charge Hazards*	*Flex Linear Shaped Charges*
Explosive (HE)	Explosive (HE)	Explosive (HE)	Explosive (HE)
		Jet (Shaped Charge)	

MK7 Anti-Personnel Obstacle Breaching Systems (APOBS)

Representative Weapon Platform, DODIC, and Nomenclature:

Platform	*DODIC*	*Nomenclature*
Individual Marine	MN79	Demolition Kit, Breaching System, Anti-Personnel Obstacle Breaching System (APOBS)

Appearance:

Description:

The APOBS is an explosive line charge system that allows safe breaching through complex anti-personnel obstacles. The APOBS is used to conduct deliberate or hasty breaches through enemy anti-personnel minefields and multi-strand wire obstacles. It is light enough to be carried by two soldiers with backpacks and can be deployed within 30 to 120 seconds.

The APOBS is made up of a front and rear backpack subsystem containing grenade-filled, line-charge segments; a detonation cord to ignite the grenades; a drogue parachute that provides stability during flight; and two quick connectors. Additionally, a rocket-motor assembly provides Marines the option to initiate the APOBS in delay or command modes.

Once set in place, the APOBS rocket is fired from a 35-meter standoff position, sending the line charge with fragmentation grenades over the minefield and/or wire obstacle. The grenades neutralize or clear the mines and sever the wire, effectively clearing a footpath for troops up to 45 meters in length.

As a certified insensitive munition, APOBS is safe to employ and transport.

Hazards:

MK7 APOBS
Explosive (HE)
Fragmentation
Projection

Demolition Kits and Assemblies

Representative Weapon Platform, DODIC, and Nomenclature:

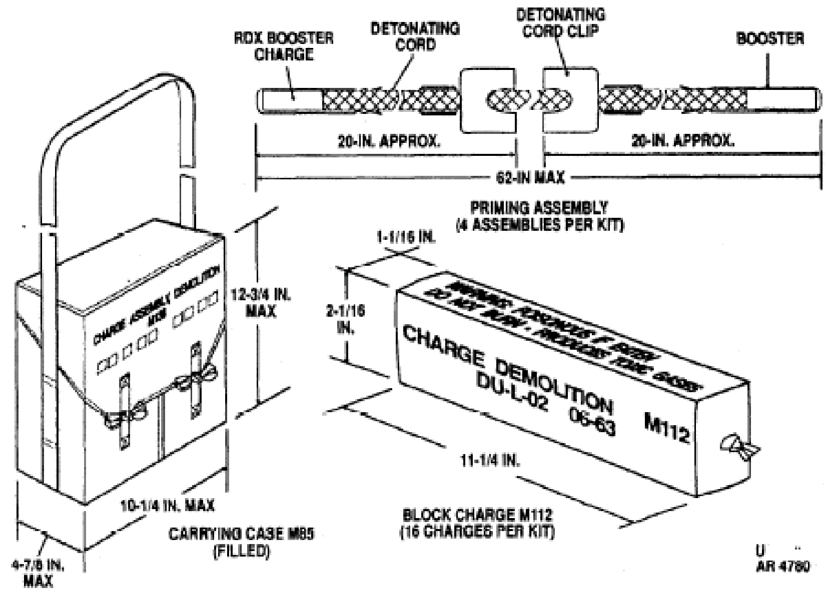
Platform	*DODIC*	*Nomenclature*
Individual Marine	M028	Demolition Kit, Bangalore Torpedo M1A2
Individual Marine	M757	Charge, Assembly Demolition Kit M183 C-4 16 x 1 1/4 pound

Appearance:

Bangalore Torpedo

Bangalore Torpedo Sections

Bangalore Torpedo Being Emplaced



Charge, Demolition Assembly M183

Description

The M1A1 Bangalore Torpedo is an anti-personnel mine clearing charge dating back to World War II. It clears a footpath 0.6 meters wide. Each Bangalore section weighs 13 pounds, including 9 pounds of explosive. The Bangalore kit consists of ten 5-foot sections.

The M183 demolition kit consists of 16 block demolition charges M112, four priming assemblies, and carrying case M85. The demolition charge M112 is a rectangular block of Comp C4 approximately 2 inches by 1-1/2 inches and 11 inches long, weighing 1-1/4 pounds.

Hazards:

M1A1 Bangalore Torpedo	*M183 Charge, Demolition Assembly*
Explosive (HE)	Explosive (HE)
Fragmentation	

Initiating and Priming Devices

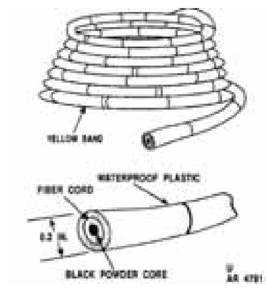
Representative Weapon Platform, DODIC, and Nomenclature:

Platform	*DODIC*	*Nomenclature*
Marine	M130	Cap, Blasting Electric Special M6
Marine	M131	Cap, Blasting Non-Electric Special M7
Marine	M670	Fuse, Blasting Time M700
Marine	M766	Igniter, Time Blasting Fuse M2/M60
Marine	M456	Cord, Detonating Pentaerythritol tetranitrate (PETN)

Appearance:

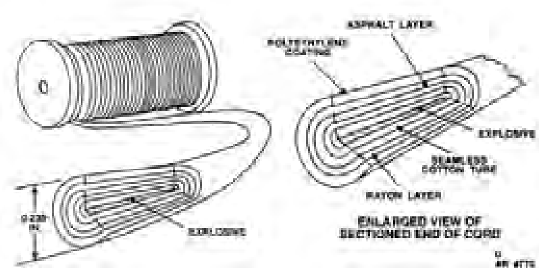
M6 Electric Blasting Cap

Non-Electric Blasting Caps



Time Fuse

Igniter, Time Fuse



Detonating Cord

Description:

Blasting Cap M6 consists of a base charge of Cyclotrimethylenetrinitramine (RDX). Two 12-foot lead wires, connected by a bridge wire in the ignition charge, extend through a rubber (or rubber and sulfur) plug assembly in the open end of the cup. Two circumferential crimps secure the plug assembly in the cup.

The non-electric blasting cap consists of an aluminum alloy cup containing an ignition charge of lead styphnate and a base charge of RDX. The flared end facilitates insertion of time-blasting fuse or detonating cord.

Time fuse is olive drab with a yellow single band 1/4 inches wide every 18 inches and a double yellow band every 90 inches.

The igniter consists of three major assemblies: a firing mechanism, a fuse holder, and a primer base.

Detonating cord generally consists of a core of high velocity explosive in a seamless textile tube. The tube is covered with a thin layer of asphalt and sheathed in an outer cover of plastic coated textile. The plastic outer cover is smooth and colored olive drab.

Hazards:

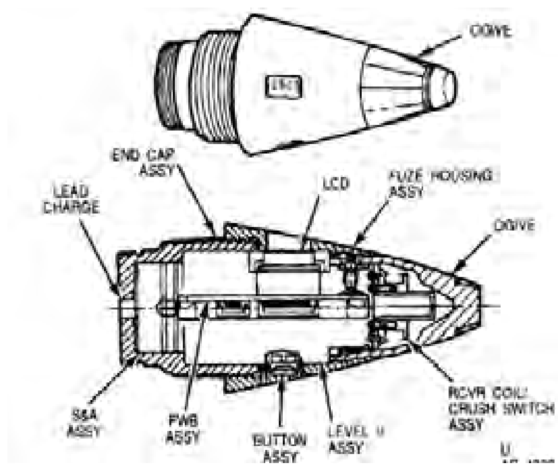
M6 Hazards	*M7 Hazards*	*M700 Hazard*	*M60 Hazard*	*Detonating Cord Hazards*
Shock	EMR	None	None	Shock
Fragmentation	Fragmentation			Explosive (HE)
Explosive (HE)	Explosive (HE)			

Fuzes and Primers

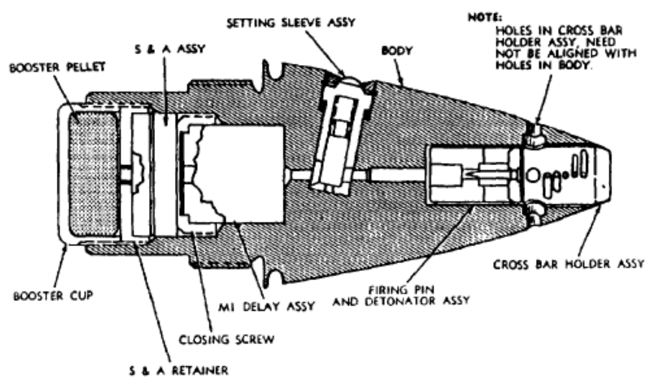
Representative Weapon Platform, DODIC, and Nomenclature:

Platform	*DODIC*	*Nomenclature*
155mm Howitzer	N289	Fuze, Electronic Time M762
155mm Howitzer	N340	Fuze, Point Detonating M739/A1
155mm Howitzer	N523	Primer, Percussion M82

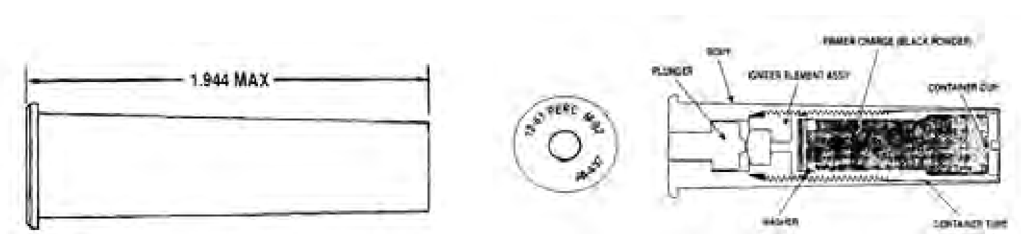
Appearance:



M762 Electrical Time Fuze



M739 Point Detonating Fuze



Primer, Percussion M82

Description:

If the M762 fuze fails in the time mode or impacts before a time setting expires, there is no true PD back-up; however, the round may or may not function on ground impact.

The M739 series fuzes are the latest improved version of the selective impact fuzes. The fuze body is a one-piece design of solid aluminum and has a standard 2-inch threaded base to match projectile nose and fuze cavity.

The primer consists of a cylindrical brass case with an extraction flange which contains a plunger in the base, an ignition element, and a container loaded with 22 grains of black powder

Hazards:

M762 Electronic Time Fuze	*M739 Point Detonating Fuze*	*M82 Percussion Primer*
High Explosive (HE)	High Explosive (HE)	Low Explosive
Fragmentation	Fragmentation	Fragmentation
		Impact
		Fire

Guided Missiles

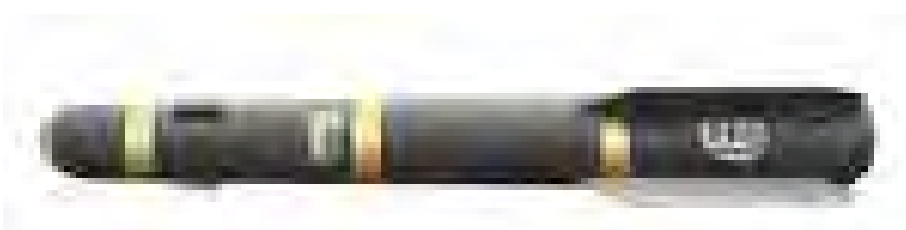
Representative Weapon Platform, DODIC, and Nomenclature:

Platform	*DODIC*	*Nomenclature*
TOW Launcher	PB99	Guided Missile, Practice BTM-71A-3 Basic Extended Tube-launched, Optically tracked, Wire-guided (TOW)
Aircraft TOW Launcher	WF10	Guided Missile, Surface Attack Ballistic Guided Missile (BGM)-71D-5 TOW
Aircraft	PB69	Guided Missile, Surface Attack Air-to-Ground Guided Missile (AGM)-65D Maverick
Aircraft	PA79	Guided Missile, Surface Attack AGM-114A Hellfire

Appearance:

TOW Missile

Maverick Missile



Hellfire Missile

Hellfire Missile

Description:

TOW tactical missiles are unpainted and have a silver-anodized electronics section, a black-anodized ogive, a black anodized warhead section, a black flight rocket motor section, and a gold anodized aft body section. Markings on all missiles are black or yellow. The ogive and warhead section of the practice missile are painted blue.

Except for an unpainted seeker window and nose dome cover, the Maverick missile is painted olive drab. A black band, with COMP B stenciled in yellow, encircles the forward body section, and a brown band encircles the aft body section. Other markings are stenciled in black.

The AGM-114 Hellfire is a multi-platform, multi-target United States designed modular missile system. The name comes from its original intention as a helicopter-launched fire-and-forget weapon (*HELicopter Launched FIRE-and-forget*). Initial problems with the TV-based guidance system forced designers to consider a laser guidance system. The Hellfire today is a comprehensive weapon system, one that can be deployed from rotary- and fixed-wing aircraft, naval assets, and land-based systems against a variety of targets.

Hazards:

TOW	*Maverick*	*Hellfire*
EMR	Explosive (HE)	EMR
Explosive (HE)	Frag	Explosive (HE)
Frag	Jet (HEAT or Shaped Charge)	Frag
High Pressure (Accumulator)		
Mechanical		
Movement		

Bombs, General Purpose and Practice

Representative Weapon Platform, DODIC, and Nomenclature:

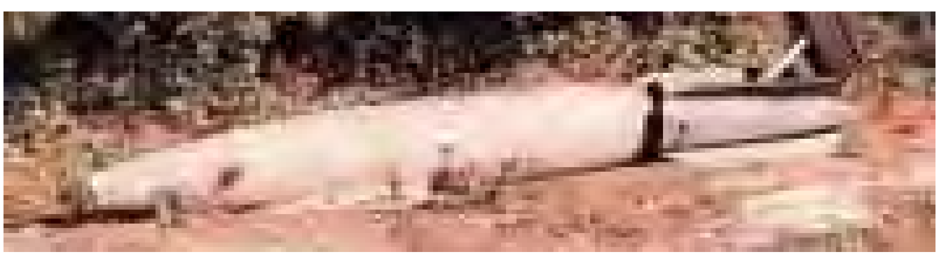
Platform	*DODIC*	*Nomenclature*
Air		Bomb, General Purpose MK-76 25 pound Inert
Air		Bomb, General Purpose MK-82 500 pound HE
Air		Bomb, General Purpose MK-83 1,000 pound Inert
Air		Bomb, General Purpose MK-84 2,000 l pound HE

Appearance:

MK-76 Practice Bomb

MK-82 500 pound General Purpose Bomb

MK-83 1,000 pound General Purpose Bomb



MK-84 2,000 pound General Purpose Bomb

Description:

The MK-76-series bombs are painted black or blue. The MK-76 Mods 1, 2, 3, 4, and some Mod 5 bombs have a 0.25-inch (6-millimeter) white stripe over the index holes.

The MK-82, MK-83 and MK-84 bombs are painted olive drab and have a yellow band 3 inches wide around the nose and tail or around the nose only. Thermally insulated bombs have two yellow bands each 3 inches wide around the nose. Yellow lettering is stenciled around the body near the nose. The MK-82 is just over 5 feet long, the MK-83 is just over 6 feet long, and the MK-84 is just over 8 feet long.

Hazards:

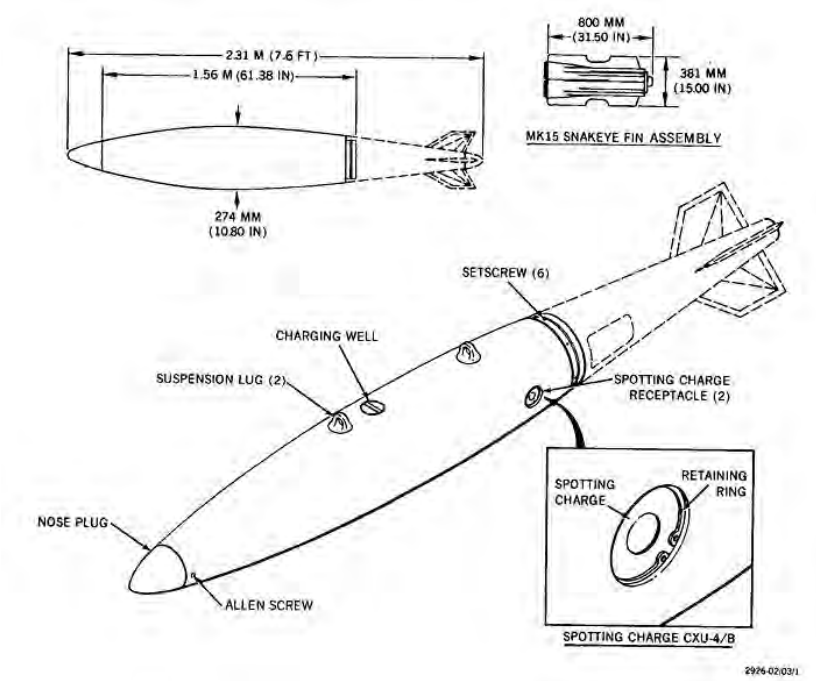
MK-76 Practice	*MK-82 500 pound*	*MK-83 1,000 pound Bomb*	*MK-84 2,000 pound Bomb*
Red Phosphorus (RP)	Antidisturbance	Antidisturbance	Antidisturbance
Smoke/Incendiary	Clockwork/Mechanical Time	Clockwork/Mechanical Time	Clockwork/Mechanical Time
	Cocked-Striker	Cocked-Striker	Cocked-Striker
	Ejection	Ejection	Ejection
	EMR	EMR	EMR
	Explosive (HE)	Explosive (HE)	Explosive (HE)
	Fragmentation	Fragmentation	Fragmentation
	Magnetic	Magnetic	Magnetic
	Movement	Movement	Movement
	Proximity (VT)	Proximity (VT)	Proximity (VT)

Bomb, Practice Inert Bomb Dummy Unit (BDU)-45

Representative Weapon Platform, DODIC, and Nomenclature:

Platform	*DODIC*	*Nomenclature*
Aircraft		Bomb, Practice Inert BDU-45

Appearance:



Description:

The BDU-45 is a 500 pound Navy practice bomb.

Hazards:

BDU-45 Practice Bomb
Low Explosive
Fragmentation
Fire

2.75-inch Aerial Rockets

Representative Weapon Platform, DODIC, and Nomenclature:

Platform	*DODIC*	*Nomenclature*
Aircraft	HA12	Rocket, 2.75 inch HE M151
Aircraft	H116	Rocket, 2.75 inch WP M259
Aircraft	H184	Rocket, 2.75 in RP M264

Appearance:

Dud 2.75-inch Rocket Warhead

2.75-inch HE Rocket Complete

Description"

The HE warhead is olive drab with yellow markings. Designation and other information are stenciled in yellow.

The nose of both the M259 and M264 is light brown, and the body is light green with a yellow color band. The designation and other information are stenciled in red. The canister is unpainted, pre-scored aluminum, with nomenclature and lot number stenciled in red.

Hazards:

M151	*M259*	*M264*
Explosive (HE)	Cocked-Striker	Clockwork/Mechanical
Frag	Ejection	Time
Movement	Explosive (HE)	Ejection
	Frag	Electrical
	Smoke/Incendiary	Explosive (HE)
	White Phosphorus (WP)	Red Phosphorus (RP)
		Smoke/Incendiary
		Wait Time

Rocket, 5-inch ZUNI

Representative Weapon Platform, DODIC, and Nomenclature:

Platform	*DODIC*	*Nomenclature*
Aircraft		Rocket, 5 inch Zuni High Explosive (HE)
Aircraft		Rocket, 5 inch Zuni WP
Air		Rocket, 5 inch Zuni Illumination

Appearance:

Zuni MK-16

LAU-10C/B or -10D/B (exact model unknown)

Description:

MK-16 Zuni Folding-Fin Aircraft Rocket (FFAR)

The Zuni 5-inch FFAR was designed as a modular system, and allows the use of different types of warhead and fuze. Options included general-purpose and shaped-charged warheads, point-detonation, delayed-action and proximity fuzes. The latter option was intended for air-to-air application, but Zuni was almost exclusively used as an air-to-ground weapon. For a list of current warheads, see section on the MK-71 motor below. The rocket is deployed primarily in four-tube pods of the LAU-10/A series. The exact length and weight of the Zuni depends on the warhead, but typical values are 2.79 meters (110 inches) and 48.5 kilograms (107 pounds), respectively.

Designation Note: No formal designations are allocated to all-up 5-inch Zuni rockets. Instead, the rocket type is generally identified by the designation of the motor assembly, which is the main body of the rocket and includes nozzle and fins. The original production Zuni motor is designated MK-16, and the ultimate variant is the MK-16 MOD 3. The various warheads are typically usable with all available motors, and are presumably often fitted to the rockets in the field only briefly before actual use. Therefore, it was apparently deemed unnecessary to assign MK/MOD designations to every specific combination of rocket and payload. In fact, the original edition of the current designation system for rockets and missiles explicitly excluded unguided line-of-sight rockets from the system.

MK-71 Zuni

The current 5-inch Zuni rockets use the MK-71 motor. It uses a smokeless propellant and has a completely new nozzle/fin assembly. The latter has four wrap-around type fins, and therefore the MK-71 is sometimes called a Wrap-Around Fin Aerial Rocket (WAFAR) instead of an FFAR. The actual diameter of the MK-71 is quoted as 130 millimeters (5.12 inches). The MK-71 MOD 0 began to replace the MK-16 in June 1971, but was soon superseded by the MK-71 MOD 1, which entered full production in September 1973. The MK-71 MOD 1 is the only Zuni motor currently in use, and is a Hazards of Electromagnetic Radiation to Ordnance (HERO) safe modification of the MOD 0. The MK-71 rockets are fired from LAU-10C/A and LAU-10D/A 4-tube pods, the earlier launcher versions (through LAU-10B/A) being incompatible with the new motor. The LAU-10C/A is for shore-based use only because it lacks the thermal protection coating of the -10D/A.

A wide variety of warheads is available for the MK-71 rocket. The following table lists the basic characteristics (length, weight) of MK-71 Zuni rockets with the warhead/fuze combinations currently used by the U.S. Navy:

<table>
<tr><th>Warhead</th><th>Warhead Type</th><th>Fuze</th><th>Length</th><th>Weight</th></tr>
<tr><td rowspan="4">MK-24 MOD 0/1</td><td rowspan="4">General Purpose</td><td>MK-93 MOD 0</td><td>249.4 centimeters (98.18 inches)</td><td rowspan="4">56.8 kilograms (125.2 pounds)</td></tr>
<tr><td>MK-188 MOD 0</td><td rowspan="3">240.0 centimeters (94.48 in)</td></tr>
<tr><td>MK-352 MOD 2</td></tr>
<tr><td>FMU-90/B</td></tr>
<tr><td rowspan="4">MK-32 MOD 0</td><td rowspan="4">Anti-Tank/Anti-Personnel</td><td>MK-93 MOD 0</td><td>277.9 centimeters (109.41 inches)</td><td rowspan="4">56.3 kilograms (124.13 pounds)</td></tr>
<tr><td>MK-188 MOD 0</td><td rowspan="3">268.5 centimeters (105.71 inches)</td></tr>
<tr><td>MK-352 MOD 2</td></tr>
<tr><td>FMU-90/B</td></tr>
</table>

<table>
<tr><th>Warhead</th><th>Warhead Type</th><th>Fuze</th><th>Length</th><th>Weight</th></tr>
<tr><td>MK-33 MOD 1</td><td>Illumination Flare</td><td>MK-193 MOD 0</td><td>274.6 centimeters
(108.12 inches)</td><td>56.9 kilograms
(125.4 pounds)</td></tr>
<tr><td rowspan="4">MK-34 MOD 0</td><td rowspan="4">Smoke (White Phosphorus)</td><td>MK-93 MOD 0</td><td>247.1 centimeters
(97.28 inches)</td><td rowspan="6">58.2 kilograms
(128.33 pounds)</td></tr>
<tr><td>MK-188 MOD 0</td><td rowspan="5">237.7 centimeters
(93.58 inches)</td></tr>
<tr><td>MK-352 MOD 2</td></tr>
<tr><td>FMU-90/B</td></tr>
<tr><td rowspan="2">MK-34 MOD 2</td><td rowspan="2">Smoke (Red Phosphorus)</td><td>MK-188 MOD 0</td></tr>
<tr><td>MK-352 MOD 2</td></tr>
<tr><td rowspan="3">MK-63 MOD 0</td><td rowspan="3">Fragmentation</td><td>MK-93 MOD 0</td><td>287.5 centimeters
(113.19 inches)</td><td rowspan="3">62.7 kilograms
(138.3 pounds)</td></tr>
<tr><td>MK-352 MOD 2</td><td rowspan="2">278.1 centimeters
(109.49 inches)</td></tr>
<tr><td>FMU-90/B</td></tr>
<tr><td>MK-84 MOD 4</td><td rowspan="2">Chaff/Countermeasures</td><td rowspan="2">FMU-136/B</td><td rowspan="2">240.0 centimeters
(94.48 inches)</td><td rowspan="2">56.8 kilograms
(125.2 pounds)</td></tr>
<tr><td>RR-182/AL</td></tr>
<tr><td>MK-6 MOD 7</td><td rowspan="3">Practice</td><td>n/a (nose plug)</td><td>237.7 centimeters
(93.58 inches)</td><td>58.2 kilograms
(128.33 pounds)</td></tr>
<tr><td>MK-24 MOD 0</td><td>n/a (ogive)</td><td>241.9 centimeters
(95.25 inches)</td><td>58.0 kilograms
(127.84 pounds)</td></tr>
<tr><td>WTU-11/B</td><td>inert MK-93 MOD 0</td><td>268.5 centimeters
(105.71 inches)</td><td>56.3 kilograms
(124.13 pounds)</td></tr>
</table>

Specifications

Note: Data given by several sources show slight variations. Figures given below may therefore be inaccurate!

Data for 5-inch FFAR, 5-inch HVAR, Zuni MK-16, Zuni MK-71:

<table>
<tr><th></th><th>5-inch FFAR</th><th>5-inch HVAR</th><th>Zuni MK-16</th><th>Zuni MK-71</th></tr>
<tr><td>Length</td><td>1.65 meters
(5 feet 5 inches)</td><td>1.83 meters
(6 feet)</td><td>1.95 meters
(77 inches) (motor only)[1]</td><td>1.94 meters
(76.3 inches) (motor only)[1]</td></tr>
<tr><td>Weight</td><td>36 kilograms
(80 pounds)</td><td>64 kilograms
(140 pounds)</td><td>26.7 kilograms
(58.9 pounds)
(motor only)[1]</td><td>36.1 kilograms
(79.5 pounds)
(motor only)[1]</td></tr>
<tr><td>Diameter</td><td>Warhead: 12.7 centimeters
(5 inches)
Motor: 8.9 centimeters
(3.5 inches)</td><td>12.7 centimeters
(5 inches)</td><td>12.7 centimeters
(5 inches)</td><td>13 centimeters
(5.12 inches)</td></tr>
<tr><td>Speed</td><td>780 kilometers per hour
(485 miles per hour)</td><td>1,530 kilometers per hour
(950 miles per hour)</td><td colspan="2">2,600 kilometers per hour
(1,615 miles per hour)</td></tr>
<tr><td>Range</td><td>< 1.6 kilometers
(1 mile)</td><td>5 kilometers
(3 miles)</td><td colspan="2">8 kilometers
(5 miles)</td></tr>
<tr><td>Propulsion</td><td>Caltech 3.5-inch rocket</td><td>Solid-fueled rocket</td><td>Solid-fueled rocket; 3.6 Knots (800 pounds) for 1.3 seconds</td><td>Solid-fueled rocket</td></tr>
<tr><td>Warhead</td><td colspan="2">20 kilograms (45 pounds)
HE warhead (& others)</td><td colspan="2">(various)</td></tr>
</table>

Note: 1. Total length and weight depend on warhead; see main section for data on all-up rounds

Hazards:

5-inch Zuni Rocket
High Explosive (HE)
Fragmentation
Shaped Charge
Incendiary
Red Phosphorus (RP)
White Phosphorus (WP)
Ejection

Bombs, Laser Guided

Representative Weapon Platform, DODIC, and Nomenclature:

Platform	*DODIC*	*Nomenclature*
Aircraft		Bomb, Laser Guided Bomb Unit (GBU)-12 500 pounds
Aircraft		Bomb, Laser GBU-16 1,000 pound
Aircraft		Bomb, Laser GBU-10 2,000 pound

Appearance:

GBU-12 500 pound Bomb

GBU-16 1,000 pound Bomb

Description:

The GBU-12, GBU-16 and GBU-10 guidance kits are painted olive drab. Component parts, designations, loading data, serial number, and date of manufacture are stenciled in black or white. The GBU-12 is about 10.5 feet long, the GBU-16 is about 12 feet long, and the GBU-10 is just over 14 feet long.

Hazards:

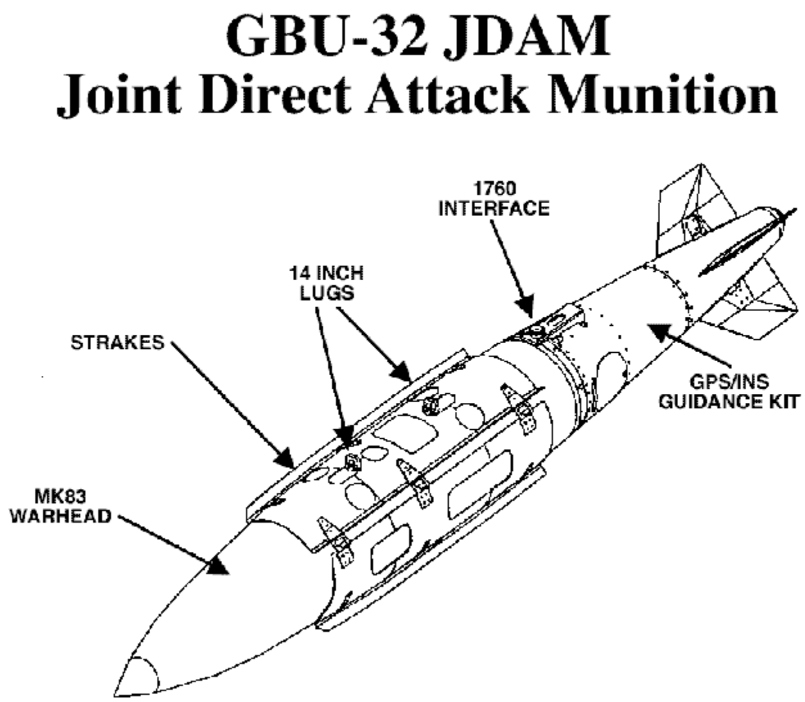
GBU 12	*GBU-16*	*GBU-10*
Ejection	Ejection	Ejection
EMR	EMR	EMR
Explosive (HE)	Explosive (HE)	Explosive (HE)
Fragmentation	Fragmentation	Fragmentation
Movement	Movement	Movement
Proximity (VT)	Proximity (VT)	Proximity (VT)
	Mechanical	Mechanical

Joint Direct Attack Munition (JDAM)

Representative Weapon Platform, DODIC, and Nomenclature:

Platform	*DODIC*	*Nomenclature*
Aircraft	NA	JDAM GBU-38 Ver. 4 250 pound
Aircraft	NA	JDAM GBU-38 500 pound
Aircraft	NA	JDAM GBU-54 500 pound
Aircraft	NA	JDAM GBU-32 1,000 pound
Aircraft	NA	JDAM GBU-31 2,000 pound

Appearance:



Description:

The JDAM GBU-31 is a tailkit meeting both United States Air Force (USAF) and Navy needs, with the USAF as the lead service. It is a weapon with high accuracy, all-weather, autonomous, conventional bombing capability. JDAM upgrades the existing inventory of general purpose and penetrator unitary bombs, and a product improvement may add a terminal seeker to improve accuracy.

Once released, the bomb's Inertial Navigation System (INS)/Global Positioning System (GPS) takes over and guides the bomb to its target regardless of weather. Guidance is accomplished via the tight coupling of an accurate GPS with a 3-axis INS. The Guidance Control Unit (GCU) provides accurate guidance in both GPS-aided INS modes of operation (13 meter Circular Error Probable [CEP]) and INS-only modes of operation (30 meter CEP). INS only is defined as GPS quality hand-off from the aircraft with GPS unavailable to the weapon (e.g., GPS jammed). In the event JDAM is unable to receive GPS signals after launch for any reason, jamming or otherwise, the INS will provide rate and acceleration measurements which the weapon software will develop into a navigation solution. The GCU provides accurate guidance in both GPS-aided INS modes of operation and INS-only modes of operation. This inherent JDAM capability will counter the threat from near-term technological advances in GPS jamming.

JDAM is not intended to replace any existing weapon system; rather, it is to provide accurate delivery of general purpose bombs in adverse weather conditions. The JDAM upgrades the existing inventory of MK-83 1,000- and MK-84 2,000-pound general purpose unitary bombs and the 2,000-pound hard target penetrator bomb by integrating a guidance kit consisting of an INS/GPS guidance kit.

There is some confusion over the precise designations of the JDAM family. The 1,000-pound variant of JDAM is designated the GBU-32, and the 2,000-pound version of the JDAM is designated the GBU-31. JDAM variants for the MK-82 500-pound bombs are reportedly designated GBU-30 and GBU-38 according to various sources, though there is no indication as to what, if any, difference exists between these variants (indeed, it is possible that the association of the GBU-30 designation with the 500-pound MK-82 is erroneous). The JDAM kit for the MK-81 250-pound bomb is reportedly designated GBU-29. Hard Target penetrators being changed into low-cost JDAMs included the 2,000 pound Bomb Live Unit (BLU)-109 (GBU-31) and 1,000 pound BLU-110 (GBU-35).

Hazards:

GBU 38/54/32/31
Explosive (HE)
Fragmentation

BLU-116 Advanced Unitary Penetrator [AUP] GBU-24 D/B (Navy)

Representative Weapon Platform, DODIC, and Nomenclature:

Platform	*DODIC*	*Nomenclature*
Aircraft	NA	Advanced Unitary Penetrator (AUP) BLU-116, GBU-24D/B

Appearance:

Description:

The AUP is the next-generation, hard target penetrator munition that provides a lethal capability to penetrate and defeat extremely hard multi-layer underground facilities. Sharing an external appearance and flight characteristics with the 2000-pound BLU-109, the AUP has an advanced heavy steel penetrator warhead filled with high-energy explosives that can penetrate more than twice as much reinforced concrete as the BLU-109. Performance is enhanced by a void-sensing Hard Target Smart Fuze that detonates the AUP at the optimum point in a target to inflict maximum damage.

The AUP can make use of the BLU-109 proven family of guidance kits for precision delivery, including the GBU-10, GBU-15, GBU-24, GBU-27, JDAM, and AGM-130 kits. The shroud also replicates BLU-109 surfaces for attachment of hardbacks, air foil groups, guidance systems, propulsion units, and ground handling equipment.

Hazards:

GBU 24
Explosive (HE)
Fragmentation

Small Diameter Bomb (SDB) GBU-39

Representative Weapon Platform, DODIC, and Nomenclature:

Platform	*DODIC*	*Nomenclature*
Aircraft	NA	Small Diameter Bomb GBU-39

Appearance:

Description:

The GBU-39 SDB is a 250 pound (113 kg) guided bomb that is intended to provide aircraft with the ability to carry a higher number of bombs. Most USAF aircraft will be able to carry (using the BRU-61/A rack) a pack of four SDBs in place of a single 2,000 lb bomb.

Two variants are being developed. One version of the SDB is equipped with a GPS-aided INS to attack fixed/stationary targets such as fuel depots, bunkers, etc. The second variant (GBU-40) (or SDB II) will include a thermal seeker with automatic target recognition features for striking mobile targets such as tanks, vehicles, and mobile command posts. The GBU-39 has a circular error probable (CEP) of only 5-8 meters, which means it has a 50% probability of hitting within 5-8 meters its intended target, which should minimize collateral damage. The small size of the bomb allows a single strike aircraft to carry more of the munitions than is possible utilizing currently available bomb units. The SDB carries approximately 38 pounds (17 kilograms) of AFX-757 high explosive, yet because of its design it has the same penetration capabilities as the 2,000 pound BLU-109. During demonstrations, the SDB has successfully penetrated more than 8 feet (2.4 meter) thick reinforced concrete. It also has integrated “DiamondBack” type wings which deploy after release, increasing the glide time and therefore the maximum range.

Hazards:

GBU 39
Explosive (HE)
Fragmentation

Laser Guided Training Round

Representative Weapon Platform, DODIC, and Nomenclature:

Platform	*DODIC*	*Nomenclature*
Aircraft	NA	Enhanced Laser Guided Training Round (E-LGTR)

Appearance:

Description:

The Paveway II E-LGTR provides realistic Paveway II Laser Guided Bomb (LGB) (GBU-10/12/16) tactical employment training as an alternative to expending operational Paveway II LGB assets.

The E-LGTR accurately emulates the LGB envelope, flight characteristics, and guidance system of the Paveway II system. Live-fire training permits aircrews to practice delivery tactics in a real-mission environment and experience actual weapon characteristics with today's range limitations. The E-LGTR provides significantly improved CEP (within 3 meters) and CE90 performance against challenging airborne lased tactical target environments.

Hazards:

E-LGTR

Bomb, Penetrator, 550 pound BLU-111

Representative Weapon Platform, DODIC, and Nomenclature:

Platform	*DODIC*	*Nomenclature*
Aircraft	NA	Enhanced Laser Guided Training Round

Appearance:

Description:

The BLU-111/B penetrator is forged steel casing warheads, which is a more accurately toleranced variant of the MK-82, 500-pound general purpose bomb. The Joint Standoff Weapon AGM-154C (Unitary Variant) will use a combination of an Imaging Infrared (IIR) terminal seeker and a two-way data link to achieve point target accuracy through aimpoint refinement and man-in-the-loop guidance. The AGM-154C will carry the BLU-111/B equipped with the FMU-152 Joint Programmable Fuze (JPF) and is designed to attack point targets.

The BLU-110A/B and BLU-111A/B thermally protected bombs are identical to the MK-83 and MK-84 thermally protected bombs, respectively, with the exception of the explosive filler. The BLU series bomb bodies use PBNX-109 as explosive filler. The MK-82 and MK-83 series Low Drag General Purpose bombs underwent a Product Improvement Initiative (PII) which entailed filling the bomb cases with a less sensitive explosive. When so filled, the MK-82 and MK-83 bombs are redesignated BLU-111/B and BLU-110/B, respectively.

The BLU-111 is a 500-pound class steel casing warhead designed to fit into low-cost JDAM bombs. The main purpose of the BLU-111 is to penetrate hardened targets, bunkers or concrete walls while minimizing collateral damage because it carries only 500-pound of high explosive. The BLU-111 warhead has been provided to the GBU-30 JDAM bomb and AGM-154C Joint Standoff Weapon (JSOW) (BLU-111/B). The BLU-111/B provided to the U.S. Navy JSOW-Cs will be fitted with the FMU-152 Joint Programmable Fuze (JPF).

Hazards:

BLU-111
Explosive (HE)
Fragmentation

Chaff

Representative Weapon Platform, DODIC, and Nomenclature:

Platform	*DODIC*	*Nomenclature*
Aircraft	NA	RR-129/AL Chaff Countermeasures
Aircraft	NA	RR-124 Chaff Countermeasures

Appearance:

Modern U.S. Navy RR-129 and RR-124 chaff countermeasures and containers. Note how the RR-129 chaff, bottom, is different lengths, and the RR-124, top, is all the same length. The RR-124 is designed to prevent interference with civil Air Traffic Control radar systems.

Description:

Chaff, originally called Window by the British, and *Düppel* by the Second World War era German Luftwaffe, is a radar countermeasure in which aircraft or other targets spread a cloud of small, thin pieces of aluminum, metallised glass fiber, or plastic, which either appears as a cluster of secondary targets on radar screens or swamps the screen with multiple returns.

Modern armed forces use chaff (in naval applications, for instance, using short-range Super Rapid Blooming Off-Board Chaff rockets) to distract radar-guided missiles from their targets. Most military aircraft and warships have chaff dispensing systems for self-defense. An intercontinental ballistic missile may release, in its midcourse phase, several independent warheads, a large number of decoys, and chaff.

Hazards:

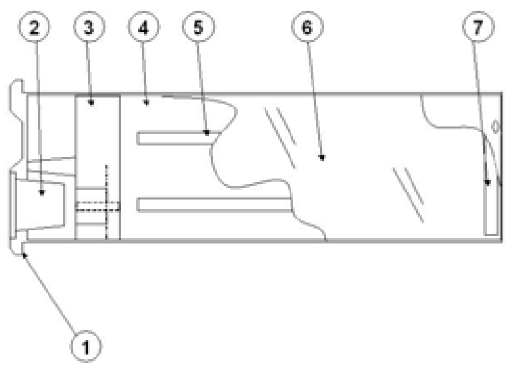
Countermeasures Chaff
None

Flares

Representative Weapon Platform, DODIC, and Nomenclature:

Platform	*DODIC*	*Nomenclature*
Aircraft	NA	

Appearance:



Typical Flare Construction

Flares In Use

Schematic view of a MJU-7A/B decoy flare cartridge: anodized aluminum cartridge (1); an electrical impulse cartridge (2), providing both expulsion and, in some cases, direct ignition of the payload; a pusher plate acting as a safe & arm device (3); the payload (4) with first fire layer (5); the wrapping self-adhesive polyester reinforced aluminum foil (6); and a front washer (7).

Description:

A (decoy) flare is an aerial infrared countermeasure to counter an infrared homing ("heat seeking") surface-to-air missile or air-to-air missile. Flares are commonly composed of a pyrotechnic composition based on magnesium or another hot-burning metal, with burning temperature equal to or hotter than engine exhaust. The aim is to make the infrared-guided missile seek out the heat signature from the flare rather than the aircraft's engines.

There is a wide variety of calibers and shapes available for aerial decoy flares. Due to volume storage restrictions on board platforms, many aircraft of American origin use square decoy flare cartridges. Nevertheless, cylindrical cartridges are also available on-board American aircraft, such as MJU-23/B on the B-1 Lancer or MJU-8A/B on the F/A-18 Hornet; however, these are used mainly on-board French aircraft and those of Russian origin, e.g., PPI-26 IW on the MiG 29.

Square calibers and typical decoy flares:

- 1x1x8 inch, e.g., M-206, MJU-61, (MTV based) M-211, M-212 (spectral flares)
- 2x1x8 inch, e.g., MJU-7A/B (MTV based), MJU-59/B (spectral flare)
- 2x2,5x8 inch, e.g., MJU-10/B (MTV based)

Cylindrical calibers and typical decoy flares:

- 2.5 inch, e.g., MJU-23/B (MTV based)
- 1.5 inch, e.g., MJU 8 A/B (MTV based)
- 1 inch, e.g., PPI 26 IW

Hazards:

Flares
Electromagnetic Radiation (EMR)
Expulsion
Incendiary

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APPENDIX G
AIR QUALITY CALCULATIONS AND CONFORMITY DETERMINATION

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Appendix G Table of Contents

Appendix G - Air Emission Calculations - 29 Palms LAAE EIS Project Alternatives

Appendix G - Air Emission Calculations - 29 Palms LAAE EIS Project Alternatives

Table G-1. Emission Source Data for Road Construction - 29 Palms LAS EIS Proposed Alternatives 1, 2, and 4-6

Activity/Equipment Type	*Hp Rating*	*Average Daily % of Full Throttle*	*Number Active*	*Hours/ Day*	*Total Work Days*	*Total Hp-Hrs*
3000 Gal Water Truck	400	0.60	2	8	30	115,200
Motor Grader - 14 Foot Blade	275	0.80	1	8	30	52,800
Rubber Wheeled Compactor	400	0.80	1	8	30	76,800
Fugitive Dust	NA	NA	1	NA	30	30
On-Road Trucks						
Activity/Equipment Type	*Vehicle Weight*	*Miles per Round Trip*	*Daily Trips*		*Total Work Days*	*Total Miles*
Equipment Delivery Truck		200	1		2	400

Table G-2. Emission Source Data for Construction of Communications Towers - 29 Palms LAS EIS Proposed Alternatives 1, 2, a

Activity/Equipment Type	*Hp Rating*	*Average Daily % of Full Throttle*	*Number Active*	*Hours/ Day*	*Total Work Days*	*Total Hours*
Forklift	67	0.40	1	4	5	536
Helicopters						
Activity/Equipment Type			*Number Active*	*Cruising (Hrs)*	*# of LTOs*	*# of Rock and Blocks (1)*
Helicopter - Skycrane			1	5	12	120
Helicopter - Huey (1)			1	2	10	50
On-Road Trucks						
Activity/Equipment Type	*Vehicle Wt. (Tons)*	*Miles per Round Trip*			*Total Trips*	*Total Miles*
Heavy Duty Truck (2)		100			10	1,000

Notes: (1) For Huey, # of Rock and Blocks = # of TGOs.

(2) Assume 10% of total VMT would occur on unpaved road.

Table G-3. Offroad Construction Equipment Emission Factors - 29 Palms LAS EIS Project Alternatives

Project Year 2010/Source Type	Fuel Type	Emission Factors (Grams/Horsepower-Hour) VOC	CO	NOx	SOx	PM	PM10	PM2.5	CO2	CH4	N2O	References
Off-Road Equipment - <15 Hp	D	0.45	2.14	2.87	0.01	0.15	0.15	0.14	568	0.084	0.006	(1)
Off-Road Equipment - 16-24 Hp	D	0.49	1.52	2.76	0.00	0.16	0.16	0.14	568	0.084	0.006	(1)
Off-Road Equipment - 25-50 Hp	D	1.49	3.87	3.44	0.00	0.35	0.45	0.33	568	0.084	0.006	(1)
Off-Road Equipment - 51-120 Hp	D	0.66	2.36	4.05	0.00	0.36	0.30	0.33	568	0.084	0.006	(1)
Off-Road Equipment - 121-175 Hp	D	0.47	2.02	3.75	0.00	0.21	0.22	0.19	568	0.084	0.006	(1)
Off-Road Equipment - 176-250 Hp	D	0.34	0.97	3.60	0.00	0.13	0.15	0.12	568	0.084	0.006	(1)
Off-Road Equipment - 251-500 Hp	D	0.29	1.08	3.03	0.00	0.11	0.15	0.10	568	0.084	0.006	(1)
Off-Road Equipment - 501-750 Hp	D	0.31	1.18	3.25	0.00	0.12	0.15	0.11	568	0.084	0.006	(1)
Off-Road Equipment - >750 Hp	D	0.37	1.45	4.28	0.00	0.13	0.13	0.12	568	0.084	0.006	(1)
On-road Truck - Idle (Gms/Hr)	D	13.69	48.45	104.13	0.06	1.76	1.58	1.20	6,994	0.500	0.250	(2)
On-road Truck - 5 mph (Gms/Mi)	D	12.10	25.26	37.29	0.04	2.31	2.08	1.57	3,845	0.100	0.050	(2)
On-road Truck - 25 mph (Gms/Mi)	D	1.50	7.95	15.51	0.02	0.65	0.59	0.44	2,043	0.100	0.050	(2)
On-road Truck - 55 mph (Gms/Mi)	D	0.81	4.66	14.53	0.02	0.58	0.52	0.39	1,662	0.100	0.050	(2)
On-Road Trucks - Composite (Gms/Mi)	D	9.42	20.77	31.79	0.04	1.89	1.70	1.29	1,847	0.100	0.050	(2)
On-Road Trucks - Fugitive Dust	- - -	- - -	- - -	- - -	- - -	8.89	2.57	0.39	- - -	- - -	- - -	(3)
Disturbed Ground - Fugitive Dust	- - -	- - -	- - -	- - -	- - -	55.00	27.50	2.75	- - -	- - -	- - -	(4)
Helicopter - Skycrane - Cruise		3.84	22.11	4.41	0.45	1.99						(5)
Helicopter - Skycrane - LTO		6.81	21.37	1.07	0.15	1.36						(5)
Helicopter - Skycrane - Rocks and Blocks		0.41	3.01	0.91	0.08	0.38						(5)
Helicopter - Skycrane - Fugitive Dust	- - -	- - -	- - -	- - -	- - -	123.22	61.61	24.64	- - -	- - -	- - -	(6)
Helicopter - Huey - Cruise		0.37	4.41	4.15	0.35	0.65						(7)
Helicopter - Huey - LTO		2.17	1.90	1.02	0.10	0.19						(7)
Helicopter - Huey - TGO		0.06	0.76	0.96	0.08	0.15						(7)
Helicopter - Huey - Fugitive Dust	- - -	- - -	- - -	- - -	- - -	11.28	5.64	2.26	- - -	- - -	- - -	(6)

Notes: (1) Composites developed from Offroad emission factors obtained from URBEMIS 2007 for project year 2010.

(2) Heavy duty diesel truck running emission factors developed from EMFAC2007 (CARB 2006b). Units in gms/mile calculated for project year 2010.
Composite emission factors based on a round trip of 75% at 55 mph, 20% at 25 mph, and 5% at 5 mph. Units in grams/mile.
Although not shown in these calculations, emissions from 15 minutes of idling mode included for each truck round trip.

(3) See Table G-7. Units in Lb/VMT.

(4) Units in lbs/acre-day from section 11.2.3 of AP-42 (USEPA 1995). Emissions reduced by 50% from uncontrolled levels to simulate implementation of best management practices (BMPs) for fugitive dust control

(5) AESO 2000a and b for a CH-46E. Cruise units in lb/hr and LTO/Rocks and Blocks/TGO units in lb/event.

(6) See Table G-17, R-2501 Section. Units in Lb/LTO.

(7) EPA 1992. Cruise units in lb/hr and LTO/Rocks and Blocks units in lb.

Table G-4. Total Road Construction Emissions - 29 Palms LAS EIS Proposed Alternatives 1, 2, and 4-6

	Total Pounds									
Activity/Equipment Type	*VOC*	*CO*	*NOx*	*SOx*	*PM*	*PM10*	*PM2.5*	*CO2*	*CH4*	*N2O*
3000 Gal Water Truck	73.85	274.97	770.26	0.82	28.19	38.10	25.94	144,254	21.32	1.42
Motor Grader - 14 Foot Blade	33.85	126.03	353.04	0.37	12.92	17.46	11.89	66,116	9.77	0.65
Rubber Wheeled Compactor	49.23	183.31	513.51	0.54	18.79	25.40	17.29	96,169	14.21	0.95
Fugitive Dust	--	--	--	--	1,650	825	83			
Subtotal	*157*	*584*	*1,637*	*2*	*1,710*	*906*	*138*	*306,540*	*45*	*3*
On-Road Vehicles										
Equipment Delivery Truck	8.30	18.31	28.04	0.03	1.67	1.50	1.13	1,629	0.09	0.04
On-Road Vehicles -Subtotal	*8.30*	*18.31*	*28.04*	*0.03*	*1.67*	*1.50*	*1.13*	*1,629*	*0.09*	*0.04*
Total Emissions (Pounds)	165	603	1,665	2	1,712	907	139	308,169	45	3

Calculation of Annual Emissions for Off-Road Equipment

Emission Factor (g/hp-hr) x Total Horsepower-hours (hp-hr/yr) x 1 lb/453.6 g = Annual Emissions (lb/yr)

Calculation of Annual Emissions for On-Road Vehicles

Emission Factor (g/mile) x Number of daily truck trips x Round-trip distance (mile) x Number of working days x 1 lb/453.6 g = Annual Emissions (lb/yr)

Calculation of Annual Emissions for PM fugitive dust - ground disturbance

Emission Factor (lb/acre-day) x Acreage Disturbed (acres) x Annual number of working days (day/yr) = Annual Emissions (lb/yr)

Table G-5. Emissions for Construction of Communications Towers - 29 Palms LAS EIS Proposed Alternatives 1, 2, and 4-6

	Total Pounds									
Activity/Equipment Type	*VOC*	*CO*	*NOx*	*SOx*	*PM*	*PM10*	*PM2.5*	*CO2*	*CH4*	*N2O*
Forklift	0.8	2.8	4.8	0.0	0.4	0.4	0.4	671.2	0.1	0.0
Subtotal	*0.8*	*2.8*	*4.8*	*0.0*	*0.4*	*0.4*	*0.4*	*671.2*	*0.1*	*0.0*
Helicopters										
Helicopter - Skycrane - Cruise	19.2	110.6	22.1	2.3	10.0	-	-	-	-	-
Helicopter - Skycrane - LTO	81.7	256.4	12.8	1.8	16.3	-	-	-	-	-
Helicopter - Skycrane - Rocks and Blocks	49.2	361.2	109.2	9.6	45.6	-	-	-	-	-
Helicopter - Skycrane - Fugitive Dust	-	-	-	-	1,478.6	739.3	295.7	-	-	-
Helicopter - Huey - Cruise	0.7	8.8	8.3	0.7	1.3	-	-	-	-	-
Helicopter - Huey - LTO	21.7	19.0	10.2	1.0	1.9	-	-	-	-	-
Helicopter - Huey - TGO	3.1	37.9	48.1	4.1	7.5	-	-	-	-	-
Helicopter - Huey - Fugitive Dust	-	-	-	-	112.8	56.4	22.6	-	-	-
Subtotal	*175.7*	*794.0*	*210.7*	*19.4*	*1,674.0*	*795.7*	*318.3*	-	-	-
On-Road Vehicles										
Equipment Delivery Truck	2.2	12.1	32.6	0.0	1.3	1.2	0.9	3,874.0	0.2	0.1
Equipment Delivery Truck - Fugitive Dust	-	-	-	-	889.3	257.0	39.4	-	-	-
On-Road Vehicles -Subtotal	*2.2*	*12.1*	*32.6*	*0.0*	*890.6*	*258.2*	*40.3*	*3,874.0*	*0.2*	*0.1*
Total Emissions (Pounds)	178.6	808.8	248.1	19.5	2,565.0	1,054.3	359.0	4,545.2	0.3	0.1

Calculation of Annual Emissions for Off-Road Equipment

Emission Factor (g/hp-hr) x Total Horsepower-hours (hp-hr/yr) x 1 lb/453.6 g = Annual Emissions (lb/yr)

Calculation of Annual Emissions for Helicopters - LTOs

Emission Factor (lb/LTO) x Number of LTOs = Annual Emissions (lb/yr)

Calculation of Annual Emissions for On-Road Vehicles

Emission Factor (g/mile) x Number of daily truck trips x Round-trip distance (mile) x Number of working days x 1 lb/453.6 g = Annual Emissions (lb/yr)

Calculation of Annual Emissions for PM fugitive dust - ground disturbance

Emission Factor (lb/acre-day) x Acreage Disturbed (acres) x Annual number of working days (day/yr) = Annual Emissions (lb/yr)

Table G-6. Emission Source Data for Tactical Vehicles/Support Equipment - 29 Palms LAS EIS Proposed Alternatives 1, 2, and 4-6

Activity/Equipment Type	*Number of Vehicles*	*Annual VMT*	*Miles per Gallon*	*Total Gallons*	*Hp*	*Total Hp-Hr (1)*
Tactical Vehicles						
Medium Tactical Vehicle Replacement	348	228,814	3.85	59,432	250	1,188,644
High-Mobility Multipurpose Wheeled Vehicle	785	393,386	14.00	28,099	150	561,980
Logistics Vehicle System	198	75,094	2.00	37,547	445	750,940
Internally Transportable Vehicle	50	18,156	14.00	1,297	71	25,937
M60A1 Bridge Vehicle	4	2,580	0.33	7,818		
Amphibious Assault Vehicle	187	87,550	0.75	116,733	425	2,334,667
(Variants)	87	34,694	5.17	6,711	275	134,213
M88A2 Hercules Recovery Vehicle	12	1,290	0.33	3,909		
High-Mobility Artillery Rocket System	6	70	3.85	18	330	364
Abrams M1A1 Main Battle Tank	44	16,354	0.33	49,558		
Joint Assault Bridge	5	1,858	0.33	5,632		
Assault Breacher Vehicle	5	3,000	0.36	8,333		
Tactical Support Equipment (2)						
	Number of Vehicles	*Hp*	*Hours per Year*	*Total Hp-Hr*		
Medium Crawler Tractor	5	118	120	70,800		
Excavator, Combat	12	295	120	424,800		
Grader	2	150	120	36,000		
Armored Tractor	3	118	120	42,480		
D7 Bulldozer	5	200	120	120,000		
Armored Backhoe	12	295	120	424,800		
Extended Boom Forklift	4	150	120	72,000		
Light Capacity Rough Terrain Truck Forklift	2	110	120	26,400		
Tractor, Rubber Tired, Articulated Steering	10	185	120	222,000		

Notes: (1) Based upon a fuel usage rate of 0.051 gallons per Hp-Hr.

(2) Horsepower ratings from 2007 CEIP Appendix D.11.

Table G-7. Tactical Vehicles/Support Equipment Emission Factors - 29 Palms LAS EIS Proposed Alternatives 1, 2, and 4-6

Source Type	*Emission Factors (Pounds/1000 Gallons)*										*Reference*
	ROG	*CO*	*NO_X*	*SO_X*	*PM*	*PM_{10}*	*$PM_{2.5}$*	*CO_2*	*CH_4*	*N_2O*	
Tank Vehicles and ABV											
Abrams Tank/Bridge Vehicles	0.06	0.45	118.80	0.51	1.56	1.56	1.52	21,054	0.68	0.60	(1)
Assault Breacher Vehicle	14.10	101.60	170.88	13.96	1.71	1.71	1.57	21,054	0.68	0.60	(2)
Other Tactical Vehicles/TSE											
	Emission Factors (Grams/Horsepower-Hour)										
121-250 Hp	0.94	4.40	10.84	1.32	0.44	0.43	0.43	568	0.08	0.01	(3)
>250 Hp	0.95	4.20	10.84	1.32	0.42	0.41	0.41	568	0.08	0.01	(3)

Notes: (1) From 2007 CEIP Appendix D.11, page 6.

(2) FEA for Proposed ABV Action at MCAGCC (2003).

(3) From 2007 CEIP Appendix D.11, page 7.

(4) GHG Emission Factors for (a) Tank Vehicles and ABVs from General Reporting Protocol, Tables C.3 and C.6 jet fuel (California Climate Action Registry 2009) and (b) other TV/TSE from OFFROAD2007 Model.

	V	W	X	Y	Z	AA	AB	AC	AD	AE	AF	AG
1	Table G-8. Total Tactical Vehicles/Support Equipment Emissions - 29 Palms LAS EIS Proposed Alternatives 1, 2, and 4-6											
2		*Pounds per Year*										
3	*Activity/Equipment Type*	*ROG*	*CO*	*NO_X*	*SO_X*	*PM*	*PM_{10}*	*$PM_{2.5}$*	*CO_2*	*CH_4*	*N_2O*	*CO_2e*
4	*Tactical Vehicles*											
5	Medium Tactical Vehicle Replacement	2,489	11,006	28,406	3,459	1,101	1,074	1,074	1,488,426	220	15	1,497,591
6	High-Mobility Multipurpose Wheeled Vehicle	1,165	5,451	13,430	1,635	545	533	533	703,714	104	7	708,047
7	Logistics Vehicle System	1,573	6,953	17,946	2,185	695	679	679	940,331	139	9	946,121
8	Internally Transportable Vehicle	54	252	620	75	25	25	25	32,479	5	0	32,679
9	M60A1 Bridge Vehicle	0	4	929	4	12	12	12	164,604	5	5	166,159
10	Amphibious Assault Vehicle	4,890	21,617	55,793	6,794	2,162	2,110	2,110	2,923,480	432	29	2,941,482
11	Light Armored Vehicle (Variants)	281	1,302	3,207	391	130	127	127	168,062	25	2	169,097
12	M88A2 Hercules Recovery Vehicle	0	2	464	2	6	6	6	82,302	3	2	83,079
13	High-Mobility Artillery Rocket System	1	3	9	1	0	0	0	455	0	0	458
14	Abrams M1A1 Main Battle Tank	3	22	5,887	25	77	77	75	1,043,385	34	29	1,053,241
15	Joint Assault Bridge	0	3	669	3	9	9	9	118,567	4	3	119,686
16	Assault Breacher Vehicle	118	847	1,424	116	14	14	13	175,450	6	5	177,107
17	Subtotal - Pounds	10,574	47,461	128,784	14,691	4,777	4,667	4,663	7,841,254	976	106	7,894,747
18	*Tactical Support Equipment*											
19	Medium Crawler Tractor	147	687	1,692	206	69	67	67	88,656	13	1	89,202
20	Excavator, Combat	890	3,933	10,152	1,236	393	384	384	531,937	79	5	535,212
21	Grader	75	333	860	105	33	33	33	45,079	7	0	45,357
22	Armored Tractor	89	393	1,015	124	39	38	38	53,194	8	1	53,521
23	D7 Bulldozer	251	1,111	2,868	349	111	108	108	150,265	22	1	151,190
24	Armored Backhoe	890	3,933	10,152	1,236	393	384	384	531,937	79	5	535,212
25	Extended Boom Forklift	149	698	1,721	210	70	68	68	90,159	13	1	90,714
26	Light Capacity Rough Terrain Truck Forklift	55	256	631	77	26	25	25	33,058	5	0	33,262
27	Multipurpose Vehicles	460	2,153	5,305	646	215	210	210	277,989	41	3	279,701
28	Subtotal - Pounds	3,006	13,499	34,395	4,188	1,350	1,318	1,318	1,802,273	266	18	1,813,371
29	Total Emissions (Pounds)	13,579	60,960	163,180	18,880	6,127	5,985	5,981	9,643,527	1,242	124	9,708,118
30	Total Emissions (Tons) [1]	6.79	30.48	81.59	9.44	3.06	2.99	2.99	4,374.24	0.56	0.06	4,403.53
31	*Calculation of Annual Emissions for Tactical and Support Equipment*											
32	Emission Factor (g/hp-hr) x total Hp-hrs x 1 lb/453.6 g = Annual Emissions (lb/yr)											
33	*Calculation of Abrams Tank/Bridge Vehicles and Assault Breacher Vehicle*											
34	Emission Factor (lbs/1000 gals) x Total Gals x 1 /1000 = Annual Emissions (lb/yr)											

Table G-9. On-Road Vehicle Data for Personnel/Equipment Transport - 29 Palms LAS EIS Project Alternatives

Activity/Equipment Type	*Annual # of Vehicle Round Trips*	*Miles/Round Trip (1)*	*Total Annual Miles*
On-Road Transport			
Buses	800	90	72,000
Tractor-Trailer/Convoyed Vehicles	200	90	18,000

Notes: (1) Equal to distance travelled within the MDAB - all trips would originate from March Air Reserve Base and Camp Pendleton.

(2) Horsepower ratings from 2007 CEIP Appendix D.11.

Table G-10. On-Road Vehicle Transport Emission Factors - 29 Palms LAS EIS Project Alternatives

	Emission Factors (Grams/Mile)										
Source Type/Activity	*ROG*	*CO*	*NO_X*	*SO_X*	*PM*	*PM_{10}*	*$PM_{2.5}$*	*CO_2*	*CH_4*	*N_2O*	*Reference*
Urban Bus											
25 MPH	0.94	8.43	15.78	0.02		0.26	0.24	2,177			(1)
55 MPH	0.46	6.01	21.96	0.02		0.16	0.14	2,133			(1)
Composite Trip (1)	0.56	6.49	20.72	0.02	-	0.18	0.16	2,142	-	-	(1)
Heavy Diesel Truck											
25 MPH	0.80	5.63	10.33	0.02		0.41	0.37	1,768			(1)
55 MPH	0.45	3.67	10.00	0.01		0.37	0.34	1,500			(1)
Composite Trip (1)	0.52	4.06	10.07	0.01	-	0.38	0.35	1,554	-	-	(1)

Notes: (1) Assumes statewide average fleets for year 2013. Obtained from ARB EMFAC2007 Model (ARB 2006). PM inlcudes combustive and tire and brake wear.

(2) Composite factors based on a trip of 80% 25 mph and 20% 55 mph.

Table G-11. Total On-Road Vehicle Personnel/Equipment Transport Emissions - 29 Palms LAS EIS Project Alternatives

	Pounds per Year										
Equipment Type	*ROG*	*CO*	*NO_X*	*SO_X*	*PM*	*PM_{10}*	*$PM_{2.5}$*	*CO_2*	*CH_4*	*N_2O*	*CO_2e*
Tactical Vehicles											
Buses	88	1,031	3,290	3	-	28	26	340,020	-	-	-
Tractor-Trailer/Convoyed Vehicles	21	161	399	0	-	15	14	61,650	-	-	-
Total Emissions (Pounds)	109	1,192	3,689	4	-	43	40	401,670	-	-	-
Total Emissions (Tons)	0.05	0.60	1.84	0.00	-	0.02	0.02	182.19	-	-	182.19

Table G-12. Emission Source Data for Tactical Vehicles/Support Equipment - Unpaved Road Dust - 29 Palms LAS EIS Proposed Alternatives 1, 2, and 4-6

Equipment Type	Weight (Tons)	Unpaved Emission Factor (Lb/VMT) PM	PM $_{10}$	PM $_{2.5}$	Annual VMT	% Unpaved Travel (1)	Unpaved VMT
Tactical Vehicles							
Medium Tactical Vehicle Replacement	10.0	6.51	1.88	0.29	228,814	90%	205,933
High-Mobility Multipurpose Wheeled Vehicle	3.0	3.79	1.09	0.17	393,386	50%	196,693
Logistics Vehicle System	20.0	8.89	2.57	0.39	75,094	50%	37,547
Internally Transportable Vehicle	3.5	4.06	1.17	0.18	18,156	50%	9,078
M60A1 Bridge Vehicle	70.0	15.63	4.52	0.69	2,580	90%	2,322
Amphibious Assault Vehicle	30.6	10.77	3.11	0.48	87,550	90%	78,795
Light Armored Vehicle (Variants)	14.1	7.60	2.20	0.34	34,694	90%	31,225
M88A2 HERCULES Recovery Vehicle	70.0	15.63	4.52	0.69	1,290	90%	1,161
High-Mobility Artillery Rocket System	12.0	7.07	2.04	0.31	70	50%	35
Abrams M1A1 Main Battle Tank	70.0	15.63	4.52	0.69	16,354	90%	14,719
Joint Assault Bridge	70.0	15.63	4.52	0.69	1,858	90%	1,673
Assault Breacher Vehicle	55.0	14.02	4.05	0.62	3,000	90%	2,700
Tactical Support Equipment							
Ground Disturbance (2)	1	110.0	55.0	5.5	48		

Notes: (1) Percentage of unpaved roads from 2007 CEIP Appendix D.13.

(2) Weight = daily disturbed acreage and Annual VMT = total annual days of disturbance. Emission factors in lb/acre-day.

Table G-13. Emission Source Data for Tactical Vehicles/Support Equipment - Paved Road Dust - 29 Palms LAS EIS Proposed Alternatives 1, 2, and 4-6

Equipment Type	Weight (Tons)	Paved Emission Factor (Lb/VMT) PM	PM $_{10}$	PM $_{2.5}$	Annual VMT	% Paved Travel (1)	Paved VMT
Tactical Vehicles							
Medium Tactical Vehicle Replacement	10.0	0.07	0.01	0.002	228,814	10%	22,881
High-Mobility Multipurpose Wheeled Vehicle	3.0	0.01	0.00	-	393,386	50%	196,693
Logistics Vehicle System	20.0	0.20	0.04	0.006	75,094	50%	37,547
Internally Transportable Vehicle	3.5	0.01	0.00	0.000	18,156	50%	9,078
M60A1 Bridge Vehicle	70.0	1.32	0.26	0.038	2,580	10%	258
Amphibious Assault Vehicle	30.6	0.38	0.07	0.011	87,550	10%	8,755
Light Armored Vehicle (Variants)	14.1	0.12	0.02	0.003	34,694	10%	3,469
M88A2 HERCULES Recovery Vehicle	70.0	1.32	0.26	0.038	1,290	10%	129
High-Mobility Artillery Rocket System	12.0	0.09	0.02	0.002	70	50%	35
Abrams M1A1 Main Battle Tank	70.0	1.32	0.26	0.038	16,354	10%	1,635
Joint Assault Bridge	70.0	1.32	0.26	0.038	1,858	10%	186
Assault Breacher Vehicle	55.0	0.92	0.18	0.027	3,000	10%	300

Notes: (1) Percentage of paved roads from 2007 CEIP Appendix D.13.

(2) US EPA 42 13.2.1, sL - 0.1, k(PM10) - 0.016, k(PM2.5) - 0.0024, C(PM10) - 0.00047, C(PM2.5) - 0.00036

Table G-14. Annual Fugitive Dust Emissions for Tactical Vehicles - Unpaved Roads - 29 Palms LAS EIS Proposed Alternatives 1, 2, and 4-6

	Annual Emissions - Tons		
Equipment Type	*PM*	*PM_{10}*	*$PM_{2.5}$*
Tactical Vehicles			
Medium Tactical Vehicle Replacement	670.28	193.71	29.70
High-Mobility Multipurpose Wheeled Vehicle	372.41	107.63	16.50
Logistics Vehicle System	166.94	48.25	7.40
Internally Transportable Vehicle	18.42	5.32	0.82
M60A1 Bridge Vehicle	18.14	5.24	0.80
Amphibious Assault Vehicle	424.23	122.61	18.80
Light Armored Vehicle (Variants)	118.62	34.28	5.26
M88A2 HERCULES Recovery Vehicle	9.07	2.62	0.40
High-Mobility Artillery Rocket System	0.12	0.04	0.01
Abrams M1A1 Main Battle Tank	115.00	33.24	5.10
Joint Assault Bridge	13.07	3.78	0.58
Assault Breacher Vehicle	18.93	5.47	0.84
Subtotal	1,945.24	562.19	86.20
Tactical Support Equipment			
Ground Disturbance	2.64	1.32	0.13
Subtotal	2.64	1.32	0.13
Total Emissions	1,947.88	563.51	86.33

Table G-15. Annual Fugitive Dust Emissions for Tactical Vehicles - Paved Roads - 29 Palms LAS EIS Proposed Alternatives 1, 2, and 4-6

	Annual Emissions - Tons		
Equipment Type	*PM*	*PM_{10}*	*$PM_{2.5}$*
Tactical Vehicles			
Medium Tactical Vehicle Replacement	0.81	0.15	0.02
High-Mobility Multipurpose Wheeled Vehicle	1.10	0.18	-
Logistics Vehicle System	3.77	0.73	0.10
Internally Transportable Vehicle	0.06	0.01	0.00
M60A1 Bridge Vehicle	0.17	0.03	0.00
Amphibious Assault Vehicle	1.67	0.32	0.05
Light Armored Vehicle (Variants)	0.21	0.04	0.01
M88A2 HERCULES Recovery Vehicle	0.09	0.02	0.00
High-Mobility Artillery Rocket System	0.00	0.00	0.00
Abrams M1A1 Main Battle Tank	1.08	0.21	0.03
Joint Assault Bridge	0.12	0.02	0.00
Assault Breacher Vehicle	0.14	0.03	0.00
Total Emissions	9.22	1.75	0.22
Total Emissions - Paved and Unpaved Roads	1,957.10	565.25	86.56

Table G-16. Proposed MCAGCC Aircraft Operations and Emissions - Airspaces - 29 Palms LAS EIS Project Alternatives

	Sorties				Tons per Year					
Aircraft Type	*Annual*	*Fraction Below 3,000 AGL*	*Total Duration (Min.)*	*Duration Below 3,000 AGL (Min.)*	*ROG/HC*	*CO*	*NOx*	*SO2*	*PM10*	*PM2.5*
F/A-18 C/D	484	0.07	90	6.3	0.07	0.41	1.14	0.07	1.07	1.07
F-35	152	0.07	90	6.3	0.02	0.13	0.36	0.02	0.34	0.34
Joint FW (1)	4	0.07	90	6.3	0.00	0.00	0.05	0.00	0.00	0.01
KC-130	136	0.07	180	12.6	0.03	0.12	0.65	0.03	0.29	0.29
AV-8B	300	0.07	78	5.5	0.37	4.28	4.18	0.03	0.52	0.52
AH-1	546	0.99	90	89.1	0.19	3.63	1.91	0.14	1.45	1.45
UH-1	546	0.99	90	89.1	0.04	0.26	1.77	0.12	1.24	1.24
CH-53E	232	0.99	90	89.1	0.12	1.64	6.21	0.31	1.70	1.70
MV-22	268	0.69	120	82.8	0.01	0.45	6.59	0.23	0.89	0.89
Joint RW (2)	320	0.99	12	11.9	0.02	0.28	0.15	0.01	0.11	0.11
EA-6B	74	-	120	-	-	-	-	-	-	-
Joint AR (3)	36	-	240	-	-	-	-	-	-	-
UAS	240	-	600	-						
Total	3,338		1,890		0.86	11.20	23.01	0.95	7.62	7.63

Notes: (1) Assumes F-16 aircraft.

(2) Assumes AH-1 helicopter.

(3) Assumes KC-135 aircraft.

Table G-16a. Proposed MCAGCC Aircraft Operations and GHG Emissions - Airspaces - 29 Palms LAS EIS Project Alternatives

	Sorties		Tons per Year			
Aircraft Type	*Annual*	*Total Duration (Min.)*	*CO2*	*CH4*	*N2O*	*CO_2e* [1]
F/A-18 C/D	484	90	7,458	0.24	0.21	7,529
F-35	152	90	2,342	0.08	0.07	2,364
Joint FW (1)	4	90	71	0.00	0.00	71
KC-130	136	180	3,284	0.11	0.09	3,315
AV-8B	300	78	3,735	0.12	0.11	3,770
AH-1	546	90	1,078	0.03	0.03	1,088
UH-1	546	90	921	0.03	0.03	930
CH-53E	232	90	2,405	0.08	0.07	2,428
MV-22	268	120	2,539	0.08	0.07	2,563
Joint RW (2)	320	12	84	0.00	0.00	85
EA-6B	74	120	2,636	0.09	0.07	2,661
Joint AR (3)	36	240	5,038	0.16	0.14	5,086
UAS	240	600				
Total	3,338	1,890	31,592	1.03	0.89	31,890

Notes: (1) Assumes F-16 aircraft.

(2) Assumes AH-1 helicopter.

(3) Assumes KC-135 aircraft.

Table G-17. Proposed Aircraft Emissions - Landing and Take-Offs - 29 Palms LAS EIS Project Alternatives

Location/Aircraft Type	*Annual Sorties*	*Tons per Year*									
		ROG/HC	*CO*	*NOx*	*SO2*	*PM10*	*PM2.5*	*CO2*	*CH4*	*N2O*	*CO_2e*
EAF											
F/A-18 C/D	484	13.17	34.61	3.86	0.22	4.02	4.02	1,672	0.05	0.05	1,688
F-35	152	4.14	10.87	1.21	0.07	1.26	1.26	525	0.02	0.01	530
Joint FW (1)	4	0.01	0.05	0.02	0.00	0.00	0.00	7	0.00	0.00	8
KC-130	136	0.52	1.01	1.18	0.06	0.61	0.61	498	0.02	0.01	503
AV-8B	300	2.62	2.93	1.72	0.13	0.23	0.23	528	0.02	0.01	533
AH-1	546	0.09	1.93	0.57	0.05	0.49	0.49	362	0.01	0.01	365
UH-1	546	0.18	0.91	0.35	0.03	0.32	0.32	237	0.01	0.01	239
CH-53E	232	1.30	2.65	1.03	0.08	0.44	0.44	627	0.02	0.02	633
MV-22	268	1.54	0.73	1.54	0.01	0.27	0.27	607	0.02	0.02	613
Joint RW (2)	320	0.05	1.13	0.33	0.03	0.29	0.29	212	0.01	0.01	214
EA-6B	74	0.83	1.70	0.45	0.04	0.07	0.07	208	0.01	0.01	210
Joint AR (3)	36	0.06	1.86	0.59	0.09	0.62	0.62	301	0.01	0.01	304
UAS	240	-	-	-	-	-	-	-	-	-	-
Subtotal	3,338	24.53	60.38	12.86	0.80	8.63	8.63	5,786	0.19	0.16	5,840
R-2501											
AH-1	1,092	0.02	0.38	0.17	0.01	0.14	0.14	101	0.00	0.00	102
UH-1	1,092	0.01	0.16	0.31	0.03	0.25	0.25	269	0.01	0.01	271
CH-53E	464	0.12	0.45	0.93	0.05	0.28	0.28	388	0.01	0.01	392
MV-22	536	0.00	0.08	2.38	0.06	0.25	0.25	491	0.02	0.01	496
Joint RW (2)	640	0.01	0.22	0.10	0.01	0.08	0.08	59	0.00	0.00	
Subtotal	3,184	0.16	1.29	3.90	0.16	1.00	1.00	1,309	0.04	0.04	1,261
Total - LTOs	6,522	24.69	61.67	16.76	0.96	9.62	9.62	7,094	0.23	0.20	7,101

Notes: (1) Assumes F-16 aircraft.

(2) Assumes AH-1 helicopter.

(3) Assumes KC-135 aircraft.

Table G-18. Proposed Fugitive Emissions - Landing and Take-Offs - 29 Palms LAS EIS Project Alternatives

Aircraft Type/Location	*Annual Sorties*	*Tons per Year*	
		PM10	*PM2.5*
EAF			
AH-1	546	0.35	0.14
UH-1	546	0.08	0.03
CH-53E	232	1.59	0.64
MV-22	268	0.26	0.10
Joint RW (2)	320	0.21	0.08
Subtotal	1,912	2.50	1.00
R-2501			
AH-1	1,092	12.71	5.08
UH-1	1,092	3.08	1.23
CH-53E	464	14.29	5.72
MV-22	536	2.33	0.93
Joint RW (2)	640	7.45	2.98
Subtotal	3,824	39.86	15.94
Total	5,736	42.36	16.94

Table G-19. Aircraft Emission Factors - Airspace Modes of Operation - 29 Palms LAS EIS Project Alternatives

Aircraft	Engine Type	# Engines	Engine Power Setting	Fuel Flow/ Engine (Lb/Hr)	VOC	CO	NOx	SO2	PM10	PM2.5	CO2	CH4	N2O	Source of EF
					Pounds/1000 Pounds Fuel									
F/A-18 C/D	F404-GE-402	2	85% N	3,318	0.44	2.44	6.74	0.40	6.36	6.36	3,096	0.10	0.09	AESO Memo Rpt 9815E, 11/02
F-35	F404-GE-402	2	85% N	3,318	0.44	2.44	6.74	0.40	6.36	6.36	3,096	0.10	0.09	F-18 as a surrogate
Joint FW (1)	F100-PW-100	1	Intermediate	7,617	0.14	0.91	30.89	0.96	2.06	6.36	3,096	0.10	0.09	F-16 as a surrogate
KC-130	T56-A-16	4	8,000 Q	1,300	0.36	1.58	8.75	0.40	3.97	3.97	3,096	0.10	0.09	AESO Memo Rpt 2000-09B, 1/01
AV-8B	F-402-RR-404	1	Intermediate	6,186	4.33	50.73	49.49	0.40	6.19	6.19	3,096	0.10	0.09	EPA (1992), p. 187
AH-1	T700-GE-401C	2	38% Q - Cruise	425	0.56	10.54	5.55	0.40	4.20	4.20	3,096	0.10	0.09	AESO Memo Rpt 9824a, 1/00
UH-1	T53-L-13B	2	58% Q - Climbout	363	0.13	0.88	6.02	0.40	4.20	4.20	3,096	0.10	0.09	AESO Memo Rpt 9904A, 1/00
CH-53E	T64-GE-416 and -416A	3	70% Q - Cruise	1,488	0.15	2.13	8.08	0.40	2.21	2.21	3,096	0.10	0.09	AESO Memo Rpt 9822C, 2/00
MV-22	T406-AD-400	2	Helo (16°) Cruise	1,530	0.01	0.79	11.64	0.40	1.58	1.58	3,096	0.10	0.09	AESO Memo Rpt 9946E, 1/01
Joint RW (2)	T700-GE-401C	2	38% Q - Cruise	425	0.56	10.54	5.55	0.40	4.20	4.20	3,096	0.10	0.09	AH-1 as a surrogate
EA-6B	J52-P408	2	Intermediate	5,752	3.85	18.29	48.20	0.96	5.75	5.75	3,096	0.10	0.09	EPA (1992), p. 186
Joint AR (3)	F108-CF-100	4	Intermediate	5,650	0.03	1.61	13.53	0.96	0.65	0.65	3,096	0.10	0.09	IERA 2002

Notes: (1) Assumes F-16 aircraft.

(2) Assumes AH-1 helicopter.

(3) Assumes KC-135 aircraft.

(4) GHG Emission Factors from General Reporting Protocol, Tables C.3 and C.6 jet fuel (California Climate Action Registry 2009).

Table G-20. Aircraft Emission Factors - Landing/Take-off Modes of Operation - 29 Palms LAS EIS Project Alternatives

			Fuel Usage	Pounds/LTO									
Aircraft	*Engine Type*	*# Engines*	*(Pounds per LTO)*	*VOC*	*CO*	*NOx*	*SO2*	*PM10*	*PM2.5*	*CO2*	*CH4*	*N2O*	*Source of EF*
F/A-18 C/D	F404-GE-402	2	2,232	54.43	143.03	15.95	0.89	16.61	16.61	6,911	0.22	0.20	AESO Memo Rpt 9815E, 11/02
F-35	F404-GE-402	2	2,232	54.43	143.03	15.95	0.89	16.61	16.61	6,911	0.22	0.20	F-18 as a surrogate
Joint FW (1)	F100-PW-100	1	1,207	4.74	23.33	9.89	1.12	2.17	2.17	3,737	0.12	0.11	USAF IERA 2002
KC-130	T56-A-16	4	2,367	7.65	14.79	17.35	0.95	9.03	9.03	7,329	0.24	0.21	AESO Memo Rpt 2000-09B, 1/01
AV-8B	F-402-RR-404	1	1,137	17.49	19.55	11.48	0.84	1.55	1.55	3,520	0.11	0.10	EPA (1992), p. 187
AH-1	T700-GE-401C	2	428	0.33	7.08	2.09	0.17	1.80	1.80	1,325	0.04	0.04	AESO Memo Rpt 9824a, 1/00
UH-1	T53-L-13B	1	280	0.67	3.32	1.28	0.11	1.18	1.18	867	0.03	0.02	AESO Memo Rpt 9904A, 1/00
CH-53E	T64-GE-416 and -416A	3	1,746	11.24	22.86	8.86	0.70	3.76	3.76	5,406	0.18	0.15	AESO Memo Rpt 9822C, 2/00
MV-22	T406-AD-400	2	1,464	11.51	5.44	11.51	0.08	2.01	2.01	4,533	0.15	0.13	AESO Memo Rpt 9946E, 1/01
Joint RW (2)	T700-GE-401C	2	428	0.33	7.08	2.09	0.17	1.80	1.80	1,325	0.04	0.04	AH-1 as a surrogate
EA-6B	J52-P408	2	1,819	22.55	45.91	12.10	0.98	1.82	1.82	5,632	0.18	0.16	EPA (1992), p. 186
Joint AR (3)	F108-CF-100	4	5,399	3.33	103.38	32.90	5.13	34.49	34.49	16,716	0.54	0.47	IERA 2002

Notes: (1) Assumes F-16 aircraft.

(2) Assumes AH-1 helicopter.

(3) Assumes KC-135 aircraft.

(4) GHG Emission Factors from General Reporting Protocol, Tables C.3 and C.6 (California Climate Action Registry 2009).

Table G-21. Aircraft Emission Factors - Pad Landings - 29 Palms LAS EIS Project Alternatives

Aircraft	Engine Type	# Engines	Fuel Usage (Pounds per Landing)	Pounds/Landing VOC	CO	NOx	SO2	PM10	PM2.5	CO2	CH4	N2O	Source of EF
AH-1	T700-GE-401C	2	60	0.03	0.69	0.32	0.02	0.25	0.25	185.8	0.01	0.01	AESO Memo Rpt 9961, 7/99
UH-1 (4)	T53-L-13B	1	159	0.02	0.30	0.57	0.05	0.46	0.46	492.3	0.02	0.01	AESO Memo Rpt 9904A, 1/00
CH-53E	T64-GE-416 and -416A	3	540	0.52	1.94	4.03	0.22	1.19	1.19	1,671.9	0.05	0.05	AESO Memo Rpt 9960, Revision B, 4/00
MV-22	T406-AD-400	2	592	0.01	0.29	8.87	0.24	0.94	0.94	1,832.9	0.06	0.05	AESO Memo Rpt 2000-09B, 1/01
Joint RW (2)	T700-GE-401C	2	60	0.03	0.69	0.32	0.02	0.25	0.25	185.8	0.01	0.01	AH-1 as a surrogate

Notes: (1) Equal to hover, climbout, descent, and approach modes.

Table G-22. Aircraft Fugitive Dust Emission Factors - Landing/Take-off Modes of Operation - 29 Palms LAS EIS Project Alternatives

Aircraft	Soil Silt Content (%)	Rain Days per Year	% of Time Wind Speed > 12 Knots	Exposed Area (Acres)	PM10 Pounds/Landing or Take O	PM2.5	Location of EF	Source of EF
EAF								
AH-1	9.1	8	0.17	0.04	1.30	0.52	2007 CEIP -	MDAQMD Mine Operations
UH-1	9.1	8	0.04	0.04	0.30	0.12	2007 CEIP -	MDAQMD Mine Operations
CH-53E	9.1	8	0.16	0.45	13.72	5.49	2007 CEIP -	MDAQMD Mine Operations
MV-22	9.1	8	0.02	0.51	1.94	0.78	2007 CEIP -	MDAQMD Mine Operations
Joint RW (1)	9.1	8	0.17	0.04	1.30	0.52	2007 CEIP -	MDAQMD Mine Operations
R-2501								
AH-1	9.1	8	0.33	0.37	23.27	9.31	2007 CEIP -	MDAQMD Mine Operations
UH-1	9.1	8	0.08	0.37	5.64	2.26	2007 CEIP -	MDAQMD Mine Operations
CH-53E	9.1	8	0.32	1.01	61.61	24.64	2007 CEIP -	MDAQMD Mine Operations
MV-22	9.1	8	0.04	1.14	8.69	3.48	2007 CEIP -	MDAQMD Mine Operations
Joint RW (1)	9.1	8	0.33	0.37	23.27	9.31	2007 CEIP -	MDAQMD Mine Operations

Table G-23. Total Proposed Aircraft Emissions within all MCAGCC Airspaces - 29 Palms LAS EIS Project Alternatives

Airspace	Tons per Year									
	ROG/HC	CO	NOx	SO2	PM10	PM2.5	CO2	CH4	N2O	CO_2e
Airspaces	0.86	11.20	23.01	0.95	7.62	7.63	31,592	1.03	0.89	31,890
EAF LTOs	24.53	60.38	12.86	0.80	8.63	8.63	5,786	0.19	0.16	5,840
Range LTOs	0.16	1.29	3.90	0.16	1.00	1.00	1,309	0.04	0.04	1,261
Prop Wash - Fugitive Dust					42.36	16.94				
Total	25.55	72.87	39.77	1.91	59.60	34.20	38,686	1.26	1.09	31,890

Table G-24. Proposed Ground Forces Annual Ordnances - 29 Palms LAS EIS Project Alternatives

Ordnance Type/Activity	*Item #*	Usage	Units	Weight/Unit (Lb)	Total Explosive Weight (Tons)
Ground Forces Munitions					
Cartridges Smaller than 30 mm	A059, A063, A064, A131, A576, A976	936,270	EA		
Cartridges 30-75 mm	B519, B535, B576, B630, B643, B647	24,242	EA		
Cartridges 75 mm and Larger	C784, C785, C868, C870, C871, C995	11,468	EA	3.06	17.52
Projectiles, Canisters, and Chargers	D505, D528, D532, D533, D541, D544, D579	38,332	EA	4.96	95.00
Grenades	G878, G930, G940, G945	666	EA		
Rockets, Rocket Motors, and Igniters	HX05, HX07, J143	144	EA	0.11	0.01
Mines and Smoke Pots	K143	144	EA	0.22	0.02
Signals and Simulators	L312, L314, L324	360	EA		
Blasting Caps, Demo. Charges, and Detonators	M Series - Detonating cord	8,829	Ft	0.01	0.02
Blasting Caps, Demo. Charges, and Detonators	M Series - Other explosives	8,829	EA		
Fuses and Primers	N289, N340, N523	24,642	EA	0.003	0.04
Guided Missiles	PB99, WF10	144	EA	1.59	0.11
Total		1,057,160			

Table G-25. Air-Delivered Munitions Used During MEB Exercises - 29 Palms LAS EIS Project Alternatives

	Identification Code	Usage	Units	Weight/Unit	Total Explosive Weight (Tons)
Unguided Munitions					
General Purpose Bomb (25 Lb) - Inert	MK-76 (Inert)	1,950	EA		
General Purpose Bomb (500 Lb)	MK-82	1,020	EA	154.00	78.54
General Purpose Bomb (1,000 Lb) Inert	MK-83 (Inert)	156	EA		
General Purpose Bomb (1,000 Lb)	MK-83	132	EA	165.50	10.92
General Purpose Bomb (2,000 Lb)	MK-84	36	EA	331.00	5.96
Inert Practice Bomb	BDU-45 (Inert)	360	EA		
2.75-inch Rocket	HE/WP/RP Rocket	8,400	EA	0.91	3.84
5-inch Zuni Rocket	HE/WP/ILLUM Rocket	792	EA	4.95	1.96
Guided Munitions [1]					
Hellfire missile	MK-114	72	EA	17.60	0.63
Laser Guided Bomb (500 lb)	GBU-12	432	EA	154.00	33.26
Laser Guided Bomb (1000 lb)	GBU-16	54	EA	165.50	4.47
Laser Guided Bomb (2000 lb)	GBU-10	4	EA	331.00	0.66
Joint Direct Attack Munitions (250 lb)	GB-38 version 4	252	EA	77.00	9.70
Joint Direct Attack Munitions (500 lb)	GBU-38, GBU-54	576	EA	154.00	44.35
Joint Direct Attack Munitions (1000 lb)	GBU-32	24	EA	165.50	1.99
Joint Direct Attack Munitions (2000 lb)	GBU-31	64	EA	331.00	10.59
Hard Target Penetrator	GBU-24	4	EA	331.00	0.66
Small Diameter Missile	GBU-39	24	EA	38.00	0.46
TOW Missile	BGM-71	84	EA	7.92	0.33
Laser Guided Training Round	-	432	EA	0.0066	0.001
Penetrator (500 lb)	BLU-111	384	EA	154.00	29.57
Aircraft Gun Systems Munitions					
20 mm	-	198,000	EA		
25 mm	-	181,000	EA		
7.62 mm	-	336,000	EA	0.002	0.32
.50 Cal	-	790,000	EA	0.01	4.29
Chaff and Flares					
Chaff (Assorted)	-	6,400	EA	0.01	0.04
Flares (Assorted)	-	20,862	EA	0.001	0.01

Table G-26. Ordnance Combustive Emission Factors - 29 Palms LAS EIS Project Alternatives

Ordnance Type	Pounds per Item or (lb/ton of Explosive)						
	ROG	*CO*	*NOx*	*SO_2*	*PM*	*PM_{10}*	*$PM_{2.5}$*
Ground Forces Munitions							
Cartridges Smaller than 30 mm	7.95E-06	1.60E-03	8.50E-05	--	1.08E-06	5.60E-07	3.23E-08
Cartridges 30-75 mm	2.99E-06	3.50E-04	3.59E-05	--	8.22E-07	4.27E-07	2.47E-08
Cartridges 75 mm and Larger	0.85	82.0	9.25	--	4.10E-03	2.13E-03	1.23E-04
Projectiles, Canisters, and Chargers	11.44	777	0.57	--	5.12E-02	2.66E-02	1.54E-03
Grenades	2.39E-05	1.75E-04	4.15E-05	--	3.29E-06	1.71E-06	9.86E-08
Rockets, Rocket Motors, and Igniters	3.26	309	7.28	--	1.74E-02	9.05E-03	5.22E-04
Mines and Smoke Pots	0.58	223.61	0.00	--	2.06E-02	1.07E-02	6.18E-04
Signals and Simulators	0.00	0.01	0.01	--	5.66E-05	2.94E-05	1.70E-06
M Series - Detonating cord	1.21	252.47	0.00	--	4.00E-05	2.08E-05	1.20E-06
M Series - Other explosives	-	0.01	0.01	--	3.44E-03	1.79E-03	1.03E-04
Fuses and Primers	3.44	170.00	-	--	5.70E-06	2.96E-06	1.71E-07
Guided Missiles (3)	3.48	263.66	53.00	--	0.0137	0.0071	0.0004

Notes: (1) Data are averages of emission factors for munitions categories found in 2007 CEIP Appendix D.9.

(2) PM emission factors are for a per blast unit

(3) Used PA45 Surface Attack MGM-51C, from Appendix D.9 of the 2007 CEIP

Table G-27. Air Delivered Munitions Combustive Emission Factors - 29 Palms LAS EIS Project Alternatives

Ordnance Type/Pollutant	*Pounds per Item or (lb/ton of Explosive)*						
	ROG	*CO*	*NOx*	*SO_2*	*PM*	*PM_{10}*	*$PM_{2.5}$*
Unguided Munitions							
General Purpose Bomb (25 Lb) - Inert							
General Purpose Bomb (500 Lb)	11.73	796.00	0.00	--	0.53	0.27	0.02
General Purpose Bomb (1,000 Lb) Inert							
General Purpose Bomb (1,000 Lb)	7.01	554.89	0.00	--	1.36	0.71	0.04
General Purpose Bomb (2,000 Lb)	7.01	554.89	0.00	--	2.72	1.41	0.08
Inert Practice Bomb							
2.75-inch Rocket	11.73	796.00	0.00	--	0.010	0.005	0.0003
5-inch Zuni Rocket	3.91	429.67	0.00	--	0.067	0.035	0.002
Guided Munitions							
Hellfire missile	3.91	429.67	0.00	--	0.01	0.01	0.0004
Laser Guided Bomb (500 lb)	11.73	796.00	0.00	--	0.53	0.27	0.02
Laser Guided Bomb (1000 lb)	7.01	554.89	0.00	--	1.36	0.71	0.04
Laser Guided Bomb (2000 lb)	7.01	554.89	0.00	--	2.72	1.41	0.08
Joint Direct Attack Munitions (250 lb)	11.73	796.00	0.00	--	0.26	0.14	0.01
Joint Direct Attack Munitions (500 lb)	11.73	796.00	0.00	--	0.53	0.27	0.02
Joint Direct Attack Munitions (1000 lb)	7.01	554.89	0.00	--	1.36	0.71	0.04
Joint Direct Attack Munitions (2000 lb)	7.01	554.89	0.00	--	2.72	1.41	0.08
Hard Target Penetrator	7.01	554.89	0.00	--	2.72	1.41	0.08
Small Diameter Missile	3.91	429.67	0.00	--	0.01	0.01	0.0004
TOW Missile	3.91	429.67	0.00	--	0.01	0.01	0.0004
Laser Guided Training Round	0.90	77.00	0.00	--	0.26	0.14	0.01
Penetrator (500 lb)	7.01	554.89	0.00	--	2.72	1.41	0.08
Aircraft Gun Systems Munitions							
20 mm	0.0002	0.03	0.0004	--	2.00E-05	1.04E-05	6.01E-07
25 mm	-	0.06	-	--	5.48E-05	2.85E-05	1.64E-06
7.62 mm	86.44	125.82	5.97	--	1.77E-06	9.19E-07	5.30E-08
.50 Cal	0.55	92.38	19.88	--	8.70E-06	4.52E-06	2.61E-07
Chaff and Flares							
Chaff (Smokeless Powder)	0.49	159.33	17.67	--	3.28E-05	1.71E-05	9.84E-07
Flares	1.64	117.00	17.67	--	2.89E-06	1.50E-06	8.68E-08

Notes: (1) Data are averages of emission factors for munitions categories found in 2007 CEIP Appendix D.9.

(2) PM emission factors are for a per blast unit

(3) TOG Emission factors were converted from ROG by multiplying by 0.82

Table G-28. Proposed Ground Forces Combustive Emissions - 29 Palms LAS EIS Project Alternatives

Ordnance Type	*Annual Emissions (Pounds/Year)*						
	ROG	CO	NO_X	SO_2	PM	PM_{10}	$PM_{2.5}$
Ground Forces Munitions							
Cartridges Smaller than 30 mm	7.4	1,498.0	79.6	--	1.0	0.5	0.0
Cartridges 30-75 mm	0.1	8.5	0.9	--	0.0	0.0	0.0
Cartridges 75 mm and Larger	14.9	1,437.1	162.1	--	47.1	24.5	1.4
Projectiles, Canisters, and Chargers	1,086.6	73,846.4	54.2	--	1,962.6	1,019.6	59.0
Grenades	0.0	0.1	0.0	--	0.0	0.0	0.0
Rockets, Rocket Motors, and Igniters	0.0	2.5	0.1	--	2.5	1.3	0.1
Mines and Smoke Pots	0.0	3.5	-	--	3.0	1.5	0.1
Signals and Simulators	-	3.6	3.6	--	0.0	0.0	0.0
M Series - Detonating cord	0.0	6.1	-	--	0.4	0.2	0.0
M Series - Other explosives	-	88.3	88.3	--	30.4	15.8	0.9
Fuses and Primers	0.1	6.3	-	--	0.1	0.1	0.0
Guided Missiles [1]	0.4	30.2	6.1	--	2.0	1.0	0.1
Total Ground Forces Emissions - Pounds	1,110	76,931	395	-	2,049	1,065	62
Total Ground Forces Emissions - Tons	0.55	38.47	0.20	-	1.02	0.53	0.03

Table G-29. Air Delivered Munitions Combustive Emissions - 29 Palms LAS EIS Project Alternatives

Ordnance Type	*Pounds/Year*						
	ROG	CO	NOx	SO2	PM	PM_{10}	$PM_{2.5}$
Unguided Munitions							
General Purpose Bomb (25 Lb) - Inert							
General Purpose Bomb (500 Lb)	921.0	62,517.8	-	--	538.6	279.5	16.1
General Purpose Bomb (1,000 Lb) Inert							
General Purpose Bomb (1,000 Lb)	76.6	6,061.1	-	--	179.5	93.3	5.4
General Purpose Bomb (2,000 Lb)	41.8	3,306.1	-	--			
Inert Practice Bomb							
2.75-inch Rocket	45.0	3,055.7	-	--	86.5	45.1	2.5
5-inch Zuni Rocket	7.7	842.7	-	--	52.7	27.4	1.6
Guided Munitions							
Hellfire missile	2.5	272.2	-	--	1.0	0.5	0.0
Laser Guided Bomb (500 lb)	390.1	26,478.1	-	--	228.1	118.4	6.8
Laser Guided Bomb (1000 lb)	31.3	2,479.5	-	--	73.4	38.2	2.2
Laser Guided Bomb (2000 lb)	4.6	367.3	-	--	10.9	5.7	0.3
Joint Direct Attack Munitions (250 lb)	113.8	7,722.8	-	--	66.5	34.5	2.0
Joint Direct Attack Munitions (500 lb)	520.1	35,304.2	-	--	304.1	157.8	9.1
Joint Direct Attack Munitions (1000 lb)	13.9	1,102.0	-	--	32.6	17.0	1.0
Joint Direct Attack Munitions (2000 lb)	74.3	5,877.4	-	--	174.1	90.5	5.2
Hard Target Penetrator	4.6	367.3	-	--	10.9	5.7	0.3
Small Diameter Missile	1.8	195.9	-	--	0.3	0.2	0.0
TOW Missile	1.3	142.9	-	--	1.2	0.6	0.0
Laser Guided Training Round	0.0	0.1	-	--	114.0	59.2	3.4
Penetrator (500 lb)	207.4	16,407.1	-	--	1,044.5	543.0	31.3
Aircraft Gun Systems Munitions							
20 mm	40.6	5,940.0	85.1	--	4.0	2.1	0.1
25 mm	-	9,955.0	-	--	9.9	5.2	0.3
7.62 mm	27.7	40.3	1.9	--	0.6	0.3	0.0
.50 Cal	2.4	396.2	85.2	--	6.9	3.6	0.2
Chaff and Flares							
Chaff (Smokeless Powder)	0.0	6.7	0.7	--	0.2	0.1	0.0
Flares	0.0	0.7	0.1	--	0.1	0.0	0.0
Total Air-Delivered Emissions - Pounds	2,528	188,839	173	-	2,941	1,528	88
Total Air-Delivered Emissions - Tons	1.26	94.42	0.09	-	1.47	0.76	0.04
Total Combustive Ordnance Emissions - Pounds	3,638	265,770	568	-	4,990	2,592	150
Total Combustive Ordnance Emissions - Tons	1.82	132.88	0.28	-	2.49	1.30	0.07

Table G-29a. 2009 Combat Center GHG Emissions Estimates - Source Activity Data and Emission Factors

Activity/Source- Fuel Type	*Fuel Usage (Gallons) (1)*	*Emission Factors (Lb/Usage Unit)*			*Notes/Reference*
		CO_2	*CH_4*	*N_2O*	
Aircraft - LTOs	NA				
Aircraft - Range Operations	NA				
Aluminum Sweat Furnace - Propane	11,171	12.7	0.0022	0.0002	
Boilers - Natural Gas	108.1	118,949.9	11.21	0.22	Lb/MSCF
Boilers - Propane	8,487	12.7	0.0022	0.0002	
Fire Fighting Training - Burn Pit - JP-5/8	300.0	21.1	0.0033	0.0002	
Stationary IC Engines - Cogeneration Plant - Natural Gas	587.6	118,524.0	2.0	0.2	Lb/MSCF
Stationary IC Engines - Diesel	54,700	22.3	0.0033	0.0002	
Stationary IC Engines - Gasoline	29,296	19.4	0.0031	0.0002	
Stationary IC Engines - Natural Gas	0.1	118,949.9	11.2	0.2	Lb/MSCF
Stationary IC Engines - Propane	89.0	12.7	0.0022	0.0002	
Landfill Gas	NA	68.8	65.7		TPY
Ordnance Usage - Combustive	NA	165.2	1.7		TPY
Tactical Vehicles/Support Equipment - JP-8	2,102,509	22.3	0.0013	0.0006	
Refrigerants	1,590	1,780.0			Lb/GWP
Zinc Pot Furnace - Propane	97.0	12.7	0.0022	0.0002	

Notes: (1) Except millions of standard cubic feet (MSCF) for natural gas and landfill gas sources and pounds for Refrigerants.

Table G-29b. Combat Center GHG Emissions Estimates - Year 2009.

Activity/Source	Annual Short Tons CO_2	Annual Short Tons CH_4	Annual Short Tons N_2O	Annual Short Tons CO_2e	Annual Metric Tons CO_2	Annual Metric Tons CH_4	Annual Metric Tons N_2O	Annual Metric Tons CO_2e
Aircraft - LTOs	29,705			29,705	26,955			26,955
Aircraft - Range Operations	28,319	0.92	0.80	28,586	25,697	0.83	0.73	25,940
Aluminum Sweat Furnace - Propane	71	0.01	0.00	72	65	0.01	0.00	65
Boilers - Natural Gas	6,430	0.61	0.01	6,446	5,835	0.55	0.01	5,850
Boilers - Propane	54	0.01	0.00	55	49	0.01	0.00	49
Fire Fighting Training - Burn Pit - JP-5/8	3	0.00	0.00	3	3	0.00	0.00	3
Stationary IC Engines - Cogeneration Plant - Natural Gas	34,871	0.60	0.07	34,904	31,643	0.54	0.06	31,673
Stationary IC Engines - Diesel	611	0.09	0.01	614	554	0.08	0.01	558
Stationary IC Engines - Gasoline	284	0.05	0.00	286	258	0.04	0.00	259
Stationary IC Engines - Natural Gas	3	0.00	0.00	3	3	0.00	0.00	3
Stationary IC Engines - Propane	1	0.00	0.00	1	1	0.00	0.00	1
Landfill Gas	69	65.73		1,449	62	59.64	-	1,315
Ordnance Usage - Combustive	165.16	1.65		200	150	1.50	-	181
Tactical Vehicles/Support Equipment - JP-8	23,475	1.34	0.60	23,690	21,302	1.22	0.55	21,497
Refrigerants (1)				1,415				1,284
Zinc Pot Furnace - Propane	1	0.00	0.00	1	1	0.00	0.00	1
Total Existing Emissions	124,059	71	1	127,428	112,576	64.43	1.35	115,633

Table G-30. Annual Construction and Operational Emissions - 29 Palms LAS EIS - Alternative 1

Activity/Source	VOC	CO	NO_X	SO_X	PM	PM_{10}	$PM_{2.5}$	CO_2	CH_4	N_2O	CO_2e
	Annual Emissions (Tons per Year)										
Road Construction											
Mobile Equipment	0.08	0.30	0.83	0.00		0.04	0.03	154	0.02	0.00	155
Fugitive Dust						0.41	0.04				
Subtotal	0.08	0.30	0.83	0.00		0.45	0.07	154	0.02	0.00	155
Communication Tower Construction											
Mobile Equipment	0.00	0.00	0.00	0.00		0.00	0.00	0.34	0.00	0.00	0
Helicopters	0.09	0.40	0.11	0.01		0.40	0.16	-	-	-	-
On-road Trucks	0.00	0.01	0.02	0.00		0.13	0.02	1.94	0.00	0.00	2
Subtotal	0.09	0.40	0.12	0.01		0.53	0.18	2.27	0.00	0.00	2
Total Construction	0.17	0.71	0.96	0.01		0.98	0.25	156	0.02	0.00	157
MEB Exercises											
Tactical Vehicles	5.29	23.73	64.39	7.35		2.33	2.33	3,921	0.49	0.05	3,947
Tactical Support Equipment	1.50	6.75	17.20	2.09		0.66	0.66	901	0.13	0.01	907
Fugitive Dust						565.25	86.56				
Subtotal	6.79	30.48	81.59	9.44		568.25	89.55	4,822	0.62	0.06	4,854
Aircraft Operations											
Airspaces	0.86	11.20	23.01	0.95		7.62	7.63	31,592	1.03	0.89	31,890
EAF LTOs	24.53	60.38	12.86	0.80		8.63	8.63	5,786	0.19	0.16	5,840
Range LTOs	0.16	1.29	3.90	0.16		1.00	1.00	1,309	0.04	0.04	1,321
Fugitive Dust						42.36	16.94				
Subtotal	25.55	72.87	39.77	1.91		59.60	34.20	38,686	1.26	1.09	39,052
Ordnance Activities											
Combustive	1.82	132.88	0.28								
Fugitive						2.49	1.30				
Subtotal	1.82	132.88	0.28			2.49	1.30	-	-	-	-
Personnel Commutes											
On-road Vehicles	0.05	0.60	1.84	0.00	-	0.02	0.02	182	-	-	182
Power Demand											
On-site Co-Generation Unit - 1,096 MW-Hr (4)								732	0.01	0.00	733
Propane Usage - 4,000 Gallons								25	0.00	0.00	26
Total Operations - Tons per Year (1)	34.21	236.83	123.48	11.36	-	630.36	125.06	44,448	2	1	44,847
Reduction of West Area Emissions - Tons per Year (2)	(2.95)	(24.27)	(1.45)	(0.03)		(258.47)	(26.87)	(455)	(0.67)	(0.00)	(469)
Reduction of South Area Emissions - Tons per Year (3)	(0.00)	(0.02)	(0.00)	(0.00)		(0.36)	(0.04)	(1)	(0.00)	-	(1)
Total Operations Net Change - Tons per Year (1)	31.25	212.54	122.03	11.33		371.53	98.15	43,993	1.23	1.16	44,377
Conformity Thresholds - Tons per Year	25	- - -	25	- - -	- - -	100	- - -				
Exceed De Minimis Thresholds?	Y	NA	Y	NA	NA	Y	NA				

Notes: (1) Excludes construction, as this would occur in a calendar year prior to initiation of the proposed exercises.

(2) Alternative 1 would eliminate 23% of year 2015 emissions from Johnson Valley.

(3) Alternative 1 would eliminate 10% of year 2015 emissions from the South Area.

(4) Based upon 2.1% of power generated at the Combat Center in 2009.

Table G-31. Annual Construction and Operational Emissions - 29 Palms LAS EIS - Alternative 2

	Annual Emissions (Tons per Year)										
Activity/Source	*VOC*	*CO*	*NO_X*	*SO_X*	*PM*	*PM_{10}*	*$PM_{2.5}$*	*CO_2*	*CH_4*	*N_2O*	*CO_2e*
Road Construction											
Mobile Equipment	0.08	0.30	0.83	0.00		0.04	0.03	154.08	0.02	0.00	155
Fugitive Dust						0.41	0.04				
Subtotal	0.08	0.30	0.83	0.00		0.45	0.07	154.08	0.02	0.00	155
Communication Tower Construction											
Mobile Equipment	0.00	0.00	0.00	0.00		0.00	0.00	0.34	0.00	0.00	-
Fugitive Dust	0.09	0.40	0.11	0.01		0.40	0.16	-	-	-	-
Mobile Equipment	0.00	0.01	0.02	0.00		0.13	0.02	1.94	0.00	0.00	-
Subtotal	0.09	0.40	0.12	0.01		0.53	0.18	2.27	0.00	0.00	-
Total Construction	0.17	0.71	0.96	0.01		0.98	0.25	156	0.02	0.00	155
MEB Exercises											
Tactical Equipment	5.29	23.73	64.39	7.35		2.33	2.33	3,921	0.49	0.05	3,947
Tactical Support Equipment	1.50	6.75	17.20	2.09		0.66	0.66	901	0.13	0.01	907
Fugitive Dust						565.25	86.56				
Subtotal	6.79	30.48	81.59	9.44		568.25	89.55	4,822	0.62	0.06	4,854
Aircraft Operations											
Airspaces	0.86	11.20	23.01	0.95		7.62	7.63	31,592	1.03	0.89	31,890
EAF LTOs	24.53	60.38	12.86	0.80		8.63	8.63	5,786	0.19	0.16	5,840
Range LTOs	0.16	1.29	3.90	0.16		1.00	1.00	1,309	0.04	0.04	1,261
Fugitive Dust						42.36	16.94				
Subtotal	25.55	72.87	39.77	1.91		59.60	34.20	38,686	1.26	1.09	38,992
Ordnance Activities											
Combustive	1.82	132.88	0.28								
Fugitive						2.49	1.30				
Subtotal	1.82	132.88	0.28			2.49	1.30	-	-	-	-
Personnel Commutes											
On-road Vehicles	0.05	0.60	1.84	0.00	-	0.02	0.02	182	-	-	182
Power Demand											
On-site Co-Generation Unit - 1,096 MW-Hr (4)								732	0.01	0.00	733
Propane Usage - 4,000 Gallons								25	0.00	0.00	26
Total Operations - Tons per Year (1)	34.21	236.83	123.48	11.36	-	630.36	125.06	44,448	2	1	44,787
Reduction of West Area Emissions - Tons per Year (2)	(1.56)	(12.83)	(0.77)	(0.01)		(136.61)	(14.20)	(240.26)	(0.35)	(0.00)	
Reduction of South Area Emissions - Tons per Year (3)	(0.00)	(0.02)	(0.00)	(0.00)		(0.36)	(0.04)	(0.66)	(0.00)	-	
Total Operations Net Change - Tons per Year (1)	32.65	223.98	122.72	11.34		493.39	110.82	44,207	1.54	1.16	44,787
Conformity Thresholds - Tons per Year	25	- - -	25	- - -	- - -	100	- - -				
Exceed De Minimis Thresholds?	Y	NA	Y	NA	NA	Y	NA				

Notes: (1) Excludes construction, as this would occur in a calendar year prior to initiation of the proposed exercises.

(2) Alternative 2 would eliminate 12% of year 2015 emissions from Johnson Valley.

(3) Alternative 2 would eliminate 10% of year 2015 emissions from the South Area.

(4) Based upon 2.1% of power generated at the Combat Center in 2009.

Table G-32. Annual Construction and Operational Emissions - 29 Palms LAS EIS - Alternative 4

	Annual Emissions (Tons per Year)										
Activity/Source	*VOC*	*CO*	*NO_X*	*SO_X*	*PM*	*PM_{10}*	*$PM_{2.5}$*	*CO_2*	*CH_4*	*N_2O*	*CO_2e*
Road Construction											
Mobile Equipment	0.08	0.30	0.83	0.00		0.04	0.03	154	0.02	0.00	155
Fugitive Dust						0.41	0.04				
Subtotal	0.08	0.30	0.83	0.00		0.45	0.07	154	0.02	0.00	155
Communication Tower Construction											
Mobile Equipment	0.00	0.00	0.00	0.00		0.00	0.00	0.34	0.00	0.00	-
Fugitive Dust	0.09	0.40	0.11	0.01		0.40	0.16	-	-	-	-
Mobile Equipment	0.00	0.01	0.02	0.00		0.13	0.02	1.94	0.00	0.00	-
Subtotal	0.09	0.40	0.12	0.01		0.53	0.18	2.27	0.00	0.00	-
Total Construction	0.17	0.71	0.96	0.01		0.98	0.25	156	0.02	0.00	155
MEB Exercises											
Tactical Equipment	5.29	23.73	64.39	7.35		2.33	2.33	3,921	0.49	0.05	3,947
Tactical Support Equipment	1.50	6.75	17.20	2.09		0.66	0.66	901	0.13	0.01	907
Fugitive Dust						565.25	86.56				
Subtotal	6.79	30.48	81.59	9.44		568.25	89.55	4,822	0.62	0.06	4,854
Aircraft Operations											
Airspaces	0.86	11.20	23.01	0.95		7.62	7.63	31,592	1.03	0.89	31,890
EAF LTOs	24.53	60.38	12.86	0.80		8.63	8.63	5,786	0.19	0.16	5,840
Range LTOs	0.16	1.29	3.90	0.16		1.00	1.00	1,309	0.04	0.04	1,261
Fugitive Dust						42.36	16.94				
Subtotal	25.55	72.87	39.77	1.91		59.60	34.20	38,686	1.26	1.09	38,992
Ordnance Activities											
Combustive	1.82	132.88	0.28								
Fugitive						2.49	1.30				
Subtotal	1.82	132.88	0.28			2.49	1.30	-	-	-	-
Personnel Commutes											
On-road Vehicles	0.05	0.60	1.84	0.00	-	0.02	0.02	182	-	-	182
Power Demand											
On-site Co-Generation Unit - 1,096 MW-Hr (4)								732	0.01	0.00	733
Propane Usage - 4,000 Gallons								25	0.00	0.00	26
Total Operations - Tons per Year (1)	34.21	236.83	123.48	11.36	-	630.36	125.06	44,448	2	1	44,787
Reduction of West Area Emissions - Tons per Year (2)	(0.51)	(4.23)	(0.25)	(0.00)		(45.01)	(4.68)	(79.15)	(0.12)	(0.00)	
Reduction of South Area Emissions - Tons per Year (3)	(0.00)	(0.02)	(0.00)	(0.00)		(0.36)	(0.04)	(0.66)	(0.00)	-	
Total Operations Net Change - Tons per Year (1)	33.69	232.59	123.23	11.35		585.00	120.34	44,368	1.78	1.16	44,787
Conformity Thresholds - Tons per Year	25	- - -	25	- - -	- - -	100	- - -				
Exceed De Minimis Thresholds?	Y	NA	Y	NA	NA	Y	NA				

Notes: (1) Excludes construction, as this would occur in a calendar year prior to initiation of the proposed exercises.

(2) Alternative 2 would eliminate 4% of year 2015 emissions from Johnson Valley.

(3) Alternative 2 would eliminate 10% of year 2015 emissions from the South Area.

(4) Based upon 2.1% of power generated at the Combat Center in 2009.

Table G-33. Annual Construction and Operational Emissions - 29 Palms LAS EIS - Alternative 5

	Annual Emissions (Tons per Year)										
Activity/Source	*VOC*	*CO*	*NO_X*	*SO_X*	*PM*	*PM_{10}*	*$PM_{2.5}$*	*CO_2*	*CH_4*	*N_2O*	*CO_2e*
Road Construction											
Mobile Equipment	0.08	0.30	0.83	0.00		0.04	0.03	154	0.02	0.00	155
Fugitive Dust						0.41	0.04				
Subtotal	0.08	0.30	0.83	0.00		0.45	0.07	154	0.02	0.00	155
Communication Tower Construction											
Mobile Equipment	0.00	0.00	0.00	0.00		0.00	0.00	0.34	0.00	0.00	-
Fugitive Dust	0.09	0.40	0.11	0.01		0.40	0.16	-	-	-	-
Mobile Equipment	0.00	0.01	0.02	0.00		0.13	0.02	1.94	0.00	0.00	-
Subtotal	0.09	0.40	0.12	0.01		0.53	0.18	2.27	0.00	0.00	-
Total Construction	0.17	0.71	0.96	0.01		0.98	0.25	156	0.02	0.00	155
MEB Exercises											
Tactical Equipment	5.29	23.73	64.39	7.35		2.33	2.33	3,921	0.49	0.05	3,947
Tactical Support Equipment	1.50	6.75	17.20	2.09		0.66	0.66	901	0.13	0.01	907
Fugitive Dust						565.25	86.56				
Subtotal	6.79	30.48	81.59	9.44		568.25	89.55	4,822	0.62	0.06	4,854
Aircraft Operations											
Airspaces	0.86	11.20	23.01	0.95		7.62	7.63	31,592	1.03	0.89	31,890
EAF LTOs	24.53	60.38	12.86	0.80		8.63	8.63	5,786	0.19	0.16	5,840
Range LTOs	0.16	1.29	3.90	0.16		1.00	1.00	1,309	0.04	0.04	1,261
Fugitive Dust						42.36	16.94				
Subtotal	25.55	72.87	39.77	1.91		59.60	34.20	38,686	1.26	1.09	38,992
Ordnance Activities											
Combustive	1.82	132.88	0.28								
Fugitive						2.49	1.30				
Subtotal	1.82	132.88	0.28			2.49	1.30	-	-	-	-
Personnel Commutes											
On-road Vehicles	0.05	0.60	1.84	0.00	-	0.02	0.02	182	-	-	182
Power Demand											
On-site Co-Generation Unit - 1,096 MW-Hr (4)								732	0.01	0.00	733
Propane Usage - 4,000 Gallons								25	0.00	0.00	26
Total Operations - Tons per Year (1)	34.21	236.83	123.48	11.36	-	630.36	125.06	44,448	2	1	44,787
Reduction of West Area Emissions - Tons per Year (2)	(0.51)	(4.23)	(0.25)	(0.00)		(45.01)	(4.68)	(79)	(0.12)	(0.00)	
Total Operations Net Change - Tons per Year (1)	33.70	232.61	123.23	11.35	-	585.36	120.38	44,369	1.78	1.16	44,787
Conformity Thresholds - Tons per Year	25	- - -	25	- - -	- - -	100	- - -				
Exceed De Minimis Thresholds?	Y	NA	Y	NA	NA	Y	NA				

Notes: (1) Excludes construction, as this would occur in a calendar year prior to initiation of the proposed exercises.

(2) Alternative 2 would eliminate 4% of year 2015 emissions from Johnson Valley.

(4) Based upon 2.1% of power generated at the Combat Center in 2009.

Table G-34. Annual Construction and Operational Emissions - 29 Palms LAS EIS - Alternative 6

	Annual Emissions (Tons per Year)										
Activity/Source	*VOC*	*CO*	*NO_X*	*SO_X*	*PM*	*PM_{10}*	*$PM_{2.5}$*	*CO_2*	*CH_4*	*N_2O*	*CO_2e*
Road Construction											
Mobile Equipment	0.08	0.30	0.83	0.00		0.04	0.03	154	0.02	0.00	155
Fugitive Dust						0.41	0.04				
Subtotal	0.08	0.30	0.83	0.00		0.45	0.07	154	0.02	0.00	155
Communication Tower Construction											
Mobile Equipment	0.00	0.00	0.00	0.00		0.00	0.00	0.34	0.00	0.00	-
Fugitive Dust	0.09	0.40	0.11	0.01		0.40	0.16	-	-	-	-
Mobile Equipment	0.00	0.01	0.02	0.00		0.13	0.02	1.94	0.00	0.00	-
Subtotal	0.09	0.40	0.12	0.01		0.53	0.18	2.27	0.00	0.00	-
Total Construction	0.17	0.71	0.96	0.01		0.98	0.25	156	0.02	0.00	155
MEB Exercises											
Tactical Equipment	5.29	23.73	64.39	7.35		2.33	2.33	3,921	0.49	0.05	3,947
Tactical Support Equipment	1.50	6.75	17.20	2.09		0.66	0.66	901	0.13	0.01	907
Fugitive Dust						565.25	86.56				
Subtotal	6.79	30.48	81.59	9.44		568.25	89.55	4,822	0.62	0.06	4,854
Aircraft Operations											
Airspaces	0.86	11.20	23.01	0.95		7.62	7.63	31,592	1.03	0.89	31,890
EAF LTOs	24.53	60.38	12.86	0.80		8.63	8.63	5,786	0.19	0.16	5,840
Range LTOs	0.16	1.29	3.90	0.16		1.00	1.00	1,309	0.04	0.04	1,261
Fugitive Dust						42.36	16.94				
Subtotal	25.55	72.87	39.77	1.91		59.60	34.20	38,686	1.26	1.09	38,992
Ordnance Activities											
Combustive	1.82	132.88	0.28								
Fugitive						2.49	1.30				
Subtotal	1.82	132.88	0.28			2.49	1.30	-	-	-	-
Personnel/Vehicle Transport											
On-Road Transport	0.05	0.60	1.84	0.00	-	0.02	0.02	182	-	-	182
Power Demand											
On-site Co-Generation Unit - 1,096 MW-Hr (4)								732	0.01	0.00	733
Propane Usage - 4,000 Gallons								25	0.00	0.00	26
Total Operations - Tons per Year (1)	34.21	236.83	123.48	11.36		630.36	125.06	44,448	2	1	44,787
Reduction of West Area Emissions - Tons per Year (2)	(1.61)	(13.26)	(0.79)	(0.01)		(141.23)	(14.68)	(248)	(0.36)	(0.00)	
Reduction of South Area Emissions - Tons per Year (3)	(0.00)	(0.02)	(0.00)	(0.00)		(0.36)	(0.04)	(0.66)	(0.00)	-	
Total Operations Net Change - Tons per Year (1)	32.59	223.55	122.69	11.34		488.77	110.34	44,199	1.53	1.16	44,787
Conformity Thresholds - Tons per Year	25	- - -	25	- - -	- - -	100	- - -				
Exceed De Minimis Thresholds?	Y	NA	Y	NA	NA	Y	NA				

Notes: (1) Excludes construction, as this would occur in a calendar year prior to initiation of the proposed exercises.

(2) Alternative 6 would eliminate 13% of year 2015 emissions from Johnson Valley.

(3) Alternative 6 would eliminate 10% of year 2015 emissions from the South Area.

(4) Based upon 2.1% of power generated at the Combat Center in 2009.

Table G-35. Emission Source Data for Tactical Vehicles/Support Equipment - 29 Palms LAS EIS - Alternative 3

Activity/Equipment Type	*Number of Vehicles*	*Annual VMT*	*Miles per Gallon*	*Total Gallons*	*Hp*	*Total Hp-Hr (1)*
Tactical Vehicles						
Medium Tactical Vehicle Replacement	348	264,470	3.85	68,694	250	1,373,870
High-Mobility Multipurpose Wheeled Vehicle	785	468,192	14.00	33,442	150	668,846
Logistics Vehicle System	198	92,318	2.00	46,159	445	923,180
Internally Transportable Vehicle	50	22,506	14.00	1,608	71	32,151
M60A1 Bridge Vehicle	4	2,982	0.33	9,036		
Amphibious Assault Vehicle	187	105,092	0.75	140,123	425	2,802,453
(Variants)	87	42,404	5.17	8,202	275	164,039
M88A2 Hercules Recovery Vehicle	12	1,464	0.33	4,436		
High-Mobility Artillery Rocket System	6	70	3.85	18	330	364
Abrams M1A1 Main Battle Tank	44	20,324	0.33	61,588		
Joint Assault Bridge	5	2,310	0.33	6,999		
Assault Breacher Vehicle	5	3,000	0.36	8,333		
Tactical Support Equipment (2)						
	Number of Vehicles	*Hp*	*Hours per Year*	*Total Hp-Hr*		
Medium Crawler Tractor	5	118	120	70,800		
Excavator, Combat	12	295	120	424,800		
Grader	2	150	120	36,000		
Armored Tractor	3	118	120	42,480		
D7 Bulldozer	5	200	120	120,000		
Armored Backhoe	12	295	120	424,800		
Extended Boom Forklift	4	150	120	72,000		
Light Capacity Rough Terrain Truck Forklift	2	110	120	26,400		
Tractor, Rubber Tired, Articulated Steering	10	185	120	222,000		

Notes: (1) Based upon a fuel usage rate of 0.051 gallons per Hp-Hr

(2) Horsepower from CEIP page 7 of 18

Table G-36. Total Tactical Vehicles/Support Equipment Emissions - 29 Palms LAS EIS - Alternative 3

	Pounds per Year										
Activity/Equipment Type	*ROG*	*CO*	*NO_X*	*SO_X*	*PM*	*PM_{10}*	*$PM_{2.5}$*	*CO_2*	*CH_4*	*N_2O*	*CO_2e*
Tactical Vehicles											
Medium Tactical Vehicle Replacement	2,877.37	12,721.02	32,832.35	3,998.03	1,272.10	1,241.81	1,241.81	1,720,366.48	254.24	16.95	1,730,960
High-Mobility Multipurpose Wheeled Vehicle	1,386.06	6,487.92	15,983.88	1,946.38	648.79	634.05	634.05	837,531.67	123.77	8.25	842,689
Logistics Vehicle System	1,933.47	8,547.96	22,061.89	2,686.50	854.80	834.44	834.44	1,156,010.23	170.84	11.39	1,163,129
Internally Transportable Vehicle	66.63	311.87	768.35	93.56	31.19	30.48	30.48	40,260.17	5.95	0.40	40,508
M60A1 Bridge Vehicle	0.54	4.07	1,073.52	4.61	14.10	14.10	13.74	190,251.60	6.18	5.38	192,049
Amphibious Assault Vehicle	5,869.34	25,948.64	66,972.21	8,155.29	2,594.86	2,533.08	2,533.08	3,509,244.91	518.61	34.57	3,530,854
Light Armored Vehicle (Variants)	343.56	1,591.20	3,920.15	477.36	159.12	155.50	155.50	205,409.99	30.36	2.02	206,675
M88A2 Hercules Recovery Vehicle	0.27	2.00	527.04	2.26	6.92	6.92	6.74	93,403.20	3.03	2.64	94,285
High-Mobility Artillery Rocket System	0.76	3.37	8.69	1.06	0.34	0.33	0.33	455.35	0.07	0.00	458
Abrams M1A1 Main Battle Tank	3.70	27.71	7,316.64	31.41	96.08	96.08	93.61	1,296,671.20	42.09	36.66	1,308,920
Joint Assault Bridge	0.42	3.15	831.44	3.57	10.92	10.92	10.64	147,349.00	4.78	4.17	148,741
Assault Breacher Vehicle	117.50	846.67	1,424.00	116.33	14.25	14.25	13.11	175,450.00	5.70	4.96	177,107
Subtotal - Pounds	12,600	56,496	153,720	17,516	5,703	5,572	5,568	9,372,404	1,166	127	9,436,374
Tactical Support Equipment											
Medium Crawler Tractor	147	687	1,692	206	69	67	67	88,656	13	1	89,202
Excavator, Combat	890	3,933	10,152	1,236	393	384	384	531,937	79	5	535,212
Grader	75	333	860	105	33	33	33	45,079	7	0	45,357
Armored Tractor	89	393	1,015	124	39	38	38	53,194	8	1	53,521
D7 Bulldozer	251	1,111	2,868	349	111	108	108	150,265	22	1	151,190
Armored Backhoe	890	3,933	10,152	1,236	393	384	384	531,937	79	5	535,212
Extended Boom Forklift	149	698	1,721	210	70	68	68	90,159	13	1	90,714
Light Capacity Rough Terrain Truck Forklift	55	256	631	77	26	25	25	33,058	5	0	33,262
Multipurpose Vehicles	460	2,153	5,305	646	215	210	210	277,989	41	3	279,701
Subtotal - Pounds	3,006	13,499	34,395	4,188	1,350	1,318	1,318	1,802,273	266	18	1,813,371
Total Emissions (Pounds)	15,605	69,995	188,116	21,705	7,053	6,890	6,886	11,174,677	1,432	145	11,249,745
Total Emissions (Tons) [1]	7.80	35.00	94.06	10.85	3.53	3.45	3.44	5,068.75	0.65	0.07	5,102.80

Calculation of Annual Emissions for Tactical and Support Equipment

Emission Factor (g/hp-hr) x HP-hr x 1 lb/453.6 g = Annual Emissions (lb/yr)

Calculation of Abrams Tank/Bridge Vehicles and Assault Breacher Vehicle

Emission Factor (lbs/1000 gals) x Gals x 1 /1000 = Annual Emissions (lb/yr)

Table G-37. Emission Source Data for Tactical Vehicles/Support Equipment - Unpaved Road Dust - 29 Palms LAS EIS - Alternative 3

Equipment Type	*Weight (Tons)*	*Unpaved Emission Factor (Lb/VMT) PM*	*PM 10*	*PM 2.5*	*Annual VMT*	*% Unpaved Travel (1)*	*Unpaved VMT*
Tactical Vehicles							
Medium Tactical Vehicle Replacement	10.0	6.51	1.88	0.29	264,470	90%	238,023
High-Mobility Multipurpose Wheeled Vehicle	3.0	3.79	1.09	0.17	468,192	50%	234,096
Logistics Vehicle System	20.0	8.89	2.57	0.39	92,318	50%	46,159
Internally Transportable Vehicle	3.5	4.06	1.17	0.18	22,506	50%	11,253
M60A1 Bridge Vehicle	70.0	15.63	4.52	0.69	2,982	90%	2,684
Amphibious Assault Vehicle	30.6	10.77	3.11	0.48	105,092	90%	94,583
Light Armored Vehicle (Variants)	14.1	7.60	2.20	0.34	42,404	90%	38,164
M88A2 HERCULES Recovery Vehicle	70.0	15.63	4.52	0.69	1,464	90%	1,318
High-Mobility Artillery Rocket System	12.0	7.07	2.04	0.31	70	50%	35
Abrams M1A1 Main Battle Tank	70.0	15.63	4.52	0.69	20,324	90%	18,292
Joint Assault Bridge	70.0	15.63	4.52	0.69	2,310	90%	2,079
Assault Breacher Vehicle	55.0	14.02	4.05	0.62	3,000	90%	2,700
Tactical Support Equipment							
Ground Disturbance (2)	1	110.0	55.0	5.5	48		

Notes: (1) Percentage of unpaved roads from CY2007 CEIP Appendix D.11 page 220 of 220

(2) Weight = daily disturbed acerage and Annual VMT = total annual days of disburbance. Emission factors in lb/acre-day.

Table G-38. Emission Source Data for Tactical Vehicles/Support Equipment - Paved Road Dust - 29 Palms LAS EIS - Alternative 3

Equipment Type	*Weight (Tons)*	*Paved Emission Factor (Lb/VMT) PM*	*PM 10*	*PM 2.5*	*Annual VMT*	*% Paved Travel (1)*	*Paved VMT*
Tactical Vehicles							
Medium Tactical Vehicle Replacement	10.0	0.07	0.01	0.002	264,470	10%	26,447
High-Mobility Multipurpose Wheeled Vehicle	3.0	0.01	0.00	-	468,192	50%	234,096
Logistics Vehicle System	20.0	0.20	0.04	0.006	92,318	50%	46,159
Internally Transportable Vehicle	3.5	0.01	0.00	0.000	22,506	50%	11,253
M60A1 Bridge Vehicle	70.0	1.32	0.26	0.038	2,982	10%	298
Amphibious Assault Vehicle	30.6	0.38	0.07	0.011	105,092	10%	10,509
Light Armored Vehicle (Variants)	14.1	0.12	0.02	0.003	42,404	10%	4,240
M88A2 HERCULES Recovery Vehicle	70.0	1.32	0.26	0.038	1,464	10%	146
High-Mobility Artillery Rocket System	12.0	0.09	0.02	0.002	70	50%	35
Abrams M1A1 Main Battle Tank	70.0	1.32	0.26	0.038	20,324	10%	2,032
Joint Assault Bridge	70.0	1.32	0.26	0.038	2,310	10%	231
Assault Breacher Vehicle	55.0	0.92	0.18	0.027	3,000	10%	300

Notes: (1) Percentage of unpaved roads from CY2007 CEIP Appendix D.11 page 220 of 220

(2) US EPA 42 13.2.1, sL - 0.1, k(PM10) - 0.016, k(PM2.5) - 0.0024, C(PM10) - 0.00047, C(PM2.5) - 0.00036

Table G-39. Annual Fugitive Dust Emisssions for Tactical Vehciles - Unpaved Roads - 29 Palms LAS EIS - /

Equipment Type	*Annual Emissions - Tons*		
	PM	*PM_{10}*	*$PM_{2.5}$*
Tactical Vehicles			
Medium Tactical Vehicle Replacement	774.7	223.9	34.3
High-Mobility Multipurpose Wheeled Vehicle	443.2	128.1	19.6
Logistics Vehicle System	205.2	59.3	9.1
Internally Transportable Vehicle	22.8	6.6	1.0
M60A1 Bridge Vehicle	21.0	6.1	0.9
Amphibious Assault Vehicle	509.2	147.2	22.6
Light Armored Vehicle (Variants)	145.0	41.9	6.4
M88A2 HERCULES Recovery Vehicle	10.3	3.0	0.5
High-Mobility Artillery Rocket System	0.1	0.0	0.0
Abrams M1A1 Main Battle Tank	142.9	41.3	6.3
Joint Assault Bridge	16.2	4.7	0.7
Assault Breacher Vehicle	18.9	5.5	0.8
Subtotal	2,309.7	667.5	102.4
Tactical Support Equipment			
Ground Disturbance	2.6	1.3	0.1
Subtotal	2.6	1.3	0.1
Total Emissions	2,312.4	668.8	102.5

Table G-40. Annual Fugitive Dust Emisssions for Tactical Vehciles - Paved Roads - 29 Palms LAS EIS - Alt

Equipment Type	*Annual Emissions - Tons*		
	PM	*PM_{10}*	*$PM_{2.5}$*
Tactical Vehicles			
Medium Tactical Vehicle Replacement	0.9	0.2	0.0
High-Mobility Multipurpose Wheeled Vehicle	1.3	0.2	-
Logistics Vehicle System	4.6	0.9	0.1
Internally Transportable Vehicle	0.1	0.01	0.00
M60A1 Bridge Vehicle	0.2	0.04	0.01
Amphibious Assault Vehicle	2.0	0.39	0.06
Light Armored Vehicle (Variants)	0.3	0.05	0.01
M88A2 HERCULES Recovery Vehicle	0.1	0.02	0.00
High-Mobility Artillery Rocket System	0.0	0.00	0.00
Abrams M1A1 Main Battle Tank	1.3	0.26	0.04
Joint Assault Bridge	0.2	0.03	0.00
Assault Breacher Vehicle	0.1	0.03	0.00
Total Emissions	11.1	2.1	0.3
Total Emissions - Paved and Unpaved Roads	2,323.5	671.0	102.8

Table G-41. Annual Air Emissions Summary - 29 Palms LAS EIS - Alternative 3

	Annual Emissions (Tons per Year)										
Activity/Source	*ROG*	*CO*	*NO_X*	*SO_X*	*PM*	*PM_{10}*	*$PM_{2.5}$*	*CO_2*	*CH_4*	*N_2O*	*CO_2e*
Road Construction											
Mobile Equipment	0.08	0.30	0.83	0.00	0.86	0.45	0.07	154	0.02	0.00	-
Fugitive Dust					0.83	0.41	0.04				
Subtotal	0.08	0.30	0.83	0.00	1.68	0.87	0.11	154	0.02	0.00	-
MEB Excersises											
Tactical Equipment	6.30	28.25	76.86	8.76	2.85	2.79	2.78	4,686	0.58	0.06	4,718
Tactical Support Equipment	1.50	6.75	17.20	2.09	0.67	0.66	0.66	901	0.13	0.01	907
Fugitive Dust					2,323.50	670.95	102.76				
Subtotal	7.80	35.00	94.06	10.85	2,327.03	674.40	106.20	5,587	0.72	0.07	5,625
Aircraft Operations											
Airspaces	0.86	11.20	23.01	0.95		7.62	7.63	31,592	1.03	0.89	31,890
EAF LTOs	24.53	60.38	12.86	0.80		8.63	8.63	5,786	0.19	0.16	5,840
Range LTOs	0.16	1.29	3.90	0.16		1.00	1.00	1,309	0.04	0.04	1,261
Fugitive Dust						42.36	16.94	-	-	-	-
Subtotal	25.55	72.87	39.77	1.91		59.60	34.20	38,686	1.26	1.09	38,992
Ordnance Activities											
Combustive	1.82	132.88	0.28								
Fugitive						2.49	1.30				
Subtotal	1.82	132.88	0.28			2.49	1.30				
Personnel Commutes											
On-road Vehicles	0.05	0.60	1.84	0.00		0.02	0.02	182	-	-	182
Power Demand											
On-site Co-Generation Unit - 1,096 MW-Hr (4)								732	0.01	0.00	733
Propane Usage - 4,000 Gallons								25	0.00	0.00	26
Total - Tons per Year (1)	35.22	241.35	135.95	12.77		736.52	141.71	45,214	1.99	1.17	45,558
Reduction of BLM East Area Emissions - Tons per Year (2)	(0.00)	(0.01)	(0.00)	(0.00)		(0.23)	(0.02)	(0.40)	(0.00)	(0.00)	(0.40)
Reduction of BLM South Area Emissions - Tons per Year (3)	(0.00)	(0.02)	(0.00)	(0.00)		(0.36)	(0.04)	(0.66)	(0.00)	-	(0.66)
Total Operations Net Change - Tons per Year (1)	35.22	241.32	135.95	12.77		735.92	141.65	45,212.67	1.99	1.17	45,556.54
Conformity Thresholds - Tons per Year	25	- - -	25	- - -		100	- - -				
Exceed De Minimis Thresholds?	Y	NA	Y	NA		Y	NA				

Notes: (1) Excludes construciton, as this would occur in a calendar year prior to initiation of the proposed exercises.

(2) Equal to 10% of total West Area emissions.

(3) Equal to 10% of total South Area emissions.

(4) Based upon 2.1% of power generated at the Combat Center in 2009.

Table G-42. Year 2010 Visitation Activities for Acquired Lands - 29 Palms LAS EIS

	Total Annual	*Total Annual Visitor Days*			*Days per*	*Total Annual Visitors*		
Area	*Visitor-Days*	*OHV Day Use*	*Overnight*	*Non-OHV Day Use*	*Overnight Use*	*OHV Day Use*	*Overnight*	*Non-OHV Day Use*
Johnson Valley	291,348	49,945	233,078	8,324	2.5	49,945	93,231	8,324
East	500	450	50		2.5	450	20	-
South	800	800			-	800	-	-

Table G-43. Emission Source Data for Existing Activities in Johnson Valley OHV Area.

Trip Type/Vehicle or Source	*Annual Vehicle Trips*	*VMT/ Trip*	*Annual VMT*	*Vehicle Weight (Tons)*
OHV Day Use				
Transport vehicle	24,973	20	499,454	1
OHVs	6,243	24	146,715	0.50
Motorcycles	18,730	24	440,144	0.05
Overnight				
Transport vehicle	31,077	30	932,314	2
OHV	11,654	44	513,501	0.50
Motorcycle	34,962	44	1,540,503	0.05
Generator - Gasoline (1) (2)	31,077	3	93,231	
Propane Stoves (1) (3)	31,077	2	62,154	
Fire (4)	31,077	20	621,542	
Non-OHV Day Use				
Transport vehicle	4,162	20	83,242	1

Notes: (1) Annual Vehicle Trips = annual # of units, VMT/Trip = hours/trip, and Annual VMT = annual hours of operation.

(2) HP = 5 at 60% Load

(3) Assumed 0.2 gallons/hours of LPG usage

(4) Annual Vehicle Trips = annual # of fires, VMT/Trip = pounds of wood burned/trip, and Annual VMT = annual pounds of wood burned.

Table G-44. Emission Source Data for Existing Activities in the East Study Area - 29 Palms LAS EIS

Trip Type/Vehicle or Source	*Annual Vehicle Trips*	*VMT/Trip*	*Annual VMT*	*Vehicle Weight (Tons)*
OHV Day Use				
Transport vehicle	225	20	4,500	1
OHVs	56	24	1,322	0.50
Motorcycles	169	24	3,966	0.05
Overnight				
Transport vehicle	7	30	200	2
OHV	3	44	110	0.50
Motorcycle	8	44	330	0.05
Generator - Gasoline (1) (2)	7	3	20	
Propane Stoves (1) (3)	7	2	13	
Fire (4)	7	20	133	

Notes: (1) Annual Vehicle Trips = annual # of units, VMT/Trip = hours/trip, and Annual VMT = annual hours of operation.

(2) HP = 5 at 60% Load

(3) Assumed 0.2 gallons/hours of LPG usage

(4) Annual Vehicle Trips = annual # of fires, VMT/Trip = pounds of wood burned/trip, and Annual VMT = annual pounds of wood burned.

Table G-45. Emission Source Data for Existing Activities in the South Study Area - 29 Palms LAS EIS

Trip Type/Vehicle or Source	*Annual Vehicle Trips*	*VMT/ Trip*	*Annual VMT*	*Vehicle Weight (Tons)*
OHV Day Use				
Transport vehicle	400	20	8,000	1
OHVs	100	24	2,350	0.50
Motorcycles	300	24	7,050	0.05

<u>Assumptions:</u>

(1) Source: (BLM 2010).

(2) 17/80/3% of visitor use days = OHV day/overnight/non-OHV day uses.

(3) The average length of stay for overnight use is 2.5 days.

(4) Rider occupancy of transport vehicle for day/overnight uses is 2/3 visitors.

(5) 50% of day and overnight visitors would operate an OHV. OHV fleet mix = 75/25% motorcycle/4 wheel vehicle.

(6) Vehile miles travelled (VMT) based upon 20% of visitors drive 10 VMT, 70% drive 25 VMT, and 10% drive 40 VMT per day.

Table G-46. Existing Emissions within Acquired Lands - 29 Palms LAS EIS (Pounds/Year)

Area/User Type/Source	VOC	CO	NO_X	SO_X	PM	PM_{10}	$PM_{2.5}$	CO_2	CH_4	N_2O
					Johnson Valley					
OHV Day Use										
Transport vehicle	159	4,371	515	6	-	53	49	530,725	46	-
Transport vehicle - dust						335,039	33,504			
OHVs	47	1,284	151	2	-	16	14	155,900	14	-
OHVs - dust						72,046	7,205			
Motorcycles	2,436	21,250	1,184	2	-	38	35	136,817	199	-
Motorcycles - dust						76,689	7,669			
Overnight										
Transport vehicle	296	8,160	962	10	-	99	91	990,686	86	-
Transport vehicle - dust						854,331	85,433			
OHVs	163	4,494	530	6	-	54	50	545,651	48	-
OHVs - dust						252,161	25,216			
Motorcycles	8,524	74,376	4,143	7	-	132	122	478,860	696	-
Motorcycles - dust						268,411	26,841			
Generator - Gasoline	6,039	1,947	3,077	165	-	202	186	302,070	-	-
Propane Stoves	12	93	162	1	9	9	9	155,386	2	11
Fire	4,289	64,019	-	-	14,295	9,323	8,080	-	3,854	-
Non-OHV Day Use										
Transport vehicle	26	729	86	1	-	9	8	88,454	8	-
Transport vehicle - dust						55,840	5,584			
Total - Johnson Valley	*21,990*	*180,723*	*10,810*	*199*	*14,304*	*1,924,451*	*200,094*	*3,384,549*	*4,953*	*11*
					East Area					
OHV Day Use										
Transport vehicle	1	39	5	0	-	0	0	4,782	0	-
Transport vehicle - dust						3,019	302			
OHVs	0	12	1	0	-	0	0	1,405	0	-
OHVs - dust						649	65			
Motorcycles	22	191	11	0	-	0	0	1,233	2	-
Motorcycles - dust						691	69			
Overnight										
Transport vehicle	0	2	0	0	-	0	0	213	0	-
Transport vehicle - dust						183	18			
OHVs	0	1	0	0	-	0	0	117	0	-
OHVs - dust						54	5			
Motorcycles	2	16	1	0	-	0	0	103	0	-
Motorcycles - dust						58	6			
Generator - Gasoline	1	0	1	0	-	0	0	65	-	-
Propane Stoves	0	0	0	0	0	0	0	33	0	0
Fire	1	14	-	-	3	2	2	-	1	-
Total - East Area	*28*	*275*	*19*	*0*	*3*	*4,657*	*468*	*7,950*	*3*	*0*
					South Area					
OHV Day Use										
Transport vehicle	3	70	8	0	-	1	1	8,501	1	-
Transport vehicle - dust						5,366	537			
OHVs	1	21	2	0	-	0	0	2,497	0	-
OHVs - dust						649	65			
Motorcycles	39	340	19	0	-	1	1	2,191	3	-
Motorcycles - dust						1,228	123			
Total - South Area	*42*	*431*	*30*	*0*	*-*	*7,246*	*726*	*13,189*	*4*	*-*
Total Emissions - Pounds	*22,061*	*181,429*	*10,858*	*200*	*14,307*	*1,936,353*	*201,288*	*3,405,688*	*4,960*	*11*

Table G-47. Existing Emissions within Acquired Lands - 29 Palms LAS EIS (Tons/Year)

Area/User Type/Source	VOC	CO	NO_X	SO_X	PM	PM_{10}	$PM_{2.5}$	CO_2	CH_4	N_2O
					Johnson Valley					
OHV Day Use										
Transport vehicle	0.08	2.19	0.26	0.00	-	0.03	0.02	265.36	0.02	-
Transport vehicle - dust	-	-	-	-	-	167.52	16.75	-	-	-
OHVs	0.02	0.64	0.08	0.00	-	0.01	0.01	77.95	0.01	-
OHVs - dust	-	-	-	-	-	36.02	3.60	-	-	-
Motorcycles	1.22	10.63	0.59	0.00	-	0.02	0.02	68.41	0.10	-
Motorcycles - dust	-	-	-	-	-	38.34	3.83	-	-	-
Overnight										
Transport vehicle	0.15	4.08	0.48	0.01	-	0.05	0.05	495.34	0.04	-
Transport vehicle - dust	-	-	-	-	-	427.17	42.72	-	-	-
OHVs	0.08	2.25	0.26	0.00	-	0.03	0.02	272.83	0.02	-
OHVs - dust	-	-	-	-	-	126.08	12.61	-	-	-
Motorcycles	4.26	37.19	2.07	0.00	-	0.07	0.06	239.43	0.35	-
Motorcycles - dust	-	-	-	-	-	134.21	13.42	-	-	-
Generator - Gasoline	3.02	0.97	1.54	0.08	-	0.10	0.09	151.03	-	-
Propane Stoves	0.01	0.05	0.08	0.00	0.00	0.00	0.00	77.69	0.00	0.01
Fire	2.14	32.01	-	-	7.15	4.66	4.04	-	1.93	-
Non-OHV Day Use										
Transport vehicle	0.01	0.36	0.04	0.00	-	0.00	0.00	44.23	0.00	-
Transport vehicle - dust						27.92	2.79			
Total - Johnson Valley	*11.00*	*90.36*	*5.40*	*0.10*	*7.15*	*962.23*	*100.05*	*1,692.27*	*2.48*	*0.01*
					East Area					
OHV Day Use										
Transport vehicle	0.00	0.02	0.00	0.00	-	0.00	0.00	2.39	0.00	-
Transport vehicle - dust	-	-	-	-	-	1.51	0.15	-	-	-
OHVs	0.00	0.01	0.00	0.00	-	0.00	0.00	0.70	0.00	-
OHVs - dust	-	-	-	-	-	0.32	0.03	-	-	-
Motorcycles	0.01	0.10	0.01	0.00	-	0.00	0.00	0.62	0.00	-
Motorcycles - dust	-	-	-	-	-	0.35	0.03	-	-	-
Overnight										
Transport vehicle	0.00	0.00	0.00	0.00	-	0.00	0.00	0.11	0.00	-
Transport vehicle - dust	-	-	-	-	-	0.09	0.01	-	-	-
OHVs	0.00	0.00	0.00	0.00	-	0.00	0.00	0.06	0.00	-
OHVs - dust	-	-	-	-	-	0.03	0.00	-	-	-
Motorcycles	0.00	0.01	0.00	0.00	-	0.00	0.00	0.05	0.00	-
Motorcycles - dust	-	-	-	-	-	0.03	0.00	-	-	-
Generator - Gasoline	0.00	0.00	0.00	0.00	-	0.00	0.00	0.03	-	-
Propane Stoves	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00
Fire	0.00	0.01	-	-	0.00	0.00	0.00	-	0.00	-
Total - East Area	*0.01*	*0.14*	*0.01*	*0.00*	*0.00*	*2.33*	*0.23*	*3.97*	*0.00*	*0.00*
					South Area					
OHV Day Use										
Transport vehicle	0.00	0.04	0.00	0.00	-	0.00	0.00	4.25	0.00	-
Transport vehicle - dust	-	-	-	-	-	2.68	0.27	-	-	-
OHVs	0.00	0.01	0.00	0.00	-	0.00	0.00	1.25	0.00	-
OHVs - dust	-	-	-	-	-	0.32	0.03	-	-	-
Motorcycles	0.02	0.17	0.01	0.00	-	0.00	0.00	1.10	0.00	-
Motorcycles - dust	-	-	-	-	-	0.61	0.06	-	-	-
Total - South Area	*0.02*	*0.22*	*0.01*	*0.00*	-	*3.62*	*0.36*	*6.59*	*0.00*	-
Total Emissions - Tons	*11.03*	*90.71*	*5.43*	*0.10*	*7.15*	*968.18*	*100.64*	*1,703*	*2.48*	*0.01*

Table G-48. Existing Emissions within Acquired Lands by Source Category - 29 Palms LAS EIS (Tons/Year)

Area/Source Category	VOC	CO	NO_X	SO_X	PM	PM_{10}	$PM_{2.5}$	CO_2	CH_4	N_2O
Johnson Valley										
Vehicles - Combustive	5.83	57.33	3.79	0.02	-	0.20	0.18	1,463.55	0.55	-
Vehicles - Dust	-	-	-	-	-	957.26	95.73	-	-	-
Generator - Gasoline	3.02	0.97	1.54	0.08	-	0.10	0.09	151.03	-	-
Propane Stoves	0.01	0.05	0.08	0.00	0.00	0.00	0.00	77.69	0.00	0.01
Camp Fires	2.14	32.01	-	-	7.15	4.66	4.04	-	1.93	-
Subtotal - Johnson Valley	*11.00*	*90.36*	*5.40*	*0.10*	*7.15*	*962.23*	*100.05*	*1,692.27*	*2.48*	*0.01*
East Area										
Vehicles - Combustive	0.01	0.13	0.01	0.00	-	0.00	0.00	3.93	0.00	-
Vehicles - Dust	-	-	-	-	-	2.33	0.23	-	-	-
Generator - Gasoline	0.00	0.00	0.00	0.00	-	0.00	0.00	0.03	-	-
Propane Stoves	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00
Camp Fires	0.00	0.01	-	-	0.00	0.00	0.00	-	0.00	-
Subtotal - East Area	*0.01*	*0.14*	*0.01*	*0.00*	*0.00*	*2.33*	*0.23*	*3.97*	*0.00*	*0.00*
South Area										
Vehicles - Combustive	0.02	0.22	0.01	0.00	-	0.00	0.00	6.59	0.00	-
Vehicles - Dust	-	-	-	-	-	3.62	0.36	-	-	-
Subtotal - South Area	*0.02*	*0.22*	*0.01*	*0.00*	-	*3.62*	*0.36*	*6.59*	*0.00*	-
Total Emissions - Tons	*11.03*	*90.71*	*5.43*	*0.10*	*7.15*	*968.18*	*100.64*	*1,703*	*2.48*	*0.01*

Table G-49. Emission Factors for Existing Sources within Acquired Lands - 29 Palms LAS EIS.

	Emission Factors										
Source	*VOC*	*CO*	*NO_X*	*SO_X*	*PM*	*PM_{10}*	*$PM_{2.5}$*	*CO_2*	*CH_4*	*N_2O*	*Notes*
Liquid Propane Gas Combustion	1.00	7.50	13.00	0.11	0.70	0.70	0.70	12,500	0.20	0.90	(1)
Camp Fires	13.80	206.00			46.00	30.00	26.00		12.40		(2)
Generator - Gasoline	0.02	0.01	0.01	0.00		0.00	0.00	1.08			(3)
Light Duty Truck - 2010	0.14	3.97	0.47	0.01		0.05	0.04	482	0.04		(4)
Motorcycle - 2010	2.51	21.90	1.22	0.00		0.04	0.04	141	0.21		(5)
Light Duty Truck - 2015	0.08	2.68	0.30	0.01		0.05	0.05	483	0.04		(6)
Motorcycle - 2015	2.24	17.76	1.17	0.00		0.03	0.03	149	0.20		(7)
Vehicle Dust - 4WD						0.49	0.05				(8)
Vehicle Dust - Day Use Transport Vehicle						0.67	0.07				(9)
Vehicle Dust - Motorcycle						0.17	0.02				(10)
Vehicle Dust - Overnight Transport Vehicle						0.92	0.09				(11)

Notes:

(1) U.S. EPA AP-42 Section 1.5 - Liquefied Petroleum Gas Combustion (lb/1,000 gal)

(2) U.S. EPA AP-42 Section 13.1-3 - Wildfires and Prescribed Burning (lb/ton)

(3) U.S. EPA AP-42 Section 3.3 - Gasoline and Diesel Industrial Engines (lb/hp-hr)

(4) Statewide average for light duty truck, 25 mph, year 2010 (g/mile). From EMFAC2007 (ARB 2007).

(5) Statewide average for motorcycle, 25 mph, year 2010 (g/mile). From EMFAC2007 (ARB 2007).

(6) Statewide average for light duty truck, 25 mph, year 2015 (g/mile). From EMFAC2007 (ARB 2007).

(7) Statewide average for motorcycle, 25 mph, year 2015 (g/mile). From EMFAC2007 (ARB 2007).

(8) Fugitive Dust from Unpaved Roads Emission Factors for OHV (lb/VMT) EPA AP-42, Section 13.2.2.

(9) Fugitive Dust from Unpaved Roads Emission Factors for Transport Vehicles (lb/VMT) EPA AP-42, Section 13.2.2.

(10) Fugitive Dust from Unpaved Roads Emission Factors for motorcycles (lb/VMT) EPA AP-42, Section 13.2.2.

(11) Fugitive Dust from Unpaved Roads Emission Factors for Overnight Transport Vehicles (lb/VMT) EPA AP-42, Section 13.2.2.

Vehicle Travel Unpaved = ((k(s/12)^a)*((W/3)^b)

k (PM_{10})	1.50	k ($PM_{2.5}$) 0.15
s	8.50	surface material silt content (%)
a	0.90	
b	0.45	
W_O	0.50	average weight OHV (tons)
W_{TV}	1.00	average weight Transport Vehicles (tons)
W_M	0.05	average weight Motorcycles (tons)
W_{TV2}	2.00	average weight Overnight Transport Vehicles (tons)

Table G-50. Year 2015 Visitation Activities for Acquired Lands - 29 Palms LAS EIS

	Total Annual	*Total Annual Visitor Days*			*Days per*	*Total Annual Visitors*		
Area	*Visitor-Days*	*OHV Day Use*	*Overnight*	*Non-OHV Day Use*	*Overnight Use*	*OHV Day Use*	*Overnight*	*Non-OHV Day Use*
Johnson Valley	336,975	57,767	269,580	9,628	2.5	57,767	107,832	9,628
East	500	450	50		2.5	450	20	-
South	800	800			-	800	-	-

Table G-51. Emission Source Data for Year 2015 Activities in Johnson Valley OHV Area.

Trip Type/Vehicle or Source	*Annual Vehicle Trips*	*VMT/ Trip*	*Annual VMT*	*Vehicle Weight (Tons)*
OHV Day Use				
Transport vehicle	28,884	20	577,671	1
OHVs	7,221	24	169,691	0.50
Motorcycles	21,663	24	509,073	0.05
Overnight				
Transport vehicle	35,944	30	1,078,320	2
OHV	13,479	44	593,918	0.50
Motorcycle	40,437	44	1,781,755	0.05
Generator - Gasoline (1) (2)	35,944	3	107,832	
Propane Stoves (1) (3)	35,944	2	71,888	
Fire (4)	35,944	20	718,880	
Non-OHV Day Use				
Transport vehicle	4,814	20	96,279	1

Notes: (1) Annual Vehicle Trips = annual # of units, VMT/Trip = hours/trip, and Annual VMT = annual hours of operation.

(2) HP = 5 at 60% Load

(3) Assumed 0.2 gallons/hours of LPG usage

(4) Annual Vehicle Trips = annual # of fires, VMT/Trip = pounds of wood burned/trip, and Annual VMT = annual pounds of wood burned.

Table G-52. Emission Source Data for Year 2015 Activities in the East Study Area - 29 Palms LAS EIS

Trip Type/Vehicle or Source	*Annual Vehicle Trips*	*VMT/Trip*	*Annual VMT*	*Vehicle Weight (Tons)*
OHV Day Use				
Transport vehicle	225	20	4,500	1
OHVs	56	24	1,322	0.50
Motorcycles	169	24	3,966	0.05
Overnight				
Transport vehicle	7	30	200	2
OHV	3	44	110	0.50
Motorcycle	8	44	330	0.05
Generator - Gasoline (1) (2)	7	3	20	
Propane Stoves (1) (3)	7	2	13	
Fire (4)	7	20	133	

Notes: (1) Annual Vehicle Trips = annual # of units, VMT/Trip = hours/trip, and Annual VMT = annual hours of operation.

(2) HP = 5 at 60% Load

(3) Assumed 0.2 gallons/hours of LPG usage

(4) Annual Vehicle Trips = annual # of fires, VMT/Trip = pounds of wood burned/trip, and Annual VMT = annual pounds of wood burned.

Table G-53. Emission Source Data for Year 2015 Activities in the South Study Area - 29 Palms LAS EIS

Trip Type/Vehicle or Source	*Annual Vehicle Trips*	*VMT/ Trip*	*Annual VMT*	*Vehicle Weight (Tons)*
OHV Day Use				
Transport vehicle	400	20	8,000	1
OHVs	100	24	2,350	0.50
Motorcycles	300	24	7,050	0.05

Assumptions:

(1) Source: (BLM 2010).

(2) 17/80/3% of visitor use days = OHV day/overnight/non-OHV day uses.

(3) The average length of stay for overnight use is 2.5 days.

(4) Rider occupancy of transport vehicle for day/overnight uses is 2/3 visitors.

(5) 50% of day and overnight visitors would operate an OHV. OHV fleet mix = 75/25% motorcycle/4 wheel vehicle.

(6) Vehile miles travelled (VMT) based upon 20% of visitors drive 10 VMT, 70% drive 25 VMT, and 10% drive 40 VMT per day.

Table G-54. Year 2015 Emissions within Acquired Lands - 29 Palms LAS EIS (Pounds/Year)

Area/User Type/Source	VOC	CO	NO_X	SO_X	PM	PM_{10}	$PM_{2.5}$	CO_2	CH_4	N_2O
Johnson Valley										
OHV Day Use										
Transport vehicle	183	5,056	596	6	-	61	56	613,840	53	-
Transport vehicle - dust						387,509	38,751			
OHVs	54	1,485	175	2	-	18	17	180,315	16	-
OHVs - dust						83,329	8,333			
Motorcycles	2,817	24,578	1,369	2	-	44	40	158,244	230	-
Motorcycles - dust						88,699	8,870			
Overnight										
Transport vehicle	342	9,438	1,113	12	-	114	105	1,145,834	100	-
Transport vehicle - dust						988,125	98,812			
OHVs	189	5,198	613	7	-	63	58	631,104	55	-
OHVs - dust						291,651	29,165			
Motorcycles	9,859	86,024	4,792	8	-	153	141	553,853	805	-
Motorcycles - dust						310,445	31,045			
Generator - Gasoline	6,985	2,252	3,558	191	-	233	215	349,376	-	-
Propane Stoves	14	108	187	2	10	10	10	179,720	3	13
Fire	4,960	74,045	-	-	16,534	10,783	9,345	-	4,457	-
Non-OHV Day Use										
Transport vehicle	31	843	99	1	-	10	9	102,307	9	-
Transport vehicle - dust						64,585	6,458			
Total - Johnson Valley	*25,434*	*209,026*	*12,503*	*231*	*16,544*	*2,225,832*	*231,430*	*3,914,591*	*5,728*	*13*
East Area										
OHV Day Use										
Transport vehicle	1	39	5	0	-	0	0	4,782	0	-
Transport vehicle - dust						3,019	302			
OHVs	0	12	1	0	-	0	0	1,405	0	-
OHVs - dust						649	65			
Motorcycles	22	191	11	0	-	0	0	1,233	2	-
Motorcycles - dust						691	69			
Overnight										
Transport vehicle	0	2	0	0	-	0	0	213	0	-
Transport vehicle - dust						183	18			
OHVs	0	1	0	0	-	0	0	117	0	-
OHVs - dust						54	5			
Motorcycles	2	16	1	0	-	0	0	103	0	-
Motorcycles - dust						58	6			
Generator - Gasoline	1	0	1	0	-	0	0	65	-	-
Propane Stoves	0	0	0	0	0	0	0	33	0	0
Fire	1	14	-	-	3	2	2	-	1	-
Total - East Area	*28*	*275*	*19*	*0*	*3*	*4,657*	*468*	*7,950*	*3*	*0*
South Area										
OHV Day Use										
Transport vehicle	3	70	8	0	-	1	1	8,501	1	-
Transport vehicle - dust						5,366	537			
OHVs	1	21	2	0	-	0	0	2,497	0	-
OHVs - dust						649	65			
Motorcycles	39	340	19	0	-	1	1	2,191	3	-
Motorcycles - dust						1,228	123			
Total - South Area	*42*	*431*	*30*	*0*	-	*7,246*	*726*	*13,189*	*4*	-
Total Emissions - Pounds	*25,504*	*209,732*	*12,551*	*231*	*16,547*	*2,237,735*	*232,625*	*3,935,730*	*5,736*	*13*

Table G-55. Year 2015 Emissions within Acquired Lands - 29 Palms LAS EIS (Tons/Year)

Area/User Type/Source	VOC	CO	NO_X	SO_X	PM	PM_{10}	$PM_{2.5}$	CO_2	CH_4	N_2O
					Johnson Valley					
OHV Day Use										
Transport vehicle	0.09	2.53	0.30	0.00	-	0.03	0.03	306.92	0.03	-
Transport vehicle - dust	-	-	-	-	-	193.75	19.38	-	-	-
OHVs	0.03	0.74	0.09	0.00	-	0.01	0.01	90.16	0.01	-
OHVs - dust	-	-	-	-	-	41.66	4.17	-	-	-
Motorcycles	1.41	12.29	0.68	0.00	-	0.02	0.02	79.12	0.12	-
Motorcycles - dust	-	-	-	-	-	44.35	4.43	-	-	-
Overnight										
Transport vehicle	0.17	4.72	0.56	0.01	-	0.06	0.05	572.92	0.05	-
Transport vehicle - dust	-	-	-	-	-	494.06	49.41	-	-	-
OHVs	0.09	2.60	0.31	0.00	-	0.03	0.03	315.55	0.03	-
OHVs - dust	-	-	-	-	-	145.83	14.58	-	-	-
Motorcycles	4.93	43.01	2.40	0.00	-	0.08	0.07	276.93	0.40	-
Motorcycles - dust	-	-	-	-	-	155.22	15.52	-	-	-
Generator - Gasoline	3.49	1.13	1.78	0.10	-	0.12	0.11	174.69	-	-
Propane Stoves	0.01	0.05	0.09	0.00	0.01	0.01	0.01	89.86	0.00	0.01
Fire	2.48	37.02	-	-	8.27	5.39	4.67	-	2.23	-
Non-OHV Day Use										
Transport vehicle	0.02	0.42	0.05	0.00	-	0.01	0.00	51.15	0.00	-
Transport vehicle - dust						32.29	3.23			
Total - Johnson Valley	*12.72*	*104.51*	*6.25*	*0.12*	*8.27*	*1,112.92*	*115.72*	*1,957.30*	*2.86*	*0.01*
					East Area					
OHV Day Use										
Transport vehicle	0.00	0.02	0.00	0.00	-	0.00	0.00	2.39	0.00	-
Transport vehicle - dust	-	-	-	-	-	1.51	0.15	-	-	-
OHVs	0.00	0.01	0.00	0.00	-	0.00	0.00	0.70	0.00	-
OHVs - dust	-	-	-	-	-	0.32	0.03	-	-	-
Motorcycles	0.01	0.10	0.01	0.00	-	0.00	0.00	0.62	0.00	-
Motorcycles - dust	-	-	-	-	-	0.35	0.03	-	-	-
Overnight										
Transport vehicle	0.00	0.00	0.00	0.00	-	0.00	0.00	0.11	0.00	-
Transport vehicle - dust	-	-	-	-	-	0.09	0.01	-	-	-
OHVs	0.00	0.00	0.00	0.00	-	0.00	0.00	0.06	0.00	-
OHVs - dust	-	-	-	-	-	0.03	0.00	-	-	-
Motorcycles	0.00	0.01	0.00	0.00	-	0.00	0.00	0.05	0.00	-
Motorcycles - dust	-	-	-	-	-	0.03	0.00	-	-	-
Generator - Gasoline	0.00	0.00	0.00	0.00	-	0.00	0.00	0.03	-	-
Propane Stoves	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00
Fire	0.00	0.01	-	-	0.00	0.00	0.00	-	0.00	-
Total - East Area	*0.01*	*0.14*	*0.01*	*0.00*	*0.00*	*2.33*	*0.23*	*3.97*	*0.00*	*0.00*
					South Area					
OHV Day Use										
Transport vehicle	0.00	0.04	0.00	0.00	-	0.00	0.00	4.25	0.00	-
Transport vehicle - dust	-	-	-	-	-	2.68	0.27	-	-	-
OHVs	0.00	0.01	0.00	0.00	-	0.00	0.00	1.25	0.00	-
OHVs - dust	-	-	-	-	-	0.32	0.03	-	-	-
Motorcycles	0.02	0.17	0.01	0.00	-	0.00	0.00	1.10	0.00	-
Motorcycles - dust	-	-	-	-	-	0.61	0.06	-	-	-
Total - South Area	*0.02*	*0.22*	*0.01*	*0.00*	-	*3.62*	*0.36*	*6.59*	*0.00*	-
Total Emissions - Tons	*12.75*	*104.87*	*6.28*	*0.12*	*8.27*	*1,118.87*	*116.31*	*1,968*	*2.87*	*0.01*

Table G-56. Year 2015 Emissions within Acquired Lands by Source Category - 29 Palms LAS EIS (Tons/Year)

Area/Source Category	VOC	CO	NO_X	SO_X	PM	PM_{10}	$PM_{2.5}$	CO_2	CH_4	N_2O
Johnson Valley										
Vehicles - Combustive	6.74	66.31	4.38	0.02	-	0.23	0.21	1,692.75	0.63	-
Vehicles - Dust	-	-	-	-	-	1,107.17	110.72	-	-	-
Generator - Gasoline	3.49	1.13	1.78	0.10	-	0.12	0.11	174.69	-	-
Propane Stoves	0.01	0.05	0.09	0.00	0.01	0.01	0.01	89.86	0.00	0.01
Camp Fires	2.48	37.02	-	-	8.27	5.39	4.67	-	2.23	-
Subtotal - Johnson Valley	*12.72*	*104.51*	*6.25*	*0.12*	*8.27*	*1,112.92*	*115.72*	*1,957.30*	*2.86*	*0.01*
East Area										
Vehicles - Combustive	0.01	0.13	0.01	0.00	-	0.00	0.00	3.93	0.00	-
Vehicles - Dust	-	-	-	-	-	2.33	0.23	-	-	-
Generator - Gasoline	0.00	0.00	0.00	0.00	-	0.00	0.00	0.03	-	-
Propane Stoves	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00
Camp Fires	0.00	0.01	-	-	0.00	0.00	0.00	-	0.00	-
Subtotal - East Area	*0.01*	*0.14*	*0.01*	*0.00*	*0.00*	*2.33*	*0.23*	*3.97*	*0.00*	*0.00*
South Area										
Vehicles - Combustive	0.02	0.22	0.01	0.00	-	0.00	0.00	6.59	0.00	-
Vehicles - Dust	-	-	-	-	-	3.62	0.36	-	-	-
Subtotal - South Area	*0.02*	*0.22*	*0.01*	*0.00*	-	*3.62*	*0.36*	*6.59*	*0.00*	-
Total Emissions - Tons	*12.75*	*104.87*	*6.28*	*0.12*	*8.27*	*1,118.87*	*116.31*	*1,968*	*2.87*	*0.01*

Table G-57. Fraction of Events Visitors in Johnson Valley OHV Area Displaced by Each Project Alternative

Alternative	*Displaced from JV*	*Remain in County (1*	*Displaced from County*	*% of Total JV out of C*	*Remain in O3 NA (1)*	*Displaced from O3 NA*	*% of Total JV out of NA*
1	1.00	-	1.00	0.17	-	1.00	0.17
2	0.60	-	1.00	0.10	-	1.00	0.10
4	0.15	-	1.00	0.03	-	1.00	0.03
5	0.15	-	1.00	0.03	-	1.00	0.03
6	0.60	-	1.00	0.10	-	1.00	0.10

Note: 17 percent of the annual visitor usage occurs from events.

Note: (1) = Total visitors that remain

Table G-58. Fraction of Dispersed-Use Visitors in Johnson Valley OHV Area Displaced by Each Project Alternative

Alternative	*Displaced from JV*	*Remain in County (1*	*Displaced from County*	*% of Total JV out of C*	*Remain in O3 NA (1)*	*Displaced from O3 NA*	*% of Total JV out of NA*
1	0.75	0.90	0.10	0.06	0.81	0.19	0.12
2	0.25	0.90	0.10	0.02	0.81	0.19	0.04
4 - MDU	0.15	0.90	0.10	0.01	0.81	0.19	0.02
4 - SDU	0.30	0.90	0.10	0.005	0.81	0.19	0.01
4 - Total				0.015			0.028
5 - MDU	0.15	0.90	0.10	0.01	0.81	0.19	0.02
5 - SDU	0.30	0.90	0.10	0.005	0.81	0.19	0.01
5 - Total				0.015			0.028
6	0.30	0.90	0.10	0.02	0.81	0.19	0.05

Note: 83 percent of the annual visitor usage occurs from dispersed-use.

Note: (1) = Total visitors that remain

??? ???

Table G-59. Fraction of All Visitors in Johnson Valley OHV Area Displaced by Each Project Alternative

Alternative	*Displaced from JV*	*Remain in County*		*% of Total JV out of C*			*% of Total JV out of NA*
1	0.79			0.23			0.29
2	0.31			0.12			0.14
4 - Total	0.17			0.04			0.05
5 - Total	0.17			0.04			0.05
6	0.35			0.13			0.15

Note: 17/83 percent of the annual visitor usage occurs from events/dispersed-use.

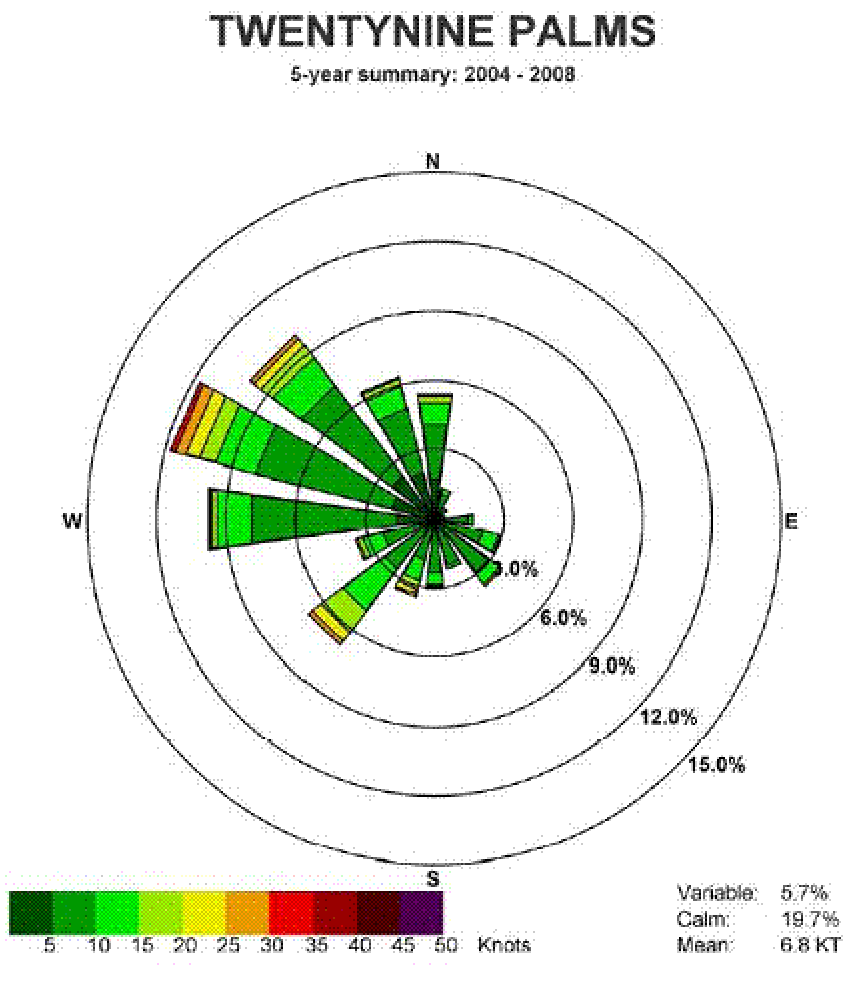
Note: (1) = Total visitors that remain

Table G-60. Year 2015 Future Baseline Emissions Relocated from Johnson Valley - 29 Palms LAS EIS Project Alternatives (Tons/Year)

Area/Source Category	VOC	CO	NO_X	SO_X	PM	PM_{10}	$PM_{2.5}$	*CO_2*	*CH_4*	*N_2O*
Johnson Valley										
Vehicles - Combustive	6.74	66.31	4.38	0.02	-	0.23	0.21	1,693	0.63	-
Vehicles - Dust	-	-	-	-	-	1,107.17	110.72	-	-	-
Gasoline-powered Generator	3.49	1.13	1.78	0.10	-	0.12	0.11	175	-	-
Propane Stoves	0.01	0.05	0.09	0.00	0.01	0.01	0.01	90	0.00	0.01
Camp Fires	2.48	37.02	-	-	8.27	5.39	4.67	-	2.23	-
Total Johnson Valley Emissions - Year 2015	12.72	104.51	6.25	0.12	8.27	1,112.92	115.72	1,957	2.86	0.01
Total Eliminated from MDAB - Alternative 1 (1)	2.95	24.27	1.45	0.03	1.92	258.47	26.87	454.58	0.67	0.00
Total Eliminated from MDAB - Alternative 2 (1)	1.56	12.83	0.77	0.01	1.02	136.61	14.20	240.26	0.35	0.00
Total Eliminated from MDAB - Alternative 4 (1)	0.51	4.23	0.25	0.00	0.33	45.01	4.68	79.15	0.12	0.00
Total Eliminated from MDAB - Alternative 5 (1)	0.51	4.23	0.25	0.00	0.33	45.01	4.68	79.15	0.12	0.00
Total Eliminated from MDAB - Alternative 6 (1)	1.61	13.26	0.79	0.01	1.05	141.23	14.68	248.38	0.36	0.00
Total Eliminated from MDAB O3 NA - Alternative 6 (1)	1.90	15.60	0.93	0.02	1.24	166.17	17.28	292.24	0.43	0.00

Note: (1) = These emissions deducted from the increase in emissions from each project alternative to produce net change in emissions.

Figure G-1. Wind Rose for 29 Palms MCAGCC Mainside Monitoring Station



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APPENDIX G.1

LAS Project Conformity Evaluations

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UNITED STATES MARINE CORPS
MARINE AIR GROUND TASK FORCE TRAINING COMMAND
MARINE CORPS AIR GROUND COMBAT CENTER
BOX 788100
TWENTYNINE PALMS, CALIFORNIA 92278-8106

5090
4F/c-10-0868

19 OCT 2010

Mr. Alan De Salvio
Mojave Desert Air Quality Management District
14306 Park Avenue
Victorville, California 92392-2383

Dear Mr. De Salvio:

SUBJECT: REQUEST FOR CONFORMITY ANALYSIS REVIEW AND DETERMINATION

The United States Marine Corps is currently analyzing an expansion of the existing training range facility at the Marine Corps Air Ground Combat Center at Twentynine Palms, California. In support of this proposed action, the Marine Corps has prepared a Conformity Analysis of air emissions associated with the proposed expansion to satisfy the Clean Air Act (CAA) Conformity Rule requirements. We believe these emissions are in conformity with your agency's plan to attain National Ambient Air Quality Standards on schedule for Ozone and Particulate Matter 10.

Therefore, we respectfully request that you review our enclosed Conformity Analysis and provide comments regarding whether it is of adequate content to demonstrate compliance with District Rule 2002. If you agree with these findings, please provide a letter to that effect per District Rules 2002(H)(1)(e)(i)(B) and 2002(H)(1)(d)(i). This documentation is necessary for us to satisfy both our CAA and National Environmental Policy Act (NEPA) requirements.

We also ask that you forward the letter and project Conformity Analysis to the California Air Resources Board for their concurrence in accordance with 40 C.F.R. § 93.158(a)(5)(i)(B) and 40 C.F.R. § 93.158(a)(4)(i).

Each individual federal action which, by itself, exceeds de *minimus* thresholds for one or more regulated emissions, must demonstrate conformity. This request for an attainment plan revision applies specifically to the Combat Center expansion analysis and is not meant to be a comprehensive inventory of potential future military growth in the Western Mojave Desert.

If you have any questions, please feel free to contact Mrs. Erin Adarns, Natural Resources and Environmental Affairs, at (760)830-7726.

Sincerely,

MAJOR W. M. Rowley
Director, NREA
Acting

Enclosures: 1. Conformity Application Analysis
2. LAAE Emissions Calculations
3. Dispersion Modeling Analysis

Copy to: Central File
AC/S, G-4
NREA Files/Air
Land Acquisition

CONFORMITY EVALUATION
LAND ACQUISITION AND AIRSPACE ESTABLISHMENT PROPOSED ACTION
MARINE CORPS COMBAT CENTER TWENTYNINE PALMS

1.0 INTRODUCTION

The following presents a Clean Air Act (CAA) general conformity evaluation for the Land Acquisition and Airspace Establishment (LAS) action at Marine Corps Combat Center Twentynine Palms (Combat Center), as proposed by the Department of Navy (Navy). Included in this evaluation are the conformity applicability analysis for the proposed action and the methods used to demonstrate this action's conformity with the CAA and specifically with the California State Implementation Plan (SIP).

This evaluation presents conformity determinations for emissions of ozone precursors and particulate matter less than 10 microns in diameter (PM_{10}). The area where the proposed project will occur lies in areas of the Mojave Desert Air Basin (MDAB) which have been designated by the U.S. Environmental Protection Agency (EPA) as nonattainment for ozone and PM_{10}. This fact triggers the General Conformity Rule found in Section 176(c) of the CAA (42 U.S.C. § 7506(c)) (40 C.F.R. 93.153(b); MDAQMD Rule 2002(A)(3)(v)).

As part of the LAS action, the Navy proposes to establish a large-scale training range facility at the Combat Center that would accommodate sustained, combined-arms, live-fire, and maneuver training exercises for all elements of a Marine Expeditionary Brigade (MEB). To accomplish this goal, the Marine Corps would acquire additional lands adjacent to the existing Combat Center. The LAS action proposes two MEB exercises per year that would last 24 days each. The Navy published the Notice of Intent to prepare an Environmental Impact Statement (EIS) for the LAS on October 30, 2008 in the Federal Register and the Navy plans to release the Draft EIS to the public in December 2010. This conformity evaluation focuses on Alternative 6 in the Draft EIS, which would acquire lands to the west and southeast of the existing Combat Center.

2.0 CLEAN AIR ACT CONFORMITY REQUIREMENTS

"No department, agency, or instrumentality of the Federal Government shall engage in, support in any way or provide financial assistance for, license or permit, or approve any activity which does not conform to an (approved SIP)" 42 U.S.C. 7506(c). "Conformity" means *inter alia* conformity to the applicable SIP's purpose of eliminating or reducing the severity and number of violations of the national ambient air quality standards (NAAQS) and achieving expeditious attainment of such standards, and the proposed action will not cause or contribute to any new violation of any standard in any area. *Id.*

To implement this mandate, the EPA promulgated the conformity rule for general federal actions. These Federal General Conformity Rules are found at 40 C.F.R. §§ 150-165. California's SIP responsibilities in the area of the proposed action are delegated to the Mojave Desert Air Quality Management District (MDAQMD). The portion of the California SIP implementing Section 176(c) of the CAA is MDAQMD Rule 2002.

When EPA approves a SIP, or portion of a SIP, a conformity evaluation is governed by the approved SIP criteria and procedures. The Federal conformity regulations apply only for the portions, if any, of the part 93 requirements not contained in the SIP conformity provisions approved by EPA. In addition, any previously applicable implementation plan conformity requirements remain enforceable until the EPA approves the revision to the applicable SIP to specifically include the revised requirements or remove requirements.

2.1 Purpose and Applicability of the General Conformity Rule

Both Federal and State General Conformity Rules require the Navy to analyze this proposed action according to standardized procedures. General conformity rules apply to federal actions affecting areas that are in nonattainment of a NAAQS and to designated maintenance areas (attainment areas that have been reclassified from a previous nonattainment status and which are required to prepare an air quality maintenance plan). Conformity requirements apply specifically to the emissions for which a given area has been designated nonattainment.

Conformity analysis focuses on the net increase in emissions from a proposed action compared to existing, historical baseline conditions. Conformity analysis is limited to those direct and indirect emissions over which the federal agency has responsibility and control. Lastly, conformity analysis is not required to address emissions that are not reasonably foreseeable or quantifiable.

Conformity determinations are required when the annual direct and indirect emissions from a proposed federal action exceed an applicable *de minimis* threshold. The conformity *de minimis* thresholds vary by emission and by the severity of nonattainment conditions in the region affected by the proposed action. The EPA has designated the area which this proposed action will affect as a severe nonattainment area for ozone and its precursors and a moderate nonattainment area for PM_{10}. As a result, MDAQMD Rule 2002(A)(3)(a)(ii)(A) sets the *de minimus* thresholds applicable to this action at 25 tons per year of an ozone precursor and 100 tons per year of PM_{10}.

The general conformity rule identifies several categories of actions that are presumed to result in no net emissions increase or in an emissions increase that will clearly be less than any applicable *de minimis* level. MDAQMD Rule 2002(D). These types of activities are exempt from the requirements of the general conformity rule and are primarily routine administrative, planning, financial, and property disposal or maintenance actions.

Air emissions produced from construction and operation of the proposed action would occur within the existing and proposed boundaries of the Combat Center. This area lies within the MDAB, which includes all but the southwest corner of San Bernardino County and the eastern portions of Riverside, Los Angeles, and Kern Counties. Presently, the MDAB attains the NAAQS for all criteria pollutants except ozone and PM_{10}.

3.0 PROJECT CONFORMITY APPLICABILITY ANALYSIS

The LAS proposed action would produce emissions within the MDAB project region due to both construction and operational activities. The following presents emissions estimates and the conformity applicability analysis for the proposed action, which is Project Alternative 6 in the LAS EIS. Attachment 1 of this conformity evaluation documents the calculations of emissions for this proposed action.

Construction

Construction activities associated with the proposed action would include (1) construction of about 30 miles of unpaved roads and (2) installation of three communication towers in the west study area. Air quality impacts due to proposed construction activities would occur from (1) combustive emissions due to the use of fossil fuel-powered equipment and (2) fugitive dust emissions (PM_{10}/$PM_{2.5}$) due to the operation of equipment on exposed soil. Construction activity data developed by Combat Center staff were used to estimate proposed combustive and fugitive dust emissions (MAGTF Training Command 2010). This conformity analysis assumes that all construction activities would occur in year 2013, prior to initiation of the proposed training exercises in 2015.

Factors needed to derive construction source emission rates were obtained from *Compilation of Air Pollution Emission Factors, AP-42, Volume I* (EPA 1995 and 2006), the *OFFROAD2007 Model* for off-road construction equipment (ARB 2006a), the *EMFAC2007 Model* for on-road vehicles (ARB 2006b), and the Navy Aircraft Environmental Support Office (AESO) for helicopter emission rates (AESO 2000a and 2000b).

The analysis reduced fugitive dust emissions generated from the use of construction equipment on exposed soil by 50 percent from uncontrolled levels to simulate implementation of best management practices (BMPs) for fugitive dust control. These BMPs include the following:

1. Use water trucks to keep areas of vehicle movement damp enough to minimize the generation of fugitive dust.
2. Minimize the amount of disturbed ground area at any given time.
3. Suspend all soil disturbance activities when winds exceed 25 miles per hour (mph) or when visible dust plumes emanate from the site and then stabilize all disturbed areas with water application.
4. Designate personnel to monitor the dust control program and to increase watering, as necessary, to minimize the generation of dust.

Table 1 presents a summary of the conformity-related emissions that would occur from construction of the proposed action within the MDAB. These data show that annual VOC, NO_x, and PM_{10} emissions from proposed construction activities would be well below the conformity *de minimis* thresholds. Consequently, construction emissions are not expected to cause or contribute to any delay of attainment or any new NAAQS exceedance.

Table 1. Annual Conformity-Related Emissions due to Construction of the LAS Proposed Action within the MDAB.

CONSTRUCTION ACTIVITY	*ANNUAL EMISSIONS (TONS)* [1]		
	VOC	***NO_X***	***PM_{10}***
Development of Unpaved Roads	0.08	0.83	0.45
Installation of Communication Towers	0.09	0.12	0.53
Total Annual Emissions (1)	**0.17**	**0.96**	**0.98**
MDAB Conformity *de minimis* Level	**25**	**25**	**100**
Exceeds *de minimis* Level?	No	No	No

Note: (1) All emissions are assumed to occur in calendar year 2013.

Operations

Air quality impacts associated with proposed operations would occur from (1) combustive emissions due to the use of fossil fuel-powered mobile sources and ordnance and (2) fugitive dust emissions (PM_{10}/$PM_{2.5}$) due to disturbances on exposed soils. Combustive emission sources associated with proposed operations would include (1) aircraft during landing and take-off (LTOs) and cruising modes below 3,000 feet AGL, (2) tactical vehicles (TVs), (3) tactical support equipment (TSE), (4) use of ordnance, and (5) personnel on-road commutes. Proposed aircraft LTOs, operations of TVs/TSE on exposed soils, and use of ordnance would generate fugitive dust emissions. The proposed training exercises would begin in year 2015 and would produce the same level of emissions for each future year of operation.

Operational data used to calculate proposed operational emissions were obtained from the Marine Corps (as presented in EIS Section 2.4) and the project airspace and noise analyses. Factors used to calculate combustive emissions for proposed sources were obtained from the AESO (AESO 1999, 2000a, 2000c, 2001a, 2001b, and 2002); the Air Force Institute for Environment, Safety and Occupational Health Risk Analysis (IERA) (IERA 2002); the *OFFROAD2007* Model, the *EMFAC2007 Model* for on-road vehicles; the *Calendar Year 2007 Comprehensive Emissions Inventory Plan for Marine Corps Air Ground Combat Center Twentynine Palms* (United States Army Corps of Engineers Sacramento District and Combat Center 2008); and the *Compilation of Air Pollution Emission Factors, AP-42, Volume I* (EPA 2006).

Lands proposed for acquisition currently generate emissions from recreational activities and the use of off-highway vehicles (OHV). The proposed action would displace some of these existing recreational activities and their associated emissions from the MDAB. Therefore, to estimate the net change in emissions due to the proposed action, the analysis subtracted portions of existing emissions displaced from these areas from the emission increases associated with the proposed action. Sources of air emissions that occur in these areas include (1) combustive emissions due to vehicular usage, camp fires, propane stoves, and portable diesel- and gasoline-powered generators and (2) fugitive dust emissions generated from the use of vehicles on unpaved surfaces. The Johnson Valley OHV Area within the west study area has the highest recreational usage and therefore generates the highest amount of emissions within any of the lands proposed for acquisition. Activity data used to estimate emissions from these activities were developed from visitor usage data obtained from the BLM, as presented in EIS Section 3.2 (BLM and The

Environmental Company [TEC] 2010). Table 2 presents a summary of the existing emissions that occur within the west and south study areas.

To determine the amount of existing recreational activities that the proposed action would displace from the west study area, the analysis considered the following factors: (1) the type of visitor usage (events vs. dispersed), (2) the amount of area affected by the proposed action, and (3) the amount of time per year that the proposed action would close this area to the public. These factors determined that (1) 85 percent of the existing activities and associated emissions would re-locate elsewhere within the MDAB ozone nonattainment area and (2) 87 percent of the existing activities and associated emissions would re-locate elsewhere within the MDAB PM_{10} nonattainment area. Therefore, the analysis subtracted (1) 15 percent of the VOC and NO_x emissions and (2) 13 percent of the PM_{10} emissions generated in the west area from the emission increases associated with the proposed action to estimate the net change in emissions due to the proposed action. Since the proposed training exercises would not occur until year 2015, the analysis took into consideration the

Table 2. Existing Emissions within Lands Acquired by the Proposed LAS

AREA/ACTIVITY	*ANNUAL EMISSIONS (TONS)*		
	VOC	***NO_x***	***PM_{10}***
West Study Area			
Vehicles – Combustive	5.83	3.79	0.20
Vehicles – Dust	---	---	957.26
Gasoline-powered Generator	3.02	1.54	0.10
Propane Stoves	0.01	0.08	0.00
Camp Fires	2.14	---	4.66
Total – West Area	**11.00**	**5.40**	**962.23**
South Study Area			
Vehicles – Combustive	0.02	0.01	0.00
Vehicles – Dust	---	---	3.62
Total - South Area	**0.02**	**0.01**	**3.62**

Notes: Developed from visitor usage data source (BLM and TEC 2010).

usages expected for Johnson Valley at this time (BLM and TEC 2010). This future baseline equates to a 16 percent increase in usage and associated emissions for the west area in 2015, compared to 2010 levels.

In the south study area, the proposed action would displace all of the existing recreational activities and their associated emissions from this area, but 90 percent of these activities and emissions would re-locate elsewhere within the MDAB ozone and PM_{10} nonattainment areas (BLM and TEC 2010). Therefore, the analysis subtracted 10 percent of the existing emissions from this area from the emission increases associated with the proposed action to estimate the net change in emissions due to the proposed action.

Table 3 presents a summary of annual emissions that would occur from operations of the proposed action within the MDAB PM_{10} and ozone nonattainment areas. These data show that operations of the proposed action would result in a net increase in VOC, NO_x, and PM_{10} emissions within the MDAB that would exceed their applicability conformity *de minimis* thresholds. Therefore, pursuant to MDAQMD Rule 2002, the Navy is required to perform a conformity determination to demonstrate how emissions of ozone precursors and PM_{10} from operations of the LAS proposed action will conform to the CAA and the California SIP.

Table 3. Net Annual Emissions due to Operations of the LAS Proposed Action within the MDAB

ACTIVITY	*ANNUAL EMISSIONS (TONS)* [(1)]		
	VOC	***NO_x***	***PM_{10}***
Aircraft Operations	25.55	39.77	17.25
Tactical Vehicles (TV)	5.29	64.39	2.33
Tactical Support Equipment (TSE)	1.50	17.20	0.66
Ordnance	1.82	0.28	-
Fugitive Dust – Aircraft	-	-	42.36
Fugitive Dust – TV/TSE	-	-	565.25
Fugitive Dust – Ordnance	-	-	2.49
Personnel On-road Commutes	0.05	1.84	0.02
Annual Emissions	**34.21**	**123.48**	**630.36**
Reduction of West Area Emissions (2)	**(1.90)**	**(0.93)**	**(141.23)**
Reduction of South Area Emissions (3)	**(0.00)**	**(0.00)**	**(0.36)**
Total Net Change - Tons per Year	**32.31**	**122.55**	**488.77**
Conformity *De Minimis* Level	**25**	**25**	**100**
Exceeds Conformity *de minimis* Level?	**Yes**	**Yes**	**Yes**

Note: (1) Proposed emissions would be the same for each year of operation.
(2) Equal to 13/15% of total West Area year 2015 PM_{10}/VOC and NO_x emissions.
(3) Equal to 10% of total South Area existing emissions.

4.0 PROJECT CONFORMITY DEMONSTRATION

4.1 Conformity Methods Defined in the General Conformity Rule

MDAQMD Rule 2002(H) identifies several criteria that can be used to demonstrate conformity. Among them include the following:

- Where the MDAQMD determines that an areawide air quality modeling analysis is not needed, local air quality modeling analysis establishes that the total direct and indirect emissions from the proposed action meet the following requirements: (a) adhere to the Procedures for Conformity Determinations of General Federal Actions contained in MDAQMD Rule 2002(I) and (b) the action does not cause or contribute to any new violation of any standard in any area or increase the frequency or severity of any existing violation (MDAQMD Rule 2002(H)(1)(d)(i)).Where the EPA has approved a revision to an area's attainment or maintenance demonstration after 1990, the proposed action may be determined to conform when MDAQMD makes a written commitment to revise its SIP attainment plan. The MDAQMD commitment must include the following (MDAQMD Rule 2002(H)(1)(e)(i)):

    1. A specific schedule for adoption and submittal of a revision to the applicable implementation plan which would achieve the needed emission reductions prior to the time emissions from the Federal action would occur;

2. Identification of specific measures for incorporation into the applicable implementation plan which would result in a level of emissions which, together with all other emissions in the nonattainment or maintenance area, would not exceed any emissions budget specified in the applicable implementation plan;

3. A demonstration that all existing applicable implementation plan requirements are being implemented in the area for the pollutants affected by the Federal action, and that local authority to implement additional requirements has been fully pursued;

4. A determination that the responsible Federal agencies have required all reasonable mitigation measures associated with their action; and

5. Written documentation including all air quality analyses supporting the conformity determination.

4.2 Conformity of Proposed Action with Respect to Ozone Precursor Emissions

The following summarizes the conformity demonstration for ozone precursor emissions associated with the LAS proposed action. This analysis is based upon (1) a review of historical emissions estimated for the Combat Center, (2) a review of recent MDAQMD ozone attainment plans, and (3) consultation with MDAQMD staff.

In 2008, the MDAQMD completed its *Federal 8-Hour Ozone Attainment Plan (Western Mojave Desert Non-attainment Area*) (*2008 Plan*), which maps a pathway to attainment of the 8-hour ozone NAAQS of 0.084 parts per million (ppm) (MDAQMD 2008). Emissions from the LAS proposed action are not specifically accounted for in this or any earlier MDAQMD attainment plan. However, the planning assumptions and principles applied in this plan are a useful tool to justify the conclusion that ozone precursor emissions will not cause or contribute to any new NAAQS violations, to any increase in severity of current conditions or delay reasonable further progress of the air basin toward attainment of the ozone NAAQS.

To satisfy the requirements of MDAQMD Rule 2002(H)(1)(e)(i)(B) and the Federal General Conformity Rules (40 C.F.R. §§ 93.150-165), the Navy formally requests the MDAQMD to provide a written commitment to include the ozone precursor emissions from the proposed LAS action into a revision of its ozone attainment plan in the California SIP revision. Because the Federal General Conformity Rules specifically require the approval of "the State agency responsible for the applicable SIP" and because recent MDAQMD attainment plans have not been approved by the EPA, the Navy respectfully asks the MDAQMD to forward its commitment to the California Air Resources Board (CARB) for their concurrence. This conformity evaluation and the emission calculations presented in Attachment 1 form the basis of project emissions data that are needed for this process. Once the MDAQMD and CARB commit to revising the California SIP according to the requirements in MDAQMD Rule 2002 and the General Federal Conformity Rules, the proposed action would conform to the SIP.

4.3 Conformity of Proposed Action with Respect to PM_{10} Emissions

The following summarizes the conformity demonstration of PM_{10} emissions for the LAS proposed action. This analysis is based upon (1) a review of historical emissions estimated for the Combat Center, (2) a review of MDAQMD PM_{10} attainment plans, and (3) consultation with the MDAQMD.

To satisfy the requirements of MDAQMD Rule 2002(H)(1)(d)(i), a dispersion modeling analysis was performed which demonstrates that PM_{10} emissions from the LAS proposed action would not contribute to an exceedance of the PM_{10} NAAQS. The following summarizes the methods and results of this analysis.

Project PM_{10} Dispersion Modeling Analysis

An air dispersion analysis was performed with the use of the EPA American Meteorological Society/EPA Regulatory Model (AERMOD) to estimate the ambient impact of PM_{10} emissions that would occur from the LAS proposed action. The AERMOD is a guideline model required by the EPA for use in regulatory air quality impact evaluations (EPA 2010). The AERMOD has the ability to simulate the various physical characteristics of stationary and mobile sources of emissions associated with the proposed LAS MEB exercises. The modeling methodologies are consistent with the guidelines of the EPA, ARB, and generally approved practices to assess proposed air pollutant concentrations. Regulatory default options appropriate for rural conditions were utilized for the modeling simulations. Attachment 2 of this conformity evaluation documents the details of this analysis.

The AERMOD analysis was performed in two steps. First, the analysis estimated PM_{10} impacts along the entire length of the proposed Combat Center boundary. Secondly, at the location of maximum impact along this boundary, a refined analysis was performed to evaluate off-site PM_{10} impacts.

<u>Source Emission Rates</u>

The analysis evaluated a scenario of peak daily PM_{10} emissions that would reasonably occur from the MEB exercises. This scenario would correspond to the final day of the 24-day MEB exercise (the FINEX). The FINEX would converge on a single objective point in the proposed West Area and therefore would produce the densest amount of PM_{10} emissions during the entire MEB exercise. The FINEX also would occur in close proximity to the boundary of the Combat Center. For these reasons, the FINEX would produce the highest off-site ambient PM_{10} impacts from the MEB exercises. Figure 2-10d in Attachment 2 shows the operational locations of the MEB exercise within the Combat Center.

The analysis assumed that peak daily PM_{10} emissions from the FINEX would occur from the following activity: (1) five percent of the annual aircraft operations, (2) seven percent of the annual TV/TSE operations, and (3) eight percent of the annual ordnance usages. In addition, the analysis assumed that 50 percent of the peak daily PM_{10} emissions during the FINEX would occur in the West Area and 25 percent each would occur in the central and east portions of the Combat Center. Tables A2-1 through A2-9 in Attachment 2 present estimations of the peak hourly PM_{10} emission rates for each source used in the AERMOD analysis.

<u>Physical Simulations of Emission Sources</u>

Due to the mobile nature of emission sources that would take part in the proposed MEB exercises, the analysis simulated both combustive and fugitive dust emissions from these sources as a series of volume sources. Figure A-1 in Attachment 2 shows the center points of the locations of these sources within the proposed Combat Center boundary. Each volume source has a side length of 2.5 kilometers (km) and a vertical height of 100 meters (m).

Source/Receptor Locations

Source base elevations were determined from USGS Digital Elevation Model (DEM) data. The horizontal locations of each source were defined in terms of Universal Transverse Mercator (UTM) coordinates.

The initial AERMOD analysis evaluated PM_{10} impacts along the proposed boundary of the Combat Center with the use of receptor points spaced about every 250 m. The analysis of maximum off-site PM_{10} impacts used a receptor spacing of 500 meters that extended approximately 10 km away from the Combat Center boundary. Figures A-1 and A-2 in Attachment 2 illustrate the receptor fields used in the AERMOD analysis.

Meteorological Data

Surface meteorological data needed for use in the modeling analysis were obtained from site-specific conditions recorded at the Combat Center Mainside ambient air monitoring station. Upper air meteorological data needed for use in the modeling analysis were obtained from conditions recorded at Desert Rock, Nevada, about 140 miles north of the Combat Center. Due to interruptions in the operations of these meteorological stations, the most recent calendar year that contained contiguous matching surface and upper air data with at least a 90 percent annual data recovery rate was 2004. The AERMET routine was used to process these meteorological data into a form suitable for use in the modeling analysis. Figure A-3 in Attachment 2 presents a wind rose generated for the Mainside station surface winds used in the analysis.

Background PM_{10} Values

The maximum PM_{10} concentration predicted by AERMOD was added to a background PM_{10} concentration to produce a total project impact for use in comparison to the 24-hour PM_{10} NAAQS. The Combat Center operated a PM_{10} sampling network from 1996 through 2005 and restarted this program in 2008. Data collected from the Emerson station, just northwest of Emerson Dry Lake and along the western boundary of the Combat Center, were used to define the background PM_{10} concentration for the PM_{10} impact analysis. This station was chosen over other stations operated at the Combat Center, as it is the closest station to the maximum PM_{10} impact location predicted by AERMOD for the proposed action.

To determine compliance with the NAAQS, EPA guidance recommends use of the highest value monitored in the area of analysis during the most recent 3-year period to define the background pollutant level (EPA 2003). The most recent 3-year period of monitoring at the Emerson station occurred from 2002 through 2005. The maximum 24-hour PM_{10} value recorded during this period was 52 *u*g/m^3, excluding any PM_{10} samples recorded when winds exceeded 15 miles per hour (mph) averaged over an hour, or instantaneous gusts of 25 mph, per MDAQMD Rule 403 guidelines.

The background 24-hour PM_{10} value of 52 *u*g/m3 defined for the analysis domain is deemed to be overly conservative. This is the case for the following reasons:

1. PM_{10} concentrations collected at the Emerson air monitoring station often contain PM_{10} emissions generated from existing activities within the (1) Johnson Valley OHV Area and (2) Combat Center. Operation of the proposed MEB exercises would eliminate any concurrent activities and associated PM_{10} emissions from these areas.

2. The top 10 project PM_{10} impacts predicted by AERMOD occurred during days of relatively low wind speeds. The maximum daily average wind speed for any of these days was 5.2 mph recorded at the Mainside monitoring station. The maximum 24-hour PM_{10} value recorded at the Mainside continuous PM_{10} sampler on these 10 days was 23 ug/m^3. In addition, analysis of PM_{10} values recorded at the Emerson station from 2002 through 2005 determined that no 24-hour PM_{10} concentration exceeded 23 ug/m^3 when the average daily wind speed was 5.2 mph or less.

Therefore, use of a 24-hour PM_{10} background value that is lower than 52 ug/m^3 is deemed reasonable for this impact analysis.

Analysis Results

The AERMOD analysis predicted that operation of Alternative 6 would produce a maximum 24-hour PM_{10} impact of 97 ug/m^3 on the boundary line of the proposed Combat Center West Area. Addition of the background PM_{10} value of 52 ug/m^3 would produce a total project PM_{10} impact of 149 ug/m^3. This impact would not exceed the 24-hour PM_{10} NAAQS of 150 ug/m^3, as shown in Table A-2.1.

Figure A-1 shows the results of the initial PM_{10} impact analysis for locations along the entire Combat Center boundary proposed under Alternative 6. These data show that the area of maximum PM_{10} impact would occur along the southwest boundary of the proposed Combat Center West Area. Figure A-2 shows the refined analysis of off-site PM_{10} impacts. These data show that PM_{10} impact values quickly decrease with distance from the Combat Center boundary. In addition, the impact value of 90 ug/m^3 extends only slightly beyond the Combat Center boundary and covers roughly 0.5 square km. Taking this into consideration and the fact that the analysis uses an overly conservative PM_{10} background value, it is reasonable to conclude that Alternative 6 would produce a total project 24-hour PM_{10} impact on public lands of no more than 140 ug/m^3. Based upon these results, it is concluded that the proposed LAS MEB exercises would comply with the PM_{10} NAAQS.

Table A-2.1. Maximum PM_{10} Impact Predicted for the LAS Alternative 6

Pollutant	*Averaging Period*	*Maximum Impact ($\mu g/m^3$)*	*Background Concentration ($\mu g/m^3$)*	*Total Impact ($\mu g/m^3$)*	*NAAQS*
PM_{10}	24-hour	97	52	149	150

Conservative Factors in Analysis

The following lists the factors that make the total project 24-hour PM_{10} impact of 149 ug/m^3 a conservative prediction:

1. The FINEX emissions scenario evaluated in the analysis is based upon activity levels for equipment, aircraft, and ordnance usage and areas of operation that are maximized to produce overly conservative ambient PM_{10} impacts to public lands. In addition, this peak day scenario would occur only 2 days per year.

2. The background PM_{10} concentration of 52 ug/m^3 obtained from the Emerson air monitoring station may contain PM_{10} emissions generated from existing activities within the Johnson Valley OHV Area and Combat Center. Therefore, use of a background value of 52 ug/m^3 may double count ambient PM_{10} that would not be present during operation of the proposed MEB exercises.

3. The top 10 project PM_{10} impacts predicted by AERMOD occurred during days of relatively low wind speeds. Data collected at the Combat Center show a trend of decreasing ambient PM_{10} concentrations with decreasing wind speed. For these 10 days, the maximum 24-hour PM_{10} value recorded at the Mainside station was 23 ug/m^3. In addition, PM_{10} concentrations recorded at the Emerson station during wind conditions that occurred on these 10 days also did not exceed 23 ug/m^3. Therefore, use of a background PM_{10} value of 52 ug/m^3 in the analysis for conditions of low winds speeds is overly conservative.

Therefore, it is reasoned that the proposed MEB exercises would produce a 24-hour PM_{10} impact to public lands that would be less than 149 ug/m^3.

4.4 Conclusions

MDAQMD Rule 2002(H)(3) requires that, notwithstanding any other requirements of this section, no proposed action subject to this rule can be determined to conform if it is inconsistent with any requirement or milestone contained in the applicable implementation plan, with the achievement of "reasonable further progress" schedule, or with assumptions specified in attainment or maintenance demonstrations. Our analysis shows the emissions associated with the proposed action conform to the specific requirements of the rules pertaining to PM_{10} and ozone precursors. These emissions also conform to the general requirements in MDAQMD Rule 2002(H)(3). For these reasons, we conclude the proposed action conforms to the MDAQMD and California air quality plans.

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ATTACHMENT A

29 Palms LAS Conformity Evaluation

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ATTACHMENT A-1

Conformity Emission Calculations

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Attachment A1 - Conformity Emission Calculations - 29 Palms LAS EIS Proposed Action Alternative 6

Table A1-1. Year 2010 Visitation Activities for Acquired Lands - 29 Palms LAS EIS

	Total Annual	*Total Annual Visitor Days*			*Days per*	*Total Annual Visitors*		
Area	*Visitor-Days*	*OHV Day Use*	*Overnight*	*Non-OHV Day Use*	*Overnight Use*	*OHV Day Use*	*Overnight*	*Non-OHV Day Use*
Johnson Valley	291,348	49,945	233,078	8,324	2.5	49,945	93,231	8,324
East	500	450	50		2.5	450	20	-
South	800	800			-	800	-	-

Table A1-2. Emission Source Data for Existing Activities in Johnson Valley OHV Area.

Trip Type/Vehicle or Source	*Annual Vehicle Trips*	*VMT/ Trip*	*Annual VMT*	*Vehicle Weight (Tons)*
OHV Day Use				
Transport vehicle	24,973	20	499,454	1
OHVs	6,243	24	146,715	0.50
Motorcycles	18,730	24	440,144	0.05
Overnight				
Transport vehicle	31,077	30	932,314	2
OHV	11,654	44	513,501	0.50
Motorcycle	34,962	44	1,540,503	0.05
Generator - Gasoline (1) (2)	31,077	3	93,231	
Propane Stoves (1) (3)	31,077	2	62,154	
Fire (4)	31,077	20	621,542	
Non-OHV Day Use				
Transport vehicle	4,162	20	83,242	1

Notes: (1) Annual Vehicle Trips = annual # of units, VMT/Trip = hours/trip, and Annual VMT = annual hours of operation.

(2) HP = 5 at 60% Load

(3) Assumed 0.2 gallons/hours of LPG usage

(4) Annual Vehicle Trips = annual # of fires, VMT/Trip = pounds of wood burned/trip, and Annual VMT = annual pounds of wood burned.

Table A1-3. Emission Source Data for Existing Activities in the East Study Area - 29 Palms LAS EIS

Trip Type/Vehicle or Source	*Annual Vehicle Trips*	*VMT/Trip*	*Annual VMT*	*Vehicle Weight (Tons)*
OHV Day Use				
Transport vehicle	225	20	4,500	1
OHVs	56	24	1,322	0.50
Motorcycles	169	24	3,966	0.05
Overnight				
Transport vehicle	7	30	200	2
OHV	3	44	110	0.50
Motorcycle	8	44	330	0.05
Generator - Gasoline (1) (2)	7	3	20	
Propane Stoves (1) (3)	7	2	13	
Fire (4)	7	20	133	

Notes: (1) Annual Vehicle Trips = annual # of units, VMT/Trip = hours/trip, and Annual VMT = annual hours of operation.

(2) HP = 5 at 60% Load

(3) Assumed 0.2 gallons/hours of LPG usage

(4) Annual Vehicle Trips = annual # of fires, VMT/Trip = pounds of wood burned/trip, and Annual VMT = annual pounds of wood burned.

Table A1-4. Emission Source Data for Existing Activities in the South Study Area - 29 Palms LAS EIS

Trip Type/Vehicle or Source	*Annual Vehicle Trips*	*VMT/ Trip*	*Annual VMT*	*Vehicle Weight (Tons)*
OHV Day Use				
Transport vehicle	400	20	8,000	1
OHVs	100	24	2,350	0.50
Motorcycles	300	24	7,050	0.05

Assumptions:

(1) Source: (BLM 2010).

(2) 17/80/3% of visitor use days = OHV day/overnight/non-OHV day uses.

(3) The average length of stay for overnight use is 2.5 days.

(4) Rider occupancy of transport vehicle for day/overnight uses is 2/3 visitors.

(5) 50% of day and overnight visitors would operate an OHV. OHV fleet mix = 75/25% motorcycle/4 wheel vehicle.

(6) Vehile miles travelled (VMT) based upon 20% of visitors drive 10 VMT, 70% drive 25 VMT, and 10% drive 40 VMT per day.

Table A1-5. Existing Emissions within Acquired Lands - 29 Palms LAS EIS (Pounds/Year)

Area/User Type/Source	VOC	CO	NO_X	SO_X	PM	PM_{10}	$PM_{2.5}$	CO_2	CH_4	N_2O
Johnson Valley										
OHV Day Use										
Transport vehicle	159	4,371	515	6	-	53	49	530,725	46	-
Transport vehicle - dust						335,039	33,504			
OHVs	47	1,284	151	2	-	16	14	155,900	14	-
OHVs - dust						72,046	7,205			
Motorcycles	2,436	21,250	1,184	2	-	38	35	136,817	199	-
Motorcycles - dust						76,689	7,669			
Overnight										
Transport vehicle	296	8,160	962	10	-	99	91	990,686	86	-
Transport vehicle - dust						854,331	85,433			
OHVs	163	4,494	530	6	-	54	50	545,651	48	-
OHVs - dust						252,161	25,216			
Motorcycles	8,524	74,376	4,143	7	-	132	122	478,860	696	-
Motorcycles - dust						268,411	26,841			
Generator - Gasoline	6,039	1,947	3,077	165	-	202	186	302,070	-	-
Propane Stoves	12	93	162	1	9	9	9	155,386	2	11
Fire	4,289	64,019	-	-	14,295	9,323	8,080	-	3,854	-
Non-OHV Day Use										
Transport vehicle	26	729	86	1	-	9	8	88,454	8	-
Transport vehicle - dust						55,840	5,584			
Total - Johnson Valley	*21,990*	*180,723*	*10,810*	*199*	*14,304*	*1,924,451*	*200,094*	*3,384,549*	*4,953*	*11*
East Area										
OHV Day Use										
Transport vehicle	1	39	5	0	-	0	0	4,782	0	-
Transport vehicle - dust						3,019	302			
OHVs	0	12	1	0	-	0	0	1,405	0	-
OHVs - dust						649	65			
Motorcycles	22	191	11	0	-	0	0	1,233	2	-
Motorcycles - dust						691	69			
Overnight										
Transport vehicle	0	2	0	0	-	0	0	213	0	-
Transport vehicle - dust						183	18			
OHVs	0	1	0	0	-	0	0	117	0	-
OHVs - dust						54	5			
Motorcycles	2	16	1	0	-	0	0	103	0	-
Motorcycles - dust						58	6			
Generator - Gasoline	1	0	1	0	-	0	0	65	-	-
Propane Stoves	0	0	0	0	0	0	0	33	0	0
Fire	1	14	-	-	3	2	2	-	1	-
Total - East Area	*28*	*275*	*19*	*0*	*3*	*4,657*	*468*	*7,950*	*3*	*0*
South Area										
OHV Day Use										
Transport vehicle	3	70	8	0	-	1	1	8,501	1	-
Transport vehicle - dust						5,366	537			
OHVs	1	21	2	0	-	0	0	2,497	0	-
OHVs - dust						649	65			
Motorcycles	39	340	19	0	-	1	1	2,191	3	-
Motorcycles - dust						1,228	123			
Total - South Area	*42*	*431*	*30*	*0*	*-*	*7,246*	*726*	*13,189*	*4*	*-*
Total Emissions - Pounds	*22,061*	*181,429*	*10,858*	*200*	*14,307*	*1,936,353*	*201,288*	*3,405,688*	*4,960*	*11*

Table A1-6. Existing Emissions within Acquired Lands - 29 Palms LAS EIS (Tons/Year)

Area/User Type/Source	VOC	CO	NO_X	SO_X	PM	PM_{10}	$PM_{2.5}$	CO_2	CH_4	N_2O
					Johnson Valley					
OHV Day Use										
Transport vehicle	0.08	2.19	0.26	0.00	-	0.03	0.02	265.36	0.02	-
Transport vehicle - dust	-	-	-	-	-	167.52	16.75	-	-	-
OHVs	0.02	0.64	0.08	0.00	-	0.01	0.01	77.95	0.01	-
OHVs - dust	-	-	-	-	-	36.02	3.60	-	-	-
Motorcycles	1.22	10.63	0.59	0.00	-	0.02	0.02	68.41	0.10	-
Motorcycles - dust	-	-	-	-	-	38.34	3.83	-	-	-
Overnight										
Transport vehicle	0.15	4.08	0.48	0.01	-	0.05	0.05	495.34	0.04	-
Transport vehicle - dust	-	-	-	-	-	427.17	42.72	-	-	-
OHVs	0.08	2.25	0.26	0.00	-	0.03	0.02	272.83	0.02	-
OHVs - dust	-	-	-	-	-	126.08	12.61	-	-	-
Motorcycles	4.26	37.19	2.07	0.00	-	0.07	0.06	239.43	0.35	-
Motorcycles - dust	-	-	-	-	-	134.21	13.42	-	-	-
Generator - Gasoline	3.02	0.97	1.54	0.08	-	0.10	0.09	151.03	-	-
Propane Stoves	0.01	0.05	0.08	0.00	0.00	0.00	0.00	77.69	0.00	0.01
Fire	2.14	32.01	-	-	7.15	4.66	4.04	-	1.93	-
Non-OHV Day Use										
Transport vehicle	0.01	0.36	0.04	0.00	-	0.00	0.00	44.23	0.00	-
Transport vehicle - dust						27.92	2.79			
Total - Johnson Valley	*11.00*	*90.36*	*5.40*	*0.10*	*7.15*	*962.23*	*100.05*	*1,692.27*	*2.48*	*0.01*
					East Area					
OHV Day Use										
Transport vehicle	0.00	0.02	0.00	0.00	-	0.00	0.00	2.39	0.00	-
Transport vehicle - dust	-	-	-	-	-	1.51	0.15	-	-	-
OHVs	0.00	0.01	0.00	0.00	-	0.00	0.00	0.70	0.00	-
OHVs - dust	-	-	-	-	-	0.32	0.03	-	-	-
Motorcycles	0.01	0.10	0.01	0.00	-	0.00	0.00	0.62	0.00	-
Motorcycles - dust	-	-	-	-	-	0.35	0.03	-	-	-
Overnight										
Transport vehicle	0.00	0.00	0.00	0.00	-	0.00	0.00	0.11	0.00	-
Transport vehicle - dust	-	-	-	-	-	0.09	0.01	-	-	-
OHVs	0.00	0.00	0.00	0.00	-	0.00	0.00	0.06	0.00	-
OHVs - dust	-	-	-	-	-	0.03	0.00	-	-	-
Motorcycles	0.00	0.01	0.00	0.00	-	0.00	0.00	0.05	0.00	-
Motorcycles - dust	-	-	-	-	-	0.03	0.00	-	-	-
Generator - Gasoline	0.00	0.00	0.00	0.00	-	0.00	0.00	0.03	-	-
Propane Stoves	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00
Fire	0.00	0.01	-	-	0.00	0.00	0.00	-	0.00	-
Total - East Area	*0.01*	*0.14*	*0.01*	*0.00*	*0.00*	*2.33*	*0.23*	*3.97*	*0.00*	*0.00*
					South Area					
OHV Day Use										
Transport vehicle	0.00	0.04	0.00	0.00	-	0.00	0.00	4.25	0.00	-
Transport vehicle - dust	-	-	-	-	-	2.68	0.27	-	-	-
OHVs	0.00	0.01	0.00	0.00	-	0.00	0.00	1.25	0.00	-
OHVs - dust	-	-	-	-	-	0.32	0.03	-	-	-
Motorcycles	0.02	0.17	0.01	0.00	-	0.00	0.00	1.10	0.00	-
Motorcycles - dust	-	-	-	-	-	0.61	0.06	-	-	-
Total - South Area	*0.02*	*0.22*	*0.01*	*0.00*	-	*3.62*	*0.36*	*6.59*	*0.00*	-
Total Emissions - Tons	*11.03*	*90.71*	*5.43*	*0.10*	*7.15*	*968.18*	*100.64*	*1,703*	*2.48*	*0.01*

Table A1-7. Existing Emissions within Acquired Lands by Source Category - 29 Palms LAS EIS (Tons/Year)

Area/Source Category	VOC	CO	NO_X	SO_X	PM	PM_{10}	$PM_{2.5}$	CO_2	CH_4	N_2O
Johnson Valley										
Vehicles - Combustive	5.83	57.33	3.79	0.02	-	0.20	0.18	1,463.55	0.55	-
Vehicles - Dust	-	-	-	-	-	957.26	95.73	-	-	-
Generator - Gasoline	3.02	0.97	1.54	0.08	-	0.10	0.09	151.03	-	-
Propane Stoves	0.01	0.05	0.08	0.00	0.00	0.00	0.00	77.69	0.00	0.01
Camp Fires	2.14	32.01	-	-	7.15	4.66	4.04	-	1.93	-
Subtotal - Johnson Valley	*11.00*	*90.36*	*5.40*	*0.10*	*7.15*	*962.23*	*100.05*	*1,692.27*	*2.48*	*0.01*
East Area										
Vehicles - Combustive	0.01	0.13	0.01	0.00	-	0.00	0.00	3.93	0.00	-
Vehicles - Dust	-	-	-	-	-	2.33	0.23	-	-	-
Generator - Gasoline	0.00	0.00	0.00	0.00	-	0.00	0.00	0.03	-	-
Propane Stoves	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00
Camp Fires	0.00	0.01	-	-	0.00	0.00	0.00	-	0.00	-
Subtotal - East Area	*0.01*	*0.14*	*0.01*	*0.00*	*0.00*	*2.33*	*0.23*	*3.97*	*0.00*	*0.00*
South Area										
Vehicles - Combustive	0.02	0.22	0.01	0.00	-	0.00	0.00	6.59	0.00	-
Vehicles - Dust	-	-	-	-	-	3.62	0.36	-	-	-
Subtotal - South Area	*0.02*	*0.22*	*0.01*	*0.00*	-	*3.62*	*0.36*	*6.59*	*0.00*	-
Total Emissions - Tons	*11.03*	*90.71*	*5.43*	*0.10*	*7.15*	*968.18*	*100.64*	*1,703*	*2.48*	*0.01*

Table A1-8. Emission Factors for Existing Sources within Acquired Lands - 29 Palms LAS EIS.

Source	Emission Factors										Notes
	VOC	*CO*	*NO_X*	*SO_X*	*PM*	*PM_{10}*	*$PM_{2.5}$*	*CO_2*	*CH_4*	*N_2O*	
Liquid Propane Gas Combustion	1.00	7.50	13.00	0.11	0.70	0.70	0.70	12,500	0.20	0.90	(1)
Camp Fires	13.80	206.00			46.00	30.00	26.00		12.40		(2)
Generator - Gasoline	0.02	0.01	0.01	0.00		0.00	0.00	1.08			(3)
Light Duty Truck - 2010	0.14	3.97	0.47	0.01		0.05	0.04	482	0.04		(4)
Motorcycle - 2010	2.51	21.90	1.22	0.00		0.04	0.04	141	0.21		(5)
Light Duty Truck - 2015	0.08	2.68	0.30	0.01		0.05	0.05	483	0.04		(6)
Motorcycle - 2015	2.24	17.76	1.17	0.00		0.03	0.03	149	0.20		(7)
Vehicle Dust - 4WD						0.49	0.05				(8)
Vehicle Dust - Day Use Transport Vehicle						0.67	0.07				(9)
Vehicle Dust - Motorcycle						0.17	0.02				(10)
Vehicle Dust - Overnight Transport Vehicle						0.92	0.09				(11)

Notes:

(1) U.S. EPA AP-42 Section 1.5 - Liquefied Petroleum Gas Combustion (lb/1,000 gal)

(2) U.S. EPA AP-42 Section 13.1-3 - Wildfires and Prescribed Burning (lb/ton)

(3) U.S. EPA AP-42 Section 3.3 - Gasoline and Diesel Industrial Engines (lb/hp-hr)

(4) Statewide average for light duty truck, 25 mph, year 2010 (g/mile). From EMFAC2007 (ARB 2007).

(5) Statewide average for motorcycle, 25 mph, year 2010 (g/mile). From EMFAC2007 (ARB 2007).

(6) Statewide average for light duty truck, 25 mph, year 2015 (g/mile). From EMFAC2007 (ARB 2007).

(7) Statewide average for motorcycle, 25 mph, year 2015 (g/mile). From EMFAC2007 (ARB 2007).

(8) Fugitive Dust from Unpaved Roads Emission Factors for OHV (lb/VMT) EPA AP-42, Section 13.2.2.

(9) Fugitive Dust from Unpaved Roads Emission Factors for Transport Vehicles (lb/VMT) EPA AP-42, Section 13.2.2.

(10) Fugitive Dust from Unpaved Roads Emission Factors for motorcycles (lb/VMT) EPA AP-42, Section 13.2.2.

(11) Fugitive Dust from Unpaved Roads Emission Factors for Overnight Transport Vehicles (lb/VMT) EPA AP-42, Section 13.2.2.

Vehicle Travel Unpaved = ((k(s/12)^a)*((W/3)^b)

k (PM_{10})	1.50	k ($PM_{2.5}$) 0.15
s	8.50	surface material silt content (%)
a	0.90	
b	0.45	
W_O	0.50	average weight OHV (tons)
W_{TV}	1.00	average weight Transport Vehicles (tons)
W_M	0.05	average weight Motorcycles (tons)
W_{TV2}	2.00	average weight Overnight Transport Vehicles (tons)

Table A1-9. Year 2015 Visitation Activities for Acquired Lands - 29 Palms LAS EIS

	Total Annual	*Total Annual Visitor Days*			*Days per*	*Total Annual Visitors*		
Area	*Visitor-Days*	*OHV Day Use*	*Overnight*	*Non-OHV Day Use*	*Overnight Use*	*OHV Day Use*	*Overnight*	*Non-OHV Day Use*
Johnson Valley	336,975	57,767	269,580	9,628	2.5	57,767	107,832	9,628
East	500	450	50		2.5	450	20	-
South	800	800			-	800	-	-

Table A1-10. Emission Source Data for Year 2015 Activities in Johnson Valley OHV Area.

Trip Type/Vehicle or Source	*Annual Vehicle Trips*	*VMT/ Trip*	*Annual VMT*	*Vehicle Weight (Tons)*
OHV Day Use				
Transport vehicle	28,884	20	577,671	1
OHVs	7,221	24	169,691	0.50
Motorcycles	21,663	24	509,073	0.05
Overnight				
Transport vehicle	35,944	30	1,078,320	2
OHV	13,479	44	593,918	0.50
Motorcycle	40,437	44	1,781,755	0.05
Generator - Gasoline (1) (2)	35,944	3	107,832	
Propane Stoves (1) (3)	35,944	2	71,888	
Fire (4)	35,944	20	718,880	
Non-OHV Day Use				
Transport vehicle	4,814	20	96,279	1

Notes: (1) Annual Vehicle Trips = annual # of units, VMT/Trip = hours/trip, and Annual VMT = annual hours of operation.

(2) HP = 5 at 60% Load

(3) Assumed 0.2 gallons/hours of LPG usage

(4) Annual Vehicle Trips = annual # of fires, VMT/Trip = pounds of wood burned/trip, and Annual VMT = annual pounds of wood burned.

Table A1-11. Emission Source Data for Year 2015 Activities in the East Study Area - 29 Palms LAS EIS

Trip Type/Vehicle or Source	*Annual Vehicle Trips*	*VMT/Trip*	*Annual VMT*	*Vehicle Weight (Tons)*
OHV Day Use				
Transport vehicle	225	20	4,500	1
OHVs	56	24	1,322	0.50
Motorcycles	169	24	3,966	0.05
Overnight				
Transport vehicle	7	30	200	2
OHV	3	44	110	0.50
Motorcycle	8	44	330	0.05
Generator - Gasoline (1) (2)	7	3	20	
Propane Stoves (1) (3)	7	2	13	
Fire (4)	7	20	133	

Notes: (1) Annual Vehicle Trips = annual # of units, VMT/Trip = hours/trip, and Annual VMT = annual hours of operation.

(2) HP = 5 at 60% Load

(3) Assumed 0.2 gallons/hours of LPG usage

(4) Annual Vehicle Trips = annual # of fires, VMT/Trip = pounds of wood burned/trip, and Annual VMT = annual pounds of wood burned.

Table A1-12. Emission Source Data for Year 2015 Activities in the South Study Area - 29 Palms LAS EIS

Trip Type/Vehicle or Source	*Annual Vehicle Trips*	*VMT/ Trip*	*Annual VMT*	*Vehicle Weight (Tons)*
OHV Day Use				
Transport vehicle	400	20	8,000	1
OHVs	100	24	2,350	0.50
Motorcycles	300	24	7,050	0.05

Assumptions:

(1) Source: (BLM 2010).

(2) 17/80/3% of visitor use days = OHV day/overnight/non-OHV day uses.

(3) The average length of stay for overnight use is 2.5 days.

(4) Rider occupancy of transport vehicle for day/overnight uses is 2/3 visitors.

(5) 50% of day and overnight visitors would operate an OHV. OHV fleet mix = 75/25% motorcycle/4 wheel vehicle.

(6) Vehile miles travelled (VMT) based upon 20% of visitors drive 10 VMT, 70% drive 25 VMT, and 10% drive 40 VMT per day.

Table A1-13. Year 2015 Emissions within Acquired Lands - 29 Palms LAS EIS (Pounds/Year)

Area/User Type/Source	VOC	CO	NO_X	SO_X	PM	PM_{10}	$PM_{2.5}$	CO_2	CH_4	N_2O
					Johnson Valley					
OHV Day Use										
Transport vehicle	183	5,056	596	6	-	61	56	613,840	53	-
Transport vehicle - dust						387,509	38,751			
OHVs	54	1,485	175	2	-	18	17	180,315	16	-
OHVs - dust						83,329	8,333			
Motorcycles	2,817	24,578	1,369	2	-	44	40	158,244	230	-
Motorcycles - dust						88,699	8,870			
Overnight										
Transport vehicle	342	9,438	1,113	12	-	114	105	1,145,834	100	-
Transport vehicle - dust						988,125	98,812			
OHVs	189	5,198	613	7	-	63	58	631,104	55	-
OHVs - dust						291,651	29,165			
Motorcycles	9,859	86,024	4,792	8	-	153	141	553,853	805	-
Motorcycles - dust						310,445	31,045			
Generator - Gasoline	6,985	2,252	3,558	191	-	233	215	349,376	-	-
Propane Stoves	14	108	187	2	10	10	10	179,720	3	13
Fire	4,960	74,045	-	-	16,534	10,783	9,345	-	4,457	-
Non-OHV Day Use										
Transport vehicle	31	843	99	1	-	10	9	102,307	9	-
Transport vehicle - dust						64,585	6,458			
Total - Johnson Valley	*25,434*	*209,026*	*12,503*	*231*	*16,544*	*2,225,832*	*231,430*	*3,914,591*	*5,728*	*13*
					East Area					
OHV Day Use										
Transport vehicle	1	39	5	0	-	0	0	4,782	0	-
Transport vehicle - dust						3,019	302			
OHVs	0	12	1	0	-	0	0	1,405	0	-
OHVs - dust						649	65			
Motorcycles	22	191	11	0	-	0	0	1,233	2	-
Motorcycles - dust						691	69			
Overnight										
Transport vehicle	0	2	0	0	-	0	0	213	0	-
Transport vehicle - dust						183	18			
OHVs	0	1	0	0	-	0	0	117	0	-
OHVs - dust						54	5			
Motorcycles	2	16	1	0	-	0	0	103	0	-
Motorcycles - dust						58	6			
Generator - Gasoline	1	0	1	0	-	0	0	65	-	-
Propane Stoves	0	0	0	0	0	0	0	33	0	0
Fire	1	14	-	-	3	2	2	-	1	-
Total - East Area	*28*	*275*	*19*	*0*	*3*	*4,657*	*468*	*7,950*	*3*	*0*
					South Area					
OHV Day Use										
Transport vehicle	3	70	8	0	-	1	1	8,501	1	-
Transport vehicle - dust						5,366	537			
OHVs	1	21	2	0	-	0	0	2,497	0	-
OHVs - dust						649	65			
Motorcycles	39	340	19	0	-	1	1	2,191	3	-
Motorcycles - dust						1,228	123			
Total - South Area	*42*	*431*	*30*	*0*	-	*7,246*	*726*	*13,189*	*4*	-
Total Emissions - Pounds	*25,504*	*209,732*	*12,551*	*231*	*16,547*	*2,237,735*	*232,625*	*3,935,730*	*5,736*	*13*

Table A1-14. Year 2015 Emissions within Acquired Lands - 29 Palms LAS EIS (Tons/Year)

Area/User Type/Source	VOC	CO	NO_X	SO_X	PM	PM_{10}	$PM_{2.5}$	CO_2	CH_4	N_2O
					Johnson Valley					
OHV Day Use										
Transport vehicle	0.09	2.53	0.30	0.00	-	0.03	0.03	306.92	0.03	-
Transport vehicle - dust	-	-	-	-	-	193.75	19.38	-	-	-
OHVs	0.03	0.74	0.09	0.00	-	0.01	0.01	90.16	0.01	-
OHVs - dust	-	-	-	-	-	41.66	4.17	-	-	-
Motorcycles	1.41	12.29	0.68	0.00	-	0.02	0.02	79.12	0.12	-
Motorcycles - dust	-	-	-	-	-	44.35	4.43	-	-	-
Overnight										
Transport vehicle	0.17	4.72	0.56	0.01	-	0.06	0.05	572.92	0.05	-
Transport vehicle - dust	-	-	-	-	-	494.06	49.41	-	-	-
OHVs	0.09	2.60	0.31	0.00	-	0.03	0.03	315.55	0.03	-
OHVs - dust	-	-	-	-	-	145.83	14.58	-	-	-
Motorcycles	4.93	43.01	2.40	0.00	-	0.08	0.07	276.93	0.40	-
Motorcycles - dust	-	-	-	-	-	155.22	15.52	-	-	-
Generator - Gasoline	3.49	1.13	1.78	0.10	-	0.12	0.11	174.69	-	-
Propane Stoves	0.01	0.05	0.09	0.00	0.01	0.01	0.01	89.86	0.00	0.01
Fire	2.48	37.02	-	-	8.27	5.39	4.67	-	2.23	-
Non-OHV Day Use										
Transport vehicle	0.02	0.42	0.05	0.00	-	0.01	0.00	51.15	0.00	-
Transport vehicle - dust						32.29	3.23			
Total - Johnson Valley	*12.72*	*104.51*	*6.25*	*0.12*	*8.27*	*1,112.92*	*115.72*	*1,957.30*	*2.86*	*0.01*
					East Area					
OHV Day Use										
Transport vehicle	0.00	0.02	0.00	0.00	-	0.00	0.00	2.39	0.00	-
Transport vehicle - dust	-	-	-	-	-	1.51	0.15	-	-	-
OHVs	0.00	0.01	0.00	0.00	-	0.00	0.00	0.70	0.00	-
OHVs - dust	-	-	-	-	-	0.32	0.03	-	-	-
Motorcycles	0.01	0.10	0.01	0.00	-	0.00	0.00	0.62	0.00	-
Motorcycles - dust	-	-	-	-	-	0.35	0.03	-	-	-
Overnight										
Transport vehicle	0.00	0.00	0.00	0.00	-	0.00	0.00	0.11	0.00	-
Transport vehicle - dust	-	-	-	-	-	0.09	0.01	-	-	-
OHVs	0.00	0.00	0.00	0.00	-	0.00	0.00	0.06	0.00	-
OHVs - dust	-	-	-	-	-	0.03	0.00	-	-	-
Motorcycles	0.00	0.01	0.00	0.00	-	0.00	0.00	0.05	0.00	-
Motorcycles - dust	-	-	-	-	-	0.03	0.00	-	-	-
Generator - Gasoline	0.00	0.00	0.00	0.00	-	0.00	0.00	0.03	-	-
Propane Stoves	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00
Fire	0.00	0.01	-	-	0.00	0.00	0.00	-	0.00	-
Total - East Area	*0.01*	*0.14*	*0.01*	*0.00*	*0.00*	*2.33*	*0.23*	*3.97*	*0.00*	*0.00*
					South Area					
OHV Day Use										
Transport vehicle	0.00	0.04	0.00	0.00	-	0.00	0.00	4.25	0.00	-
Transport vehicle - dust	-	-	-	-	-	2.68	0.27	-	-	-
OHVs	0.00	0.01	0.00	0.00	-	0.00	0.00	1.25	0.00	-
OHVs - dust	-	-	-	-	-	0.32	0.03	-	-	-
Motorcycles	0.02	0.17	0.01	0.00	-	0.00	0.00	1.10	0.00	-
Motorcycles - dust	-	-	-	-	-	0.61	0.06	-	-	-
Total - South Area	*0.02*	*0.22*	*0.01*	*0.00*	-	*3.62*	*0.36*	*6.59*	*0.00*	-
Total Emissions - Tons	*12.75*	*104.87*	*6.28*	*0.12*	*8.27*	*1,118.87*	*116.31*	*1,968*	*2.87*	*0.01*

Table A1-15. Year 2015 Emissions within Acquired Lands by Source Category - 29 Palms LAS EIS (Tons/Year)

Area/Source Category	VOC	CO	NO_X	SO_X	PM	PM_{10}	$PM_{2.5}$	CO_2	CH_4	N_2O
Johnson Valley										
Vehicles - Combustive	6.74	66.31	4.38	0.02	-	0.23	0.21	1,692.75	0.63	-
Vehicles - Dust	-	-	-	-	-	1,107.17	110.72	-	-	-
Generator - Gasoline	3.49	1.13	1.78	0.10	-	0.12	0.11	174.69	-	-
Propane Stoves	0.01	0.05	0.09	0.00	0.01	0.01	0.01	89.86	0.00	0.01
Camp Fires	2.48	37.02	-	-	8.27	5.39	4.67	-	2.23	-
Subtotal - Johnson Valley	*12.72*	*104.51*	*6.25*	*0.12*	*8.27*	*1,112.92*	*115.72*	*1,957.30*	*2.86*	*0.01*
East Area										
Vehicles - Combustive	0.01	0.13	0.01	0.00	-	0.00	0.00	3.93	0.00	-
Vehicles - Dust	-	-	-	-	-	2.33	0.23	-	-	-
Generator - Gasoline	0.00	0.00	0.00	0.00	-	0.00	0.00	0.03	-	-
Propane Stoves	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00
Camp Fires	0.00	0.01	-	-	0.00	0.00	0.00	-	0.00	-
Subtotal - East Area	*0.01*	*0.14*	*0.01*	*0.00*	*0.00*	*2.33*	*0.23*	*3.97*	*0.00*	*0.00*
South Area										
Vehicles - Combustive	0.02	0.22	0.01	0.00	-	0.00	0.00	6.59	0.00	-
Vehicles - Dust	-	-	-	-	-	3.62	0.36	-	-	-
Subtotal - South Area	*0.02*	*0.22*	*0.01*	*0.00*	-	*3.62*	*0.36*	*6.59*	*0.00*	-
Total Emissions - Tons	*12.75*	*104.87*	*6.28*	*0.12*	*8.27*	*1,118.87*	*116.31*	*1,968*	*2.87*	*0.01*

Table A1-16. Fraction of Events Visitors in Johnson Valley OHV Area Displaced by Each Project Alternative

Alternative	*Displaced from JV*	*Remain in County (1*	*Displaced from County*	*% of Total JV out of C*	*Remain in O3 NA (1)*	*Displaced from O3 NA*	*% of Total JV out of NA*
1	1.00	-	1.00	0.17	-	1.00	0.17
2	0.60	-	1.00	0.10	-	1.00	0.10
4	0.15	-	1.00	0.03	-	1.00	0.03
5	0.15	-	1.00	0.03	-	1.00	0.03
6	0.60	-	1.00	0.10	-	1.00	0.10

Note: 17 percent of the annual visitor usage occurs from events.

Note: (1) = Total visitors that remain

Table A1-17. Fraction of Dispersed-Use Visitors in Johnson Valley OHV Area Displaced by Each Project Alternative

Alternative	*Displaced from JV*	*Remain in County (1*	*Displaced from County*	*% of Total JV out of C*	*Remain in O3 NA (1)*	*Displaced from O3 NA*	*% of Total JV out of NA*
1	0.75	0.90	0.10	0.06	0.81	0.19	0.12
2	0.25	0.90	0.10	0.02	0.81	0.19	0.04
4 - MDU	0.15	0.90	0.10	0.01	0.81	0.19	0.02
4 - SDU	0.30	0.90	0.10	0.005	0.81	0.19	0.01
4 - Total				0.015			0.028
5 - MDU	0.15	0.90	0.10	0.01	0.81	0.19	0.02
5 - SDU	0.30	0.90	0.10	0.005	0.81	0.19	0.01
5 - Total				0.015			0.028
6	0.30	0.90	0.10	0.02	0.81	0.19	0.05

Note: 83 percent of the annual visitor usage occurs from dispersed-use.

Note: (1) = Total visitors that remain

??? ???

Table A1-18. Fraction of All Visitors in Johnson Valley OHV Area Displaced by Each Project Alternative

Alternative	*Displaced from JV*	*Remain in County*		*% of Total JV out of C*			*% of Total JV out of NA*
1	0.79			0.23			0.29
2	0.31			0.12			0.14
4 - Total	0.17			0.04			0.05
5 - Total	0.17			0.04			0.05
6	0.25			0.13			0.15

Note: 17/83 percent of the annual visitor usage occurs from events/dispersed-use.

Note: (1) = Total visitors that remain

Table A1-19. Year 2015 Future Baseline Emissions Relocated from Johnson Valley - 29 Palms LAS EIS Project Alternatives (Tons/Year)

Area/Source Category	VOC	CO	NO_X	SO_X	PM	PM_{10}	$PM_{2.5}$	*CO_2*	*CH_4*	*N_2O*
Johnson Valley										
Vehicles - Combustive	6.74	66.31	4.38	0.02	-	0.23	0.21	1,693	0.63	-
Vehicles - Dust	-	-	-	-	-	1,107.17	110.72	-	-	-
Gasoline-powered Generator	3.49	1.13	1.78	0.10	-	0.12	0.11	175	-	-
Propane Stoves	0.01	0.05	0.09	0.00	0.01	0.01	0.01	90	0.00	0.01
Camp Fires	2.48	37.02	-	-	8.27	5.39	4.67	-	2.23	-
Total Johnson Valley Emissions - Year 2015	12.72	104.51	6.25	0.12	8.27	1,112.92	115.72	1,957	2.86	0.01
Total Eliminated from MDAB - Alternative 1 (1)	2.95	24.27	1.45	0.03	1.92	258.47	26.87	454.58	0.67	0.00
Total Eliminated from MDAB - Alternative 2 (1)	1.56	12.83	0.77	0.01	1.02	136.61	14.20	240.26	0.35	0.00
Total Eliminated from MDAB - Alternative 4 (1)	0.51	4.23	0.25	0.00	0.33	45.01	4.68	79.15	0.12	0.00
Total Eliminated from MDAB - Alternative 5 (1)	0.51	4.23	0.25	0.00	0.33	45.01	4.68	79.15	0.12	0.00
Total Eliminated from MDAB - Alternative 6 (1)	1.61	13.26	0.79	0.01	1.05	141.23	14.68	248.38	0.36	0.00
Total Eliminated from MDAB O3 NA - Alternative 6 (1)	1.90	15.60	0.93	0.02	1.24	166.17	17.28	292.24	0.43	0.00

Note: (1) = These emissions deducted from the increase in emissions from each project alternative to produce net change in emissions.

Table A1-20. Emission Source Data for Road Construction - 29 Palms LAS EIS Proposed Alternative 6

Activity/Equipment Type	*Hp Rating*	*Average Daily % of Full Throttle*	*Number Active*	*Hours/ Day*	*Total Work Days*	*Total Hp-Hrs*
3000 Gal Water Truck	400	0.60	2	8	30	115,200
Motor Grader - 14 Foot Blade	275	0.80	1	8	30	52,800
Rubber Wheeled Compactor	400	0.80	1	8	30	76,800
Fugitive Dust	NA	NA	1	NA	30	30
On-Road Trucks						
Activity/Equipment Type	*Vehicle Weight*	*Miles per Round Trip*	*Daily Trips*		*Total Work Days*	*Total Miles*
Equipment Delivery Truck		200	1		2	400

Table A1-21. Emission Source Data for Construction of Communications Towers - 29 Palms LAS EIS Proposed Alternative 6

Activity/Equipment Type	*Hp Rating*	*Average Daily % of Full Throttle*	*Number Active*	*Hours/ Day*	*Total Work Days*	*Total Hours*
Forklift	67	0.40	1	4	5	536
Helicopters						
Activity/Equipment Type			*Number Active*	*Cruising (Hrs)*	*# of LTOs*	*# of Rock and Blocks (1)*
Helicopter - Skycrane			1	5	12	120
Helicopter - Huey (1)			1	2	10	50
On-Road Trucks						
Activity/Equipment Type	*Vehicle Wt. (Tons)*	*Miles per Round Trip*			*Total Trips*	*Total Miles*
Heavy Duty Truck (2)		100			10	1,000

Notes: (1) For Huey, # of Rock and Blocks = # of TGOs.

(2) Assume 10% of total VMT would occur on unpaved road.

Table A1-22. Offroad Construction Equipment Emission Factors - 29 Palms LAS EIS Project Alternatives

Project Year 2010/Source Type	Fuel Type	Emission Factors (Grams/Horsepower-Hour) VOC	CO	NOx	SOx	PM	PM10	PM2.5	References
Off-Road Equipment - <15 Hp	D	0.45	2.14	2.87	0.01	0.15	0.15	0.14	(1)
Off-Road Equipment - 16-24 Hp	D	0.49	1.52	2.76	0.00	0.16	0.16	0.14	(1)
Off-Road Equipment - 25-50 Hp	D	1.49	3.87	3.44	0.00	0.35	0.45	0.33	(1)
Off-Road Equipment - 51-120 Hp	D	0.66	2.36	4.05	0.00	0.36	0.30	0.33	(1)
Off-Road Equipment - 121-175 Hp	D	0.47	2.02	3.75	0.00	0.21	0.22	0.19	(1)
Off-Road Equipment - 176-250 Hp	D	0.34	0.97	3.60	0.00	0.13	0.15	0.12	(1)
Off-Road Equipment - 251-500 Hp	D	0.29	1.08	3.03	0.00	0.11	0.15	0.10	(1)
Off-Road Equipment - 501-750 Hp	D	0.31	1.18	3.25	0.00	0.12	0.15	0.11	(1)
Off-Road Equipment - >750 Hp	D	0.37	1.45	4.28	0.00	0.13	0.13	0.12	(1)
On-road Truck - Idle (Gms/Hr)	D	13.69	48.45	104.13	0.06	1.76	1.58	1.20	(2)
On-road Truck - 5 mph (Gms/Mi)	D	12.10	25.26	37.29	0.04	2.31	2.08	1.57	(2)
On-road Truck - 25 mph (Gms/Mi)	D	1.50	7.95	15.51	0.02	0.65	0.59	0.44	(2)
On-road Truck - 55 mph (Gms/Mi)	D	0.81	4.66	14.53	0.02	0.58	0.52	0.39	(2)
On-Road Trucks - Composite (Gms/Mi)	D	9.42	20.77	31.79	0.04	1.89	1.70	1.29	(2)
On-Road Trucks - Fugitive Dust	- - -	- - -	- - -	- - -	- - -	8.89	2.57	0.39	(3)
Disturbed Ground - Fugitive Dust	- - -	- - -	- - -	- - -	- - -	55.00	27.50	2.75	(4)
Helicopter - Skycrane - Cruise		3.84	22.11	4.41	0.45	1.99			(5)
Helicopter - Skycrane - LTO		6.81	21.37	1.07	0.15	1.36			(5)
Helicopter - Skycrane - Rocks and Blocks		0.41	3.01	0.91	0.08	0.38			(5)
Helicopter - Skycrane - Fugitive Dust	- - -	- - -	- - -	- - -	- - -	123.22	61.61	24.64	(6)
Helicopter - Huey - Cruise		0.37	4.41	4.15	0.35	0.65			(7)
Helicopter - Huey - LTO		2.17	1.90	1.02	0.10	0.19			(7)
Helicopter - Huey - TGO		0.06	0.76	0.96	0.08	0.15			(7)
Helicopter - Huey - Fugitive Dust	- - -	- - -	- - -	- - -	- - -	11.28	5.64	2.26	(6)

Notes: (1) Composites developed from Offroad emission factors obtained from URBEMIS 2007 for project year 2010.

(2) Heavy duty diesel truck running emission factors developed from EMFAC2007 (CARB 2006b). Units in gms/mile calculated for project year 2010. Composite emission factors based on a round trip of 75% at 55 mph, 20% at 25 mph, and 5% at 5 mph. Units in grams/mile. Although not shown in these calculations, emissions from 15 minutes of idling mode included for each truck round trip.

(3) See Table A1-7. Units in Lb/VMT.

(4) Units in lbs/acre-day from section 11.2.3 of AP-42 (USEPA 1995). Emissions reduced by 50% from uncontrolled levels to simulate implementation of best management practices (BMPs) for fugitive dust control

(5) AESO 2000a and b for a CH-46E. Cruise units in lb/hr and LTO/Rocks and Blocks/TGO units in lb/event.

(6) See Table A1-17, R-2501 Section. Units in Lb/LTO.

(7) EPA 1992. Cruise units in lb/hr and LTO/Rocks and Blocks units in lb.

Table A1-23. Total Road Construction Emissions - 29 Palms LAS EIS Proposed Alternative 6

	Total Pounds						
Activity/Equipment Type	*VOC*	*CO*	*NOx*	*SOx*	*PM*	*PM10*	*PM2.5*
3000 Gal Water Truck	73.85	274.97	770.26	0.82	28.19	38.10	25.94
Motor Grader - 14 Foot Blade	33.85	126.03	353.04	0.37	12.92	17.46	11.89
Rubber Wheeled Compactor	49.23	183.31	513.51	0.54	18.79	25.40	17.29
Fugitive Dust	--	--	--	--	1,650	825	83
Subtotal	*157*	*584*	*1,637*	*2*	*1,710*	*906*	*138*
On-Road Vehicles							
Equipment Delivery Truck	8.30	18.31	28.04	0.03	1.67	1.50	1.13
On-Road Vehicles -Subtotal	*8.30*	*18.31*	*28.04*	*0.03*	*1.67*	*1.50*	*1.13*
Total Emissions (Pounds)	165	603	1,665	2	1,712	907	139

Calculation of Annual Emissions for Off-Road Equipment

Emission Factor (g/hp-hr) x Total Horsepower-hours (hp-hr/yr) x 1 lb/453.6 g = Annual Emissions (lb/yr)

Calculation of Annual Emissions for On-Road Vehicles

Emission Factor (g/mile) x Number of daily truck trips x Round-trip distance (mile) x Number of working days x 1 lb/453.6 g = Annual Emissions (lb/yr)

Calculation of Annual Emissions for PM fugitive dust - ground disturbance

Emission Factor (lb/acre-day) x Acreage Disturbed (acres) x Annual number of working days (day/yr) = Annual Emissions (lb/yr)

Table A1-24. Emissions for Construction of Communications Towers - 29 Palms LAS EIS Proposed Alternative 6

	Total Pounds						
Activity/Equipment Type	*VOC*	*CO*	*NOx*	*SOx*	*PM*	*PM10*	*PM2.5*
Forklift	0.8	2.8	4.8	0.0	0.4	0.4	0.4
Subtotal	*0.8*	*2.8*	*4.8*	*0.0*	*0.4*	*0.4*	*0.4*
Helicopters							
Helicopter - Skycrane - Cruise	19.2	110.6	22.1	2.3	10.0	-	-
Helicopter - Skycrane - LTO	81.7	256.4	12.8	1.8	16.3	-	-
Helicopter - Skycrane - Rocks and Blocks	49.2	361.2	109.2	9.6	45.6	-	-
Helicopter - Skycrane - Fugitive Dust	-	-	-	-	1,478.6	739.3	295.7
Helicopter - Huey - Cruise	0.7	8.8	8.3	0.7	1.3	-	-
Helicopter - Huey - LTO	21.7	19.0	10.2	1.0	1.9	-	-
Helicopter - Huey - TGO	3.1	37.9	48.1	4.1	7.5	-	-
Helicopter - Huey - Fugitive Dust	-	-	-	-	112.8	56.4	22.6
Subtotal	*175.7*	*794.0*	*210.7*	*19.4*	*1,674.0*	*795.7*	*318.3*
On-Road Vehicles							
Equipment Delivery Truck	2.2	12.1	32.6	0.0	1.3	1.2	0.9
Equipment Delivery Truck - Fugitive Dust	-	-	-	-	889.3	257.0	39.4
On-Road Vehicles -Subtotal	*2.2*	*12.1*	*32.6*	*0.0*	*890.6*	*258.2*	*40.3*
Total Emissions (Pounds)	178.6	808.8	248.1	19.5	2,565.0	1,054.3	359.0

Calculation of Annual Emissions for Off-Road Equipment

Emission Factor (g/hp-hr) x Total Horsepower-hours (hp-hr/yr) x 1 lb/453.6 g = Annual Emissions (lb/yr)

Calculation of Annual Emissions for Helicopters - LTOs

Emission Factor (lb/LTO) x Number of LTOs = Annual Emissions (lb/yr)

Calculation of Annual Emissions for On-Road Vehicles

Emission Factor (g/mile) x Number of daily truck trips x Round-trip distance (mile) x Number of working days x 1 lb/453.6 g = Annual Emissions (lb/yr)

Calculation of Annual Emissions for PM fugitive dust - ground disturbance

Emission Factor (lb/acre-day) x Acreage Disturbed (acres) x Annual number of working days (day/yr) = Annual Emissions (lb/yr)

Table A1-25. Emission Source Data for Tactical Vehicles/Support Equipment - 29 Palms LAS EIS Proposed Alternatives 1, 2, and 4-6

Activity/Equipment Type	*Number of Vehicles*	*Annual VMT*	*Miles per Gallon*	*Total Gallons*	*Hp*	*Total Hp-Hr (1)*
Tactical Vehicles						
Medium Tactical Vehicle Replacement	348	228,814	3.85	59,432	250	1,188,644
High-Mobility Multipurpose Wheeled Vehicle	785	393,386	14.00	28,099	150	561,980
Logistics Vehicle System	198	75,094	2.00	37,547	445	750,940
Internally Transportable Vehicle	50	18,156	14.00	1,297	71	25,937
M60A1 Bridge Vehicle	4	2,580	0.33	7,818		
Amphibious Assault Vehicle	187	87,550	0.75	116,733	425	2,334,667
(Variants)	87	34,694	5.17	6,711	275	134,213
M88A2 Hercules Recovery Vehicle	12	1,290	0.33	3,909		
High-Mobility Artillery Rocket System	6	70	3.85	18	330	364
Abrams M1A1 Main Battle Tank	44	16,354	0.33	49,558		
Joint Assault Bridge	5	1,858	0.33	5,632		
Assault Breacher Vehicle	5	3,000	0.36	8,333		
Tactical Support Equipment (2)						
	Number of Vehicles	*Hp*	*Hours per Year*	*Total Hp-Hr*		
Medium Crawler Tractor	5	118	120	70,800		
Excavator, Combat	12	295	120	424,800		
Grader	2	150	120	36,000		
Armored Tractor	3	118	120	42,480		
D7 Bulldozer	5	200	120	120,000		
Armored Backhoe	12	295	120	424,800		
Extended Boom Forklift	4	150	120	72,000		
Light Capacity Rough Terrain Truck Forklift	2	110	120	26,400		
Tractor, Rubber Tired, Articulated Steering	10	185	120	222,000		

Notes: (1) Based upon a fuel usage rate of 0.051 gallons per Hp-Hr.

(2) Horsepower ratings from 2007 CEIP Appendix D.11.

Table A1-26. Tactical Vehicles/Support Equipment Emission Factors - 29 Palms LAS EIS Proposed Alternative 6

Source Type	*Emission Factors (Pounds/1000 Gallons)*							Reference
	ROG	*CO*	*NO_X*	*SO_X*	*PM*	*PM_{10}*	*$PM_{2.5}$*	
Tank Vehicles and ABV								
Abrams Tank/Bridge Vehicles	0.06	0.45	118.80	0.51	1.56	1.56	1.52	(1)
Assault Breacher Vehicle	14.10	101.60	170.88	13.96	1.71	1.71	1.57	(2)
Other Tactical Vehicles/TSE								
	Emission Factors (Grams/Horsepower-Hour)							
121-250 Hp	0.94	4.40	10.84	1.32	0.44	0.43	0.43	(3)
>250 Hp	0.95	4.20	10.84	1.32	0.42	0.41	0.41	(3)

Notes: (1) From 2007 CEIP Appendix D.11, page 6.

(2) FEA for Proposed ABV Action at MCAGCC (2003).

(3) From 2007 CEIP Appendix D.11, page 7.

(4) GHG Emission Factors for (a) Tank Vehicles and ABVs from General Reporting Protocol, Tables C.3 and C.6 jet fuel (California Climate

and (b) other TV/TSE from OFFROAD2007 Model.

Table A1-27. Total Tactical Vehicles/Support Equipment Emissions - 29 Palms LAS EIS Proposed Alternative 6

	Pounds per Year						
Activity/Equipment Type	*ROG*	*CO*	*NO_X*	*SO_X*	*PM*	*PM_{10}*	*$PM_{2.5}$*
Tactical Vehicles							
Medium Tactical Vehicle Replacement	2,489	11,006	28,406	3,459	1,101	1,074	1,074
High-Mobility Multipurpose Wheeled Vehicle	1,165	5,451	13,430	1,635	545	533	533
Logistics Vehicle System	1,573	6,953	17,946	2,185	695	679	679
Internally Transportable Vehicle	54	252	620	75	25	25	25
M60A1 Bridge Vehicle	0	4	929	4	12	12	12
Amphibious Assault Vehicle	4,890	21,617	55,793	6,794	2,162	2,110	2,110
Light Armored Vehicle (Variants)	281	1,302	3,207	391	130	127	127
M88A2 Hercules Recovery Vehicle	0	2	464	2	6	6	6
High-Mobility Artillery Rocket System	1	3	9	1	0	0	0
Abrams M1A1 Main Battle Tank	3	22	5,887	25	77	77	75
Joint Assault Bridge	0	3	669	3	9	9	9
Assault Breacher Vehicle	118	847	1,424	116	14	14	13
Subtotal - Pounds	10,574	47,461	128,784	14,691	4,777	4,667	4,663
Tactical Support Equipment							
Medium Crawler Tractor	147	687	1,692	206	69	67	67
Excavator, Combat	890	3,933	10,152	1,236	393	384	384
Grader	75	333	860	105	33	33	33
Armored Tractor	89	393	1,015	124	39	38	38
D7 Bulldozer	251	1,111	2,868	349	111	108	108
Armored Backhoe	890	3,933	10,152	1,236	393	384	384
Extended Boom Forklift	149	698	1,721	210	70	68	68
Light Capacity Rough Terrain Truck Forklift	55	256	631	77	26	25	25
Multipurpose Vehicles	460	2,153	5,305	646	215	210	210
Subtotal - Pounds	3,006	13,499	34,395	4,188	1,350	1,318	1,318
Total Emissions (Pounds)	13,579	60,960	163,180	18,880	6,127	5,985	5,981
Total Emissions (Tons) [1]	6.79	30.48	81.59	9.44	3.06	2.99	2.99

Calculation of Annual Emissions for Tactical and Support Equipment

Emission Factor (g/hp-hr) x total Hp-hrs x 1 lb/453.6 g = Annual Emissions (lb/yr)

Calculation of Abrams Tank/Bridge Vehicles and Assault Breacher Vehicle

Emission Factor (lbs/1000 gals) x Total Gals x 1 /1000 = Annual Emissions (lb/yr)

Table A1-28. On-Road Vehicle Data for Personnel/Equipment Transport - 29 Palms LAS EIS Project Alternatives

Activity/Equipment Type	*Annual # of Vehicle Round Trips*	*Miles/Round Trip (1)*	*Total Annual Miles*
On-Road Transport			
Buses	800	90	72,000
Tractor-Trailer/Convoyed Vehicles	200	90	18,000

Notes: (1) Equal to distance travelled within the MDAB - all trips would originate from March Air Reserve Base and Camp Pendleton.

(2) Horsepower ratings from 2007 CEIP Appendix D.11.

Table A1-29. On-Road Vehicle Transport Emission Factors - 29 Palms LAS EIS Project Alternatives

Source Type/Activity	*Emission Factors (Grams/Mile)*							*Reference*
	ROG	*CO*	*NO_X*	*SO_X*	*PM*	*PM_{10}*	*$PM_{2.5}$*	
Urban Bus								
25 MPH	0.94	8.43	15.78	0.02		0.26	0.24	(1)
55 MPH	0.46	6.01	21.96	0.02		0.16	0.14	(1)
Composite Trip (1)	0.56	6.49	20.72	0.02	-	0.18	0.16	(1)
Heavy Diesel Truck								
25 MPH	0.80	5.63	10.33	0.02		0.41	0.37	(1)
55 MPH	0.45	3.67	10.00	0.01		0.37	0.34	(1)
Composite Trip (1)	0.52	4.06	10.07	0.01	-	0.38	0.35	(1)

Notes: (1) Assumes statewide average fleets for year 2013. Obtained from ARB EMFAC2007 Model (ARB 2006). PM inlcudes comb

(2) Composite factors based on a trip of 80% 25 mph and 20% 55 mph.

Table A1-30. Total On-Road Vehicle Personnel/Equipment Transport Emissions - 29 Palms LAS EIS Project Alternative

Equipment Type	*Pounds per Year*						
	ROG	*CO*	*NO X*	*SO X*	*PM*	*PM 10*	*PM 2.5*
Tactical Vehicles							
Buses	88	1,031	3,290	3	-	28	26
Tractor-Trailer/Convoyed Vehicles	21	161	399	0	-	15	14
Total Emissions (Pounds)	109	1,192	3,689	4	-	43	40
Total Emissions (Tons)	0.05	0.60	1.84	0.00	-	0.02	0.02

Table A1-31. Emission Source Data for Tactical Vehicles/Support Equipment - Unpaved Road Dust - 29 Palms LAS EIS Proposed Alternative 6

Equipment Type	Weight (Tons)	Unpaved Emission Factor (Lb/VMT)			Annual VMT	% Unpaved Travel (1)	Unpaved VMT
		PM	PM_{10}	$PM_{2.5}$			
Tactical Vehicles							
Medium Tactical Vehicle Replacement	10.0	6.51	1.88	0.29	228,814	90%	205,933
High-Mobility Multipurpose Wheeled Vehicle	3.0	3.79	1.09	0.17	393,386	50%	196,693
Logistics Vehicle System	20.0	8.89	2.57	0.39	75,094	50%	37,547
Internally Transportable Vehicle	3.5	4.06	1.17	0.18	18,156	50%	9,078
M60A1 Bridge Vehicle	70.0	15.63	4.52	0.69	2,580	90%	2,322
Amphibious Assault Vehicle	30.6	10.77	3.11	0.48	87,550	90%	78,795
Light Armored Vehicle (Variants)	14.1	7.60	2.20	0.34	34,694	90%	31,225
M88A2 HERCULES Recovery Vehicle	70.0	15.63	4.52	0.69	1,290	90%	1,161
High-Mobility Artillery Rocket System	12.0	7.07	2.04	0.31	70	50%	35
Abrams M1A1 Main Battle Tank	70.0	15.63	4.52	0.69	16,354	90%	14,719
Joint Assault Bridge	70.0	15.63	4.52	0.69	1,858	90%	1,673
Assault Breacher Vehicle	55.0	14.02	4.05	0.62	3,000	90%	2,700
Tactical Support Equipment							
Ground Disturbance (2)	1	110.0	55.0	5.5	48		

Notes: (1) Percentage of unpaved roads from 2007 CEIP Appendix D.13.

(2) Weight = daily disturbed acreage and Annual VMT = total annual days of disturbance. Emission factors in lb/acre-day.

Table A1-32. Emission Source Data for Tactical Vehicles/Support Equipment - Paved Road Dust - 29 Palms LAS EIS Proposed Alternative 6

Equipment Type	Weight (Tons)	Paved Emission Factor (Lb/VMT)			Annual VMT	% Paved Travel (1)	Paved VMT
		PM	PM_{10}	$PM_{2.5}$			
Tactical Vehicles							
Medium Tactical Vehicle Replacement	10.0	0.07	0.01	0.002	228,814	10%	22,881
High-Mobility Multipurpose Wheeled Vehicle	3.0	0.01	0.00	-	393,386	50%	196,693
Logistics Vehicle System	20.0	0.20	0.04	0.006	75,094	50%	37,547
Internally Transportable Vehicle	3.5	0.01	0.00	0.000	18,156	50%	9,078
M60A1 Bridge Vehicle	70.0	1.32	0.26	0.038	2,580	10%	258
Amphibious Assault Vehicle	30.6	0.38	0.07	0.011	87,550	10%	8,755
Light Armored Vehicle (Variants)	14.1	0.12	0.02	0.003	34,694	10%	3,469
M88A2 HERCULES Recovery Vehicle	70.0	1.32	0.26	0.038	1,290	10%	129
High-Mobility Artillery Rocket System	12.0	0.09	0.02	0.002	70	50%	35
Abrams M1A1 Main Battle Tank	70.0	1.32	0.26	0.038	16,354	10%	1,635
Joint Assault Bridge	70.0	1.32	0.26	0.038	1,858	10%	186
Assault Breacher Vehicle	55.0	0.92	0.18	0.027	3,000	10%	300

Notes: (1) Percentage of paved roads from 2007 CEIP Appendix D.13.

(2) US EPA 42 13.2.1, sL - 0.1, k(PM10) - 0.016, k(PM2.5) - 0.0024, C(PM10) - 0.00047, C(PM2.5) - 0.00036

Table A1-33. Annual Fugitive Dust Emissions for Tactical Vehicles - Unpaved Roads - 29 Palms LAS EIS Proposed Alternative 6

	Annual Emissions - Tons		
Equipment Type	*PM*	*PM_{10}*	*$PM_{2.5}$*
Tactical Vehicles			
Medium Tactical Vehicle Replacement	670.28	193.71	29.70
High-Mobility Multipurpose Wheeled Vehicle	372.41	107.63	16.50
Logistics Vehicle System	166.94	48.25	7.40
Internally Transportable Vehicle	18.42	5.32	0.82
M60A1 Bridge Vehicle	18.14	5.24	0.80
Amphibious Assault Vehicle	424.23	122.61	18.80
Light Armored Vehicle (Variants)	118.62	34.28	5.26
M88A2 HERCULES Recovery Vehicle	9.07	2.62	0.40
High-Mobility Artillery Rocket System	0.12	0.04	0.01
Abrams M1A1 Main Battle Tank	115.00	33.24	5.10
Joint Assault Bridge	13.07	3.78	0.58
Assault Breacher Vehicle	18.93	5.47	0.84
Subtotal	1,945.24	562.19	86.20
Tactical Support Equipment			
Ground Disturbance	2.64	1.32	0.13
Subtotal	2.64	1.32	0.13
Total Emissions	1,947.88	563.51	86.33

Table A1-34. Annual Fugitive Dust Emissions for Tactical Vehicles - Paved Roads - 29 Palms LAS EIS Proposed Alternative 6

	Annual Emissions - Tons		
Equipment Type	*PM*	*PM_{10}*	*$PM_{2.5}$*
Tactical Vehicles			
Medium Tactical Vehicle Replacement	0.81	0.15	0.02
High-Mobility Multipurpose Wheeled Vehicle	1.10	0.18	-
Logistics Vehicle System	3.77	0.73	0.10
Internally Transportable Vehicle	0.06	0.01	0.00
M60A1 Bridge Vehicle	0.17	0.03	0.00
Amphibious Assault Vehicle	1.67	0.32	0.05
Light Armored Vehicle (Variants)	0.21	0.04	0.01
M88A2 HERCULES Recovery Vehicle	0.09	0.02	0.00
High-Mobility Artillery Rocket System	0.00	0.00	0.00
Abrams M1A1 Main Battle Tank	1.08	0.21	0.03
Joint Assault Bridge	0.12	0.02	0.00
Assault Breacher Vehicle	0.14	0.03	0.00
Total Emissions	9.22	1.75	0.22
Total Emissions - Paved and Unpaved Roads	1,957.10	565.25	86.56

Table A1-35. Proposed MCAGCC Aircraft Operations and Emissions - Airspaces - 29 Palms LAS EIS Project Alternatives

Aircraft Type	Sorties				Tons per Year					
	Annual	Fraction Below 3,000 AGL	Total Duration (Min.)	Duration Below 3,000 AGL (Min.)	ROG/HC	CO	NOx	SO2	PM10	PM2.5
F/A-18 C/D	484	0.07	90	6.3	0.07	0.41	1.14	0.07	1.07	1.07
F-35	152	0.07	90	6.3	0.02	0.13	0.36	0.02	0.34	0.34
Joint FW (1)	4	0.07	90	6.3	0.00	0.00	0.05	0.00	0.00	0.01
KC-130	136	0.07	180	12.6	0.03	0.12	0.65	0.03	0.29	0.29
AV-8B	300	0.07	78	5.5	0.37	4.28	4.18	0.03	0.52	0.52
AH-1	546	0.99	90	89.1	0.19	3.63	1.91	0.14	1.45	1.45
UH-1	546	0.99	90	89.1	0.04	0.26	1.77	0.12	1.24	1.24
CH-53E	232	0.99	90	89.1	0.12	1.64	6.21	0.31	1.70	1.70
MV-22	268	0.69	120	82.8	0.01	0.45	6.59	0.23	0.89	0.89
Joint RW (2)	320	0.99	12	11.9	0.02	0.28	0.15	0.01	0.11	0.11
EA-6B	74	-	120	-	-	-	-	-	-	-
Joint AR (3)	36	-	240	-	-	-	-	-	-	-
UAS	240	-	600	-						
Total	3,338		1,890		0.86	11.20	23.01	0.95	7.62	7.63

Notes: (1) Assumes F-16 aircraft.

(2) Assumes AH-1 helicopter.

(3) Assumes KC-135 aircraft.

Table A1-36. Proposed Aircraft Emissions - Landing and Take-Offs - 29 Palms LAS EIS Project Alternatives

Location/Aircraft Type	Annual Sorties	Tons per Year					
		ROG/HC	CO	NOx	SO2	PM10	PM2.5
EAF							
F/A-18 C/D	484	13.17	34.61	3.86	0.22	4.02	4.02
F-35	152	4.14	10.87	1.21	0.07	1.26	1.26
Joint FW (1)	4	0.01	0.05	0.02	0.00	0.00	0.00
KC-130	136	0.52	1.01	1.18	0.06	0.61	0.61
AV-8B	300	2.62	2.93	1.72	0.13	0.23	0.23
AH-1	546	0.09	1.93	0.57	0.05	0.49	0.49
UH-1	546	0.18	0.91	0.35	0.03	0.32	0.32
CH-53E	232	1.30	2.65	1.03	0.08	0.44	0.44
MV-22	268	1.54	0.73	1.54	0.01	0.27	0.27
Joint RW (2)	320	0.05	1.13	0.33	0.03	0.29	0.29
EA-6B	74	0.83	1.70	0.45	0.04	0.07	0.07
Joint AR (3)	36	0.06	1.86	0.59	0.09	0.62	0.62
UAS	240	-	-	-	-	-	-
Subtotal	3,338	24.53	60.38	12.86	0.80	8.63	8.63
R-2501							
AH-1	1,092	0.02	0.38	0.17	0.01	0.14	0.14
UH-1	1,092	0.01	0.16	0.31	0.03	0.25	0.25
CH-53E	464	0.12	0.45	0.93	0.05	0.28	0.28
MV-22	536	0.00	0.08	2.38	0.06	0.25	0.25
Joint RW (2)	640	0.01	0.22	0.10	0.01	0.08	0.08
Subtotal	3,184	0.16	1.29	3.90	0.16	1.00	1.00
Total - LTOs	6,522	24.69	61.67	16.76	0.96	9.62	9.62

Notes: (1) Assumes F-16 aircraft.

(2) Assumes AH-1 helicopter.

(3) Assumes KC-135 aircraft.

Table A1-37. Proposed Fugitive Emissions - Landing and Take-Offs - 29 Palms LAS EIS Project Alternatives

Aircraft Type/Location	Annual Sorties	Tons per Year	
		PM10	PM2.5
EAF			
AH-1	546	0.35	0.14
UH-1	546	0.08	0.03
CH-53E	232	1.59	0.64
MV-22	268	0.26	0.10
Joint RW (2)	320	0.21	0.08
Subtotal	1,912	2.50	1.00
R-2501			
AH-1	1,092	12.71	5.08
UH-1	1,092	3.08	1.23
CH-53E	464	14.29	5.72
MV-22	536	2.33	0.93
Joint RW (2)	640	7.45	2.98
Subtotal	3,824	39.86	15.94
Total	5,736	42.36	16.94

Table A1-38. Aircraft Emission Factors - Airspace Modes of Operation - 29 Palms LAS EIS Project Alternatives

Aircraft	Engine Type	# Engines	Engine Power Setting	Fuel Flow/ Engine (Lb/Hr)	VOC	CO	NOx	SO2	PM10	PM2.5	CO2	CH4	N2O	Source of EF
					Pounds/1000 Pounds Fuel									
F/A-18 C/D	F404-GE-402	2	85% N	3,318	0.44	2.44	6.74	0.40	6.36	6.36	3,096	0.10	0.09	AESO Memo Rpt 9815E, 11/02
F-35	F404-GE-402	2	85% N	3,318	0.44	2.44	6.74	0.40	6.36	6.36	3,096	0.10	0.09	F-18 as a surrogate
Joint FW (1)	F100-PW-100	1	Intermediate	7,617	0.14	0.91	30.89	0.96	2.06	6.36	3,096	0.10	0.09	F-16 as a surrogate
KC-130	T56-A-16	4	8,000 Q	1,300	0.36	1.58	8.75	0.40	3.97	3.97	3,096	0.10	0.09	AESO Memo Rpt 2000-09B, 1/01
AV-8B	F-402-RR-404	1	Intermediate	6,186	4.33	50.73	49.49	0.40	6.19	6.19	3,096	0.10	0.09	EPA (1992), p. 187
AH-1	T700-GE-401C	2	38% Q - Cruise	425	0.56	10.54	5.55	0.40	4.20	4.20	3,096	0.10	0.09	AESO Memo Rpt 9824a, 1/00
UH-1	T53-L-13B	2	58% Q - Climbout	363	0.13	0.88	6.02	0.40	4.20	4.20	3,096	0.10	0.09	AESO Memo Rpt 9904A, 1/00
CH-53E	T64-GE-416 and -416A	3	70% Q - Cruise	1,488	0.15	2.13	8.08	0.40	2.21	2.21	3,096	0.10	0.09	AESO Memo Rpt 9822C, 2/00
MV-22	T406-AD-400	2	Helo (16°) Cruise	1,530	0.01	0.79	11.64	0.40	1.58	1.58	3,096	0.10	0.09	AESO Memo Rpt 9946E, 1/01
Joint RW (2)	T700-GE-401C	2	38% Q - Cruise	425	0.56	10.54	5.55	0.40	4.20	4.20	3,096	0.10	0.09	AH-1 as a surrogate
EA-6B	J52-P408	2	Intermediate	5,752	3.85	18.29	48.20	0.96	5.75	5.75	3,096	0.10	0.09	EPA (1992), p. 186
Joint AR (3)	F108-CF-100	4	Intermediate	5,650	0.03	1.61	13.53	0.96	0.65	0.65	3,096	0.10	0.09	IERA 2002

Notes: (1) Assumes F-16 aircraft.

(2) Assumes AH-1 helicopter.

(3) Assumes KC-135 aircraft.

(4) GHG Emission Factors from General Reporting Protocol, Tables C.3 and C.6 jet fuel (California Climate Action Registry 2009).

Table A1-39. Aircraft Emission Factors - Landing/Take-off Modes of Operation - 29 Palms LAS EIS Project Alternatives

Aircraft	*Engine Type*	*# Engines*	*Fuel Usage (Pounds per LTO)*	*Pounds/LTO* VOC	CO	NOx	SO2	PM10	PM2.5	CO2	CH4	N2O	*Source of EF*
F/A-18 C/D	F404-GE-402	2	2,232	54.43	143.03	15.95	0.89	16.61	16.61	6,911	0.22	0.20	AESO Memo Rpt 9815E, 11/02
F-35	F404-GE-402	2	2,232	54.43	143.03	15.95	0.89	16.61	16.61	6,911	0.22	0.20	F-18 as a surrogate
Joint FW (1)	F100-PW-100	1	1,207	4.74	23.33	9.89	1.12	2.17	2.17	3,737	0.12	0.11	USAF IERA 2002
KC-130	T56-A-16	4	2,367	7.65	14.79	17.35	0.95	9.03	9.03	7,329	0.24	0.21	AESO Memo Rpt 2000-09B, 1/01
AV-8B	F-402-RR-404	1	1,137	17.49	19.55	11.48	0.84	1.55	1.55	3,520	0.11	0.10	EPA (1992), p. 187
AH-1	T700-GE-401C	2	428	0.33	7.08	2.09	0.17	1.80	1.80	1,325	0.04	0.04	AESO Memo Rpt 9824a, 1/00
UH-1	T53-L-13B	1	280	0.67	3.32	1.28	0.11	1.18	1.18	867	0.03	0.02	AESO Memo Rpt 9904A, 1/00
CH-53E	T64-GE-416 and -416A	3	1,746	11.24	22.86	8.86	0.70	3.76	3.76	5,406	0.18	0.15	AESO Memo Rpt 9822C, 2/00
MV-22	T406-AD-400	2	1,464	11.51	5.44	11.51	0.08	2.01	2.01	4,533	0.15	0.13	AESO Memo Rpt 9946E, 1/01
Joint RW (2)	T700-GE-401C	2	428	0.33	7.08	2.09	0.17	1.80	1.80	1,325	0.04	0.04	AH-1 as a surrogate
EA-6B	J52-P408	2	1,819	22.55	45.91	12.10	0.98	1.82	1.82	5,632	0.18	0.16	EPA (1992), p. 186
Joint AR (3)	F108-CF-100	4	5,399	3.33	103.38	32.90	5.13	34.49	34.49	16,716	0.54	0.47	IERA 2002

Notes: (1) Assumes F-16 aircraft.

(2) Assumes AH-1 helicopter.

(3) Assumes KC-135 aircraft.

(4) GHG Emission Factors from General Reporting Protocol, Tables C.3 and C.6 (California Climate Action Registry 2009).

Table A1-40. Aircraft Emission Factors - Pad Landings - 29 Palms LAS EIS Project Alternatives

Aircraft	Engine Type	# Engines	Fuel Usage (Pounds per Landing)	Pounds/Landing VOC	CO	NOx	SO2	PM10	PM2.5	CO2	CH4	N2O	Source of EF
AH-1	T700-GE-401C	2	60	0.03	0.69	0.32	0.02	0.25	0.25	185.8	0.01	0.01	AESO Memo Rpt 9961, 7/99
UH-1 (4)	T53-L-13B	1	159	0.02	0.30	0.57	0.05	0.46	0.46	492.3	0.02	0.01	AESO Memo Rpt 9904A, 1/00
CH-53E	T64-GE-416 and -416A	3	540	0.52	1.94	4.03	0.22	1.19	1.19	1,671.9	0.05	0.05	AESO Memo Rpt 9960, Revision B, 4/00
MV-22	T406-AD-400	2	592	0.01	0.29	8.87	0.24	0.94	0.94	1,832.9	0.06	0.05	AESO Memo Rpt 2000-09B, 1/01
Joint RW (2)	T700-GE-401C	2	60	0.03	0.69	0.32	0.02	0.25	0.25	185.8	0.01	0.01	AH-1 as a surrogate

Notes: (1) Equal to hover, climbout, descent, and approach modes.

Table A1-41. Aircraft Fugitive Dust Emission Factors - Landing/Take-off Modes of Operation - 29 Palms LAS EIS Project Alternatives

Aircraft	Soil Silt Content (%)	Rain Days per Year	% of Time Wind Speed > 12 Knots	Exposed Area (Acres)	PM10 Pounds/Landing or Take O	PM2.5	Location of EF	Source of EF
EAF								
AH-1	9.1	8	0.17	0.04	1.30	0.52	2007 CEIP -	MDAQMD Mine Operations
UH-1	9.1	8	0.04	0.04	0.30	0.12	2007 CEIP -	MDAQMD Mine Operations
CH-53E	9.1	8	0.16	0.45	13.72	5.49	2007 CEIP -	MDAQMD Mine Operations
MV-22	9.1	8	0.02	0.51	1.94	0.78	2007 CEIP -	MDAQMD Mine Operations
Joint RW (1)	9.1	8	0.17	0.04	1.30	0.52	2007 CEIP -	MDAQMD Mine Operations
R-2501								
AH-1	9.1	8	0.33	0.37	23.27	9.31	2007 CEIP -	MDAQMD Mine Operations
UH-1	9.1	8	0.08	0.37	5.64	2.26	2007 CEIP -	MDAQMD Mine Operations
CH-53E	9.1	8	0.32	1.01	61.61	24.64	2007 CEIP -	MDAQMD Mine Operations
MV-22	9.1	8	0.04	1.14	8.69	3.48	2007 CEIP -	MDAQMD Mine Operations
Joint RW (1)	9.1	8	0.33	0.37	23.27	9.31	2007 CEIP -	MDAQMD Mine Operations

Table A1-42. Total Proposed Aircraft Emissions within all MCAGCC Airspaces - 29 Palms LAS EIS Project Alternatives

Airspace	Tons per Year					
	ROG/HC	CO	NOx	SO2	PM10	PM2.5
Airspaces	0.86	11.20	23.01	0.95	7.62	7.63
EAF LTOs	24.53	60.38	12.86	0.80	8.63	8.63
Range LTOs	0.16	1.29	3.90	0.16	1.00	1.00
Prop Wash - Fugitive Dust					42.36	16.94
Total	25.55	72.87	39.77	1.91	59.60	34.20

Table A1-43. Proposed Ground Forces Annual Ordnances - 29 Palms LAS EIS Project Alternatives

Ordnance Type/Activity	*Item #*	Usage	Units	Weight/Unit (Lb)	Total Explosive Weight (Tons)
Ground Forces Munitions					
Cartridges Smaller than 30 mm	A059, A063, A064, A131, A576, A976	936,270	EA		
Cartridges 30-75 mm	B519, B535, B576, B630, B643, B647	24,242	EA		
Cartridges 75 mm and Larger	C784, C785, C868, C870, C871, C995	11,468	EA	3.06	17.52
Projectiles, Canisters, and Chargers	D505, D528, D532, D533, D541, D544, D579	38,332	EA	4.96	95.00
Grenades	G878, G930, G940, G945	666	EA		
Rockets, Rocket Motors, and Igniters	HX05, HX07, J143	144	EA	0.11	0.01
Mines and Smoke Pots	K143	144	EA	0.22	0.02
Signals and Simulators	L312, L314, L324	360	EA		
Blasting Caps, Demo. Charges, and Detonators	M Series - Detonating cord	8,829	Ft	0.01	0.02
Blasting Caps, Demo. Charges, and Detonators	M Series - Other explosives	8,829	EA		
Fuses and Primers	N289, N340, N523	24,642	EA	0.003	0.04
Guided Missiles	PB99, WF10	144	EA	1.59	0.11
Total		1,057,160			

Table A1-44. Air-Delivered Munitions Used During MEB Exercises - 29 Palms LAS EIS Project Alternatives

	Identification Code	Usage	Units	Weight/Unit	Total Explosive Weight (Tons)
Unguided Munitions					
General Purpose Bomb (25 Lb) - Inert	MK-76 (Inert)	1,950	EA		
General Purpose Bomb (500 Lb)	MK-82	1,020	EA	154.00	78.54
General Purpose Bomb (1,000 Lb) Inert	MK-83 (Inert)	156	EA		
General Purpose Bomb (1,000 Lb)	MK-83	132	EA	165.50	10.92
General Purpose Bomb (2,000 Lb)	MK-84	36	EA	331.00	5.96
Inert Practice Bomb	BDU-45 (Inert)	360	EA		
2.75-inch Rocket	HE/WP/RP Rocket	8,400	EA	0.91	3.84
5-inch Zuni Rocket	HE/WP/ILLUM Rocket	792	EA	4.95	1.96
Guided Munitions [1]					
Hellfire missile	MK-114	72	EA	17.60	0.63
Laser Guided Bomb (500 lb)	GBU-12	432	EA	154.00	33.26
Laser Guided Bomb (1000 lb)	GBU-16	54	EA	165.50	4.47
Laser Guided Bomb (2000 lb)	GBU-10	4	EA	331.00	0.66
Joint Direct Attack Munitions (250 lb)	GB-38 version 4	252	EA	77.00	9.70
Joint Direct Attack Munitions (500 lb)	GBU-38, GBU-54	576	EA	154.00	44.35
Joint Direct Attack Munitions (1000 lb)	GBU-32	24	EA	165.50	1.99
Joint Direct Attack Munitions (2000 lb)	GBU-31	64	EA	331.00	10.59
Hard Target Penetrator	GBU-24	4	EA	331.00	0.66
Small Diameter Missile	GBU-39	24	EA	38.00	0.46
TOW Missile	BGM-71	84	EA	7.92	0.33
Laser Guided Training Round	-	432	EA	0.0066	0.001
Penetrator (500 lb)	BLU-111	384	EA	154.00	29.57
Aircraft Gun Systems Munitions					
20 mm	-	198,000	EA		
25 mm	-	181,000	EA		
7.62 mm	-	336,000	EA	0.002	0.32
.50 Cal	-	790,000	EA	0.01	4.29
Chaff and Flares					
Chaff (Assorted)	-	6,400	EA	0.01	0.04
Flares (Assorted)	-	20,862	EA	0.001	0.01

Table A1-45. Ordnance Combustive Emission Factors - 29 Palms LAS EIS Project Alternatives

Ordnance Type	*Pounds per Item or (lb/ton of Explosive)*						
	ROG	*CO*	*NOx*	*SO_2*	*PM*	*PM_{10}*	*$PM_{2.5}$*
Ground Forces Munitions							
Cartridges Smaller than 30 mm	7.95E-06	1.60E-03	8.50E-05	--	1.08E-06	5.60E-07	3.23E-08
Cartridges 30-75 mm	2.99E-06	3.50E-04	3.59E-05	--	8.22E-07	4.27E-07	2.47E-08
Cartridges 75 mm and Larger	0.85	82.0	9.25	--	4.10E-03	2.13E-03	1.23E-04
Projectiles, Canisters, and Chargers	11.44	777	0.57	--	5.12E-02	2.66E-02	1.54E-03
Grenades	2.39E-05	1.75E-04	4.15E-05	--	3.29E-06	1.71E-06	9.86E-08
Rockets, Rocket Motors, and Igniters	3.26	309	7.28	--	1.74E-02	9.05E-03	5.22E-04
Mines and Smoke Pots	0.58	223.61	0.00	--	2.06E-02	1.07E-02	6.18E-04
Signals and Simulators	0.00	0.01	0.01	--	5.66E-05	2.94E-05	1.70E-06
M Series - Detonating cord	1.21	252.47	0.00	--	4.00E-05	2.08E-05	1.20E-06
M Series - Other explosives	-	0.01	0.01	--	3.44E-03	1.79E-03	1.03E-04
Fuses and Primers	3.44	170.00	-	--	5.70E-06	2.96E-06	1.71E-07
Guided Missiles (3)	3.48	263.66	53.00	--	0.0137	0.0071	0.0004

Notes: (1) Data are averages of emission factors for munitions categories found in 2007 CEIP Appendix D.9.

(2) PM emission factors are for a per blast unit

(3) Used PA45 Surface Attack MGM-51C, from Appendix D.9 of the 2007 CEIP

Table A1-46. Air Delivered Munitions Combustive Emission Factors - 29 Palms LAS EIS Project Alternatives

Ordnance Type/Pollutant	Pounds per Item or (lb/ton of Explosive)						
	ROG	*CO*	*NOx*	*SO_2*	*PM*	*PM_{10}*	*$PM_{2.5}$*
Unguided Munitions							
General Purpose Bomb (25 Lb) - Inert							
General Purpose Bomb (500 Lb)	11.73	796.00	0.00	--	0.53	0.27	0.02
General Purpose Bomb (1,000 Lb) Inert							
General Purpose Bomb (1,000 Lb)	7.01	554.89	0.00	--	1.36	0.71	0.04
General Purpose Bomb (2,000 Lb)	7.01	554.89	0.00	--	2.72	1.41	0.08
Inert Practice Bomb							
2.75-inch Rocket	11.73	796.00	0.00	--	0.010	0.005	0.0003
5-inch Zuni Rocket	3.91	429.67	0.00	--	0.067	0.035	0.002
Guided Munitions							
Hellfire missile	3.91	429.67	0.00	--	0.01	0.01	0.0004
Laser Guided Bomb (500 lb)	11.73	796.00	0.00	--	0.53	0.27	0.02
Laser Guided Bomb (1000 lb)	7.01	554.89	0.00	--	1.36	0.71	0.04
Laser Guided Bomb (2000 lb)	7.01	554.89	0.00	--	2.72	1.41	0.08
Joint Direct Attack Munitions (250 lb)	11.73	796.00	0.00	--	0.26	0.14	0.01
Joint Direct Attack Munitions (500 lb)	11.73	796.00	0.00	--	0.53	0.27	0.02
Joint Direct Attack Munitions (1000 lb)	7.01	554.89	0.00	--	1.36	0.71	0.04
Joint Direct Attack Munitions (2000 lb)	7.01	554.89	0.00	--	2.72	1.41	0.08
Hard Target Penetrator	7.01	554.89	0.00	--	2.72	1.41	0.08
Small Diameter Missile	3.91	429.67	0.00	--	0.01	0.01	0.0004
TOW Missile	3.91	429.67	0.00	--	0.01	0.01	0.0004
Laser Guided Training Round	0.90	77.00	0.00	--	0.26	0.14	0.01
Penetrator (500 lb)	7.01	554.89	0.00	--	2.72	1.41	0.08
Aircraft Gun Systems Munitions							
20 mm	0.0002	0.03	0.0004	--	2.00E-05	1.04E-05	6.01E-07
25 mm	-	0.06	-	--	5.48E-05	2.85E-05	1.64E-06
7.62 mm	86.44	125.82	5.97	--	1.77E-06	9.19E-07	5.30E-08
.50 Cal	0.55	92.38	19.88	--	8.70E-06	4.52E-06	2.61E-07
Chaff and Flares							
Chaff (Smokeless Powder)	0.49	159.33	17.67	--	3.28E-05	1.71E-05	9.84E-07
Flares	1.64	117.00	17.67	--	2.89E-06	1.50E-06	8.68E-08

Notes: (1) Data are averages of emission factors for munitions categories found in 2007 CEIP Appendix D.9.

(2) PM emission factors are for a per blast unit

(3) TOG Emission factors were converted from ROG by multiplying by 0.82

Table A1-47. Proposed Ground Forces Combustive Emissions - 29 Palms LAS EIS Project Alternatives

Ordnance Type	*Annual Emissions (Pounds/Year)*						
	ROG	CO	NO_X	SO_2	PM	PM_{10}	$PM_{2.5}$
Ground Forces Munitions							
Cartridges Smaller than 30 mm	7.4	1,498.0	79.6	--	1.0	0.5	0.0
Cartridges 30-75 mm	0.1	8.5	0.9	--	0.0	0.0	0.0
Cartridges 75 mm and Larger	14.9	1,437.1	162.1	--	47.1	24.5	1.4
Projectiles, Canisters, and Chargers	1,086.6	73,846.4	54.2	--	1,962.6	1,019.6	59.0
Grenades	0.0	0.1	0.0	--	0.0	0.0	0.0
Rockets, Rocket Motors, and Igniters	0.0	2.5	0.1	--	2.5	1.3	0.1
Mines and Smoke Pots	0.0	3.5	-	--	3.0	1.5	0.1
Signals and Simulators	-	3.6	3.6	--	0.0	0.0	0.0
M Series - Detonating cord	0.0	6.1	-	--	0.4	0.2	0.0
M Series - Other explosives	-	88.3	88.3	--	30.4	15.8	0.9
Fuses and Primers	0.1	6.3	-	--	0.1	0.1	0.0
Guided Missiles [1]	0.4	30.2	6.1	--	2.0	1.0	0.1
Total Ground Forces Emissions - Pounds	1,110	76,931	395	-	2,049	1,065	62
Total Ground Forces Emissions - Tons	0.55	38.47	0.20	-	1.02	0.53	0.03

Table A1-48. Air Delivered Munitions Combustive Emissions - 29 Palms LAS EIS Project Alternatives

Ordnance Type	Pounds/Year						
	ROG	CO	NOx	SO2	PM	PM_{10}	$PM_{2.5}$
Unguided Munitions							
General Purpose Bomb (25 Lb) - Inert							
General Purpose Bomb (500 Lb)	921.0	62,517.8	-	--	538.6	279.5	16.1
General Purpose Bomb (1,000 Lb) Inert							
General Purpose Bomb (1,000 Lb)	76.6	6,061.1	-	--	179.5	93.3	5.4
General Purpose Bomb (2,000 Lb)	41.8	3,306.1	-	--			
Inert Practice Bomb							
2.75-inch Rocket	45.0	3,055.7	-	--	86.5	45.1	2.5
5-inch Zuni Rocket	7.7	842.7	-	--	52.7	27.4	1.6
Guided Munitions							
Hellfire missile	2.5	272.2	-	--	1.0	0.5	0.0
Laser Guided Bomb (500 lb)	390.1	26,478.1	-	--	228.1	118.4	6.8
Laser Guided Bomb (1000 lb)	31.3	2,479.5	-	--	73.4	38.2	2.2
Laser Guided Bomb (2000 lb)	4.6	367.3	-	--	10.9	5.7	0.3
Joint Direct Attack Munitions (250 lb)	113.8	7,722.8	-	--	66.5	34.5	2.0
Joint Direct Attack Munitions (500 lb)	520.1	35,304.2	-	--	304.1	157.8	9.1
Joint Direct Attack Munitions (1000 lb)	13.9	1,102.0	-	--	32.6	17.0	1.0
Joint Direct Attack Munitions (2000 lb)	74.3	5,877.4	-	--	174.1	90.5	5.2
Hard Target Penetrator	4.6	367.3	-	--	10.9	5.7	0.3
Small Diameter Missile	1.8	195.9	-	--	0.3	0.2	0.0
TOW Missile	1.3	142.9	-	--	1.2	0.6	0.0
Laser Guided Training Round	0.0	0.1	-	--	114.0	59.2	3.4
Penetrator (500 lb)	207.4	16,407.1	-	--	1,044.5	543.0	31.3
Aircraft Gun Systems Munitions							
20 mm	40.6	5,940.0	85.1	--	4.0	2.1	0.1
25 mm	-	9,955.0	-	--	9.9	5.2	0.3
7.62 mm	27.7	40.3	1.9	--	0.6	0.3	0.0
.50 Cal	2.4	396.2	85.2	--	6.9	3.6	0.2
Chaff and Flares							
Chaff (Smokeless Powder)	0.0	6.7	0.7	--	0.2	0.1	0.0
Flares	0.0	0.7	0.1	--	0.1	0.0	0.0
Total Air-Delivered Emissions - Pounds	2,528	188,839	173	-	2,941	1,528	88
Total Air-Delivered Emissions - Tons	1.26	94.42	0.09	-	1.47	0.76	0.04
Total Combustive Ordnance Emissions - Pounds	3,638	265,770	568	-	4,990	2,592	150
Total Combustive Ordnance Emissions - Tons	1.82	132.88	0.28	-	2.49	1.30	0.07

Table A1-49. Annual Construction and Operational Emissions - 29 Palms LAS EIS - Alternative 6

Activity/Source	Annual Emissions (Tons per Year)						
	VOC	*CO*	*NO_X*	*SO_X*	*PM*	*PM_{10}*	*$PM_{2.5}$*
Road Construction							
Mobile Equipment	0.08	0.30	0.83	0.00		0.04	0.03
Fugitive Dust						0.41	0.04
Subtotal	0.08	0.30	0.83	0.00		0.45	0.07
Communication Tower Construction							
Mobile Equipment	0.00	0.00	0.00	0.00		0.00	0.00
Fugitive Dust	0.09	0.40	0.11	0.01		0.40	0.16
Mobile Equipment	0.00	0.01	0.02	0.00		0.13	0.02
Subtotal	0.09	0.40	0.12	0.01		0.53	0.18
Total Construction	0.17	0.71	0.96	0.01		0.98	0.25
MEB Exercises							
Tactical Vehicles	5.29	23.73	64.39	7.35		2.33	2.33
Tactical Support Equipment	1.50	6.75	17.20	2.09		0.66	0.66
Fugitive Dust						565.25	86.56
Subtotal	6.79	30.48	81.59	9.44		568.25	89.55
Aircraft Operations							
Airspaces	0.86	11.20	23.01	0.95		7.62	7.63
EAF LTOs	24.53	60.38	12.86	0.80		8.63	8.63
Range LTOs	0.16	1.29	3.90	0.16		1.00	1.00
Fugitive Dust						42.36	16.94
Subtotal	25.55	72.87	39.77	1.91		59.60	34.20
Ordnance Activities							
Combustive	1.82	132.88	0.28				
Fugitive						2.49	1.30
Subtotal	1.82	132.88	0.28			2.49	1.30
Personnel Commutes							
On-road Vehicles	0.05	0.60	1.84	0.00		0.02	0.02
Total Operations - Tons per Year (1)	34.21	236.83	123.48	11.36		630.36	125.06
Reduction of West Area Emissions - Tons per Year (2)	(1.90)	(15.60)	(0.93)	(0.02)		(141.23)	(17.28)
Reduction of South Area Emissions - Tons per Year (3)	(0.00)	(0.02)	(0.00)	(0.00)		(0.36)	(0.04)
Total Operations Net Change - Tons per Year (1)	32.31	221.21	122.55	11.34		488.77	107.74
Conformity Thresholds - Tons per Year	25	- - -	25	- - -	- - -	100	- - -
Exceed De Minimis Thresholds?	Y	NA	Y	NA	NA	Y	NA

Notes: (1) Excludes construction, as this would occur in a calendar year prior to initiation of the proposed exercises.

(2) Alternative 6 would eliminate 13/15% of year 2015 PM10/VOC and NOx emissions from Johnson Valley.

(3) Alternative 6 would eliminate 10% of year 2015 emissions from the South Area.

ATTACHMENT A-2

PM$_{10}$ Dispersion Modeling Analyses

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Attachment A-2 - PM_{10} Dispersion Modeling Analyses

Table A2-1. Dispersion Modeling Scenario for 24-Hour PM10
Emissions - 29 Palms LAS EIS - Alternative 6

Activity/Source	*Pounds per Hour PM_{10}*
MEB Exercises	
Tactical Vehicles	6.8
Tactical Support Equipment	2.0
Fugitive Dust	1,648.7
Subtotal	1,657.5
Aircraft Operations	
Airspaces	7.9
EAF LTOs	36.0
Range LTOs	2.1
Fugitive Dust - EAF LTOs	10.4
Fugitive Dust - Range LTOs	83.0
Subtotal	139.4
Ordnance Activities	
Combustive	-
Fugitive	16.6
Subtotal	16.6
Total Operations - PPH	1,813.5
Without EAF	1,767.2

Note: These emissions would occur within the West Area.

Table A2-2. Simulation of Combustive/Fugitive Dust PM10 Emissions from TV/TSE- 29 Palms LAS EIS - Alternative 6

Activity/Volume Source #	*Width (meters)*	*Area (m2)*	*#of Sources*	*Total Source Area (m2)*	*Indi. Source Area/ Total Source Area*	*Location Factor (1)*	*Battalion Factor*	*Volume Source PM10 Lb/Hr*
MEB Exercises								
1a	2,500	6,250,000	1	6,250,000	0.02	0.01	0.67	11.0
1b	2,500	6,250,000	1	6,250,000	0.02	0.02	0.67	22.1
1c	2,500	6,250,000	1	6,250,000	0.02	0.06	0.67	66.3
1d	2,500	6,250,000	1	6,250,000	0.02	0.09	0.67	99.4
1dE	2,500	6,250,000	1	6,250,000	0.02	0.07	0.67	77.3
1e	2,500	6,250,000	1	6,250,000	0.02	0.02	0.33	11.0
1f	2,500	6,250,000	1	6,250,000	0.02	0.02	0.33	11.0
1g	2,500	6,250,000	1	6,250,000	0.02	0.04	0.67	44.2
1h	2,500	6,250,000	1	6,250,000	0.02	0.06	0.67	66.3
1hE	2,500	6,250,000	1	6,250,000	0.02	0.05	0.67	55.2
1i	2,500	6,250,000	1	6,250,000	0.02	0.06	0.33	33.1
1j	2,500	6,250,000	1	6,250,000	0.02	0.06	0.33	33.1
1k	2,500	6,250,000	1	6,250,000	0.02	0.04	0.67	44.2
1l	2,500	6,250,000	1	6,250,000	0.02	0.05	0.67	55.2
1lE	2,500	6,250,000	1	6,250,000	0.02	0.03	0.67	33.1
1m	2,500	6,250,000	1	6,250,000	0.02	0.08	0.33	44.2
1n	2,500	6,250,000	1	6,250,000	0.02	0.08	0.33	44.2
1o	2,500	6,250,000	1	6,250,000	0.02	0.06	0.33	33.1
1p	2,500	6,250,000	1	6,250,000	0.02	0.04	0.33	22.1
1pE	2,500	6,250,000	1	6,250,000	0.02	0.02	0.33	11.0
1q	2,500	6,250,000	1	6,250,000	0.02	0.06	0.33	33.1
1r	2,500	6,250,000	1	6,250,000	0.02	0.06	0.33	33.1
1s	2,500	6,250,000	1	6,250,000	0.02	0.04	0.33	22.1
1t	2,500	6,250,000	1	6,250,000	0.02	0.02	0.33	11.0
1tE	2,500	6,250,000	1	6,250,000	0.02	0.01	0.33	5.5
1u	2,500	6,250,000	1	6,250,000	0.02	0.03	0.33	16.6
1v	2,500	6,250,000	1	6,250,000	0.02	0.03	0.33	16.6
1w	2,500	6,250,000	1	6,250,000	0.02	0.02	0.33	11.0
1x	2,500	6,250,000	1	6,250,000	0.02	0.01	0.33	5.5
1xE	2,500	6,250,000	1	6,250,000	0.02	0.01	0.33	5.5
1y	2,500	6,250,000	1	6,250,000	0.02	0.02	0.33	11.0
1z	2,500	6,250,000	1	6,250,000	0.02	0.02	0.33	11.0
1aa	2,500	6,250,000	1	6,250,000	0.02	0.01	0.33	5.5
1bb	2,500	6,250,000	1	6,250,000	0.02	0.01	0.33	5.5
1cc	2,500	6,250,000	1	6,250,000	0.02	0.01	0.33	5.5
1dd	2,500	6,250,000	1	6,250,000	0.02	0.01	0.33	5.5
1ee	2,500	6,250,000	1	6,250,000	0.02	0.01	0.33	5.5
1ff	2,500	6,250,000	1	6,250,000	0.02	0.01	0.33	5.5
1gg	2,500	6,250,000	1	6,250,000	0.02	0.01	0.33	5.5
1hh	2,500	6,250,000	1	6,250,000	0.02	0.01	0.33	5.5
2	2,500	6,250,000	1	6,250,000	0.02	0.03	0.67	33.1
2n	2,500	6,250,000	1	6,250,000	0.02	0.02	0.67	22.1
3	2,500	6,250,000	1	6,250,000	0.02	0.01	0.67	11.0
4	2,500	6,250,000	1	6,250,000	0.02	0.02	0.33	11.0
4s	2,500	6,250,000	1	6,250,000	0.02	0.04	0.33	22.1
5	2,500	6,250,000	1	6,250,000	0.02	0.04	0.33	22.1
5n	2,500	6,250,000	1	6,250,000	0.02	0.05	0.33	27.6
6	2,500	6,250,000	1	6,250,000	0.02	0.07	0.67	77.3
6n	2,500	6,250,000	1	6,250,000	0.02	0.04	0.67	44.2
7a	2,500	6,250,000	1	6,250,000	0.02	0.08	0.67	88.4
7b	2,500	6,250,000	1	6,250,000	0.02	0.05	0.67	55.2
7c	2,500	6,250,000	1	6,250,000	0.02	0.04	0.67	44.2
7d	2,500	6,250,000	1	6,250,000	0.02	0.04	0.67	44.2
7e	2,500	6,250,000	1	6,250,000	0.02	0.04	0.67	44.2
7nw	2,500	6,250,000	1	6,250,000	0.02	0.06	0.67	66.3
Total MEB Exercises				343,750,000	1.00	2.00		1,657

Note: (1) Total amounts to 2.0, as the sources are divided into 2 sectors: one each for 2 battalions and 1 battalion.

Table A2-3. Simulation of Combustive PM10 Emissions from Aircraft Operations in Airspaces - 29 Palms LAS EIS - Alternative 6

Activity/Volume Source #	*Width (meters)*	*Area (m2)*	*#of Sources*	*Total Source Area (m2)*	*Indi. Source Area/ Total Source Area*	*Location Factor*	*Battalion Factor*	*Volume Source PM10 Lb/Hr*
Aircraft Operations - Airspaces								
1a	2,500	6,250,000	1	6,250,000	0.03	0.05		0.4
1b	2,500	6,250,000	1	6,250,000	0.03	0.05		0.4
1c	2,500	6,250,000	1	6,250,000	0.03	0.04		0.3
1d	2,500	6,250,000	1	6,250,000	0.03	0.03		0.2
1dE	2,500	6,250,000	1	6,250,000	0.03	0.02		0.2
1e	2,500	6,250,000	1	6,250,000	0.03	0.05		0.4
1f	2,500	6,250,000	1	6,250,000	0.03	0.05		0.4
1g	2,500	6,250,000	1	6,250,000	0.03	0.04		0.3
1h	2,500	6,250,000	1	6,250,000	0.03	0.03		0.2
1hE	2,500	6,250,000	1	6,250,000	0.03	0.02		0.2
1i	2,500	6,250,000	1	6,250,000	0.03	0.04		0.3
1j	2,500	6,250,000	1	6,250,000	0.03	0.04		0.3
1k	2,500	6,250,000	1	6,250,000	0.03	0.03		0.2
1l	2,500	6,250,000	1	6,250,000	0.03	0.02		0.2
1lE	2,500	6,250,000	1	6,250,000	0.03	0.02		0.2
1m	2,500	6,250,000	1	6,250,000	0.03	0.03		0.2
1n	2,500	6,250,000	1	6,250,000	0.03	0.03		0.2
1o	2,500	6,250,000	1	6,250,000	0.03	0.03		0.2
1p	2,500	6,250,000	1	6,250,000	0.03	0.01		0.1
1pE	2,500	6,250,000	1	6,250,000	0.03	0.01		0.1
2	2,500	6,250,000	1	6,250,000	0.03	0.04		0.3
2n	2,500	6,250,000	1	6,250,000	0.03	0.02		0.2
3	2,500	6,250,000	1	6,250,000	0.03	0.04		0.3
4	2,500	6,250,000	1	6,250,000	0.03	0.04		0.3
4s	2,500	6,250,000	1	6,250,000	0.03	0.03		0.2
5n	2,500	6,250,000	1	6,250,000	0.03	0.03		0.2
6	2,500	6,250,000	1	6,250,000	0.03	0.03		0.2
6n	2,500	6,250,000	1	6,250,000	0.03	0.02		0.2
7a	2,500	6,250,000	1	6,250,000	0.03	0.03		0.2
7b	2,500	6,250,000	1	6,250,000	0.03	0.02		0.2
7c	2,500	6,250,000	1	6,250,000	0.03	0.01		0.1
7d	2,500	6,250,000	1	6,250,000	0.03	0.02		0.2
7e	2,500	6,250,000	1	6,250,000	0.03	0.01		0.1
7nw	2,500	6,250,000	1	6,250,000	0.03	0.02		0.2
Total Aircraft Operations - Airspaces				212,500,000	1.00	1.00		7.94

Table A2-4. Simulation of PM10 Emissions from Aircraft Ops Range LTOs, Ordnance Usage, and EAF LTOs - 29 Palms LAS EIS - Alternative 6

Activity/Volume Source #	*Width (meters)*	*Area (m2)*	*#of Sources*	*Total Source Area (m2)*	*Indi. Source Area/ Total Source Area*	*Location Factor*	*Battalion Factor*	*Volume Source PM10 Lb/Hr*
Aircraft Operations - Range LTOs								
5n	2,500	6,250,000	1	6,250,000	0.50			42.6
7a	2,500	6,250,000	1	6,250,000	0.50			42.6
Total Aircraft Operations - Range LTOs				12,500,000				85.1
Ordnance Activities								
1a	2,500	6,250,000	1	6,250,000	0.07	0.10		1.7
1b	2,500	6,250,000	1	6,250,000	0.07	0.10		1.7
1c	2,500	6,250,000	1	6,250,000	0.07	0.06		1.0
1e	2,500	6,250,000	1	6,250,000	0.07	0.10		1.7
1f	2,500	6,250,000	1	6,250,000	0.07	0.10		1.7
1g	2,500	6,250,000	1	6,250,000	0.07	0.06		1.0
1i	2,500	6,250,000	1	6,250,000	0.07	0.06		1.0
1j	2,500	6,250,000	1	6,250,000	0.07	0.06		1.0
1k	2,500	6,250,000	1	6,250,000	0.07	0.04		0.7
2	2,500	6,250,000	1	6,250,000	0.07	0.06		1.0
3	2,500	6,250,000	1	6,250,000	0.07	0.06		1.0
4	2,500	6,250,000	1	6,250,000	0.07	0.08		1.3
4s	2,500	6,250,000	1	6,250,000	0.07	0.06		1.0
6	2,500	6,250,000	1	6,250,000	0.07	0.04		0.7
Total Ordnance Activities				87,500,000	1.00	1.00		16.5
Aircraft Operations - EAF LTOs								
8	2,500	6,250,000	1	6,250,000	1.00			46.4

Table A2-5. Total Combined Volume Source PM10 Emissions - 29 Palms LAS EIS - Alternative 6

Volume Source #	Width (meters)	Area (m2)	#of Sources	Total Source Area (m2)	Indi. Source Area/ Total Source Area	Location Factor	Battalion Factor	Volume Source PM10 Lb/Hr
1a								13.1
1b								24.2
1c								67.7
1d								99.7
1dE								77.5
1e								13.1
1f								13.1
1g								45.6
1h								66.5
1hE								55.4
1i								34.5
1j								34.5
1k								45.1
1l								55.4
1lE								33.3
1m								44.4
1n								44.4
1o								33.4
1p								22.2
1pE								11.1
1q								33.1
1r								33.1
1s								22.1
1t								11.0
1tE								5.5
1u								16.6
1v								16.6
1w								11.0
1x								5.5
1xE								5.5
1y								11.0
1z								11.0
1aa								5.5
1bb								5.5
1cc								5.5
1dd								5.5
1ee								5.5
1ff								5.5
1gg								5.5
1hh								5.5
2								34.5
2n								22.3
3								12.4
4								12.7
4s								23.3
5								64.9
5n								27.6
6								78.3
6n								44.4
7a								131.2
7b								55.4
7c								44.3
7d								44.4
7e								44.3
7nw								66.5
8								46.4
Total Hourly Emissions								1,813.5

Table A2-6. Dispersion Modeling Scenario for 24-Hour PM10
Emissions in Alternative 6 Central Area - 29 Palms LAS EIS

Activity/Source	*Pounds per Hour PM 10*
MEB Exercises	
Tactical Vehicles	3.4
Tactical Support Equipment	1.0
Fugitive Dust	824.3
Subtotal	828.7
Aircraft Operations	
Airspaces	7.9
EAF LTOs	
Range LTOs	1.0
Fugitive Dust - EAF LTOs	
Fugitive Dust - Range LTOs	41.5
Subtotal	50.5
Ordnance Activities	
Combustive	
Fugitive	
Subtotal	-
Total Operations - PPH	879.2

Generally = 50% of activity and emissions within West Area.

Table A2-7. Simulation of Combustive/Fugitive Dust PM10 Emissions from All Sources in Alternative 6 Central Area - 29 Palms LAS EIS

Activity/Volume Source #	*Width (meters)*	*Area (m2)*	*#of Sources*	*Total Source Area (m2)*	*Indi. Source Area/ Total Source Area*	*Volume Source PM10 Lb/Hr*
All Activities						
16a	2,500	6,250,000	1	6,250,000	0.04	32.6
16b	2,500	6,250,000	1	6,250,000	0.04	32.6
16c	2,500	6,250,000	1	6,250,000	0.04	32.6
16d	2,500	6,250,000	1	6,250,000	0.04	32.6
17a	2,500	6,250,000	1	6,250,000	0.04	32.6
17b	2,500	6,250,000	1	6,250,000	0.04	32.6
17c	2,500	6,250,000	1	6,250,000	0.04	32.6
17d	2,500	6,250,000	1	6,250,000	0.04	32.6
26a	2,500	6,250,000	1	6,250,000	0.04	32.6
26b	2,500	6,250,000	1	6,250,000	0.04	32.6
26c	2,500	6,250,000	1	6,250,000	0.04	32.6
26d	2,500	6,250,000	1	6,250,000	0.04	32.6
26e	2,500	6,250,000	1	6,250,000	0.04	32.6
26f	2,500	6,250,000	1	6,250,000	0.04	32.6
26g	2,500	6,250,000	1	6,250,000	0.04	32.6
26h	2,500	6,250,000	1	6,250,000	0.04	32.6
26i	2,500	6,250,000	1	6,250,000	0.04	32.6
26j	2,500	6,250,000	1	6,250,000	0.04	32.6
26k	2,500	6,250,000	1	6,250,000	0.04	32.6
26l	2,500	6,250,000	1	6,250,000	0.04	32.6
26m	2,500	6,250,000	1	6,250,000	0.04	32.6
26n	2,500	6,250,000	1	6,250,000	0.04	32.6
26o	2,500	6,250,000	1	6,250,000	0.04	32.6
26p	2,500	6,250,000	1	6,250,000	0.04	32.6
41	2,500	6,250,000	1	6,250,000	0.04	32.6
42	2,500	6,250,000	1	6,250,000	0.04	32.6
44	2,500	6,250,000	1	6,250,000	0.04	32.6
Total All Sources				168,750,000	1.00	879.2

Table A2-8. Dispersion Modeling Scenario for 24-Hour PM10
Emissions in Alternative 6 Eastern Area - 29 Palms LAS EIS

Activity/Source	*Pounds per Hour PM 10*
MEB Exercises	
Tactical Vehicles	3.4
Tactical Support Equipment	1.0
Fugitive Dust	824.3
Subtotal	828.7
Aircraft Operations	
Airspaces	7.9
EAF LTOs	
Range LTOs	1.0
Fugitive Dust - EAF LTOs	
Fugitive Dust - Range LTOs	41.5
Subtotal	50.5
Ordnance Activities	
Combustive	
Fugitive	
Subtotal	-
Total Operations - PPH	879.2

Generally = 50% of activity and emissions within West Area.

Table A2-9. Simulation of Combustive/Fugitive Dust PM10 Emissions from All Sources in Alternative 6 Eastern Area - 29 Palms LAS EIS

Activity/Volume Source #	*Width (meters)*	*Area (m2)*	*#of Sources*	*Total Source Area (m2)*	*Indi. Source Area/ Total Source Area*	*Volume Source PM10 Lb/Hr*
All Activities						
29a	2,500	6,250,000	1	6,250,000	0.04	36.6
29b	2,500	6,250,000	1	6,250,000	0.04	36.6
29c	2,500	6,250,000	1	6,250,000	0.04	36.6
29d	2,500	6,250,000	1	6,250,000	0.04	36.6
30a	2,500	6,250,000	1	6,250,000	0.04	36.6
30b	2,500	6,250,000	1	6,250,000	0.04	36.6
30c	2,500	6,250,000	1	6,250,000	0.04	36.6
30d	2,500	6,250,000	1	6,250,000	0.04	36.6
30e	2,500	6,250,000	1	6,250,000	0.04	36.6
30f	2,500	6,250,000	1	6,250,000	0.04	36.6
30g	2,500	6,250,000	1	6,250,000	0.04	36.6
30h	2,500	6,250,000	1	6,250,000	0.04	36.6
30i	2,500	6,250,000	1	6,250,000	0.04	36.6
30j	2,500	6,250,000	1	6,250,000	0.04	36.6
30k	2,500	6,250,000	1	6,250,000	0.04	36.6
30l	2,500	6,250,000	1	6,250,000	0.04	36.6
30m	2,500	6,250,000	1	6,250,000	0.04	36.6
30n	2,500	6,250,000	1	6,250,000	0.04	36.6
30o	2,500	6,250,000	1	6,250,000	0.04	36.6
30p	2,500	6,250,000	1	6,250,000	0.04	36.6
31a	2,500	6,250,000	1	6,250,000	0.04	36.6
31b	2,500	6,250,000	1	6,250,000	0.04	36.6
31c	2,500	6,250,000	1	6,250,000	0.04	36.6
31d	2,500	6,250,000	1	6,250,000	0.04	36.6
Total All Sources				150,000,000	1.00	879.2

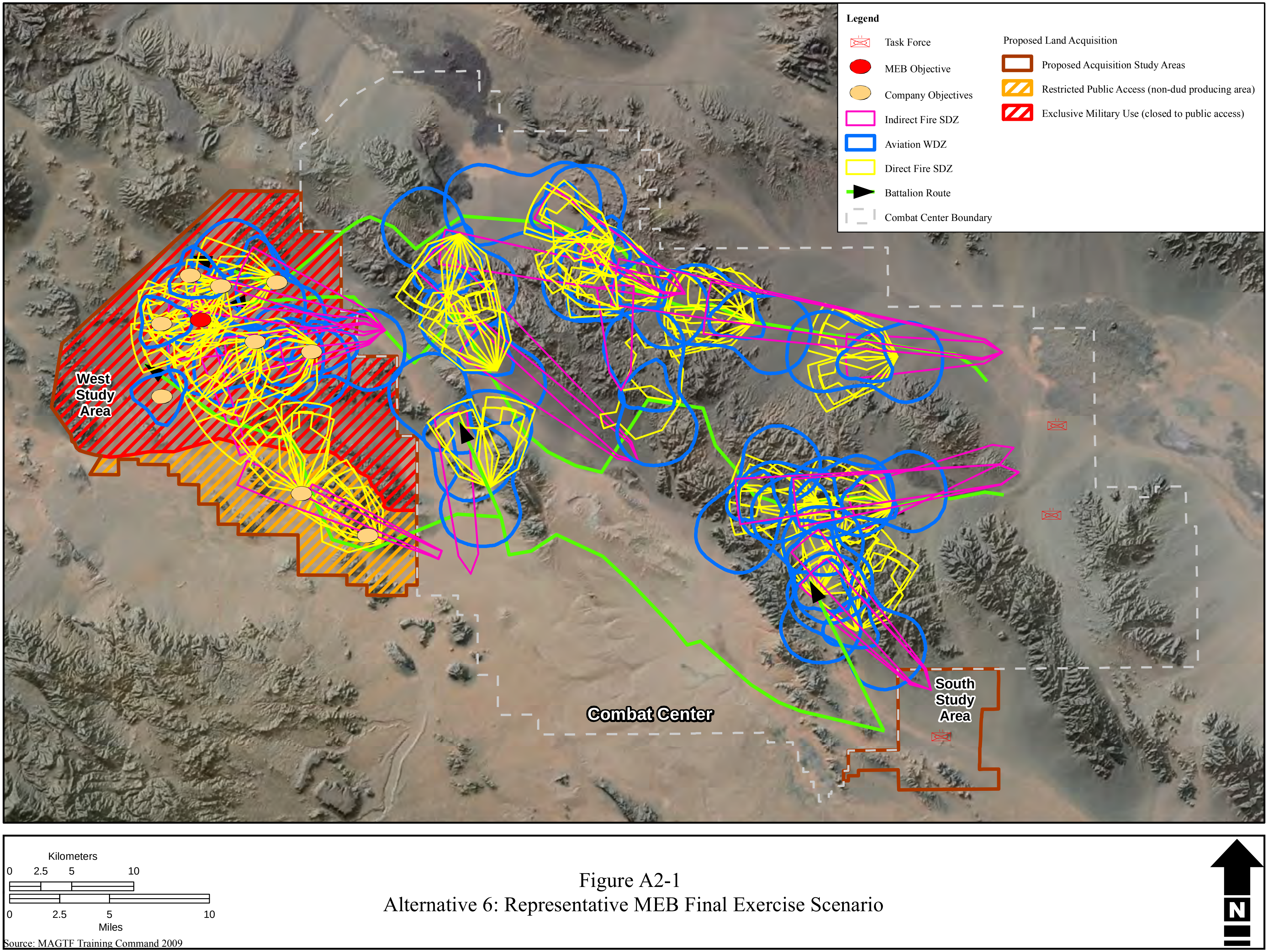


Figure A2-1
Alternative 6: Representative MEB Final Exercise Scenario

Source: MAGTF Training Command 2009

Figure AHTH. Maxim um 24-Hour PM10 Concentrations Predicted for the LAS MEB Exercises (ug/m^3) - Project Alternative 6

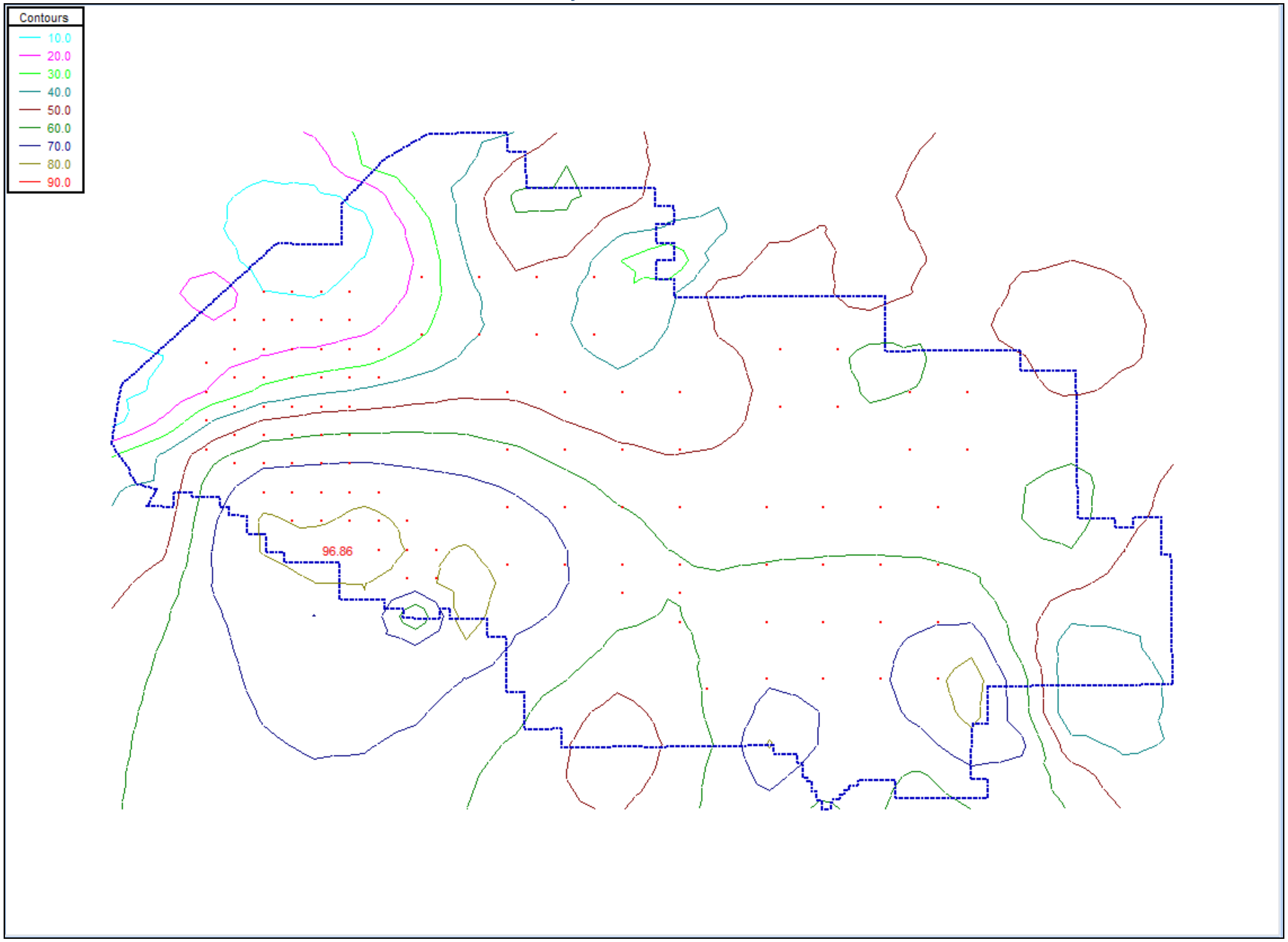


Figure A‑10. 24-Hour PM10 Concentrations Predicted at the Maximum Impact Location – LAS MEB Exercise Project Alternative 6 (ug/m^3)

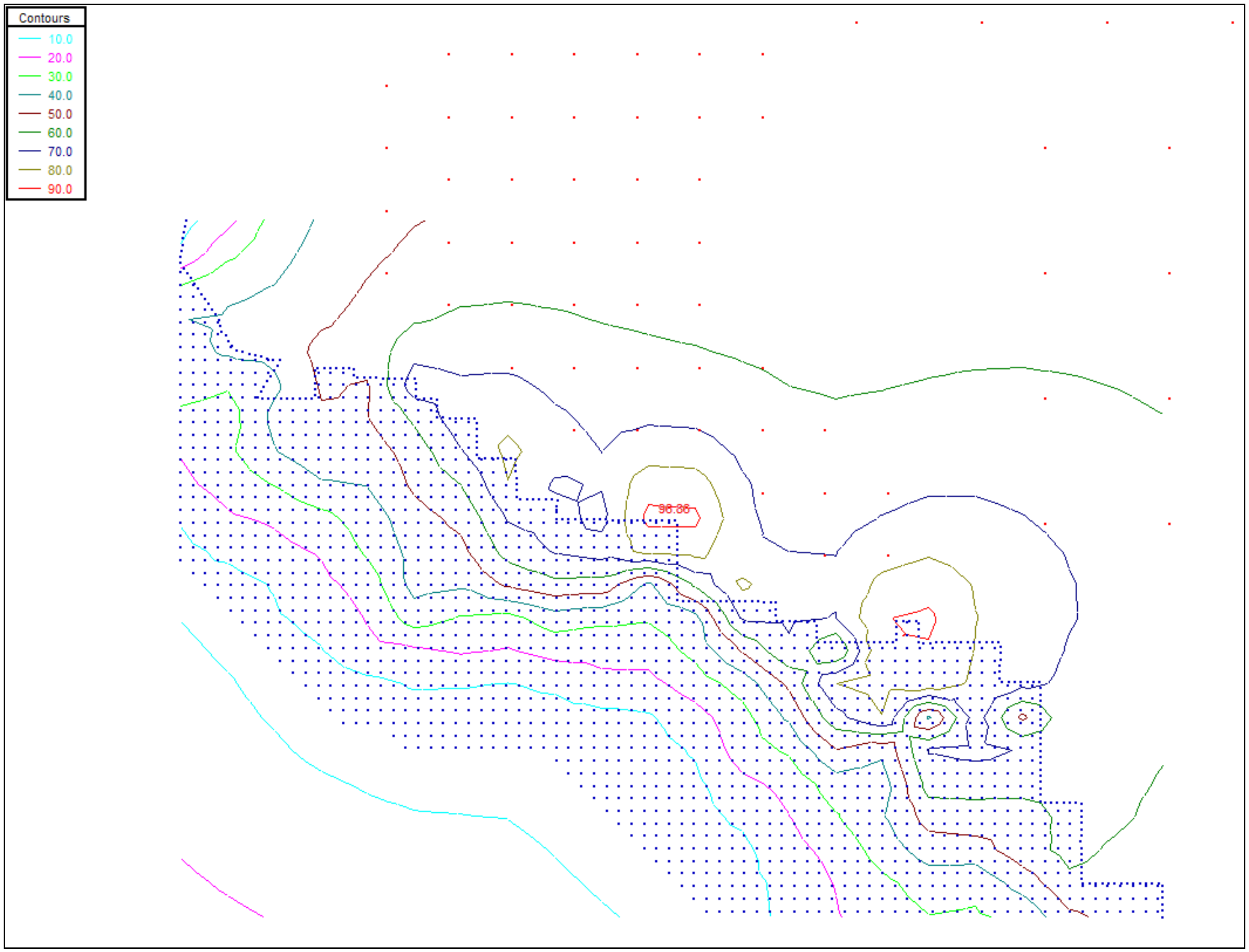
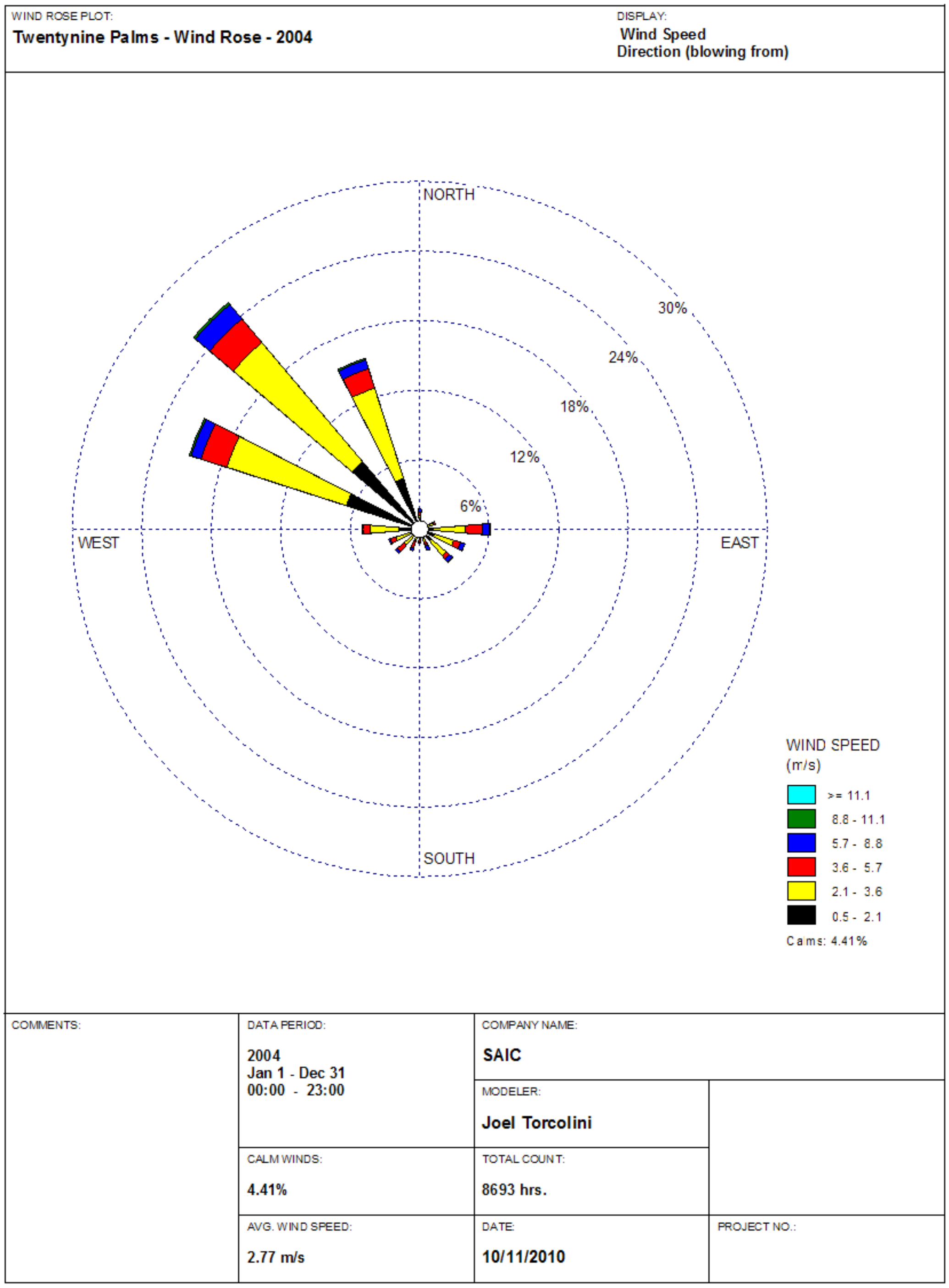


Figure Ан-п. Wind RoǎŜ of MCAGCC Mainside Monitoring Station Winds for 20л4



APPENDIX G.1.1

29 Palms LAS Proposed Action Conformity Evaluations – Regulatory Review Status

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MOJAVE
air quality management district
DESERT

Mojave Desert Air Quality Management District
14306 Park Avenue, Victorville, CA 92392-2310
760.245.1661 • fax 760.245.2699
Visit our web site: http://www.rndaqrnd.ca.gov
Eldon Heaston, Executive Director

November 2, 2010

Major W. M. Rowley, Director, NREA
United States Marine Corps
Marine Air Ground Task Force Training Command
Marine Corps Air Ground Combat Center
Box 788100
Twentynine Palms, CA 92278-8106

Re: Request for Conformity Analysis Review and Determination, Land Acquisition and Airspace Establishment Proposed Action

The Mojave Desert Air Quality Management District (MDAQMD) appreciates the opportunity to review the Conformity Evaluation for the Land Acquisition and Airspace Establishment (LAS) action at Marine Corps Combat Center Twentynine Palms (Combat Center), as proposed by the Department of Navy.

The District has reviewed the Conformity Analysis and makes the following determinations in compliance with Rule 2002 – ***General Conformity:***

- The MDAQMD commits to include the ozone precursor emissions from the proposed LAS action into a revision of its ozone attainment plan in the California State Implementation Plan revision pursuant to Rule 2002 §(H)(1)(e)(i)(B).

- The MDAQMD concurs with the dispersion modeling analysis which demonstrates that PM_{10} emissions from the proposed LAS action would not contribute to an exceedance of the PM_{10} NAAQS pursuant to Rule 2002 §(H)(1)(d)(i).

Thank you for allowing the District to provide this input into the proposed Land Acquisition and Airspace Establishment proposed action. If you have any questions regarding this letter, please contact Alan De Salvio, Supervising Air Quality Engineer at extension 6726.

Sincerely,

Alan J. De Salvio
Supervising Air Quality Engineer

cc: Director, USEPA Region IX
Chief, Planning Division, CARB

AJD/tw USMC Conformity Eval.doc

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APPENDIX G.2

NO_2 Dispersion Modeling Analyses - LAS Project Alternative 1

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Appendix G.2 - NO_2 Dispersion Modeling Analyses - LAS Project Alternative 1

Table G.2-1. Dispersion Modeling Scenario for Annual NOx Operational Emissions - 29 Palms LAS Project EIS - Alternative 1

Activity/Source	*Pounds per Hour NOx (1)*
MEB Exercises	
Tactical Equipment	89.4
Tactical Support Equipment	22.8
Fugitive Dust	
Subtotal	112.2
Aircraft Operations	
Airspaces	32.0
EAF LTOs	17.9
Range LTOs	5.4
Fugitive Dust - EAF LTOs	
Fugitive Dust - Range LTOs	
Subtotal	55.2
Ordnance Activities	
Combustive	0.4
Fugitive	
Subtotal	0.4
Total Operations - Pounds per Hour	167.9

Note: (1) Equates to total annual emissions for each source category divided by (60 days * 24 hours).

Table G.2-2. Operational NOx Emission Simulations - 29 Palms LAS Project EIS - Alternative 1

Activity/Volume Source #	*Width (meters)*	*Area (m2)*	*#of Sources*	*Total Source Area (m2)*	*Indi. Source Fraction of Total Source Area*	*Volume Source NOx Emissions (Lbs/Hr)*	
						Individual	*Combined*
MEB Exercises							
9a	2,500	6,250,000	1	6,250,000	0.02	1.7	2
11a-d	2,500	6,250,000	4	25,000,000	0.02	1.7	7
12	2,500	6,250,000	1	6,250,000	0.02	1.7	2
13	2,500	6,250,000	1	6,250,000	0.02	1.7	2
14	2,500	6,250,000	1	6,250,000	0.02	1.7	2
15a-d	2,500	6,250,000	4	25,000,000	0.02	1.7	7
16a-d	2,500	6,250,000	4	25,000,000	0.02	1.7	7
17a-d	2,500	6,250,000	4	25,000,000	0.02	1.7	7
18a-i	2,500	6,250,000	9	56,250,000	0.02	1.7	16
19a-jj	2,500	6,250,000	36	225,000,000	0.02	1.7	62
Total MEB Exercises		62,500,000	65	406,250,000			112.2
Aircraft Operations - Airspaces + Range LTOs							
9a	2,500	6,250,000	1	6,250,000	0.02	0.6	1
11a-d	2,500	6,250,000	4	25,000,000	0.02	0.6	2
12	2,500	6,250,000	1	6,250,000	0.02	0.6	1
13	2,500	6,250,000	1	6,250,000	0.02	0.6	1
14	2,500	6,250,000	1	6,250,000	0.02	0.6	1
15a-d	2,500	6,250,000	4	25,000,000	0.02	0.6	2
16a-d	2,500	6,250,000	4	25,000,000	0.02	0.6	2
17a-d	2,500	6,250,000	4	25,000,000	0.02	0.6	2
18a-i	2,500	6,250,000	9	56,250,000	0.02	0.6	5
19a-jj	2,500	6,250,000	36	225,000,000	0.02	0.6	21
Total Aircraft Operations - Airspaces + Range LTOs		62,500,000	65	406,250,000			37.4
Ordnance Activities							
9a	2500	6250000	1	6,250,000	0.02	0.01	0
11a-d	2500	6250000	4	25,000,000	0.02	0.01	0
12	2500	6250000	1	6,250,000	0.02	0.01	0
13	2500	6250000	1	6,250,000	0.02	0.01	0
14	2500	6250000	1	6,250,000	0.02	0.01	0
15a-d	2500	6250000	4	25,000,000	0.02	0.01	0
16a-d	2500	6250000	4	25,000,000	0.02	0.01	0
17a-d	2500	6250000	4	25,000,000	0.02	0.01	0
18a-i	2500	6250000	9	56,250,000	0.02	0.01	0
19a-jj	2500	6250000	36	225,000,000	0.02	0.01	0
Total Ordnance Activities		62,500,000	65	406,250,000			0.4
Aircraft Operations - EAF LTOs							
8	2,500	6,250,000	1	6,250,000	1.00	17.9	17.9
Total Combined Emissions							
8			1			17.9	17.9
9a			1			2.31	2.31
11a-d			4			2.31	9.23
12			1			2.31	2.31
13			1			2.31	2.31
14			1			2.31	2.31
15a-d			4			2.31	9.23
16a-d			4			2.31	9.23
17a-d			4			2.31	9.23
18a-i			9			2.31	20.77
19a-jj			36			2.31	83.08
Total Hourly Emissions			66				167.9

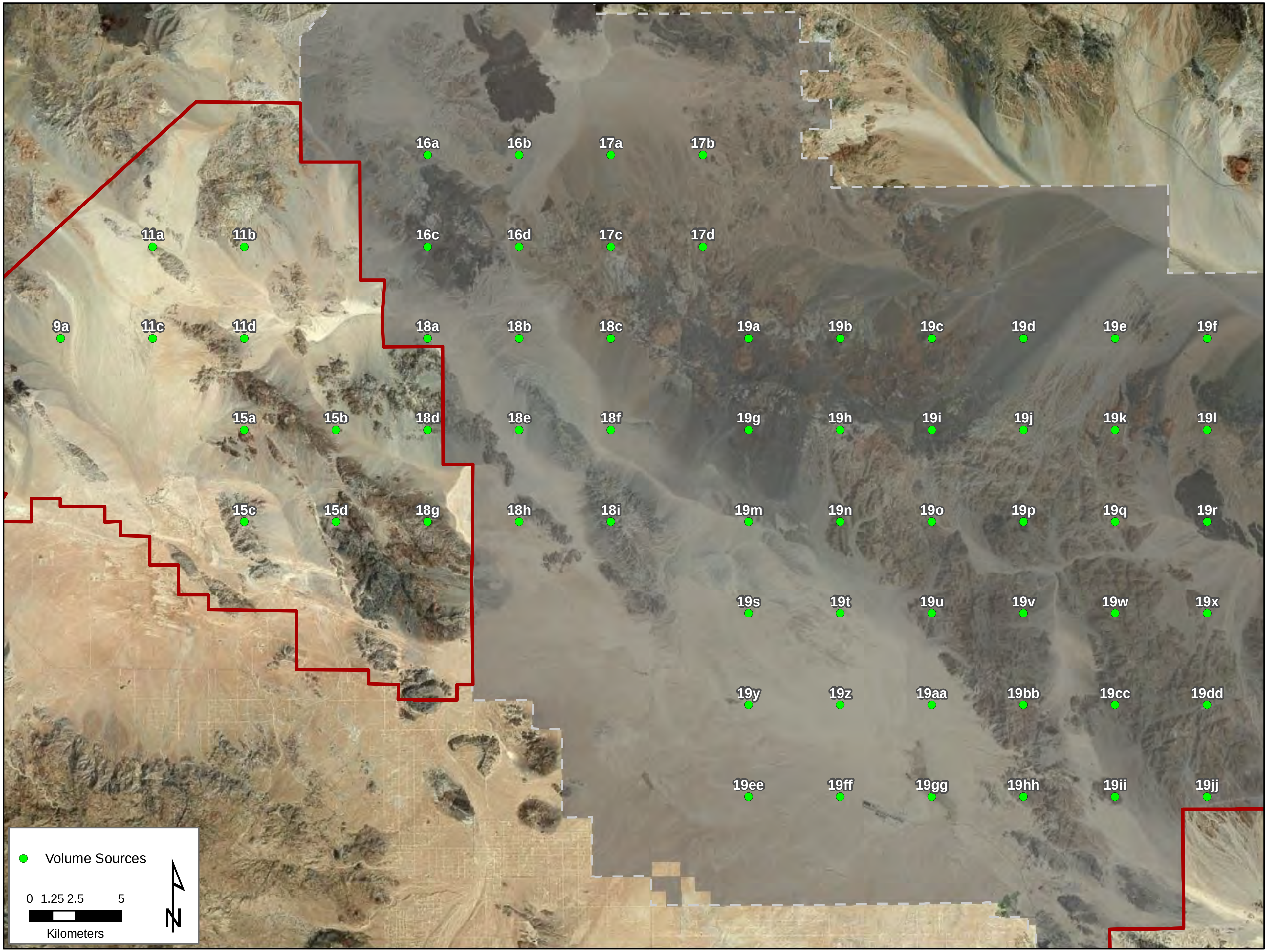
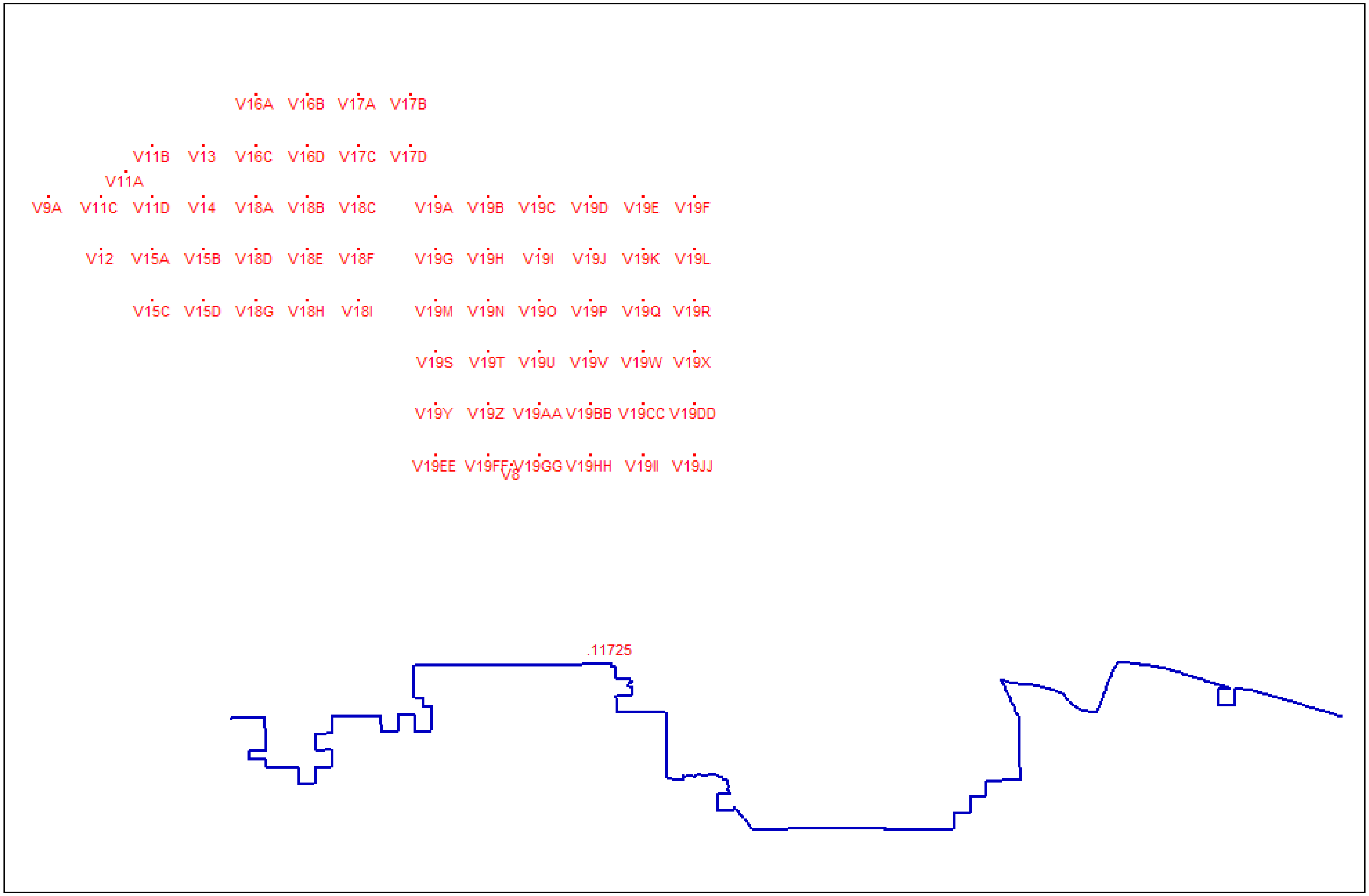


Figure G.2-1. Simulation of Emission Sources for NO2 Modeling Analysis - 29 Palms LAS Project EIS - Alternative 1

Figure G.2-2. Maximum Annual NOx Concentration Predicted for the 29 Palms LAS Project (ug/m^3) -Alternative 1.



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APPENDIX G.3

Dispersion Modeling Analyses - LAS Project Alternative 3

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APPENDIX G.3.1

PM_{10} Dispersion Modeling Analyses - LAS Project Alternative 3

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Appendix G.3.1 - PM_{10} Dispersion Modeling Analyses - LAS Project Alternative 3

Table G.3.1-1. Dispersion Modeling Scenario for 24-Hour PM10 Emissions - 29 Palms LAS Alternative 3 - West Area

Activity/Source	*Pounds per Hour PM 10*
MEB Exercises	
Tactical Vehicles	8.1
Tactical Support Equipment	2.0
Fugitive Dust	1,956.9
Subtotal	1,967.1
Aircraft Operations	
Airspaces	7.9
EAF LTOs	36.0
Range LTOs	2.1
Fugitive Dust - EAF LTOs	10.4
Fugitive Dust - Range LTOs	83.0
Subtotal	139.4
Ordnance Activities	
Combustive	-
Fugitive	16.6
Subtotal	16.6
Total Operations - PPH	2,123.2

Note: These emissions would occur within the West Area.

Table G.3.1-2. Simulation of Combustive/Fugitive Dust PM10 Emissions from TV/TSE- 29 Palms LAS Alternative 3 - West Area

Activity/Volume Source #	*Width (meters)*	*Area (m2)*	*#of Sources*	*Total Source Area (m2)*	*Indi. Source Area/ Total Source Area*	*Location Factor (1)*	*Battalion Factor*	*Volume Source PM10 Lb/Hr*
MEB Exercises								
20	2,500	6,250,000	1	6,250,000	0.03	0.03	0.67	39.3
21a	2,500	6,250,000	1	6,250,000	0.03	0.07	0.67	91.8
21b	2,500	6,250,000	1	6,250,000	0.03	0.07	0.67	91.8
21c	2,500	6,250,000	1	6,250,000	0.03	0.04	0.67	52.5
21d	2,500	6,250,000	1	6,250,000	0.03	0.04	0.67	52.5
22a	2,500	6,250,000	1	6,250,000	0.03	0.10	0.33	65.6
22b	2,500	6,250,000	1	6,250,000	0.03	0.10	0.33	65.6
22c	2,500	6,250,000	1	6,250,000	0.03	0.08	0.33	52.5
22d	2,500	6,250,000	1	6,250,000	0.03	0.10	0.67	131.1
22e	2,500	6,250,000	1	6,250,000	0.03	0.10	0.67	131.1
22f	2,500	6,250,000	1	6,250,000	0.03	0.10	0.67	131.1
22g	2,500	6,250,000	1	6,250,000	0.03	0.10	0.67	131.1
22h	2,500	6,250,000	1	6,250,000	0.03	0.10	0.67	131.1
22i	2,500	6,250,000	1	6,250,000	0.03	0.10	0.67	131.1
23	2,500	6,250,000	1	6,250,000	0.03	0.06	0.33	39.3
24a	2,500	6,250,000	1	6,250,000	0.03	0.03	0.33	19.7
24b	2,500	6,250,000	1	6,250,000	0.03	0.03	0.33	19.7
24c	2,500	6,250,000	1	6,250,000	0.03	0.02	0.33	13.1
24d	2,500	6,250,000	1	6,250,000	0.03	0.05	0.33	32.8
24e	2,500	6,250,000	1	6,250,000	0.03	0.05	0.33	32.8
24f	2,500	6,250,000	1	6,250,000	0.03	0.04	0.33	26.2
24g	2,500	6,250,000	1	6,250,000	0.03	0.08	0.33	52.5
24h	2,500	6,250,000	1	6,250,000	0.03	0.06	0.33	39.3
24i	2,500	6,250,000	1	6,250,000	0.03	0.04	0.33	26.2
25a	2,500	6,250,000	1	6,250,000	0.03	0.03	0.33	19.7
25b	2,500	6,250,000	1	6,250,000	0.03	0.02	0.33	13.1
25c	2,500	6,250,000	1	6,250,000	0.03	0.03	0.33	19.7
25d	2,500	6,250,000	1	6,250,000	0.03	0.02	0.33	13.1
45	2,500	6,250,000	1	6,250,000	0.03	0.08	0.33	52.5
46	2,500	6,250,000	1	6,250,000	0.03	0.08	0.33	52.5
47	2,500	6,250,000	1	6,250,000	0.03	0.03	0.67	39.3
48	2,500	6,250,000	1	6,250,000	0.03	0.03	0.67	39.3
49	2,500	6,250,000	1	6,250,000	0.03	0.02	0.67	26.2
50	2,500	6,250,000	1	6,250,000	0.03	0.03	0.67	39.3
51	2,500	6,250,000	1	6,250,000	0.03	0.01	0.67	13.1
52	2,500	6,250,000	1	6,250,000	0.03	0.02	0.67	26.2
53	2,500	6,250,000	1	6,250,000	0.03	0.01	0.67	13.1
Total MEB Exercises				231,250,000	1.00	2.00		1,967

Note: (1) Total amounts to 2.0, as the sources are divided into 2 sectors: one each for 2 battalions and 1 battalion.

Table G.3.1-3. Simulation of Combustive PM10 Emissions from Aircraft Operations in Airspaces - 29 Palms LAS Alternative 3 - West Area

Activity/Volume Source #	*Width (meters)*	*Area (m2)*	*#of Sources*	*Total Source Area (m2)*	*Indi. Source Area/ Total Source Area*	*Location Factor*	*Battalion Factor*	*Volume Source PM10 Lb/Hr*
Aircraft Operations - Airspaces								
20	2,500	6,250,000	1	6,250,000	0.05	0.01		0.1
21a	2,500	6,250,000	1	6,250,000	0.05	0.05		0.4
21b	2,500	6,250,000	1	6,250,000	0.05	0.05		0.4
21c	2,500	6,250,000	1	6,250,000	0.05	0.03		0.2
21d	2,500	6,250,000	1	6,250,000	0.05	0.03		0.2
22a	2,500	6,250,000	1	6,250,000	0.05	0.08		0.6
22b	2,500	6,250,000	1	6,250,000	0.05	0.08		0.6
22c	2,500	6,250,000	1	6,250,000	0.05	0.05		0.4
22d	2,500	6,250,000	1	6,250,000	0.05	0.08		0.6
22e	2,500	6,250,000	1	6,250,000	0.05	0.08		0.6
22f	2,500	6,250,000	1	6,250,000	0.05	0.05		0.4
22g	2,500	6,250,000	1	6,250,000	0.05	0.08		0.6
22h	2,500	6,250,000	1	6,250,000	0.05	0.08		0.6
22i	2,500	6,250,000	1	6,250,000	0.05	0.05		0.4
23	2,500	6,250,000	1	6,250,000	0.05	0.03		0.2
24d	2,500	6,250,000	1	6,250,000	0.05	0.01		0.1
24g	2,500	6,250,000	1	6,250,000	0.05	0.03		0.2
45	2,500	6,250,000	1	6,250,000	0.05	0.05		0.4
46	2,500	6,250,000	1	6,250,000	0.05	0.05		0.4
47	2,500	6,250,000	1	6,250,000	0.05	0.03		0.2
Total Aircraft Operations - Airspaces				125,000,000	1.00	1.00		7.94

Table G.3.1-4. Simulation of PM10 Emissions from Aircraft Ops Range LTOs, Ordnance Usage, and EAF LTOs - 29 Palms LAS Alternative 3 - West Area

Activity/Volume Source #	*Width (meters)*	*Area (m2)*	*#of Sources*	*Total Source Area (m2)*	*Indi. Source Area/ Total Source Area*	*Location Factor*	*Battalion Factor*	*Volume Source PM10 Lb/Hr*
Aircraft Operations - Range LTOs								
20	2,500	6,250,000	1	6,250,000	0.50			42.6
23	2,500	6,250,000	1	6,250,000	0.50			42.6
Total Aircraft Operations - Range LTOs				12,500,000				85.1
Ordnance Activities								
22a	2,500	6,250,000	1	6,250,000	0.11	0.10		1.7
22b	2,500	6,250,000	1	6,250,000	0.11	0.10		1.7
22c	2,500	6,250,000	1	6,250,000	0.11	0.03		0.5
22d	2,500	6,250,000	1	6,250,000	0.11	0.25		4.2
22e	2,500	6,250,000	1	6,250,000	0.11	0.25		4.2
22f	2,500	6,250,000	1	6,250,000	0.11	0.04		0.7
22g	2,500	6,250,000	1	6,250,000	0.11	0.10		1.7
22h	2,500	6,250,000	1	6,250,000	0.11	0.10		1.7
22i	2,500	6,250,000	1	6,250,000	0.11	0.03		0.5
Total Ordnance Activities				56,250,000	1.00	1.00		16.6
Aircraft Operations - EAF LTOs								
8	2,500	6,250,000	1	6,250,000	1.00			46.4

Table G.3.1-5. Total Combined Volume Source PM10 Emissions - 29 Palms LAS Alternative 3 - West Area

Volume Source #		*Volume Source PM10 Lb/Hr*
8		46.4
20		82.0
21a		92.2
21b		92.2
21c		52.7
21d		52.7
22a		67.9
22b		67.9
22c		53.4
22d		135.9
22e		135.9
22f		132.2
22g		133.4
22h		133.4
22i		132.0
23		82.1
24a		19.7
24b		19.7
24c		13.1
24d		32.9
24e		32.8
24f		26.2
24g		52.7
24h		39.3
24i		26.2
25a		19.7
25b		13.1
25c		19.7
25d		13.1
45		52.9
46		52.9
47		39.6
48		39.3
49		26.2
50		39.3
51		13.1
52		26.2
53		13.1
Total Hourly Emissions		2,123.2

Table G.3.1-6. Dispersion Modeling Scenario for 24-Hour PM10 Emissions in Alternative 3 Central Area - 29 Palms LAS EIS

Activity/Source	*Pounds per Hour* *PM_{10}*
MEB Exercises	
Tactical Vehicles	4.9
Tactical Support Equipment	1.2
Fugitive Dust	1,174.2
Subtotal	1,180.3
Aircraft Operations	
Airspaces	4.8
EAF LTOs	
Range LTOs	1.2
Fugitive Dust - EAF LTOs	
Fugitive Dust - Range LTOs	49.8
Subtotal	55.8
Ordnance Activities	
Combustive	
Fugitive	
Subtotal	
Total Operations - PPH	1,236.1

Note: = 60% of activity and emissions within West Area.

Table G.3.1-7. Simulation of Combustive/Fugitive Dust PM10 Emissions from All Sources in Alternative 3 Central Area - 29 Palms LAS

Activity/Volume Source #	*Width (meters)*	*Area (m2)*	*#of Sources*	*Total Source Area (m2)*	*Indi. Source Area/ Total Source Area*	*Volume Source PM10 Lb/Hr*
All Activities						
26c	5,000	25,000,000	1	25,000,000	0.03	35.3
26d	5,000	25,000,000	1	25,000,000	0.03	35.3
26g	5,000	25,000,000	1	25,000,000	0.03	35.3
26h	5,000	25,000,000	1	25,000,000	0.03	35.3
26k	5,000	25,000,000	1	25,000,000	0.03	35.3
26l	5,000	25,000,000	1	25,000,000	0.03	35.3
26o	5,000	25,000,000	1	25,000,000	0.03	35.3
26p	5,000	25,000,000	1	25,000,000	0.03	35.3
28	5,000	25,000,000	1	25,000,000	0.03	35.3
43	5,000	25,000,000	1	25,000,000	0.03	35.3
44	5,000	25,000,000	1	25,000,000	0.03	35.3
29a	5,000	25,000,000	1	25,000,000	0.03	35.3
29b	5,000	25,000,000	1	25,000,000	0.03	35.3
29c	5,000	25,000,000	1	25,000,000	0.03	35.3
29d	5,000	25,000,000	1	25,000,000	0.03	35.3
30a	5,000	25,000,000	1	25,000,000	0.03	35.3
30b	5,000	25,000,000	1	25,000,000	0.03	35.3
30c	5,000	25,000,000	1	25,000,000	0.03	35.3
30d	5,000	25,000,000	1	25,000,000	0.03	35.3
30e	5,000	25,000,000	1	25,000,000	0.03	35.3
30f	5,000	25,000,000	1	25,000,000	0.03	35.3
30g	5,000	25,000,000	1	25,000,000	0.03	35.3
30h	5,000	25,000,000	1	25,000,000	0.03	35.3
30i	5,000	25,000,000	1	25,000,000	0.03	35.3
30j	5,000	25,000,000	1	25,000,000	0.03	35.3
30k	5,000	25,000,000	1	25,000,000	0.03	35.3
30l	5,000	25,000,000	1	25,000,000	0.03	35.3
30m	5,000	25,000,000	1	25,000,000	0.03	35.3
30n	5,000	25,000,000	1	25,000,000	0.03	35.3
30o	5,000	25,000,000	1	25,000,000	0.03	35.3
30p	5,000	25,000,000	1	25,000,000	0.03	35.3
31a	5,000	25,000,000	1	25,000,000	0.03	35.3
31b	5,000	25,000,000	1	25,000,000	0.03	35.3
31c	5,000	25,000,000	1	25,000,000	0.03	35.3
31d	5,000	25,000,000	1	25,000,000	0.03	35.3
Total All Sources				875,000,000	1.00	1,236

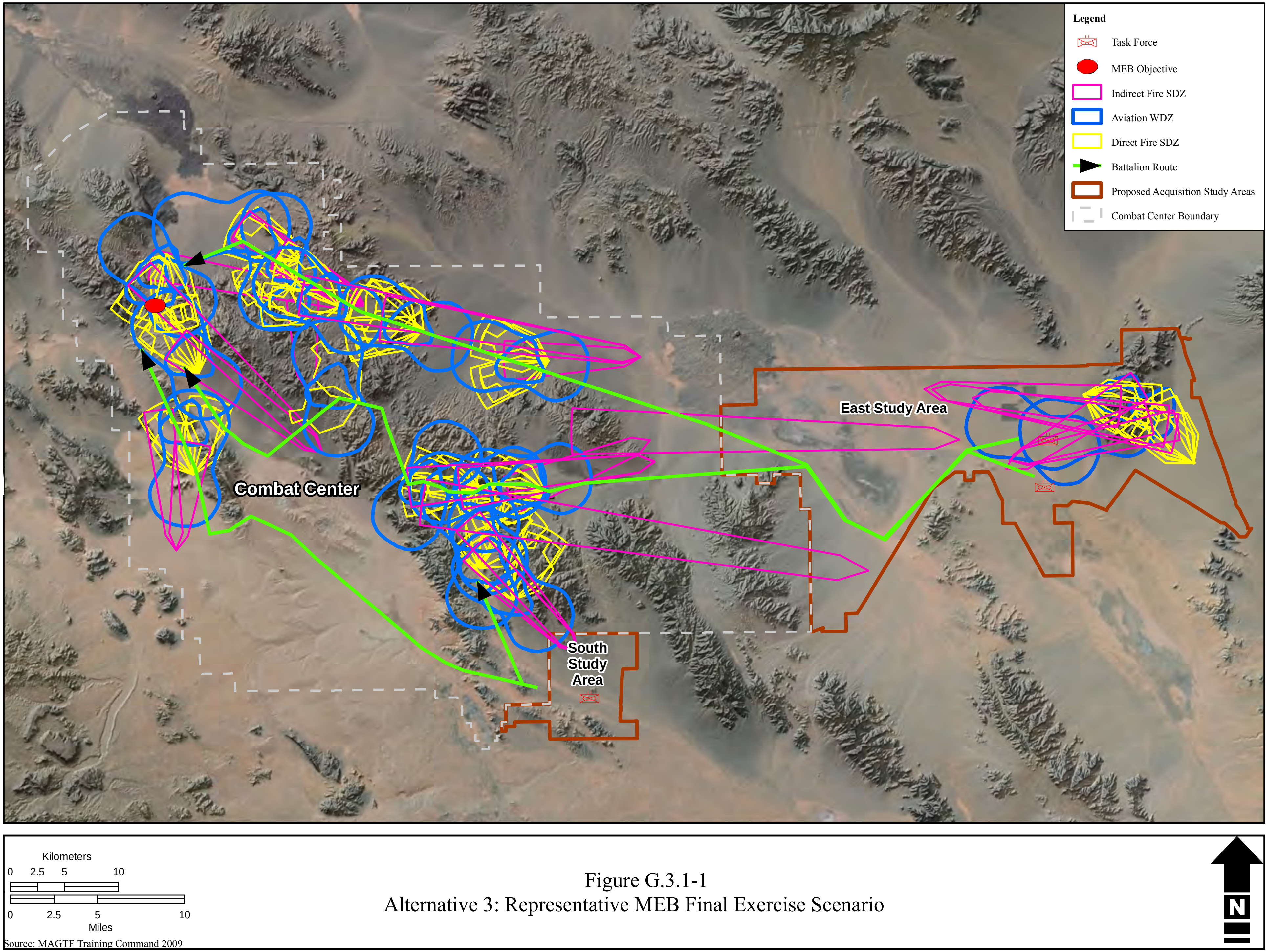
Table G.3.1-9. Simulation of Combustive/Fugitive Dust PM10 Emissions from All Sources in Alternative 3 Eastern Area - 29 Palms LAS EIS

Activity/Volume Source #	*Width (meters)*	*Area (m2)*	*#of Sources*	*Total Source Area (m2)*	*Indi. Source Area/ Total Source Area*	*Volume Source PM10 Lb/Hr*
All Activities						
32	7,500	56,250,000	1	56,250,000	0.14	115.9
33	7,500	56,250,000	1	56,250,000	0.14	115.9
34a	5,000	25,000,000	1	25,000,000	0.06	51.5
34b	5,000	25,000,000	1	25,000,000	0.06	51.5
34c	5,000	25,000,000	1	25,000,000	0.06	51.5
34d	5,000	25,000,000	1	25,000,000	0.06	51.5
35	5,000	25,000,000	1	25,000,000	0.06	51.5
36	5,000	25,000,000	1	25,000,000	0.06	51.5
37	5,000	25,000,000	1	25,000,000	0.06	51.5
38	7,500	56,250,000	1	56,250,000	0.14	115.9
39	7,500	56,250,000	1	56,250,000	0.14	115.9
Total All Sources				400,000,000	1.00	824.1

Table G.3.1-8. Dispersion Modeling Scenario for 24-Hour PM10 Emissions in Alternative 3 Eastern Area - 29 Palms LAS EIS

Activity/Source	*Pounds per Hour* *PM 10*
MEB Exercises	
Tactical Vehicles	3.3
Tactical Support Equipment	0.8
Fugitive Dust	782.8
Subtotal	786.8
Aircraft Operations	
Airspaces	3.2
EAF LTOs	
Range LTOs	0.8
Fugitive Dust - EAF LTOs	
Fugitive Dust - Range LTOs	33.2
Subtotal	37.2
Ordnance Activities	
Combustive	
Fugitive	
Subtotal	
Total Operations - PPH	824.1

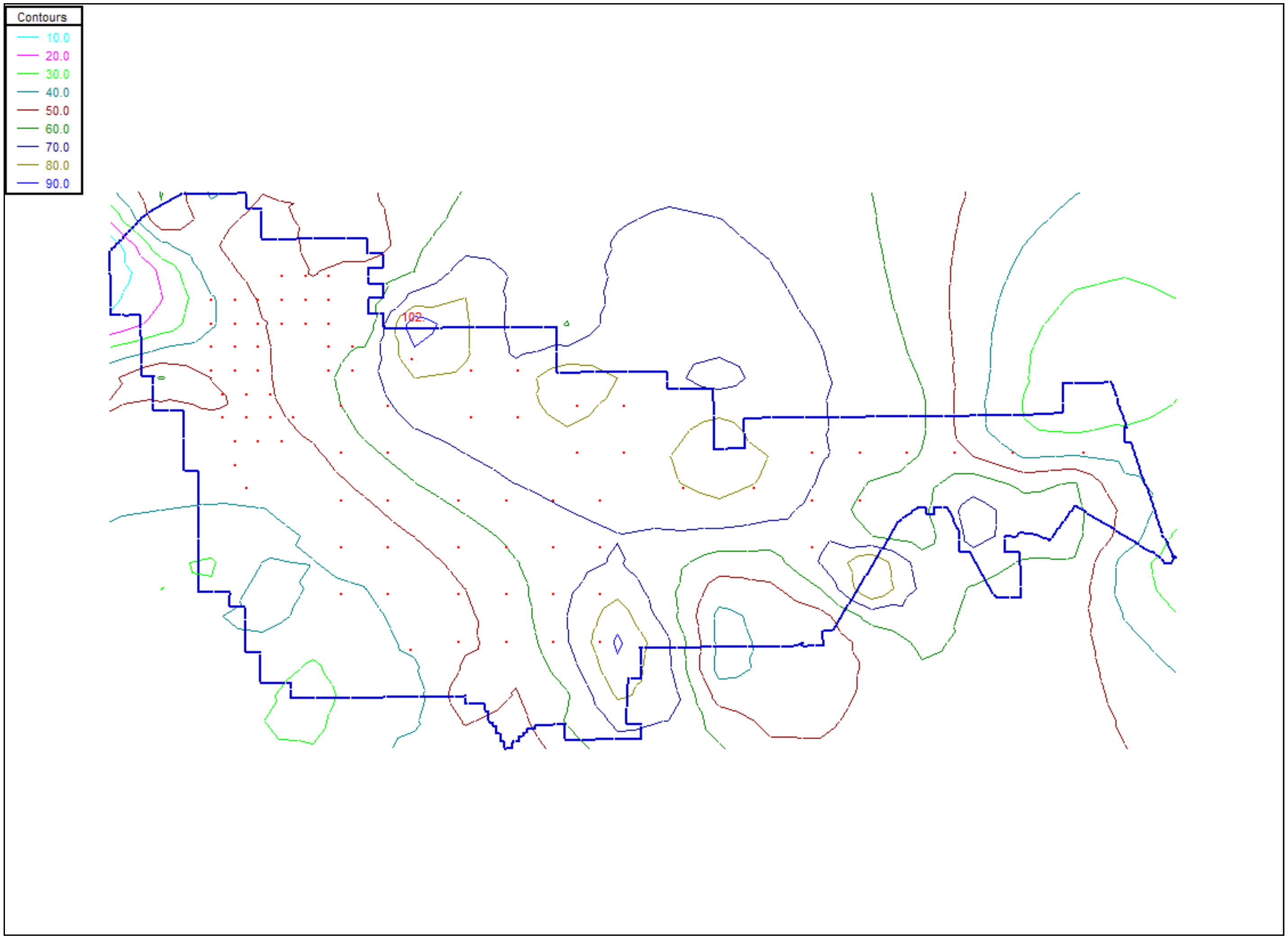
Note: = 40% of activity and emissions within West Area.



Source: MAGTF Training Command 2009

Figure G.3.1-1
Alternative 3: Representative MEB Final Exercise Scenario

Figure G.3.1-2. Maximum 24-Hour PM10 Concentrations Predicted for the LAS MEB Exercises (ug/m^3) - Project Alternative 3



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APPENDIX G.3.2

NO_2 Dispersion Modeling Analyses - LAS Project Alternative 3

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Appendix G.3.2 - NO_2 Dispersion Modeling Analyses - LAS Project Alternative 3

Table G.3.2-1. Dispersion Modeling Scenario for Annual NOx Operational Emissions - 29 Palms LAS EIS - Alternative 3

Activity/Source	*Pounds per Hour NOx (1)*
MEB Exercises	
Tactical Equipment	106.8
Tactical Support Equipment	22.8
Fugitive Dust	
Subtotal	129.6
Aircraft Operations	
Airspaces	32.0
EAF LTOs	17.9
Range LTOs	5.4
Fugitive Dust - EAF LTOs	
Fugitive Dust - Range LTOs	
Subtotal	55.2
Ordnance Activities	
Combustive	0.4
Fugitive	
Subtotal	0.4
Total Operations - Pounds per Hour	185.2

Note: (1) Equates to total annual emissions for each source category divided by (60 days * 24 hours).

Table G.3.2-2. Operational NOx Emission Simulations - 29 Palms LAS EIS - Alternative 3

Activity/Volume Source #	Width (meters)	Area (m2)	#of Sources	Total Source Area (m2)	Indi. Source Fraction of Total Source Area	Volume Source NOx Emissions (Lbs/Hr) Individual	Combined
MEB Exercises							
26a-26p	5,000	25,000,000	4	100,000,000	0.02	2.9	12
29a-29d	5,000	25,000,000	16	400,000,000	0.02	2.9	47
30a-30p	5,000	25,000,000	16	400,000,000	0.02	2.9	47
31a-31d	5,000	25,000,000	4	100,000,000	0.02	2.9	12
34a-34d	5,000	25,000,000	4	100,000,000	0.02	2.9	12
Total MEB Exercises		125,000,000	44	1,100,000,000			129.6
Aircraft Operations - Airspaces + Range LTOs							
26a-26p	5,000	25,000,000	4	100,000,000	0.02	0.20	7.5
29a-29d	5,000	25,000,000	16	400,000,000	0.02	0.20	7.5
30a-30p	5,000	25,000,000	16	400,000,000	0.02	0.20	7.5
31a-31d	5,000	25,000,000	4	100,000,000	0.02	0.20	7.5
34a-34d	5,000	25,000,000	4	100,000,000	0.02	0.20	7.5
Total Aircraft Operations - Airspaces + Range LTOs		125,000,000	44	1,100,000,000			37.4
Ordnance Activities							
26a-26p	5,000	25,000,000	4	100,000,000	0.02	0.20	0.1
29a-29d	5,000	25,000,000	16	400,000,000	0.02	0.20	0.1
30a-30p	5,000	25,000,000	16	400,000,000	0.02	0.20	0.1
31a-31d	5,000	25,000,000	4	100,000,000	0.02	0.20	0.1
34a-34d	5,000	25,000,000	4	100,000,000	0.02	0.20	0.1
Total Ordnance Activities		125,000,000	44	1,100,000,000			0.4
Aircraft Operations - EAF LTOs							
8	2,500	6,250,000	1	6,250,000	1.00	1.00	17.9
Total Combined Emissions							
8						17.9	17.9
26a-26p						3.3	19.3
29a-29d						3.3	54.7
30a-30p						3.3	54.7
31a-31d						3.3	19.3
34a-34d						3.3	19.3
Total Hourly Emissions							185.2

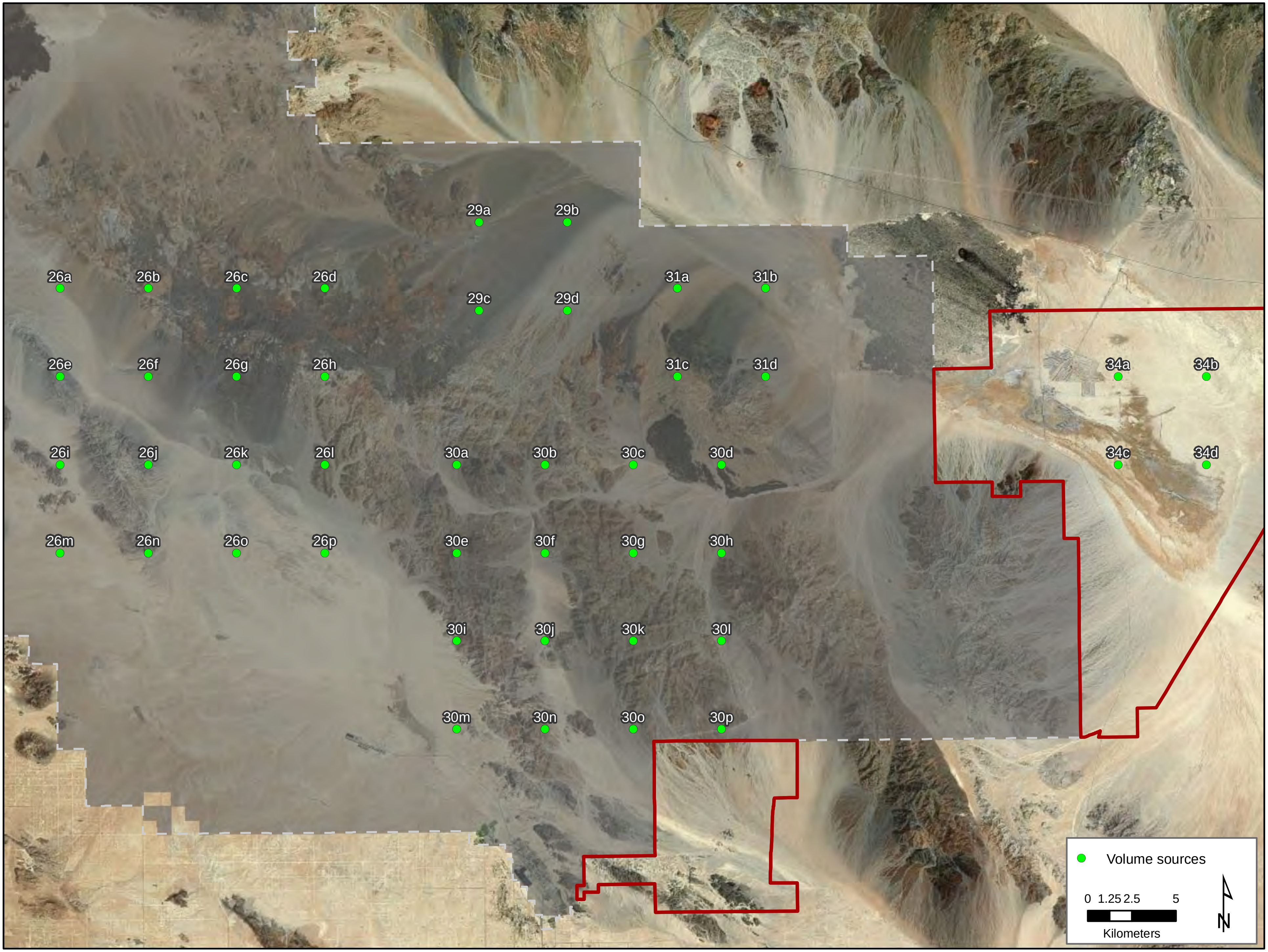
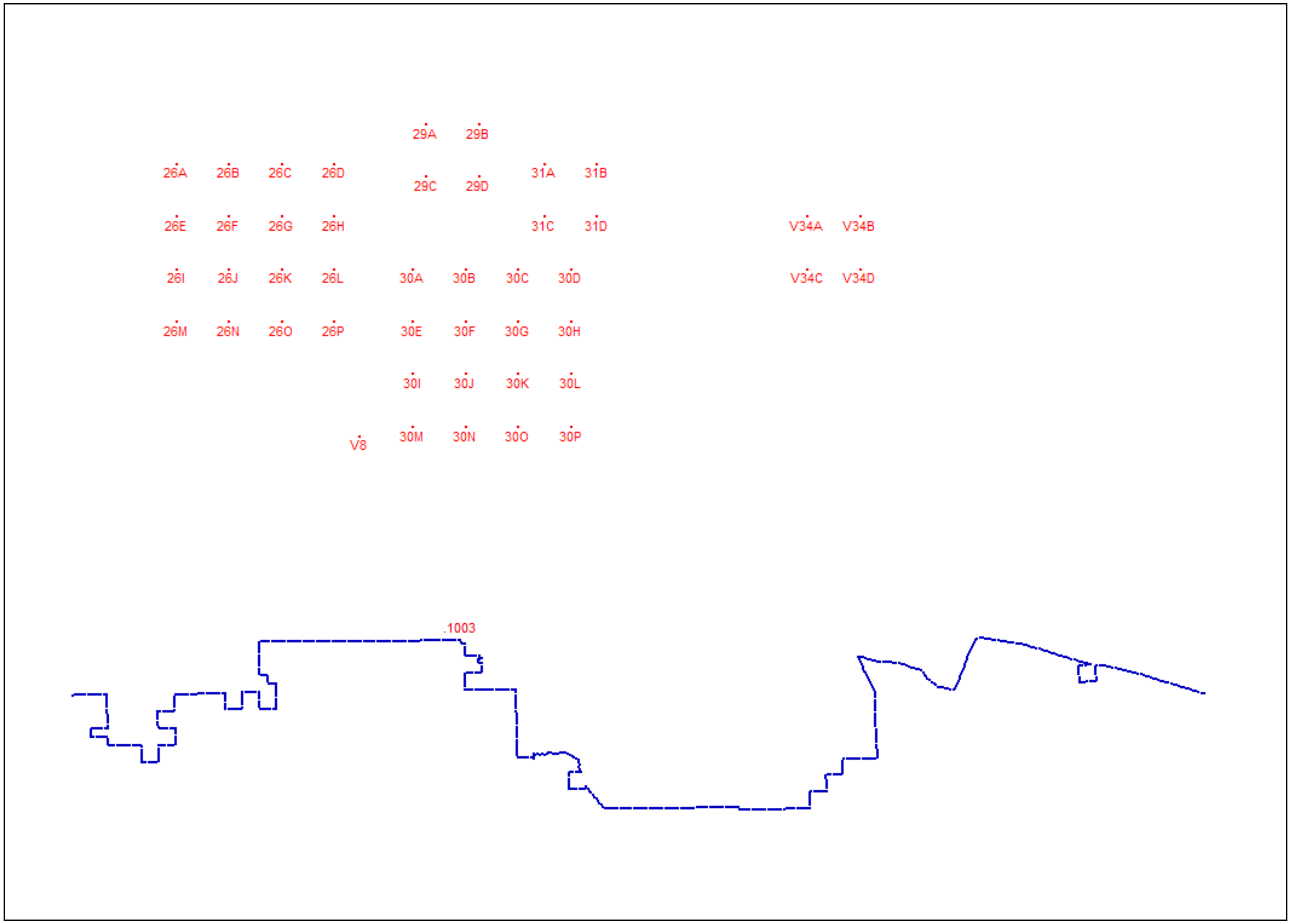


Figure G.3.2-1. Simulation of Emission Sources for NO2 Modeling Analysis - 29 Palms LAS EIS - Alternative 3

Figure G.3.2-2. Maximum Annual NOx Concentration Predicted for Joshua Tree National Park (ug/m^3) - 29 Palms LAS Project Alternative 3



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APPENDIX H
NOISE: DESCRIPTION, EFFECTS AND MODELING DATA

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Appendix H Table of Contents

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H.1 NOISE

H.1.1 Basics of Sound

Noise is unwanted sound. Sound is all around us; sound becomes noise when it interferes with normal activities, such as sleep or conversation.

Sound is a physical phenomenon consisting of minute vibrations that travel through a medium, such as air, and are sensed by the human ear. Whether that sound is interpreted as pleasant (e.g., music) or unpleasant (e.g., jackhammers) depends largely on the listener's current activity, past experience, and attitude toward the source of that sound.

The measurement and human perception of sound involves three basic physical characteristics: intensity, frequency, and duration. First, intensity is a measure of the acoustic energy of the sound vibrations and is expressed in terms of sound pressure. The greater the sound pressure, the more energy carried by the sound and the louder the perception of that sound. The second important physical characteristic of sound is frequency, which is the number of times per second the air vibrates or oscillates. Low-frequency sounds are characterized as rumbles or roars, while high-frequency sounds are typified by sirens or screeches. The third important characteristic of sound is duration or the length of time the sound can be detected.

The loudest sounds that can be detected comfortably by the human ear have intensities that are a trillion times higher than those of sounds that can barely be detected. Because of this vast range, using a linear scale to represent the intensity of sound becomes very unwieldy. As a result, a logarithmic unit known as the decibel (abbreviated dB) is used to represent the intensity of a sound. Such a representation is called a sound level. A sound level of 0 dB is approximately the threshold of human hearing and is barely audible under extremely quiet listening conditions. Normal speech has a sound level of approximately 60 dB; sound levels above 120 dB begin to be felt inside the human ear as discomfort. Sound levels between 130 to 140 dB are felt as pain (Berglund and Lindvall 1995).

Because of the logarithmic nature of the decibel unit, sound levels cannot be arithmetically added or subtracted and are somewhat cumbersome to handle mathematically. However, some simple rules are useful in dealing with sound levels. First, if a sound's intensity is doubled, the sound level increases by 3 dB, regardless of the initial sound level. For example:

60 dB + 60 dB = 63 dB, and

80 dB + 80 dB = 83 dB.

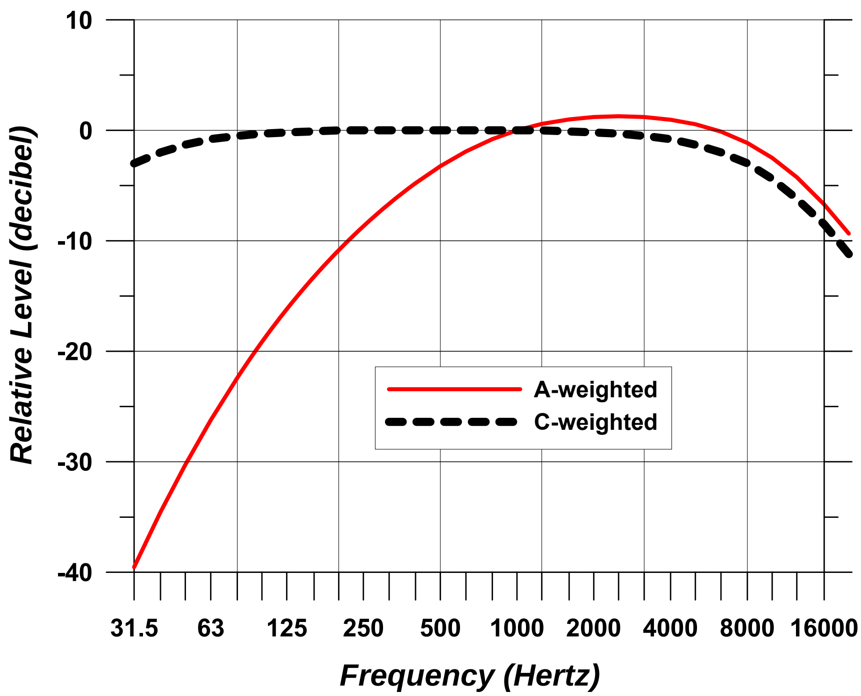
Second, the total sound level produced by two sounds of different levels is usually only slightly more than the higher of the two. For example:

60.0 dB + 70.0 dB = 70.4 dB.

Because the addition of sound levels is different than that of ordinary numbers, such addition is often referred to as "decibel addition" or "energy addition." The latter term arises from the fact that what we are really doing when we add decibel values is first converting each decibel value to its corresponding acoustic energy, then adding the energies using the normal rules of addition, and finally converting the total energy back to its decibel equivalent.

The minimum change in the sound level of individual events that an average human ear can detect is about 3 dB. On average, a person perceives a change in sound level of about 10 dB as a doubling (or halving) of the sound's loudness, and this relation holds true for loud and quiet sounds. A decrease in sound level of 10 dB actually represents a 90 percent decrease in sound intensity but only a 50 percent decrease in perceived loudness because of the nonlinear response of the human ear (similar to most human senses).

Sound frequency is measured in terms of cycles per second (cps), or hertz (Hz), which is the standard unit for cps. The normal human ear can detect sounds that range in frequency from about 20 Hz to about 15,000 Hz. All sounds in this wide range of frequencies, however, are not heard equally by the human ear, which is most sensitive to frequencies in the 1,000 to 4,000 Hz range. Weighting curves have been developed to correspond to the sensitivity and perception of different types of sound. A-weighting and C-weighting are the two most common weightings. A-weighting accounts for frequency dependence by adjusting the very high and very low frequencies (below approximately 500 Hz and above approximately 10,000 Hz) to approximate the human ear's lower sensitivities to those frequencies. C-weighting is nearly flat throughout the range of audible frequencies, hardly de-emphasizing the low frequency sound while approximating the human ear's sensitivity to higher intensity sounds. The two curves shown in Figure H-1 are also the most adequate to quantify environmental noises.



Source: ANSI S1.4A -1985 "Specification of Sound Level Meters"

Figure H-1. Frequency Response Characteristics of A- and C-Weighting Networks

H.1.1.1 A-weighted Sound Level

Sound levels that are measured using A-weighting, called A-weighted sound levels, are often denoted by the unit dBA or dB(A) rather than dB. When the use of A-weighting is understood, the adjective "A-weighted" is often omitted and the measurements are expressed as dB. In this report (as in most environmental impact documents), dB units refer to A-weighted sound levels.

Noise potentially becomes an issue when its intensity exceeds the ambient or background sound pressures. Ambient background noise in metropolitan, urbanized areas typically varies from 60 to 70 dB and can be as high as 80 dB or greater; quiet suburban neighborhoods experience ambient noise levels of approximately 45-50 dB (U.S. Environmental Protection Agency (EPA) 1978).

Figure H-2 is a chart of A-weighted sound levels from typical sounds. Some noise sources (air conditioner, vacuum cleaner) are continuous sounds which levels are constant for some time. Some (automobile, heavy truck) are the maximum sound during a vehicle pass-by. Some (urban daytime, urban nighttime) are averages over extended periods. A variety of noise metrics have been developed to describe noise over different time periods, as discussed below.

Aircraft noise consists of two major types of sound events: aircraft takeoffs and landings, and engine maintenance operations. The former can be described as intermittent sounds and the latter as continuous. Noise levels from flight operations exceeding background noise typically occur beneath main approach and departure corridors, in local air traffic patterns around the airfield, and in areas immediately adjacent to parking ramps and aircraft staging areas. As aircraft in flight gain altitude, their noise contribution drops to lower levels, often becoming indistinguishable from the background.

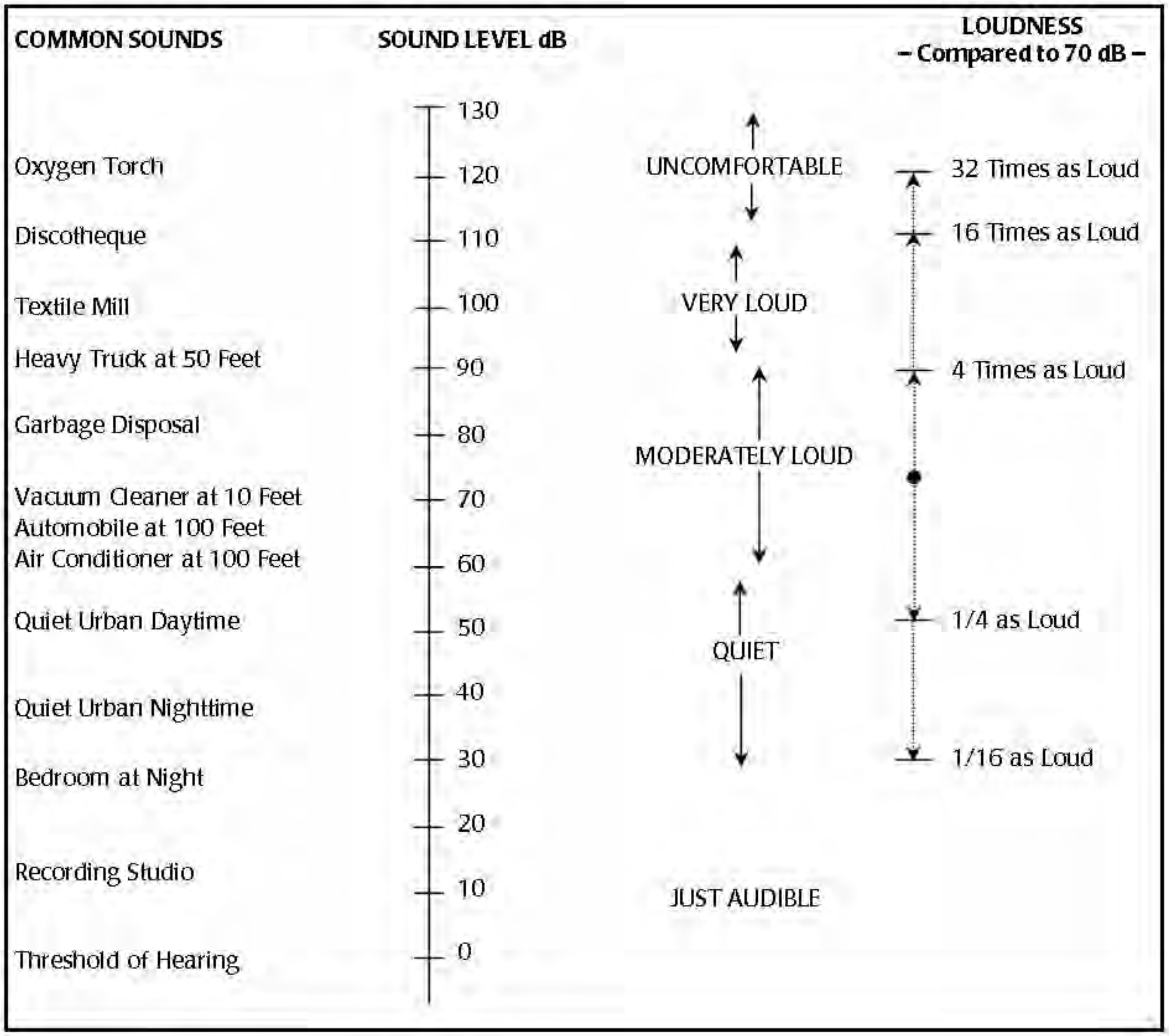
C-weighted Sound Level

Sound levels measured using a C-weighting are most appropriately called C-weighted sound levels (and denoted dBC). C-weighting is nearly flat throughout the audible frequency range, hardly de-emphasizing the low frequency. This weighting scale is generally used to describe impulsive sounds. Sounds that are characterized as impulsive generally contain low frequencies. Impulsive sounds may induce secondary effects, such as shaking of a structure, rattling of windows, inducing vibrations. These secondary effects can cause additional annoyance and complaints.

The following definitions in the American National Standard Institute (ANSI) Report S12.9, Part 4 provide general concepts helpful in understanding impulsive sounds (ANSI 1996).

Impulsive Sound: Sound characterized by brief excursions of sound pressure (acoustic impulses) that significantly exceeds the ambient environmental sound pressure. The duration of a single impulsive sound is usually less than one second (ANSI 1996).

Highly Impulsive Sound: Sound from one of the following enumerated categories of sound sources: small-arms gunfire, metal hammering, wood hammering, drop hammering, pile driving, drop forging, pneumatic hammering, pavement breaking, metal impacts during rail-yard shunting operation, and riveting.



SOURCE: Handbook of Noise Control, *C.M. Harris, Editor McGraw-Hill Book Co., 1979, and FICAN 1997*

Figure H-2. Typical A-weighted Sound Levels of Common Sounds

High-energy Impulsive Sound: Sound from one of the following enumerated categories of sound sources: quarry and mining explosions, sonic booms, demolition and industrial processes that use high explosives, military ordnance (e.g., armor, artillery and mortar fire, and bombs), explosive ignition of rockets and missiles, explosive industrial circuit breakers, and any other explosive source where the equivalent mass of dynamite exceeds 25 grams.

H.1.2 Noise Metrics

In general, a metric is a statistic for measuring or quantifying. A noise metric quantifies the noise environment. There are three families of noise metrics described herein – one for single noise events such as an aircraft flyby, one for cumulative noise events such as a day's worth of aircraft activity and one which quantifies the events or time relative to single noise events.

Within the single noise event family, metrics described below include Peak Sound Pressure Level, Maximum Sound Level and Sound Exposure Level. Within the cumulative noise events family, metrics described below include Equivalent Sound Level, Day-Night Average Sound Level and several others. Within the events/time family, metrics described below include Number of Events Above a Threshold Level and Time Above a Specified Level.

H.1.2.1 Maximum Sound Level (L_{max})

The highest A-weighted integrated sound level measured during a single event in which the sound level changes value with time (e.g., an aircraft overflight) is called the maximum A-weighted sound level or Maximum Sound Level.

During an aircraft overflight, the noise level starts at the ambient or background noise level, rises to the maximum level as the aircraft flies closest to the observer, and returns to the background level as the aircraft recedes into the distance. The L_{max} indicates the maximum sound level occurring for a fraction of a second. For aircraft noise, the "fraction of a second" over which the maximum level is defined is generally one-eighth of a second, and is denoted as "fast" response (ANSI 1988). Slowly varying or steady sounds are generally measured over a period of one second, denoted "slow" response. The L_{max} is important in judging the interference caused by a noise event with conversation, TV or radio listening, sleep, or other common activities. Although it provides some measure of the intrusiveness of the event, it does not completely describe the total event, because it does not include the period of time that the sound is heard.

H.1.2.2 Peak Sound Pressure Level (L_{pk})

The Peak Sound Pressure Level, is the highest instantaneous level obtained by a sound level measurement device. The L_{pk} is typically measured using a 20 microseconds or faster sampling rate, and is typically based on unweighted or linear response of the meter.

H.1.2.3 Sound Exposure Level (SEL)

Sound Exposure Level is a composite metric that represents both the intensity of a sound and its duration. Individual time-varying noise events (e.g., aircraft overflights) have two main characteristics: a sound level that changes throughout the event and a period of time during which the event is heard. SEL provides a measure of the net impact of the entire acoustic event, but it does not directly represent the sound level heard at any given time. During an aircraft flyover, SEL would include both the L_{max} and the lower noise levels produced during onset and recess periods of the overflight.

SEL is a logarithmic measure of the total acoustic energy transmitted to the listener during the event. Mathematically, it represents the sound level of a constant sound that would, in one second, generate the same acoustic energy as the actual time-varying noise event. For sound from aircraft overflights, which typically lasts more than one second, the SEL is usually greater than the L_{max} because an individual overflight takes seconds and the L_{max} occurs instantaneously. SEL represents the best metric to compare noise levels from overflights.

H.1.2.4 Equivalent Sound Level (L_{eq})

A cumulative noise metric useful in describing noise is the Equivalent Sound Level. L_{eq} is the continuous sound level that would be present if all of the variations in sound level occurring over a specified time period were smoothed out as to contain the samed total sound energy.

Just as SEL has proven to be a good measure of the noise impact of a single event, L_{eq} has been established to be a good measure of the impact of a series of events during a given time period. Also, while L_{eq} is defined as an average, it is effectively a sum over that time period and is, thus, a measure of the cumulative impact of noise. For example, the sum of all noise-generating events during the period of 7 a.m. to 4 p.m. could provide the relative impact of noise generating events for a school day.

H.1.2.5 Day-Night Average Sound Level (DNL or L_{dn}) and Community Noise Equivalent Level (CNEL and CCNEL)

Day-Night Average Sound Level (DNL or L_{dn}) and Community Noise Equivalent Level (CNEL for A-weighted noise and CCNEL for C-weighted noise) are composite metrics that account for all noise events in a 24-hour period. In order to account for increased human sensitivity to noise at night, a 10 dB penalty is applied to nighttime events (10:00 p.m. to 7:00 a.m. time period). A variant of the DNL, the CNEL includes a 5 dB penalty on noise during the 7:00 a.m. to 10:00 p.m. time period, and a 10 dB penalty on noise during the 10:00 p.m. to 7:00 a.m. time period. C-weighted CNEL is denoted CCNEL or dBC CNEL. The notations DNL and L_{dn} are both used for Day-Night Average Sound Level and are equivalent.

Like L_{eq}, DNL and CNEL (or CCNEL) without their penalties are average quantities, mathematically representing the continuous A-weighted or C-weighted sound level that would be present if all of the variations in sound level that occur over a 24-hour period were smoothed out so as to contain the same total sound energy. These composite single-measure time-average metrics account for the SELs, L_{max}, the duration of the events (sorties or operations), and the number of events that occur over a 24-hour period but do not provide specific information on the number of noise events or the individual sound levels that occur during the 24-hour day. Like SEL, neither DNL nor CNEL/CCNEL represent the sound level heard at any particular time, but quantifies the total sound energy received. While it is normalized as an average, it represents all of the sound energy, and is therefore a cumulative measure.

The nighttime penalties in both DNL and CNEL/CCNEL account for the added intrusiveness of sounds that occur during normal sleeping hours, both because of the increased sensitivity to noise during those hours and because ambient sound levels during nighttime are typically about 10 dB lower than during daytime hours. The evening penalty in CNEL/CCNEL accounts for the added intrusiveness of sounds during that period.

The inclusion of daytime, evening and nighttime periods in the computation of the DNL and CNEL/CCNEL reflects their basic 24-hour definition. They can, however, be applied over periods of multiple days. For application to civil airports, where operations are consistent from day to day, DNL and CNEL/CCNEL are usually applied as an annual average.

The logarithmic nature of the decibel unit causes the noise levels of the loudest events to control the 24-hour average. A DNL of 65 dB could result from a very few noisy events or a large number of quieter events.

As a simple example of this characteristic, consider a case in which only one aircraft overflight occurs during the daytime over a 24-hour period, creating a sound level of 100 dB for 30 seconds. During the remaining 23 hours, 59 minutes, and 30 seconds of the day, the ambient sound level is 50 dB. The DNL for this 24-hour period is 65.9 dB. Assume, as a second example, that 10 such 30-second overflights occur during daytime hours during the next 24-hour period, with the same ambient sound level of 50 dB during the remaining 23 hours and 55 minutes of the day. The DNL for this 24-hour period is 75.5 dB. Clearly, the averaging of noise over a 24-hour period does not ignore the louder single events and tends to emphasize both the sound levels and number of those events.

Daily average sound levels are typically used for the evaluation of community noise effects (i.e., long-term annoyance), and particularly aircraft noise effects. In general, scientific studies and social surveys have found a high correlation between the percentages of groups of people highly annoyed and the level of average noise exposure measured in DNL (EPA 1978 and Schultz 1978).

H.1.2.6 Onset-Rate Adjusted Monthly Day-Night Average Sound Level (L_{dnmr}) and Onset-Rate Adjusted Monthly Community Noise Equivalent Level ($CNEL_{mr}$)

Military aircraft utilizing Special Use Airspace (SUA) such as Military Training Routes (MTRs), Military Operating Areas (MOAs) and Restricted Areas/Ranges generate a noise environment that is somewhat different from that associated with airfield operations. As opposed to patterned or continuous noise environments associated with airfields, flight activity in SUAs is highly sporadic, and often seasonal ranging from ten per hour to less than one per week. Individual military overflight events also differ from typical community noise events in that noise from a low-altitude, high-airspeed flyover can have a rather sudden onset, exhibiting a rate of increase in sound level (onset rate) of up to 150 dB per second.

To represent these differences, the conventional SEL metric is adjusted to account for the "surprise" effect of the sudden onset of aircraft noise events on humans with an adjustment ranging up to 11 dB above the normal SEL (Stusnick, et al. 1992). Onset rates between 15 to 150 dB per second require an adjustment of 0 to 11 dB, while onset rates below 15 dB per second require no adjustment. The adjusted SEL is designated as the onset-rate adjusted sound exposure level (SEL_r).

Because of the sporadic characteristic of SUA activity and so as not to dilute the resultant noise exposure, the month with the most operations or sorties from a yearly tabulation for the given SUA is examined -- the so-called busiest month. The cumulative exposure to noise in these areas is computed by DNL over the busy month, but using SEL_r instead of SEL. This monthly average is denoted L_{dnmr}. If onset rate adjusted DNL is computed over a period other than a month, it would be designated L_{dnr} and the period must be specified. In the state of California, a variant of the L_{dnmr} includes a penalty for evening operations (7 p.m. to 10 p.m) and is denoted $CNEL_{mr}$.

H.1.2.7 Peak Sound Level (Lpk)

The Peak Sound Pressure Level is the highest instantaneous level obtained by a sound level measurement device. The Lpk is typically measured using a 20 microseconds or faster sampling rate, and is typically based on un-weighted or linear response of the meter.

H.1.2.8 Single Event Peak Level Exceeded by 15 Percent of Events [PK 15(met)]

The Single Event Peak Level Exceeded by 15 Percent of Events [PK 15(met)] is a metric used in addition to cumulative noise metrics to provide more information on the effects of noise from ordnance activity. PK 15(met) is the calculated peak noise level, without frequency weighting, expected to be exceeded by 15 percent of all modeled events. It supports assessment of the potential for receiving noise complaints from the public about large caliber impulsive noise from armor, artillery, mortars and demolition activities, as well as from small arms ranges. The metric PK 15(met) is related to Lpk but accounts for statistical variation in received single event peak noise level that is due to variable meteorological conditions.

The USMC has not established guidance for damage assessment or noise complaint potential for large caliber weapons. For the purposes of this EIS, guidance from U.S. Army Regulation 200-1 (Environmental Protection and Enhancement) is used (U.S. Department of the Army 2007). PK 15(met) less than 115 dB is considered to have low potential for noise complaints from large caliber weapons. Noise sensitive land uses are discouraged in areas where PK 15(met) is between 115 and 130 dB with medium potential for complaints. Noise sensitive land uses are strongly discouraged in areas where PK 15(met) is equal to or greater than 130 dB with high potential for noise complaints. With large caliber weapons PK 15(met) exceeding 140 dB, there is a potential for physiological damage to unprotected human ears and structural damage claims.

H.1.3 Noise Effects

This noise effects section includes discussions of annoyance, speech interference and sleep disturbance, and the effects of noise on hearing, health, performance, learning, animals, property values, terrain and archaeological sites.

H.1.3.1 Annoyance

The primary effect of aircraft noise on exposed communities is one of long-term annoyance, defined by the Environmental Protection Agency (EPA) as any negative subjective reaction on the part of an individual or group. The scientific community has adopted the use of long-term annoyance as a primary indicator of community response because it attempts to account for all negative aspects of effects from noise, e.g., increased annoyance due to being awakened the previous night by aircraft and interference with everyday conversation.

Numerous laboratory studies and field surveys have been conducted to measure annoyance and to account for a number of variables, many of which are dependent on a person's individual circumstances and preferences. Laboratory studies of individual response to noise have helped isolate a number of the factors contributing to annoyance, such as the intensity level and spectral characteristics of the noise, duration, the presence of impulses, pitch, information content, and the degree of interference with activity. Social surveys of community response to noise have allowed the development of general dose-response relationships that can be used to estimate the proportion of people who will be highly annoyed by a given noise level. The results of these studies have formed the basis for criteria established to define areas of compatible land use.

A wide variety of responses have been used to determine intrusiveness of noise and disturbances of speech, sleep, audio/video entertainment, and outdoor living; but the most useful metric for assessing peoples' responses to noise is the percentage of the population expected to be "highly annoyed." The concept of "percent highly annoyed" has provided the most consistent response of a community to a particular noise environment. In his synthesis of several different social surveys that employed different response scales, Schultz (1978) defined "highly annoyed" respondents as those respondents whose self-described annoyance fell within the upper 28 percent of the response scale where the scale was numerical or un-named. For surveys where the response scale was named, Schultz counted those who claimed to be highly annoyed, combining the responses of "very annoyed" and "extremely annoyed." Schultz's definition of "percent highly annoyed" (%HA) became the basis for the Federal policy on environmental noise. Daily average sound levels are typically used for the evaluation of community noise effects, such as long-term annoyance.

In general, scientific studies and social surveys have found a correlation between the percentages of groups of people highly annoyed and the level of average noise exposure. Thus, the results are expressed as the average %HA at various exposure levels measured in DNL. The classic analysis is Schultz's original 1978 study, whose results are shown in Figure H-3. This figure is commonly referred to as the Schultz curve. It represents the synthesis of a large number of social surveys (161 data points in all), that relates the long-term community response to various types of noise sources, measured using the DNL metric.

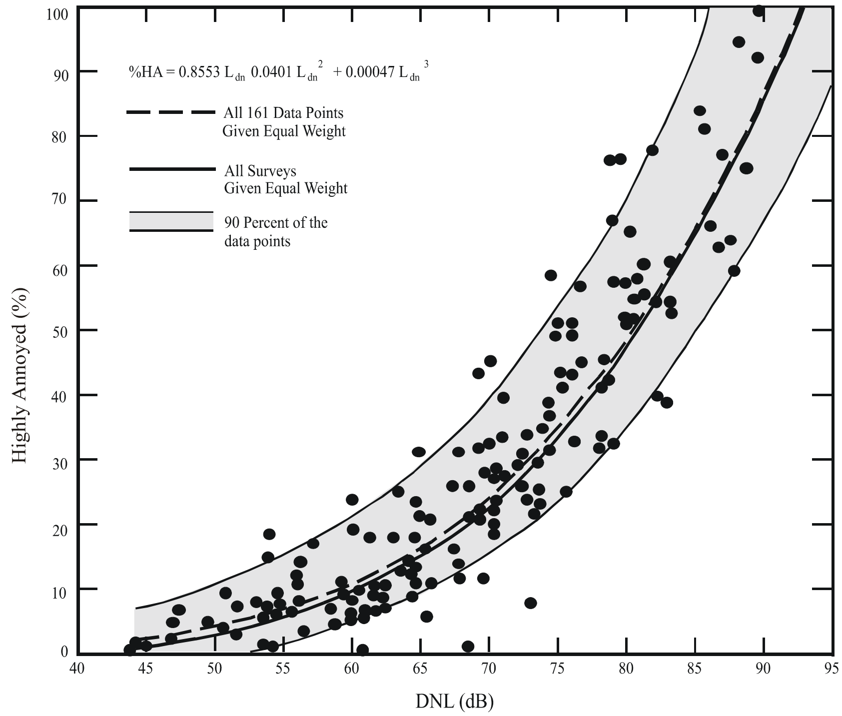
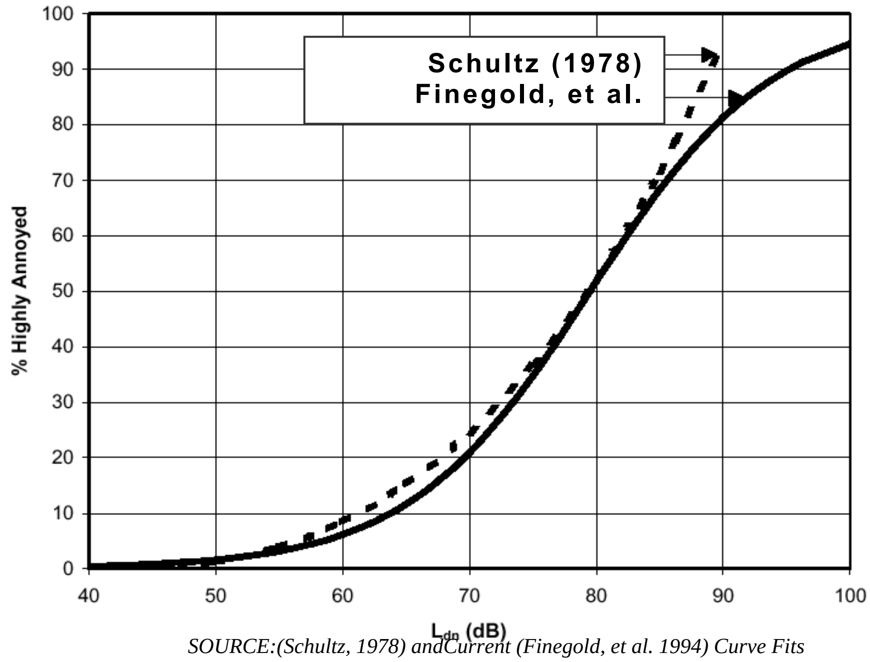


Figure H-3. Community Surveys of Noise Annoyance

An updated study of the original Schultz data based on the analysis of 400 data points collected through 1989 essentially reaffirmed this relationship. Figure H-4 shows an updated form of the curve fit in comparison with the original Schultz curve (Finegold 1994). The updated fit, which does not differ substantially from the original, is the preferred form in the U.S. The relationship between %HA and DNL is:

$\%HA = 100/[1+ \exp(11.13 – 0.141L_{dn})]$



SOURCE:(Schultz, 1978) andCurrent (Finegold, et al. 1994) Curve Fits

Figure H-4. Response of Communities to Noise; Comparison of Original

In general, correlation coefficients of 0.85 to 0.95 are found between the percentages of groups of people highly annoyed and the level of average noise exposure. However, the correlation coefficients for the annoyance of individuals are relatively low, on the order of 0.5 or less. This is not surprising, considering the varying personal factors that influence the manner in which individuals react to noise.

A number of non-acoustic factors have been identified that may influence the annoyance response of an individual. Newman and Beattie (1985) divided these factors into emotional and physical variables.

Emotional Variables:

- Feelings about the necessity or preventability of the noise;
- Judgment of the importance and value of the activity that is producing the noise;
- Activity at the time an individual hears the noise;
- Attitude about the environment;
- General sensitivity to noise;
- Belief about the effect of noise on health; and
- Feeling of fear associated with the noise.

Physical Variables:

- Type of neighborhood;
- Time of day;
- Season;
- Predictability of noise;
- Control over the noise source; and
- Length of time an individual is exposed to a noise.

The low correlation coefficients for individuals' reactions reflect the large amount of scatter among the data drawn from the various surveys and point to the substantial uncertainty associated with the equation representing the relationship between %HA and DNL. Based on the results of surveys it has been observed that noise exposure can explain less than 50 percent of the observed variance in annoyance, indicating that non-acoustical factors play a major role. As a result, it is not possible to accurately predict individual annoyance in any specific community based on the aircraft noise exposure. Nevertheless, changes in %HA can be useful in giving the decision maker more information about the relative effects that different alternatives may have on the community.

The original Schultz curve and the subsequent updates do not separate out the annoyance from aircraft noise and other transportation noise sources. This was an important element, in that it allowed Schultz to obtain some consensus among the various social surveys from the 1960s and 1970s that were synthesized in the analysis. In essence, the Schultz curve assumes that the effects of long-term annoyance on the general population are the same, regardless of whether the noise source is road, rail, or aircraft. In the years after the classical Schultz analysis, additional social surveys have been conducted to better understand the annoyance effects of various transportation sources.

Miedema & Vos (1998) present synthesis curves for the relationship between DNL and percentage "Annoyed" and percentage "Highly Annoyed" for three transportation noise sources. Separate, non-identical curves were found for aircraft, road traffic, and railway noise. Table H-1 illustrates that, for a DNL of 65 dB, the percent of the people forecasted to be Highly Annoyed is 28 percent for air traffic, 18 percent for road traffic, and 11 percent for railroad traffic. For an outdoor DNL of 55 dB, the percent highly annoyed would be close to 12 percent if the noise is generated by aircraft operations, but only 7 percent and 4 percent, respectively, if the noise is generated by road or rail traffic. Comparing the levels on the Miedema & Vos curve to those on the updated Schultz curve indicates that the percentage of people highly annoyed by aircraft noise may be higher than previously thought when the noise is solely generated by aircraft activity.

Table H-1. Percent Highly Annoyed for Different Transportation Noise Sources

DNL (dB)	Percent Hightly Annoyed (%HA)			
	Miedema and Vos			Schultz Combined
	Air	Road	Rail	
55	12	7	4	3
60	19	12	7	6
65	28	18	11	12
70	37	29	16	22
75	48	40	22	36

Source: Miedema & Vos 1998

As noted by the World Health Organization (WHO), even though aircraft noise seems to produce a stronger annoyance response than road traffic, caution should be exercised when interpreting synthesized data from different studies (WHO 2000). The WHO noted that five major parameters should be randomly distributed for the analyses to be valid: personal, demographic, and lifestyle factors, as well as the duration of noise exposure and the population experience with noise.

The FICON found that the updated Schultz curve remains the best available source of empirical dosage effect information to predict community response to transportation noise without any segregation by transportation source (FICON 1992); a position held by the FICAN in 1997 (FICAN 1997). However, FICON also recommended further research to investigate the differences in perceptions of aircraft noise, ground transportation noise (highways and railroads), and general background noise.

H.1.3.2 Speech Interference

Speech interference associated with aircraft noise is a primary cause of annoyance for communities. The disruption of routine activities such as radio or television listening, telephone use, or family conversation gives rise to frustration and irritation. The quality of speech communication is particularly important in classrooms and offices. In industrial settings it can cause fatigue and vocal strain in those who attempt to communicate over the noise.

The disruption of speech in the classroom is a primary concern, due to the potential for adverse effects on children's learning ability. There are two aspects to speech comprehension:

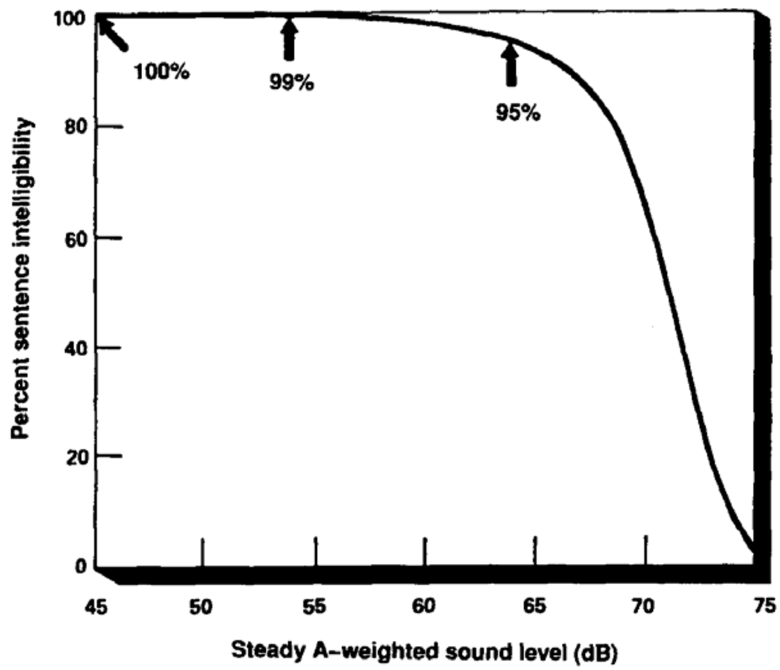
1. *Word Intelligibility* - the percent of words transmitted and received. This might be important for students in the lower grades who are learning the English language, and particularly for students who have English as a Second Language.
2. S*entence Intelligibility* – the percent of sentences transmitted and understood. This might be important for high-school students and adults who are familiar with the language, and who do not necessarily have to understand each word in order to understand sentences.

For teachers to be clearly understood by their students, it is important that regular voice communication is clear and uninterrupted. Not only does the background sound level have to be low enough for the teacher to be clearly heard, but intermittent outdoor noise events also need to be minimized. It is therefore important to evaluate the steady background level, the level of voice communication, and the single-event level due to aircraft overflights that might interfere with speech.

Several research studies have been conducted and guideline documents been developed resulting in a fairly consistent set of noise level criteria for speech interference. This section provides an overview of the results of these studies.

U.S. Federal Criteria for Interior Noise

In 1974, the EPA identified a goal of an indoor 24-hour average sound level $L_{eq(24)}$ of 45 dB to minimize speech interference based on the intelligibility of sentences in the presence of a steady background noise (EPA 1974). Intelligibility pertains to the percentage of speech units correctly understood out of those transmitted, and specifies the type of speech material used, i.e. sentences or words . The curve displayed in Figure H-5 shows the effect of steady indoor background sound levels on sentence intelligibility. For an average adult with normal hearing and fluency in the language, steady background sound levels indoors of less than 45 dB L_{eq} are expected to allow 100 percent intelligibility of sentences.



Source: EPA 1974

Figure H-5. Speech Intelligibility Curve

The curve shows 99 percent sentence intelligibility for background levels at a L_{eq} of 54 dB, and less than 10 percent intelligibility for background levels above a L_{eq} of 73 dB. Note that the curve is especially sensitive to changes in sound level between 65 dB and 75 dB - an increase of 1 dB in background sound level from 70 dB to 71 dB results in a 14 percent decrease in sentence intelligibility, whereas a 1 dB increase in background sound level from 60 dB to 61 dB results in less than 1 percent decrease in sentence intelligibility.

Classroom Criteria

For listeners with normal hearing and fluency in the language, complete sentence intelligibility can be achieved when the signal-to-noise ratio (i.e., the difference between the speech level and the level of the interfering noise) is in the range 15-18 dB (Lazarus 1990).

Both the ANSI and the American Speech-Language-Hearing Association (ASHLA) recommend at least a 15 dB signal-to-noise ratio in classrooms, to ensure that children with hearing impairments and language disabilities are able to enjoy high speech intelligibility (ANSI 2002; ASHLA 1995). As such, provided that the average adult male or female voice registers a minimum of 50 dB L_{max} in the rear of the classroom, the ANSI standard requires that the continuous background noise level indoors must not exceed a L_{eq} of 35 dB (assumed to apply for the duration of school hours).

The WHO reported for a speaker-to-listener distance of about 1 meter, empirical observations have shown that speech in relaxed conversations is 100 percent intelligible in background noise levels of about 35 dB, and speech can be fairly well understood in the presence of background levels of 45 dB. The WHO recommends a guideline value of 35 dB L_{eq} for continuous background levels in classrooms during school hours (WHO 2000).

Bradley suggests that in smaller rooms, where speech levels in the rear of the classroom are approximately 50 dB L_{max}, steady-state noise levels above 35 dB L_{eq} may interfere with the intelligibility of speech (Bradley 1993).

For the purposes of determining eligibility for noise insulation funding, the Federal Aviation Administration (FAA) guidelines state that the design objective for a classroom environment is 45 dB L_{eq} resulting from aircraft operations during normal school hours (FAA 1985).

However, most aircraft noise is not continuous and consists of individual events where the sound level exceeds the background level for a limited time period as the aircraft flies over. Since speech interference in the presence of aircraft noise is essentially determined by the magnitude and frequency of individual aircraft flyover events, a time-averaged metric alone, such as L_{eq}, is not necessarily appropriate when evaluating the overall effects. In addition to the background level criteria described above, single-event criteria, which account for those sporadic intermittent outdoor noisy events, are also essential to specifying speech interference criteria.

In 1984, a report to the Port Authority of New York and New Jersey recommended utilizing the Speech Interference Level (SIL) metric for classroom noise criteria (Sharp and Plotkin 1984). This metric is based on the maximum sound levels in the frequency range (approximately 500 Hz to 2,000 Hz) that directly affects speech communication. The study identified an SIL (the average of the sound levels in the 500, 1000, and 2000 Hz octave-bands) of 45 dB as the desirable goal, which was estimated to provide 90 percent word intelligibility for the short time periods during aircraft over-flights. Although early classroom level criteria were defined in terms of SIL, the use and measurement of L_{max} as the primary metric has since become more popular. Both metrics take into consideration the L_{max} associated with intermittent noise events and can be related to existing background levels when determining speech interference percentages. An SIL of 45 dB is approximately equivalent to an A-weighted L_{max} of 50 dB for aircraft noise (Wesler 1986).

In 1998, a report also concluded that if an aircraft noise event's indoor L_{max} reached the speech level of 50 dB, 90 percent of the words would be understood by students seated throughout the classroom (Lind, Pearsons, and Fidell 1998). Since intermittent aircraft noise does not appreciably disrupt classroom communication at lower levels and other times, the authors also adopted an indoor L_{max} of 50 dB as the maximum single-event level permissible in classrooms. Note that this limit was set based on students with normal hearing and no special needs; at-risk students may be adversely affected at lower sound levels.

Bradley recommends SEL as a better indicator of indoor estimated speech interference in the presence of aircraft overflights (Bradley 1985). For acceptable speech communication using normal vocal efforts, Bradley suggests that the indoor SEL be no greater than 64 dB. He assumes a 26 dB outdoor-to-indoor noise reduction that equates to 90 dB SEL outdoors. Aircraft events producing outdoor SEL values greater than 90 dB would result in disruption to indoor speech communication. Bradley's work indicates that, for speakers talking with a casual vocal effort, 95 percent intelligibility would be achieved when indoor SEL values did not exceed 60 dB, which translates approximately to an L_{max} of 50 dB.

In the presence of intermittent noise events, ANSI states that the criteria for allowable background noise level can be relaxed since speech is impaired only for the short time when the aircraft noise is close to its maximum value. Consequently, they recommend when the background noise level of the noisiest hour is dominated by aircraft noise, the indoor criteria (35 dB L_{eq} for continuous background noise) can be increased by 5 dB to an Leq of 40 dB, as long as the noise level does not exceed 40 dB for more than 10 percent of the noisiest hour. (ANSI 2002).

The WHO does not recommend a specific indoor Lmax criterion for single-event noise, but does place a guideline value at L_{eq} of 35 dB for overall background noise in the classroom. However, WHO does report that "for communication distances beyond a few meters, speech interference starts at sound pressure levels below 50 dB for octave bands centered on the main speech frequencies at 500 Hz, 1kHz, and 2 kHz." (WHO 2000). One can infer this can be approximated by an L_{max} value of 50 dB.

The United Kingdom Department for Education and Skills (UKDFES) established in its classroom acoustics guide a 30-minute time-averaged metric [$L_{eq(30min)}$] for background levels and $L_{A1,30}$ min for intermittent noises, at thresholds of 30-35 dB and 55 dB, respectively. $L_{A1,30}$ min represents the A-weighted sound level that is exceeded one percent of the time (in this case, during a 30 minute teaching session) and is generally equivalent to the L_{max} metric (UKDFES 2003).

Summary

As the previous section demonstrates, research indicates that it is not only important to consider the continuous background levels using time-averaged metrics, but also the intermittent events, using single-event metrics such as L_{max}. Table H-2 provides a summary of the noise level criteria recommended in the scientific literature.

Table H-2. Indoor Noise Level Criteria Based on Speech Intelligibility

Source	Metric/Level (dB)	Effects and Notes
U.S. FAA (1985)	L_{eq}(during school hours) = 45 dB	Federal assistance criteria for school sound insulation; supplemental single-event criteria may be used
Lind et al. (1998), Sharp and Plotkin (1984), Wesler (1986)	L_{max} = 50 dB / SIL 45	Single event level permissible in the classroom
WHO (1999)	L_{eq} = 35 dB L_{max} = 50 dB	Assumes average speech level of 50 dB and recommends signal to noise ratio of 15 dB
U.S. ANSI (2002)	L_{eq} = 40 dB, Based on Room Volume	Acceptable background level for continuous noise/ relaxed criteria for intermittent noise in the classroom
U.K. DFES (2003)	$L_{eq(30min)}$ = 30-35 dB L_{max} = 55 dB	Minimum acceptable in classroom and most other learning environs

When considering intermittent noise caused by aircraft overflights, a review of the relevant scientific literature and international guidelines indicates that an appropriate criteria is a limit on indoor background noise levels of 35 to 40 dB L_{eq} and a limit on single events of 50 dB L_{max}.

H.1.3.3 Sleep Disturbance

The disturbance of sleep is a major concern for communities exposed to nighttime aircraft noise. There have been numerous research studies that have attempted to quantify the complex effects of noise on sleep. This section provides an overview of the major noise-induced sleep disturbance studies that have been conducted, with particular emphasis placed on those studies that have influenced U.S. federal noise policy. The studies have been separated into two groups:

1. Initial studies performed in the 1960s and 1970s, where the research was focused on laboratory sleep observations.
2. Later studies performed in the 1990s up to the present, where the research was focused on field observations, and correlations to laboratory research were sought.

Initial Studies

The relationship between noise levels and sleep disturbance is complex and not fully understood. The disturbance depends not only on the depth of sleep, but also on the previous exposure to aircraft noise, familiarity with the surroundings, the physiological and psychological condition of the recipient, and a host of other situational factors. The most readily measurable effect of noise on sleep is the number of arousals or awakenings, and so the body of scientific literature has focused on predicting the percentage of the population that will be awakened at various noise levels. Fundamentally, regardless of the tools used to measure the degree of sleep disturbance (awakenings, arousals, etc.), these studies have grouped the data points into bins to predict the percentage of the population likely to be disturbed at various sound level thresholds.

FICON produced a guidance document that provided an overview of the most pertinent sleep disturbance research that had been conducted throughout the 1970s (FICON 1992). Literature reviews and meta-analysis conducted between 1978 and 1989 made use of the existing datasets that indicated the effects of nighttime noise on various sleep-state changes and awakenings (Lukas 1978; Griefahn 1978; Peasons et. al. 1989). FICON noted that various indoor A-weighted sound levels – ranging from 25 to 50 dB were observed to be thresholds below which significant sleep effects were not expected. Due to the large variability in the data, FICON did not endorse the reliability of the results.

However, FICON did recommend the use of an interim dose-response curve—awaiting future research—which predicted the percent of the exposed population expected to be awakened as a function of the exposure to single event noise levels expressed in terms of SEL. This curve was based on the research conducted for the U.S. Air

Force (Finegold 1994). The dataset included most of the research performed up to that point, and predicted that ten percent of the population would be awakened when exposed to an interior SEL of approximately 58 dB. The data utilized to derive this relationship were primarily the results of controlled laboratory studies.

Recent Sleep Disturbance Research – Field and Laboratory Studies

It was noted in the early sleep disturbance research that the controlled laboratory studies did not account for many factors that are important to sleep behavior, such as habituation to the environment and previous exposure to noise and awakenings from sources other than aircraft noise. In the early 1990s, field studies were conducted to validate the earlier laboratory work. The most significant finding from these studies was that an estimated 80 to 90 percent of sleep disturbances were not related to individual outdoor noise events, but were instead the result of indoor noise sources and other non-noise-related factors . The results showed that there was less of an effect of noise on sleep in real-life conditions than had been previously reported from laboratory studies .

FICAN

The interim FICON dose-response curve that was recommended for use in 1992 was based on the most pertinent sleep disturbance research that was conducted through the 1970s, primarily in laboratory settings. After that time, considerable field research was conducted to evaluate the sleep effects in peoples' normal, home environment. Laboratory sleep studies tend to show higher values of sleep disturbance than field studies because people who sleep in their own homes are habituated to their environment and, therefore, do not wake up as easily (FICAN 1997).

Based on the new information, FICAN updated its recommended dose-response curve in 1997, depicted as the lower curve in Figure H-6. This figure is based on the results of three field studies (Ollerhead 1992; Fidell et. al. 1994; Fidell et al. 1995a and 1995b), along with the datasets from six previous field studies.

The new relationship represents the higher end, or upper envelope, of the latest field data. It should be interpreted as predicting the "maximum percent of the exposed population expected to be behaviorally awakened" or the "maximum percent awakened" for a given residential population. According to this relationship, a maximum of 3 percent of people would be awakened at an indoor SEL of 58 dB, compared to 10 percent using the 1992 curve. An indoor SEL of 58 dB is equivalent to outdoor SEL's of 73 and 83 dB respectively assuming 15 and 25 dB noise level reduction from outdoor to indoor with windows open and closed, respectively.

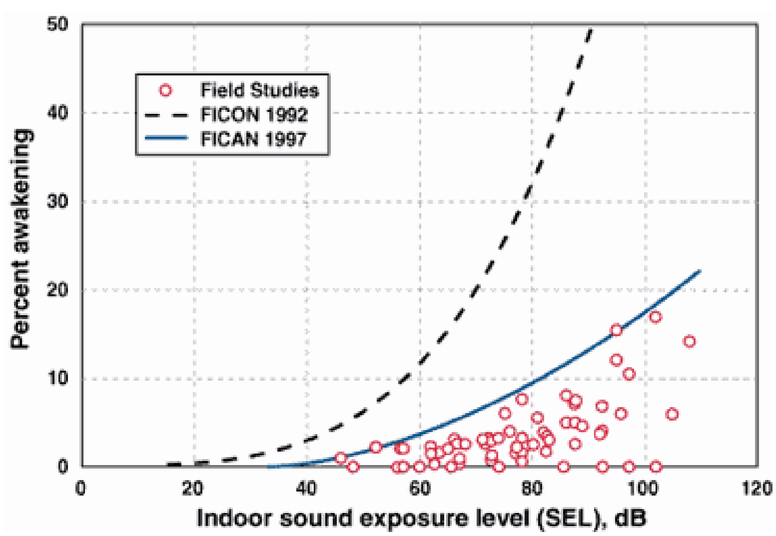


Figure H-6. FICAN's 1997 Recommended Sleep Disturbance Dose-Response Relationship

The FICAN 1997 curve is represented by the following equation:

$$\text{Percent Awakenings} = 0.0087 \times [\text{SEL} - 30]^{1.79}$$

Note the relatively low percentage of awakenings to fairly high noise levels. People think they are awakened by a noise event, but usually the reason for awakening is otherwise. For example, the 1992 UK CAA study found the average person was awakened about 18 times per night for reasons other than exposure to an aircraft noise – some of these awakenings are due to the biological rhythms of sleep and some to other reasons that were not correlated with specific aircraft events.

Number of Events and Awakenings

In recent years, there have been studies and one proposal that attempted to determine the effect of multiple aircraft events on the number of awakenings. The German Aerospace Center (DLR) conducted an extensive study focused on the effects of nighttime aircraft noise on sleep and other related human performance factors (Basner 2004). The DLR study was one of the largest studies to examine the link between aircraft noise and sleep disturbance and involved both laboratory and in-home field research phases. The DLR investigators developed a dose-effect curve that predicts the number of aircraft events at various values of L_{max} expected to produce one additional awakening over the course of a night. The dose-effect curve was based on the relationships found in the field studies.

In July 2008 ANSI and the Acoustical Society of America (ASA) published a method to estimate the percent of the exposed population that might be awakened by multiple aircraft noise events based on statistical assumptions about the probability of awakening (or not awakening) (ANSI 2008). This method relies on probability theory rather than direct field research/experimental data to account for multiple events.

Figure H-7 depicts the awakenings data that form the basis and equations of ANSI S12.9-2008. The curve labeled 'Eq. (B1)' is the relationship between noise and awakening endorsed by FICAN in 1997. The ANSI recommended curve labeled 'Eq. (1)' quantifies the probability of awakening for a population of sleepers who are exposed to an outdoor noise event as a function of the associated indoor SEL in the bedroom. This curve was derived from studies of behavioral awakenings associated with noise events in "steady state" situations where the population has been exposed to the noise long enough to be habituated. The data points in Figure H-7 come from these studies. Unlike the FICAN curve, the ANSI 2008 curve represents the average of the field research data points.

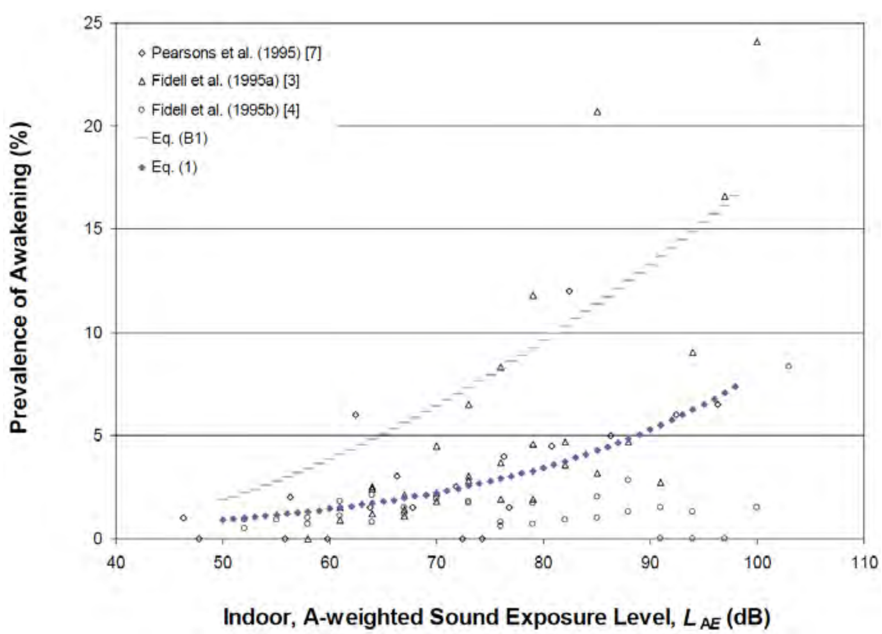


Figure H-7. Plot of Sleep Awakening Data versus Indoor SEL

In December 2008, FICAN recommended the use of this new estimation procedure for future analyses of behavioral awakenings from aircraft noise. In that statement, FICAN also recognized that additional sleep disturbance research is underway by various research organizations, and results of that work may result in additional changes to FICAN's position. Until that time, FICAN recommends the use of ANSI S12.9-2008.

H.1.3.4 Noise-Induced Hearing Impairment

Residents in surrounding communities express concerns regarding the effects of aircraft noise on hearing. This section provides a brief overview of hearing loss caused by noise exposure. The goal is to provide a sense of perspective as to how aircraft noise (as experienced on the ground) compares to other activities that are often linked with hearing loss.

Hearing Threshold Shifts

Hearing loss is generally interpreted as a decrease in the ear's sensitivity or acuity to perceive sound; i.e. a shift in the hearing threshold to a higher level. This change can either be a Temporary Threshold Shift (TTS), or a Permanent Threshold Shift (PTS) (Berger 1995) .

TTS can result from exposure to loud noise over a given amount of time, yet the hearing loss is not necessarily permanent. An example of TTS might be a person attending a loud music concert. After the concert is over, the person may experience a threshold shift that may last several hours, depending upon the level and duration of exposure. While experiencing TTS, the person becomes less sensitive to low-level sounds, particularly at certain frequencies in the speech range (typically near 4,000 Hz) . Normal hearing ability eventually returns, as long as the person has enough time to recover within a relatively quiet environment.

PTS usually results from repeated exposure to high noise levels, where the ears are not given adequate time to recover from the strain and fatigue of exposure. A common example of PTS is the result of working in a loud environment such as a factory. It is important to note that a temporary shift (TTS) can eventually become permanent (PTS) over time with continuous exposure to high noise levels. Thus, even if the ear is given time to recover from TTS, repeated occurrence of TTS may eventually lead to permanent hearing loss. The point at which a Temporary Threshold Shift results in a Permanent Threshold Shift is difficult to identify and varies with a person's sensitivity.

Criteria for Permanent Hearing Loss

Considerable data on hearing loss have been collected and analyzed by the scientific/medical community. It has been well established that continuous exposure to high noise levels will damage human hearing (EPA 1978). The Occupational Safety and Health Administration (OSHA) regulation of 1971 standardizes the limits on workplace noise exposure for protection from hearing loss as an average level of 90 dB over an 8-hour work period or 85 dB over a 16-hour period (the average level is based on a 5 dB decrease per doubling of exposure time) (US Department of Labor 1970). Even the most protective criterion (no measurable hearing loss for the most sensitive portion of the population at the ear's most sensitive frequency, 4,000 Hz, after a 40-year exposure) is an average sound level of 70 dB over a 24-hour period.

The US EPA established 75 dB for an 8-hour exposure and 70 dB for a 24-hour exposure as the average noise level standard requisite to protect 96 percent of the population from greater than a 5 dB PTS (EPA 1978). The National Academy of Sciences Committee on Hearing, Bioacoustics, and Biomechanics identified 75 dB as the minimum level at which hearing loss may occur (CHABA 1977). Finally, the WHO has concluded that environmental and leisure-time noise below an L_{eq24} value of 70 dB "will not cause hearing loss in the large majority of the population, even after a lifetime of exposure" (WHO 2000).

Hearing Loss and Aircraft Noise

The 1982 EPA Guidelines report specifically addresses the criteria and procedures for assessing the noise-induced hearing loss in terms of the Noise-Induced Permanent Threshold Shift (NIPTS), a quantity that defines the permanent change in hearing level, or threshold, caused by exposure to noise (EPA, 1982). Numerically, the NIPTS is the change in threshold averaged over the frequencies 0.5, 1, 2, and 4 kHz that can be expected from daily exposure to noise over a normal working lifetime of 40 years, with the exposure beginning at an age of 20 years. A grand average of the NIPTS over time (40 years) and hearing sensitivity (10 to 90 percentiles of the exposed population) is termed the Average NIPTS, or Ave NIPTS for short. The Average Noise Induced Permanent Threshold Shift (Ave. NIPTS) that can be expected for noise exposure as measured by the DNL metric is given in Table H-3.

Table H-3. Ave. NIPTS and 10th Percentile NIPTS as a Function of DNL

DNL	Ave. NIPTS dB*	10th Percentile NIPTS dB*
75-76	1.0	4.0
76-77	1.0	4.5
77-78	1.6	5.0
78-79	2.0	5.5
79-80	2.5	6.0
80-81	3.0	7.0
81-82	3.5	8.0
82-83	4.0	9.0
83-84	4.5	10.0
84-85	5.5	11.0

* Rounded to the nearest 0.5 dB

For example, for a noise exposure of 80 dB DNL, the expected lifetime aveerage value of NIPTS is 2.5 dB, or 6.0 dB for the 10th percentile. Characterizing the noise exposure in terms of DNL will usually overestimate the assessment of hearing loss risk as DNL includes a 10 dB weighting factor for aircraft operations occuring between 10 p.m. and 7 a.m. If, however, flight operations between the hours of 10 p.m. and 7 a.m. account for 5 percent or less of the total 24-hour operations, the overestimation is on the order of 1.5 dB.

From a civilian airport perspective, the scientific community has concluded that there is little likelihood that the resulting noise exposure from aircraft noise could result in either a temporary or permanent hearing loss. Studies on community hearing loss from exposure to aircraft flyovers near airports showed that there is no danger, under normal circumstances, of hearing loss due to aircraft noise (Newman and Beattie 1985). The EPA criterion (L_{eq24} = 70 dBA) can be exceeded in some areas located near airports, but that is only the case outdoors. Inside a building, where people are more likely to spend most of their time, the average noise level will be much less than 70 dBA (Eldred and von Gierke 1993). Eldred and von Gierke also report that "several studies in the U.S., Japan, and the U.K. have confirmed the predictions that the possibility for permanent hearing loss in communities, even under the most intense commercial take-off and landing patterns, is remote."

With regard to military airbases, as individual aircraft noise levels are increasing with the introduction of new aircraft, a 2009 DoD policy directive requires that hearing loss risk be estimated for the at risk population, defined as the population exposed to DNL greater than or equal to 80 dB and higher (DoD 2009). Specifically, DoD components are directed to "*use the 80 Day-Night A-Weighted (DNL) noise contour to identify populations at the most risk of potential hearing loss*". This does not preclude populations outside the 80 DNL contour, i.e. at lower exposure levels, from being at some degree of risk of hearing loss. However, the analysis should be restricted to populations within this contour area, including residents of on-base housing. The exposure of workers inside the base boundary area should be considered occupational and evaluated using the appropriate DoD component regulations for occupational noise exposure.

With regard to military airspace activity, studies have shown conflicting results. A 1995 laboratory study measured changes in human hearing from noise representative of low-flying aircraft on MTRs (Nixon, et al. 1993). The potential effects of aircraft flying along MTRs is of particular concern because of maximum overflight noise levels can exceed 115 dB, with rapid increases in noise levels exceeding 30 dB per second. In this study, participants were first subjected to four overflight noise exposures at A-weighted levels of 115 dB to 130 dB. Fifty percent of the subjects showed no change in hearing levels, 25 percent had a temporary 5 dB *increase* in sensitivity (the people could hear a 5 dB wider range of sound than before exposure), and 25 percent had a temporary 5 dB decrease in sensitivity (the people could hear a 5 dB narrower range of sound than before exposure). In the next phase, participants were subjected to a single overflight at a maximum level of 130 dB for eight successive exposures, separated by 90 seconds or until a temporary shift in hearing was observed. The temporary hearing threshold shifts showed an *increase* in sensitivity of up to 10 dB.

In another study of 115 test subjects between 18 and 50 years old in 1999, temporary threshold shifts were measured after laboratory exposure to military low-altitude flight noise (Ising, et al. 1999). According to the authors, the results indicate that repeated exposure to military low-altitude flight noise with L_{max} greater than 114 dB, especially if the noise level increases rapidly, may have the potential to cause noise induced hearing loss in humans.

Summary

Aviation and typical community noise levels near airports are not comparable to the occupational or recreational noise exposures associated with hearing loss. Studies of aircraft noise levels associated with civilian airport activity have not definitively correlated permanent hearing impairment with aircraft activity. It is unlikely that airport neighbors will remain outside their homes 24 hours per day, so there is little likelihood of hearing loss below an average sound level of 75 dB DNL. Near military airbases, average noise levels above 75 dB may occur, and while new DoD policy dictates that NIPTS be evaluated, no research results to date have definitively related permanent hearing impairment to aviation noise.

H.1.3.5 Nonauditory Health Effects

Studies have been conducted to determine whether correlations exist between noise exposure and cardiovascular problems, birth weight, and mortality rates. The nonauditory effect of noise on humans is not as easily substantiated as the effect on hearing. The results of studies conducted in the United States, primarily concentrating on cardiovascular response to noise, have been contradictory (Cantrell 1974). Cantrell concluded that the results of human and animal experiments show that average or intrusive noise can act as a stress-provoking stimulus. Prolonged stress is known to be a contributor to a number of health disorders. Kryter and Poza (1980) state, "It is more likely that noise-related general ill-health effects are due to the psychological annoyance from the noise interfering with normal everyday behavior, than it is from the noise eliciting, because of its intensity, reflexive response in the autonomic or other physiological systems of the body." Psychological stresses may cause a physiological stress reaction that could result in impaired health.

The National Institute for Occupational Safety and Health and EPA commissioned CHABA in 1981 to study whether established noise standards are adequate to protect against health disorders other than hearing defects. CHABA's conclusion was that:

Evidence from available research reports is suggestive, but it does not provide definitive answers to the question of health effects, other than to the auditory system, of long-term exposure to noise. It seems prudent, therefore, in the absence of adequate knowledge as to whether or not noise can produce effects upon health other than damage to auditory system, either directly or mediated through stress, that insofar as feasible, an attempt should be made to obtain more critical evidence.

Since the CHABA report, there have been more recent studies that suggest that noise exposure may cause hypertension and other stress-related effects in adults. Near an airport in Stockholm, Sweden, the prevalence of hypertension was reportedly greater among nearby residents who were exposed to energy averaged noise levels exceeding 55 dB and maximum noise levels exceeding 72 dB, particularly older subjects and those not reporting impaired hearing ability (Rosenlund, et al. 2001). A study of elderly volunteers who were exposed to simulated military low-altitude flight noise reported that blood pressure was raised by L_{max} of 112 dB and high speed level increase (Michalak, et al. 1990). Yet another study of subjects exposed to varying levels of military aircraft or road noise found no significant relationship between noise level and blood pressure (Pulles, et al. 1990).

The U.S. Department of the Navy prepared a programmatic Environmental Assessment (EA) for the continued use of non-explosive ordnance on the Vieques Inner Range. Following the preparation of the EA, it was learned that research conducted by the University of Puerto Rico, Ponce School of Medicine, suggested that Vieques fishermen and their families were experiencing symptoms associated with vibroacoustic disease (VAD) (U.S. Department of the Navy 2002). The study alleged that exposure to noise and sound waves of large pressure amplitudes within lower frequency bands, associated with Navy training activities—specifically, air-to-ground bombing or naval fire support—was related to a larger prevalence of heart anomalies within the Vieques fishermen and their families. The Ponce School of Medicine study compared the Vieques group with a group from Ponce Playa. A 1999 study conducted on Portuguese aircraft-manufacturing workers from a single factory reported effects of jet aircraft noise exposure that involved a wide range of symptoms and disorders, including the cardiac issues on which the Ponce School of Medicine study focused. The 1999 study identified these effects as VAD.

Johns Hopkins University (JHU) conducted an independent review of the Ponce School of Medicine study, as well as the Portuguese aircraft workers study and other relevant scientific literature. Their findings concluded that VAD should not be accepted as a syndrome, given that exhaustive research across a number of populations has not yet been conducted. JHU also pointed out that the evidence supporting the existence of VAD comes largely from one group of investigators and that similar results would have to be replicated by other investigators. In short, JHU concluded that it had not been established that noise was the causal agent for the symptoms reported and no inference can be made as to the role of noise from naval gunfire in producing echocardiographic abnormalities (U.S. Department of the Navy 2002).

Most studies of nonauditory health effects of long-term noise exposure have found that noise exposure levels established for hearing protection will also protect against any potential nonauditory health effects, at least in workplace conditions. One of the best scientific summaries of these findings is contained in the lead paper at the National Institutes of Health Conference on Noise and Hearing Loss, held on 22 to 24 January 1990 in Washington, D.C.:

> "The nonauditory effects of chronic noise exposure, when noise is suspected to act as one of the risk factors in the development of hypertension, cardiovascular disease, and other nervous disorders, have never been proven to occur as chronic manifestations at levels below these criteria (an average of 75 dBA for complete protection against hearing loss for an 8-hour day). At the recent (1988) International Congress on Noise as a Public Health Problem, most studies attempting to clarify such health effects did not find them at levels below the criteria protective of noise-induced hearing loss, and even above these criteria, results regarding such health effects were ambiguous. Consequently, one comes to the conclusion that establishing and enforcing exposure levels protecting against noise-induced hearing loss would not only solve the noise-induced hearing loss problem, but also any potential nonauditory health effects in the work place" (von Gierke 1990).

Although these findings were specifically directed at noise effects in the workplace, they are equally applicable to aircraft noise effects in the community environment. Research studies regarding the nonauditory health effects of aircraft noise are ambiguous, at best, and often contradictory. Yet, even those studies that purport to find such health effects use time-average noise levels of 75 dB and higher for their research.

For example, two UCLA researchers apparently found a relationship between aircraft noise levels under the approach path to Los Angeles International Airport (LAX) and increased mortality rates among the exposed residents by using an average noise exposure level greater than 75 dB for the "noise-exposed" population (Meacham and Shaw 1979). Nevertheless, three other UCLA professors analyzed those same data and found no relationship between noise exposure and mortality rates (Frerichs, et al. 1980).

As a second example, two other UCLA researchers used this same population near LAX to show a higher rate of birth defects for 1970 to 1972 when compared with a control group residing away from the airport (Jones and Tauscher 1978). Based on this report, a separate group at the Center for Disease Control performed a more thorough study of populations near Atlanta's Hartsfield International Airport (ATL) for 1970 to 1972 and found no relationship in their study of 17 identified categories of birth defects to aircraft noise levels above 65 dB (Edmonds, et al. 1979).

In summary, there is no scientific basis for a claim that potential health effects exist for aircraft time-average sound levels below 75 dB.

The potential for noise to affect physiological health, such as the cardiovascular system, has been speculated; however, no unequivocal evidence exists to support such claims (Harris 1997). Conclusions drawn from a review of health effect studies involving military low-altitude flight noise with its unusually high maximum levels and rapid rise in sound level have shown no increase in cardiovascular disease (Schwartze and Thompson 1993). Additional claims that are unsupported include flyover noise producing increased mortality rates and increases in cardiovascular death, aggravation of post-traumatic stress syndrome, increased stress, increase in admissions to mental hospitals, and adverse affects on pregnant women and the unborn fetus (Harris 1997).

H.1.3.6 Performance Effects

The effect of noise on the performance of activities or tasks has been the subject of many studies. Some of these studies have established links between continuous high noise levels and performance loss. Noise-induced performance losses are most frequently reported in studies employing noise levels in excess of 85 dB. Little change has been found in low-noise cases. It has been cited that moderate noise levels appear to act as a stressor for more sensitive individuals performing a difficult psychomotor task.

While the results of research on the general effect of periodic aircraft noise on performance have yet to yield definitive criteria, several general trends have been noted including:

- A periodic intermittent noise is more likely to disrupt performance than a steady-state continuous noise of the same level. Flyover noise, due to its intermittent nature, might be more likely to disrupt performance than a steady-state noise of equal level.
- Noise is more inclined to affect the quality than the quantity of work.
- Noise is more likely to impair the performance of tasks that place extreme demands on theworker.

H.1.3.7 Noise Effects on Children

In response to noise-specific and other environmental studies, Executive Order 13045, Protection of Children from Environmental Health Risks and Safety Risks (1997), requires federal agencies to ensure that policies, programs, and activities address environmental health and safety risks to identify any disproportionate risks to children.

A review of the scientific literature indicates that there has not been a tremendous amount of research in the area of aircraft noise effects on children. The research reviewed does suggest that environments with sustained high background noise can have variable effects, including noise effects on learning and cognitive abilities, and reports of various noise-related physiological changes.

Effects on Learning and Cognitive Abilities

In 2002 ANSI refers to studies that suggest that loud and frequent background noise can affect the learning patterns of young children (ANSI 2002). ANSI provides discussion on the relationships between noise and learning, and stipulates design requirements and acoustical performance criteria for outdoor-to-indoor noise isolation. School design is directed to be cognizant of, and responsive to surrounding land uses and the shielding of outdoor noise from the indoor environment. The ANSI acoustical performance criteria for schools include the requirement that the one-hour-average background noise level shall not exceed 35 dBA in core learning spaces smaller than 20,000 cubic-feet and 40 dBA in core learning spaces with enclosed volumes exceeding 20,000 cubic-feet. This would require schools be constructed such that, in quiet neighborhoods indoor noise levels are lowered by 15 to 20 dBA relative to outdoor levels. In schools near airports, indoor noise levels would have to be lowered by 35 to 45 dBA relative to outdoor levels (ANSI 2002).

The studies referenced by ANSI to support the new standard are not specific to jet aircraft noise and the potential effects on children. However, there are references to studies that have shown that children in noisier classrooms scored lower on a variety of tests. Excessive background noise or reverberation within schools causes interferences of communication and can therefore create an acoustical barrier to learning (ANSI 2002). Studies have been performed that contribute to the body of evidence emphasizing the importance of communication by way of the spoken language to the development of cognitive skills. The ability to read, write, comprehend, and maintain attentiveness, are, in part, based upon whether teacher communication is consistently intelligible (ANSI 2002).

Numerous studies have shown varying degrees of effects of noise on the reading comprehension, attentiveness, puzzle-solving, and memory/recall ability of children. It is generally accepted that young children are more susceptible than adults to the effects of background noise. Because of the developmental status of young children (linguistic, cognitive, and proficiency), barriers to hearing can cause interferences or disruptions in developmental evolution.

Research on the impacts of aircraft noise, and noise in general, on the cognitive abilities of school-aged children has received more attention in recent years. Several studies suggest that aircraft noise can affect the academic performance of schoolchildren. Although many factors could contribute to learning deficits in school-aged children (e.g., socioeconomic level, home environment, diet, sleep patterns), evidence exists that suggests that chronic exposure to high aircraft noise levels can impair learning.

Specifically, elementary school children attending schools near New York City's two airports demonstrated lower reading scores than children living farther away from the flight paths (Green, et al. 1982). Researchers have found that tasks involving central processing and language comprehension (such as reading, attention, problem solving, and memory) appear to be the most affected by noise (Evans and Lepore 1993; Hygge 1994; and Evans, et al. 1998). It has been demonstrated that chronic exposure of first- and second-grade children to aircraft noise can result in reading deficits and impaired speech perception (i.e., the ability to hear common, low-frequency [vowel] sounds but not high frequencies [consonants] in speech) (Evans and Maxwell 1997).

The Evans and Maxwell (1997) study found that chronic exposure to aircraft noise resulted in reading deficits and impaired speech perception for first- and second-grade children. Other studies found that children residing near the Los Angeles International Airport had more difficulty solving cognitive problems and did not perform as well as children from quieter schools in puzzle-solving and attentiveness (Bronzaft 1997; Cohen, et al. 1980). Children attending elementary schools in high aircraft noise areas near London's Heathrow Airport demonstrated poorer reading comprehension and selective cognitive impairments (Haines, et al. 2001a, and 2001b). Similarly, a 1994 study found that students exposed to aircraft noise of approximately 76 dBA scored 20% lower on recall ability tests than students exposed to ambient noise of 42-44 dBA (Hygge 1994). Similar studies involving the testing of attention, memory, and reading comprehension of school children located near airports showed that their tests exhibited reduced performance results compared to those of similar groups of children who were located in quieter environments (Evans, et al. 1998; Haines, et al. 1998). The Haines and Stansfeld study indicated that there may be some long-term effects associated with exposure, as one-year follow-up testing still demonstrated lowered scores for children in higher noise schools (Haines, et al. 2001a, and 2001b). In contrast, a 2002 study found that although children living near the old Munich airport scored lower in standardized reading and long-term memory tests than a control group, their performance on the same tests was equal to that of the control group once the airport was closed. (Hygge, et al. 2002).

Finally, although it is recognized that there are many factors that could contribute to learning deficits in school-aged children, there is increasing awareness that chronic exposure to high aircraft noise levels may impair learning. This awareness has led the World Health Organization and a North Atlantic Treaty Organization working group to conclude that daycare centers and schools should not be located near major sources of noise, such as highways, airports, and industrial sites (World Health Organization 2000; North Atlantic Treaty Organization 2000).

Health Effects

Physiological effects in children exposed to aircraft noise and the potential for health effects have also been the focus of limited investigation. Studies in the literature include examination of blood pressure levels, hormonal secretions, and hearing loss.

As a measure of stress response to aircraft noise, authors have looked at blood pressure readings to monitor children's health. Children who were chronically exposed to aircraft noise from a new airport near Munich, Germany, had modest (although significant) increases in blood pressure, significant increases in stress hormones, and a decline in quality of life (Evans, et al. 1998). Children attending noisy schools had statistically significant average systolic and diastolic blood pressure ($p<0.03$). Systolic blood pressure means were 89.68 mm for children attending schools located in noisier environments compared to 86.77 mm for a control group. Similarly, diastolic blood pressure means for the noisier environment group were 47.84 mm and 45.16 for the control group (Cohen, et al. 1980).

Although the literature appears limited, studies focused on the wide range of potential effects of aircraft noise on school children have also investigated hormonal levels between groups of children exposed to aircraft noise compared to those in a control group. Specifically, two studies analyzed cortisol and urinary catecholamine levels in school children as measurements of stress response to aircraft noise (Haines, et al. 2001b and 2001c). In both instances, there were no differences between the aircraft-noise-exposed children and the control groups.

Other studies have reported hearing losses from exposure to aircraft noise. Noise-induced hearing loss was reportedly higher in children who attended a school located under a flight path near a Taiwan airport, as compared to children at another school far away (Chen, et al. 1997). Another study reported that hearing ability was reduced significantly in individuals who lived near an airport and were frequently exposed to aircraft noise (Chen and Chen 1993). In that study, noise exposure near the airport was reportedly uniform, with DNL greater than 75 dB and maximum noise levels of about 87 dB during overflights. Conversely, several other studies that were reviewed reported no difference in hearing ability between children exposed to high levels of airport noise and children located in quieter areas (Fisch 1977; Andrus, et al. 1975; Wu, et al. 1995).

H.1.3.8 Effects on Domestic Animals and Wildlife

Hearing is critical to an animal's ability to react, compete, reproduce, hunt, forage, and survive in its environment. While the existing literature does include studies on possible effects of jet aircraft noise and sonic booms on wildlife, there appears to have been little concerted effort in developing quantitative comparisons of aircraft noise effects on normal auditory characteristics. Behavioral effects have been relatively well described, but the larger ecological context issues, and the potential for drawing conclusions regarding effects on populations, has not been well developed.

The relationships between potential auditory/physiological effects and species interactions with their environments are not well understood. Manci, et al. (1988), assert that the consequences that physiological effects may have on behavioral patterns is vital to understanding the long-term effects of noise on wildlife. Questions regarding the effects (if any) on predator-prey interactions, reproductive success, and intra-inter specific behavior patterns remain.

The following discussion provides an overview of the existing literature on noise effects (particularly jet aircraft noise) on animal species. The literature reviewed here involves those studies that have focused on the observations of the behavioral effects that jet aircraft and sonic booms have on animals.

A great deal of research was conducted in the 1960's and 1970's on the effects of aircraft noise on the public and the potential for adverse ecological impacts. These studies were largely completed in response to the increase in air travel and as a result of the introduction of supersonic jet aircraft. According to Manci, et al. (1988), the foundation of information created from that focus does not necessarily correlate or provide information specific to the impacts to wildlife in areas overflown by aircraft at supersonic speed or at low altitudes.

The abilities to hear sounds and noise and to communicate assist wildlife in maintaining group cohesiveness and survivorship. Social species communicate by transmitting calls of warning, introduction, and other types that are subsequently related to an individual's or group's responsiveness.

Animal species differ greatly in their responses to noise. Noise effects on domestic animals and wildlife are classified as primary, secondary, and tertiary. Primary effects are direct, physiological changes to the auditory system, and most likely include the masking of auditory signals. Masking is defined as the inability of an individual to hear important environmental signals that may arise from mates, predators, or prey. There is some potential that noise could disrupt a species' ability to communicate or could interfere with behavioral patterns (Manci, et al. 1988). Although the effects are likely temporal, aircraft noise may cause masking of auditory signals within exposed faunal communities. Animals rely on hearing to avoid predators, obtain food, and communicate with, and attract, other members of their species. Aircraft noise may mask or interfere with these functions. Other primary effects, such as ear drum rupture or temporary and permanent hearing threshold shifts, are not as likely given the subsonic noise levels produced by aircraft overflights. Secondary effects may include non-auditory effects such as stress and hypertension; behavioral modifications; interference with mating or reproduction; and impaired ability to obtain adequate food, cover, or water. Tertiary effects are the direct result of primary and secondary effects, and include population decline and habitat loss. Most of the effects of noise are mild enough that they may never be detectable as variables of change in population size or population growth against the background of normal variation (Bowles 1995). Other environmental variables (e.g., predators, weather, changing prey base, ground-based disturbance) also influence secondary and tertiary effects, and confound the ability to identify the ultimate factor in limiting productivity of a certain nest, area, or region (Smith, et al. 1988). Overall, the literature suggests that species differ in their response to various types, durations, and sources of noise (Manci, et al. 1988).

Many scientific studies have investigated the effects of aircraft noise on wildlife, and some have focused on wildlife "flight" due to noise. Apparently, animal responses to aircraft are influenced by many variables, including size, speed, proximity (both height above the ground and lateral distance), engine noise, color, flight profile, and radiated noise. The type of aircraft (e.g., fixed wing versus rotor-wing [helicopter]) and type of flight mission may also produce different levels of disturbance, with varying animal responses (Smith, et al. 1988). Consequently, it is difficult to generalize animal responses to noise disturbances across species.

One result of the 1988 Manci, et al., literature review was the conclusion that, while behavioral observation studies were relatively limited, a general behavioral reaction in animals from exposure to aircraft noise is the startle response. The intensity and duration of the startle response appears to be dependent on which species is exposed, whether there is a group or an individual, and whether there have been some previous exposures. Responses range from flight, trampling, stampeding, jumping, or running, to movement of the head in the apparent direction of the noise source. Manci, et al. (1988), reported that the literature indicated that avian species may be more sensitive to aircraft noise than mammals.

Domestic Animals

Although some studies report that the effects of aircraft noise on domestic animals is inconclusive, a majority of the literature reviewed indicates that domestic animals exhibit some behavioral responses to military overflights but generally seem to habituate to the disturbances over a period of time. Mammals in particular appear to react to noise at sound levels higher than 90 dB, with responses including the startle response, freezing (i.e., becoming temporarily stationary), and fleeing from the sound source. Many studies on domestic animals suggest that some species appear to acclimate to some forms of sound disturbance (Manci, et al. 1988). Some studies have reported such primary and secondary effects as reduced milk production and rate of milk release, increased glucose concentrations, decreased levels of hemoglobin, increased heart rate, and a reduction in thyroid activity. These latter effects appear to represent a small percentage of the findings occurring in the existing literature.

Some reviewers have indicated that earlier studies, and claims by farmers linking adverse effects of aircraft noise on livestock, did not necessarily provide clear-cut evidence of cause and effect (Cottereau 1978). In contrast, many studies conclude that there is no evidence that aircraft overflights affect feed intake, growth, or production rates in domestic animals.

Cattle

In response to concerns about overflight effects on pregnant cattle, milk production, and cattle safety, the U.S. Air Force prepared a handbook for environmental protection that summarizes the literature on the impacts of low-altitude flights on livestock (and poultry) and includes specific case studies conducted in numerous airspaces across the country. Adverse effects have been found in a few studies but have not been reproduced in other similar studies. One such study, conducted in 1983, suggested that 2 of 10 cows in late pregnancy aborted after showing rising estrogen and falling progesterone levels. These increased hormonal levels were reported as being linked to 59 aircraft overflights. The remaining eight cows showed no changes in their blood concentrations and calved normally (U.S. Air Force 1994b). A similar study reported abortions occurred in three out of five pregnant cattle after exposing them to flyovers by six different aircraft (U.S.Air Force 1994b). Another study suggested that feedlot cattle could stampede and injure themselves when exposed to low-level overflights (U.S. Air Force 1994b).

A majority of the studies reviewed suggests that there is little or no effect of aircraft noise on cattle. Studies presenting adverse effects to domestic animals have been limited. A number of studies (Parker and Bayley 1960; Casady and Lehmann 1967; Kovalcik and Sottnik 1971) investigated the effects of jet aircraft noise and sonic booms on the milk production of dairy cows. Through the compilation and examination of milk production data from areas exposed to jet aircraft noise and sonic boom events, it was determined that milk yields were not affected. This was particularly evident in those cows that had been previously exposed to jet aircraft noise.

A study examined the causes of 1,763 abortions in Wisconsin dairy cattle over a one-year time period and none were associated with aircraft disturbances (U.S.Air Force 1993). In 1987, Anderson contacted seven livestock operators for production data, and no effects of low-altitude and supersonic flights were noted. Three out of 43 cattle previously exposed to low-altitude flights showed a startle response to an F/A-18 aircraft flying overhead at 500 feet above ground level and 400 knots by running less than 10 meters. They resumed normal activity within one minute (U.S.Air Force 1994b). Beyer (1983) found that helicopters caused more reaction than other low-aircraft overflights, and that the helicopters at 30 to 60 feet overhead did not affect milk production and pregnancies of 44 cows and heifers in a 1964 study (U.S. Air Force 1994b).

Additionally, Beyer reported that five pregnant dairy cows in a pasture did not exhibit fright-flight tendencies or disturb their pregnancies after being overflown by 79 low-altitude helicopter flights and 4 low-altitude, subsonic jet aircraft flights (U.S. Air Force 1994b). A 1956 study found that the reactions of dairy and beef cattle to noise from low-altitude, subsonic aircraft were similar to those caused by paper blowing about, strange persons, or other moving objects (U.S. Air Force 1994b).

In a report to Congress, the U. S. Forest Service concluded that "evidence both from field studies of wild ungulates and laboratory studies of domestic stock indicate that the risks of damage are small (from aircraft approaches of 50 to 100 meters), as animals take care not to damage themselves (U.S. Forest Service 1992). If animals are overflown by aircraft at altitudes of 50 to 100 meters, there is no evidence that mothers and young are separated, that animals collide with obstructions (unless confined) or that they traverse dangerous ground at too high a rate." These varied study results suggest that, although the confining of cattle could magnify animal response to aircraft overflight, there is no proven cause-and-effect link between startling cattle from aircraft overflights and abortion rates or lower milk production.

Horses

Horses have also been observed to react to overflights of jet aircraft. Several of the studies reviewed reported a varied response of horses to low-altitude aircraft overflights. Observations made in 1966 and 1968 noted that horses galloped in response to jet flyovers (U.S. Air Force 1993). Bowles (1995) cites Kruger and Erath as observing horses exhibiting intensive flight reactions, random movements, and biting/kicking behavior. However, no injuries or abortions occurred, and there was evidence that the mares adapted somewhat to the flyovers over the course of a month (U.S. Air Force 1994b). Although horses were observed noticing the overflights, it did not appear to affect either survivability or reproductive success. There was also some indication that habituation to these types of disturbances was occurring.

LeBlanc, et al. (1991), studied the effects of F-14 jet aircraft noise on pregnant mares. They specifically focused on any changes in pregnancy success, behavior, cardiac function, hormonal production, and rate of habituation. Their findings reported observations of "flight-fright" reactions, which caused increases in heart rates and serum cortisol concentrations. The mares, however, did habituate to the noise. Levels of anxiety and mass body movements were the highest after initial exposure, with intensities of responses decreasing thereafter. There were no differences in pregnancy success when compared to a control group.

Swine

Generally, the literature findings for swine appear to be similar to those reported for cows and horses. While there are some effects from aircraft noise reported in the literature, these effects are minor. Studies of continuous noise exposure (i.e., 6 hours, 72 hours of constant exposure) reported influences on short-term hormonal production and release. Additional constant exposure studies indicated the observation of stress reactions, hypertension, and electrolyte imbalances (Dufour 1980). A study by Bond, et al. (1963), demonstrated no adverse effects on the feeding efficiency, weight gain, ear physiology, or thyroid and adrenal gland condition of pigs subjected to observed aircraft noise. Observations of heart rate increase were recorded, noting that cessation of the noise resulted in the return to normal heart rates. Conception rates and offspring survivorship did not appear to be influenced by exposure to aircraft noise.

Similarly, simulated aircraft noise at levels of 100 dB to 135 dB had only minor effects on the rate of feed utilization, weight gain, food intake, or reproduction rates of boars and sows exposed, and there were no injuries or inner ear changes observed (Manci, et al. 1988; Gladwin, et al. 1988).

Domestic Fowl

According to a 1994 position paper by the U.S. Air Force on effects of low-altitude overflights (below 1,000 ft) on domestic fowl, overflight activity has negligible effects (U.S. Air Force 1994a). The paper did recognize that given certain circumstances, adverse effects can be serious. Some of the effects can be panic reactions, reduced productivity, and effects on marketability (e.g., bruising of the meat caused during "pile-up" situations).

The typical reaction of domestic fowl after exposure to sudden, intense noise is a short-term startle response. The reaction ceases as soon as the stimulus is ended, and within a few minutes all activity returns to normal. More severe responses are possible depending on the number of birds, the frequency of exposure, and environmental conditions. Large crowds of birds, and birds not previously exposed, are more likely to pile up in response to a noise stimulus (U.S. Air Force 1994a). According to studies and interviews with growers, it is typically the previously unexposed birds that incite panic crowding, and the tendency to do so is markedly reduced within five exposures to the stimulus (U.S. Air Force 1994a). This suggests that the birds habituate relatively quickly. Egg productivity was not adversely affected by infrequent noise bursts, even at exposure levels as high as 120 to 130 dBA.

Between 1956 and 1988, there were 100 recorded claims against the Navy for alleged damage to domestic fowl. The number of claims averaged three per year, with peak numbers of claims following publications of studies on the topic in the early 1960s (U.S. Air Force 1994a). Many of the claims were disproved or did not have sufficient supporting evidence. The claims were filed for the following alleged damages: 55% for panic reactions, 31% for decreased production, 6% for reduced hatchability, 6% for weight loss, and less than 1% for reduced fertility (U.S. Air Force 1994a).

Turkeys

The review of the existing literature suggests that there has not been a concerted or widespread effort to study the effects of aircraft noise on commercial turkeys. One study involving turkeys examined the differences between simulated versus actual overflight aircraft noise, turkey responses to the noise, weight gain, and evidence of habituation (Bowles, et al. 1990a). Findings from the study suggested that turkeys habituated to jet aircraft noise quickly, that there were no growth rate differences between the experimental and control groups, and that there were some behavioral differences that increased the difficulty in handling individuals within the experimental group.

Low-altitude overflights were shown to cause turkey flocks that were kept inside turkey houses to occasionally pile up and experience high mortality rates due to the aircraft noise and a variety of disturbances unrelated to aircraft (U.S. Air Force 1994a).

Wildlife

Studies on the effects of overflights and sonic booms on wildlife have been focused mostly on avian species and ungulates such as caribou and bighorn sheep. Few studies have been conducted on marine mammals, small terrestrial mammals, reptiles, amphibians, and carnivorous mammals. Generally, species that live entirely below the surface of the water have also been ignored due to the fact they do not experience the same level of sound as terrestrial species (National Park Service 1994). Wild ungulates appear to be much more sensitive to noise disturbance than domestic livestock (Manci, et al. 1988). This may be due to previous exposure to disturbances. One common factor appears to be that low-altitude flyovers seem to be more disruptive in terrain where there is little cover (Manci, et al. 1988).

MAMMALS

Terrestrial Mammals

Studies of terrestrial mammals have shown that noise levels of 120 dBA can damage mammals' ears, and levels at 95 dBA can cause temporary loss of hearing acuity. Noise from aircraft has affected other large carnivores by causing changes in home ranges, foraging patterns, and breeding behavior. One study recommended that aircraft not be allowed to fly at altitudes below 2,000 feet above ground level over important grizzly and polar bear habitat (Dufour 1980). Wolves have been frightened by low-altitude flights that were 25 to 1,000 feet off the ground. However, wolves have been found to adapt to aircraft overflights and noise as long as they were not being hunted from aircraft (Dufour 1980).

Wild ungulates (American bison, caribou, bighorn sheep) appear to be much more sensitive to noise disturbance than domestic livestock (Weisenberger, et al. 1996). Behavioral reactions may be related to the past history of disturbances by such things as humans and aircraft. Common reactions of reindeer kept in an enclosure exposed to aircraft noise disturbance were a slight startle response, raising of the head, pricking ears, and scenting of the air. Panic reactions and extensive changes in behavior of individual animals were not observed. Observations of caribou in Alaska exposed to fixed-wing aircraft and helicopters showed running and panic reactions occurred when overflights were at an altitude of 200 feet or less. The reactions decreased with increased altitude of overflights, and, with more than 500 feet in altitude, the panic reactions stopped. Also, smaller groups reacted less strongly than larger groups. One negative effect of the running and avoidance behavior is increased expenditure of energy. For a 90-kg animal, the calculated expenditure due to aircraft harassment is 64 kilocalories per minute when running and 20 kilocalories per minute when walking. When conditions are favorable, this expenditure can be counteracted with increased feeding; however, during harsh winter conditions, this may not be possible. Incidental observations of wolves and bears exposed to fixed-wing aircraft and helicopters in the northern regions suggested that wolves are less disturbed than wild ungulates, while grizzly bears showed the greatest response of any animal species observed.

It has been proven that low-altitude overflights do induce stress in animals. Increased heart rates, an indicator of excitement or stress, have been found in pronghorn antelope, elk, and bighorn sheep. As such reactions occur naturally as a response to predation, infrequent overflights may not, in and of themselves, be detrimental. However, flights at high frequencies over a long period of time may cause harmful effects. The consequences of this disturbance, while cumulative, is not additive. It may be that aircraft disturbance may not cause obvious and serious health effects, but coupled with a harsh winter, it may have an adverse impact. Research has shown that stress induced by other types of disturbances produces long-term decreases in metabolism and hormone balances in wild ungulates.

Behavioral responses can range from mild to severe. Mild responses include head raising, body shifting, or turning to orient toward the aircraft. Moderate disturbance may be nervous behaviors, such as trotting a short distance. Escape is the typical severe response.

Marine Mammals

The physiological composition of the ear in aquatic and marine mammals exhibits adaptation to the aqueous environment. These differences (relative to terrestrial species) manifest themselves in the auricle and middle ear (Manci, et al. 1988). Some mammals use echolocation to perceive objects in their surroundings and to determine the directions and locations of sound sources (Simmons 1983 in Manci, et al. 1988).

In 1980, the Acoustical Society of America held a workshop to assess the potential hazard of manmade noise associated with proposed Alaska Arctic (North Slope-Outer Continental Shelf) petroleum operations on marine wildlife and to prepare a research plan to secure the knowledge necessary for proper assessment of noise impacts (Acoustical Society of America, 1980). Since 1980 it appears that research on responses of aquatic mammals to aircraft noise and sonic booms has been limited. Research conducted on northern fur seals, sea lions, and ringed seals indicated that there are some differences in how various animal groups receive frequencies of sound. It was observed that these species exhibited varying intensities of a startle response to airborne noise, which was habituated over time. The rates of habituation appeared to vary with species, populations, and demographics (age, sex). Time of day of exposure was also a factor (Muyberg 1978 in Manci, et al. 1988).

Studies accomplished near the Channel Islands were conducted near the area where the space shuttle launches occur. It was found that there were some response differences between species relative to the loudness of sonic booms. Those booms that were between 80 and 89 dBA caused a greater intensity of startle reactions than lower-intensity booms at 72 to 79 dBA. However, the duration of the startle responses to louder sonic booms was shorter (Jehl and Cooper 1980 in Manci, et al. 1988).

Jehl and Cooper (1980) indicated that low-flying helicopters, loud boat noises, and humans were the most disturbing to pinnipeds. According to the research, while the space launch and associated operational activity noises have not had a measurable effect on the pinniped population, it also suggests that there was a greater "disturbance level" exhibited during launch activities. There was a recommendation to continue observations for behavioral effects and to perform long-term population monitoring (Jehl and Cooper 1980).

The continued presence of single or multiple noise sources could cause marine mammals to leave a preferred habitat. However, it does not appear likely that overflights could cause migration from suitable habitats as aircraft noise over water is mobile and would not persist over any particular area. Aircraft noise, including supersonic noise, currently occurs in the overwater airspace of Eglin, Tyndall, and Langley AFBs from sorties predominantly involving jet aircraft. Survey results reported in Davis, et al. (2000), indicate that cetaceans (i.e., dolphins) occur under all of the Eglin and Tyndall marine airspace. The continuing presence of dolphins indicates that aircraft noise does not discourage use of the area and apparently does not harm the locally occurring population.

In a summary by the National Parks Service (1994) on the effects of noise on marine mammals, it was determined that gray whales and harbor porpoises showed no outward behavioral response to aircraft noise or overflights. Bottlenose dolphins showed no obvious reaction in a study involving helicopter overflights at 1,200 to 1,800 feet above the water. Neither did they show any reaction to survey aircraft unless the shadow of the aircraft passed over them, at which point there was some observed tendency to dive (Richardson, et al. 1995). Other anthropogenic noises in the marine environment from ships and pleasure craft may have more of an effect on marine mammals than aircraft noise (U.S. Air Force 2000). The noise effects on cetaceans appear to be somewhat attenuated by the air/water interface. The cetacean fauna along the coast of California have been subjected to sonic booms from military aircraft for many years without apparent adverse effects (Tetra Tech, Inc. 1997).

Manatees appear relatively unresponsive to human-generated noise to the point that they are often suspected of being deaf to oncoming boats [although their hearing is actually similar to that of pinnipeds (Bullock, et al. 1980)]. Little is known about the importance of acoustic communication to manatees, although they are known to produce at least ten different types of sounds and are thought to have sensitive hearing (Richardson, et al. 1995). Manatees continue to occupy canals near Miami International Airport, which suggests that they have become habituated to human disturbance and noise (Metro-Dade County 1995). Since manatees spend most of their time below the surface and do not startle readily, no effect of aircraft overflights on manatees would be expected (Bowles, et al. 1991b).

BIRDS

Auditory research conducted on birds indicates that they fall between the reptiles and the mammals relative to hearing sensitivity. According to Dooling (1978), within the range of one to five kHz, birds show a level of hearing sensitivity similar to that of the more sensitive mammals. In contrast to mammals, bird sensitivity falls off at a greater rate to increasing and decreasing frequencies. Passive observations and studies examining aircraft bird strikes indicate that birds nest and forage near airports. Aircraft noise in the vicinity of commercial airports apparently does not inhibit bird presence and use.

High-noise events (like a low-altitude aircraft overflight) may cause birds to engage in escape or avoidance behaviors, such as flushing from perches or nests (Ellis, et al. 1991). These activities impose an energy cost on the birds that, over the long term, may affect survival or growth. In addition, the birds may spend less time engaged in necessary activities like feeding, preening, or caring for their young because they spend time in noise-avoidance activity. However, the long-term significance of noise-related impacts is less clear. Several studies on nesting raptors have indicated that birds become habituated to aircraft overflights and that long-term reproductive success is not affected (Grubb and King 1991; Ellis, et al. 1991). Threshold noise levels for significant responses range from 62 dB for Pacific black brant (Branta bernicla nigricans) (Ward and Stehn 1990) to 85 dB for crested tern (Sterna bergii) (Brown 1990).

Songbirds were observed to become silent prior to the onset of a sonic boom event (F-111 jets), followed by "raucous discordant cries." There was a return to normal singing within 10 seconds after the boom (Higgins 1974 in Manci, et al. 1988). Ravens responded by emitting protestation calls, flapping their wings, and soaring.

Manci, et al. (1988), reported a reduction in reproductive success in some small territorial passerines (i.e., perching birds or songbirds) after exposure to low-altitude overflights. However, it has been observed that passerines are not driven any great distance from a favored food source by a nonspecific disturbance, such as aircraft overflights (U.S. Forest Service 1992). Further study may be warranted.

A recent study, conducted cooperatively between the DoD and the USFWS, assessed the response of the red-cockaded woodpecker to a range of military training noise events, including artillery, small arms, helicopter, and maneuver noise (Pater, et al. 1999). The project findings show that the red-cockaded woodpecker successfully acclimates to military noise events. Depending on the noise level that ranged from innocuous to very loud, the birds responded by flushing from their nest cavities. When the noise source was closer and the noise level was higher, the number of flushes increased proportionately. In all cases, however, the birds returned to their nests within a relatively short period of time (usually within 12 minutes). Additionally, the noise exposure did not result in any mortality or statistically detectable changes in reproductive success (Pater, et al. 1999). Red-cockaded woodpeckers did not flush when artillery simulators were more than 122 meters away and SEL noise levels were 70 dBA.

Lynch and Speake (1978) studied the effects of both real and simulated sonic booms on the nesting and brooding eastern wild turkey (Meleagris gallopavo silvestris) in Alabama. Hens at four nest sites were subjected to between 8 and 11 combined real and simulated sonic booms. All tests elicited similar responses, including quick lifting of the head and apparent alertness for between 10 and 20 seconds. No apparent nest failure occurred as a result of the sonic booms.

Twenty-one brood groups were also subjected to simulated sonic booms. Reactions varied slightly between groups, but the largest percentage of groups reacted by standing motionless after the initial blast. Upon the sound of the boom, the hens and poults fled until reaching the edge of the woods (approximately 4 to 8 meters). Afterward, the poults resumed feeding activities while the hens remained alert for a short period of time (approximately 15 to 20 seconds). In no instances were poults abandoned, nor did they scatter and become lost. Every observation group returned to normal activities within a maximum of 30 seconds after a blast.

RAPTORS

In a literature review of raptor responses to aircraft noise, Manci, et al. (1988), found that most raptors did not show a negative response to overflights. When negative responses were observed they were predominantly associated with rotor-winged aircraft or jet aircraft that were repeatedly passing within 0.5 mile of a nest.

Ellis, et al. (1991), performed a study to estimate the effects of low-level military jet aircraft and mid- to high-altitude sonic booms (both actual and simulated) on nesting peregrine falcons and seven other raptors (common black-hawk, Harris' hawk, zone-tailed hawk, red-tailed hawk, golden eagle, prairie falcon, bald eagle). They observed responses to test stimuli, determined nest success for the year of the testing, and evaluated site occupancy the following year. Both long- and short-term effects were noted in the study. The results reported the successful fledging of young in 34 of 38 nest sites (all eight species) subjected to low-level flight and/or simulated sonic booms. Twenty-two of the test sites were revisited in the following year, and observations of pairs or lone birds were made at all but one nest. Nesting attempts were underway at 19 of 20 sites that were observed long enough to be certain of breeding activity. Reoccupancy and productivity rates were within or above expected values for self-sustaining populations.

Short-term behavior responses were also noted. Overflights at a distance of 150 m or less produced few significant responses and no severe responses. Typical responses consisted of crouching or, very rarely, flushing from the perch site. Significant responses were most evident before egg laying and after young were "well grown." Incubating or brooding adults never burst from the nest, thus preventing egg breaking or knocking chicks out of the nest. Jet passes and sonic booms often caused noticeable alarm; however, significant negative responses were rare and did not appear to limit productivity or reoccupancy. Due to the locations of some of the nests, some birds may have been habituated to aircraft noise. There were some test sites located at distances far from zones of frequent military aircraft usage, and the test stimuli were often closer, louder, and more frequent than would be likely for a normal training situation.

Manci, et al. (1988), noted that a female northern harrier was observed hunting on a bombing range in Mississippi during bombing exercises. The harrier was apparently unfazed by the exercises, even when a bomb exploded within 200 feet. In a similar case of habituation/non-disturbance, a study on the Florida snail-kite stated the greatest reaction to overflights (approximately 98 dBA) was "watching the aircraft fly by." No detrimental impacts to distribution, breeding success, or behavior were noted.

Bald Eagle

A study by Grubb and King (1991) on the reactions of the bald eagle to human disturbances showed that terrestrial disturbances elicited the greatest response, followed by aquatic (i.e., boats) and aerial disturbances. The disturbance regime of the area where the study occurred was predominantly characterized by aircraft noise. The study found that pedestrians consistently caused responses that were greater in both frequency and duration. Helicopters elicited the highest level of aircraft-related responses. Aircraft disturbances, although the most common form of disturbance, resulted in the lowest levels of response. This low response level may have been due to habituation; however, flights less than 170 meters away caused reactions similar to other disturbance types. Ellis, et al. (1991), showed that eagles typically respond to the proximity of a disturbance, such as a pedestrian or aircraft within 100 meters, rather than the noise level. Fleischner and Weisberg (1986) stated that reactions of bald eagles to commercial jet flights, although minor (e.g., looking), were twice as likely to occur when the jets passed at a distance of 0.5 mile or less. They also noted that helicopters were four times more likely to cause a reaction than a commercial jet and 20 times more likely to cause a reaction than a propeller plane.

The USFWS advised Cannon AFB that flights at or below 2,000 feet AGL from October 1 through March 1 could result in adverse impacts to wintering bald eagles (U.S. Fish and Wildlife Serice 1998). However, Fraser, et al. (1985), suggested that raptors habituate to overflights rapidly, sometimes tolerating aircraft approaches of 65 feet or less.

Osprey

A study by Trimper, et al. (1998), in Goose Bay, Labrador, Canada, focused on the reactions of nesting osprey to military overflights by CF-18 Hornets. Reactions varied from increased alertness and focused observation of planes to adjustments in incubation posture. No overt reactions (e.g., startle response, rapid nest departure) were observed as a result of an overflight. Young nestlings crouched as a result of any disturbance until they grew to 1 to 2 weeks prior to fledging. Helicopters, human presence, float planes, and other ospreys elicited the strongest reactions from nesting ospreys. These responses included flushing, agitation, and aggressive displays. Adult osprey showed high nest occupancy rates during incubation regardless of external influences.

The osprey observed occasionally stared in the direction of the flight before it was audible to the observers. The birds may have been habituated to the noise of the flights; however, overflights were strictly controlled during the experimental period. Strong reactions to float planes and helicopter may have been due to the slower flight and therefore longer duration of visual stimuli rather than noise-related stimuli.

Red-tailed Hawk

Anderson, et al. (1989), conducted a study that investigated the effects of low-level helicopter overflights on 35 red-tailed hawk nests. Some of the nests had not been flown over prior to the study. The hawks that were naïve (i.e., not previously exposed) to helicopter flights exhibited stronger avoidance behavior (nine of 17 birds flushed from their nests) than those that had experienced prior overflights. The overflights did not appear to affect nesting success in either study group. These findings were consistent with the belief that red-tailed hawks habituate to low-level air traffic, even during the nesting period.

MIGRATORY WATERFOWL

A study of caged American black ducks was conducted by Fleming, et al. in 1996. It was determined that noise had negligible energetic and physiologic effects on adult waterfowl. Measurements included body weight, behavior, heart rate, and enzymatic activity. Experiments also showed that adult ducks exposed to high noise events acclimated rapidly and showed no effects.

The study also investigated the reproductive success of captive ducks, which indicated that duckling growth and survival rates at Piney Island, North Carolina, were lower than those at a background location. In contrast, observations of several other reproductive indices (i.e., pair formation, nesting, egg production, and hatching success) showed no difference between Piney Island and the background location. Potential effects on wild duck populations may vary, as wild ducks at Piney Island have presumably acclimated to aircraft overflights. It was not demonstrated that noise was the cause of adverse impacts. A variety of other factors, such as weather conditions, drinking water and food availability and variability, disease, and natural variability in reproduction, could explain the observed effects. Fleming noted that drinking water conditions (particularly at Piney Island) deteriorated during the study, which could have affected the growth of young ducks. Further research would be necessary to determine the cause of any reproductive effects.

Another study by Conomy, et al. (1998) exposed previously unexposed ducks to 71 noise events per day that equaled or exceeded 80 dBA. It was determined that the proportion of time black ducks reacted to aircraft activity and noise decreased from 38 percent to 6 percent in 17 days and remained stable at 5.8 percent thereafter. In the same study, the wood duck did not appear to habituate to aircraft disturbance. This supports the notion that animal response to aircraft noise is species-specific. Because a startle response to aircraft noise can result in flushing from nests, migrants and animals living in areas with high concentrations of predators would be the most vulnerable to experiencing effects of lowered birth rates and recruitment over time. Species that are subjected to infrequent overflights do not appear to habituate to overflight disturbance as readily.

Black brant studied in the Alaska Peninsula were exposed to jets and propeller aircraft, helicopters, gunshots, people, boats, and various raptors. Jets accounted for 65% of all the disturbances. Humans, eagles, and boats caused a greater percentage of brant to take flight. There was markedly greater reaction to Bell-206-B helicopter flights than fixed wing, single-engine aircraft (Ward, et al. 1986).

The presence of humans and low-flying helicopters in the Mackenzie Valley North Slope area did not appear to affect the population density of Lapland longspurs, but the experimental group was shown to have reduced hatching and fledging success and higher nest abandonment. Human presence appeared to have a greater impact on the incubating behavior of the black brant, common eider, and Arctic tern than fixed-wing aircraft (Gunn and Livingston 1974).

Gunn and Livingston (1974) found that waterfowl and seabirds in the Mackenzie Valley and North Slope of Alaska and Canada became acclimated to float plane disturbance over the course of three days. Additionally, it was observed that potential predators (bald eagle) caused a number of birds to leave their nests. Non-breeding birds were observed to be more reactive than breeding birds. Waterfowl were affected by helicopter flights, while snow geese were disturbed by Cessna 185 flights. The geese flushed when the planes were under 1,000 feet, compared to higher flight elevations. An overall reduction in flock sizes was observed. It was recommended that aircraft flights be reduced in the vicinity of premigratory staging areas.

Manci, et al. 1988 reported that waterfowl were particularly disturbed by aircraft noise. The most sensitive appeared to be snow geese. Canada geese and snow geese were thought to be more sensitive than other animals such as turkey vultures, coyotes, and raptors (Edwards, et al. 1979).

WADING AND SHORE BIRDS

Black, et al. (1984), studied the effects of low-altitude (less than 500 feet AGL) military training flights with sound levels from 55 to 100 dBA on wading bird colonies (i.e., great egret, snowy egret, tricolored heron, and little blue heron). The training flights involved three or four aircraft, which occurred once or twice per day. This study concluded that the reproductive activity--including nest success, nestling survival, and nestling chronology--was independent of F-16 overflights. Dependent variables were more strongly related to ecological factors, including location and physical characteristics of the colony and climatology. Another study on the effects of circling fixed-wing aircraft and helicopter overflights on wading bird colonies found that at altitudes of 195 to 390 feet, there was no reaction in nearly 75 percent of the 220 observations. Ninety percent displayed no reaction or merely looked toward the direction of the noise source. Another 6 percent stood up, 3 percent walked from the nest, and 2 percent flushed (but were without active nests) and returned within 5 minutes (Kushlan 1978). Apparently, non-nesting wading birds had a slightly higher incidence of reacting to overflights than nesting birds. Seagulls observed roosting near a colony of wading birds in another study remained at their roosts when subsonic aircraft flew overhead (Burger 1981). Colony distribution appeared to be most directly correlated to available wetland community types and was found to be distributed randomly with respect to military training routes. These results suggest that wading bird species presence was most closely linked to habitat availability and that they were not affected by low-level military overflights (U.S. Air Force 2000).

Burger (1986) studied the response of migrating shorebirds to human disturbance and found that shorebirds did not fly in response to aircraft overflights, but did flush in response to more localized intrusions (i.e., humans and dogs on the beach). Burger (1981) studied the effects of noise from JFK Airport in New York on herring gulls that nested less than 1 kilometer from the airport. Noise levels over the nesting colony were 85 to 100 dBA on approach and 94 to 105 dBA on takeoff. Generally, there did not appear to be any prominent adverse effects of subsonic aircraft on nesting, although some birds flushed when the concorde flew overhead and, when they returned, engaged in aggressive behavior. Groups of gulls tended to loaf in the area of the nesting colony, and these birds remained at the roost when the Concorde flew overhead. Up to 208 of the loafing gulls flew when supersonic aircraft flew overhead. These birds would circle around and immediately land in the loafing flock (U.S. Air Force 2000).

In 1970, sonic booms were potentially linked to a mass hatch failure of Sooty Terns on the Dry Tortugas (Austin, et al. 1970). The cause of the failure was not certain, but it was conjectured that sonic booms from military aircraft or an overgrowth of vegetation were factors. In the previous season, Sooties were observed to react to sonic booms by rising in a "panic flight," circling over the island, then usually settling down on their eggs again. Hatching that year was normal. Following the 1969 hatch failure, excess vegetation was cleared and measures were taken to reduce supersonic activity. The 1970 hatch appeared to proceed normally. A colony of Noddies on the same island hatched successfully in 1969, the year of the Sooty hatch failure.

Subsequent laboratory tests of exposure of eggs to sonic booms and other impulsive noises (Bowles, et al. 1991a; Bowles, et al. 1994; Cottereau 1972; Cogger and Zegarra 1980) failed to show adverse effects on hatching of eggs. A structural analysis (Ting, et al. 2002) showed that, even under extraordinary circumstances, sonic booms would not damage an avian egg.

Burger (1981) observed no effects of subsonic aircraft on herring gulls in the vicinity of JFK International Airport. The Concorde aircraft did cause more nesting gulls to leave their nests (especially in areas of higher density of nests), causing the breakage of eggs and the scavenging of eggs by intruder prey. Clutch sizes were observed to be smaller in areas of higher-density nesting (presumably due to the greater tendency for panic flight) than in areas where there were fewer nests.

Fish, Reptiles, and Amphibians

The effects of overflight noise on fish, reptiles, and amphibians have been poorly studied, but conclusions regarding their expected responses have involved speculation based upon known physiologies and behavioral traits of these taxa (Gladwin, et al. 1988). Although fish do startle in response to low-flying aircraft noise, and probably to the shadows of aircraft, they have been found to habituate to the sound and overflights. Reptiles and amphibians that respond to low frequencies and those that respond to ground vibration, such as spadefoots (genus Scaphiopus), may be affected by noise. Limited information is available on the effects of short-duration noise events on reptiles. Dufour (1980) and Manci, et al. (1988), summarized a few studies of reptile responses to noise. Some reptile species tested under laboratory conditions experienced at least temporary threshold shifts or hearing loss after exposure to 95 dB for several minutes. Crocodilians in general have the most highly developed hearing of all reptiles. Crocodile ears have lids that can be closed when the animal goes under water. These lids can reduce the noise intensity by 10 to 12 dB (Wever and Vernon 1957). On Homestead Air Reserve Station, Florida, two crocodilians (the American Alligator and the Spectacled Caiman) reside in wetlands and canals along the base runway suggesting that they can coexist with existing noise levels of an active runway including DNLs of 85 dB.

Summary

Some physiological/behavioral responses such as increased hormonal production, increased heart rate, and reduction in milk production have been described in a small percentage of studies. A majority of the studies focusing on these types of effects have reported short-term or no effects.

The relationships between physiological effects and how species interact with their environments have not been thoroughly studied. Therefore, the larger ecological context issues regarding physiological effects of jet aircraft noise (if any) and resulting behavioral pattern changes are not well understood.

Animal species exhibit a wide variety of responses to noise. It is therefore difficult to generalize animal responses to noise disturbances or to draw inferences across species, as reactions to jet aircraft noise appear to be species-specific. Consequently, some animal species may be more sensitive than other species and/or may exhibit different forms or intensities of behavioral responses. For instance, wood ducks appear to be more sensitive and more resistant to acclimation to jet aircraft noise than Canada geese in one study. Similarly, wild ungulates seem to be more easily disturbed than domestic animals.

The literature does suggest that common responses include the “startle” or “fright” response and, ultimately, habituation. It has been reported that the intensities and durations of the startle response decrease with the numbers and frequencies of exposures, suggesting no long-term adverse effects. The majority of the literature suggests that domestic animal species (cows, horses, chickens) and wildlife species exhibit adaptation, acclimation, and habituation after repeated exposure to jet aircraft noise and sonic booms.

Animal responses to aircraft noise appear to be somewhat dependent on, or influenced by, the size, shape, speed, proximity (vertical and horizontal), engine noise, color, and flight profile of planes. Helicopters also appear to induce greater intensities and durations of disturbance behavior as compared to fixed-wing aircraft. Some studies showed that animals that had been previously exposed to jet aircraft noise exhibited greater degrees of alarm and disturbance to other objects creating noise, such as boats, people, and objects blowing across the landscape. Other factors influencing response to jet aircraft noise may include wind direction, speed, and local air turbulence; landscape structures (i.e., amount and type of vegetative cover); and, in the case of bird species, whether the animals are in the incubation/nesting phase.

H.1.3.9 Property Values

Property within a noise zone (or Accident Potential Zone) may be affected by the availability of federally guaranteed loans. According to U.S. Department of Housing and Urban Development (HUD), Federal Housing Administration (FHA), and Veterans Administration (VA) guidance, sites are acceptable for program assistance, subsidy, or insurance for housing in noise zones of less than 65 dB DNL, and sites are conditionally acceptable with special approvals and noise attenuation in the 65 to 75 dB DNL noise zone and the greater than 75 dB DNL noise zone. HUD’s position is that noise is not the only determining factor for site acceptability, and properties should not be rejected only because of airport influences if there is evidence of acceptability within the market and if use of the dwelling is expected to continue. Similar to the Navy’s and Air Force’s Air Installation Compatible Use Zone Program, HUD, FHA, and VA recommend sound attenuation for housing in the higher noise zones and written disclosures to all prospective buyers or lessees of property within a noise zone (or Accident Potential Zone).

Newman and Beattie (1985) reviewed the literature to assess the effect of aircraft noise on property values. One paper by Nelson (1978), reviewed by Newman and Beattie, suggested a 1.8 to 2.3 percent decrease in property value per decibel at three separate airports, while at another period of time, they found only a 0.8 percent devaluation per decibel change in DNL. However, Nelson also noted a decline in noise depreciation over time which he theorized could be due to either noise sensitive people being replaced by less sensitive people or the increase in commerical value of the property near airports; both ideas were supported by Crowley (1978). Ultimately, Newman and Beattie summarized that while an effect of noise was observed, noise is only one of the many factors that is part of a decision to move close to, or away from, an airport, but which is sometimes considered an advantage due to increased opportunities for employment or ready access to the airport itself. With all the issues associated with determining property values, their reviews found that decreases in property values usually range from 0.5 to 2 percent per decibel increase of cumulative noise exposure.

More recently Fidell, et al. (1996) studied the influences of aircraft noise on actual sale prices of residential properties in the vicinity of two military facilities and found that equations developed for one area to predict residential sale prices in areas unaffected by aircraft noise worked equally well when applied to predicting sale prices of homes in areas with aircraft noise in excess of 65 dB DNL. Thus, the model worked equally well in predicting sale prices in areas with and without aircraft noise exposure. This indicates that aircraft noise had no meaningful effect on residential property values. In some cases, the average sale prices of noise exposed properties were somewhat higher than those elsewhere in the same area. In the vicinity of Davis-Monthan AFB in Tucson, AZ, Fidell found the homes near the AFB were much older, smaller and in poorer condition than homes elsewhere. These factors caused the equations developed for predicting sale prices in areas further away from the base to be inapplicable with those nearer the AFB. However, again Fidell found that, similar to other researchers, differences in sale prices between homes with and without aircraft noise were frequently due to factors other than noise itself.

H.1.3.10 Noise Effects on Structures

Normally, the components of a structure that are most sensitive to airborne noise are the windows and, infrequently, the plastered walls and ceilings. An evaluation of the peak sound pressures impinging on the structure is normally used to determine the possibility of damage. In general, with peak sound levels above 130 dB, there is the possibility of the excitation of structural component resonances. While certain frequencies (such as 30 Hz for window breakage) may be of more concern than other frequencies, conservatively only sounds lasting more than one second above a sound level of 130 dB are potentially damaging to structural components (Committee on Hearing, Bioacoustics, and Biomechanics 1977).

Noise-induced structural vibration may also cause annoyance to dwelling occupants because of induced secondary vibrations, or rattling of objects within the dwelling such as hanging pictures, dishes, plaques, and bric-a-brac. Window panes may also vibrate noticeably when exposed to high levels of airborne noise. In general, such noise-induced vibrations occur at peak sound levels of 110 dB or greater. Thus, assessments of noise exposure levels for compatible land use should also be protective of noise-induced secondary vibrations.

H.1.3.11 Noise Effects on Terrain

It has been suggested that noise levels associated with low-flying aircraft may affect the terrain under the flight path by disturbing fragile soil or snow, especially in mountainous areas, causing landslides or avalanches. There are no known instances of such effects, and it is considered improbable that such effects would result from routine, subsonic aircraft operations.

H.1.3.12 Noise Effects on Historical and Archaeological Sites

Because of the potential for increased fragility of structural components of historical buildings and other historical sites, aircraft noise may affect such sites more severely than newer, modern structures. Particularly in older structures, seemingly insignificant surface cracks initiated by vibrations from aircraft noise may lead to greater damage from natural forces (Hanson, et al. 1991). There are few scientific studies of such effects to provide guidance for their assessment.

One study involved the measurements of sound levels and structural vibration levels in a superbly restored plantation house, originally built in 1795, and now situated approximately 1,500 feet from the centerline at the departure end of Runway 19L at Washington Dulles International Airport. These measurements were made in connection with the proposed scheduled operation of the Concorde airplane at Dulles (Wesler 1977). There was special concern for the building’s windows, since roughly half of the 324 panes were original. No instances of structural damage were found. Interestingly, despite the high levels of noise during Concorde takeoffs, the induced structural vibration levels were actually less than those induced by touring groups and vacuum cleaning.

As noted above for the noise effects of noise-induced vibrations on conventional structures, assessments of noise exposure levels for normally compatible land uses should also be protective of historic and archaeological sites.

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H.2 EXPEDITIONARY AIRFIELD

H.2.1 Modeled Flight Operations

Baseline Operations at 29 Palms EAF

Assumed Category	Aircraft Type	Departure				Non Break Arrival				Overhead Break				Touch and Go (1)				Camp Wilson (1)				Drop Zone Sandhill (1)				Grand Total			
		Day	Eve	Night	Total	Day	Eve	Night	Total	Day	Eve	Night	Total	Day	Eve	Night	Total	Day	Eve	Night	Total	Day	Eve	Night	Total	Day	Eve	Night	Total
Jet	F/A-18A/C(3)	1,473	295	-	1,768	637	360	-	997	759	-	-	759	32	49	-	81	-	-	-	-	-	-	-	-	2,901	704	-	3,605
	F/A-18E/F(3)	77	16	-	93	33	19	-	52	40	-	-	40	2	3	-	5	-	-	-	-	-	-	-	-	152	38	-	190
	AV-8B	354	289	-	643	250	107	-	357	357	-	-	357	43	29	-	72	-	-	-	-	-	-	-	-	1,004	425	-	1,429
	F-35	-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	EA-6B	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Prop	C-12	24	-	-	24	24	-	-	24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	48	-	-	48
	C-130	208	6	-	214	89	36	-	125	89	-	-	89	249	-	-	249	-	-	-	-	-	-	-	-	635	42	-	677
	KC-130	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rotary Wing	CH-46E	1,707	528	-	2,235	1,374	622	70	2,066	219	-	-	219	88	-	-	88	112	70	-	182	58	82	-	140	3,558	1,302	70	4,930
	CH-53E	968	496	17	1,481	731	474	12	1,217	261	-	-	261	77	71	-	148	125	-	-	125	142	-	-	142	2,304	1,041	29	3,374
	MV-22B	388	233	60	681	74	44	11	129	314	189	48	551	217	131	33	381	-	-	-	-	-	-	-	-	993	597	152	1,742
	AH/UH-1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Joint AR	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Joint FW	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Joint RW	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	UAS	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	11	-	-	11	11	-	-	11
Modeled Total		5,199	1,863	77	7,139	3,212	1,662	93	4,967	2,039	189	48	2,276	708	283	33	1,024	237	70	-	307	200	82	-	282	11,595	4,149	251	15,995
Not Modeled Total		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	11	-	-	11	11	-	-	11
Grand Total		5,199	1,863	77	7,139	3,212	1,662	93	4,967	2,039	189	48	2,276	708	283	33	1,024	237	70	-	307	211	82	-	293	11,606	4,149	251	16,006

day = 0700-1900 local; eve = 1900-2200 local; night = 2200-0700 local

(1) Counted here as two (2) operations

(2) Modeled aircraft are shaded

(3) F/A-18A/C ops from 2001 study modeled here as 95% F/A-18A/C and 5% F/A-18E/F

Proposed Operations at 29 Palms EAF

Assumed Category	Aircraft Type	Departure				Non Break Arrival				Overhead Break				Touch and Go (1)				Camp Wilson (1)				Drop Zone Sandhill (1)				Grand Total			
		Day	Eve	Night	Total	Day	Eve	Night	Total	Day	Eve	Night	Total	Day	Eve	Night	Total	Day	Eve	Night	Total	Day	Eve	Night	Total	Day	Eve	Night	Total
Jet	F/A-18A/C (3)	1,763	389	78	2,230	927	454	78	1,459	759	-	-	759	32	49	-	81	-	-	-	-	-	-	-	-	3,481	892	156	4,529
	F/A-18E/F (3)	91	20	4	115	47	23	4	74	40	-	-	40	2	3	-	5	-	-	-	-	-	-	-	-	180	46	8	234
	AV-8B	550	355	40	945	446	173	40	659	357	-	-	357	43	29	-	72	-	-	-	-	-	-	-	-	1,396	557	80	2,033
	F-35 (4)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	EA-6B	50	16	8	74	50	16	8	74	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	100	32	16	148
Prop	C-12	24	-	-	24	24	-	-	24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	48	-	-	48
	C-130	208	6	-	214	89	36	-	125	89	-	-	89	249	-	-	249	-	-	-	-	-	-	-	-	635	42	-	677
	KC-130 (5)	88	30	20	138	88	30	20	138	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	176	60	40	276
Rotary Wing	CH-46E	1,707	528	-	2,235	1,374	622	70	2,066	219	-	-	219	88	-	-	88	112	70	-	182	58	82	-	140	3,558	1,302	70	4,930
	CH-53E	1,126	550	37	1,713	889	528	32	1,449	261	-	-	261	77	71	-	148	125	-	-	125	142	-	-	142	2,620	1,149	69	3,838
	MV-22B	568	295	86	949	254	106	37	397	314	189	48	551	217	131	33	381	-	-	-	-	-	-	-	-	1,353	721	204	2,278
	AH/UH-1 (6)	716	242	134	1,092	716	242	134	1,092	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1,432	484	268	2,184
	Joint AR	18	4	14	36	18	4	14	36	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	36	8	28	72
	Joint FW (7)	20	6	14	40	20	6	14	40	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	40	12	28	80
	Joint RW (8)	214	74	32	320	214	74	32	320	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	428	148	64	640
	UAS	154	50	36	240	154	50	36	240	-	-	-	-	-	-	-	-	-	-	-	-	11	-	-	11	319	100	72	491
Modeled Total		7,125	2,511	453	10,089	5,138	2,310	469	7,917	2,039	189	48	2,276	708	283	33	1,024	237	70	-	307	200	82	-	282	15,447	5,445	1,003	21,895
Not Modeled Total		172	54	50	276	172	54	50	276	-	-	-	-	-	-	-	-	-	-	-	-	11	-	-	11	355	108	100	563
Grand Total		7,297	2,565	503	10,365	5,310	2,364	519	8,193	2,039	189	48	2,276	708	283	33	1,024	237	70	-	307	211	82	-	293	15,802	5,553	1,103	22,458

day = 0700-1900 local; eve = 1900-2200 local; night = 2200-0700 local
(1) Counted here as two (2) operations
(2) Modeled aircraft are shaded
(3) F/A-18A/C ops from 2001 study modeled here as 95% F/A-18A/C and 5% F/A-18E/F
(4) Assumed the F-35 will not use the EAF
(5) Modeled as C-130H&N&P
(6) Modeled as AH-1N
(7) Modeled as F/A-18E/F

H.2.2 Modeled Runway and Flight Track Utilization for Expeditionary Airfield

Baseline F/A-18A/C, F/A-18E/F, AV-8B, C-12, and C-130 Runway and Flight Track Utilization

Operation Type	Runway	Runway Mix %	Flight Track ID	Flight Track %
Departures	10	25%	10D1	70%
			10D2	10%
			10D5	20%
	28	75%	28D1	10%
			28D2	40%
			28D3	40%
			28D4	10%
Straight-In/ Full Stop Arrivals	10	25%	10A1	100%
	28	75%	28A1	100%
Overhead Arrivals	10	25%	10O1	10%
			10O2	90%
	28	75%	28O1	10%
			28O2	90%
Touch and Go	10	25%	10T1	100%
	28	75%	28T1	100%

Baseline CH-46, CH-53 and MV-22 Runway and Flight Track Utilization

Operation Type	Runway	Runway Mix %	Flight Track ID	Flight Track %
Departures	10	25%	10D1	20%
			10D2	30%
			10D3	10%
			10D4	30%
			10D5	10%
	28	75%	28D1	45%
			28D4	45%
			28D5	10%
	Wilson	100%	WD1	33%
			WD2	33%
			WD3	34%
Straight-In/	10	25%	10A1	50%
			10A2	50%
	28	75%	28A1	25%
			28A2	75%
	Wilson	100%	WA1	10%
			WA2	35%
			WA3	10%
			WA4	35%
			WA5	10%
	Sandhill	100%	SA1	100%
Overhead Arrivals	10	25%	10O1	10%
			10O2	90%
	28	75%	28O1	50%
			28O2	50%
Touch and Go	10	25%	10T1	100%
	28	75%	28T1	100%
Interfacility Departures from Sandhill to Runway	Sandhill	100%	SI1	50%
			SI2	50%

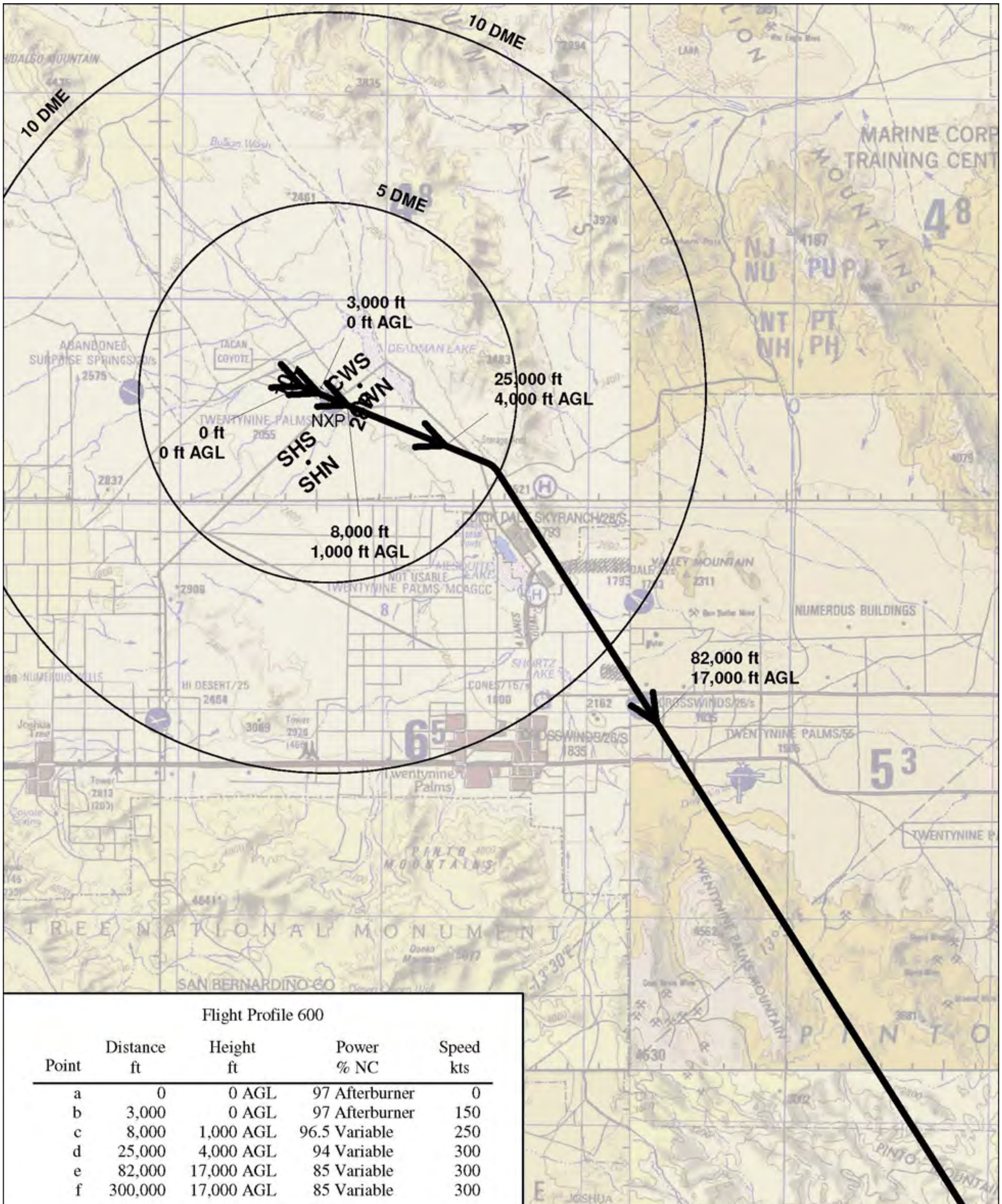
Proposed EA-6B Runway and Flight Track Utilization

Operation Type	Runway	Runway Mix %	Flight Track ID	Flight Track %
Departures	10	25%	10D1	70%
			10D2	10%
			10D5	20%
	28	75%	28D1	10%
			28D2	40%
			28D3	40%
			28D4	10%
Straight-In/ Full Stop Arrivals	10	25%	10A1	100%
	28	75%	28A1	100%
Overhead Arrivals	10	25%	10O1	10%
			10O2	90%
	28	75%	28O1	10%
			28O2	90%
Touch and Go	10	25%	10T1	100%
	28	75%	28T1	100%

Proposed AH-1 and UH-1 Runway and Flight Track Utilization

Operation Type	Runway	Runway Mix %	Flight Track ID	Flight Track %
Departures	10	25%	10D1	20%
			10D2	30%
			10D3	10%
			10D4	30%
			10D5	10%
	28	75%	28D1	45%
			28D4	45%
			28D5	10%
	Wilson	100%	WD1	33%
			WD2	33%
			WD3	34%
Straight-In/	10	25%	10A1	50%
			10A2	50%
	28	75%	28A1	25%
			28A2	75%
	Wilson	100%	WA1	10%
			WA2	35%
			WA3	10%
			WA4	35%
			WA5	10%
	Sandhill	100%	SA1	100%
Overhead Arrivals	10	25%	10O1	10%
			10O2	90%
	28	75%	28O1	50%
			28O2	50%
Touch and Go	10	25%	10T1	100%
	28	75%	28T1	100%
Interfacility Departures from Sandhill to Runway	Sandhill	100%	SI1	50%
			SI2	50%

H.2.3 Modeled Representative Flight Profiles for Key Aircraft at Expeditionary Airfield



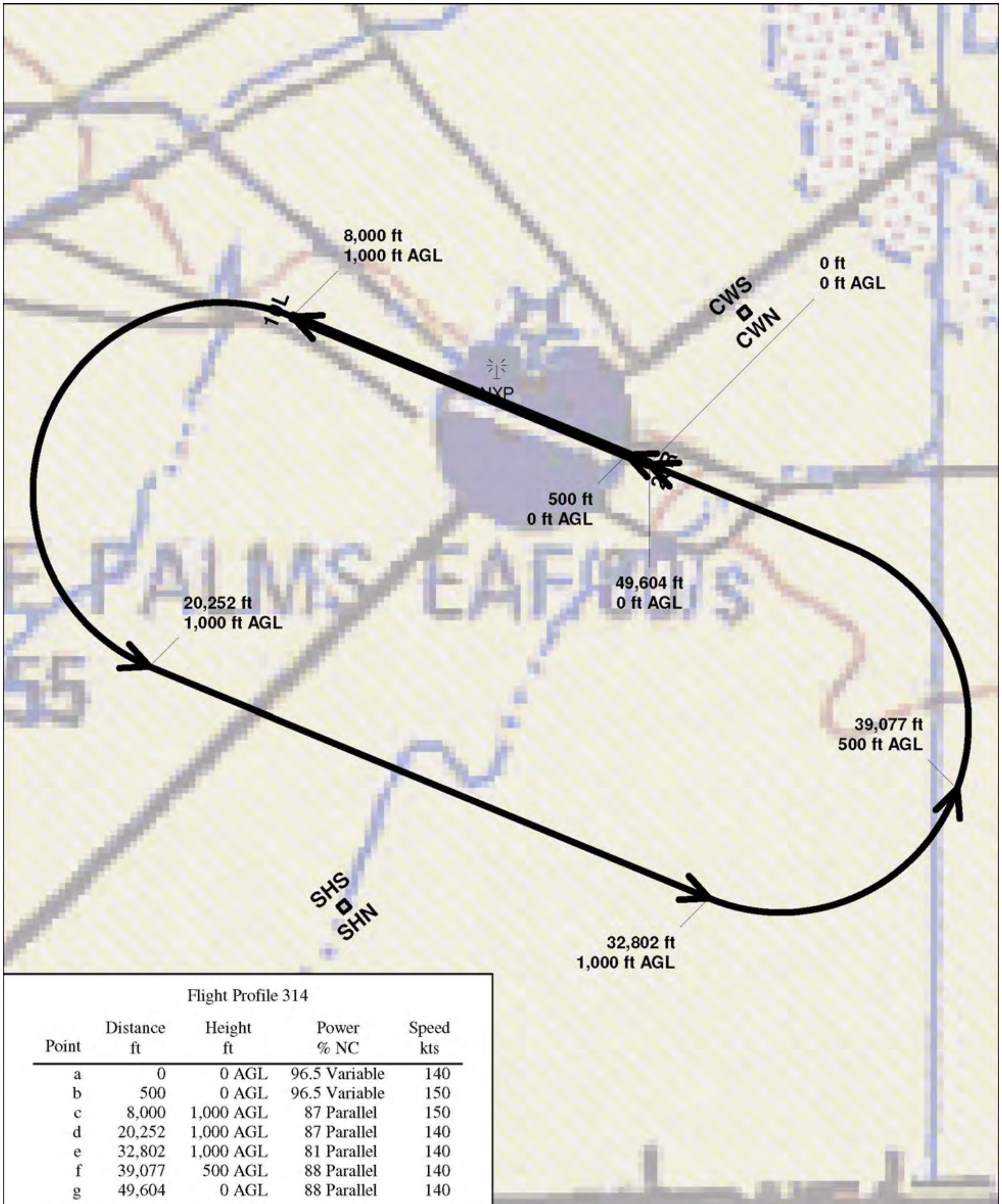
Flight Profile 600

Point	Distance ft	Height ft	Power % NC	Speed kts
a	0	0 AGL	97 Afterburner	0
b	3,000	0 AGL	97 Afterburner	150
c	8,000	1,000 AGL	96.5 Variable	250
d	25,000	4,000 AGL	94 Variable	300
e	82,000	17,000 AGL	85 Variable	300
f	300,000	17,000 AGL	85 Variable	300

Flight Profile 600 - Departure to SE - Lake Bandini Sewage Disposal Ponds
F-18E/F
on Runway 10L, Flight Track 10D1

0 10,000 20,000 30,000 40,000 50,000 60,000 70,000 80,000 90,000 100,000

Scale in Feet 1:295,000 (1 inch = 24,600 feet)

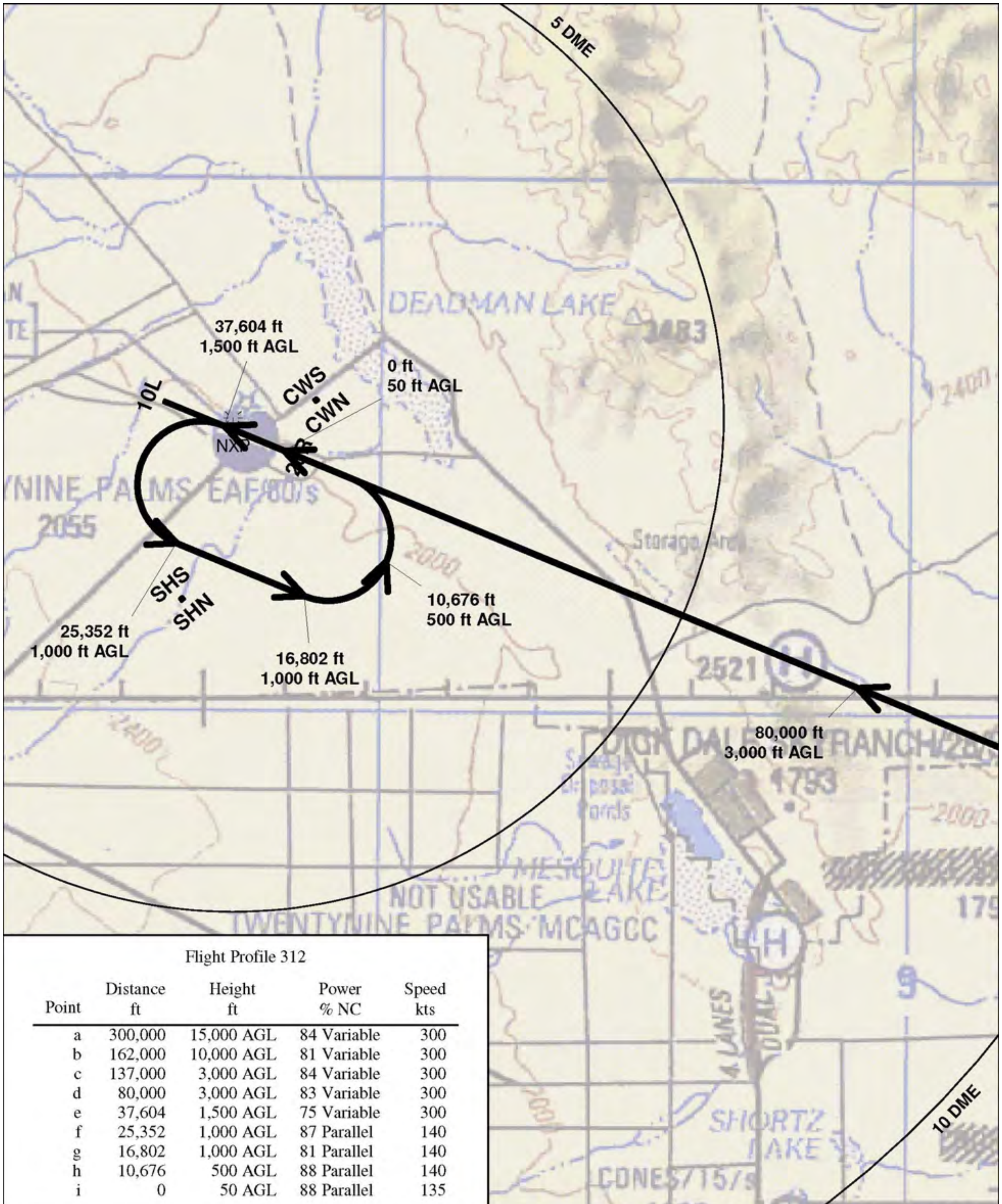


Flight Profile 314

Point	Distance ft	Height ft	Power % NC	Speed kts
a	0	0 AGL	96.5 Variable	140
b	500	0 AGL	96.5 Variable	150
c	8,000	1,000 AGL	87 Parallel	150
d	20,252	1,000 AGL	87 Parallel	140
e	32,802	1,000 AGL	81 Parallel	140
f	39,077	500 AGL	88 Parallel	140
g	49,604	0 AGL	88 Parallel	140

Flight Profile 314 - Touch and Go on Runway 28 (to the south of the Runway)
F-18A/C
on Runway 28R, Flight Track 28T1

Scale in Feet 1:38,100 (1 inch = 3,170 feet)



Flight Profile 312

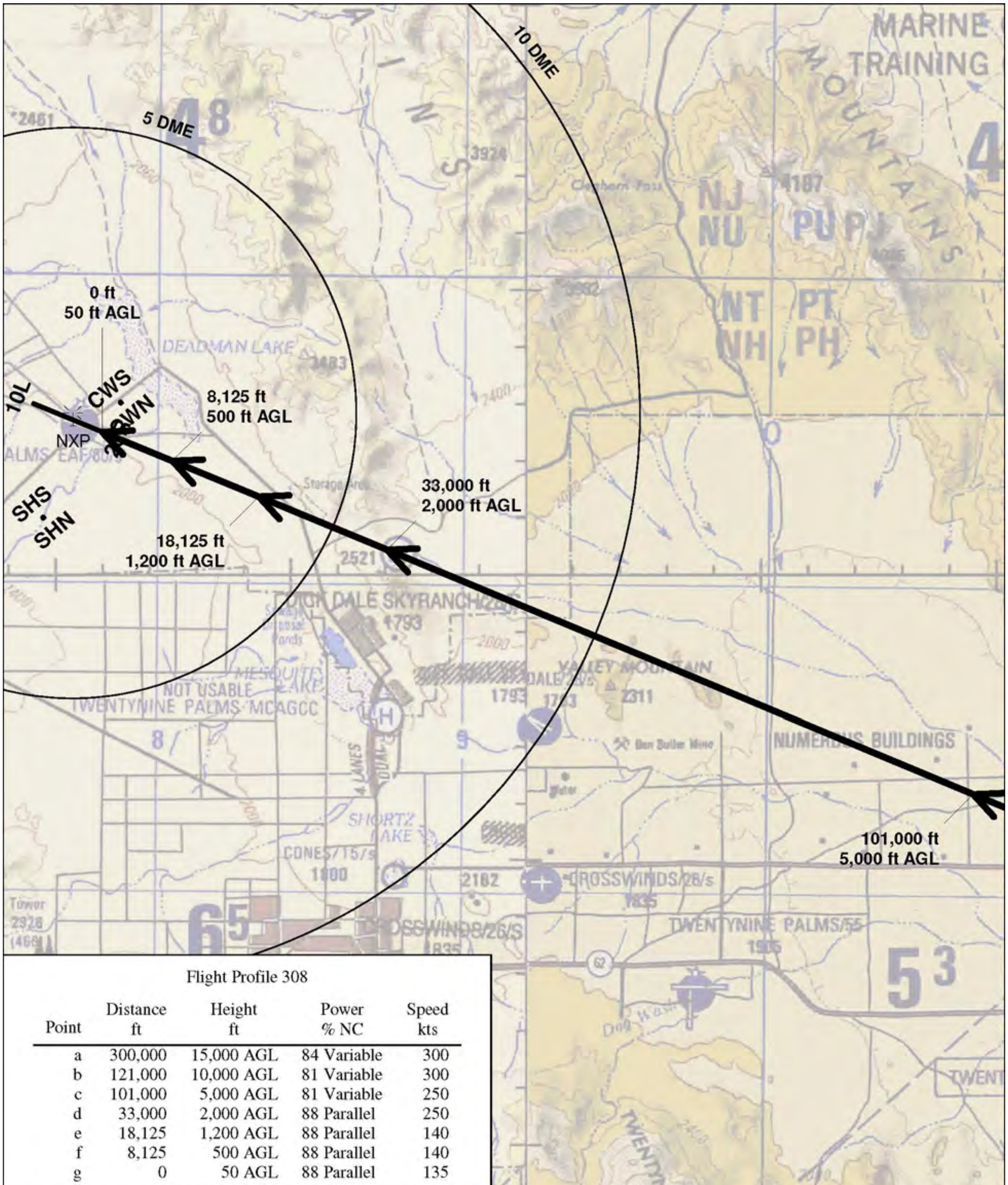
Point	Distance ft	Height ft	Power % NC	Speed kts
a	300,000	15,000 AGL	84 Variable	300
b	162,000	10,000 AGL	81 Variable	300
c	137,000	3,000 AGL	84 Variable	300
d	80,000	3,000 AGL	83 Variable	300
e	37,604	1,500 AGL	75 Variable	300
f	25,352	1,000 AGL	87 Parallel	140
g	16,802	1,000 AGL	81 Parallel	140
h	10,676	500 AGL	88 Parallel	140
i	0	50 AGL	88 Parallel	135

Flight Profile 312 - Overhead Break Arrival Mid Runway (90% of the time)
F-18A/C
on Runway 28R, Flight Track 28O2

0 4,000 8,000 12,000 16,000 20,000 24,000 28,000 32,000 36,000

Scale in Feet 1:114,000 (1 inch = 9,480 feet)

N



Flight Profile 308

Point	Distance ft	Height ft	Power % NC	Speed kts
a	300,000	15,000 AGL	84 Variable	300
b	121,000	10,000 AGL	81 Variable	300
c	101,000	5,000 AGL	81 Variable	250
d	33,000	2,000 AGL	88 Parallel	250
e	18,125	1,200 AGL	88 Parallel	140
f	8,125	500 AGL	88 Parallel	140
g	0	50 AGL	88 Parallel	135

Flight Profile 308 - Straight-In Arrival from SE - Lake Bandini Sewage Disposal Ponds

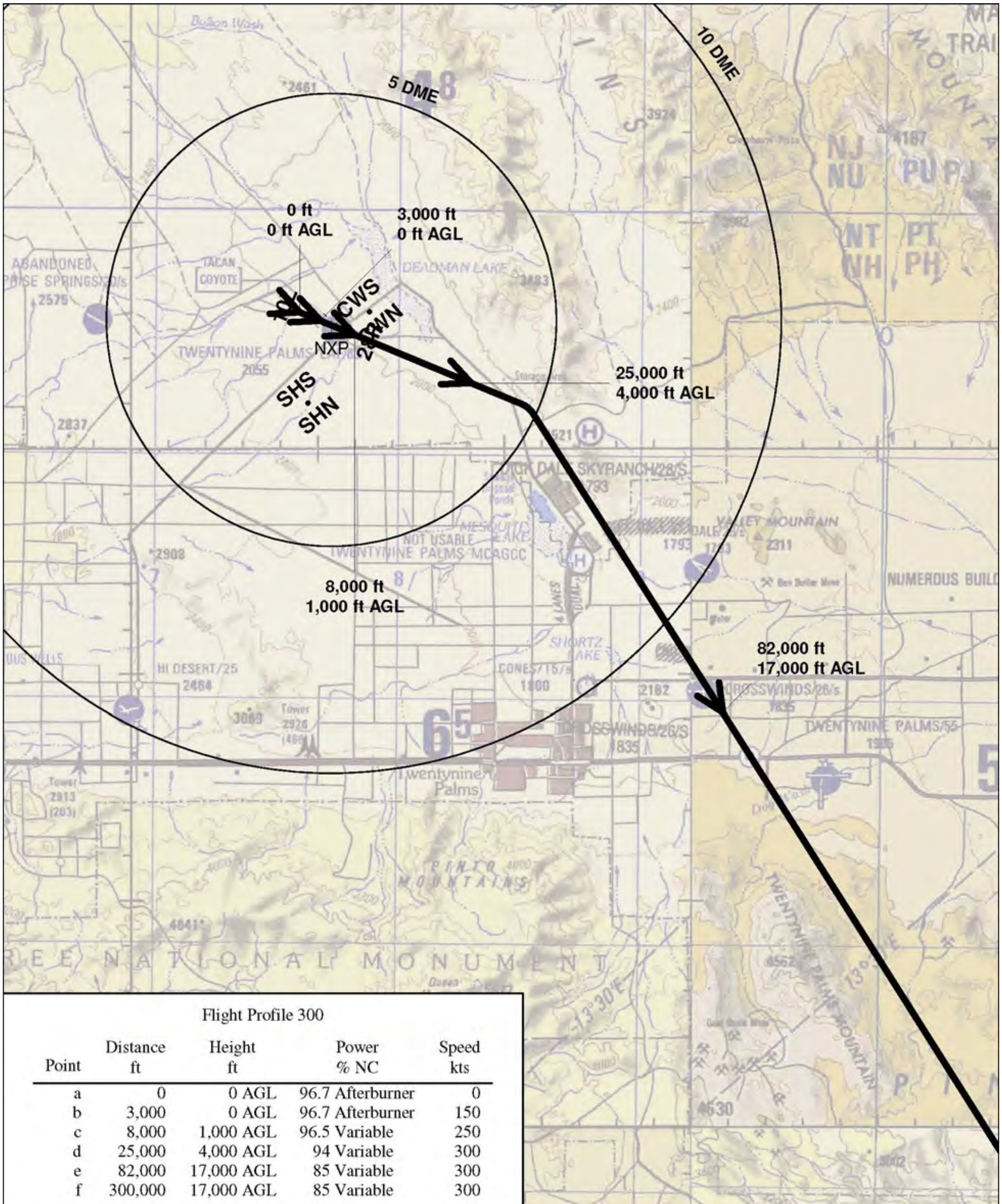
F-18A/C

on Runway 28R, Flight Track 28A1

0 10,000 20,000 30,000 40,000 50,000 60,000

Scale in Feet 1:198,000 (1 inch = 16,500 feet)

N



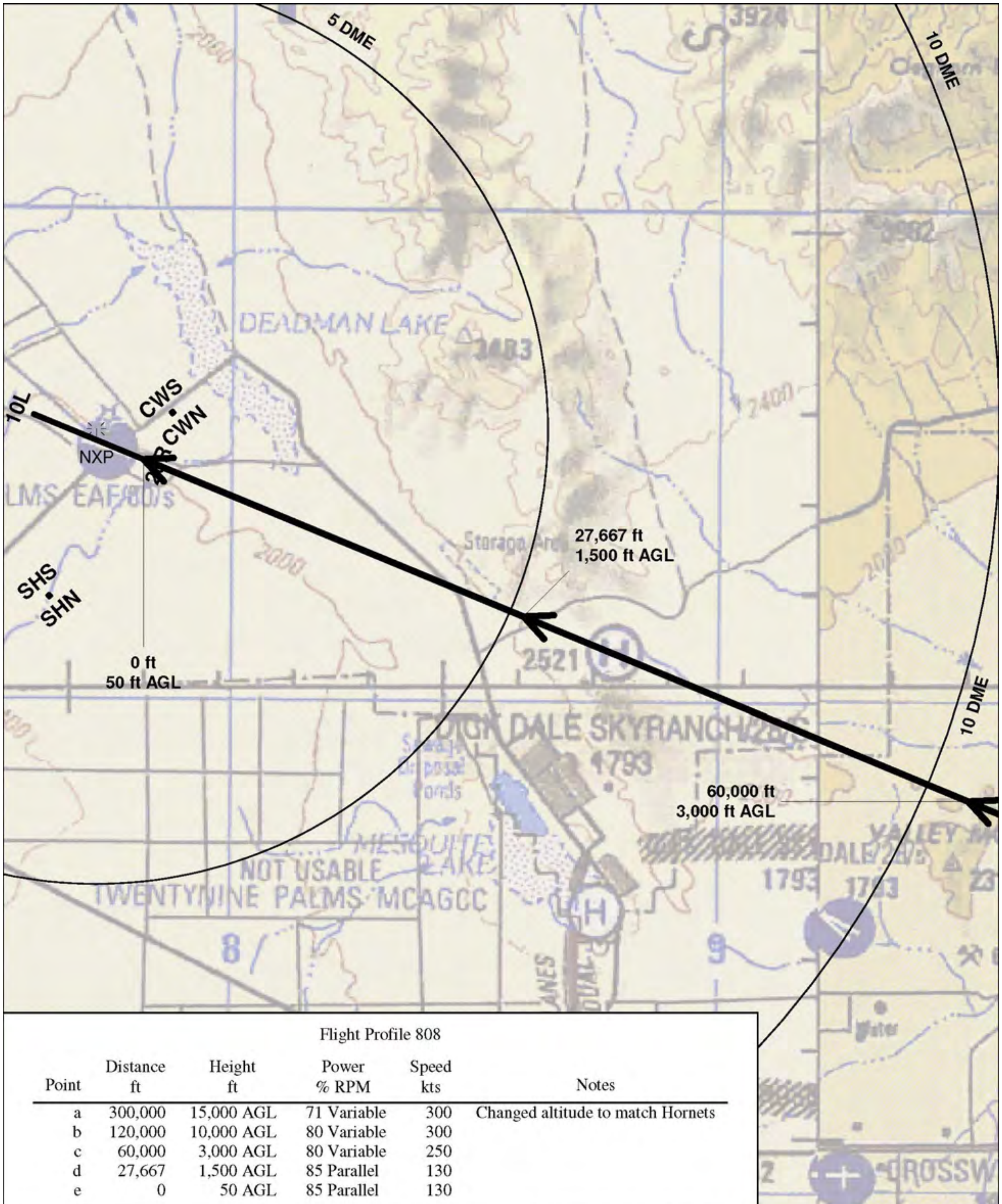
Flight Profile 300

Point	Distance ft	Height ft	Power % NC	Speed kts
a	0	0 AGL	96.7 Afterburner	0
b	3,000	0 AGL	96.7 Afterburner	150
c	8,000	1,000 AGL	96.5 Variable	250
d	25,000	4,000 AGL	94 Variable	300
e	82,000	17,000 AGL	85 Variable	300
f	300,000	17,000 AGL	85 Variable	300

Flight Profile 300 - Departure to SE - Lake Bandini Sewage Disposal Ponds
F-18A/C
on Runway 10L, Flight Track 10D1

0 10,000 20,000 30,000 40,000 50,000 60,000 70,000 80,000

Scale in Feet 1:248,000 (1 inch = 20,700 feet)



Flight Profile 808

Point	Distance ft	Height ft	Power % RPM	Speed kts	Notes
a	300,000	15,000 AGL	71 Variable	300	Changed altitude to match Hornets
b	120,000	10,000 AGL	80 Variable	300	
c	60,000	3,000 AGL	80 Variable	250	
d	27,667	1,500 AGL	85 Parallel	130	
e	0	50 AGL	85 Parallel	130	

Flight Profile 808 - Straight-In Arrival from W - Pt Giant
EA-6B
on Runway 28R, Flight Track 28A1

0 4,000 8,000 12,000 16,000 20,000 24,000 28,000 32,000 36,000 40,000

Scale in Feet 1:124,000 (1 inch = 10,300 feet)

N

Flight Profile 800

Point	Distance ft	Height ft	Power % RPM	Speed kts	Notes
a	0	0 AGL	95 Variable	0	
b	4,000	0 AGL	95 Variable	150	
c	9,114	500 AGL	95 Variable	250	
d	12,152	800 AGL	95 Variable	300	
e	42,000	9,000 AGL	95 Variable	300	
f	100,000	17,000 AGL	85 Variable	300	altitude change to level off at 17k like Hornets
g	200,000	17,000 AGL	85 Variable	300	altitude change to level off at 17k like Hornets

Flight Profile 800 - Departure to SE - Lake Bandini Sewage Disposal Ponds

EA-6B

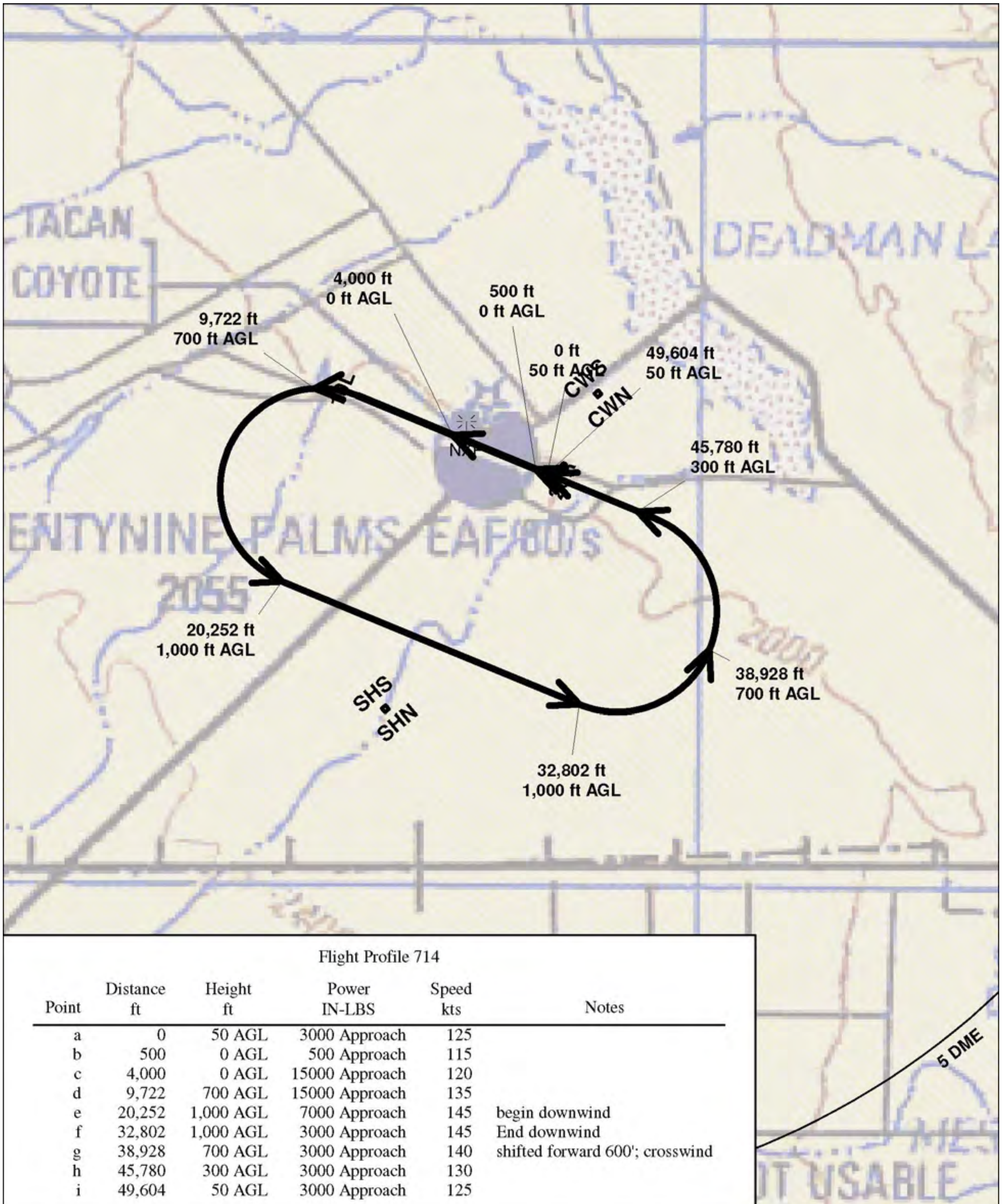
on Runway 10L, Flight Track 10D1

Prior to brake release, aircraft sits at 95 % RPM Variable for 1 seconds

0 10,000 20,000 30,000 40,000 50,000 60,000

Scale in Feet 1:192,000 (1 inch = 16,000 feet)

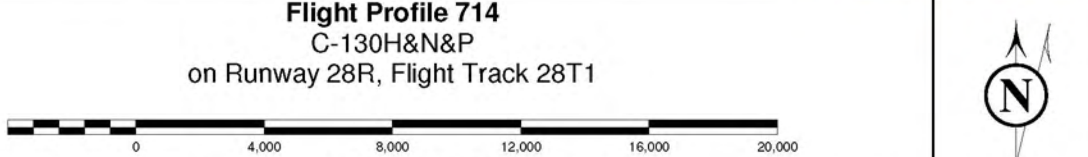
N



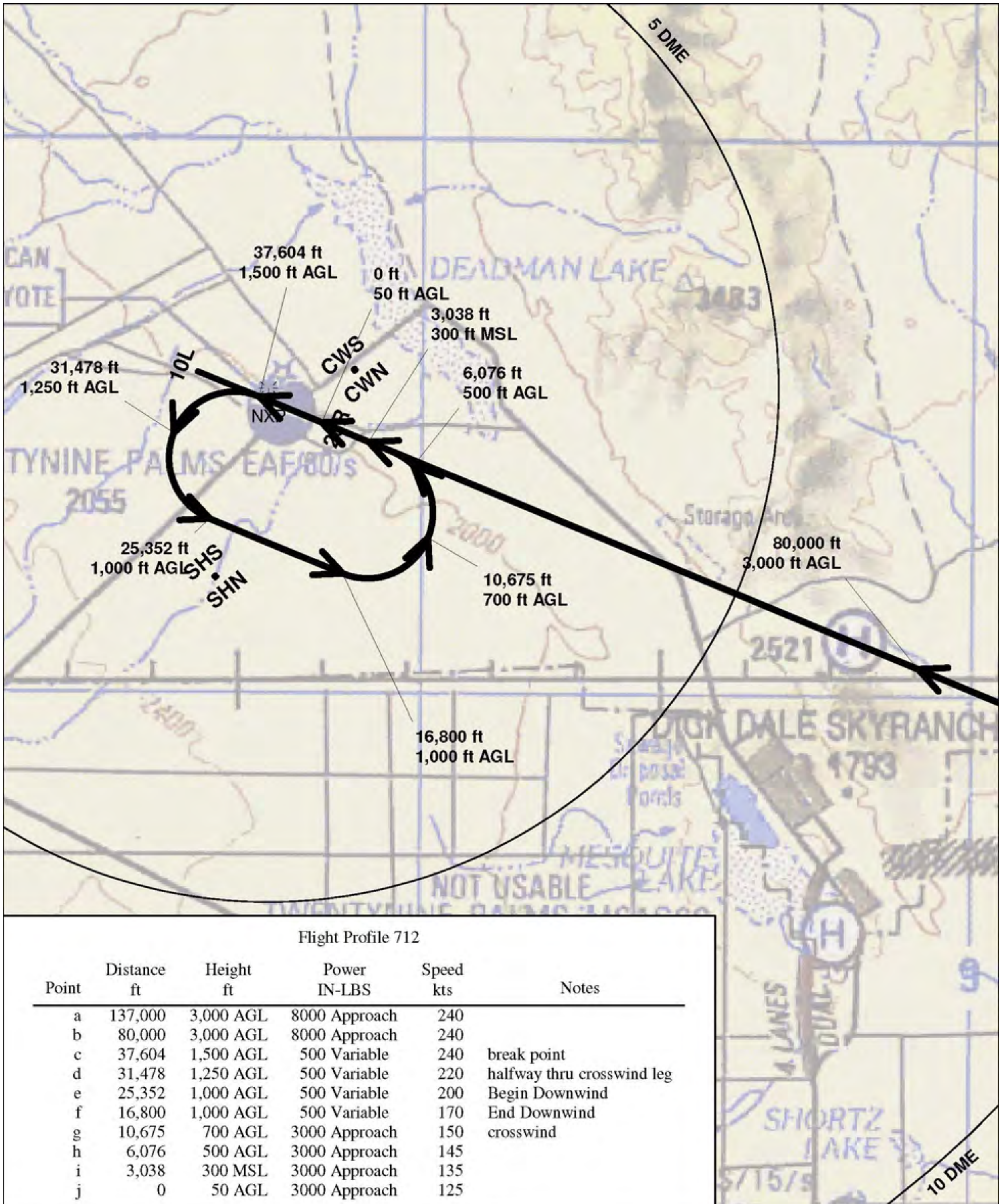
Flight Profile 714

Point	Distance ft	Height ft	Power IN-LBS	Speed kts	Notes
a	0	50 AGL	3000 Approach	125	
b	500	0 AGL	500 Approach	115	
c	4,000	0 AGL	15000 Approach	120	
d	9,722	700 AGL	15000 Approach	135	
e	20,252	1,000 AGL	7000 Approach	145	begin downwind
f	32,802	1,000 AGL	3000 Approach	145	End downwind
g	38,928	700 AGL	3000 Approach	140	shifted forward 600'; crosswind
h	45,780	300 AGL	3000 Approach	130	
i	49,604	50 AGL	3000 Approach	125	

Flight Profile 714
C-130H&N&P
on Runway 28R, Flight Track 28T1



Scale in Feet 1:71,800 (1 inch = 5,980 feet)



Flight Profile 712

Point	Distance ft	Height ft	Power IN-LBS	Speed kts	Notes
a	137,000	3,000 AGL	8000 Approach	240	
b	80,000	3,000 AGL	8000 Approach	240	
c	37,604	1,500 AGL	500 Variable	240	break point
d	31,478	1,250 AGL	500 Variable	220	halfway thru crosswind leg
e	25,352	1,000 AGL	500 Variable	200	Begin Downwind
f	16,800	1,000 AGL	500 Variable	170	End Downwind
g	10,675	700 AGL	3000 Approach	150	crosswind
h	6,076	500 AGL	3000 Approach	145	
i	3,038	300 MSL	3000 Approach	135	
j	0	50 AGL	3000 Approach	125	

Flight Profile 712
C-130H&N&P
on Runway 28R, Flight Track 28O2

0 4,000 8,000 12,000 16,000 20,000 24,000 28,000 32,000 36,000

Scale in Feet 1:109,000 (1 inch = 9,110 feet)

N

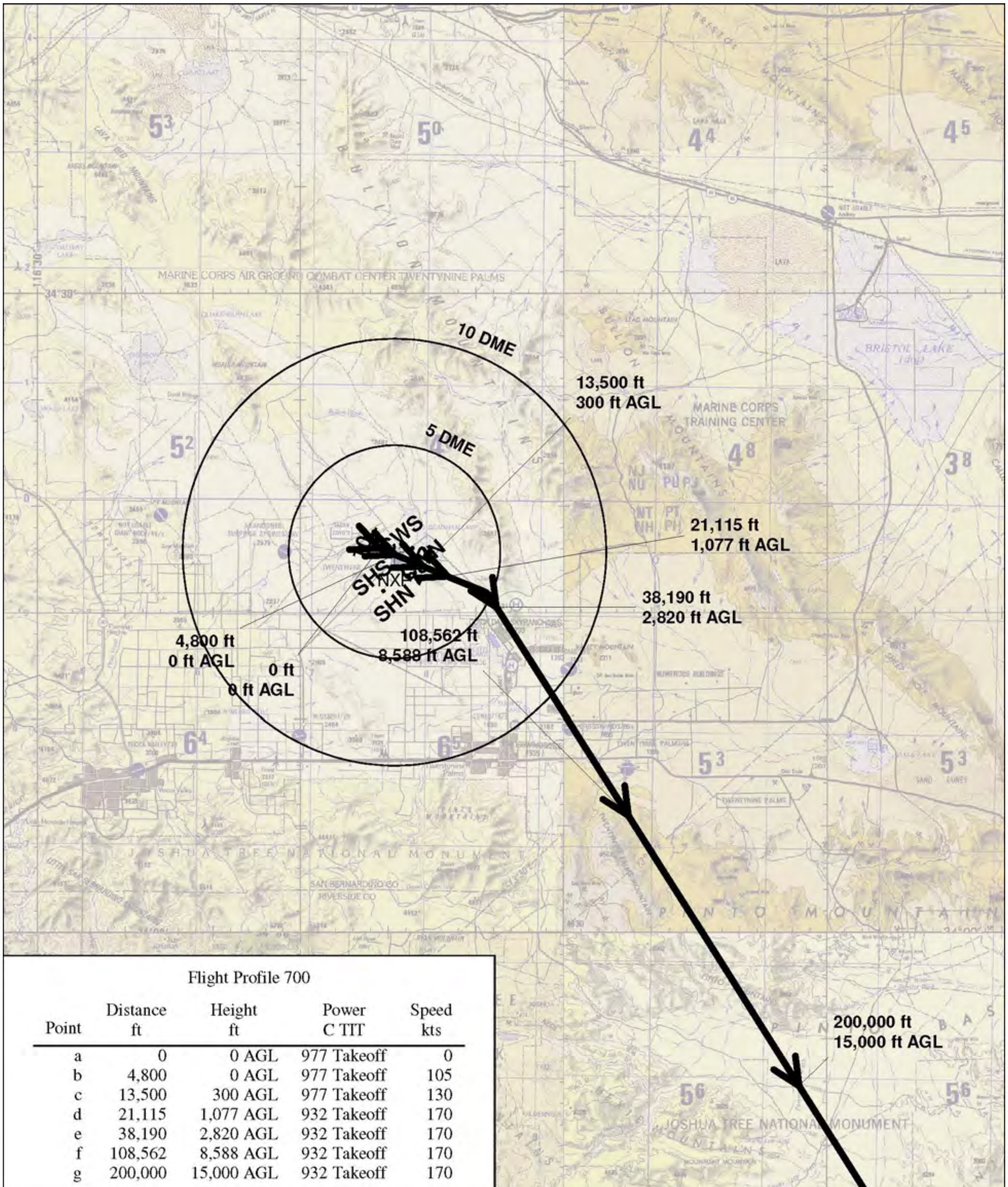
Flight Profile 708

Point	Distance ft	Height ft	Power IN-LBS	Speed kts
a	200,000	10,000 AGL	3200 Approach	200
b	60,600	3,300 AGL	4000 Approach	170
c	40,200	2,300 AGL	4000 Approach	150
d	28,200	1,900 AGL	4000 Approach	125
e	7,800	440 AGL	4000 Approach	125
f	0	50 AGL	3200 Approach	110

Flight Profile 708
C-130H&N&P
on Runway 28R, Flight Track 28A1

0 10,000 20,000 30,000 40,000 50,000 60,000 70,000 80,000 90,000

Scale in Feet 1:278,000 (1 inch = 23,200 feet)



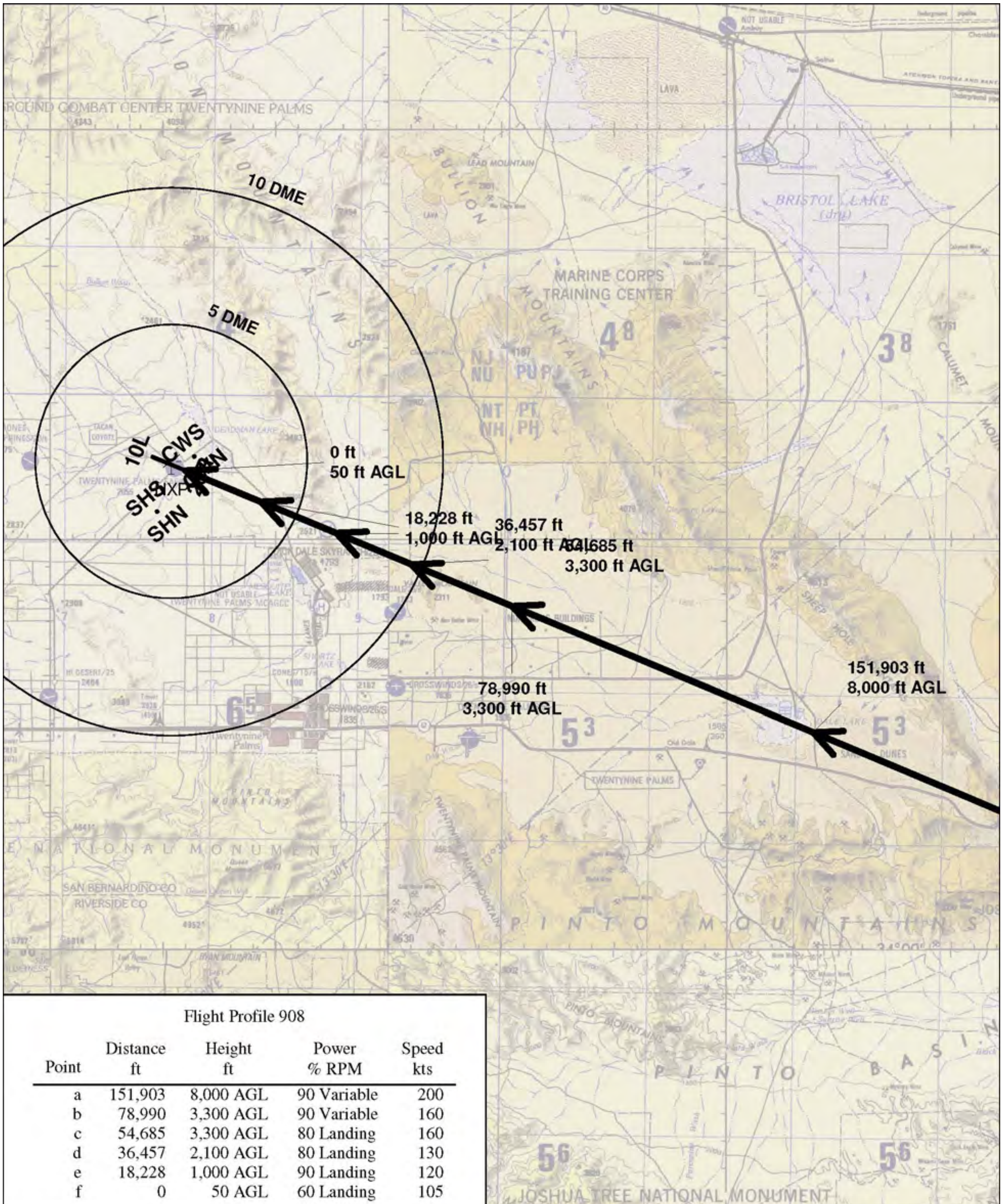
Flight Profile 700

Point	Distance ft	Height ft	Power C TIT	Speed kts
a	0	0 AGL	977 Takeoff	0
b	4,800	0 AGL	977 Takeoff	105
c	13,500	300 AGL	977 Takeoff	130
d	21,115	1,077 AGL	932 Takeoff	170
e	38,190	2,820 AGL	932 Takeoff	170
f	108,562	8,588 AGL	932 Takeoff	170
g	200,000	15,000 AGL	932 Takeoff	170

Flight Profile 700
C-130H&N&P
on Runway 10L, Flight Track 10D1
Prior to brake release, aircraft sits at 977 C TIT Takeoff for 5 seconds

0 20,000 40,000 60,000 80,000 100,000 120,000 140,000 160,000 180,000

Scale in Feet 1:530,000 (1 inch = 44,200 feet)



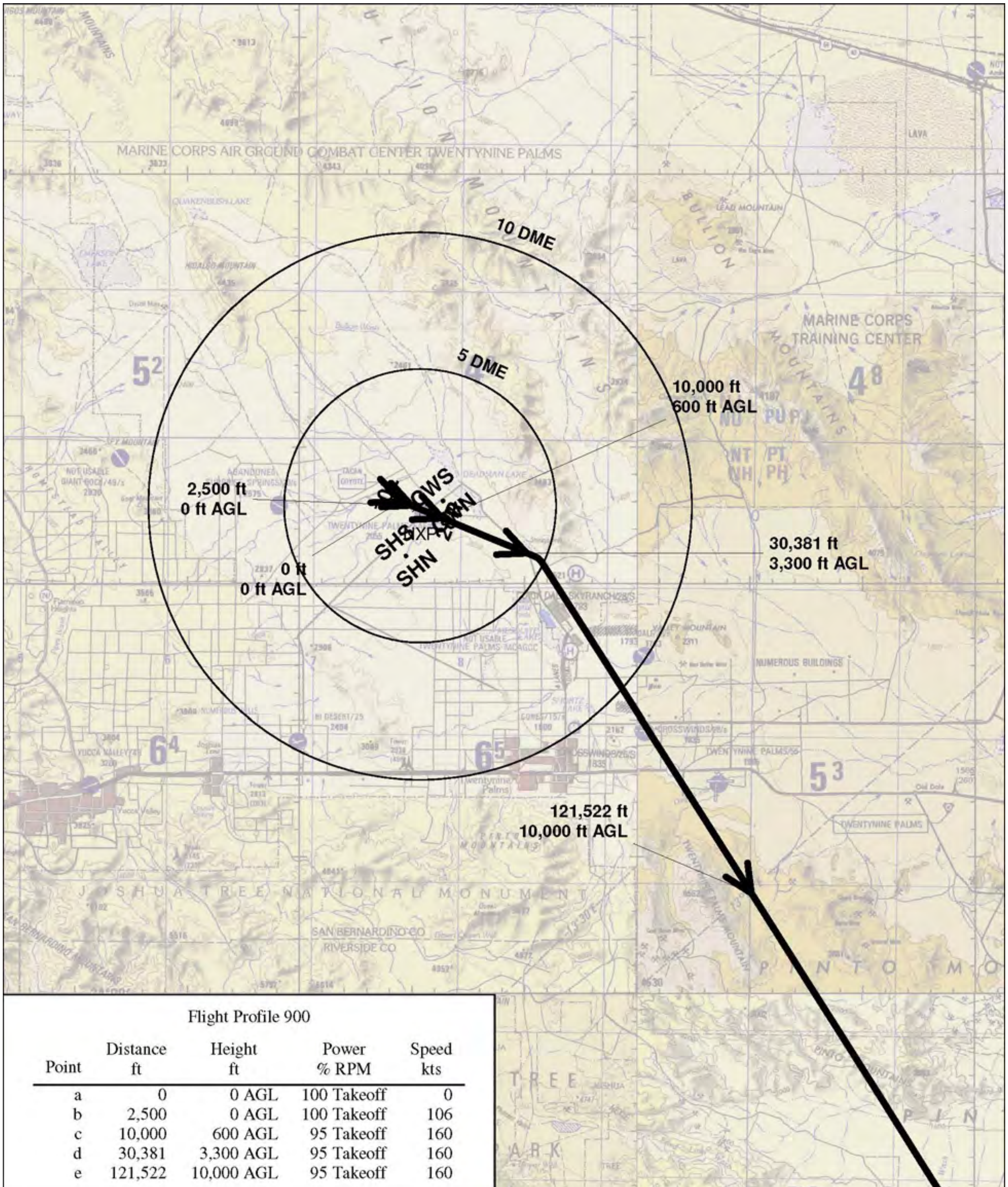
Flight Profile 908

Point	Distance ft	Height ft	Power % RPM	Speed kts
a	151,903	8,000 AGL	90 Variable	200
b	78,990	3,300 AGL	90 Variable	160
c	54,685	3,300 AGL	80 Landing	160
d	36,457	2,100 AGL	80 Landing	130
e	18,228	1,000 AGL	90 Landing	120
f	0	50 AGL	60 Landing	105

Flight Profile 908
C-12
on Runway 28R, Flight Track 28A1

0 20,000 40,000 60,000 80,000 100,000 120,000

Scale in Feet 1:411,000 (1 inch = 34,200 feet)



Flight Profile 900

Point	Distance ft	Height ft	Power % RPM	Speed kts
a	0	0 AGL	100 Takeoff	0
b	2,500	0 AGL	100 Takeoff	106
c	10,000	600 AGL	95 Takeoff	160
d	30,381	3,300 AGL	95 Takeoff	160
e	121,522	10,000 AGL	95 Takeoff	160

Flight Profile 900

C-12

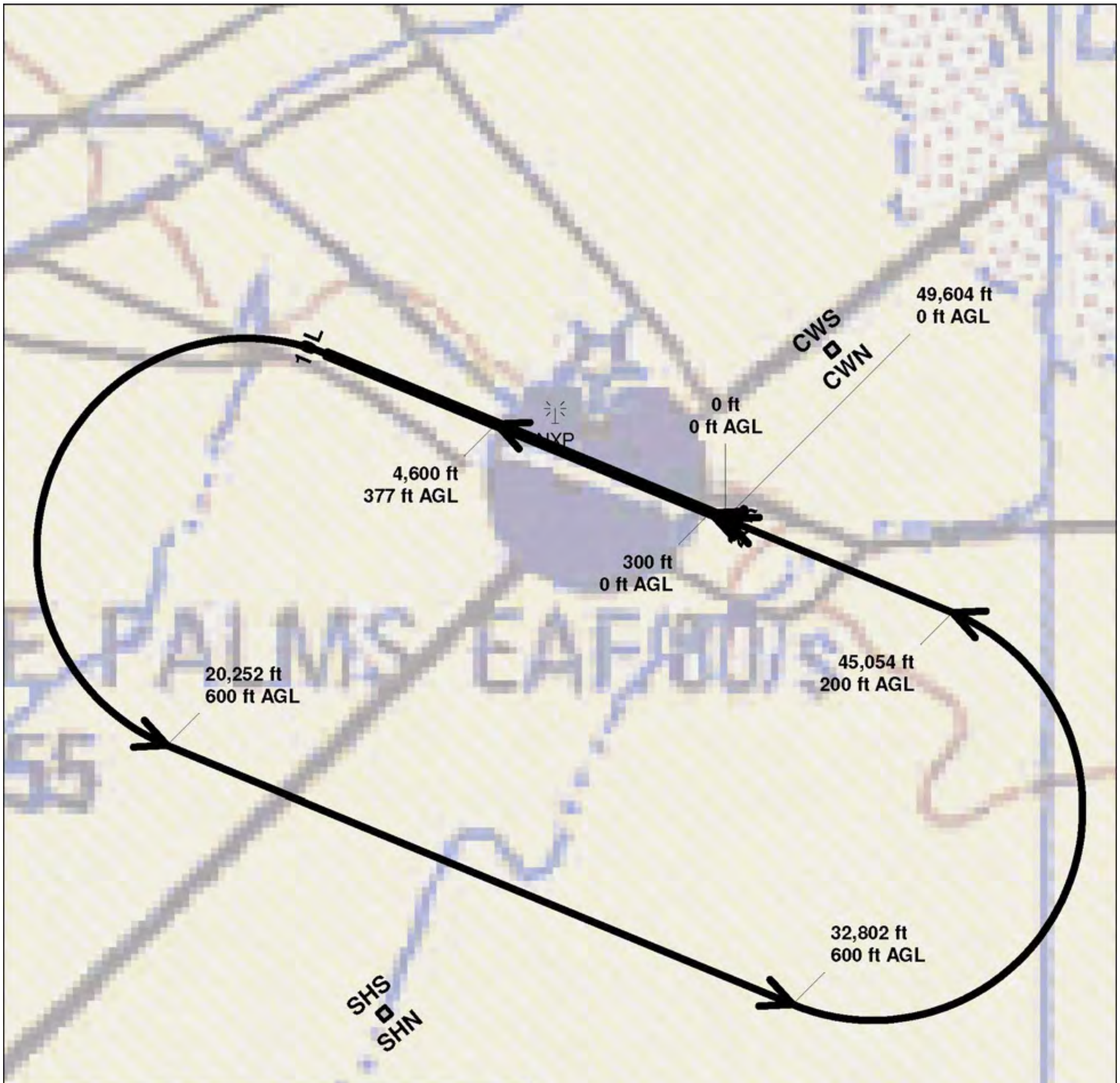
on Runway 10L, Flight Track 10D1

Prior to brake release, aircraft sits at 100 % RPM Takeoff for 15 seconds

0 20,000 40,000 60,000 80,000 100,000 120,000

Scale in Feet 1:413,000 (1 inch = 34,400 feet)

N



Flight Profile 414

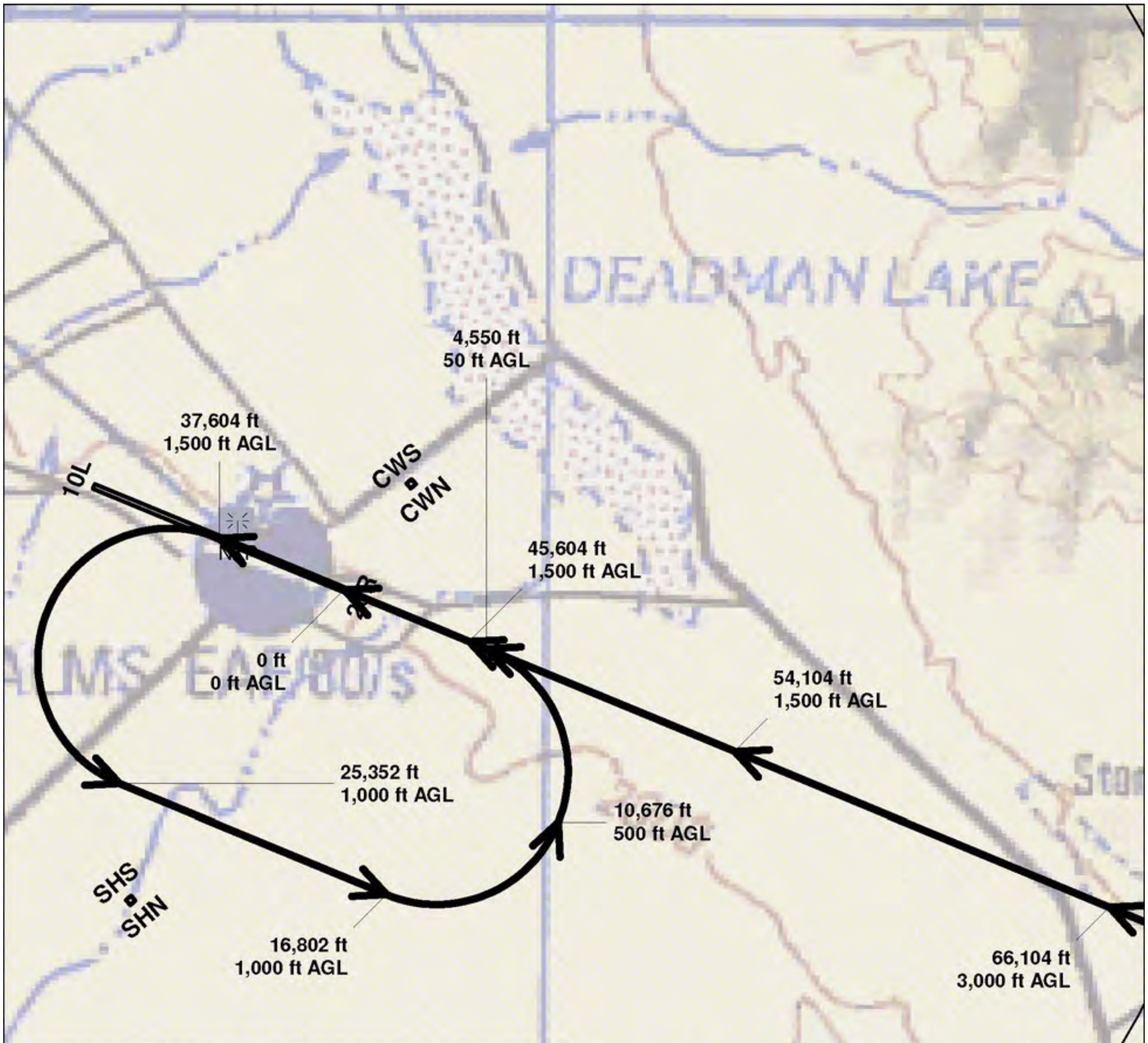
Point	Distance ft	Height ft	Power % RPM	Speed kts
a	0	0 AGL	103 Variable	40
b	300	0 AGL	103 Variable	110
c	4,600	377 AGL	93 Variable	170
d	20,252	600 AGL	75 Variable	170
e	32,802	600 AGL	93 Variable	120
f	45,054	200 AGL	93 Variable	120
g	49,604	0 AGL	93 Variable	40

Flight Profile 414
AV-8B
on Runway 28R, Flight Track 28T1

0 2,000 4,000 6,000 8,000 10,000 12,000

Scale in Feet 1:38,100 (1 inch = 3,170 feet)

N



Flight Profile 412

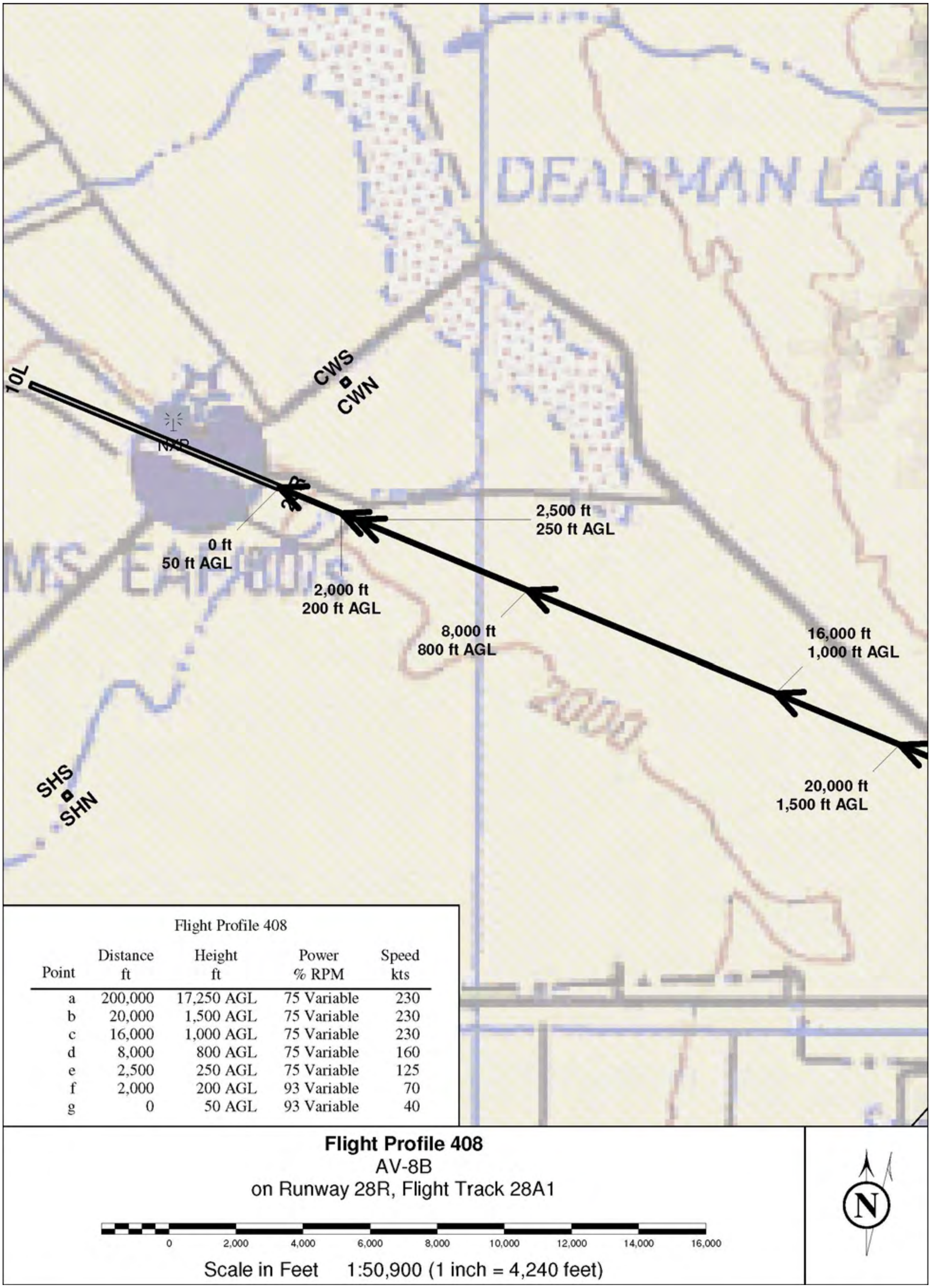
Point	Distance ft	Height ft	Power % RPM	Speed kts
a	300,000	17,250 AGL	75 Variable	230
b	66,104	3,000 AGL	75 Variable	230
c	54,104	1,500 AGL	75 Variable	230
d	45,604	1,500 AGL	75 Variable	230
e	37,604	1,500 AGL	75 Variable	230
f	25,352	1,000 AGL	75 Variable	160
g	16,802	1,000 AGL	93 Variable	125
h	10,676	500 AGL	93 Variable	110
i	4,550	50 AGL	93 Variable	110
j	0	0 AGL	93 Variable	40

Flight Profile 412
AV-8B
on Runway 28R, Flight Track 28O2

0 2,000 4,000 6,000 8,000 10,000 12,000 14,000 16,000 18,000 20,000

Scale in Feet 1:62,300 (1 inch = 5,190 feet)

N



Flight Profile 408

Point	Distance ft	Height ft	Power % RPM	Speed kts
a	200,000	17,250 AGL	75 Variable	230
b	20,000	1,500 AGL	75 Variable	230
c	16,000	1,000 AGL	75 Variable	230
d	8,000	800 AGL	75 Variable	160
e	2,500	250 AGL	75 Variable	125
f	2,000	200 AGL	93 Variable	70
g	0	50 AGL	93 Variable	40

Flight Profile 408
AV-8B
on Runway 28R, Flight Track 28A1

Scale in Feet 1:50,900 (1 inch = 4,240 feet)

Flight Profile 400

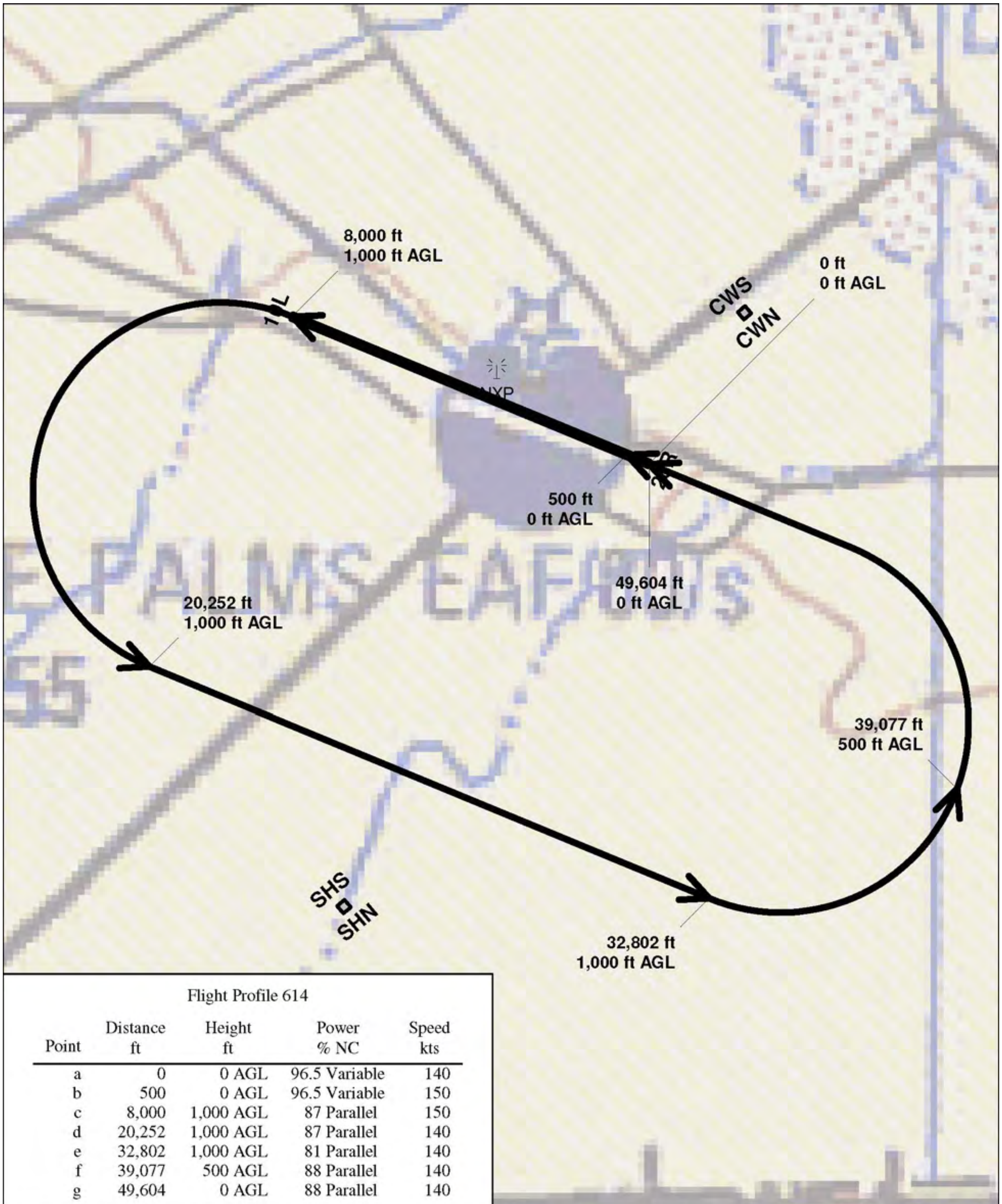
Point	Distance ft	Height ft	Power % RPM	Speed kts
a	0	0 AGL	103 Variable	0
b	3,000	0 AGL	103 Variable	110
c	4,600	100 AGL	93 Variable	110
d	13,700	1,000 AGL	93 Variable	145
e	23,200	1,500 AGL	85 Variable	200
f	42,300	2,500 AGL	85 Variable	300
g	100,000	15,000 AGL	85 Variable	300

Flight Profile 400
AV-8B
on Runway 10L, Flight Track 10D1

0 4,000 8,000 12,000 16,000 20,000

Scale in Feet 1:72,300 (1 inch = 6,030 feet)

N



Flight Profile 614

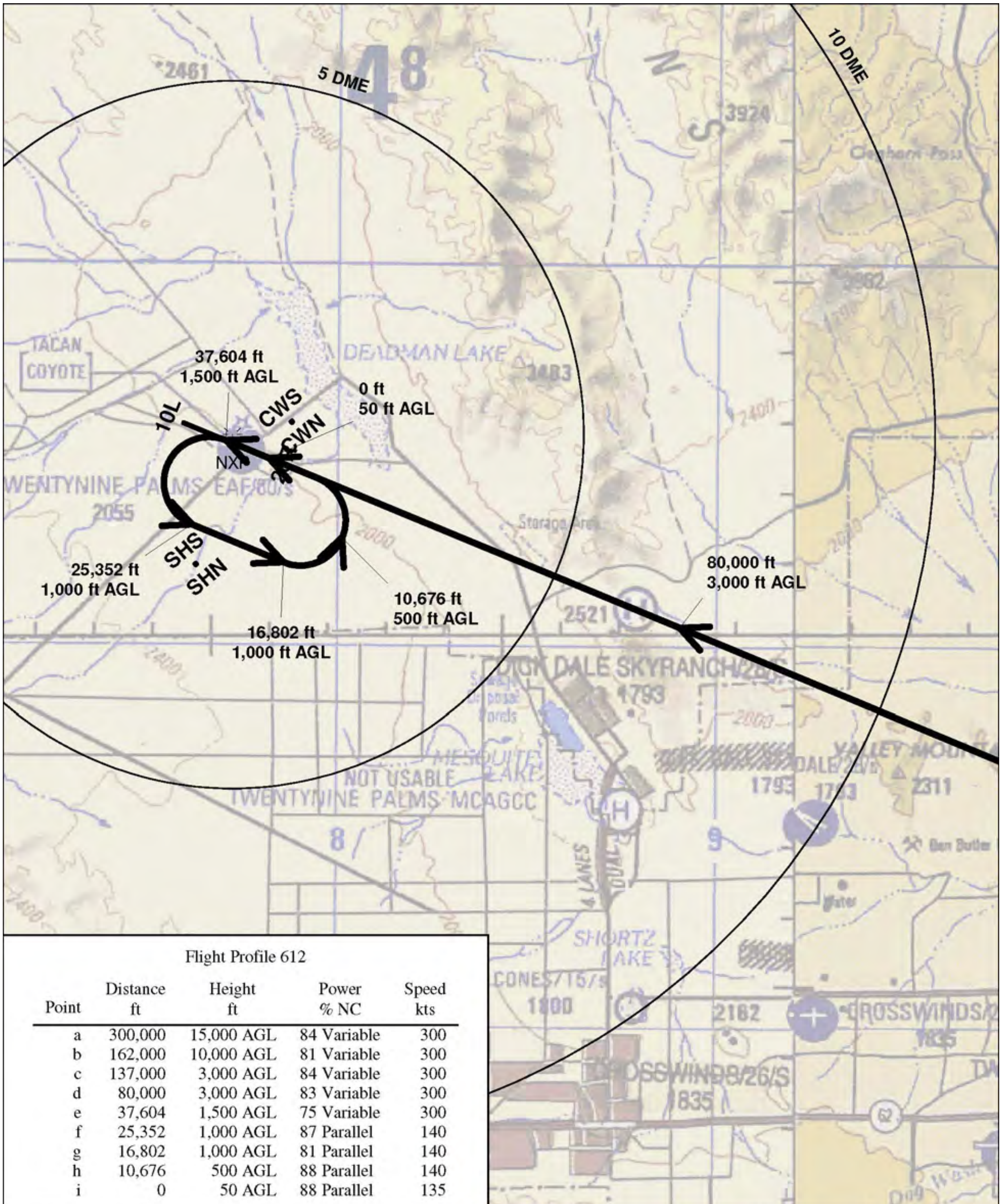
Point	Distance ft	Height ft	Power % NC	Speed kts
a	0	0 AGL	96.5 Variable	140
b	500	0 AGL	96.5 Variable	150
c	8,000	1,000 AGL	87 Parallel	150
d	20,252	1,000 AGL	87 Parallel	140
e	32,802	1,000 AGL	81 Parallel	140
f	39,077	500 AGL	88 Parallel	140
g	49,604	0 AGL	88 Parallel	140

Flight Profile 614 - Touch and Go on Runway 28 (to the south of the Runway)
F-18E/F
on Runway 28R, Flight Track 28T1

0 2,000 4,000 6,000 8,000 10,000 12,000

Scale in Feet 1:38,100 (1 inch = 3,170 feet)

N



Flight Profile 612

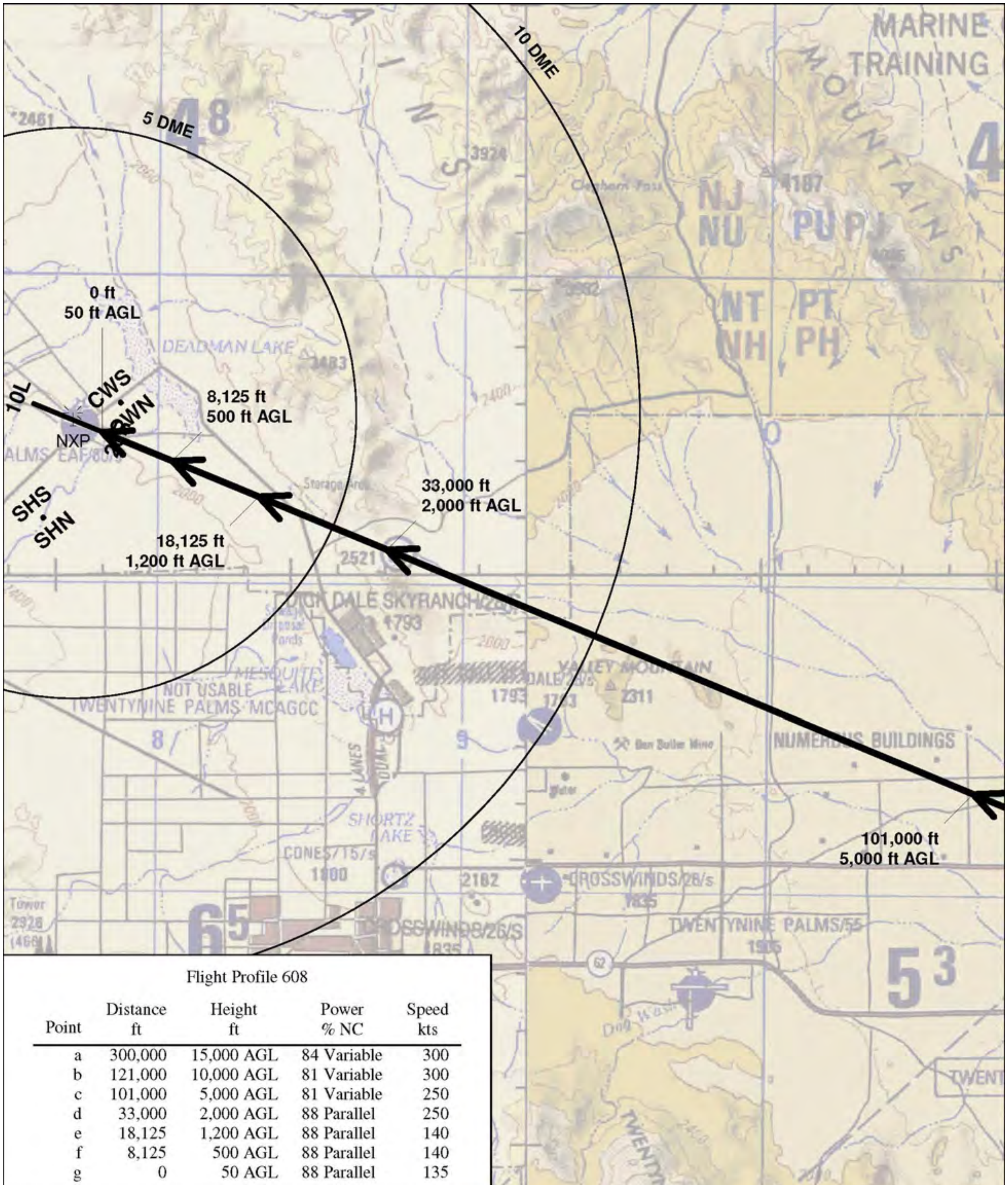
Point	Distance ft	Height ft	Power % NC	Speed kts
a	300,000	15,000 AGL	84 Variable	300
b	162,000	10,000 AGL	81 Variable	300
c	137,000	3,000 AGL	84 Variable	300
d	80,000	3,000 AGL	83 Variable	300
e	37,604	1,500 AGL	75 Variable	300
f	25,352	1,000 AGL	87 Parallel	140
g	16,802	1,000 AGL	81 Parallel	140
h	10,676	500 AGL	88 Parallel	140
i	0	50 AGL	88 Parallel	135

Flight Profile 612 - Overhead Break Arrival Mid Runway (90% of the time)
F-18E/F
on Runway 28R, Flight Track 28O2

0 10,000 20,000 30,000 40,000 50,000

Scale in Feet 1:159,000 (1 inch = 13,200 feet)

N



Flight Profile 608

Point	Distance ft	Height ft	Power % NC	Speed kts
a	300,000	15,000 AGL	84 Variable	300
b	121,000	10,000 AGL	81 Variable	300
c	101,000	5,000 AGL	81 Variable	250
d	33,000	2,000 AGL	88 Parallel	250
e	18,125	1,200 AGL	88 Parallel	140
f	8,125	500 AGL	88 Parallel	140
g	0	50 AGL	88 Parallel	135

Flight Profile 608 - Straight-In Arrival from SE - Lake Bandini Sewage Disposal Ponds

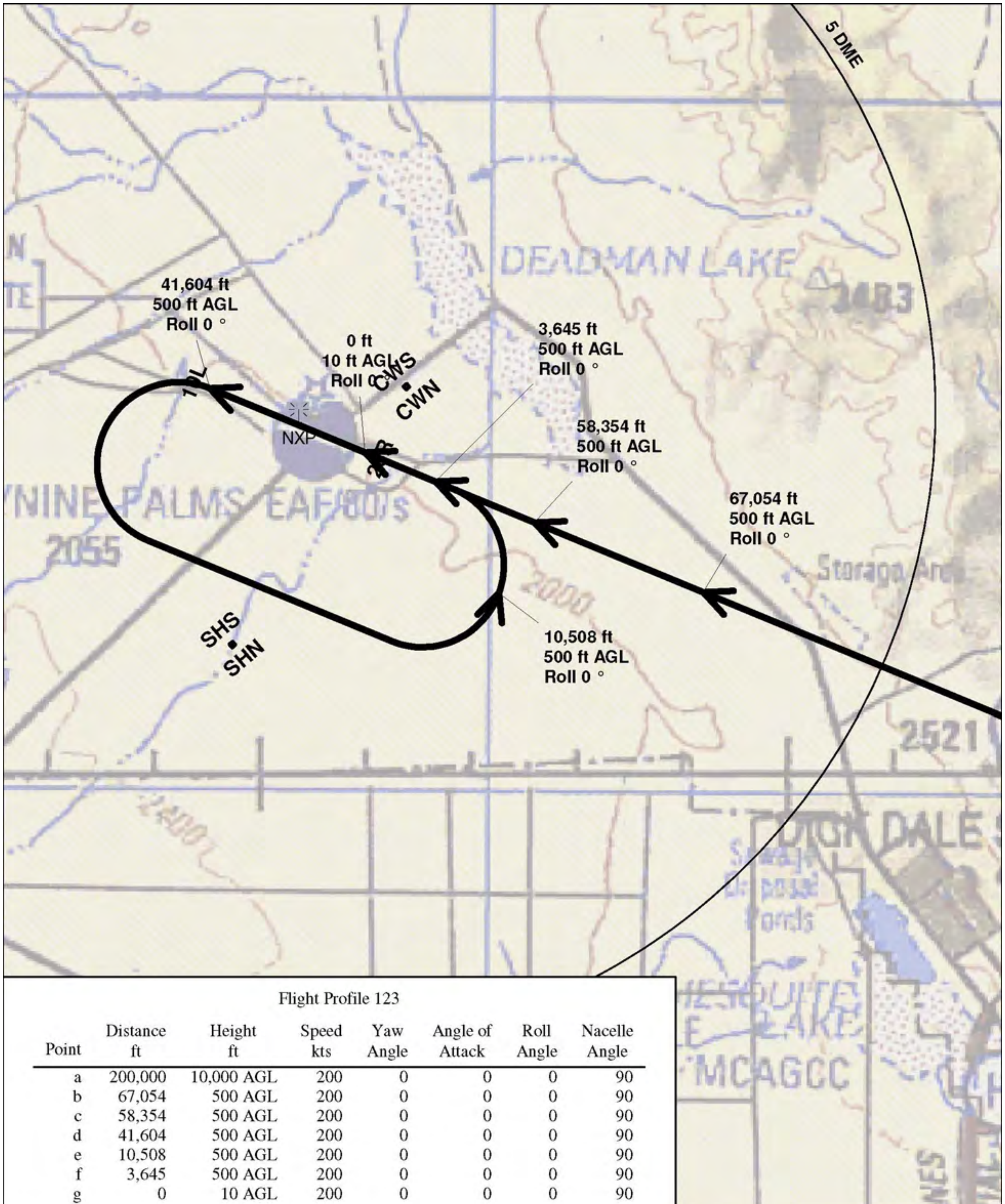
F-18E/F

on Runway 28R, Flight Track 28A1

0 10,000 20,000 30,000 40,000 50,000 60,000

Scale in Feet 1:198,000 (1 inch = 16,500 feet)

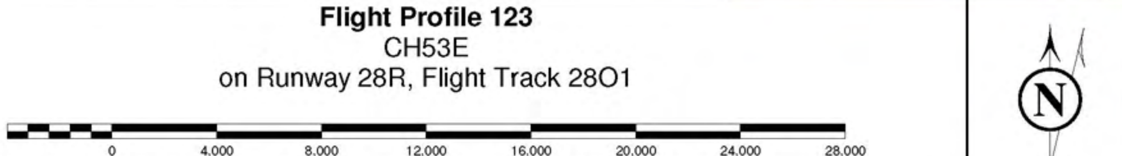
N



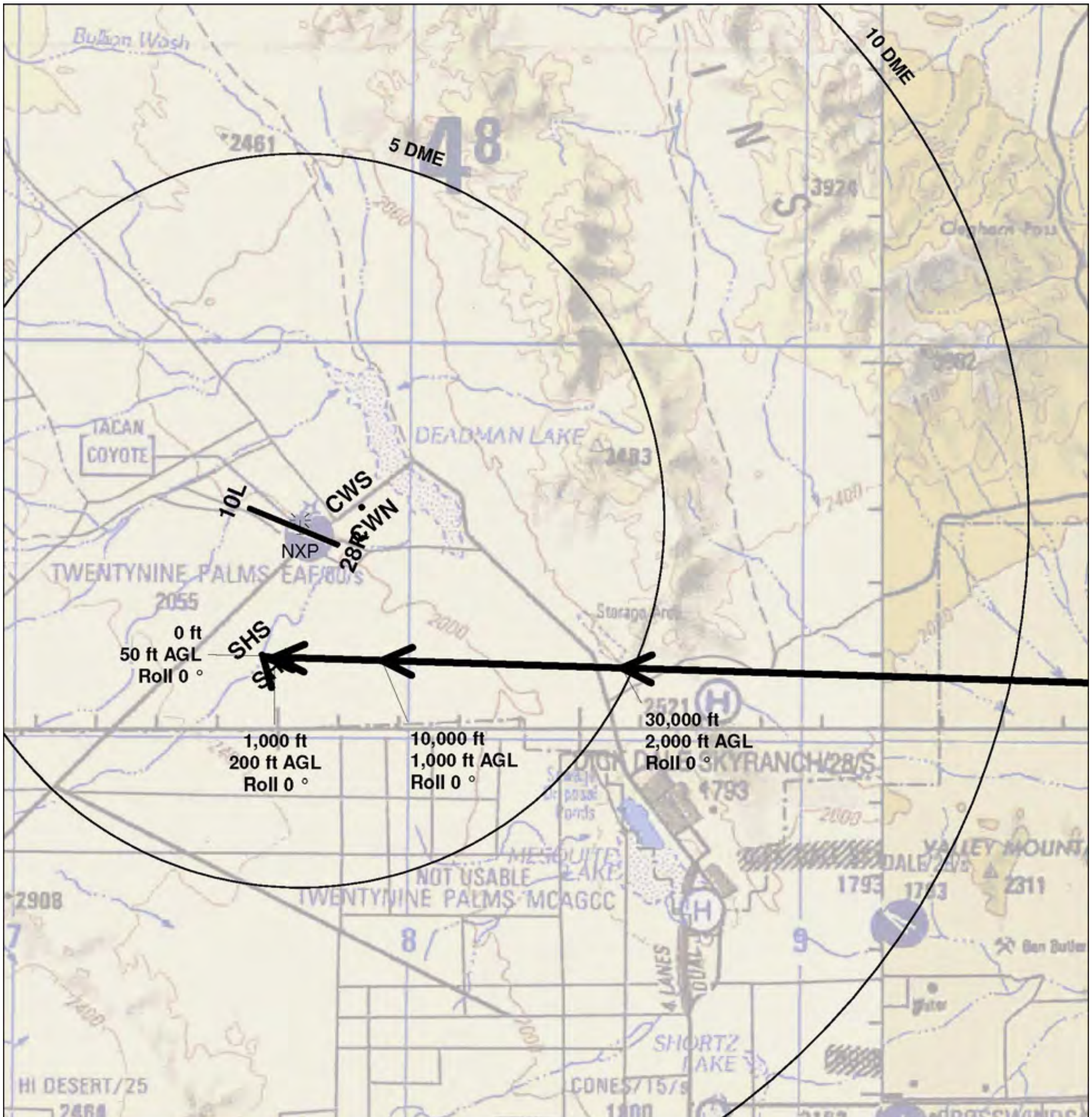
Flight Profile 123

Point	Distance ft	Height ft	Speed kts	Yaw Angle	Angle of Attack	Roll Angle	Nacelle Angle
a	200,000	10,000 AGL	200	0	0	0	90
b	67,054	500 AGL	200	0	0	0	90
c	58,354	500 AGL	200	0	0	0	90
d	41,604	500 AGL	200	0	0	0	90
e	10,508	500 AGL	200	0	0	0	90
f	3,645	500 AGL	200	0	0	0	90
g	0	10 AGL	200	0	0	0	90

Flight Profile 123
CH53E
on Runway 28R, Flight Track 28O1



Scale in Feet 1:87,900 (1 inch = 7,330 feet)



Flight Profile 120

Point	Distance ft	Height ft	Speed kts	Yaw Angle	Angle of Attack	Roll Angle	Nacelle Angle
a	30,000	2,000 AGL	150	0	0	0	90
b	10,000	1,000 AGL	80	0	5	0	90
c	1,000	200 AGL	60	0	5	0	90
d	0	50 AGL	0	0	0	0	90

Flight Profile 120
CH53E
on Runway SHN, Flight Track SA1

0 10,000 20,000 30,000 40,000 50,000

Scale in Feet 1:167,000 (1 inch = 13,900 feet)

N

Flight Profile 114

Point	Distance ft	Height ft	Speed kts	Yaw Angle	Angle of Attack	Roll Angle	Nacelle Angle
a	30,000	2,000 AGL	150	0	0	0	90
b	10,000	1,000 AGL	80	0	0	0	90
c	8,385	856 AGL	76	0	5	25	90
d	4,595	520 AGL	68	0	5	0	90
e	1,000	100 AGL	60	0	5	0	90
f	0	50 AGL	0	0	0	0	90

Flight Profile 114
CH53E
on Runway 28R, Flight Track 28A2

0 4,000 8,000 12,000 16,000 20,000 24,000 28,000 32,000 36,000 40,000 44,000

Scale in Feet 1:127,000 (1 inch = 10,500 feet)

Flight Profile 108

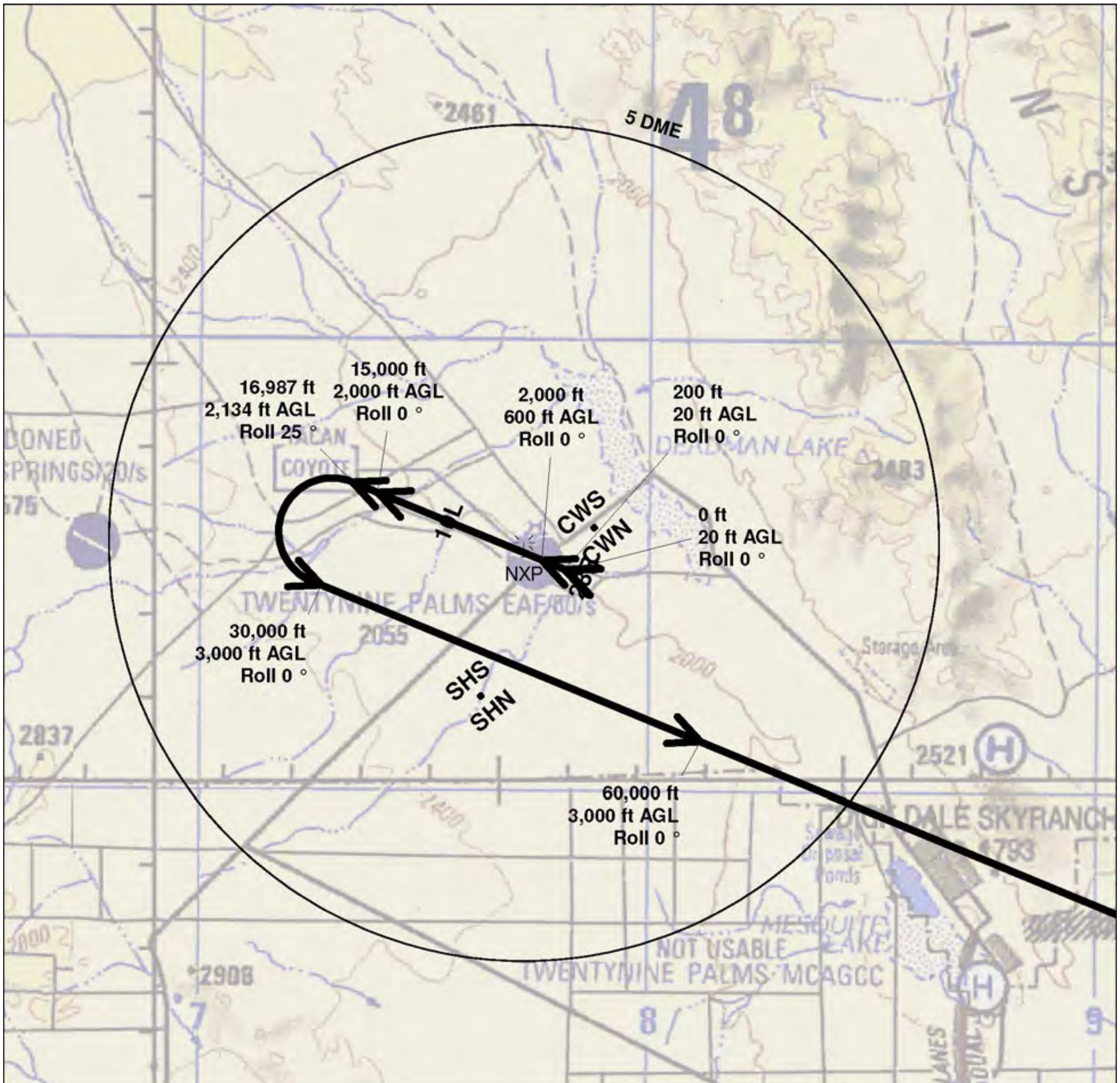
Point	Distance ft	Height ft	Speed kts	Yaw Angle	Angle of Attack	Roll Angle	Nacelle Angle	Notes
a	0	20 AGL	200	0	0	0	90	altitude changed from 0 to 20 ft AGL
b	200	20 AGL	20	0	-5	0	90	
c	2,000	600 AGL	105	0	-5	0	90	
d	15,000	2,000 AGL	120	0	0	0	90	
e	19,947	2,330 AGL	120	0	0	15	90	
f	25,360	2,691 AGL	120	0	0	0	90	
g	30,000	3,000 AGL	120	0	0	0	90	
h	60,145	5,000 AGL	120	0	0	0	90	

Flight Profile 108
CH53E
on Runway CWN, Flight Track WD1

0 4,000 8,000 12,000 16,000 20,000 24,000 28,000 32,000 36,000 40,000 44,000

Scale in Feet 1:134,000 (1 inch = 11,100 feet)

N



Flight Profile 105

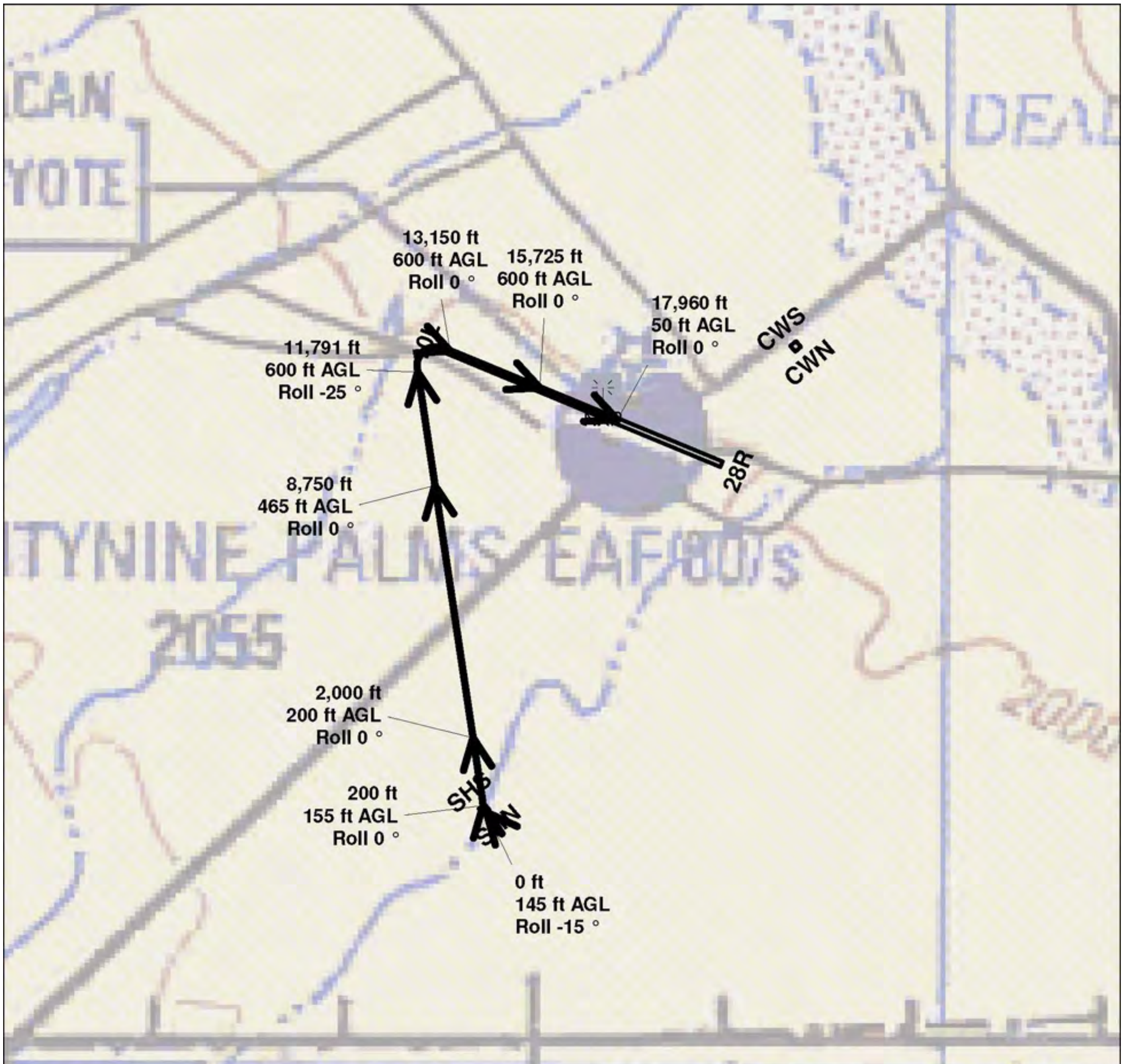
Point	Distance ft	Height ft	Speed kts	Yaw Angle	Angle of Attack	Roll Angle	Nacelle Angle	Notes
a	0	20 AGL	200	0	0	0	90	altitude changed from 0 to 20 ft AGL
b	200	20 AGL	20	0	-5	0	90	
c	2,000	600 AGL	105	0	-5	0	90	
d	15,000	2,000 AGL	120	0	0	0	90	
e	16,987	2,134 AGL	120	0	0	25	90	
f	30,000	3,000 AGL	120	0	0	0	90	
g	60,000	3,000 AGL	120	0	0	0	90	

Flight Profile 105
CH53E
on Runway 28R, Flight Track 28D1

0 4,000 8,000 12,000 16,000 20,000 24,000 28,000 32,000 36,000 40,000 44,000 48,000 52,000

Scale in Feet 1:150,000 (1 inch = 12,500 feet)

N

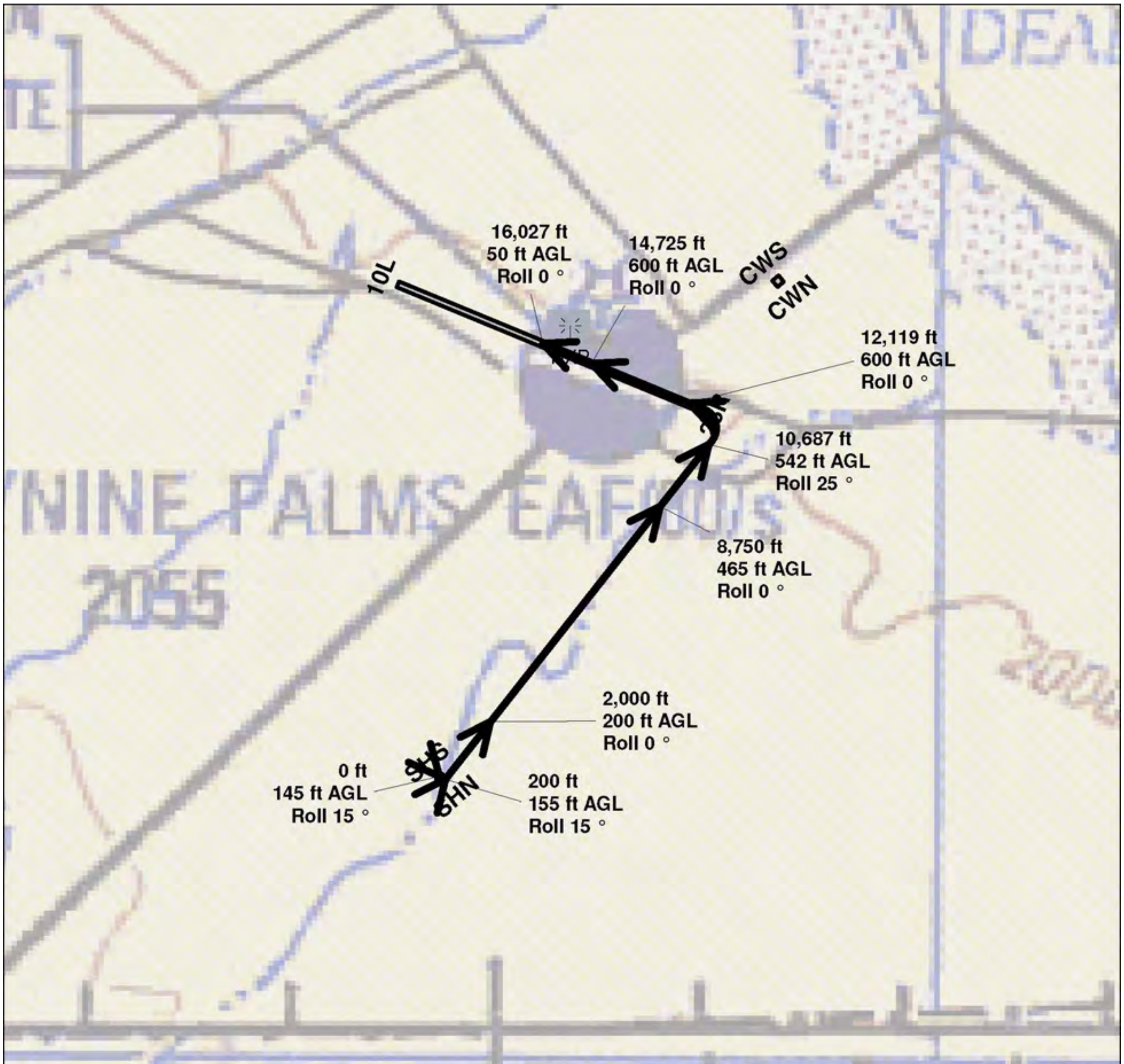


Flight Profile 228

Point	Distance ft	Height ft	Speed kts	Yaw Angle	Angle of Attack	Roll Angle	Nacelle Angle
a	0	145 AGL	0	0	0	-15	90
b	200	155 AGL	20	0	-5	0	90
c	2,000	200 AGL	70	0	0	0	90
d	8,750	465 AGL	70	0	0	0	90
e	11,791	600 AGL	70	0	0	-25	90
f	13,150	600 AGL	63	0	0	0	90
g	15,725	600 AGL	60	0	5	0	90
h	17,960	50 AGL	0	0	0	0	90

Flight Profile 228
CH46E
on Runway SHN, Flight Track SI2

Scale in Feet 1:54,900 (1 inch = 4,570 feet)

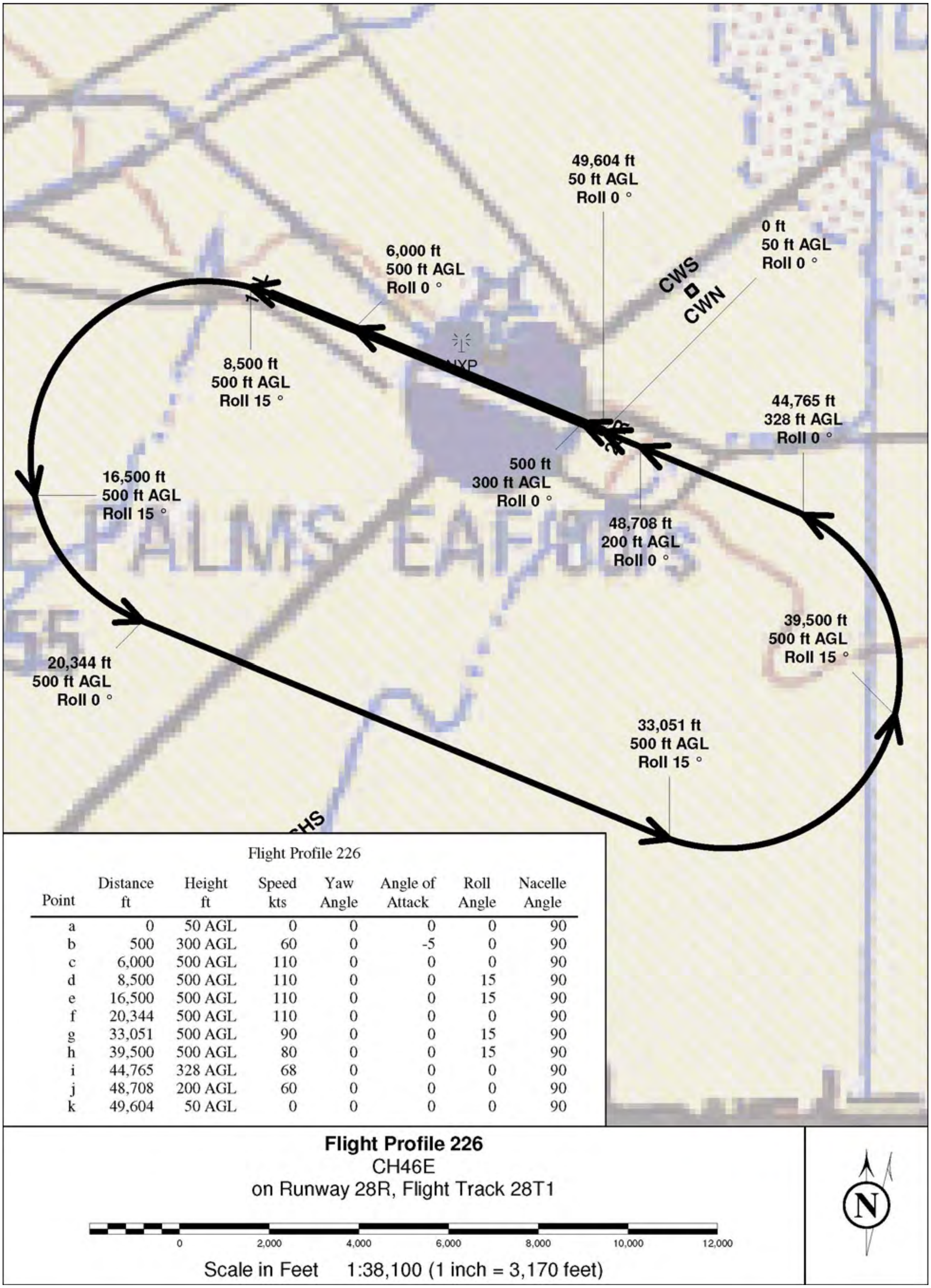


Flight Profile 227

Point	Distance ft	Height ft	Speed kts	Yaw Angle	Angle of Attack	Roll Angle	Nacelle Angle
a	0	145 AGL	0	0	0	15	90
b	200	155 AGL	20	0	-5	15	90
c	2,000	200 AGL	70	0	0	0	90
d	8,750	465 AGL	70	0	0	0	90
e	10,687	542 AGL	70	0	0	25	90
f	12,119	600 AGL	70	0	0	0	90
g	14,725	600 AGL	60	0	5	0	90
h	16,027	50 AGL	0	0	0	0	90

Flight Profile 227
CH46E
on Runway SHS, Flight Track SI1

Scale in Feet 1:50,900 (1 inch = 4,240 feet)

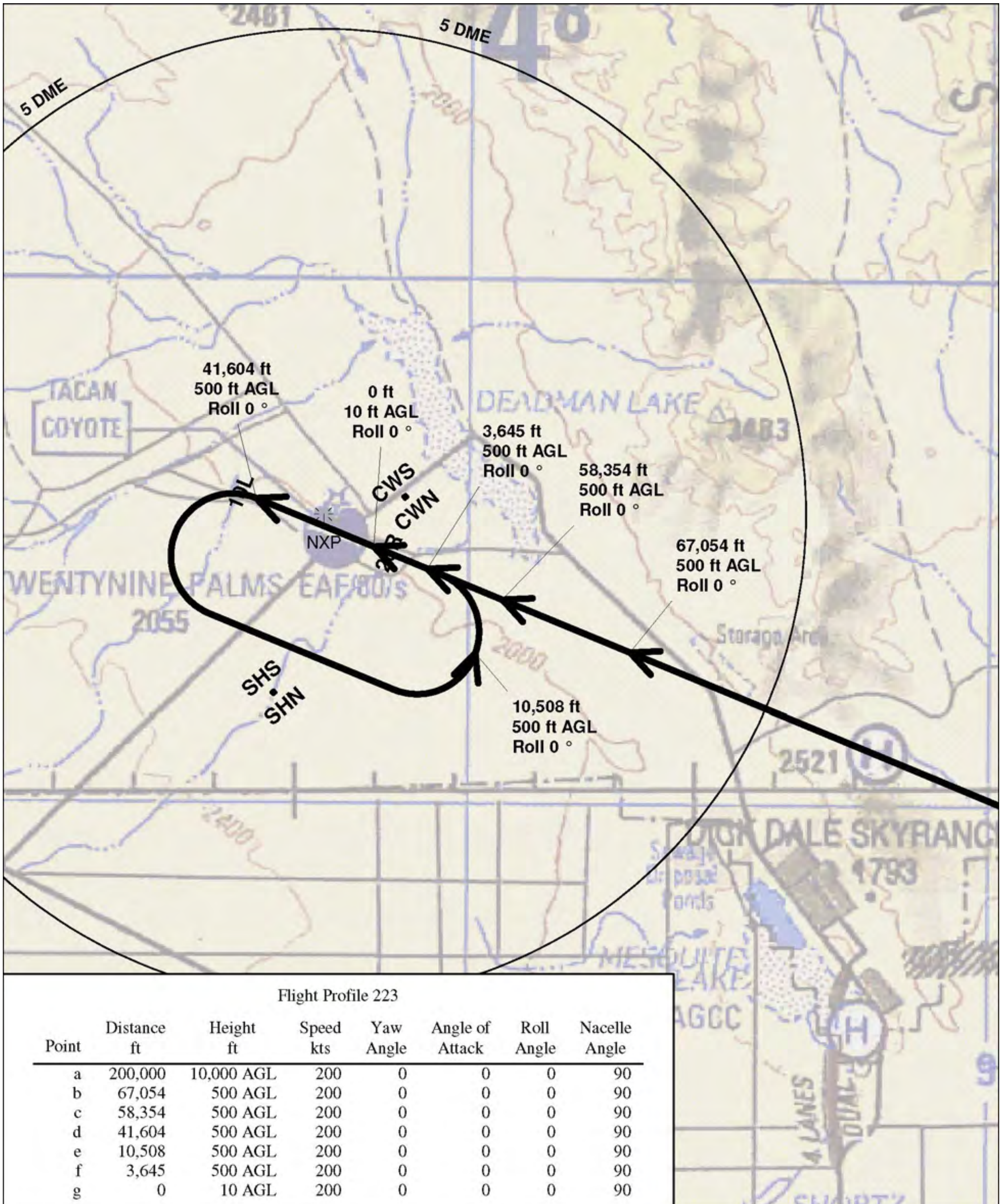


Flight Profile 226

Point	Distance ft	Height ft	Speed kts	Yaw Angle	Angle of Attack	Roll Angle	Nacelle Angle
a	0	50 AGL	0	0	0	0	90
b	500	300 AGL	60	0	-5	0	90
c	6,000	500 AGL	110	0	0	0	90
d	8,500	500 AGL	110	0	0	15	90
e	16,500	500 AGL	110	0	0	15	90
f	20,344	500 AGL	110	0	0	0	90
g	33,051	500 AGL	90	0	0	15	90
h	39,500	500 AGL	80	0	0	15	90
i	44,765	328 AGL	68	0	0	0	90
j	48,708	200 AGL	60	0	0	0	90
k	49,604	50 AGL	0	0	0	0	90

Flight Profile 226
CH46E
on Runway 28R, Flight Track 28T1

Scale in Feet 1:38,100 (1 inch = 3,170 feet)



Flight Profile 223

Point	Distance ft	Height ft	Speed kts	Yaw Angle	Angle of Attack	Roll Angle	Nacelle Angle
a	200,000	10,000 AGL	200	0	0	0	90
b	67,054	500 AGL	200	0	0	0	90
c	58,354	500 AGL	200	0	0	0	90
d	41,604	500 AGL	200	0	0	0	90
e	10,508	500 AGL	200	0	0	0	90
f	3,645	500 AGL	200	0	0	0	90
g	0	10 AGL	200	0	0	0	90

Flight Profile 223
CH46E
on Runway 28R, Flight Track 28O1

Scale in Feet 1:116,000 (1 inch = 9,640 feet)

Flight Profile 220

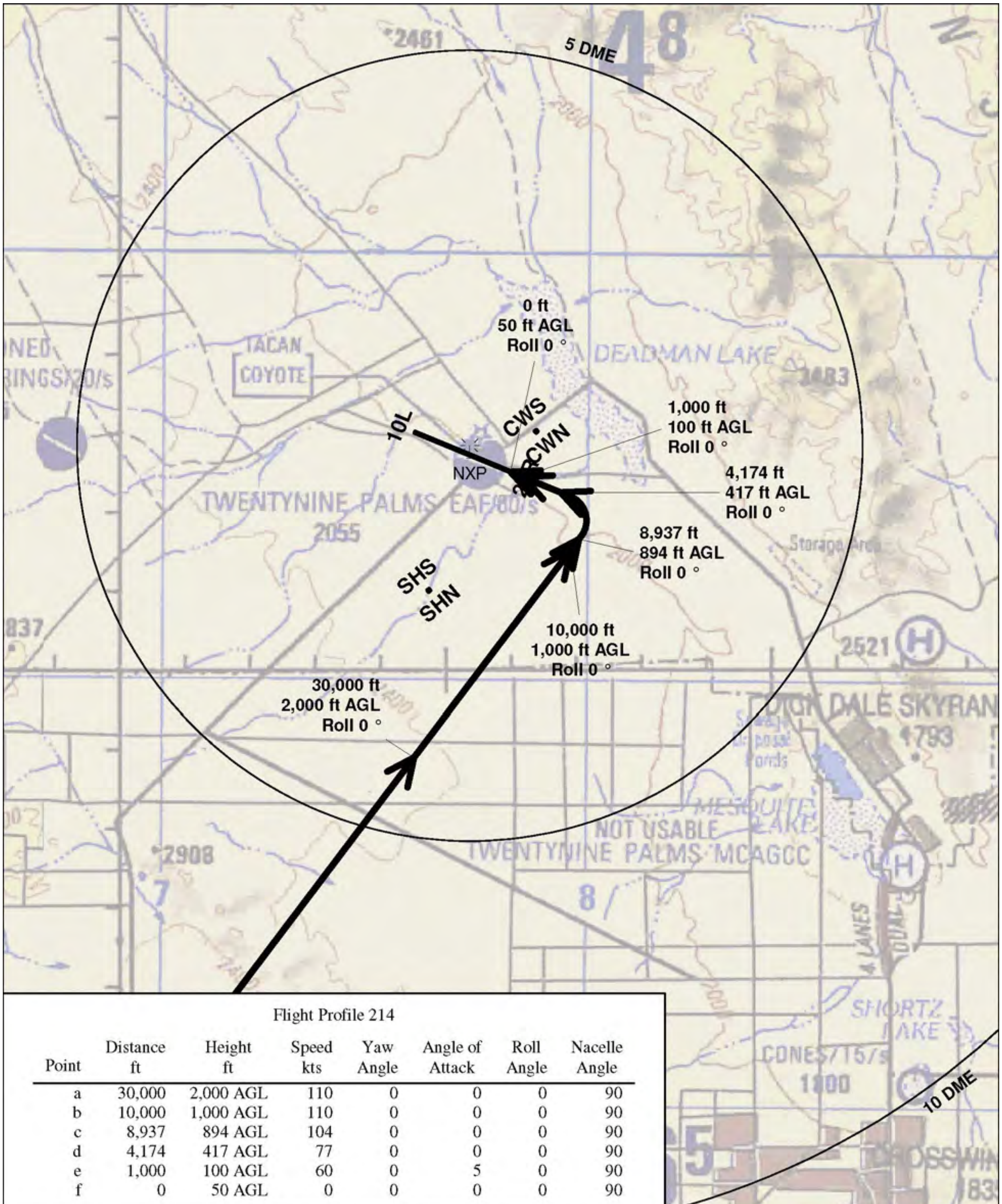
Point	Distance ft	Height ft	Speed kts	Yaw Angle	Angle of Attack	Roll Angle	Nacelle Angle
a	30,000	2,000 AGL	110	0	0	0	90
b	10,000	1,000 AGL	110	0	0	0	90
c	1,000	200 AGL	60	0	5	0	90
d	0	50 AGL	0	0	0	0	90

Flight Profile 220
CH46E
on Runway SHN, Flight Track SA1

0 4,000 8,000 12,000 16,000 20,000 24,000 28,000 32,000

Scale in Feet 1:100,000 (1 inch = 8,340 feet)

N



Flight Profile 214

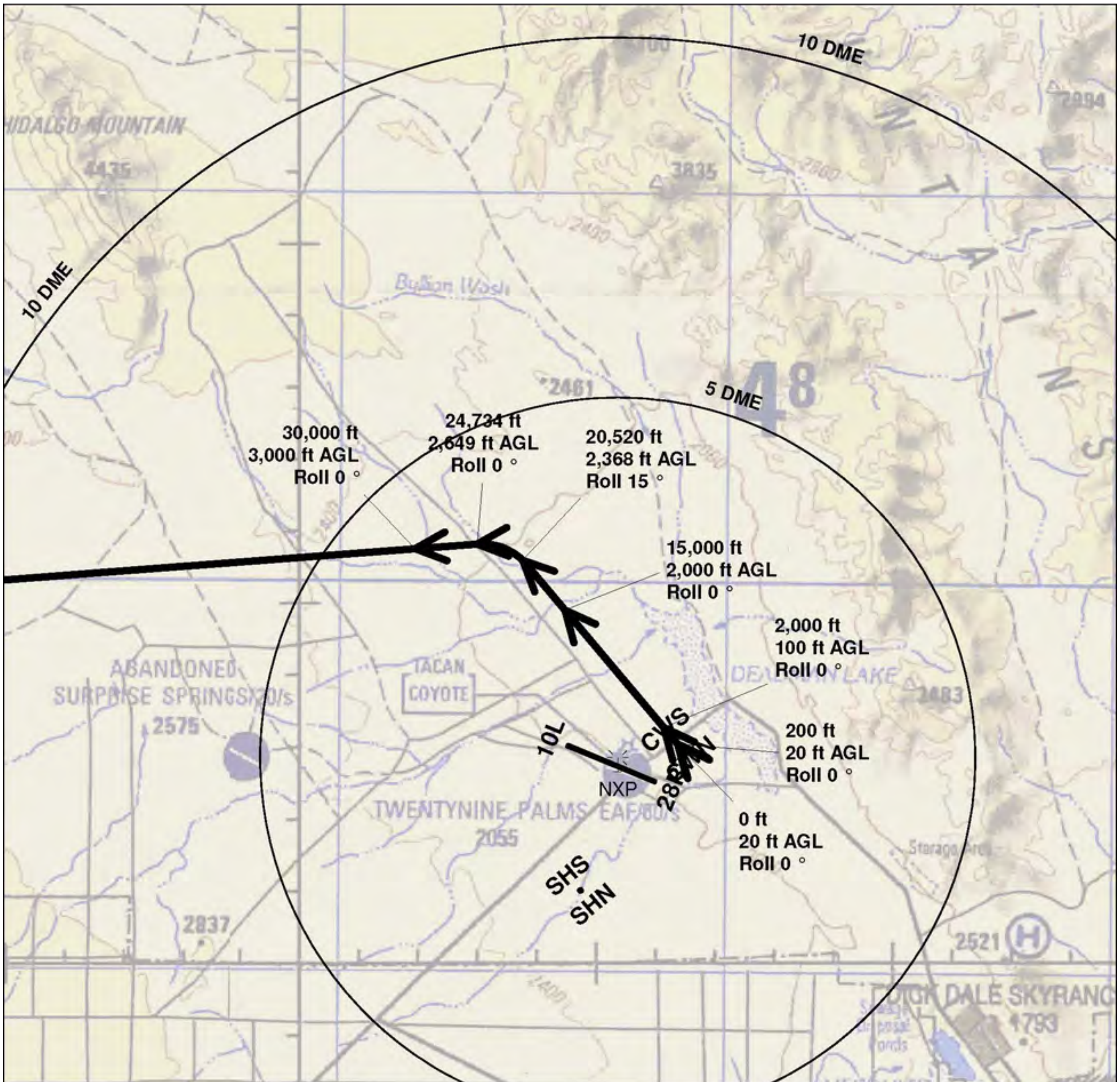
Point	Distance ft	Height ft	Speed kts	Yaw Angle	Angle of Attack	Roll Angle	Nacelle Angle
a	30,000	2,000 AGL	110	0	0	0	90
b	10,000	1,000 AGL	110	0	0	0	90
c	8,937	894 AGL	104	0	0	0	90
d	4,174	417 AGL	77	0	0	0	90
e	1,000	100 AGL	60	0	5	0	90
f	0	50 AGL	0	0	0	0	90

Flight Profile 214
CH46E
on Runway 28R, Flight Track 28A2

0 4,000 8,000 12,000 16,000 20,000 24,000 28,000 32,000 36,000 40,000 44,000 48,000

Scale in Feet 1:142,000 (1 inch = 11,800 feet)

N

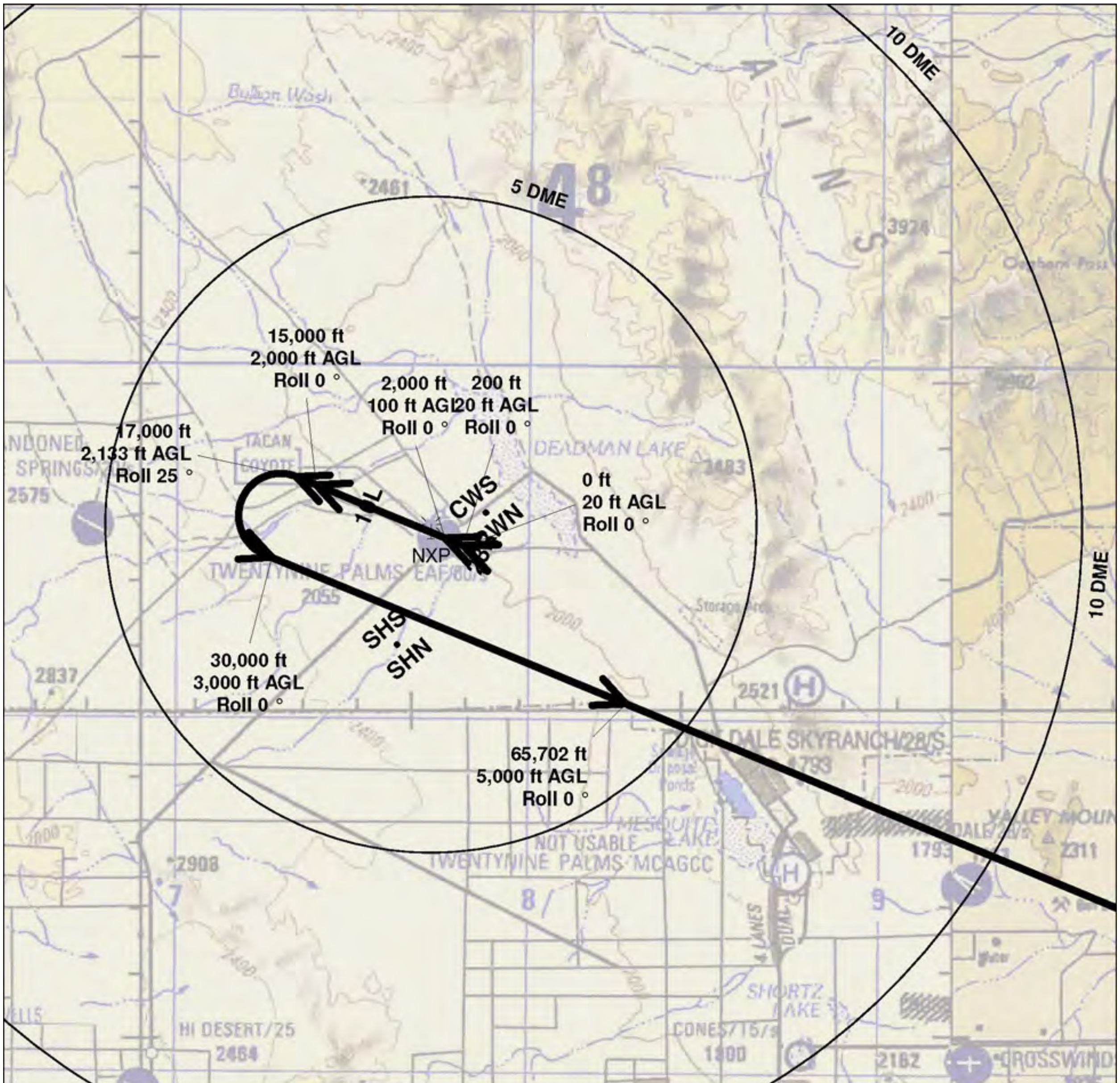


Point	Distance ft	Height ft	Speed kts	Yaw Angle	Angle of Attack	Roll Angle	Nacelle Angle	Notes
a	0	20 AGL	0	0	0	0	90	altitude changed from 0 to 20 ft AGL
b	200	20 AGL	20	0	-5	0	90	
c	2,000	100 AGL	105	0	-5	0	90	
d	15,000	2,000 AGL	110	0	0	0	90	
e	20,520	2,368 AGL	110	0	0	15	90	
f	24,734	2,649 AGL	110	0	0	0	90	
g	30,000	3,000 AGL	110	0	0	0	90	

Flight Profile 208

Flight Profile 208
CH46E
on Runway CWN, Flight Track WD1

Scale in Feet 1:174,000 (1 inch = 14,500 feet)



Flight Profile 205

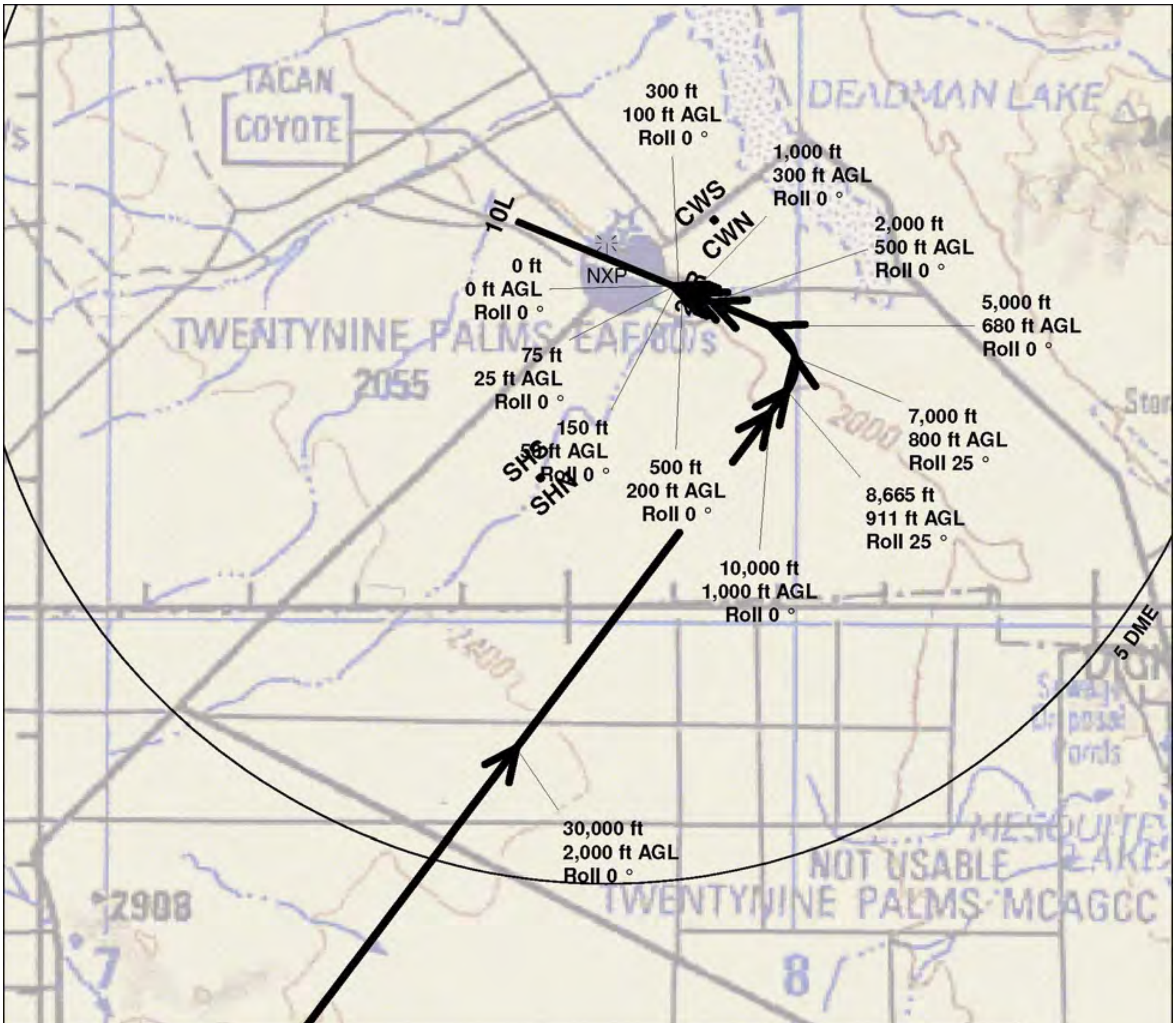
Point	Distance ft	Height ft	Speed kts	Yaw Angle	Angle of Attack	Roll Angle	Nacelle Angle	Notes
a	0	20 AGL	0	0	0	0	90	altitude changed from 0 to 20 ft AGL
b	200	20 AGL	20	0	-5	0	90	
c	2,000	100 AGL	105	0	-5	0	90	
d	15,000	2,000 AGL	110	0	0	0	90	
e	17,000	2,133 AGL	110	0	0	25	90	
f	30,000	3,000 AGL	110	0	0	0	90	
g	65,702	5,000 AGL	110	0	0	0	90	

Flight Profile 205
CH46E
on Runway 28R, Flight Track 28D1

0 10,000 20,000 30,000 40,000 50,000 60,000

Scale in Feet 1:192,000 (1 inch = 16,000 feet)

N



Flight Profile 1014

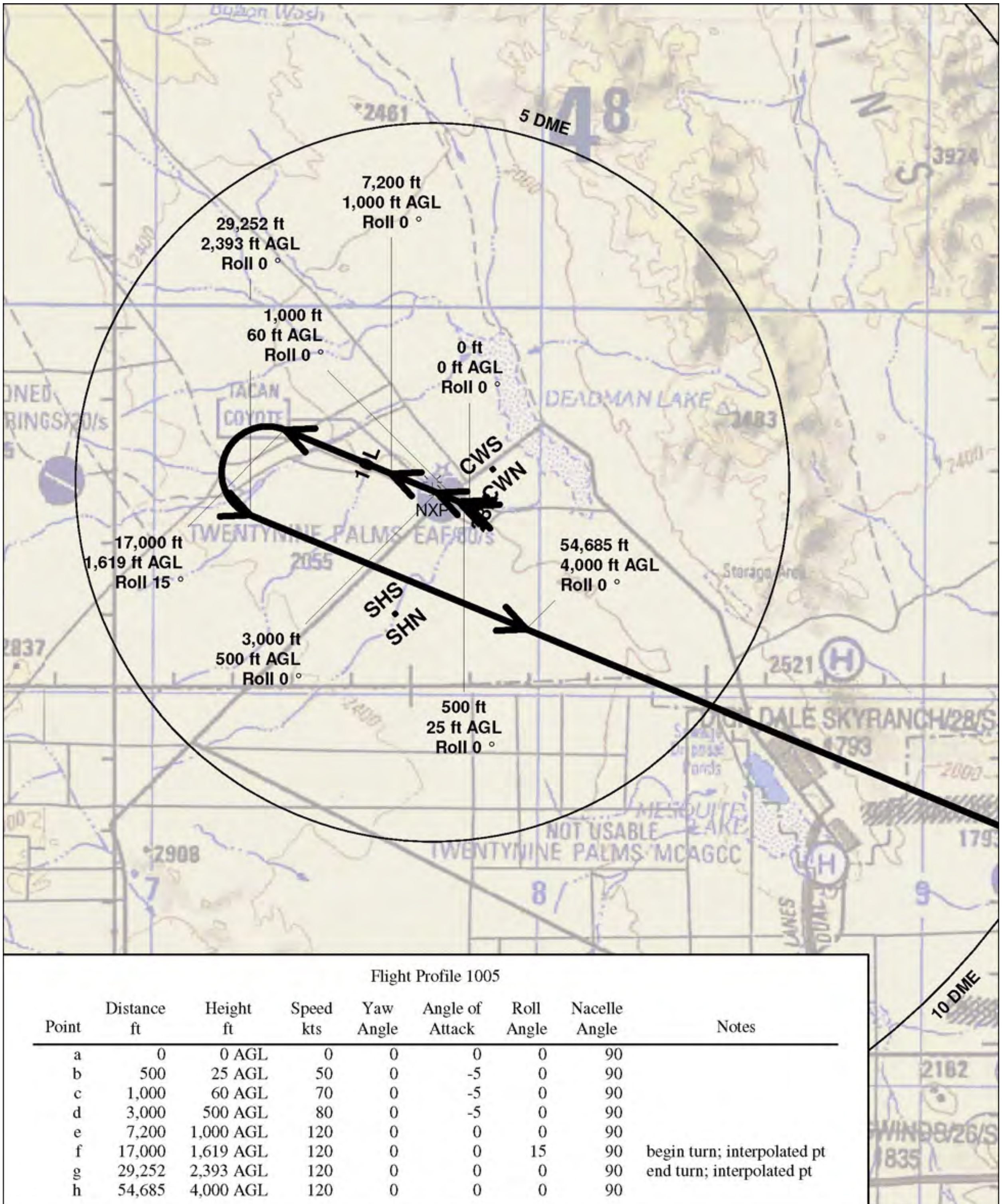
Point	Distance ft	Height ft	Speed kts	Yaw Angle	Angle of Attack	Roll Angle	Nacelle Angle	Notes
a	30,000	2,000 AGL	100	0	-2	0	90	
b	10,000	1,000 AGL	100	0	-2	0	90	
c	8,665	911 AGL	100	0	-2	25	90	begin turn; interpolated pt
d	7,000	800 AGL	100	0	-2	25	90	
e	5,000	680 AGL	92	0	-2	0	90	end turn; interpolated pt
f	2,000	500 AGL	80	0	-1	0	90	
g	1,000	300 AGL	70	0	0	0	90	
h	500	200 AGL	60	0	0	0	90	
i	300	100 AGL	40	0	0	0	90	
j	150	50 AGL	20	0	2	0	90	
k	75	25 AGL	10	0	0	0	90	
l	0	0 AGL	0	0	0	0	90	

Flight Profile 1014
AH-1W
on Runway 28R, Flight Track 28A2

0 4,000 8,000 12,000 16,000 20,000 24,000 28,000 32,000

Scale in Feet 1:103,000 (1 inch = 8,580 feet)

N



Flight Profile 1005

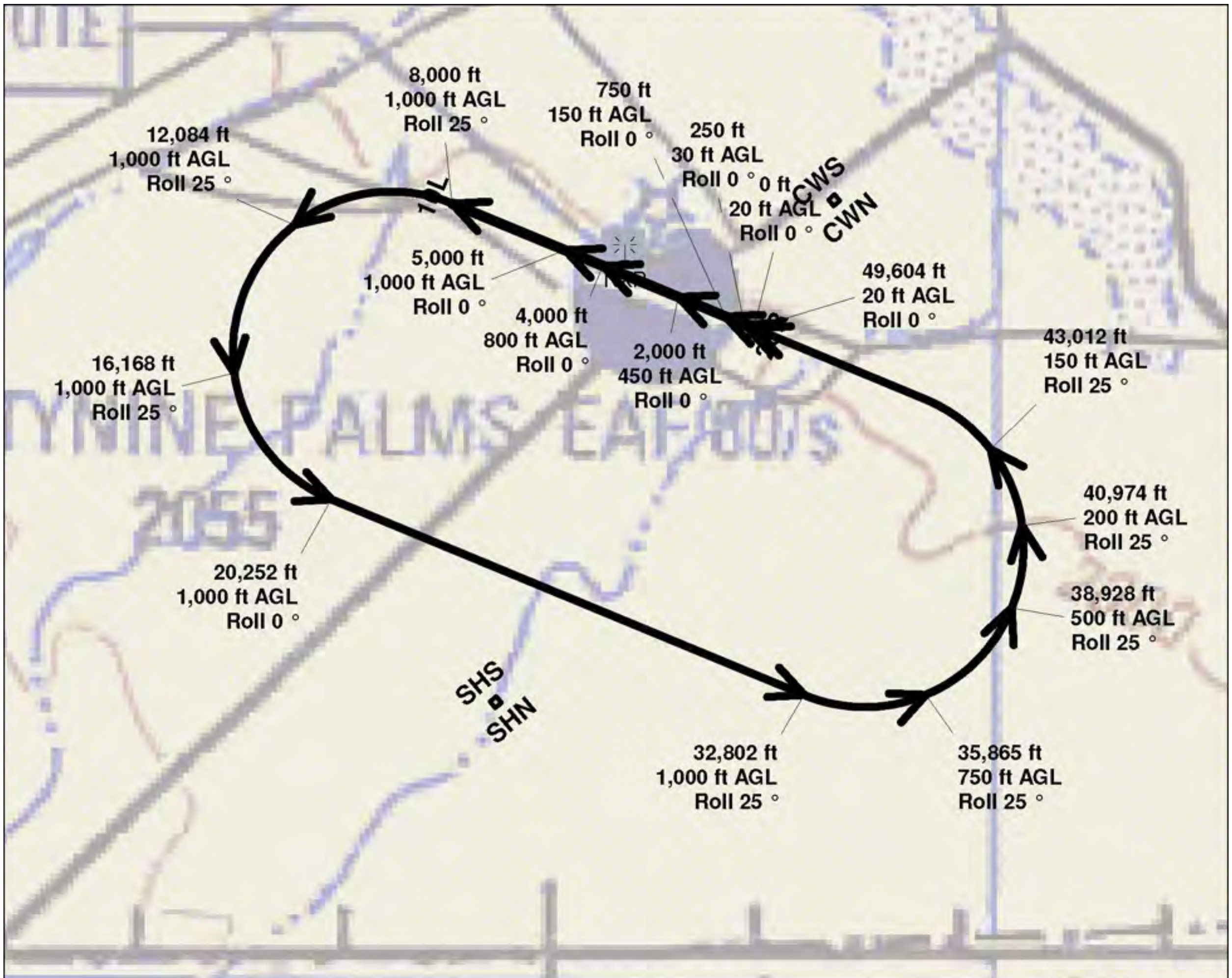
Point	Distance ft	Height ft	Speed kts	Yaw Angle	Angle of Attack	Roll Angle	Nacelle Angle	Notes
a	0	0 AGL	0	0	0	0	90	
b	500	25 AGL	50	0	-5	0	90	
c	1,000	60 AGL	70	0	-5	0	90	
d	3,000	500 AGL	80	0	-5	0	90	
e	7,200	1,000 AGL	120	0	0	0	90	
f	17,000	1,619 AGL	120	0	0	15	90	begin turn; interpolated pt
g	29,252	2,393 AGL	120	0	0	0	90	end turn; interpolated pt
h	54,685	4,000 AGL	120	0	0	0	90	

Flight Profile 1005
AH-1W
on Runway 28R, Flight Track 28D1

0 10,000 20,000 30,000 40,000 50,000

Scale in Feet 1:156,000 (1 inch = 13,000 feet)

N



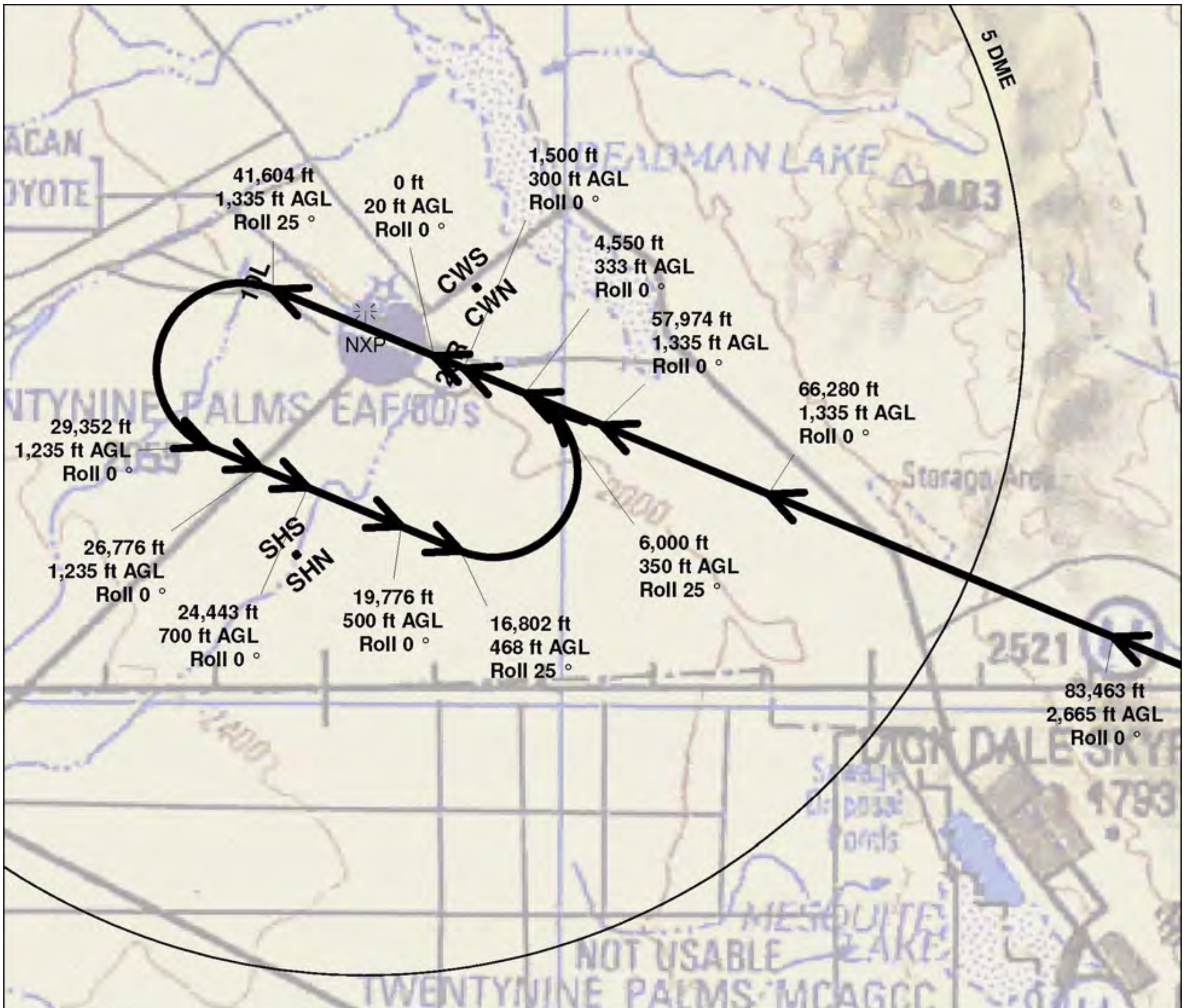
Flight Profile 526

Point	Distance ft	Height ft	Speed kts	Yaw Angle	Angle of Attack	Roll Angle	Nacelle Angle	Notes
a	0	20 AGL	5	0	0	0	60	5 kt start
b	250	30 AGL	45	0	-6	0	60	
c	750	150 AGL	65	0	0	0	60	
d	2,000	450 AGL	110	0	3	0	30	
e	4,000	800 AGL	135	0	10	0	0	
f	5,000	1,000 AGL	145	0	0	0	0	
g	8,000	1,000 AGL	170	0	7	25	0	begin turn to downwind
h	12,084	1,000 AGL	150	0	7	25	0	MOVE TO 1/3 turn
i	16,168	1,000 AGL	170	0	7	25	0	MOVE TO 2/3 turn
j	20,252	1,000 AGL	170	0	7	0	0	begin downwind
k	32,802	1,000 AGL	170	0	3	25	0	end downwind
l	35,865	750 AGL	140	0	3	25	0	1/4 thru turn
m	38,928	500 AGL	110	0	0	25	60	1/2 thru turn
n	40,974	200 AGL	60	0	0	25	87	2/3 thru turn
o	43,012	150 AGL	50	0	0	25	90	5/6 thru turn
p	49,604	20 AGL	5	0	0	0	90	

Flight Profile 526
MV22B
on Runway 28R, Flight Track 28T1

0 2,000 4,000 6,000 8,000 10,000 12,000 14,000 16,000 18,000

Scale in Feet 1:55,400 (1 inch = 4,620 feet)



Flight Profile 523

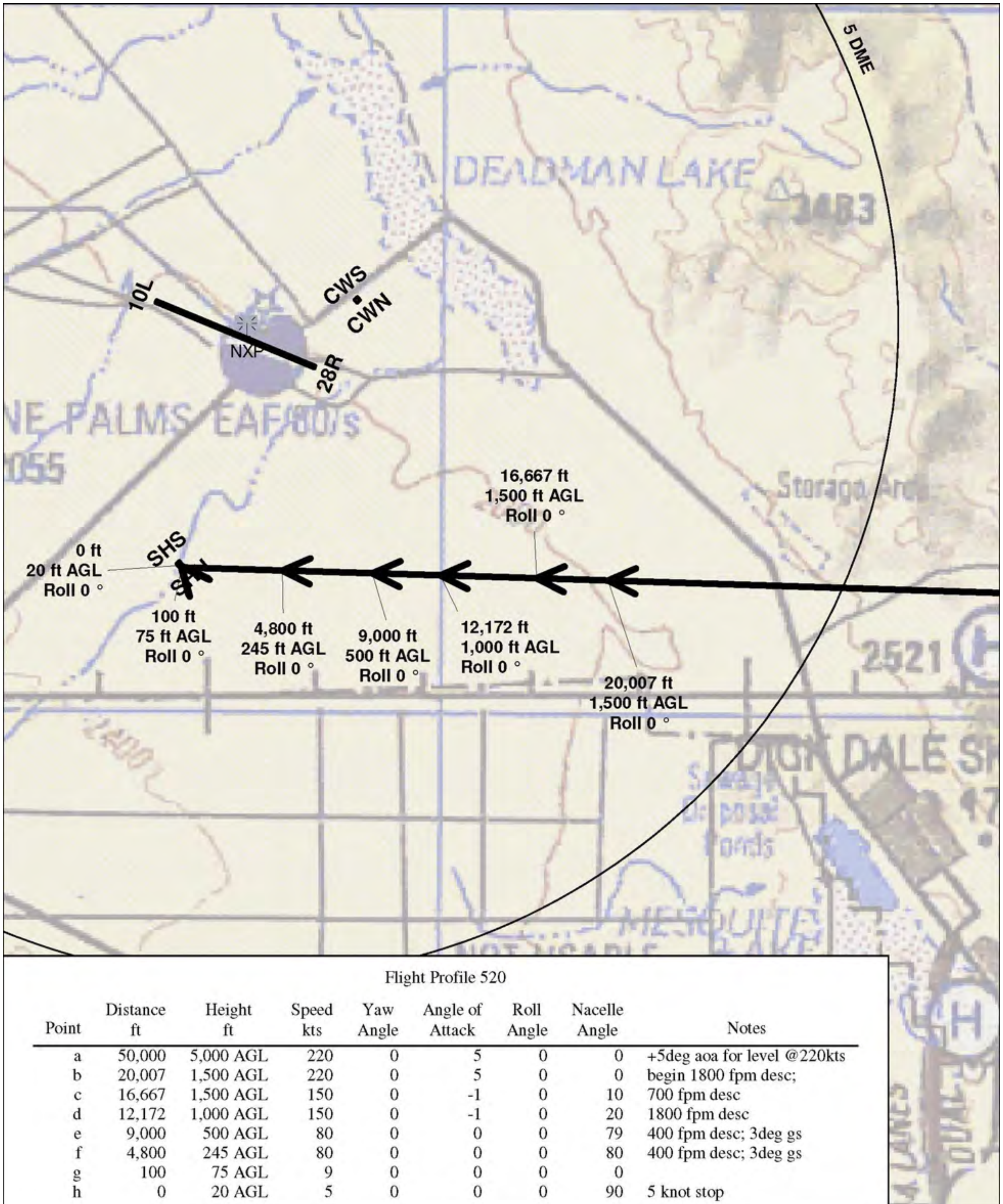
Point	Distance ft	Height ft	Speed kts	Yaw Angle	Angle of Attack	Roll Angle	Nacelle Angle	Notes
a	83,463	2,665 AGL	220	0	0	0	0	
b	66,280	1,335 AGL	200	0	0	0	0	
c	57,974	1,335 AGL	170	0	0	0	0	
d	41,604	1,335 AGL	114	0	0	25	0	
e	29,352	1,235 AGL	110	0	0	0	60	begin downwind leg
f	26,776	1,235 AGL	110	0	0	0	60	Course Rules Break Alt =1600 MSL; begin downw
g	24,443	700 AGL	110	0	0	0	60	
h	19,776	500 AGL	80	0	0	0	73	
i	16,802	468 AGL	77	0	0	25	74	end of downwind
j	6,000	350 AGL	65	0	7	25	79	~1nm out
k	4,550	333 AGL	60	0	8	0	81	
l	1,500	300 AGL	50	0	10	0	85	1500ft out
m	0	20 AGL	5	0	10	0	90	cross threshold

Flight Profile 523
MV22B
on Runway 28R, Flight Track 28O1

0 4,000 8,000 12,000 16,000 20,000 24,000 28,000 32,000

Scale in Feet 1:100,000 (1 inch = 8,340 feet)

N

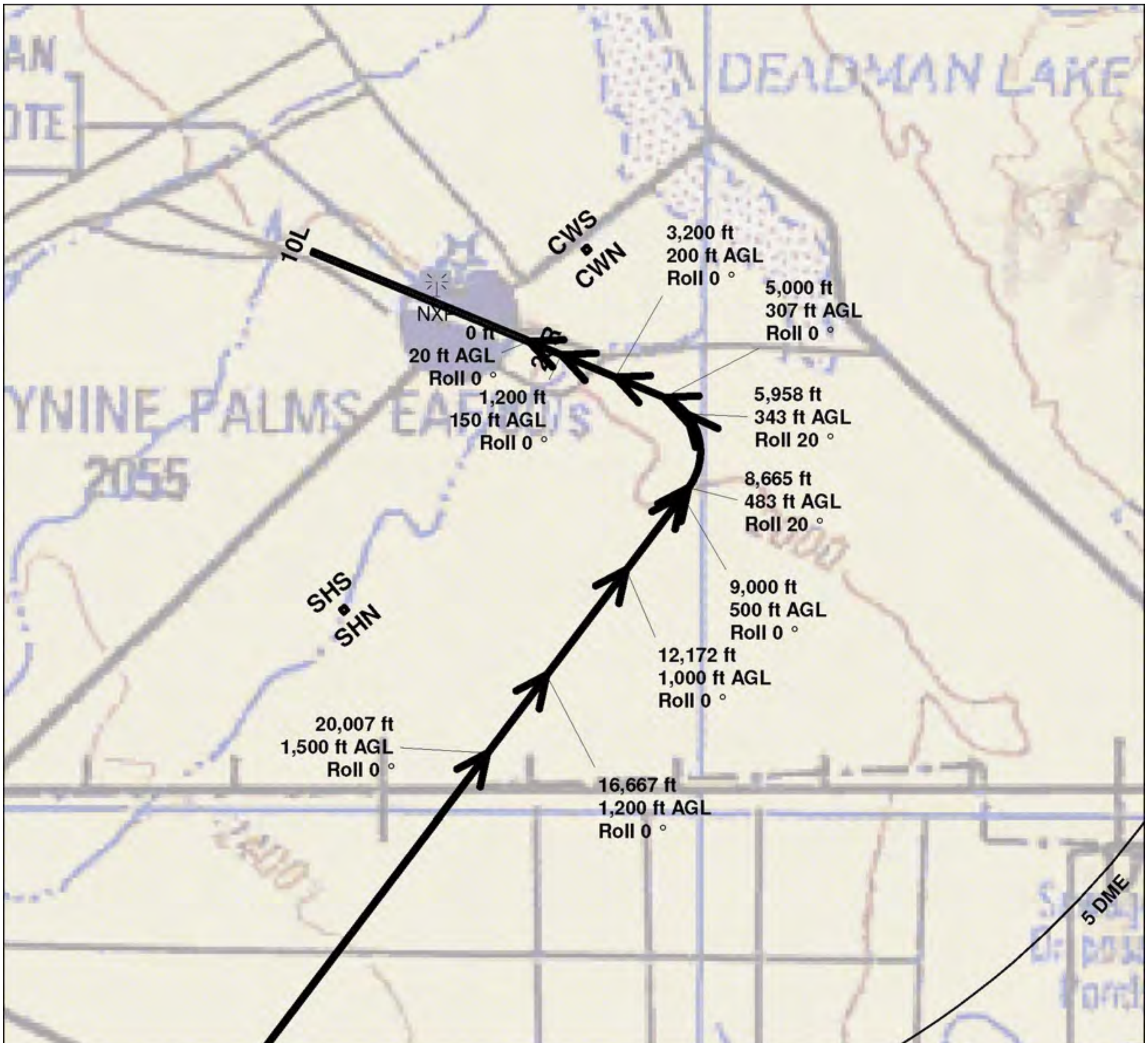


Flight Profile 520

Point	Distance ft	Height ft	Speed kts	Yaw Angle	Angle of Attack	Roll Angle	Nacelle Angle	Notes
a	50,000	5,000 AGL	220	0	5	0	0	+5deg aoa for level @220kts
b	20,007	1,500 AGL	220	0	5	0	0	begin 1800 fpm desc;
c	16,667	1,500 AGL	150	0	-1	0	10	700 fpm desc
d	12,172	1,000 AGL	150	0	-1	0	20	1800 fpm desc
e	9,000	500 AGL	80	0	0	0	79	400 fpm desc; 3deg gs
f	4,800	245 AGL	80	0	0	0	80	400 fpm desc; 3deg gs
g	100	75 AGL	9	0	0	0	0	
h	0	20 AGL	5	0	0	0	90	5 knot stop

Flight Profile 520
MV22B
on Runway SHN, Flight Track SA1

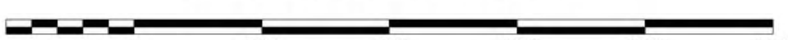
Scale in Feet 1:85,800 (1 inch = 7,150 feet)



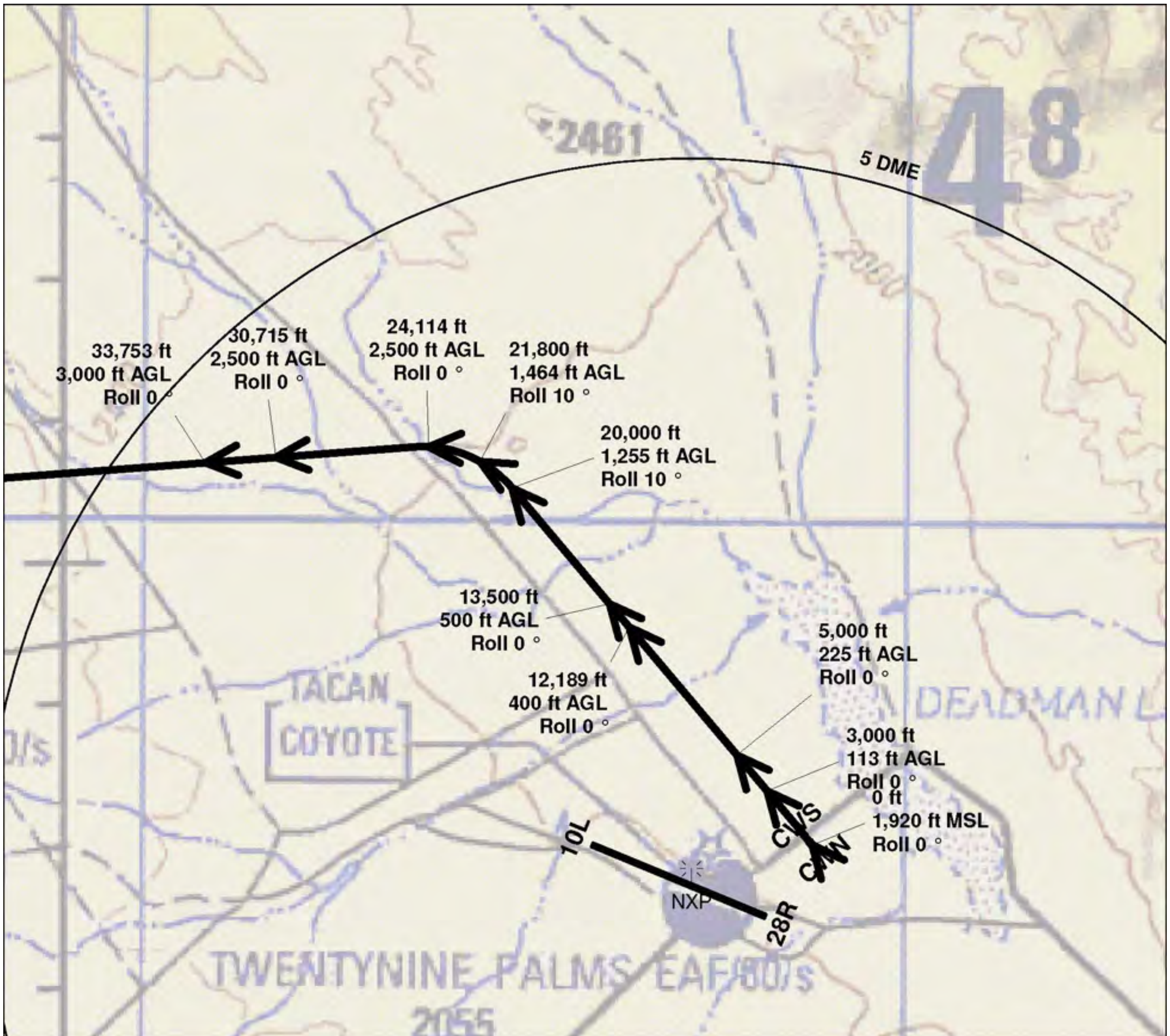
Flight Profile 514

Point	Distance ft	Height ft	Speed kts	Yaw Angle	Angle of Attack	Roll Angle	Nacelle Angle	Notes
a	20,007	1,500 AGL	220	0	-1	0	0	begin 1800 fpm desc;
b	16,667	1,200 AGL	170	0	-1	0	10	700 fpm desc
c	12,172	1,000 AGL	150	0	-1	0	20	1800 fpm desc
d	9,000	500 AGL	80	0	0	0	79	400 fpm desc; 3deg gs
e	8,665	483 AGL	80	0	0	20	79	
f	5,958	343 AGL	80	0	0	20	80	
g	5,000	307 AGL	80	0	0	0	80	
h	3,200	200 AGL	60	0	-1	0	87	200 fpm desc; 2deg gs
i	1,200	150 AGL	50	0	5	0	90	300 fpm desc; 6deg gs
j	0	20 AGL	5	0	0	0	90	5 knot stop

Flight Profile 514
MV22B
on Runway 28R, Flight Track 28A2



Scale in Feet 1:72,000 (1 inch = 6,000 feet)



Flight Profile 508

Point	Distance ft	Height ft	Speed kts	Yaw Angle	Angle of Attack	Roll Angle	Nacelle Angle	Notes
a	0	1,920 MSL	5	0	0	0	87	5 knot start
b	3,000	113 AGL	71	0	0	0	77	
c	5,000	225 AGL	115	0	0	0	70	
d	12,189	400 AGL	162	0	0	0	11	
e	13,500	500 AGL	170	0	6	0	0	2000 fpm climb; +7deg aoa for 2500 fpm climb; ro
f	20,000	1,255 AGL	170	0	6	10	0	
g	21,800	1,464 AGL	170	0	6	10	0	
h	24,114	2,500 AGL	220	0	6	0	0	point added at end of turn; interpolated
i	30,715	2,500 AGL	170	0	7	0	0	accel to 220 within 0.5nm; +7deg aoa for level crui
j	33,753	3,000 AGL	220	0	5	0	0	+5deg for level cruise @ 220kts

Flight Profile 508

MV22B

on Runway CWN, Flight Track WD1

Prior to brake release, aircraft sits at 100 N/A Variable for 120 seconds

0 4,000 8,000 12,000 16,000 20,000 24,000 28,000

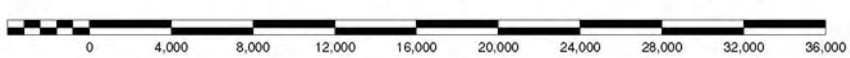
Scale in Feet 1:92,400 (1 inch = 7,700 feet)

N

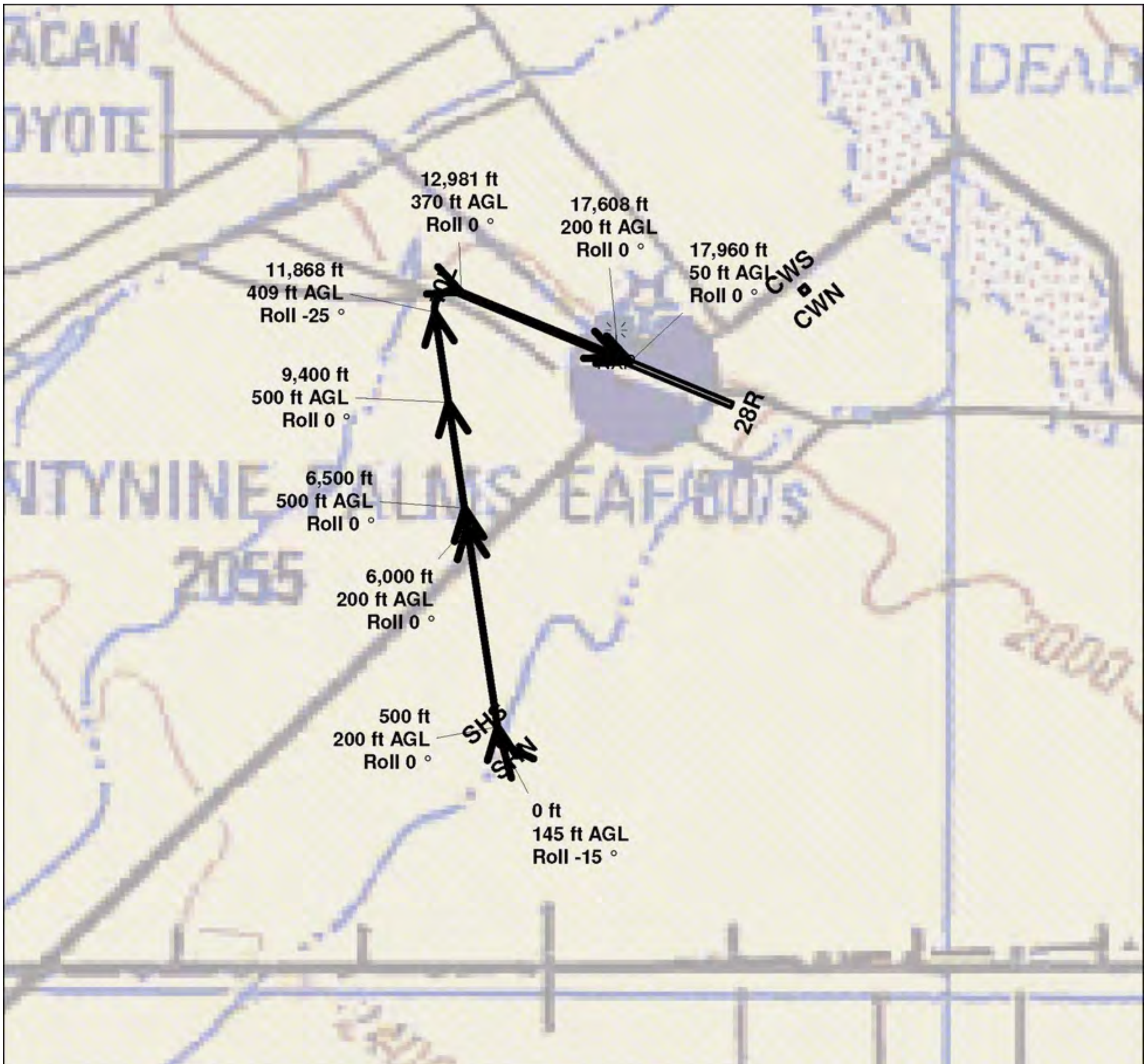
Flight Profile 505

Point	Distance ft	Height ft	Speed kts	Yaw Angle	Angle of Attack	Roll Angle	Nacelle Angle	Notes
a	0	20 AGL	5	0	0	0	60	Normal 60 STO transition to APLN to 1500 ft
b	334	35 AGL	50	0	-4	0	60	
c	730	55 AGL	66	0	-2	0	60	
d	3,000	188 AGL	125	0	5	0	9	
e	4,000	500 AGL	135	0	10	0	0	
f	4,693	1,100 AGL	145	0	7	0	0	point added at beginning of turn: interpolated
g	5,175	1,500 AGL	155	0	6	0	0	
h	7,345	1,500 AGL	165	0	7	0	0	point added at end of turn: interpolated
i	8,175	1,500 AGL	170	0	7	0	0	steady state climb APLN 170kts 1500-3500 ft
j	17,000	3,500 AGL	170	0	7	25	0	straight and level, 170 kts, 7 deg pitch
k	23,710	3,500 AGL	170	0	7	25	0	straight and level, 170 kts, 7 deg pitch
l	29,252	3,500 AGL	170	0	7	0	0	straight and level, 170 kts, 7 deg pitch
m	55,000	3,500 AGL	170	0	7	0	0	straight and level, 170 kts, 7 deg pitch

Flight Profile 505
MV22B
on Runway 28R, Flight Track 28D1
Prior to brake release, aircraft sits at 100 N/A Variable for 120 seconds



Scale in Feet 1:113,000 (1 inch = 9,380 feet)



Flight Profile 128

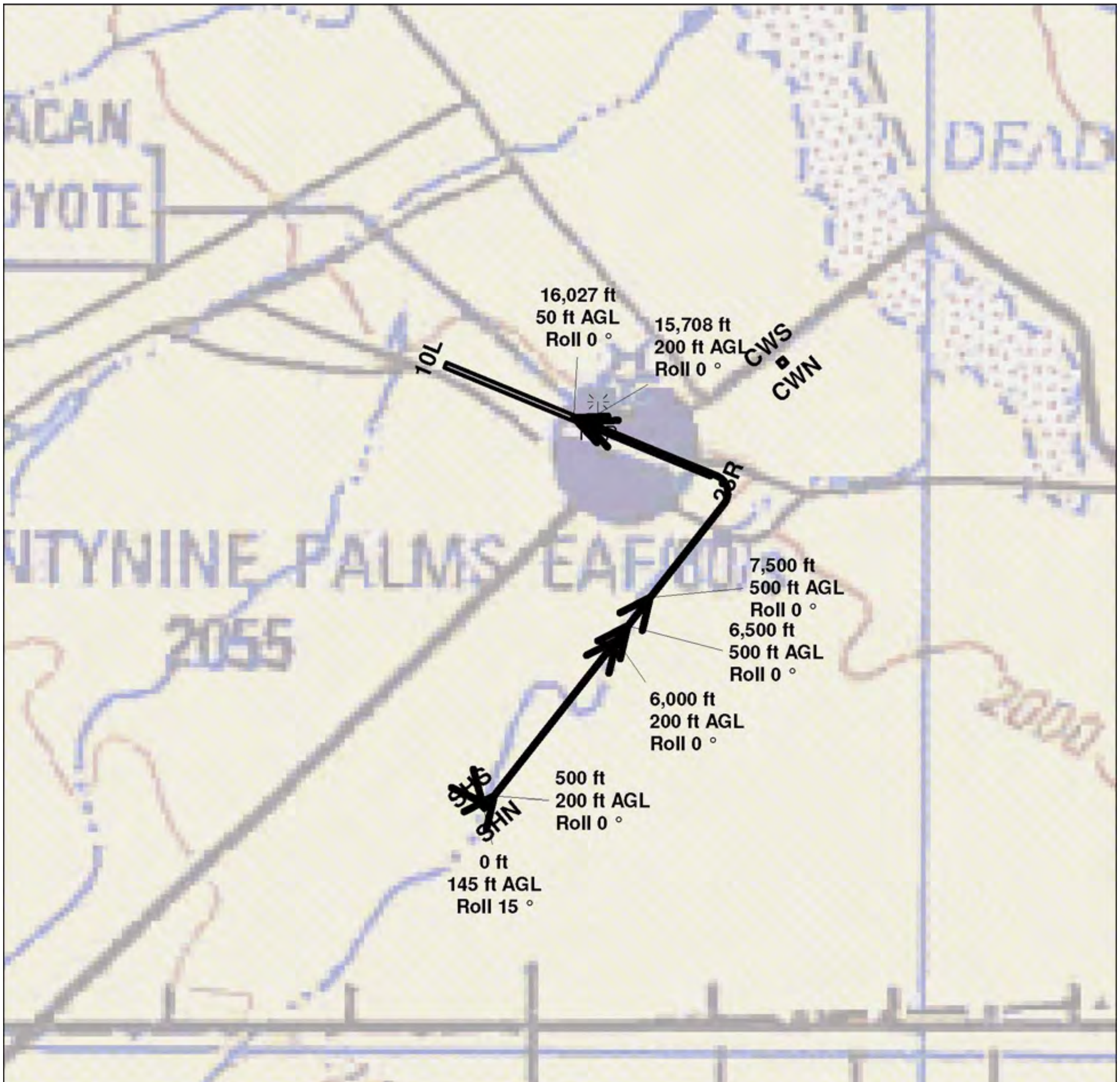
Point	Distance ft	Height ft	Speed kts	Yaw Angle	Angle of Attack	Roll Angle	Nacelle Angle
a	0	145 AGL	0	0	0	-15	90
b	500	200 AGL	60	0	-5	0	90
c	6,000	200 AGL	120	0	0	0	90
d	6,500	500 AGL	120	0	0	0	90
e	9,400	500 AGL	80	0	5	0	90
f	11,868	409 AGL	74	0	5	-25	90
g	12,981	370 AGL	71	0	5	0	90
h	17,608	200 AGL	60	0	5	0	90
i	17,960	50 AGL	0	0	0	0	90

Flight Profile 128
CH53E
on Runway SHN, Flight Track SI2

0 2,000 4,000 6,000 8,000 10,000 12,000 14,000 16,000 18,000 20,000

Scale in Feet 1:57,400 (1 inch = 4,780 feet)

N



Flight Profile 127

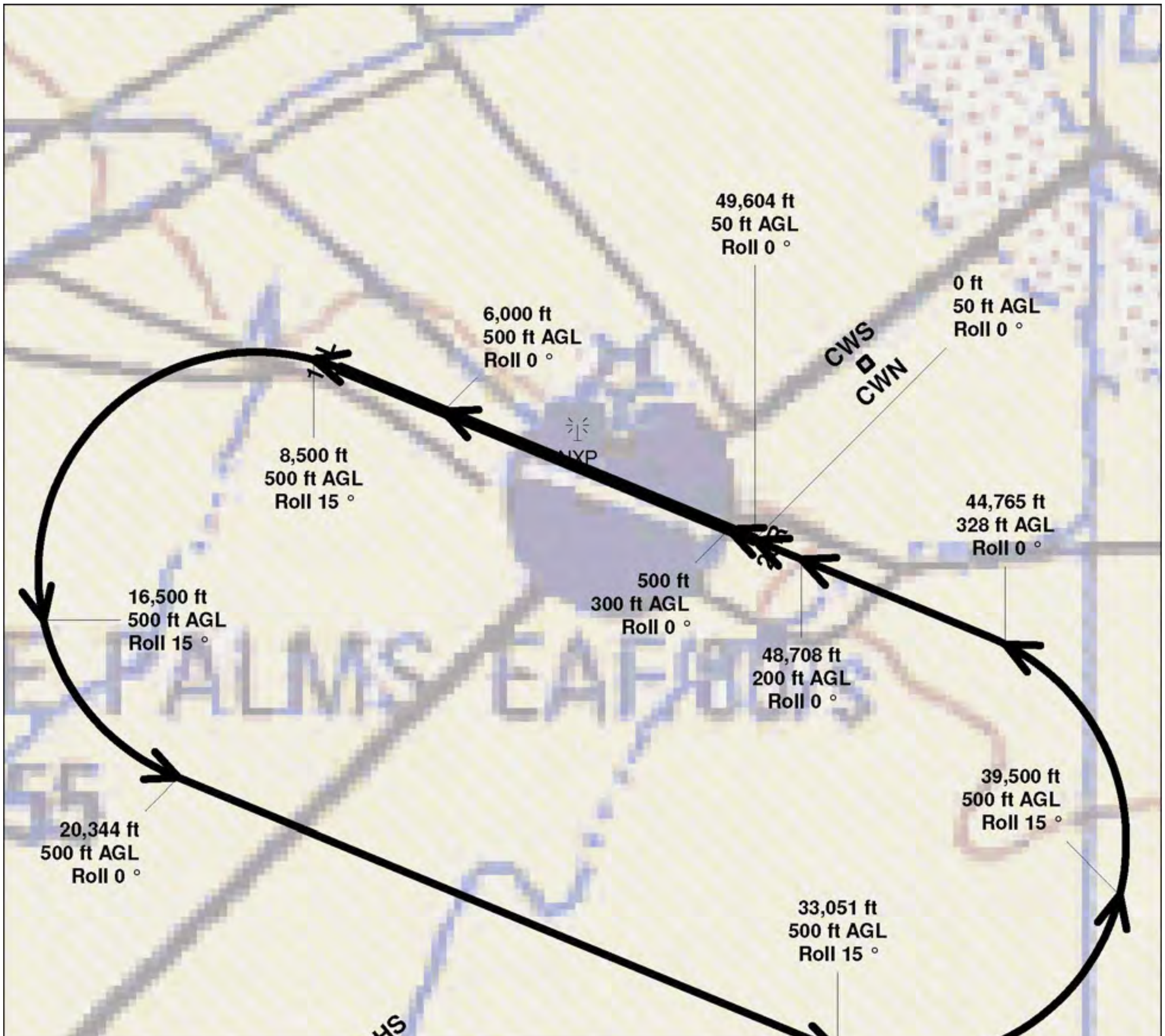
Point	Distance ft	Height ft	Speed kts	Yaw Angle	Angle of Attack	Roll Angle	Nacelle Angle
a	0	145 AGL	0	0	0	15	90
b	500	200 AGL	60	0	-5	0	90
c	6,000	200 AGL	120	0	0	0	90
d	6,500	500 AGL	120	0	0	0	90
e	7,500	500 AGL	80	0	5	0	90
f	15,708	200 AGL	60	0	5	0	90
g	16,027	50 AGL	0	0	0	0	90

Flight Profile 127
CH53E
on Runway SHS, Flight Track SI1

0 2,000 4,000 6,000 8,000 10,000 12,000 14,000 16,000 18,000

Scale in Feet 1:57,200 (1 inch = 4,770 feet)

N



Flight Profile 126

Point	Distance ft	Height ft	Speed kts	Yaw Angle	Angle of Attack	Roll Angle	Nacelle Angle
a	0	50 AGL	0	0	0	0	90
b	500	300 AGL	60	0	-5	0	90
c	6,000	500 AGL	120	0	0	0	90
d	8,500	500 AGL	120	0	0	15	90
e	16,500	500 AGL	120	0	0	15	90
f	20,344	500 AGL	120	0	0	0	90
g	33,051	500 AGL	90	0	0	15	90
h	39,500	500 AGL	80	0	0	15	90
i	44,765	328 AGL	68	0	0	0	90
j	48,708	200 AGL	60	0	0	0	90
k	49,604	50 AGL	0	0	0	0	90

Flight Profile 126
CH53E
on Runway 28R, Flight Track 28T1

Scale in Feet 1:38,100 (1 inch = 3,170 feet)

H.3 AIRSPACE

H.3.1 Operations & Sorties

Baseline Area Operations at 29 Palms Airspace

Aircraft Type		LAVIC LAKE				EMERSON LAKE				LEAD MTN NORTH				LEAD MOUNTAIN SOUTH				NOBLE PASS				DELTA				FASP			
		Day	Eve	Night	Total	Day	Eve	Night	Total	Day	Eve	Night	Total	Day	Eve	Night	Total	Day	Eve	Night	Total	Day	Eve	Night	Total	Day	Eve	Night	Total
MV-22	T&R	22	12	4	38	4	1	-	5	30	11	-	41	48	23	4	75	6	1	-	7	6	1	-	7	4	1	-	5
	WTI	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Desert Talon	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TOTAL		22	12	4	38	4	1	-	5	30	11	-	41	48	23	4	75	6	1	-	7	6	1	-	7	4	1	-	5

Aircraft Type		R-2501N				R-2501S				R-2501E				R-2501W				Sundance MOA				Bristol MOA				Totals			
		Day	Eve	Night	Total	Day	Eve	Night	Total	Day	Eve	Night	Total	Day	Eve	Night	Total	Day	Eve	Night	Total	Day	Eve	Night	Total	Day	Eve	Night	Total
F/A-18C/D		1,021	17	-	1,038	1,302	22	-	1,324	1,009	16	-	1,025	965	16	-	981	95	2	-	97	220	5	-	225	4,612	78	-	4,690
F/A-18E/F		54	1	-	55	69	1	-	70	53	1	-	54	51	1	-	52	5	-	-	5	12	-	-	12	244	4	-	248
F-5E		36	-	-	36	44	-	-	44	35	-	-	35	33	-	-	33	3	-	-	3	7	-	-	7	158	-	-	158
KC-130		340	18	-	358	433	23	-	456	335	17	-	352	322	17	-	339	32	2	-	34	75	5	-	80	1,537	82	-	1,619
AV-8B		645	250	-	895	821	319	-	1,140	636	247	-	883	611	237	-	848	60	23	-	83	140	54	-	194	2,913	1,130	-	4,043
AH-1		876	214	54	1,144	1,119	275	69	1,463	867	212	53	1,132	829	203	51	1,083	83	20	5	108	192	47	12	251	3,966	971	244	5,181
UH-1		359	-	-	359	458	-	-	458	354	-	-	354	339	-	-	339	34	-	-	34	79	-	-	79	1,623	-	-	1,623
CH-53E		537	18	-	555	684	23	-	707	530	17	-	547	508	17	-	525	50	2	-	52	116	5	-	121	2,425	82	-	2,507
CH-46E		896	161	18	1,075	1,143	206	23	1,372	884	159	17	1,060	846	152	17	1,015	84	15	2	101	195	35	5	235	4,048	728	82	4,858
MV-22	T&R	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	120	50	8	178
	WTI	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Desert Talon	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
UAV(1)		161	18	107	286	206	23	137	366	159	17	106	282	152	17	101	270	15	2	10	27	35	5	23	63	728	82	484	1,294
TOTAL		4,925	697	179	5,801	6,279	892	229	7,400	4,862	686	176	5,724	4,656	660	169	5,485	461	66	17	544	1,071	156	40	1,267	22,374	3,207	818	26,399

(1) Unmanned Aerial Vehicle (Not Modeled)

Baseline Route Operations at 29 Palms Airspace

Aircraft Type		Route												Totals			
		Bristol Aerial Refueling Track 19k				Bristol Aerial Refueling Track 22k				Perimeter Route[2]							
		Day	Eve	Night	Total	Day	Eve	Night	Total	Day	Eve	Night	Total	Day	Eve	Night	Total
F/A-18C/D		93	2	-	95	93	2	-	95	-	-	-	-	186	4	-	190
F/A-18E/F		5	-	-	5	5	-	-	5	-	-	-	-	10	-	-	10
F-5E		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
KC-130		383	25	-	408	383	25	-	408	-	-	-	-	766	50	-	816
AV-8B		63	25	-	88	63	25	-	88	-	-	-	-	126	50	-	176
AH-1		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
UH-1		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CH-53E		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CH-46E		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MV-22	T&R	-	-	-	-	-	-	-	-	130	104	35	269	130	104	35	269
	WTI	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Desert Talon	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
UAV[1]		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TOTAL		544	52	-	596	544	52	-	596	130	104	35	269	1,218	208	35	1,461

(1) Unmanned Aerial Vehicle (Not Modeled)

(2) Includes MV-22 High Light Level (HLL) and Low Light Level (LLL) Night Vision Goggle training and Tactics (TAC) sorties

(3) MV-22 operations scaled to 59 percent of MV22 West Coast Basing EIS proposed ops

Proposed Reduced Area operations at 29 Palms Airspace

Aircraft Type		LAVIC LAKE				EMERSON LAKE				LEAD MTN NORTH				LEAD MOUNTAIN SOUTH				NOBLE PASS				DELTA				FASP			
		Day	Eve	Night	Total	Day	Eve	Night	Total	Day	Eve	Night	Total	Day	Eve	Night	Total	Day	Eve	Night	Total	Day	Eve	Night	Total	Day	Eve	Night	Total
MV-22	T&R	22	12	4	38	4	1	-	5	30	11	-	41	48	23	4	75	6	1	-	7	6	1	-	7	4	1	-	5
	WTI	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Desert Talon	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TOTAL		22	12	4	38	4	1	-	5	30	11	-	41	48	23	4	75	6	1	-	7	6	1	-	7	4	1	-	5

Aircraft Type		R-2501N				R-2501S				R-2501E				R-2501W				Sundance MOA				Bristol MOA			
		Day	Eve	Night	Total	Day	Eve	Night	Total	Day	Eve	Night	Total	Day	Eve	Night	Total	Day	Eve	Night	Total	Day	Eve	Night	Total
F/A-18C/D		613	10	-	623	1,302	22	-	1,324	908	14	-	922	579	10	-	589	95	2	-	97	220	5	-	225
F/A-18E/F		32	1	-	33	69	1	-	70	48	1	-	49	31	1	-	32	5	-	-	5	12	-	-	12
F-5E		22	-	-	22	44	-	-	44	32	-	-	32	20	-	-	20	3	-	-	3	7	-	-	7
KC-130		204	11	-	215	433	23	-	456	302	15	-	317	193	10	-	203	32	2	-	34	75	5	-	80
AV-8B		387	150	-	537	821	319	-	1,140	572	222	-	794	367	142	-	509	60	23	-	83	140	54	-	194
AH-1		526	128	32	686	1,119	275	69	1,463	780	191	48	1,019	497	122	31	650	83	20	5	108	192	47	12	251
UH-1		215	-	-	215	458	-	-	458	319	-	-	319	203	-	-	203	34	-	-	34	79	-	-	79
CH-53E		322	11	-	333	684	23	-	707	477	15	-	492	305	10	-	315	50	2	-	52	116	5	-	121
CH-46E		538	97	11	646	1,143	206	23	1,372	796	143	15	954	508	91	10	609	84	15	2	101	195	35	5	235
MV-22	T&R	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	WTI	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Desert Talon	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
UAV(1)		97	11	64	172	206	23	137	366	143	15	95	253	91	10	61	162	15	2	10	27	35	5	23	63
TOTAL		2,956	419	107	3,482	6,279	892	229	7,400	4,377	616	158	5,151	2,794	396	102	3,292	461	66	17	544	1,071	156	40	1,267

Aircraft Type		R-2511 and Johnson Valley MOA				CAX and Turtle MOA				Totals			
		Day	Eve	Night	Total	Day	Eve	Night	Total	Day	Eve	Night	Total
F/A-18C/D		794	13	-	807	101	2	-	103	4,612	78	-	4,690
F/A-18E/F		42	-	-	42	5	-	-	5	244	4	-	248
F-5E		26	-	-	26	4	-	-	4	158	-	-	158
KC-130		264	14	-	278	34	2	-	36	1,537	82	-	1,619
AV-8B		502	195	-	697	64	25	-	89	2,913	1,130	-	4,043
AH-1		682	167	42	891	87	21	5	113	3,966	971	244	5,181
UH-1		280	-	-	280	35	-	-	35	1,623	-	-	1,623
CH-53E		418	14	-	432	53	2	-	55	2,425	82	-	2,507
CH-46E		696	125	14	835	88	16	2	106	4,048	728	82	4,858
MV-22	T&R	-	-	-	-	-	-	-	-	120	50	8	178
	WTI	-	-	-	-	-	-	-	-	-	-	-	-
	Desert Talon	-	-	-	-	-	-	-	-	-	-	-	-
UAV(1)		125	14	83	222	16	2	11	29	728	82	484	1,294
TOTAL		3,829	542	139	4,510	487	70	18	575	22,374	3,207	818	26,399

Notes:
(1) Unmanned Aerial Vehicle (Not Modeled)
(2) Portion of baseline ops in R-2501N and R-2501W moved to R-2511 and Johnson Valley MOA for Alternatives 1, 2, 4, 5, 6; In Alt 3 no ops are moved
(3) Portion of baseline ops in R-2501E moved to CAX and Turtle MOA for all Alternatives

Proposed Route Operations at 29 Palms Airspace

Aircraft Type		Route												Totals			
		Bristol Aerial Refueling Track 19k				Bristol Aerial Refueling Track 22k				Perimeter Route[2]							
		Day	Eve	Night	Total	Day	Eve	Night	Total	Day	Eve	Night	Total	Day	Eve	Night	Total
F/A-18C/D		93	2	-	95	93	2	-	95	-	-	-	-	186	4	-	190
F/A-18E/F		5	-	-	5	5	-	-	5	-	-	-	-	10	-	-	10
F-5E		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
KC-130		383	25	-	408	383	25	-	408	-	-	-	-	766	50	-	816
AV-8B		63	25	-	88	63	25	-	88	-	-	-	-	126	50	-	176
AH-1		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
UH-1		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CH-53E		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CH-46E		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MV-22	T&R	-	-	-	-	-	-	-	-	130	104	35	269	130	104	35	269
	WTI	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Desert Talon	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
UAV[1]		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TOTAL		544	52	-	596	544	52	-	596	130	104	35	269	1,218	208	35	1,461

(1) Unmanned Aerial Vehicle (Not Modeled)

(2) Includes MV-22 High Light Level (HLL) and Low Light Level (LLL) Night Vision Goggle training and Tactics (TAC) sorties

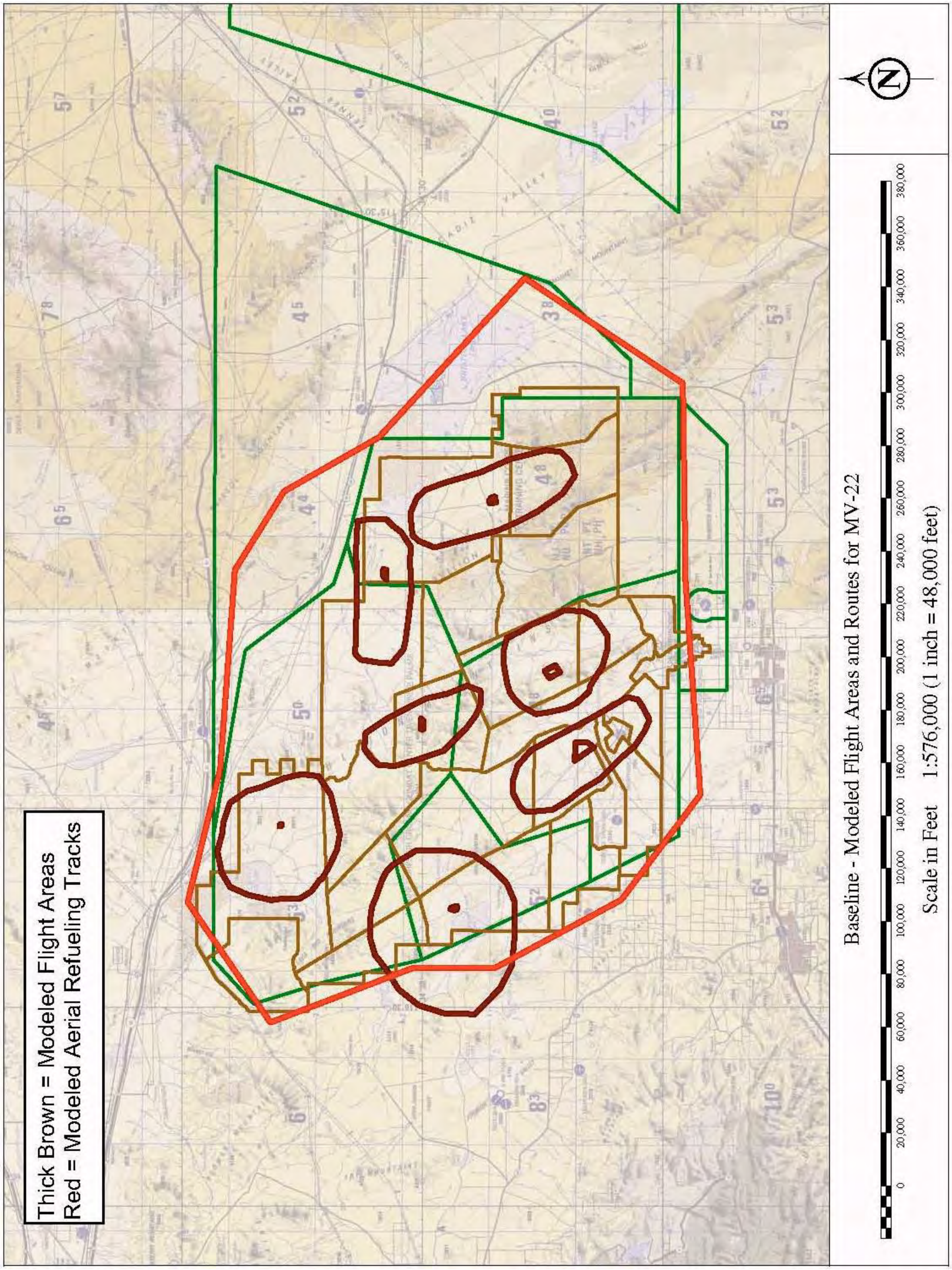
(3) MV-22 operations scaled to 59 percent of MV22 West Coast Basing EIS proposed ops

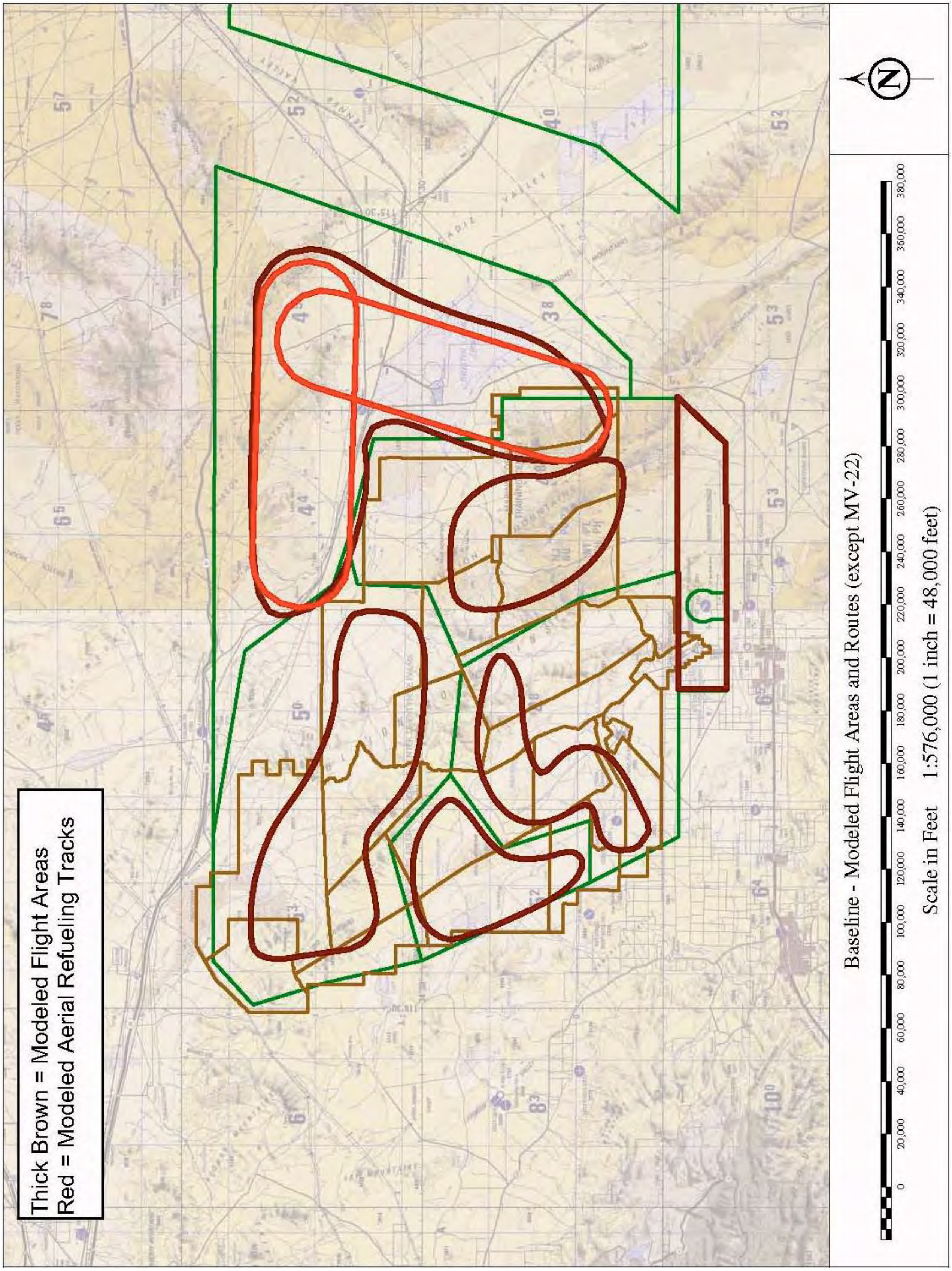
Proposed Annual MEBEX Sorties

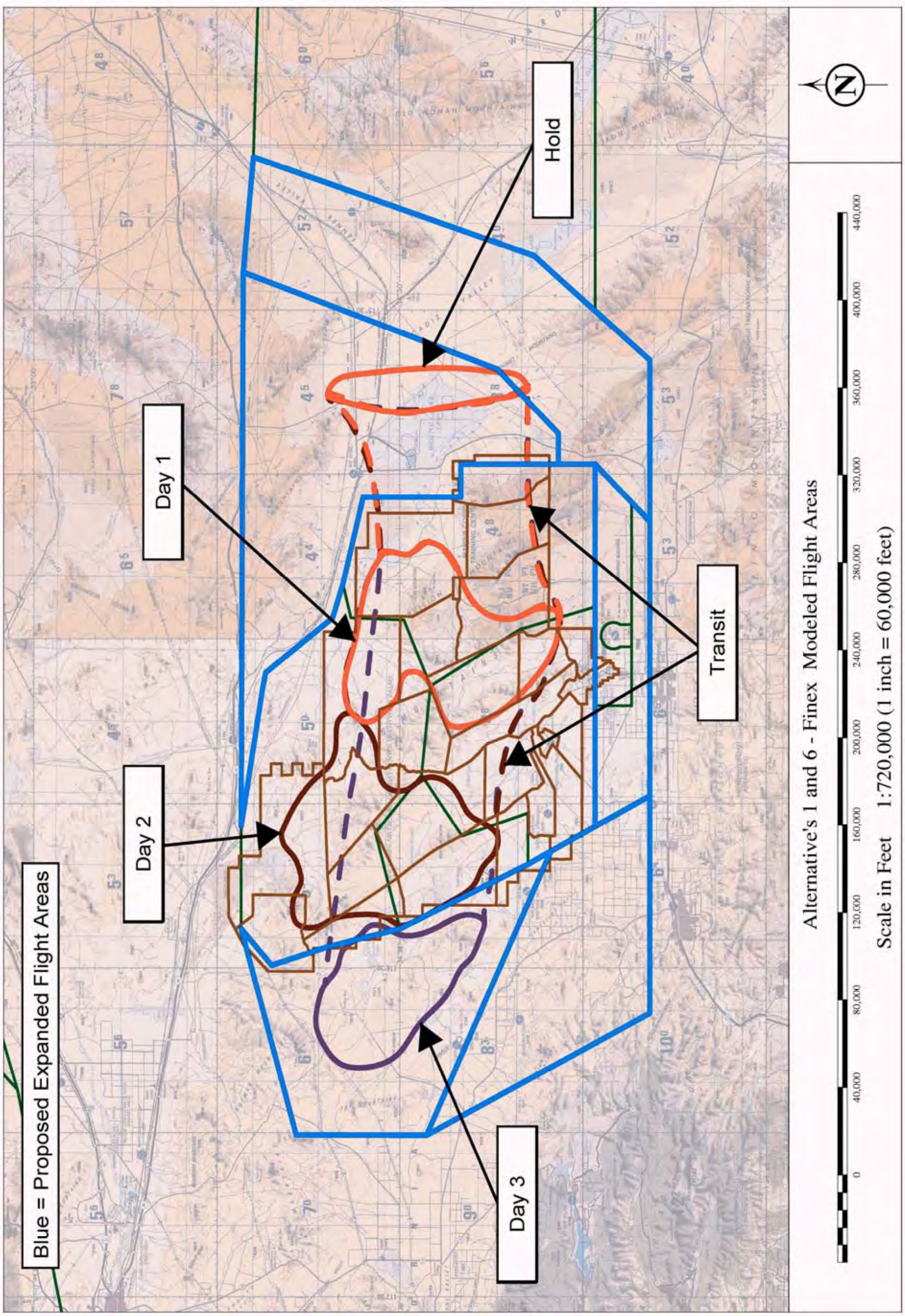
Aircraft Type	Workup				Finex				TOTAL			
	Day (0700-1900)	Eve (1900-2200)	Night (2200-0700)	Total	Day (0700-1900)	Eve (1900-2200)	Night (2200-0700)	Total	Day (0700-1900)	Eve (1900-2200)	Night (2200-0700)	Total
AV-8B	160	58	12	230	36	8	28	72	196	66	40	302
F/A-18C/D	208	74	16	298	82	20	62	164	290	94	78	462
F/A-18E/F	10	4	-	14	4	-	4	8	14	4	4	22
F-35B*	78	28	6	112	22	6	16	44	100	34	22	156
Joint FW (e.g., F-16)	2	2	-	4	18	4	14	36	20	6	14	40
AH-1/ UH-1	596	214	42	852	120	28	92	240	716	242	134	1,092
CH-53	146	52	10	208	12	2	10	24	158	54	20	232
MV-22	162	58	12	232	18	4	14	36	180	62	26	268
Joint RW (e.g., H-60)	190	68	14	272	24	6	18	48	214	74	32	320
EA-6B	40	14	2	56	10	2	6	18	50	16	8	74
KC-130	70	26	6	102	18	4	14	36	88	30	20	138
Joint AR (KC-10, KC-135)	-	-	-	-	18	4	14	36	18	4	14	36
UAS	118	42	8	168	36	8	28	72	154	50	36	240
TOTAL	**1,780**	**640**	**128**	**2,548**	**418**	**96**	**320**	**834**	**2,198**	**736**	**448**	**3,382**

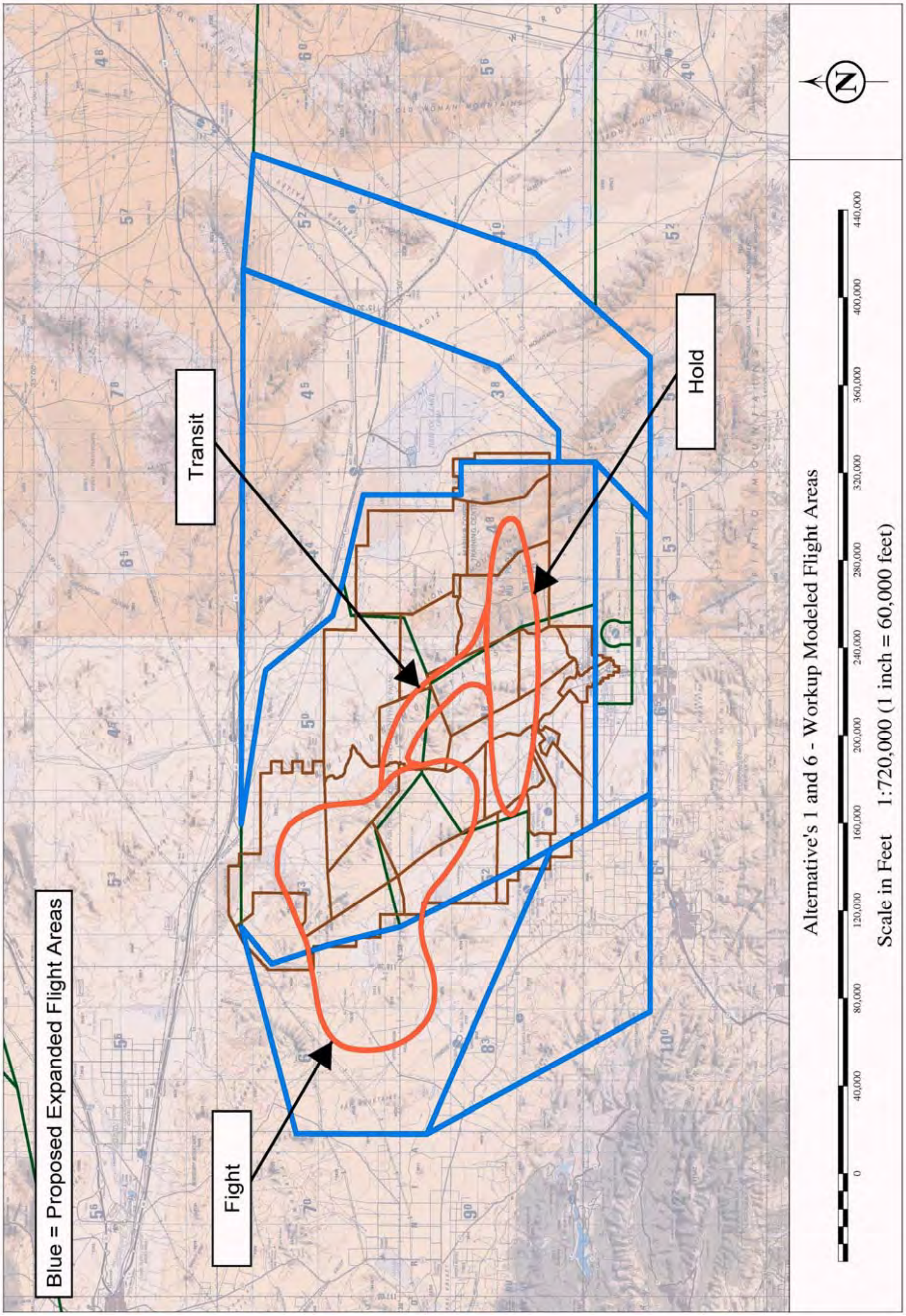
** comprised of 10% of original F-18 sorties and 25% of original AV-8 sorties*

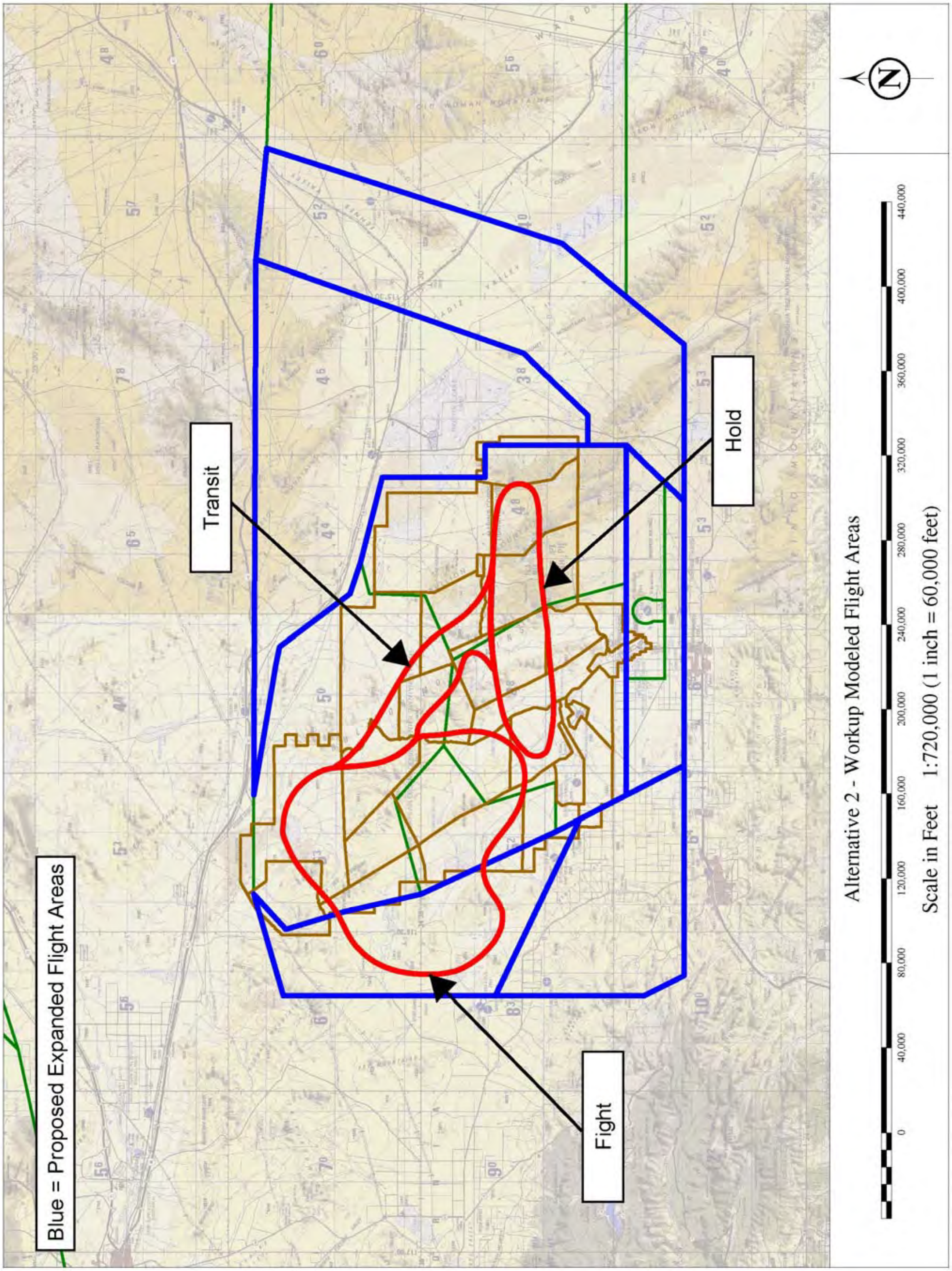
H.3.2 Airspace Maps


Thick Brown = Modeled Flight Areas
Red = Modeled Aerial Refueling Tracks
N
Baseline - Modeled Flight Areas and Routes for MV-22
Scale in Feet 1:576,000 (1 inch = 48,000 feet)


Thick Brown = Modeled Flight Areas
Red = Modeled Aerial Refueling Tracks
Baseline - Modeled Flight Areas and Routes (except MV-22)
Scale in Feet 1:576,000 (1 inch = 48,000 feet)
0 20,000 40,000 60,000 80,000 100,000 120,000 140,000 160,000 180,000 200,000 220,000 240,000 260,000 280,000 300,000 320,000 340,000 360,000 380,000
N

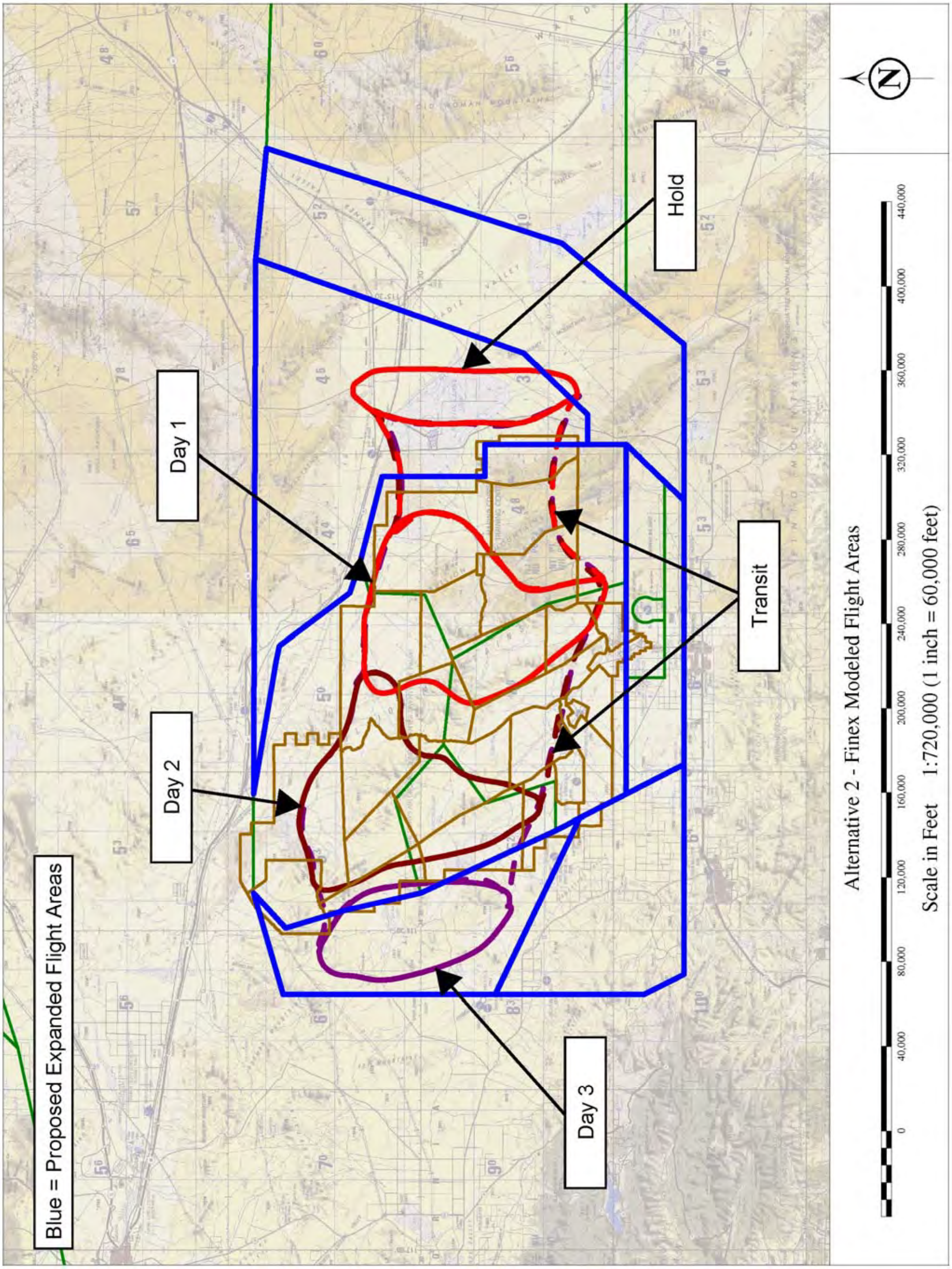

Blue = Proposed Expanded Flight Areas
Day 1
Day 2
Day 3
Hold
Transit
N
0
40,000
80,000
120,000
160,000
200,000
240,000
280,000
320,000
360,000
400,000
440,000
Alternative's 1 and 6 - Finex Modeled Flight Areas
Scale in Feet 1:720,000 (1 inch = 60,000 feet)


Blue = Proposed Expanded Flight Areas
Fight
Transit
Hold
Alternative's 1 and 6 - Workup Modeled Flight Areas
Scale in Feet 1:720,000 (1 inch = 60,000 feet)
0
40,000
80,000
120,000
160,000
200,000
240,000
280,000
320,000
360,000
400,000
440,000

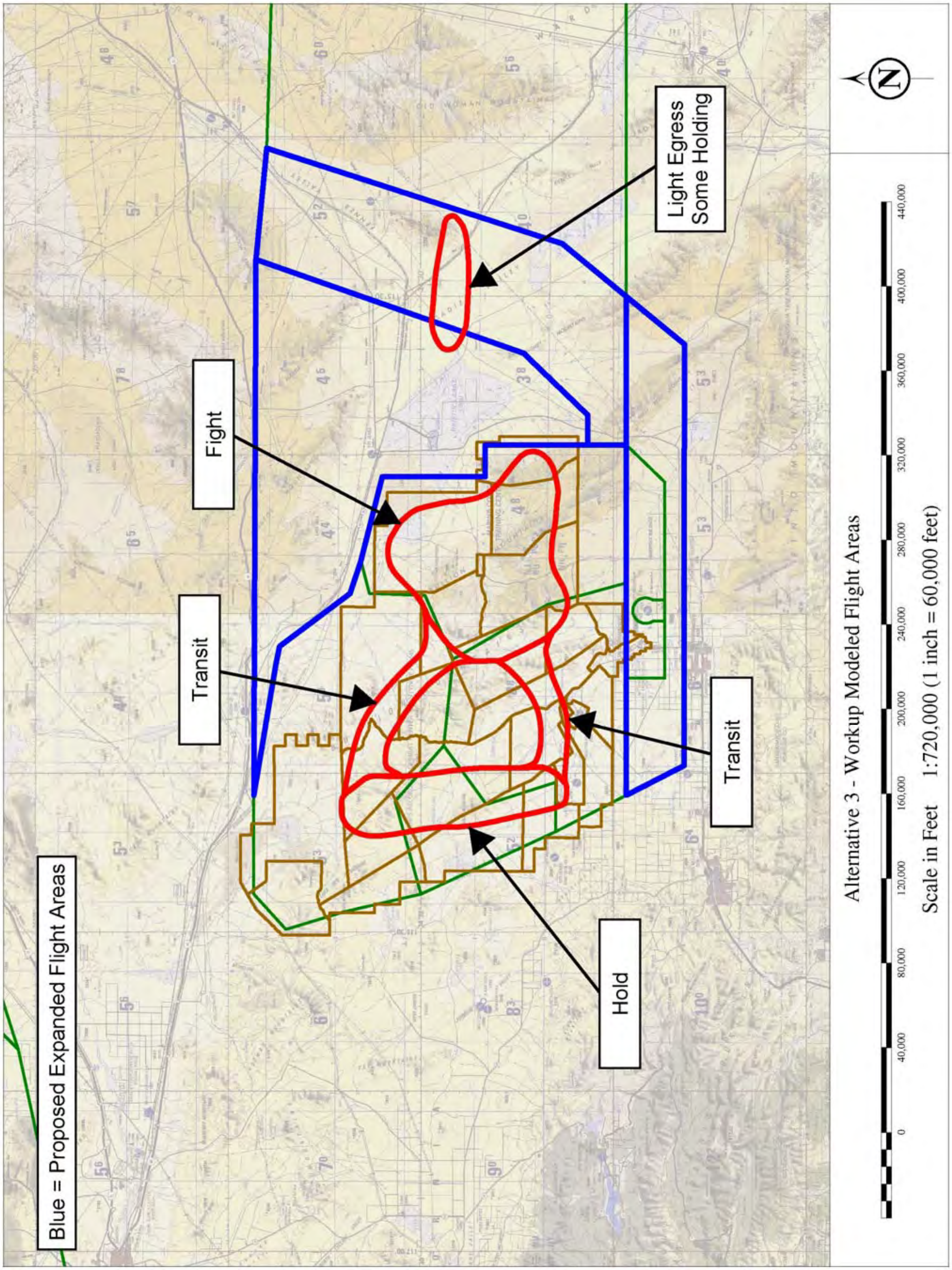


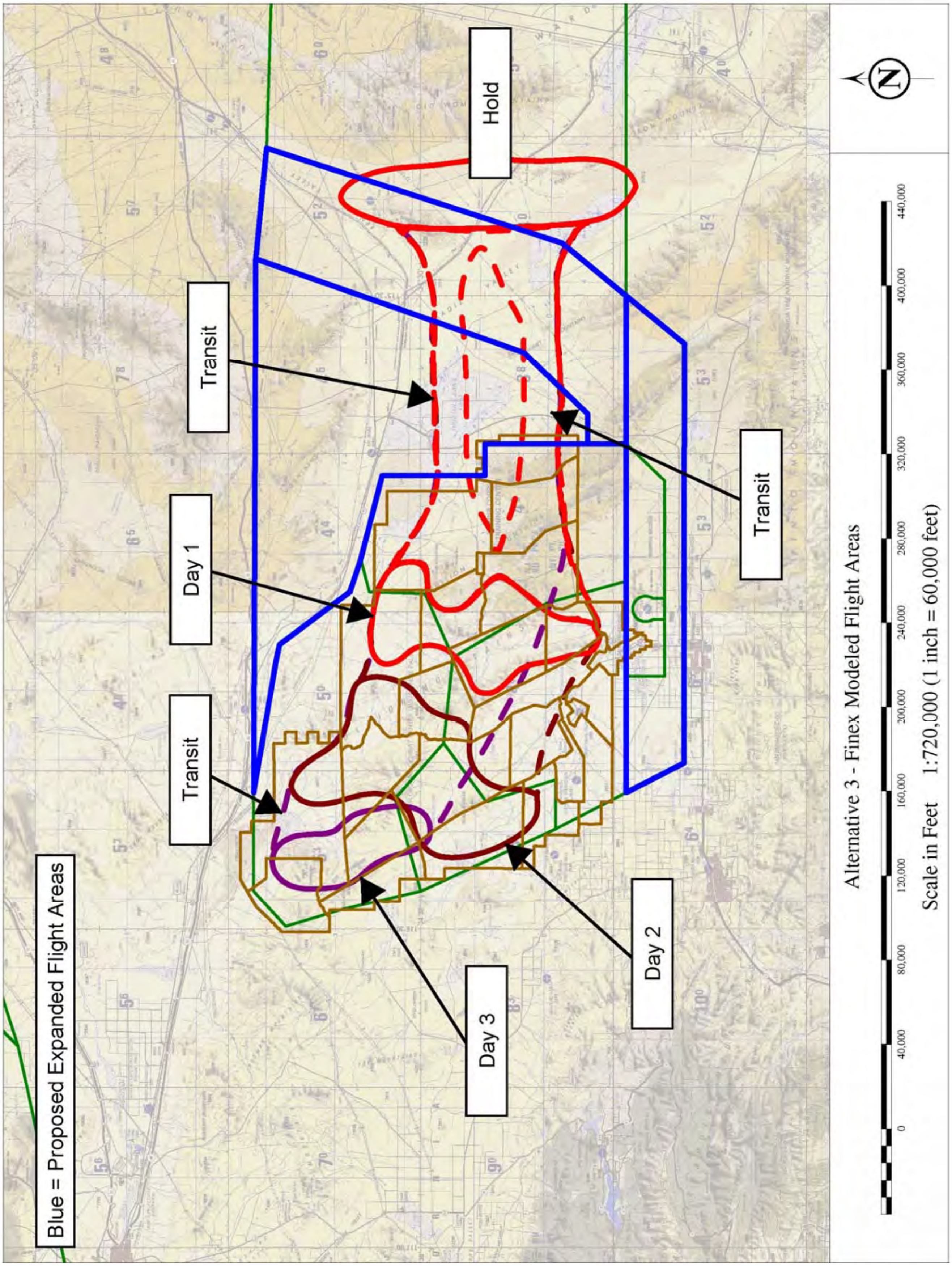
Alternative 2 - Workup Modeled Flight Areas

Scale in Feet 1:720,000 (1 inch = 60,000 feet)

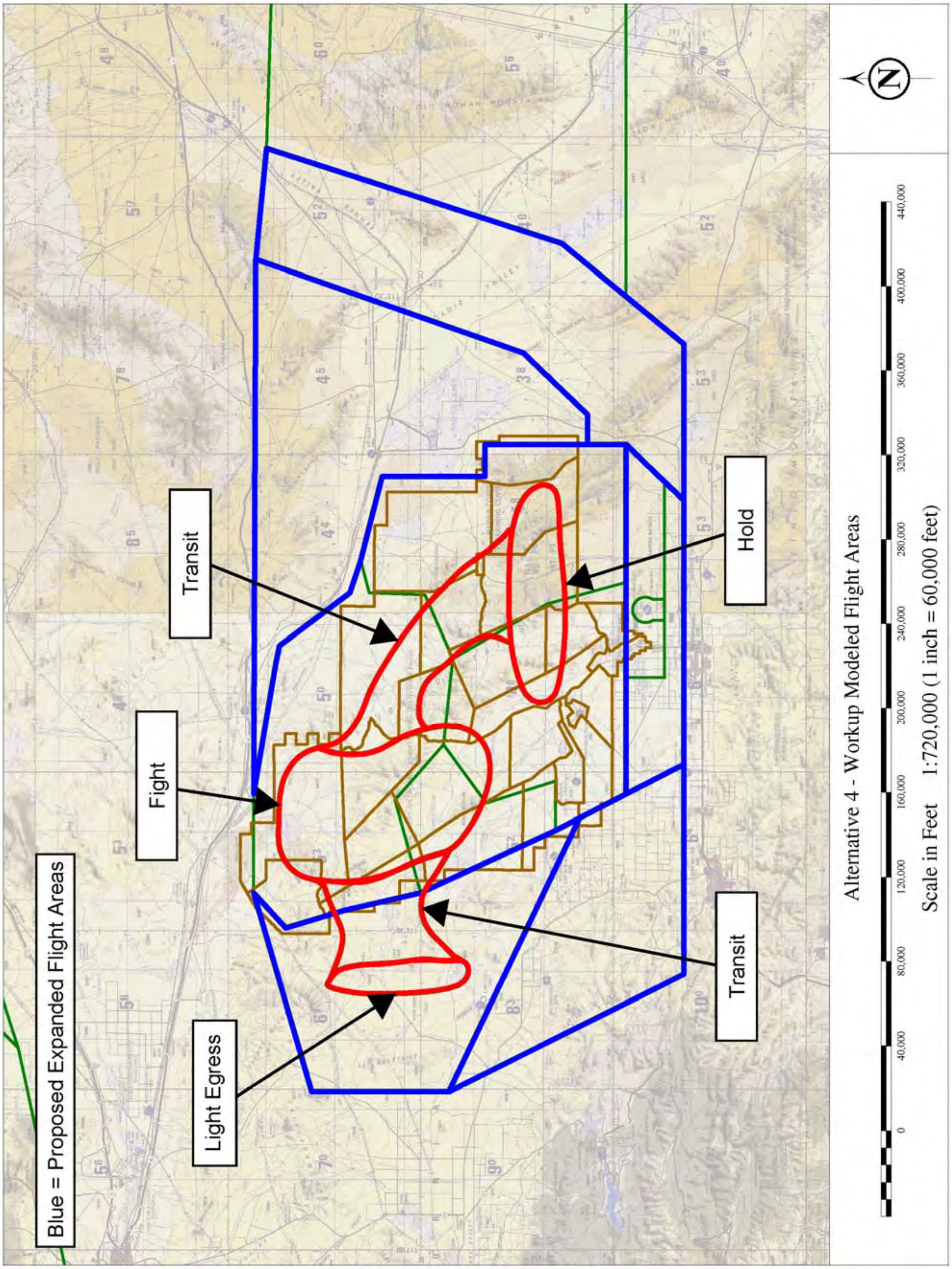


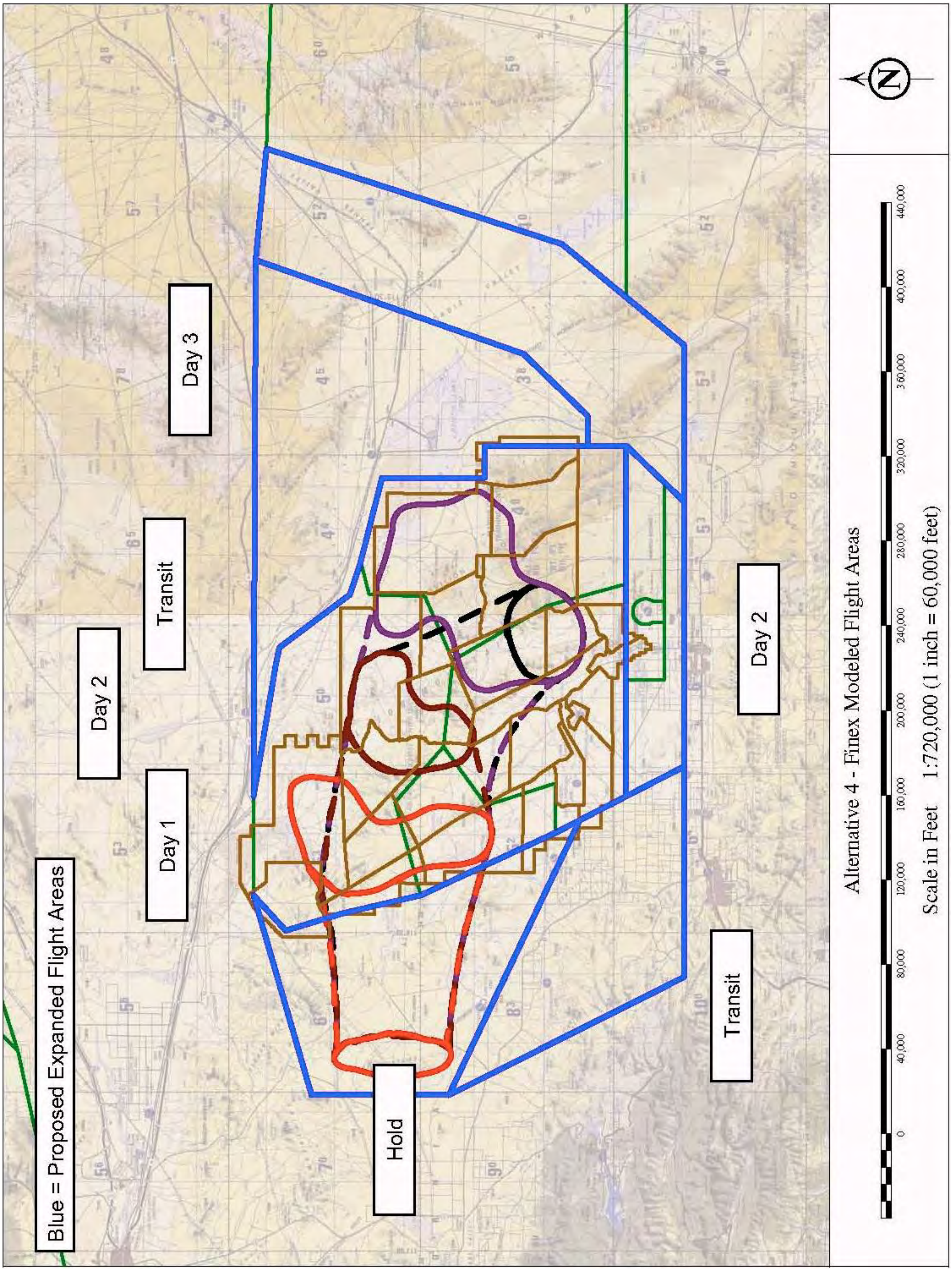
Alternative 2 - Finex Modeled Flight Areas


Blue = Proposed Expanded Flight Areas
Fight
Transit
Transit
Hold
Light Egress
Some Holding
Alternative 3 - Workup Modeled Flight Areas
Scale in Feet 1:720,000 (1 inch = 60,000 feet)
0
40,000
80,000
120,000
160,000
200,000
240,000
280,000
320,000
360,000
400,000
440,000

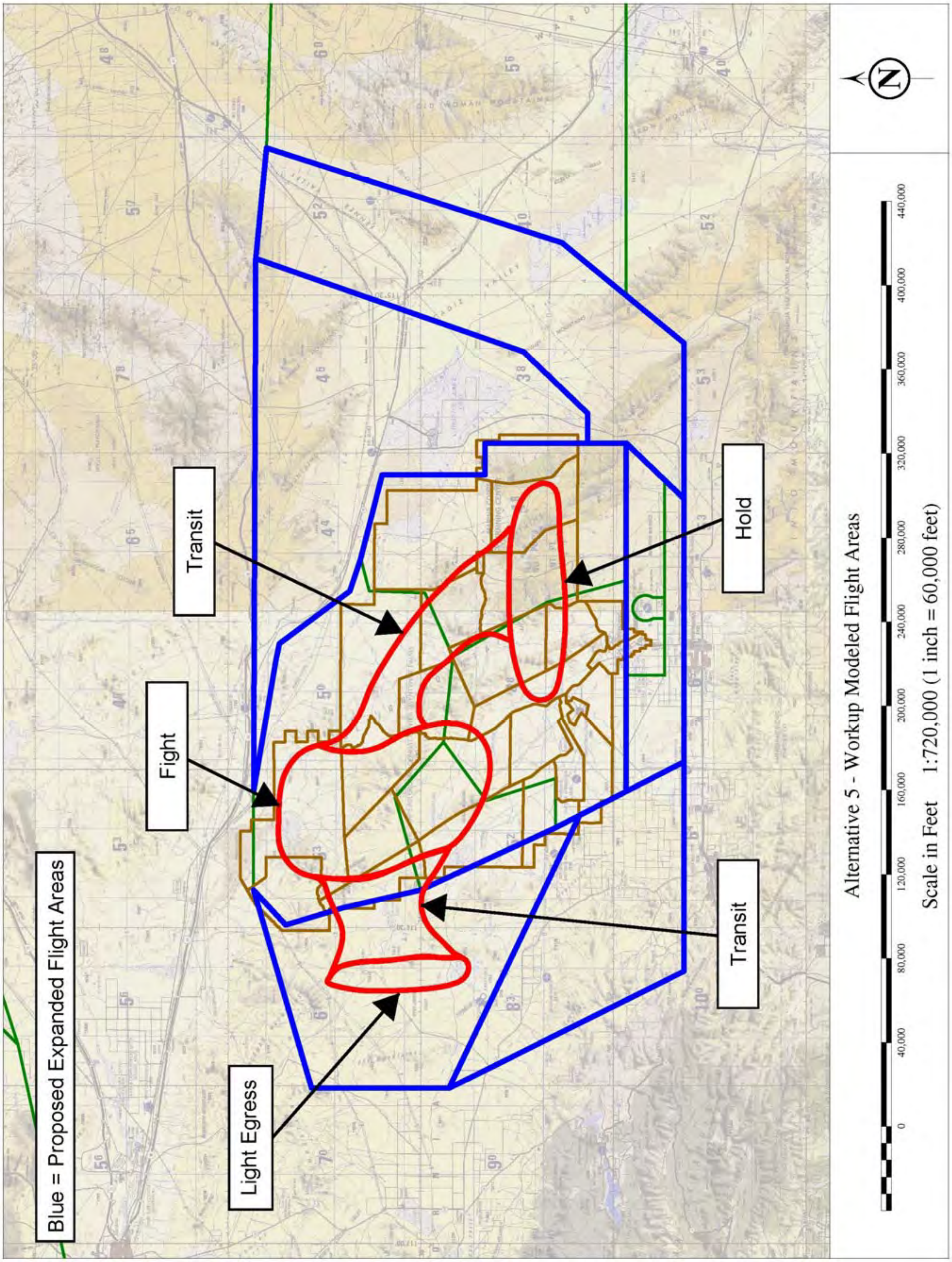


Blue = Proposed Expanded Flight Areas
Hold
Transit
Day 1
Transit
Transit
Day 2
Day 3
Alternative 3 - Finex Modeled Flight Areas
Scale in Feet 1:720,000 (1 inch = 60,000 feet)
0
40,000
80,000
120,000
160,000
200,000
240,000
280,000
320,000
360,000
400,000
440,000


Blue = Proposed Expanded Flight Areas
Transit
Fight
Light Egress
Hold
Transit
Alternative 4 - Workup Modeled Flight Areas
Scale in Feet 1:720,000 (1 inch = 60,000 feet)
0
40,000
80,000
120,000
160,000
200,000
240,000
280,000
320,000
360,000
400,000
440,000
N

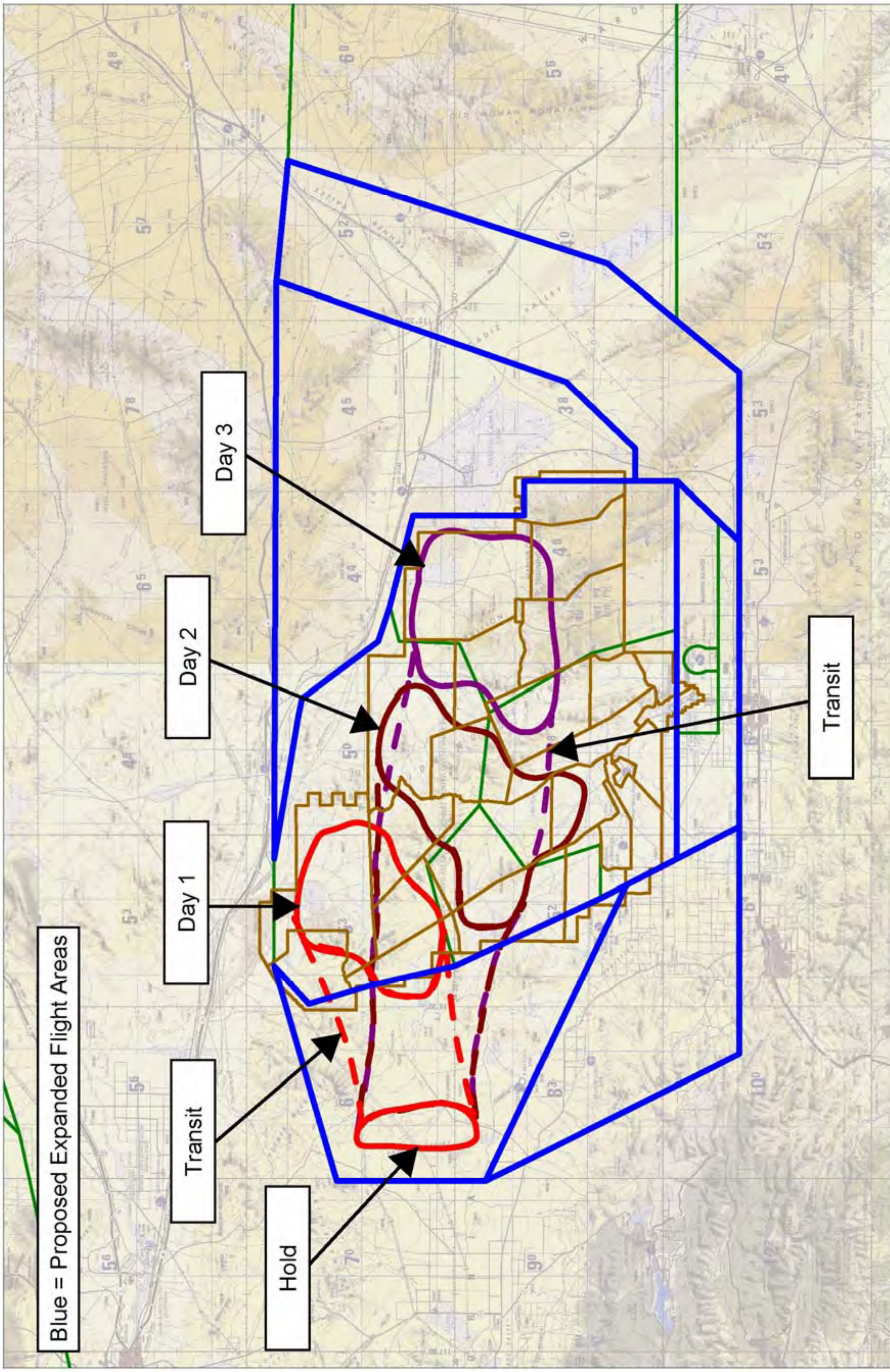


Alternative 4 - Finex Modeled Flight Areas



Alternative 5 - Workup Modeled Flight Areas

Scale in Feet 1:720,000 (1 inch = 60,000 feet)



Alternative 5 - Finex Modeled Flight Areas

Scale in Feet 1:720,000 (1 inch = 60,000 feet)

H.3.3 Flight Profiles Database

MCAGCC Twentynine Palms Modeled Airspace

MODELED CONDITIONS								TIME (% OR MINUTES) IN RANGE OF ALTITUDE (FT AGL)								
AIRSPACE ID	MISSION ID	AIRCRAFT ID	SPEED (KIAS)	POWER DESCRIPTION	POWER SETTING	POWER UNIT	PERIOD OF DAY	MIN: 22000 MAX: 22000	0 500	0 1000	500 1000	1000 5000	1500 5000	1500 22000	19000 19000	TOTAL
BRISTOL	F-18 BRI	F-18	400	CRUISE POWER	88	% NC	daytime							100		100
BRISTOL	F-5 BRI	F-5E	325	CRUISE POWER	86	% RPM	daytime							100		100
BRISTOL	KC-130 BRI	C-130H&N&P	250	TAKEOFF POWER	850	C TIT	daytime							100		100
BRISTOL	AV-8B BRI	AV-8B	300	TRAFFIC PATTERN	85	% RPM	daytime							100		100
BRISTOL	AH-1 BRI	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	daytime						100			100
BRISTOL	AH-1 BRI	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	nighttime						100			100
BRISTOL	UH-1 BRI	UH-1N	100	FLT AT 80 KTS	100	% RPM	daytime						100			100
BRISTOL	CH-53E BRI	CH-53E	120	CRUISE POWER	68	%Q-BPA	daytime						100			100
2501E	F-18 RES	F-18	400	CRUISE POWER	88	% NC	daytime		20		40	40				100
2501E	F-5 RES	F-5E	325	CRUISE POWER	86	% RPM	daytime		20		40	40				100
2501E	KC-130 RES	C-130H&N&P	250	TAKEOFF POWER	850	C TIT	daytime		20		40	40				100
2501E	AV-8B RES	AV-8B	300	TRAFFIC PATTERN	85	% RPM	daytime		20		40	40				100
2501E	AH-1 RES	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	daytime		20		40	40				100
2501E	AH-1 RES	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	nighttime		20		40	40				100
2501E	UH-1 RES	UH-1N	100	FLT AT 80 KTS	100	% RPM	daytime			100						100
2501E	CH-53E RES	CH-53E	120	CRUISE POWER	68	%Q-BPA	daytime			100						100
2501E	CH-46E RES	CH-46E	110	CRUISE POWER	79	%Q-BPA	daytime			100						100
2501E	CH-46E RES	CH-46E	110	CRUISE POWER	79	%Q-BPA	nighttime			100						100
2501N	F-18 RES	F-18	400	CRUISE POWER	88	% NC	daytime		20		40	40				100
2501N	F-5 RES	F-5E	325	CRUISE POWER	86	% RPM	daytime		20		40	40				100
2501N	KC-130 RES	C-130H&N&P	250	TAKEOFF POWER	850	C TIT	daytime		20		40	40				100
2501N	AV-8B RES	AV-8B	300	TRAFFIC PATTERN	85	% RPM	daytime		20		40	40				100
2501N	AH-1 RES	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	daytime		20		40	40				100
2501N	AH-1 RES	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	nighttime		20		40	40				100
2501N	UH-1 RES	UH-1N	100	FLT AT 80 KTS	100	% RPM	daytime			100						100
2501N	CH-53E RES	CH-53E	120	CRUISE POWER	68	%Q-BPA	daytime			100						100
2501N	CH-46E RES	CH-46E	110	CRUISE POWER	79	%Q-BPA	daytime			100						100
2501N	CH-46E RES	CH-46E	110	CRUISE POWER	79	%Q-BPA	nighttime			100						100
2501S	F-18 RES	F-18	400	CRUISE POWER	88	% NC	daytime		20		40	40				100
2501S	F-5 RES	F-5E	325	CRUISE POWER	86	% RPM	daytime		20		40	40				100
2501S	KC-130 RES	C-130H&N&P	250	TAKEOFF POWER	850	C TIT	daytime		20		40	40				100
2501S	AV-8B RES	AV-8B	300	TRAFFIC PATTERN	85	% RPM	daytime		20		40	40				100
2501S	AH-1 RES	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	daytime		20		40	40				100
2501S	AH-1 RES	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	nighttime		20		40	40				100
2501S	UH-1 RES	UH-1N	100	FLT AT 80 KTS	100	% RPM	daytime			100						100
2501S	CH-53E RES	CH-53E	120	CRUISE POWER	68	%Q-BPA	daytime			100						100
2501S	CH-46E RES	CH-46E	110	CRUISE POWER	79	%Q-BPA	daytime			100						100
2501S	CH-46E RES	CH-46E	110	CRUISE POWER	79	%Q-BPA	nighttime			100						100
2501W	F-18 RES	F-18	400	CRUISE POWER	88	% NC	daytime		20		40	40				100
2501W	F-5 RES	F-5E	325	CRUISE POWER	86	% RPM	daytime		20		40	40				100
2501W	KC-130 RES	C-130H&N&P	250	TAKEOFF POWER	850	C TIT	daytime		20		40	40				100
2501W	AV-8B RES	AV-8B	300	TRAFFIC PATTERN	85	% RPM	daytime		20		40	40				100
2501W	AH-1 RES	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	daytime		20		40	40				100
2501W	AH-1 RES	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	nighttime		20		40	40				100
2501W	UH-1 RES	UH-1N	100	FLT AT 80 KTS	100	% RPM	daytime			100						100
2501W	CH-53E RES	CH-53E	120	CRUISE POWER	68	%Q-BPA	daytime			100						100
2501W	CH-46E RES	CH-46E	110	CRUISE POWER	79	%Q-BPA	daytime			100						100
2501W	CH-46E RES	CH-46E	110	CRUISE POWER	79	%Q-BPA	nighttime			100						100
SUNDANCE	F-18 SUN	F-18	400	CRUISE POWER	88	% NC	daytime				100					100
SUNDANCE	F-5 SUN	F-5E	325	CRUISE POWER	86	% RPM	daytime				100					100
SUNDANCE	KC-130 SUN	C-130H&N&P	250	TAKEOFF POWER	850	C TIT	daytime				100					100
SUNDANCE	AV-8B SUN	AV-8B	300	TRAFFIC PATTERN	85	% RPM	daytime				100					100
SUNDANCE	AH-1 SUN	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	daytime				100					100
SUNDANCE	AH-1 SUN	AH-1G	100	LFO LITE 100 KTS	100	KNOTS	nighttime				100					100
SUNDANCE	UH-1 SUN	UH-1N	100	FLT AT 80 KTS	100	% RPM	daytime				100					100
SUNDANCE	CH-53E SUN	CH-53E	120	CRUISE POWER	68	%Q-BPA	daytime				100					100
SUNDANCE	CH-46E SUN	CH-46E	110	CRUISE POWER	79	%Q-BPA	daytime				100					100
SUNDANCE	CH-46E SUN	CH-46E	110	CRUISE POWER	79	%Q-BPA	nighttime				100					100

MCAGCC Twentynine Palms Modeled Airspace (concluded)

MODELED CONDITIONS								TIME (% OR MINUTES) IN RANGE OF ALTITUDE (FT AGL)								
AIRSPACE ID	MISSION ID	AIRCRAFT ID	SPEED (KIAS)	POWER DESCRIPTION	POWER SETTING	POWER UNIT	PERIOD OF DAY	MIN: 22000 MAX: 22000	0 500	0 1000	500 1000	1000 5000	1500 5000	1500 22000	19000 19000	TOTAL
LMTNN	MV22_110	TAKEOFF PO	110	110			daytime		100							100
LMTNN	MV22_110	TAKEOFF PO	110	110			evening		100							100
LMTNS	MV22_110	TAKEOFF PO	110	110			daytime		100							100
LMTNS	MV22_110	TAKEOFF PO	110	110			evening		100							100
LMTNS	MV22_110	TAKEOFF PO	110	110			nighttime		100							100
NOBLE	MV22_110	TAKEOFF PO	110	110			daytime		100							100
NOBLE	MV22_110	TAKEOFF PO	110	110			evening		100							100
DELTA	MV22_110	TAKEOFF PO	110	110			daytime		100							100
DELTA	MV22_110	TAKEOFF PO	110	110			evening		100							100
FASP	MV22_110	TAKEOFF PO	110	110			daytime		100							100
FASP	MV22_110	TAKEOFF PO	110	110			evening		100							100
EMERSON	MV22_110	TAKEOFF PO	110	110			daytime		100							100
EMERSON	MV22_110	TAKEOFF PO	110	110			evening		100							100
LAVIC	MV22_110	TAKEOFF PO	110	110			daytime		100							100
LAVIC	MV22_110	TAKEOFF PO	110	110			evening		100							100
LAVIC	MV22_110	TAKEOFF PO	110	110			nighttime		100							100
LAVICSUB	MV22_110	TAKEOFF PO	110	110			daytime		100							100
LAVICSUB	MV22_110	TAKEOFF PO	110	110			evening		100							100
LAVICSUB	MV22_110	TAKEOFF PO	110	110			nighttime		100							100
LMTNNSUB	MV22_110	TAKEOFF PO	110	110			daytime		100							100
LMTNNSUB	MV22_110	TAKEOFF PO	110	110			evening		100							100
NOBLESUB	MV22_110	TAKEOFF PO	110	110			daytime		100							100
NOBLESUB	MV22_110	TAKEOFF PO	110	110			evening		100							100
EMERSONSUB	MV22_110	TAKEOFF PO	110	110			daytime		100							100
EMERSONSUB	MV22_110	TAKEOFF PO	110	110			evening		100							100
LMTNSSUB	MV22_110	TAKEOFF PO	110	110			daytime		100							100
LMTNSSUB	MV22_110	TAKEOFF PO	110	110			evening		100							100
LMTNSSUB	MV22_110	TAKEOFF PO	110	110			nighttime		100							100
FASPSUB	MV22_110	TAKEOFF PO	110	110			daytime		100							100
FASPSUB	MV22_110	TAKEOFF PO	110	110			evening		100							100
DELTASUB	MV22_110	TAKEOFF PO	110	110			daytime		100							100
DELTASUB	MV22_110	TAKEOFF PO	110	110			evening		100							100

MODELED CONDITIONS								TIME (% OR MINUTES) IN RANGE OF ALTITUDE (FT AGL)								
AIRSPACE ID	MISSION ID	AIRCRAFT ID	SPEED (KIAS)	POWER DESCRIPTION	POWER SETTING	POWER UNIT	PERIOD OF DAY	MIN: 22000 MAX: 22000	0 500	0 1000	500 1000	1000 5000	1500 5000	1500 22000	19000 19000	TOTAL
FLTRK22	KC130#2FTK	C-130H&N&P	250	TAKEOFF POWER	850	C TIT	daytime	100								
FLTRK22	F18#2FLTRK	F-18	250	TRAFFIC PATTERN	82	% NC	daytime	100								
FLTRK22	AV8#2FLTRK	AV-8B	250	TRAFFIC PATTERN	70	% RPM	daytime	100								
FLTRK19	KC130#1FTK	C-130H&N&P	250	TAKEOFF POWER	850	C TIT	daytime									100
FLTRK19	F18#1FLTRK	F-18	250	TRAFFIC PATTERN	82	% NC	daytime									100
FLTRK19	AV8#1FLTRK	AV-8B	250	TRAFFIC PATTERN	70	% RPM	daytime									100
PERIMETER	MV22_220	TAKEOFF PO	110	110	VC10		daytime			100						100
PERIMETER	MV22_220	TAKEOFF PO	110	110	VC10		evening			100						100
PERIMETER	MV22_220	TAKEOFF PO	110	110	VC10		nighttime			100						100

MEBEX Flight Profiles for Work-up and FINEX Phases

Aircraft Type	Holding													
	Average Power Setting	Average Airspeed (kts)	Sortie Duration (minutes)	0-500	500-1k	1k-3k	3k-4k	0-4k	4-10k	10-14k	14k-24k	22k-24k	24k-26k	Total
AV-8B	85% RPM	300	30								90	10		100
F/A-18C/D	88% NC	400	30								90	10		100
F-35B*	85% ETR	350	30								90	10		100
Joint FW (e.g., F-16)	87% NC	400	30								90	10		100
EA-6B	80% RPM	300	30								100			100
KC-130	850 CTIT	250	30							100				100
Joint AR (KC-10, KC-135)	85% NF	450	30										100	100
AH-1/ UH-1	n/a	100	30	100										100
CH-53	n/a	120	30	100										100
MV-22	n/a	200	30						100					100
Joint RW (e.g., H-60)	n/a	100	30	100										100
UAS	Not Modeled	90	30							100				100

Aircraft Type	Transit													
	Average Power Setting	Average Airspeed (kts)	Sortie Duration (minutes)	0-500	500-1k	1k-3k	3k-4k	0-4k	4-10k	10-14k	14k-24k	22k-24k	24k-26k	Total
AV-8B	85% RPM	300	10								100			100
F/A-18C/D	88% NC	400	10								100			100
F-35B*	85% ETR	350	10								100			100
Joint FW (e.g., F-16)	87% NC	400	10								100			100
EA-6B	80% RPM	300	10								100			100
KC-130	850 CTIT	250	10						100					100
Joint AR (KC-10, KC-135)	85% NF	450	10								100			100
AH-1/ UH-1	n/a	100	10	100										100
CH-53	n/a	120	10	100										100
MV-22	n/a	200	10			80	20							100
Joint RW (e.g., H-60)	n/a	100	10	100										100
UAS	Not Modeled	90	10						100					100

MEBEX Flight Profiles for Work-up and FINEX Phases (concluded)

Aircraft Type	Range													
	Average Power Setting	Average Airspeed (kts)	Sortie Duration (minutes)	0-500	500-1k	1k-4k	3k-4k	0-4k	4-10k	10-14k	14k-24k	22k-24k	24k-26k	Total
AV-8B	85% RPM	300	38	5	1	2			35	57				100
F/A-18C/D	88% NC	400	50	5	1	2			35	57				100
F-35B*	85% ETR	350	50	5	1	2			35	57				100
Joint FW (e.g., F-16)	87% NC	400	50	5	1	2			35	57				100
EA-6B	80% RPM	300	80								100			100
KC-130	850 CTIT	250	140					100						100
Joint AR (KC-10, KC-135)	85% NF	450	200								100			100
AH-1/ UH-1	n/a	100	50	100										100
CH-53	n/a	120	50	100										100
MV-22	n/a	200	80	50	50									100
Joint RW (e.g., H-60)	n/a	100	80	100										100
UAS	Not Modeled	90	560					100						100

Aircraft Type	Transit Back													
	Average Power Setting	Average Airspeed (kts)	Sortie Duration (minutes)	0-500	500-1k	1k-3k	3k-4k	0-4k	4-10k	10-14k	14k-24k	22k-24k	24k-26k	Total
AV-8B	85% RPM	300	10								100			100
F/A-18C/D	88% NC	400	10								100			100
F-35B*	85% ETR	350	10								100			100
Joint FW (e.g., F-16)	87% NC	400	10								100			100
EA-6B	80% RPM	300	10								100			100
KC-130	850 CTIT	250	10						100					100
Joint AR (KC-10, KC-135)	85% NF	450	10								100			100
AH-1/ UH-1	n/a	100	10	100										100
CH-53	n/a	120	10	100										100
MV-22	n/a	200	10			80	20							100
Joint RW (e.g., H-60)	n/a	100	10	100										100
UAS	Not Modeled	90	10						100					100

H.4 ORDNANCE

H.4.1 Baseline Events

Baseline (CY01) Ground-to-Ground Firings for Fixed (Numbered) Ranges

Reported Ammunition Type	Description	Modeled As (if modeled)[2]	Annual Firings			
			0700-1900	1900-2200	2200-0700	Total
RANGE 101						
5.56MM (DUMMY, BLK)	Semi Automatic Rifle		310	0	0	310
	TOTAL		310	0	0	310
RANGE 101A						
12GA (00BCK,#7)	Shot Gun		199	0	0	199
5.56MM (4/1,BALL)	Semi Automatic Rifle		8,519	0	0	8,519
9MMB	Sub Machine Gun		7,240	0	0	7,240
	TOTAL		15,958	0	0	15,958
RANGE 103						
40MM	Grenade Launcher	40-MM GREN LN M203	12	0	0	12
40MM ILLUM	Grenade Launcher (Illumination Rounds)		15	0	0	15
66MM AT	Grenade (Inert)		7	0	0	7
5.56MM (M885,LINKD,4/1,BAL,M193,BM200,BLK)	Semi Automatic Rifle		325,612	0	0	325,612
7.62MM (39BAL,BLK)	Machine Gun		1,965	0	0	1,965
60MMHE	Light Weight Mortar	60-MM MORTAR	42	0	0	42
	TOTAL		327,653	0	0	327,653
RANGE 104						
SUBCAL	Sub Machine Gun		327	0	0	327
9MMB	Sub Machine Gun		1,898	0	0	1,898
ATP[1]			208	0	0	208
40MM (HEDP)	Grenade Launcher	40-MM GREN LN M203	4,983	0	0	4,983
40MM (CS,PRLKD,TP)	Grenade Launcher (Practice Rounds)		1,583	0	0	1,583
M 203	40mm Grenade Launcher (Inert Rounds)		583	0	0	583
AT4	Rocket	AT4 ROCKET	72	0	0	72
GRNFRM67 (2/5E)	Hand Grenade	HAND GRENADE M67	5,783	0	0	5,783
GRNPRM228	Practice Hand Grenade		369	0	0	369
83MM SMAW	Shoulder-Launched Multipurpose Assault Weapon	AT4 ROCKET	28	0	0	28
DRAGON PR	Practice Dragon Missile	DRAGON MISSILE (inert)	15	0	0	15
DRAGON HE	High Explosive Dragon Missile	DRAGON MISSILE	21	0	0	21
	TOTAL		15,870	0	0	15,870
RANGE 105						
9MMB	Sub Machine Gun		60	0	0	60
CSGAS	CS Hand Grenade		549	0	0	549
5.56MBAL	Semi Automatic Rifle		1,932	0	0	1,932
	TOTAL		2,541	0	0	2,541
RANGE 105A						
12GA, #7	Shot Gun		642	0	0	642
5.56MM (4/1,M193,BALSAW,BLK)	Semi Automatic Rifle		69,632	0	0	69,632
7.62MM (39BAL,BLK)	Machine Gun		7,900	0	0	7,900
9MMB	Sub Machine Gun		8,660	0	0	8,660
.50 (4&1A/T,BALL)	.50 Caliber Machine Gun		2,400	0	0	2,400
90MMHE	90mm Mortar	90-MM REC RIFLE M67	3,000	0	0	3,000
CSGAS	CS Hand Grenade		17	0	0	17
	TOTAL		92,251	0	0	92,251
RANGE 106						
60MMHE	60mm Mortar	60-MM MORTAR	2,327	1,552	0	3,879
60MMTP	60mm Mortar (Practice Rounds)	60-MM MORTAR (inert)	37	24	0	61
81MM (HE,HEPU)	81mm Mortar	81-MM MORTAR	1,824	1,216	0	3,040
81MMSMKWP	81mm Mortar (Smoke)	81-MM MORTAR (inert)	18	12	0	30
DEMO CH	Demolition Charge	TNT (8 LBS)	3	2	0	5
	TOTAL		4,209	2,806	0	7,015
RANGE 107						
5.56MM (BAL,BLK)	Semi Automatic Rifle		95,938	5,049	0	100,987
7.62MM BLK	Machine Gun		594	31	0	625
40MM	Grenade Launcher	40-MM GREN LN M203	12	1	0	13
SMOKE HC	Smoke Canisters		373	20	0	393
	TOTAL		96,917	5,101	0	102,018
	TOTAL (this page)		555,709	7,907	0	563,616

Baseline (CY01) Ground-to-Ground Firings for Fixed (Numbered) Ranges (continued)

Reported Ammunition Type	Description	Modeled As (if modeled)[2]	Annual Firings			
			0700-1900	1900-2200	2200-0700	Total
RANGE 108						
5.56MM (BALSAW,BLK)	Semi Automatic Rifle		298,826	15,727	0	314,553
7.62MM (4/1,39BAL,BLK)	Machine Gun		38,394	2,021	0	40,415
9MM	Sub Machine Gun		11	1	0	12
40MM (HEDP)	Grenade Launcher	40-MM GREN LN M203	1,383	73	0	1,456
40MM TP	Grenade Launcher (Practice Rounds)		67	4	0	71
FRAGM67	Hand Grenade	HAND GRENADE M67	45	2	0	47
60MMHE	60mm Mortar	60-MM MORTAR	14	1	0	15
TOTAL			338,740	17,829	0	356,569
RANGE 109						
.50 (4&1A/T,4&1B/T,BALL,API,BLK)	.50 Caliber Machine Gun		85,506	57,004	0	142,510
20MM (LKDTPT,TPI)	20mm Automatic Gun	20-MM GUN	1,092	728	0	1,820
25MM (TPDS,TPT)	25mm Automatic Gun	20-MM GUN	5,698	3,798	0	9,496
25MM HEI	25mm Automatic Gun	20-MM GUN	929	620	0	1,549
40MM (HEDP)	Grenade Launcher	40-MM GREN LN M203	1,670	1,114	0	2,784
83MM SMAW	Shoulder-Launched Multipurpose Assault Weapon	AT4 ROCKET	4	2	0	6
TOW (PRA,INERT)	Tow Missile (Inert)	TOW MISSILE (inert)	2	2	0	4
TOTAL			94,901	63,268	0	158,169
RANGE 110						
.50 BALL	.50 Caliber Machine Gun		23,007	0	0	23,007
40MM (HEDP)	Grenade Launcher	40-MM GREN LN M203	80,983	0	0	80,983
40MM TP	Grenade Launcher (Practice Rounds)		1,291	0	0	1,291
C4 1-1/4	Demolition Charge	C4 1-1/4	16	0	0	16
BLCAPM6	General Purpose Dispenser		1	0	0	1
TOTAL			105,298	0	0	105,298
RANGE 113						
5.56MM (BALSAW,BLK)	Semi Automatic Rifle		63,924	5,559	0	69,483
7.62MM (BPACK,39BAL,BLK)	Machine Gun		310,258	26,979	0	337,237
60MM	60mm Mortar	60-MM MORTAR	15	1	0	16
TOTAL			374,197	32,539	0	406,736
RANGE 113A						
.50 (BALL,API)	.50 Caliber Machine Gun		1,375	120	0	1,495
7.62MM (BPACK,BM82,LKD,BLK)	Machine Gun		16,433	1,429	0	17,862
5.56MM BAL	Semi Automatic Rifle		7,575	659	0	8,234
TOTAL			25,383	2,208	0	27,591
RANGE 114						
TNT 1LB	Demolition Charge	TNT (1 LBS)	26	0	0	26
C4 1-1/4	Demolition Charge	C4 1-1/4	16	0	0	16
TOTAL			42	0	0	42
RANGE 400						
.50 (BALL,BLK)	.50 Caliber Machine Gun		25,137	254	0	25,391
10MM[1]			75	1	0	76
40MM (HEDP)	Grenade Launcher	40-MM GREN LN M203	3,292	33	0	3,325
40MM (ILLUM,CS)	Grenade Launcher (Illumination Rounds, Gas)		357	3	0	360
5.56MM (BLK,BLSAW,TM196)	Semi Automatic Rifle		352,547	3,561	0	356,108
60MMHE	60mm Mortar	60-MM MORTAR	2,785	28	0	2,813
60MMTP	60mm Mortar (Practice Rounds)	60-MM MORTAR (inert)	372	4	0	376
7.62MM (39BAL,BLK,BM118,L4/1,LTM62)	Machine Gun		211,280	2,135	0	213,415
81MMHE	81mm Mortar	81-MM MORTAR	2,880	30	0	2,910
81MMILLUM	81mm Mortar (Illumination Rounds)	81-MM MORTAR (inert)	20	0	0	20
83MM SMAW	Shoulder-Launched Multipurpose Assault Weapon	AT4 ROCKET	9	0	0	9
AT4	Rocket	AT4 ROCKET	101	1	0	102
9MMB	Sub Machine Gun		429	4	0	433
BANGTORP	Bangalore Torpedo	BANGALORE M1A1 (90 LBS)	7	0	0	7
DEMO CH	Demolition Charge	TNT (8 LBS)	2	0	0	2
DRAGON HE	Dragon Missile	DRAGON MISSLE	2	0	0	2
FRAGM67	Hand Grenade	HAND GRENADE M67	24	0	0	24
TOTAL			599,319	6,054	0	605,373
TOTAL (this page)			1,537,880	121,898	0	1,659,778

Baseline (CY01) Ground-to-Ground Firings for Fixed (Numbered) Ranges (concluded)

Reported Ammunition Type	Description	Modeled As (if modeled)[2]	Annual Firings			
			0700-1900	1900-2200	2200-0700	Total
RANGE 410						
12GA, #7	Shot Gun		30	0	0	30
20MM TPI	Automatic Gun (Practice)		40	0	0	40
40MM (HEDP)	Grenade Launcher	40-MM GREN LN M203	520	5	0	525
40MM TP	Grenade Launcher (Practice)		112	1	0	113
5.56MM (BALL,,BLSAW)	Semi Automatic Rifle		116,896	1,181	0	118,077
7.62MM (39BAL,BLK)	Machine Gun		40,590	410	0	41,000
9MMB	Sub Machine Gun		519	5	0	524
CLAYMORE	Claymore Mines	CLAYMORE M18A1	2	0	0	2
TOTAL			158,709	1,602	0	160,311
RANGE 410A						
.22 CAL	.22 Caliber Machine Gun		10,687	108	0	10,795
40MM (HEDP)	Grenade Launcher	40-MM GREN LN M203	1,488	14	0	1,502
40MM (ILLUM,TP)	Grenade Launcher (Illumination Rounds, Practice)		221	2	0	223
5.56MM (TR,BAL,LINKD,BLK)	Semi Automatic Rifle		283,913	2,867	0	286,780
7.62MM (4/1,39BAL,BLK,LKD)	Machine Gun		204,336	2,064	0	206,400
83MM SMAW	Shoulder-Launched Multipurpose Assault Weapon	AT4 ROCKET	9	0	0	9
9MMB	Sub Machine Gun		18	0	0	18
GRNM69	Practice Hand Grenade		834	8	0	842
TOTAL			501,506	5,063	0	506,569
RANGE 500						
.22 CAL	.22 Caliber Machine Gun		118	15	15	148
.50 (4&1B/T,API,BALL,BLK)	.50 Caliber Machine Gun		13,889	1,737	1,737	17,363
120MM HE/PD	120mm Mortar	120-MM MORTAR	830	104	104	1,038
120 ILLUM	120mm Mortar (Illumination Rounds)	120-MM MORTAR (inert)	32	4	4	40
20MM (LKDTPT,TPI)	20mm Automatic Gun (Practice)	20-MM GUN (inert)	2,661	332	332	3,325
25MM HEI	25mm Automatic Gun	25-MM GUN	10,778	1,347	1,347	13,472
25MM(TPT,APDS,TPDS)	25mm Automatic Gun (Practice)	25-MM GUN (inert)	7,155	894	894	8,943
30MM (APIHEI)	30mm Gun (Armor Piercing Incendiary)	25-MM GUN	24	3	3	30
5.56MM BAL	Semi Automatic Rifle		640	80	80	800
7.62MM (4/1,39BAL,BLK)	Machine Gun		65,872	8,234	8,234	82,340
75MM BLK	75mm Pack Howitzer (Blank)	4.2-IN MORTAR (inert)	366	46	46	458
AT4	Rocket	AT4 ROCKET	400	50	50	500
TOTAL			102,765	12,846	12,846	128,457
RANGE 601						
C4 1-1/4	Demolition Charge	C4 1-1/4	42	0	0	42
TOTAL			42	0	0	42
RANGE 603						
.50 BALL	.50 Caliber Machine Gun		1,800	200	0	2,000
TOTAL			1,800	200	0	2,000
TOTAL (this page)			764,822	19,711	12,846	797,379
GRAND TOTAL (all pages)			2,858,411	149,516	12,846	3,020,773

[1] Unknown Ammunition (Not Modeled)

[2] Corresponding "Modeled As (If Modeled)" column presented only for modeled ammunitions.

LBS = Pound

Yellow shading indicates update regarding WR 03-11

Baseline (CY01) Ground-to-Ground Firings for Training Ranges

Reported Ammunition Type	Description	Modeled As (if modeled)[2]	Annual Firings			
			0700-1900	1900-2200	2200-0700	Total
AMERICA MINE						
.50 BALL	.50 Caliber Machine Gun		4,817	1,606	1,606	8,029
25MM APDS	25mm Automatic Gun	25-MM GUN	1,326	442	442	2,210
25MM TPT	25mm Automatic Gun	25-MM GUN	4,665	1,555	1,555	7,775
40MM	Grenade Launcher	40-MM GREN LN M203	60	20	20	100
40MM (TP,TPHEL)	Grenade Launcher (Practice Rounds)		65	22	22	109
5.56MM (BAL,BLK)	Semi Automatic Rifle		7,437	2,479	2,479	12,395
7.62MM (4/1,39BAL,BLK)	Machine Gun		10,425	3,475	3,475	17,375
81MM	81mm Mortar	81-MM MORTAR	297	99	99	495
9MMB	Sub Machine Gun		1,445	481	481	2,407
AT4	Rocket	AT4 ROCKET	5	2	2	9
DRAGON HE	Dragon Missile	DRAGON MISSILE	10	4	3	17
TOW HE	Tow Missile	TOW MISSILE	1	1	0	2
TOTAL			30,553	10,186	10,184	50,923
BLACKTOP						
.50 (BALL,BLK)	.50 Caliber Machine Gun		14,721	4,907	4,907	24,535
120 HE/PD	120mm Mortar	120-MM MORTAR	65	22	22	109
120 TPT	120mm Mortar (Practice Rounds)	120-MM MORTAR (inert)	77	26	26	129
155MM HE	155mm Howitzer	155-MM HOWITZER M109	2,483	827	827	4,137
155MM ILLUM	155mm Howitzer (Illumination Rounds)	155-MM HOWITZER M109 (inert)	59	20	20	99
20MM HEI	20mm Automatic Gun	20-MM GUN	2,361	787	787	3,935
25MM TPT	25mm Automatic Gun	25-MM GUN	1,165	388	388	1,941
40MM (ILLUM,TP)	Grenade Launcher (Illumination Rounds)		346	116	116	578
5.56MM (4/1,LINKD,BAL,BLK)	Semi Automatic Rifle		49,788	16,596	16,596	82,980
60MM HE	60mm Mortar	60-MM MORTAR	481	160	160	801
7.62MM (4/1,39BAL,BLM82)	Machine Gun		38,617	12,872	12,872	64,361
81MM ILLUM	81mm Mortar (Illumination Rounds)	81-MM MORTAR (inert)	7	2	2	11
81MMHE	81mm Mortar	81-MM MORTAR	1,323	441	441	2,205
TOW HE	Tow Missile	TOW MISSILE	2	1	1	4
TOW INERT	Tow Missile (Inert)	TOW MISSILE (inert)	17	6	6	29
TOW SIMBL	Tow Missile (Inert)	TOW MISSILE (inert)	1	0	0	1
TOTAL			111,513	37,171	37,171	185,855
BULLION						
.50 BALL	.50 Caliber Machine Gun		2,520	840	840	4,200
81MMHE	81mm Mortar	81-MM MORTAR	1	0	0	1
TOW HEAT	Tow Missile	TOW MISSILE	13	5	5	23
TOTAL			2,534	845	845	4,224
DELTA						
.50 BALL	.50 Caliber Machine Gun		11,530	3,844	3,843	19,217
120 HE/PD	120mm Mortar	120-MM MORTAR	63	21	21	105
155MM HE	155mm Howitzer	155-MM HOWITZER M109	651	218	217	1,086
155MM ILL	155mm Howitzer (Illumination Rounds)	155-MM HOWITZER M109 (inert)	7	2	2	11
2.75HY70	2.75 inch Rocket	2.75-IN ROCKET	2	1	1	4
20MMAPI	20mm Automatic Gun	20-MM GUN	90	30	30	150
40MM	Grenade Launcher	40-MM GREN LN M203	1,521	507	507	2,535
5.56MM (LINKD,BAL)	Semi Automatic Rifle		54,120	18,040	18,040	90,200
60MMHE	60mm Mortar	60-MM MORTAR	195	65	65	325
7.62MM (39BAL,LKDB,BLK)	Machine Gun		33,288	11,096	11,096	55,480
81MM ILLUM	81mm Mortar (Illumination Rounds)	81-MM MORTAR (inert)	7	3	2	12
81MMHE	81mm Mortar	81-MM MORTAR	249	84	83	416
AT4	Rocket	AT4 ROCKET	1	0	0	1
C4 1-1/4	Demolition Charge	C4 1-1/4	7	3	2	12
TOW HEAT	Tow Missile	TOW MISSILE	6	2	2	10
TOWINERT	Tow Missile (Inert)	TOW MISSILE (inert)	1	0	0	1
TOWPRA	Tow Missile (Practice)	TOW MISSILE (inert)	1	1	0	2
TOTAL			101,739	33,917	33,911	169,567
TOTAL (this page)			246,339	82,119	82,111	410,569

Baseline (CY01) Ground-to-Ground Firings for Training Ranges (continued)

Reported Ammunition Type	Description	Modeled As (if modeled)[2]	CY01 Annual Firings 0700-1900	1900-2200	2200-0700	Total
EMERSON LAKE						
.50 BALL	.50 Caliber Machine Gun		88,834	29,612	29,612	148,058
120 HE/PD	120mm Mortar	120-MM MORTAR	299	100	100	499
155MM HE	155mm Howitzer	155-MM HOWITZER M109	417	139	139	695
25MM APDS	25mm Automatic Gun (Armor Piercing)	25-MM GUN	61	20	20	101
25MM HEI	25mm Automatic Gun	25-MM GUN	4,609	1,536	1,536	7,681
25MM TPT	25mm Automatic Gun (Practice Rounds)	25-MM GUN	2,106	702	702	3,510
40MM	Grenade Launcher	40-MM GREN LN M203	319	106	106	531
40MM HEDP	Grenade Launcher	40-MM GREN LN M203	544	181	181	906
5.56MM BAL	Semi Automatic Rifle		14,470	4,823	4,823	24,116
60MMHE	60mm Mortar	60-MM MORTAR	21	7	7	35
7.62MM (39BAL,BLK)	Machine Gun		101,038	33,679	33,679	168,396
81MMHE	81mm Mortar	81-MM MORTAR	119	40	40	199
AT4	Rocket	AT4 ROCKET	4	2	2	8
9MMB	Sub Machine Gun		20	7	7	34
DEMOBLK	Demolition Charge	TNT (3.5 LBS)	1	0	0	1
SMK GREEN	Green Smoke		24	8	8	40
TOW HEAT	Tow Missile	TOW MISSILE	3	1	1	5
TOWINERT	Tow Missile (Inert)	TOW MISSILE (inert)	8	3	2	13
	TOTAL		212,897	70,966	70,965	354,828
GAYS PASS						
.50 BALL	.50 Caliber Machine Gun		5,160	1,720	1,720	8,600
155MM HE	155mm Howitzer	155-MM HOWITZER M109	276	92	92	460
155MM ILL	155mm Howitzer (Illumination Rounds)	155-MM HOWITZER M109 (inert)	10	3	3	16
5.56MM (BAL,BLK)	Semi Automatic Rifle		4,896	1,632	1,632	8,160
7.62MM (39BAL,BLK)	Machine Gun		4,560	1,520	1,520	7,600
81MMHE	81mm Mortar	81-MM MORTAR	197	66	66	329
84MM AT4	Rocket	AT4 ROCKET	12	4	4	20
9MMB	Sub Machine Gun		720	240	240	1,200
BLCAPM6	M6 Blasting Cap		10	3	3	16
C4 1-1/4	Demolition Charge	C4 1-1/4	10	3	3	16
DEMO CH	Demolition Charge	TNT (8 LBS)	1	0	0	1
MRLSPR[1]			17	6	6	29
TOWINERT	Tow Missile (Inert)	TOW MISSILE (inert)	5	2	2	9
	TOTAL		15,874	5,291	5,291	26,456
LAVA						
.50 BALL	.50 Caliber Machine Gun		2,430	810	810	4,050
25MM TPT	25mm Automatic Gun	25-MM GUN	659	220	220	1,099
40MM	Grenade Launcher	40-MM GREN LN M203	149	50	50	249
40MMTP	Grenade Launcher (Practice Rounds)		136	45	45	226
7.62M39BAL	Machine Gun		4,289	1,430	1,430	7,149
BLCAPM7	M7 Blasting Cap		3	1	1	5
C4 1-1/4	Demolition Charge	C4 1-1/4	6	2	2	10
	TOTAL		7,672	2,558	2,558	12,788
LAVIC LAKE						
2.75FBAT	2.75 inch Rocket	2.75-IN ROCKET	8	3	3	14
20MM HEI	20mm Automatic Gun	20-MM GUN	840	280	280	1,400
	TOTAL		848	283	283	1,414
LEAD MOUNTAIN						
.50 (BALL,4&1A/T,4&1B/T)	.50 Caliber Machine Gun		2,112	704	704	3,520
155MM HE	155mm Howitzer	155-MM HOWITZER M109	1,000	334	334	1,668
155MM ILL	155mm Howitzer (Illumination Rounds)	155-MM HOWITZER M109 (inert)	65	22	22	109
155MMCHEM	155mm Howitzer (Chemicals)	155-MM HOWITZER M109 (inert)	3	1	1	5
2.75M257	2.75 inch Rocket	2.75-IN ROCKET	19	6	6	31
20MM HEI	20mm Automatic Gun	20-MM GUN	120	40	40	200
5.56MM (BAL,BLK)	Semi Automatic Rifle		600	200	200	1,000
7.62MM (4/1,39BAL,BLK)	Machine Gun		2,760	920	920	4,600
81MMHE	81mm Mortar	81-MM MORTAR	336	112	112	560
81MMILLUM	81mm Mortar (Illumination Rounds)	81-MM MORTAR (inert)	115	38	38	191
81MMSMKWP	81mm Mortar (Smoke)	81-MM MORTAR (inert)	8	3	3	14
TOWHEAT	Tow Missile	TOW MISSILE	11	4	4	19
TOWINERT	Tow Missile (Inert)	TOW MISSILE (inert)	13	4	4	21
	TOTAL		7,162	2,388	2,388	11,938
	TOTAL (this page)		244,453	81,486	81,485	407,424

Baseline (CY01) Ground-to-Ground Firings for Training Ranges (concluded)

Reported Ammunition Type	Description	Modeled As (if modeled)[2]	CY01 Annual Firings 0700-1900	1900-2200	2200-0700	Total
MAUMEE						
.50 BALL	.50 Caliber Machine Gun		3,600	1,200	1,200	6,000
25MMAPDS	25mm Automatic Gun	25-MM GUN	61	20	20	101
40MM	Grenade Launcher	40-MM GREN LN M203	7	2	2	11
7.62M39BAL	Machine Gun		1,979	660	660	3,299
TOTAL			5,647	1,882	1,882	9,411
NOBLE						
40MM	Grenade Launcher	40-MM GREN LN M203	2	1	1	4
5.56MBAL	Semi Automatic Rifle		7,200	2,400	2,400	12,000
60MMHE	60mm Mortar	60-MM MORTAR	89	30	30	149
60MMTP	60mm Mortar (Practice Rounds)	60-MM MORTAR (inert)	2	1	1	4
7.62MM (39BAL,BLK)	Machine Gun		7,200	2,400	2,400	12,000
81MMHE	81mm Mortar	81-MM MORTAR	6	2	2	10
81MMILLUM	81mm Mortar (Illumination Rounds)	81-MM MORTAR (inert)	21	7	7	35
AT4	Rocket	AT4 ROCKET	1	0	0	1
C4 1-1/4	Demolition Charge	C4 1-1/4	10	3	3	16
DEMO CH	Demolition Charge	TNT (8 LBS)	1	0	0	1
TOTAL			14,532	4,844	4,844	24,220
PROSPECT						
.50 BALL	.50 Caliber Machine Gun		6,384	2,128	2,128	10,640
155MM HE	155mm Howitzer	155-MM HOWITZER M109	208	69	69	346
155MM ILL	155mm Howitzer (Illumination Rounds)	155-MM HOWITZER M109 (inert)	5	2	2	9
40MM	Grenade Launcher	40-MM GREN LN M203	169	57	57	283
40MMHEDP	Grenade Launcher	40-MM GREN LN M203	48	16	16	80
40MMTP	Grenade Launcher (Practice Rounds)		97	32	32	161
5.56MM (TR,M885,BAL,LINKD,BLK)	Semi Automatic Rifle		43,611	14,537	14,537	72,685
60MMHE	60mm Mortar	60-MM MORTAR	2,573	858	858	4,289
60MMTP	60mm Mortar (Practice Rounds)	60-MM MORTAR (inert)	136	45	45	226
7.62MM (39BAL,BLK)	Machine Gun		22,020	7,340	7,340	36,700
81MMHE	81mm Mortar	81-MM MORTAR	842	281	281	1,404
81MMILLUM	81mm Mortar (Illumination Rounds)	81-MM MORTAR (inert)	2	1	1	4
83MM SMAW	Shoulder-Launched Multipurpose Assault Weapon	AT4 ROCKET	2	1	1	4
84MMAT4	Rocket	AT4 ROCKET	33	11	11	55
9MMB	Sub Machine Gun		212	71	71	354
TOTAL			76,342	25,449	25,449	127,240
QUACKENBUSH LAKE						
.50 (BALL,BLK)	.50 Caliber Machine Gun		2,705	902	902	4,509
120 SMK/WP	120mm Mortar (Smoke)	120-MM MORTAR (inert)	62	21	21	104
155MM HE	155mm Howitzer	155-MM HOWITZER M109	1,665	555	555	2,775
155MM ILL	155mm Howitzer (Illumination Rounds)	155-MM HOWITZER M109 (inert)	17	6	6	29
155MM SMK	155mm Howitzer (Smoke)	155-MM HOWITZER M109 (inert)	8	3	3	14
40MM	Grenade Launcher	40-MM GREN LN M203	211	70	70	351
40MM PRLKD	Grenade Launcher (Practice Rounds)		490	163	163	816
5.56MM BAL	Semi Automatic Rifle		96	32	32	160
60MMHE	60mm Mortar	60-MM MORTAR	94	31	31	156
7.62MM (39BAL,BLK)	Machine Gun		6,151	2,050	2,050	10,251
81MMHE	81mm Mortar	81-MM MORTAR	1,568	523	523	2,614
81MMHEI	81mm Mortar	81-MM MORTAR	109	36	36	181
81MMILLUM	81mm Mortar (Illumination Rounds)	81-MM MORTAR (inert)	5	2	2	9
83MM SMAW	Shoulder-Launched Multipurpose Assault Weapon	AT4 ROCKET	6	2	2	10
84MMHE	84mm MAAWS	AT4 ROCKET	151	50	50	251
STINGER	Stinger Missile	AT4 ROCKET	88	28	28	144
TOW HEAT	Tow Missile	TOW MISSILE	6	2	2	10
TOTAL			13,432	4,476	4,476	22,384
RAINBOW CANYON						
155MM HE	155mm Howitzer	155-MM HOWITZER M109	21	7	7	35
165MM HE	165mm	165-MM CANNON M135	42	14	14	70
TOTAL			63	21	21	105
TOTAL (this page)			110,016	36,672	36,672	183,360
GRAND TOTAL			600,808	200,277	200,268	1,001,353

[1] Unidentified Ammunition (Not Modeled)
[2] Corresponding "Modeled As (If Modeled)" column presented only for modeled ammunition types.
LBS = Pounds
Yellow shading indicates update regarding WR 03-11

Baseline (FY02) Air-to-Ground Ordnance Expenditure for Training Ranges

Weapon Type	Description	Modeled As (if modeled)[2]	FY02 Events			
			0700-1900	1900-2200	2200-0700	Total
BOMB,GENERAL PURPOSE,MK 84 MOD (6A,3,4,1 & 2)	Low Drag General Purpose bombs	MK-84	25	8	8	41
MK 82 BOMB	Low Drag General Purpose bombs	MK-82	161	53	53	267
MK 83 BOMB THERMAL	Low Drag General Purpose bombs	MK-83	687	230	230	1,147
CLUSTER BOMB	Cluster Bombs	MK-82	146	49	49	244
BOMB,PRACTICE (MK 76,BDU-45/B,BDU-48/B)	Practice Low Drag General Purpose bombs	BDU-48	1,899	633	633	3,165
CARTRIDGE 20MM (LINKED, TARGET PRACTICE)	Automatic Gun	20-MM GUN	66,190	22,063	22,063	110,316
CARTRIDGE .50 CAL (API LINKED, BALL LINKED 100 RD)	Machine Gun		276,569	92,190	92,190	460,949
CARTRIDGE, 25MM	Automatic Gun	25-MM GUN	3,333	1,111	1,111	5,555
CARTRIDGE, 7.62MM (LINKED 4 BALL M80, NATO, LINKED 4 BALL M80)	Machine Gun		329,040	109,680	109,680	548,400
HE 2.75 RKT WARHEAD	2.75" Rocket	2.75-IN ROCKET	2,749	916	916	4,581
ILLUM 2.75 RKT WARHEAD	2.75" Rocket (Illumination Rounds)	2.75-IN ROCKET (inert)	2,092	697	697	3,486
GRENADE SMOKE (GREEN,RED,VIOLET,WHITE,YELLOW)	Grenade (Smoke)		173	58	58	289
LASER (LGTR, BDU-59A/B)	Laser Guided Low Drag General Purpose bombs (Practice Rounds)		138	46	46	230
WHD, 2.75 RKT (PRACTICE, RKT FLRE M278)	2.75" Rocket (Practice Rounds)	2.75-IN ROCKET (inert)	130	43	43	216
WHD, 5" (MK 24, MK 63)	Light Weight Gun Mount	5-IN MK41	361	121	121	603
WHD, 5" (PRACTICE MK6, WTU-11/B)	Light Weight Gun Mount (Practice Rounds)	5-IN MK41 (inert)	637	213	213	1,063
GRAND TOTAL			684,330	228,111	228,111	1,140,552

[1]Corresponding "Modeled As (If Modeled)" column presented only for modeled ordnance

Yellow shading indicates update regarding WR03-11

H.4.2 Baseline
Ordnance Firing/Target Location Maps

Baseline Fixed Ranges

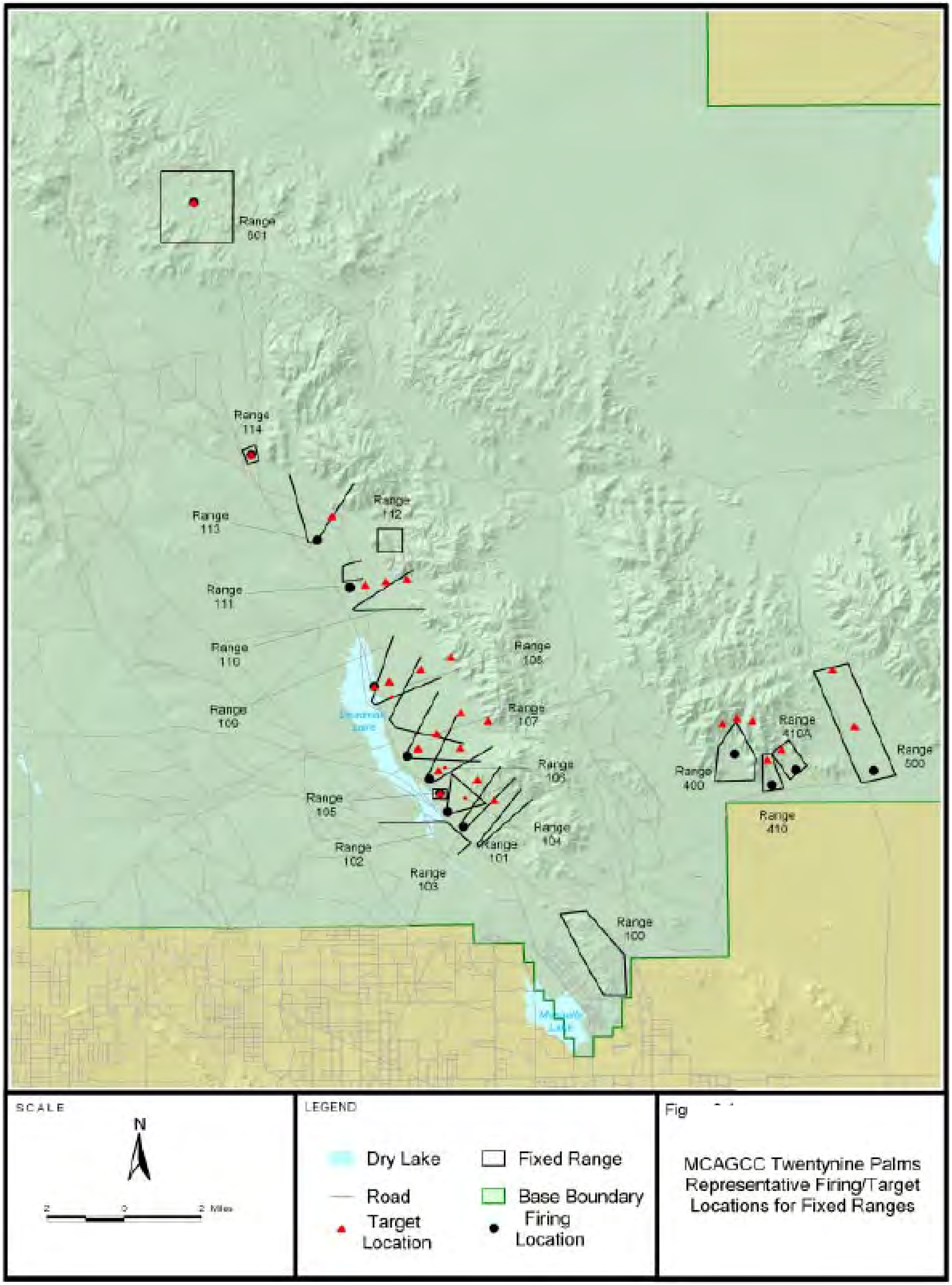
Fixed Ranges	Description	Allowable Munitions
Range 1	Known Distance Rifle Range	
Range 1A	Unknown Distance Rifle Range	
Range 2	Known Distance Pistol Range	
Range 2A	Combat Pistol Range	
Range 3	Rifle Field Expedient	
Range 3A	Multipurpose Rifle/Pistol Range	
Range 100	Squad Maneuver Range (Land navigation, nonlive)	Blank ammunition only, trip flares, flash bangs, pop-ups, smoke grenades
Range 101	Small Arms Battle Sight Zero (BZO)	9mm, 5.56mm, 38 cal, 45 cal and 12 gauge
Range 102	Land Navigation	None
Range 103	Squad Defense Fire Range (Automated)	5.56mm, 7.62mm, 40 mm and 60 mm (illumination rounds)
Range 104	Antimechanized/Grenade Range	40 mm (Except CS), Grenade, Light Anti-Tank Weapon (LAW), Dragon Missiles, Shoulder Launched Multipurpose Assault Weapon (SMAW), AT4 Rockets
Range 105	Gas Chamber	CS Capsules (tear gas)
Range 105A	Small Arms BZO	5.56mm, 7.62mm, .50 cal
Range 106	Mortar Range	60 mm, 81 mm
Range 106A	Grenade Range	
Range 107	Infantry Squad Assault Range	5.56mm, 7.62mm, 40 mm and 60 mm (illumination rounds), pyrotechnics
Range 108	Infantry Squad Battle Course	5.56mm, 7.62mm, 40 mm, SMAW, AT4 Rocket, pyrotechnics, 60 mm (illumination rounds)
Range 109	Anti-armor Live Fire Tracking Range	Dragon, Tow missiles, 25 mm Chain Gun, 40 mm (inert rounds), 9 mm spotter rounds, SMAW, M-2
Range 110	MK-19 Range	40 mm
Range 110A	M203 Grenade Range	
Range 111	Military Operations in Urban Terrain (MOUT) Assault Course	None
Range 112	Range Residue Storage	None
Range 113	Multi-purpose Machine Gun Range	5.56mm, 7.62mm, 60 mm (illumination rounds)
Range 113A	Machine Gun BZO	5.56mm, 7.62mm, .50 cal
Range 114	Combat Engineer Demolition Range	Demolitions, mines and line charges
Range 200	Non-live-fire MOUT	
Range 205	Live-fire convoy operations course	
Range 210	Live-fire MOUT facility	
Range 215	Non-Live MOUT	
Range 215A	Tactical Exploitation Site	
Range 220	Combined Arms MOUT	
Range 225	Non-live-fire MOUT	
Range 400	Company Fire and Maneuver Range	5.56mm, 7.62mm, .50 cal, 40 mm, 60 mm, 81 mm, SMAW, Dragon missile, AT4 Rocket, Hand Grenade, Pyrotechnics, Demolition and Bangalore Torpedoes
Range 401	Company Fire and Maneuver range	

Baseline Fixed Ranges (concluded)

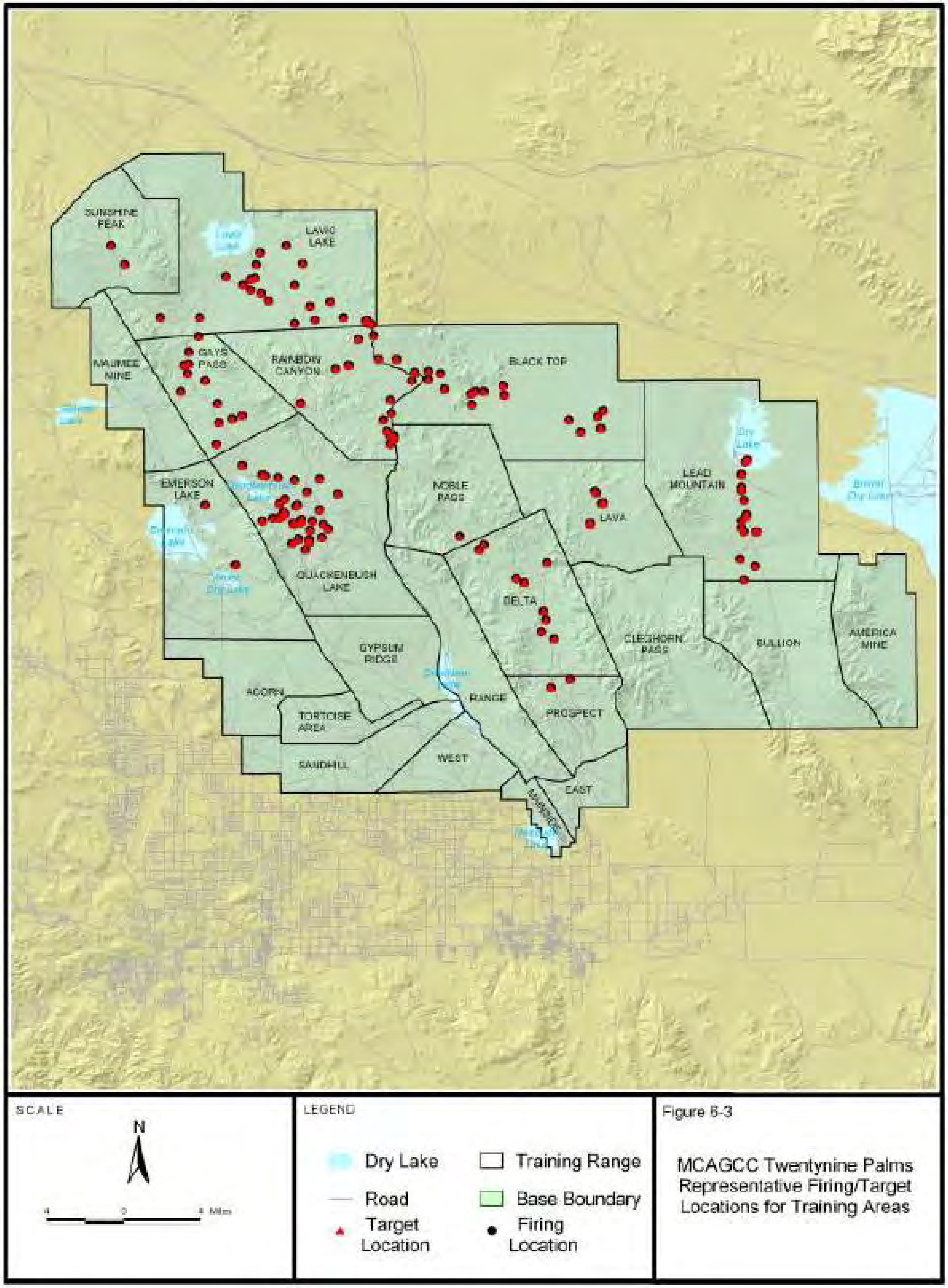
Fixed Ranges	Description	Allowable Munitions
Range 410	Platoon Fire and Maneuver Range	5.56mm, 7.62mm, .50 cal, 40 mm, 60 mm, 81 mm, SMAW, Dragon missile, AT4 Rocket, Hand Grenade, Pyrotechnics, Demolition and Bangalore Torpedoes
Range 410A	Platoon Hasty Attack and Maneuver Range	5.56mm, 7.62mm, .50 cal, 40 mm, 60 mm, 81 mm, SMAW, Dragon missile, AT4 Rocket, Hand Grenade, Pyrotechnics, Demolition and Bangalore Torpedoes
Range 500	Armor Multi-purpose Range Complex	5.56mm, 7.62mm, .50 cal, 40 mm, Tank Main Gun, 25 mm, 60 mm, 81 mm, SMAW, Dragon missile, AT4 Rocket, Hand Grenade, Pyrotechnics
Range 601	Sensitive Fuze Munition Range	Artillery and Air (MK-20, CBU-58, 63, 75, 77, 83, 2.75 " Rocket)
Range 620	Aviation training area. Urban Array used for collateral damage assessments only	
Range 630	Mock city for aerial assault training	
Range 700	Physical Fitness Training center – pneumatic mortar range	
Range 705	Combat Vehicle Operator Training Course	
Range 705A	Advanced Combat Vehicle Operator Training Course	
Range 800	Improvised Explosive Device Range	

Baseline Training Ranges

Training Areas	Area (acres)	Uses
Acorn	17486	Non live fire
America Mine	20933	Patrolling, mortar fire, infantry, Land Assault Vehicles (LAV)
Black Top	50909	Tank gunnery, artillery, small arms, major exercises
Bullion	28894	Aviation bombing and strafing, gunnery practice, artillery, infantry maneuvers, ranges
Cleghorn Pass	36345	Small arms, tank gunnery, LAV live fire maneuvers, ranges
Delta	29785	Live fire maneuvers, major exercises
East	6899	Non live fire, staging area, range
Emerson Lake	32183	Tank maneuver, aerial bombardment and targetry
Gays Pass	18331	Artillery, ground-based live fire
Gypsum Ridge	17569	Ground-based live fire, aerial impacts, tank maneuvers
Lava	22802	Battalion tactical, ground-based live fire, combined ground/air live fire, artillery
Lavic Lake	54831	Aviation, live fire, major exercises
Lead Mountain	53609	Ground-based live fire, aviation, artillery, major exercises
Maumee Mine	16124	Artillery and maneuvers
Noble Pass	24059	Aerial and ground-based live fire, tank maneuvers, infantry, CAX, artillery
Prospect	13162	Maneuvers, artillery, range
Quackenbush Lake	42470	Artillery, ground-based live fire, aviation training, maneuvers
Rainbow Canyon	25599	Maneuvers, artillery, range
Range	21767	Aerial bombardment, fixed ranges, sensitive fuze ranges
Sandhill	16808	Maneuvers, staging areas, Expeditionary Facilities, ESB
Sunshine Peak	22921	Emergency drops
West	10635	Non-live fire maneuvers, staging area for major exercises, drop zones



Representative Firing/Target Locations for Baseline Fixed Ranges



Representative Firing/Target Locations for Baseline Training Ranges

H.4.3 Proposed Events

The Baseline ordanance operations of approximately 1 million live and inert munitions rounds was based on CY2001 ordnance tempo as reported in the 2003 RAICUZ study (WR 03-11). Since that time training operations have increased in support of the Iraq and Afghan war efforts to an estimated 5 million munition rounds annually. For the 2014-15 time frame land-use planning is anticipated that training activities will decrease significantly from current (2010) tempo as war efforts are reduced but to not less than 2 million munition rounds annually. It was assumed that the distribution of weapon type and firing/target locations remained the same as the 2003 RAICUZ study. The munitions tempo scaled accordingly through present and into the 2014-15 scenario. Therefore the No Action Alternative was assumed to be twice (2x) the Baseline (approximately 2 million live and inert munition rounds) with the same weapon type and firing/target location distributions. The No Action Activity represents existing, on-going training activities. All proposed activity including the MEBEX, FINEX and MEB Building Block is in addition to No Action Activity.

No Action Alternative = Baseline × 2

Alternative 1 = No Action (but with 25% of the No Action numbers of events relocated to the Western Study Area for MEB Building Block) + Alt 1 MEBEX Work-Up + Alt 1 FINEX.

Alternative 2 = No Action (but with 25% of the No Action numbers of events relocated to the Western Study Area for MEB Building Block) + Alt 2 MEBEX Work-Up + Alt 2 FINEX.

Alternative 3 = No Action (but with 25% of the No Action numbers of events relocated to the Eastern Study Area for MEB Building Block) + Alt 3 MEBEX Work-Up + Alt 3 FINEX.

Alternative 4 = No Action + Alt 4 MEBEX Work-Up + Alt 4 FINEX.

Alternative 5 = No Action + Alt 5 MEBEX Work-Up + Alt 5 FINEX.

Alternative 6 = No Action (but with 25% of the No Action numbers of events relocated to the Western Study Area for MEB Building Block) + Alt 6 MEBEX Work-Up + Alt 6 FINEX.

Numbers of MEBEX and FINEX ordnance events are identical for each action Alternative; only locations where they occur would be different among the action Alternatives.

Proposed MEBEX Ground-To-Ground Firings

Munitions Type	Reported Ammuntition Type	Modeled As (If Modeled)	Annual MEBEX Work-up 0700-1900	Annual MEBEX Work-up 1900-2200	Annual MEBEX Work-up 2200-0700	Annual MEBEX Work-up Total	Annual FINEX 0700-1900	Annual FINEX 1900-2200	Annual FINEX 2200-0700	Annual FINEX Total	Annual Total 0700-1900	Annual Total 1900-2200	Annual Total 2200-0700	Annual Total Total
Cartridges smaller than 30 mm	A059 5.56MM BALL		104664	37380	7476	149,520	37,380	8,971	28,409	74,760	142,044	46,351	35,885	224,280
	A063 5.56MM TRACER		17942.4	6408	1281.6	25,632	6,408	1,538	4,870	12,816	24,350	7,946	6,152	38,448
	A064 5.56MM 4&1 LINK		143354.4	51198	10239.6	204,792	51,198	12,288	38,910	102,396	194,552	63,486	49,150	307,188
	A131 7.62MM 4&1 LINK		129360	46200	9240	184,800	46,200	11,088	35,112	92,400	175,560	57,288	44,352	277,200
	A576 CAL .50 4&1 LINK		37800	13500	2700	54,000	13,500	3,240	10,260	27,000	51,300	16,740	12,960	81,000
	A976 25MM TP-T	25-MM GUN	3805.2	1359	271.8	5,436	1,359	326	1,033	2,718	5,164	1,685	1,305	8,154
Cartridges 30-75 mm	B519 40MM TP	40-MM GREN LN M203	3166.8	1131	226.2	4,524	1,131	271	860	2,262	4,298	1,402	1,086	6,786
	B535 40MM WSP	40-MM GREN LN M203	554.4	198	39.6	792	198	48	150	396	752	246	190	1,188
	B576 40MM TP (MK 19)	40-MM GREN LN M203	6232.8	2226	445.2	8,904	2,226	534	1,692	4,452	8,459	2,760	2,137	13,356
	B630 60MM WP LWCMS	60-MM MORTAR	61.6	22	4.4	88	12	3	9	24	74	25	14	112
	B643 60MM HEDP	60-MM MORTAR	1386	495	99	1,980	270	65	205	540	1,656	560	304	2,520
	B647 60MM ILLUM	60-MM MORTAR (firing only)	154	55	11	220	30	7	23	60	184	62	34	280
Cartridges 75 mm and larger	C784 120MM TP-T	120-MM MORTAR	770	275	55	1,100	150	36	114	300	920	311	169	1,400
	C785 120MM TPCSD-T	120-MM MORTAR	770	275	55	1,100	150	36	114	300	920	311	169	1,400
	C868 81MM HEPD	81-MM MORTAR	4219.6	1507	301.4	6,028	822	197	625	1,644	5,042	1,704	926	7,672
	C870 81MM WP	81-MM MORTAR	215.6	77	15.4	308	42	10	32	84	258	87	47	392
	C871 81MM ILLUM	81-MM MORTAR (firing only)	292.6	104.5	20.9	418	57	14	43	114	350	118	64	532
	C995 AT-4	AT-4 ROCKET	33.6	12	2.4	48	12	3	9	24	46	15	12	72
Projectiles, Canisters, and Charges	D505 155MM ILLUM	155-MM HOWITZER M109 (firing only)	554.4	198	39.6	792	108	26	82	216	662	224	122	1,008
	D528 155MM SMK M825	155-MM HOWITZER M109 (firing only)	154	55	11	220	30	7	23	60	184	62	34	280
	D532 CHG 155 RAP	155-MM HOWITZER M109	107.8	38.5	7.7	154	21	5	16	42	129	44	24	196
	D533 CHG REDBAG	155-MM HOWITZER M109	2571.8	918.5	183.7	3,674	501	120	381	1,002	3,073	1,039	564	4,676
	D541 CHG WHITEBAG	155-MM HOWITZER M109	7869.4	2810.5	562.1	11,242	1,533	368	1,165	3,066	9,402	3,178	1,727	14,308
	D544 155MM HE	155-MM HOWITZER M109	9717.4	3470.5	694.1	13,882	1,893	454	1,439	3,786	11,610	3,925	2,133	17,668
	D579 PRJ 155MM RA	155-MM HOWITZER M109	107.8	38.5	7.7	154	21	5	16	42	129	44	24	196
Grenades	G878 FUZE GRENADE PRACTICE		168	60	12	240	60	14	46	120	228	74	58	360
	G930GRENADE SMOKE TA		42	15	3	60	15	4	11	30	57	19	14	90
	G940GRENADE SMOKE GREEN		50.4	18	3.6	72	18	4	14	36	68	22	17	108
	G945GRENADE SMOKE YELLOW		50.4	18	3.6	72	18	4	14	36	68	22	17	108
Rockets, Rocket Motors, and Igniters	HX05 ROCKET SMAW HE	83-MM SMAW	25.2	9	1.8	36	9	2	7	18	34	11	9	54
	HX07 ROCKET SMAW PRACT	83-MM SMAW (firing only)	33.6	12	2.4	48	12	3	9	24	46	15	12	72
	J143 ROCKET MOTOR 5”		8.4	3	0.6	12	3	1	2	6	11	4	3	18

Proposed MEBEX Ground-To-Ground Operations (concluded)

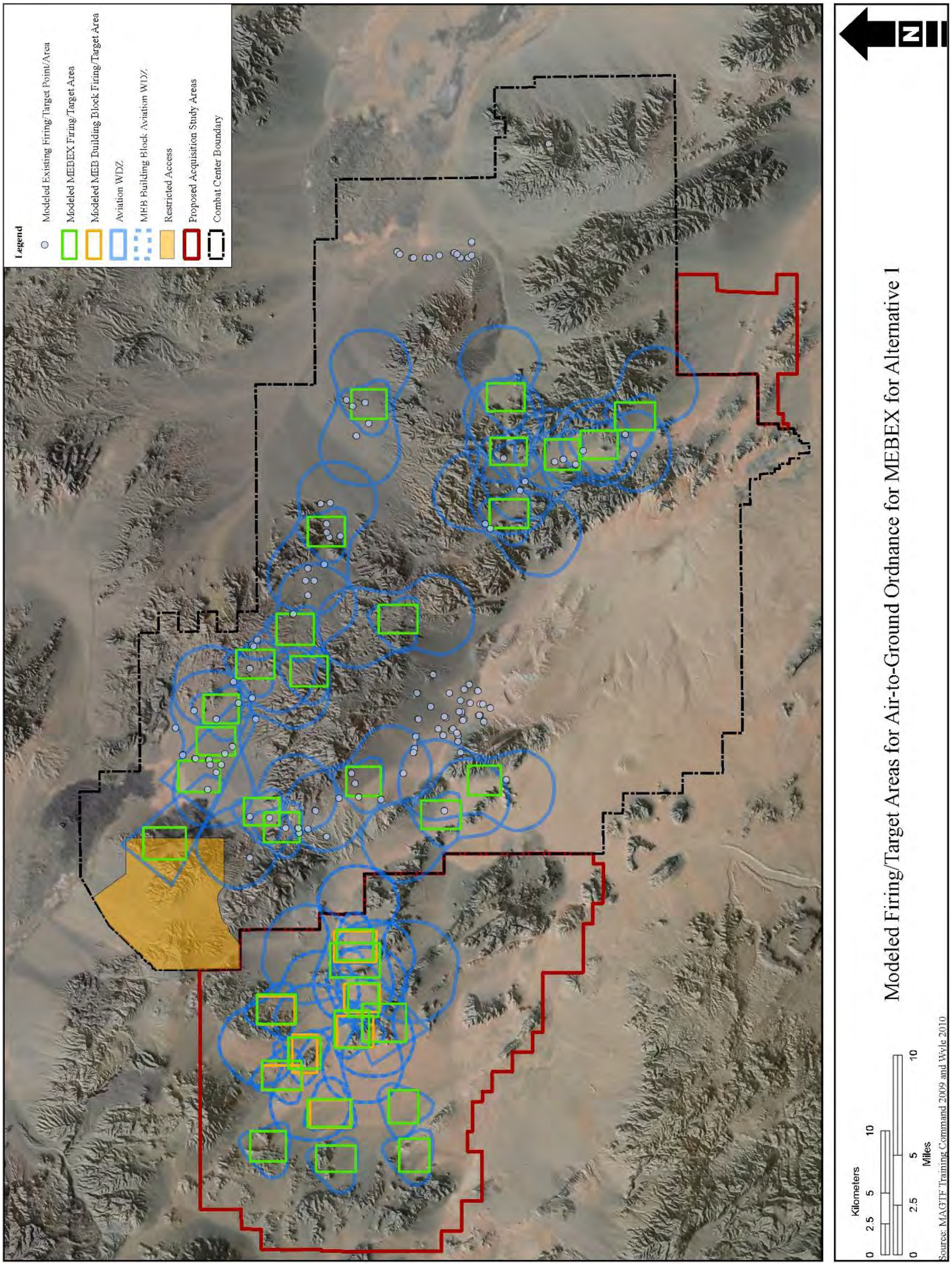
Munitions Type	Reported Ammuntition Type	Modeled As (If Modeled)	Annual MEBEX Work-up 0700-1900	Annual MEBEX Work-up 1900-2200	Annual MEBEX Work-up 2200-0700	Annual MEBEX Work-up Total	Annual FINEX 0700-1900	Annual FINEX 1900-2200	Annual FINEX 2200-0700	Annual FINEX Total	Annual Total 0700-1900	Annual Total 1900-2200	Annual Total 2200-0700	Annual Total Total
Mines and Smoke Pots	K143 CLAYMORE MINE	CLAYMORE M18A1	67.2	24	4.8	96	24	6	18	48	91	30	23	144
Signals and Simulators	L307 SIGNAL WHITE STAR CLSTR		50.4	18	3.6	72	18	4	14	36	68	22	17	108
	L312 SIGNAL WHITE STAR PARACHUTE		50.4	18	3.6	72	18	4	14	36	68	22	17	108
	L314 SIGNAL GREEN STAR CLSTR		50.4	18	3.6	72	18	4	14	36	68	22	17	108
	L324 SIGNAL GREEN STAR PARACHUTE		16.8	6	1.2	24	6	1	5	12	23	7	6	36
Blasting Caps, Demolition Charges, and Detonators	M028 BANGALORE	BANGALORE M1A1 (90 LBS)	8.4	3	0.6	12	3	1	2	6	11	4	3	18
	M032 DEMO 1LB TNT	TNT (1 LBS)	33.6	12	2.4	48	12	3	9	24	46	15	12	72
	M039 DEMO CRTR 40 LB	CRATER CHRG (40 LB)	16.8	6	1.2	24	6	1	5	12	23	7	6	36
	M130 CAP BLASTING ELECTRIC		142.8	51	10.2	204	51	12	39	102	194	63	49	306
	M131 CAP BLASTING NONELECTRIC		142.8	51	10.2	204	51	12	39	102	194	63	49	306
	M421 DEMO SHPD 40LB	SHAPE CHARGE M3 SERIES (40 LB)	16.8	6	1.2	24	6	1	5	12	23	7	6	36
	M456 DETONATION CORD		7140	2550	510	10,200	2,550	612	1,938	5,100	9,690	3,162	2,448	15,300
	M670 FUZE BLASTING TIME		562.8	201	40.2	804	201	48	153	402	764	249	193	1,206
	M757 DEMOLITION M183 W/ACC		16.8	6	1.2	24	6	1	5	12	23	7	6	36
	M766 IGNITER TIME BLASTING		142.8	51	10.2	204	51	12	39	102	194	63	49	306
	ML25 LINE CHARGE HE		8.4	3	0.6	12	3	1	2	6	11	4	3	18
	MN79 APOBS		8.4	3	0.6	12	3	1	2	6	11	4	3	18
Fuses and Primers	N289 FUZE ELEC TIME		394.8	141	28.2	564	141	34	107	282	536	175	135	846
	N340 FUZE PD M739		5359.2	1914	382.8	7,656	1,914	459	1,455	3,828	7,273	2,373	1,837	11,484
	N523 PRIMER		5745.6	2052	410.4	8,208	2,052	492	1,560	4,104	7,798	2,544	1,970	12,312
Guided Missiles	PB99 TOW PRAC	TOW MISSILE (firing only)	33.6	12	2.4	48	12	3	9	24	46	15	12	72
	WF10 TOW E-MIOC	TOW MISSILE	33.6	12	2.4	48	12	3	9	24	46	15	12	72
	Subtotal		496,286	177,245	35,449	708,980	172,545	41,411	131,134	345,090	668,831	218,656	166,583	1,054,070

TAMCN	Surface-to-Surface Weapons	Modeled As	MEBEX 0700-1900	MEBEX 1900-2200	MEBEX 2200-0700	MEBEX Total	FINEX 0700-1900	FINEX 1900-2200	FINEX 2200-0700	FINEX Total	Total 0700-1900	Total 1900-2200	Total 2200-0700	Total
E0207	JAVELIN (M98A1)	DRAGON MISSILE	22	8	2	32	8	2	6	16	30	10	8	48
E0671	155-MM Howitzer (M777)	155-MM TOW HOWITZER M198	17	6	1	24	6	1	5	12	23	7	6	36
E0915	Rocket Launcher (83mm, MK153, Mod 0)	83-MM SMAW	78	28	6	112	28	7	21	56	106	35	27	168
E0935	TOW Launcher (M220A3)	TOW MISSILE	47	17	3	67	17	4	13	33	63	21	16	100
E0980	0.50 Cal Machine Gun (Browning, M2)		427	153	31	611	153	37	116	305	580	189	147	916
E0989	M240B Machine Gun (7.62mm)		483	173	35	691	173	41	131	345	656	214	166	1,036
E0994	40-MM Grenade Launcher (MK-19, Mod 3)	40-MM GREN LN M203	315	113	23	451	113	27	86	225	428	140	108	676
E1065	60-MM Mortar (M224)	60-MM MORTAR	25	9	2	36	9	2	7	18	34	11	9	54
E1070	120-MM Mortar	120-MM MORTAR	6	2	0	8	2	0	2	4	8	2	2	12
E1095	81-MM Mortar (M252)	81-MM MORTAR	22	8	2	32	8	2	6	16	30	10	8	48
	Subtotal		1,444	516	103	2,063	516	124	392	1,031	1,960	639	495	3,094
										Annual GG Total	**670,791**	**219,295**	**167,078**	**1,057,164**

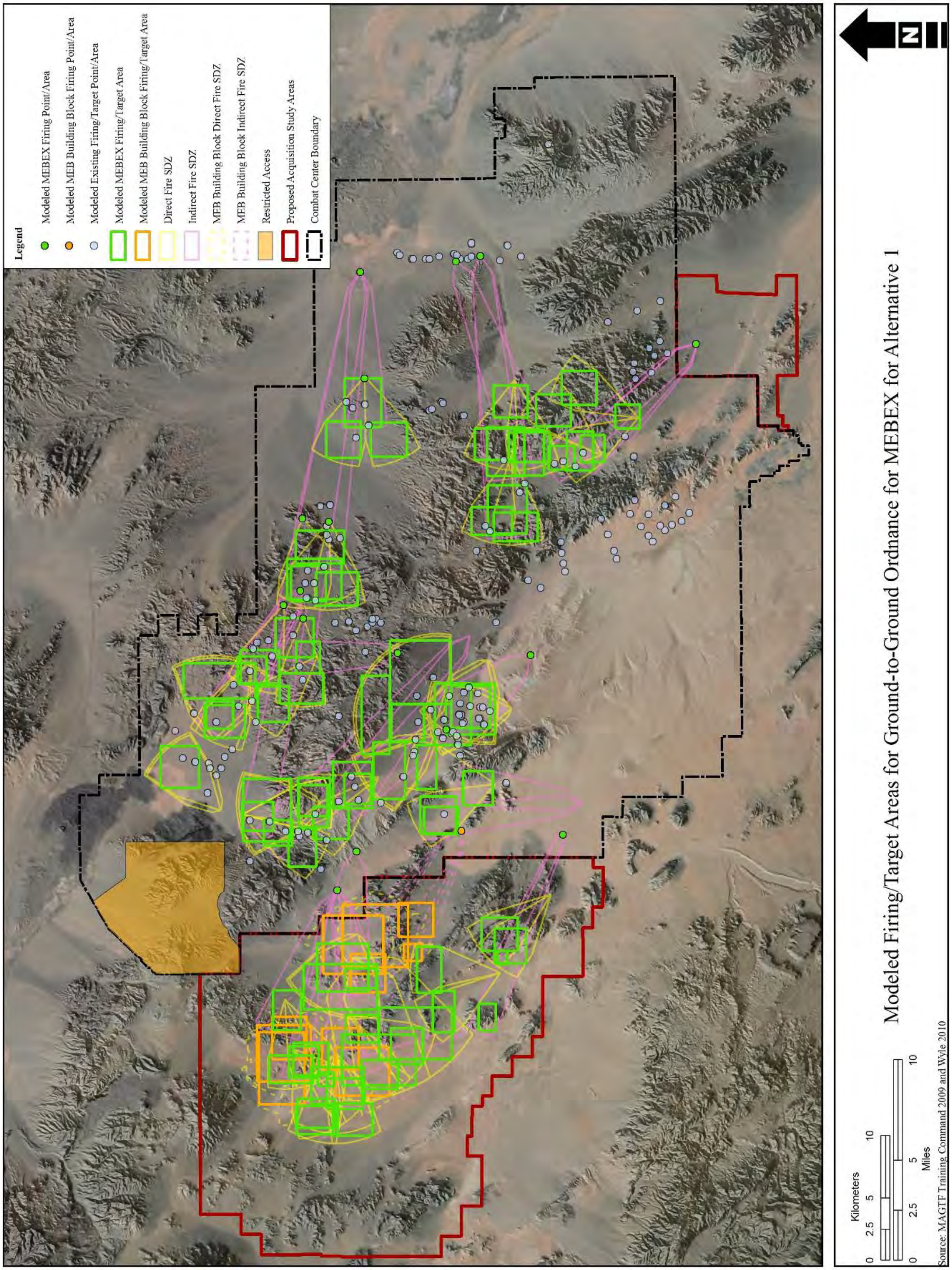
Proposed Air-To-Ground Ordnance Expenditure

Munitions Type	Reported Ammuntition Type	Description	Modeled As (If Modeled)	Annual MEBEX Work-Up 0700-1900	Annual MEBEX Work-Up 1900-2200	Annual MEBEX Work-Up 2200-0700	Annual MEBEX Work-Up Total	Annual FINEX 0700-1900	Annual FINEX 1900-2200	Annual FINEX 2200-0700	Annual FINEX Total	Annual Total 0700-1900	Annual Total 1900-2200	Annual Total 2200-0700	Annual Total Total
Air-to-Ground Missiles	AGM-65E	Laser Maverick Missile		-	-	-	-	-	-	-	-	-	-	-	-
Unguided Munitions	MK-76 Inert	25# GP Practice bomb		1,092	390	78	1,560	195	47	148	390	1,287	437	226	1,950
	MK-82	500# GP bomb	MK-82	420	150	30	600	210	50	160	420	630	200	190	1,020
	MK-83	1000# HE GP bomb	MK-83	50	18	4	72	30	7	23	60	80	25	26	132
	Mk-83 Inert	1000# Inert bomb		67	24	5	96	30	7	23	60	97	31	28	156
	MK-84	2000# GP bomb	MK-84	-	-	-	-	18	4	14	36	18	4	14	36
	BDU-45	500# Inert practice bomb		252	90	18	360	-	-	-	-	252	90	18	360
	2.75" Rockets	HE/WP/RP rocket	2.75-IN ROCKET	4,200	1,500	300	6,000	1,200	288	912	2,400	5,400	1,788	1,212	8,400
	5" ZUNI	HE/WP/ILLUM rocket	3.5-IN MISSILE	403	144	29	576	108	26	82	216	511	170	111	792
Guided Munitions	MK 114	Hellfire Missile	HELLFIRE MISSILE	17	6	1	24	24	6	18	48	41	12	19	72
	GBU-12	500# LGB	MK-82	202	72	14	288	72	17	55	144	274	89	69	432
	GBU-16	1000# LGB	MK-83	-	-	-	-	27	6	21	54	27	6	21	54
	GBU-10	2000# LGB	MK-84	3	1	0	4	-	-	-	-	3	1	0	4
	GBU-38 version 4	250# LCD JDAM	MK-81	76	27	5	108	72	17	55	144	148	44	60	252
	GBU-38	500# JDAM	MK-82	202	72	14	288	72	17	55	144	274	89	69	432
	GBU-54	500# Laser JDAM	MK-82	67	24	5	96	24	6	18	48	91	30	23	144
	GBU-32	1000# JDAM	MK-83	8	3	1	12	6	1	5	12	14	4	5	24
	GBU-31	2000# JDAM	MK-84	36	13	3	52	6	1	5	12	42	14	7	64
	GBU-24	Hard Target Penetrator	MK-84	3	1	0	4	-	-	-	-	3	1	0	4
	GBU-39	Small Diameter missile (SDM)	MK-81	6	2	0	8	8	2	6	16	14	4	6	24
	BGM-71	TOW Missile	TOW MISSILE	17	6	1	24	30	7	23	60	47	13	24	84
	LGTR	Laser Guided Training Round		202	72	14	288	72	17	55	144	274	89	69	432
	BLU-111	500# Penetrator	MK-82	168	60	12	240	72	17	55	144	240	77	67	384
Aircraft Gun Systems Munitions	20-MM	Projectile Gun Unit TP/HEI	20-MM GUN	100,800	36,000	7,200	144,000	27,000	6,480	20,520	54,000	127,800	42,480	27,720	198,000
	25-MM TP	Projectile Gun Unit 23/U	25-MM GUN	84,000	30,000	6,000	120,000	22,500	5,400	17,100	45,000	106,500	35,400	23,100	165,000
	25-MM HEI	Projectile Gun Unit 25/U	25-MM GUN	-	-	-	-	8,000	1,920	6,080	16,000	8,000	1,920	6,080	16,000
	7.62-MM	Helicopter gun		184,800	66,000	13,200	264,000	36,000	8,640	27,360	72,000	220,800	74,640	40,560	336,000
	.50 Cal	Helicopter door/tail gun		427,000	152,500	30,500	610,000	90,000	21,600	68,400	180,000	517,000	174,100	98,900	790,000
Flares	LUU-19	IR Parachute Flare		378	135	27	540	225	54	171	450	603	189	198	990
	Luu-2 B/B	Parachute Flare		269	96	19	384	144	35	109	288	413	131	129	672
	Decoy Flares	IR EO expendable		10,920	3,900	780	15,600	1,800	432	1,368	3,600	12,720	4,332	2,148	19,200
Chaff	Decoy Chaff	Radar expendable countermeasures		3,640	1,300	260	5,200	600	144	456	1,200	4,240	1,444	716	6,400
		Total		819,297	292,606	58,521	1,170,424	188,545	45,251	143,294	377,090	1,003,602	336,413	201,099	1,541,114

H.4.4 Proposed
Ordnance Firing/Target Location Maps

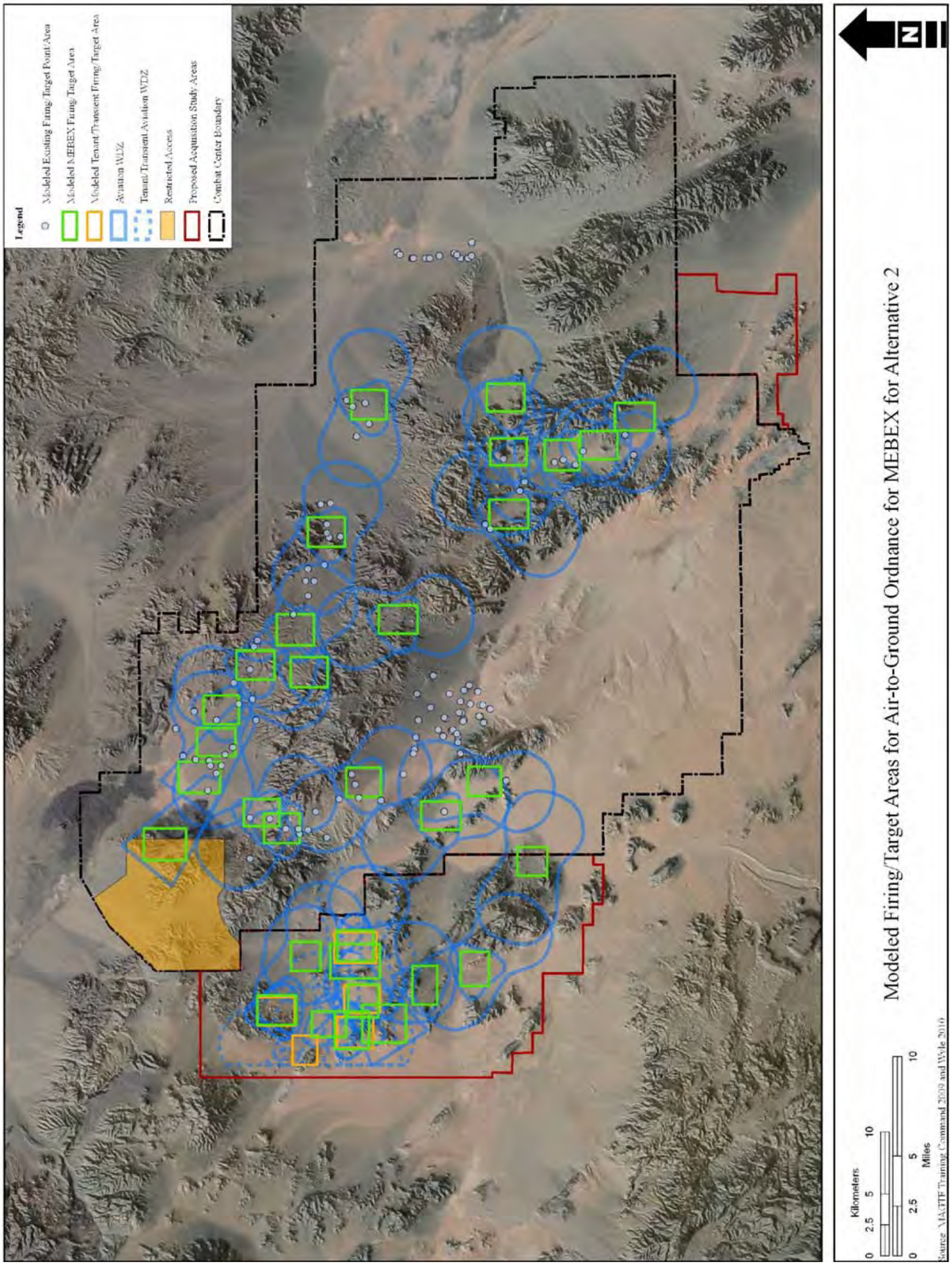


Modeled Firing/Target Areas for Air-to-Ground Ordnance for MEBEX for Alternative 1

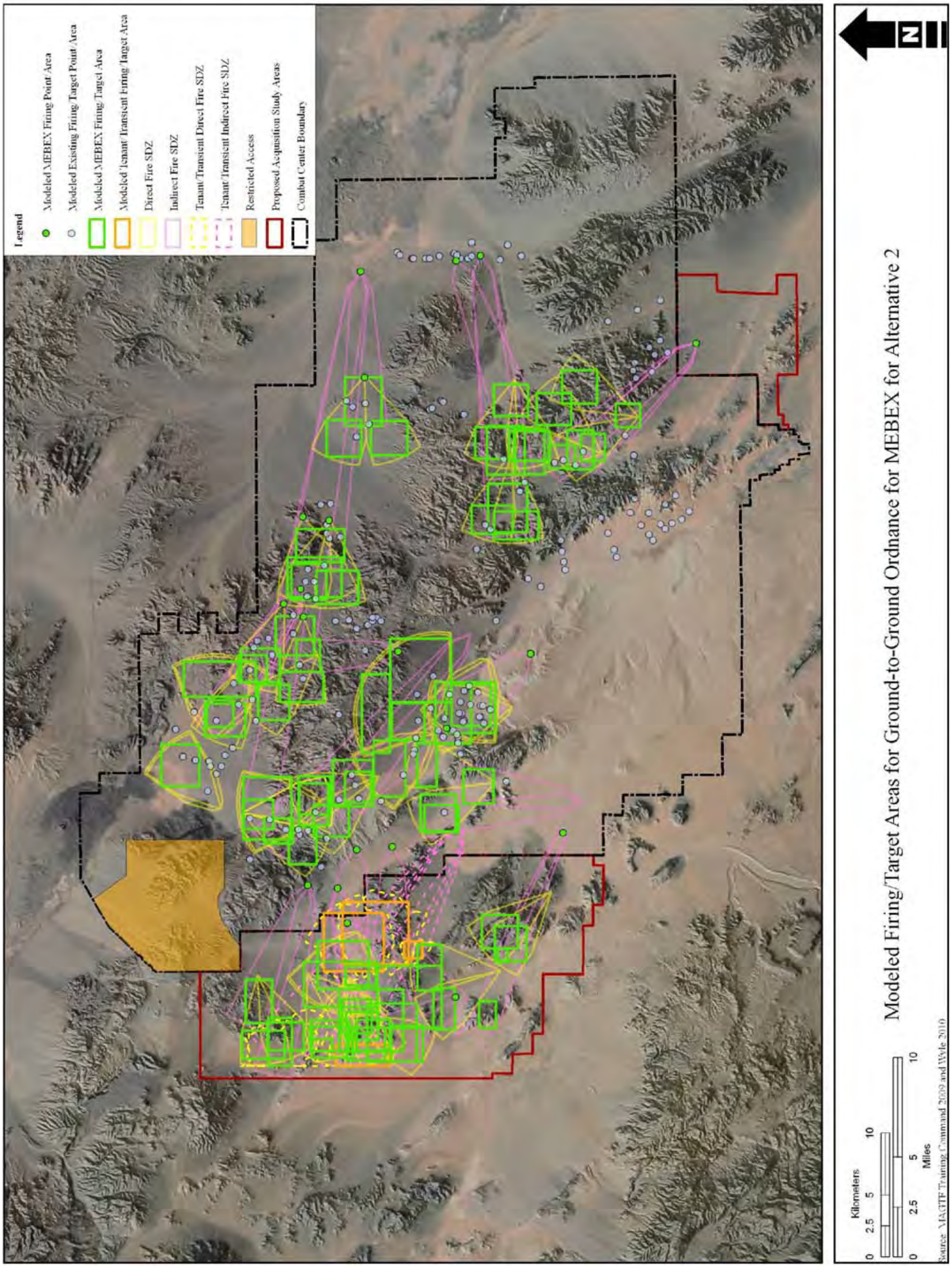


Modeled Firing/Target Areas for Ground-to-Ground Ordnance for MEBEX for Alternative 1

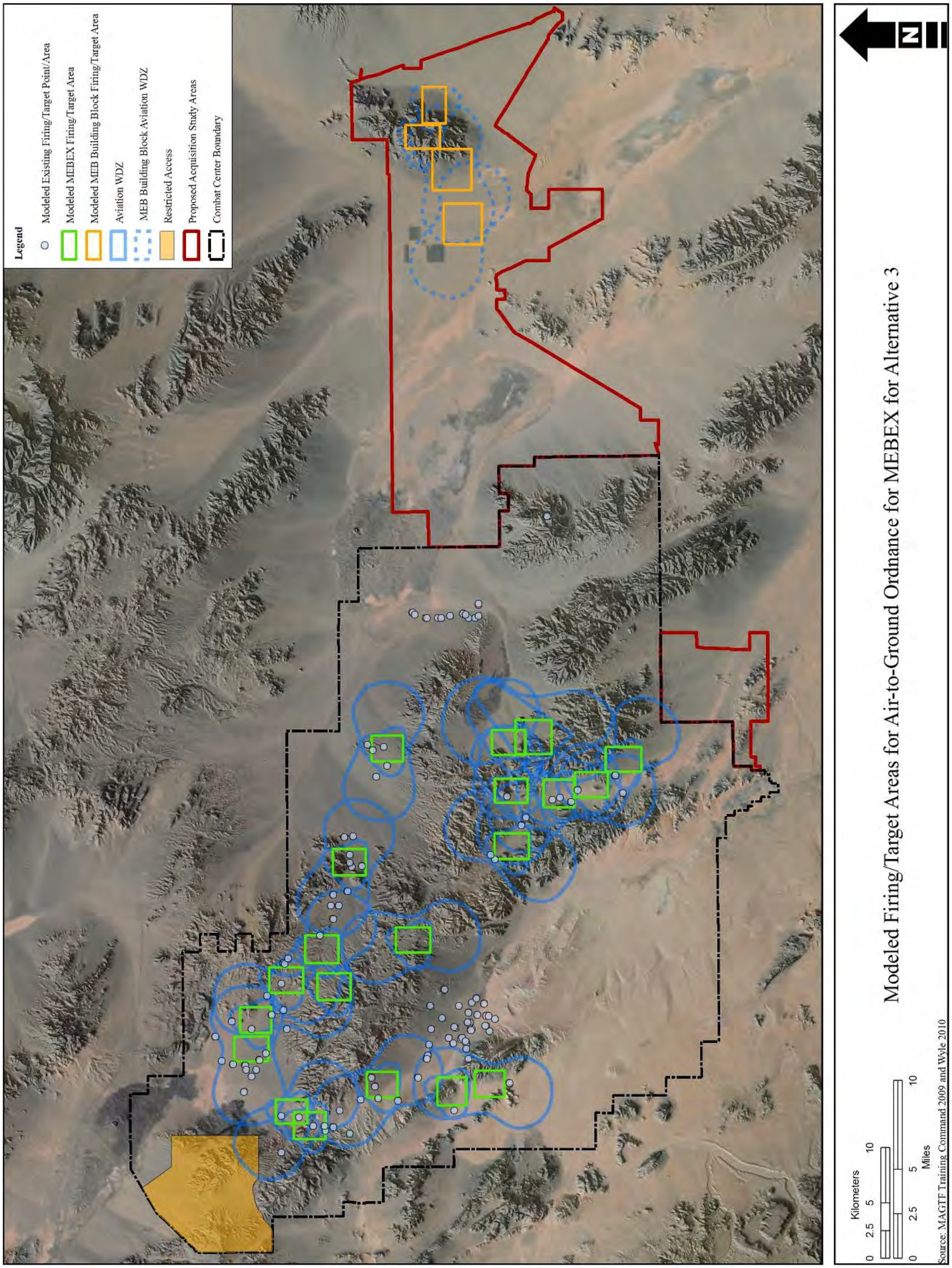
Source: MAGTF Training Command 2009 and Wyle 2010



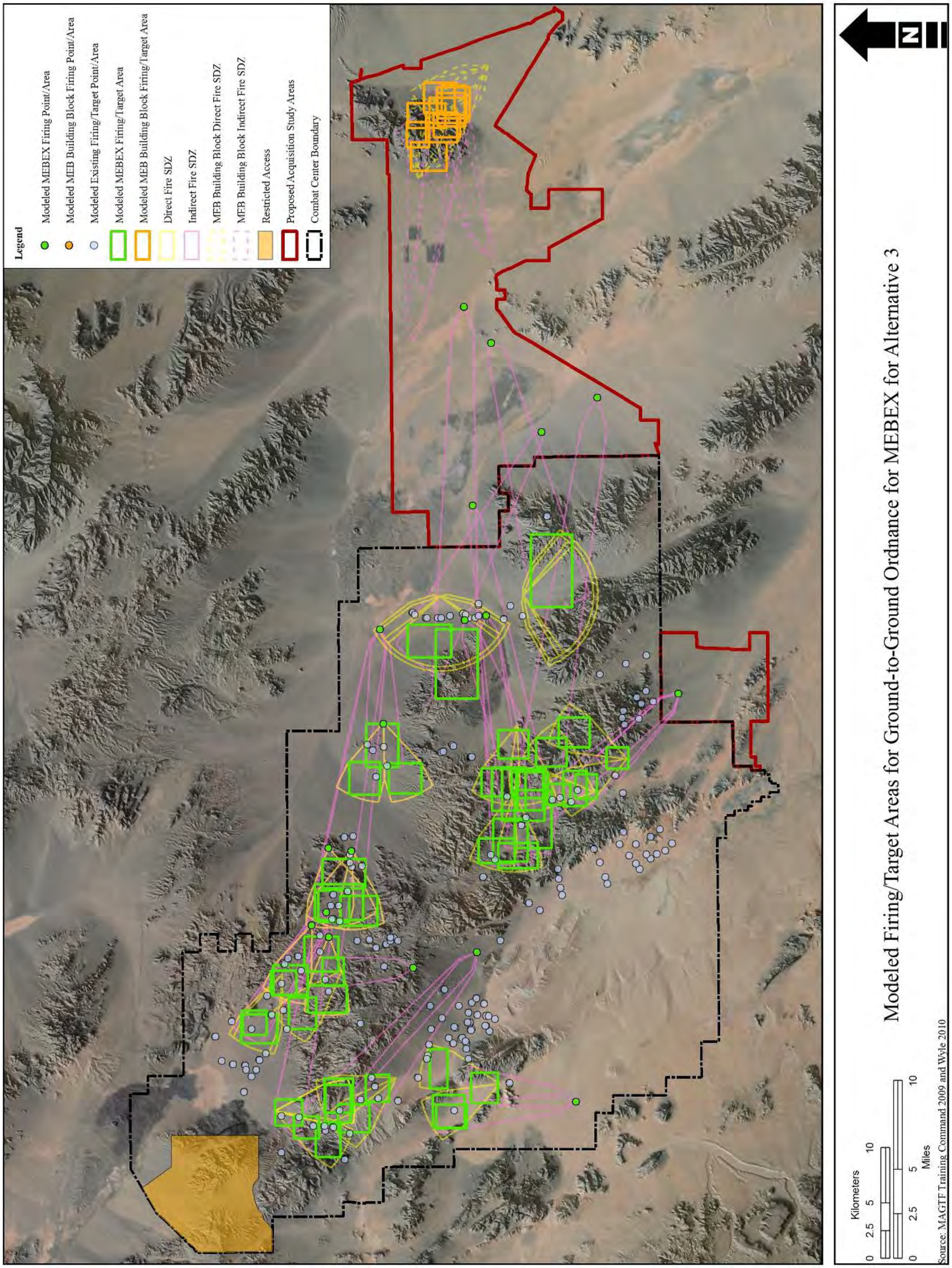
Modeled Firing/Target Areas for Air-to-Ground Ordnance for MEBEX for Alternative 2



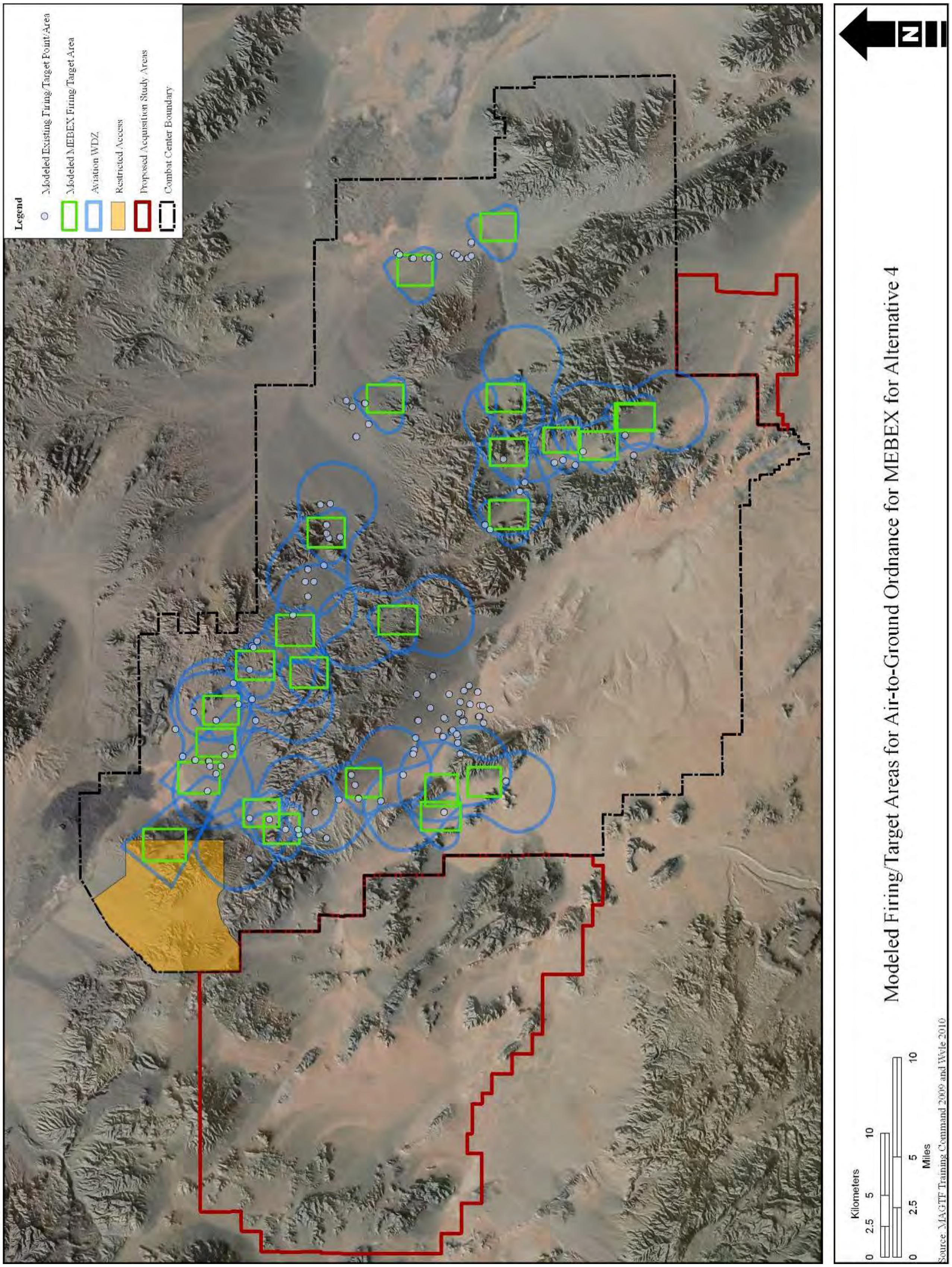
Modeled Firing/Target Areas for Ground-to-Ground Ordnance for MEBEX for Alternative 2



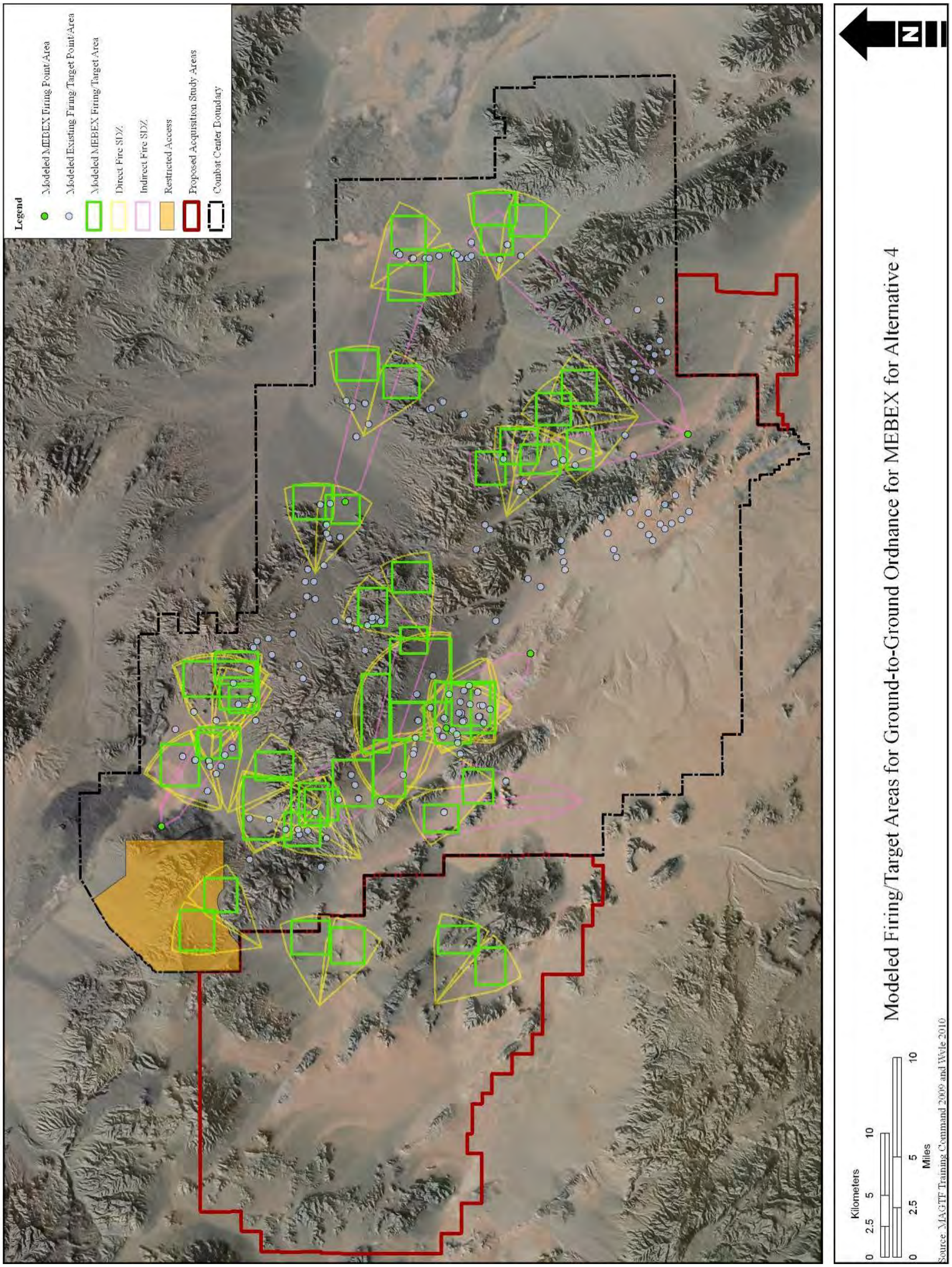
Modeled Firing/Target Areas for Air-to-Ground Ordnance for MEBEX for Alternative 3



Modeled Firing/Target Areas for Ground-to-Ground Ordnance for MEBEX for Alternative 3

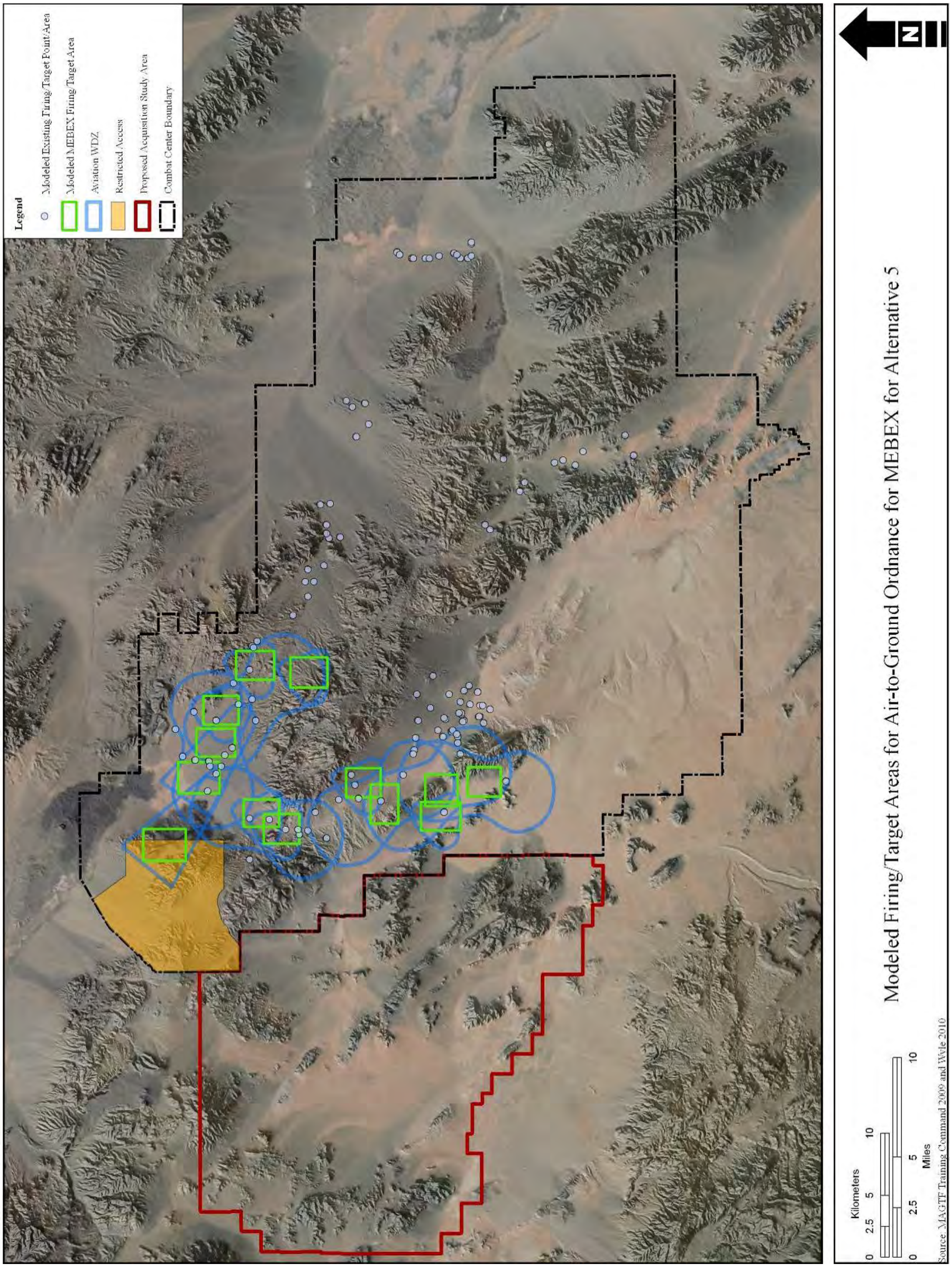


Modeled Firing/Target Areas for Air-to-Ground Ordnance for MEBEX for Alternative 4

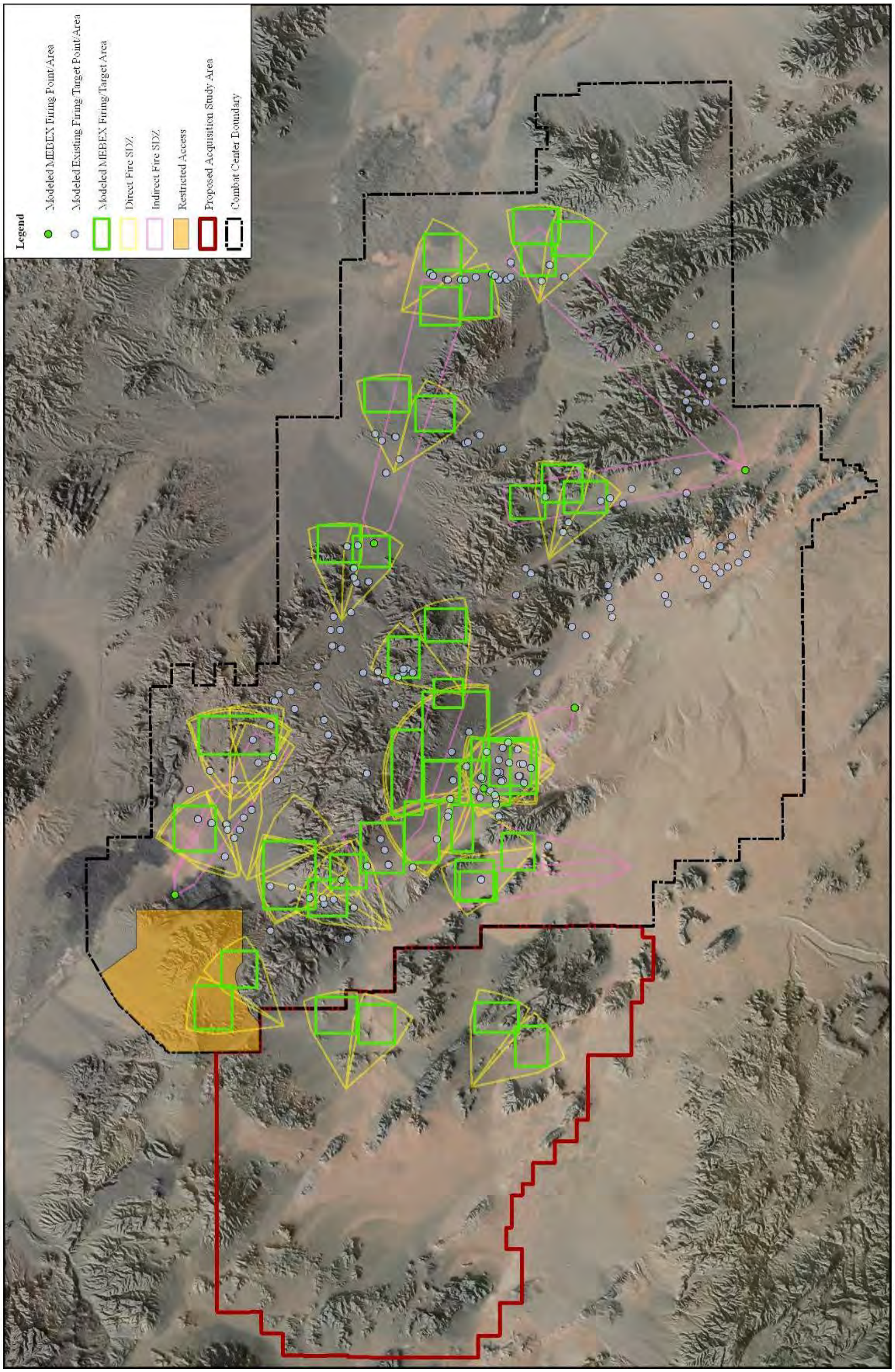


Modeled Firing/Target Areas for Ground-to-Ground Ordnance for MEBEX for Alternative 4

Source: MAGTF Training Command 2009 and Wyle 2010



Modeled Firing/Target Areas for Air-to-Ground Ordnance for MEBEX for Alternative 5

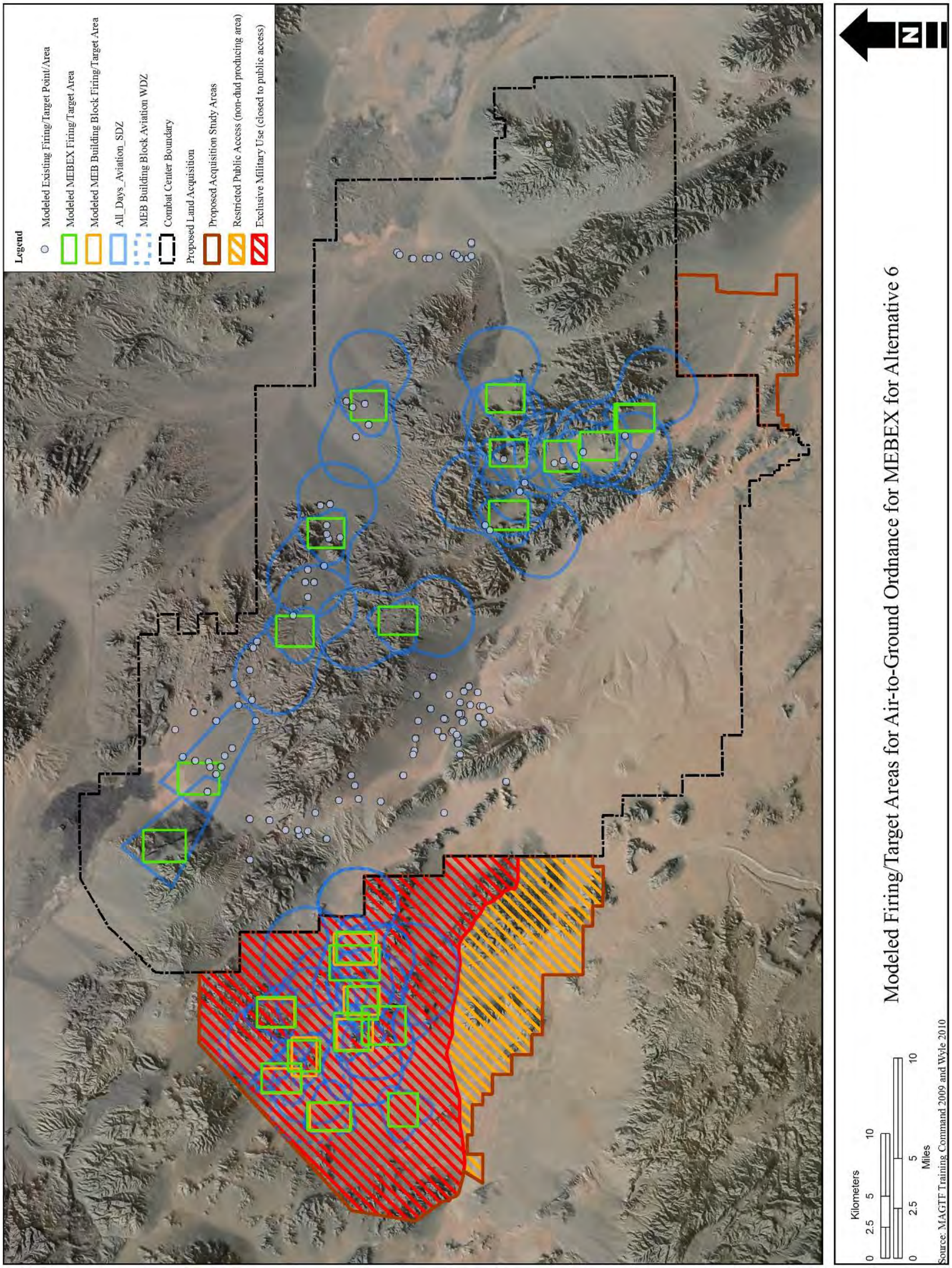


N

Modeled Firing/Target Areas for Ground-to-Ground Ordnance for MEBEX for Alternative 5

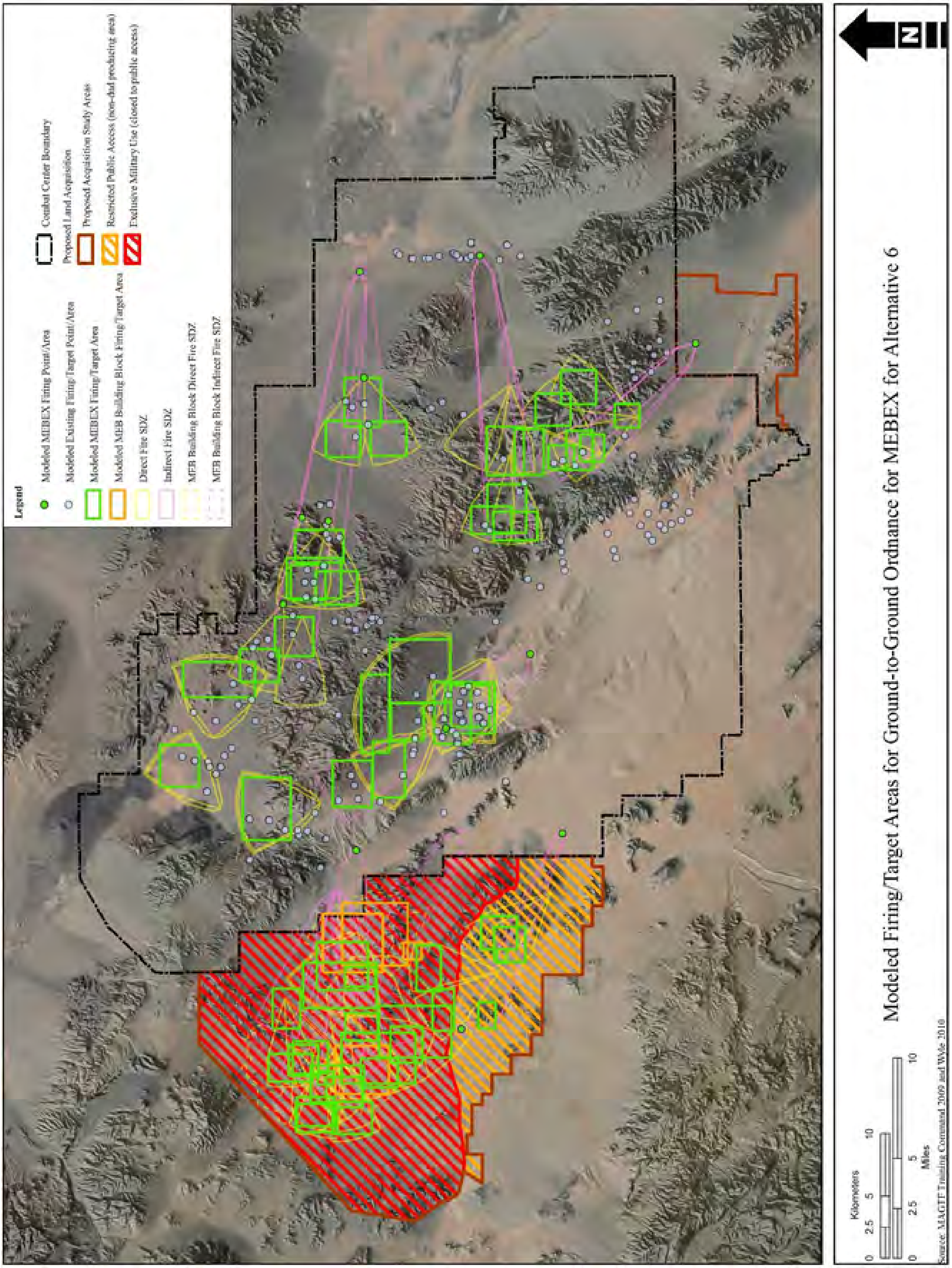
Kilometers
0 2.5 5 10
0 2.5 5 10
Miles

Source: MAGTF Training Command 2009 and Wyle 2010



Modeled Firing/Target Areas for Air-to-Ground Ordnance for MEBEX for Alternative 6

Source: MAGTF Training Command 2009 and Wyle 2010



Modeled Firing/Target Areas for Ground-to-Ground Ordnance for MEBEX for Alternative 6

Source: MAGTF Training Command 2009 and Wyle 2010

PK15 (met) and Risk of Ordnance Noise Complaints for Points of Interest at the Combat Center

POI Type	ID	POI Name	No Action/ Baseline	Alternative					
				1	2	3	4	5	6
Town/City	1	Newberry Springs	104	107	107	105	107	107	107
	2	Ludlow	102	113	107	104	107	107	107
	3	Amboy	*118*	*118*	*118*	*118*	*118*	*118*	*118*
	4	Chubbuck	103	103	103	*117*	103	103	103
	5	Wonder Valley	99	102	105	102	101	101	101
	6	Twentynine Palms	114	114	114	114	114	114	114
	7	Joshua Tree	111	111	111	111	111	111	111
	8	Yucca Valley	110	110	110	110	110	110	110
	9	Morongo Valley	91	91	99	91	99	98	91
	10	Yucca Mesa	112	112	113	112	112	112	112
	11	Flamingo Heights	111	112	112	112	112	112	111
	12	Homestead Valley	113	113	*116*	113	113	113	113
	13	Landers	*115*	*115*	*116*	*115*	*115*	*115*	*115*
	14	Johnson Valley	112	*121*	*121*	114	*119*	*119*	*121*
	51	West Residence	93	n/a	102	93	n/a	n/a	103
Residential_Zoned	47	West Study Area	114	n/a	n/a	114	n/a	n/a	n/a
	48	South of Existing Base	*116*	*116*	*116*	*116*	*116*	*116*	*116*
	49	South of South Study Area	108	*115*	114	*115*	112	109	112
	50	Cadiz in East Study Area	108	108	108	n/a	109	108	108
RCUZ	52	Bristol Dry Lake	*117*	*117*	*117*	n/a	*118*	*117*	*117*

Color code:

- *= low risk of noise complaints (less than 115 dB)* [white]
- *= low risk of noise complaints (estimated less than 115 dB)* [orange]
- *= medium risk of noise complaints (between 115 and 130 dB)* [light blue]
- *= high risk of noise complaints (greater than or equal to 130 dB)* [medium blue]
- *= high risk of noise complaints and potential risk of structural damage (greater than or equal to 140 dB)* [dark blue]

PK15 (met) and Risk of Ordnance Noise Complaints for Points of Interest at the Combat Center (cont'd)

POI Type	ID	POI Name	No Action/ Baseline	Alternative					
				1	2	3	4	5	6
Wilderness_Closest	18	Bristol Mountain	106	106	106	106	106	106	106
Wilderness_Center	38		103	107	105	107	105	103	105
Wilderness_Closest	20	Tribolite	107	107	107	*118*	107	107	107
Wilderness_Center	32		92	92	92	112	92	92	92
Wilderness_Closest	25	Old Woman Mountains	86	87	86	**134**	86	86	86
Wilderness_Center	37		91	91	91	97	96	95	91
Wilderness_Closest	24	Cadiz Dunes	105	105	105	*129*	105	105	105
Wilderness_Center	36		104	104	104	*121*	104	104	104
Wilderness_Closest	23	Sheephole Mountains / Valley	109	109	109	*126*	110	109	109
Wilderness_Center	35		99	100	99	108	102	99	99
Wilderness_Closest	22	Cleghorn Lakes / Mountain	107	109	*115*	108	108	108	108
Wilderness_Center	34		99	102	100	106	100	99	100
Wilderness_Closest	17	Bighorn Mountains	110	*115*	*116*	111	114	114	*115*
Wilderness_Center	44		105	110	109	108	107	107	110
Wilderness_Closest	15	Newberry Mountains	91	97	93	93	94	94	94
Wilderness_Center	46		87	98	90	89	88	88	91

Color code:

= low risk of noise complaints (less than 115 dB)
= low risk of noise complaints (estimated less than 115 dB)
= medium risk of noise complaints (between 115 and 130 dB)
= high risk of noise complaints (greater than or equal to 130 dB)
= high risk of noise complaints and potential risk of structural damage (greater than or equal to 140 dB)

PK15 (met) and Risk of Ordnance Noise Complaints for Points of Interest at the Combat Center (concluded)

POI Type	ID	POI Name	No Action/ Baseline	Alternative 1	2	3	4	5	6
Wilderness_Closest	16	Rodman Mountains	93	105	99	94	95	95	100
Wilderness_Center	45		95	103	98	101	99	99	97
Wilderness_Closest	19	Kelso Dunes	101	112	111	101	111	111	111
Wilderness_Center	39		105	107	107	106	107	107	107
Wilderness_Closest	21	Clipper Mountain	103	103	103	112	103	103	103
Wilderness_Center	31		89	94	92	109	102	89	92
Wilderness_Closest	26	Turtle Mountains	103	103	103	103	103	103	103
Wilderness_Center	41		102	102	102	102	102	102	102
Wilderness_Closest	27	Stepladder Mountains	85	85	85	85	85	85	85
Wilderness_Center	40		104	104	104	104	104	104	104
Wilderness_Closest	28	Piute Mountains	102	102	102	110	102	102	102
Wilderness_Center	33		81	96	82	108	101	81	82
Wilderness_Closest	29	Chemehuevi Mountains	103	103	103	103	103	103	103
Wilderness_Center	43		103	103	103	103	103	103	103
Wilderness_Closest	30	Whipple Mountains	103	103	103	103	103	103	103
Wilderness_Center	42		102	102	102	102	102	102	102

Color code:

= low risk of noise complaints (less than 115 dB)
= low risk of noise complaints (estimated less than 115 dB)
= medium risk of noise complaints (between 115 and 130 dB)
= high risk of noise complaints (greater than or equal to 130 dB)
= high risk of noise complaints and potential risk of structural damage (greater than or equal to 140 dB)

H.4.5 Probability of Structural Damage

Noise from ordnance delivery (blast noise) is powerful, impulsive in nature, and of short duration. Vibrations of buildings and structures induced by blast noise may potentially result in increased annoyance and discomfort of residents, or structural damages. Effects on structures of impulsive blast sound generated by artillery firing, ordnance or demolition operations at the Combat Center were assessed for three points of interest (POIs), all located to the south or west of the Center's existing and proposed boundaries.

POI ID	DESCRIPTION	PK 15(met), dB
14	Johnson Valley (Town/City)	112 - 121
22	Cleghorn Lakes/Mountain (Wilderness)	107 - 115
48	South of Existing Base (Residential Zoned)	116 - 118

The Single Event Peak Level Exceeded by 15% of Events [PK 15(met)] was calculated at the three POIs from the ground-to-ground and air-to-ground operations for the Baseline/No action scenario and all six alternative scenarios. PK 15(met) is the calculated peak noise level, without frequency weighting, expected to be exceeded by 15% of all events that might occur due to the base activities. It accounts for statistical variation in single event peak noise level due to variable weather conditions. PK 15(met) represents typical loud blast events and is an appropriate input to the statistically-oriented Probability of Damage (POD) model described below.

The PK 15(met) values calculated for the POIs under the seven scenarios are shown in the table above. The PK 15(met) values calculated for the three POIs ranges overall from 107 to 121 dB for the Baseline/No action and the six alternatives. The PK 15(met) of 121 dB is thus the highest peak level exceeded by 15 % of single events (blasts from artillery, ordnance and explosions) of the three POIs selected.

The POD of structures from sonic blast loading was estimated using a method developed by Sutherland (2009), based on the blast pressure loading on a structure, the vibration and stress response to this loading, and the thresholds for damaging or failure stress to such loading. The highest PK 15(met) level of 121 dB was initially selected as the one potentially damaging blast, with only 15% of other events possibly exceeding this level (at POI 14).

The blast durations from 0.005 to 0.2 seconds were evaluated, covering a range of positive phase duration of the typical blast pulses anticipated at the Combat Center. Structures of two general types were evaluated. The non-window structures included adobe, aluminum frame walls, brick walls, concrete block, masonry/stone walls, steel frame walls, and wood frame walls with wallboard, plaster, or wood panel interiors. The window structures analyzed included 36 windows with the areas of 1.4, 4.4, and 22.2 square-feet, aspect ratios of 0.25, 0.50, 0.75 and 1.00, and the relative strength of new glass and failure stress of 25% and 50% of new glass.

Upon completion of these calculations it was determined that the resulting worst-case POD to the windows and non-window structures receiving a blast sound wave with the peak sound level of 121 dB is below 0.0001%. This value indicates extremely low probability of structural damage under a blast of this strength. Indeed, in order to present a POD of about 0.01%, the peak sound pressure level at a wood-frame wall with interior plaster would have to be nearly 129 dB; a POD of 0.1% would require peak sound pressure of nearly 132 dB; and a POD of 1% would require peak sound pressure of 135 dB. The other non-window structures and windows provide even lower probability of damage from blasts.

The difference between the peak sound level (Lpk) used for the POD assessment and PK 15(met) modeled for the base depends on several factors, such as propagation distance of the blast waves, terrain features at the site, and the BNOISE 2 calculation algorithm details, and is difficult to estimate in general. It can be concluded, however, that at least 85% of all blast events at POIs 14, 22 and 48 will present negligible probability of damage to structures under any of the seven scenerios considered (Baseline/No action and the six alternatives). Given extremely low values of the POD estimated for the highest PK 15(met) level (121 dB) above, it is expected that even with the reasonably higher peak sound levels of the remaining 15% of the blast events, the probability of structural damage at these POIs will be sufficiently low. Overall, structural damage is not expected at POIs 14, 22 and 48 from the blast events at the base under any of the scenarios considered.

APPENDIX I
BIOLOGICAL RESOURCES

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I.1 Methodology for Description and Quantification of Existing and Projected Future Disturbance to Biological Resources

This section describes the methodology and assumptions used to prepare the Geographic Information System (GIS)-based analysis of disturbance to vegetation and occupied desert tortoise habitat, and estimated take of desert tortoises.

Quantitative information regarding the existing level of disturbance on the Marine Corps Air Ground Combat Center at Twentynine Palms, CA (Combat Center) was not available, so qualitative analysis was used when possible. General information regarding disturbance of the Combat Center from military training is included below, based on information in Section 1 of the EIS. Information regarding existing disturbance to the west and south study areas was available from analysis performed by Karl (2010b), based on interpretation of photos, aerial photos, and notes of tracks and trails observed in the study areas during desert tortoise surveys in 2008 and 2009.

I.1.1 Project Lifetime

In determining a suitable period of time to define the Project life cycle, numerous criteria were reviewed. In the end, a 50 year project life cycle was decided upon as the most representative of the projects impacts to the environment and surrounding communities. Most of the nearby environmental plans use 25 to 30 years as a project life (West Mojave Plan: 30 yrs, CDCA: 25 yrs, Tortoise Recovery Plan: 25 yrs). This implied a 30-year project life at the minimum as a starting point for analysis. However, two other factors needed to be assessed in order to make a suitable decision on project life cycle. The first is the time and resources required to return the land back to safe use after the Marine Corps requirement is no longer valid, if ever. This process could easily take another 10 to 20 years, based on the amount of ordnance that would have been expended in the project area. While this is not necessarily an impact of the proposed action, it does need to be considered. But most critically, project life from an operational viewpoint is logically the most lengthy. The basic requirement for the proposed action will likely exceed the 25-30 year timeframe and easily be relevant for at least 50 years. Military weapon systems, tactics, techniques, and procedures (TTPs) are in constant flux. However, doctrine and basic capabilities change very methodically and are evolutionary, not revolutionary, meaning it takes time for things to change to the point where a totally new requirement needs to be developed. For example, today's machine gun is certainly more capable than its ancestor from World War II, but the techniques and ranges for employing the weapons system have not changed significantly in that same 60-year time frame. The tactics change far less often than the individual weapons systems, even though they are being modified constantly. The need to train a large scale MAGTF will remain for a long period of time.

As a result of this assessment, 50 years was determined to be, across all resource areas of the proposed action, the most valid and inclusive project lifespan. Therefore, 50 years was applied as the project life cycle across all resource areas in order to conform to the evolutionary nature of the proposed action and ultimately support the NEPA and ESA analysis.

I.1.2 Existing Level of Disturbance on the Combat Center (adapted from the EIS Description of the Proposed Action and Alternatives)

The following text, drawn from Section 2 of the EIS describes military training activities that currently occur on the Combat Center under existing conditions, and provides detail on the ways in which these activities can generate disturbance. This information is intended to supplement the project-specific information provided in Section 4.10, but the numbers provided herein may not apply to the proposed action.

Disturbance from Vehicle Maneuvers

Vehicles use the Combat Center's training areas, fixed ranges, and road network daily and are a crucial element in operational activities. Normally, the main supply routes (MSRs) and secondary roads are used to transport Marines and supplies to fixed ranges and other training sites. However, off-road use of vehicles is an integral part of the real-life battle scenarios that take place during major exercises, when large numbers of vehicles travel off-road for varying durations. Vehicles involved in training operations are categorized as follows:

- Tracked Vehicles – vehicles with non-rubber wheels or tracks (e.g., tanks, Amphibious Assault Vehicles);
- Heavy Wheeled Vehicles – vehicles with multiple axles and/or more than four rubber tires (e.g., Light Armored Vehicles, five- and seven-ton trucks, personnel carriers); and
- Light Wheeled Vehicles – vehicles with four rubber tires (e.g., utility vehicles, high-mobility multi-purpose wheeled vehicles [also known as "Humvees"], and smaller trucks).

Tracked vehicles function as weapons systems, armored personnel carriers, engineering devices, and recovery systems. The Abrams M1A1 Main Battle Tank and the Amphibious Assault Vehicle are the main components of mechanized operations. In a combat environment, the capabilities of tracked vehicles are influenced by terrain-related factors such as surface, subsurface, and slope. Tracked vehicles utilize terrain to the maximum advantage and have the capability of traveling over virtually any flat or gently sloping land (a 22% grade is normally used as a planning factor to evaluate tracked vehicle movement). When moving into position, vehicles use terrain for cover and concealment; vehicles also spread out over washes, hills, rocky outcrops, and sloping terrain to cover and mask their movements. Depending upon the tactical training requirements and terrain, tracked vehicles may or may not utilize roads. During the 250 days per year on which major training exercises are conducted, tracked vehicles travel an estimated aggregate average of 220 miles (354 km) per day or approximately 55,000 miles (88,514 km) per year.

Wheeled vehicles (both heavy and light) primarily function as weapons systems, reconnaissance vehicles, Marine transports, and combat service support vehicles. Many of the same tactics and limitations that apply to tracked vehicles also apply to wheeled vehicles. Excessive slopes and rough terrain can severely impair mobility or stop travel altogether, and the vehicles typically spread out during travel to present smaller targets. During major exercises, all heavy-wheeled vehicles collectively travel an estimated average of 3,280 miles (5,279 km) per day or 820,000 miles (1,319,662 km) per year. Light-wheeled vehicle use under the same conditions involves an estimated aggregate average of 4,500 miles (7,242 km) per day or 1,125,000 miles (1,810,512 km) per year.

When in a stationary position for an extended period of time, such as in defense or in preparation for an ambush, vehicles must be dug in. Digging in is the act of constructing a fighting position below the surface of the ground to provide the vehicle and crew with protection against direct and indirect enemy fire and to conceal their position from enemy forces. This critical skill typically utilizes engineering equipment or other large machinery. Digging in is normally done during defensive operations and takes place in only a few locations at the Combat Center. Obstacles are also built to channelize, slow down, or stop enemy forces. There are various types of natural and mechanical obstacles that can be constructed, but the most common is a tank ditch. In addition, anti-tank training relies on berm and trench systems called "tank traps." Three such traps have been constructed in strategic locations at the Combat Center.

Disturbance from Infantry Operations

Infantry or "dismounted" operations are essential elements of training at the Combat Center. Dismounted attacks are necessary and must be practiced to ensure that Marine units are capable of achieving mission objectives. These operations occur in all training areas, including those that are geographically restrictive to vehicles. Annually, infantry maneuvers at the Combat Center involve approximately 1,500 Marines per day. Such maneuvers are often extensive in the distance and area covered on foot, with an average of 3 miles (5 km) traveled per Marine per day (DoN 2003; MAGTF Training Command 2009).

Ground training exercises and activities can last for extended periods of time and require bivouacking in which Marines camp on the range and conduct various operations. Staged operations can include excavation of soils for trenches and fighting positions (to provide individuals with protection against enemy fire or for sanitation reasons). Digging activities associated with staged operations create ground disturbances below the normal soil horizon of 12 inches (30 centimeters). On average, an estimated 12% of the ground element forces will dig a fighting hole on any given day. Finally, infantry maneuvers also require the use of restrictive materials (e.g., razor wire) with associated berms and trenches to facilitate realistic battle scenarios.

Disturbance from Aircraft-Delivered Ordnance

The delivery of air-to-ground ordnance is one of the characteristic training activities conducted at the Combat Center. The majority of air-to-ground ordnance delivery occurs on approximately 80,000 acres (32,375 hectares) (13.4% of total area) encompassing many different training areas. These include almost all of Quackenbush, the southern half of Gays Pass, Lavic Lake, the northern portions of Rainbow Canyon and Noble Pass, most of Lead Mountain, the central portion of Black Top, and the Delta Training Area corridor. Fixed Range 601 and Fixed Range 605 are used exclusively for aircraft-delivered ordnance, and several areas of these fixed ranges have experienced substantial degradation (USFWS 1999).

Disturbance from Heavy Artillery

Artillery use occurs on approximately 110,000 acres (44,515 hectares) (18%) of the installation, but is concentrated on approximately 45,000 acres (18,211 hectares) (7.5%). Most artillery firing is directed at fixed targets and areas that are already heavily disturbed. Most of the explosive ordnance fired leaves craters about 2 feet (0.6 meter) wide and 6 inches (15 centimeters) deep (Marine Corps 1999). Very little artillery use occurs in the mountainous areas of the Combat Center. Currently, an estimated 58,000 units of artillery ordnance are fired annually within the Combat Center, including mortar shells, missiles, and heavy artillery munitions.

Disturbance from Tank and Other Armor Ordnance

Tank operations are conducted over approximately 200,000 acres (80,937 hectares) (33%) of the Combat Center, but most of the ordnance delivered from tanks and associated maneuvers are concentrated in 132,000 acres (53,419 hectares) (22%). The majority of tank operations take place in areas that are already moderately to highly disturbed (USFWS 1999). Tank firing occurs in all or parts of the following training areas: Black Top, Lavic Lake, Emerson Lake, Quackenbush, Gays Pass, Delta Corridor, Bullion, Lead Mountain, Maumee Mine, and Cleghorn Pass. Unit-level tank, Amphibious Assault Vehicle, and

Light Armored Vehicle training and annual gunnery qualifications occur at Range 500 in the Cleghorn Pass Training Area.

I.1.2 Existing Level of Disturbance in the West and South Study Areas

A report describing existing disturbance along survey transects in the west and south study areas (Karl 2010) categorized the lands within the study areas as follows:

High Disturbance: Typically includes areas containing race routes used for large events (e.g., King of the Hammers), designated off-highway vehicle (OHV) routes, and areas used for camping. A visual representation of a highly disturbed area in the west study area is presented in Figure 1. Note that a highly disturbed area could have even fewer plants and more soil disturbance than shown in this photo; this is intended to represent the minimum amount of disturbance considered "High Disturbance."

Medium Disturbance: Typically includes areas where OHV activity occurs regularly, but with lower diversity of routes (three to five established trails) and lower overall traffic levels. A visual representation of a moderately disturbed area is presented in Figure 2.

Low Disturbance: Typically includes areas used infrequently for OHV recreation, with little to no off-trail riding or camping. These areas also would include steep slopes and rocky mountainous areas not used for "rock crawling." A visual representation of a low-disturbance area is presented in Figure 3.

Karl (2010b) conducted a chi-square analysis of the different tortoise density categories as they relate to disturbance levels (Table C-1), and found a significant difference (Chi-square = 843.15, df = 12, <0.001). In the lowest tortoise density category (1-2 adult tortoises/km^2), there is a higher proportion of square kilometers with high disturbance than for the other density categories. In the highest tortoise density category, there is a higher proportion of square kilometers with low use and a low proportion with high use.

Table I-1. Chi-Square Analysis of Tortoise Density as Related to Existing Disturbance Levels in the Study Areas

Tortoise Density Category	Transects With Corresponding Tortoise Density and Existing Disturbance Level			Total
	High	Medium	Low	
Lowest (1 - 2 /km^2)	94	28	49	171
Very Low (3 - 4/km^2)	157	57	122	336
Low (5 – 7/km^2)	83	62	111	256
Moderate (8-14/km^2)	9	12	24	47
Total	343	159	306	810

Source: Adapted from Karl 2010b

Figure 1. This photo represents the level of disturbance in the west study area determined to be "High Disturbance." More than five established trails or all high-use areas (race routes, staging areas, RV camping areas, hill-climbs, obvious vegetation loss obvious from aerials and photographs) or high track volume or heavy use of specific washes (as described by surveyor) (Karl 2010b). Several hundred tire tracks would be present within a square kilometer, soils are damaged, and the distance between plants is high.

Figure 2. This photo represents the level of disturbance in the west study area determined to be "Medium Disturbance." Three to five established trails. Single tracks were observed throughout, although there were no heavily tracked areas (Karl 2010b). Soils show less damage as compared to "high disturbance" areas, and the spacing between plants is reduced.

Figure 3. This photo represents the level of disturbance in the west study area determined to be "Low Disturbance." Zero to two established trails with occasional single tracks or tracks in washes, and described as low impact by surveyor (Karl 2010b). Soils are intact off-trail, and the spacing between plants is not substantially different from a non-impacted area.

I.1.3 Projected Disturbance under the Proposed Action (Common to all GIS-Based Analyses)

For the task force routes as identified in Section 2.4 of the EIS, disturbance "footprints" were developed to represent the areas in which companies and platoons would spread out as they move across the Combat Center and study areas. These footprints were developed in consultation with the Combat Center and take into account physical constraints of the terrain (e.g., rocky areas, playas, lava flows) and operational constraints (e.g., no maneuver areas, Special Use Areas). In some areas the footprint is limited to the width of the MSR, but for the areas that were identified by the Combat Center as especially appropriate for the platoons and companies to spread out (e.g., Black Top Training Area), the frontage for each battalion can reach as much as 2 km in width. The footprint for each alternative is included on Figures 4.10-1 through 4.10-6.

Disturbance was only identified and mapped for "High Intensity" and "Medium Intensity" levels of anticipated disturbance described below, as "Low Intensity" disturbance would not result in a substantial impact to biological resources:

High Intensity: Areas where projected activities would be expected to result in high levels of disturbance, meaning a complete or near-complete loss of vegetation and soil surface disruption. GIS layers were developed to identify the geographic area covered by the following disturbances:

1. An area-specific radius around MSRs, to account for disturbance from high levels of Marine vehicle and foot traffic. For the Combat Center, MSRs were assumed to already be highly disturbed and were not included in calculations. However, in the study areas, all MSRs were assumed to be new disturbance and were assumed to be an average of 32 feet wide, consistent with the current average width of MSRs on the Combat Center. For all areas, a radius of 100 meters from the edge of the MSR was assumed to be subject to high disturbance, regardless of the width of the disturbance "footprint" as described above. MSRs are assumed to be constructed along the path of MAGTF travel under each MEB Final Exercise; no other locations for MSRs have been identified. No locations for minor dirt roads have been identified for the project or alternatives, so disturbance associated with these roads was not specifically included in GIS modeling.
2. A radius of 250 meters around centers of aviation target arrays, to account for disturbance resulting from aviation ordnance explosion.
3. A radius of 2.5-kilometers surrounding the MEB objective, to account for ordnance explosion and high levels of Marine vehicle traffic.
4. A radius of 100-meters surrounding company objectives, to account for high levels of Marine vehicle traffic and foot traffic and bivouacking,
5. A radius of 1-kilometers surrounding MAGTF assembly areas to account for high levels of Marine vehicle traffic, foot traffic..
6. A radius of 100-meters surrounding helicopter landing zones to account for downwash from rotors and physical disturbance from the landing of the helicopters.

Medium Intensity: These are areas where disturbance, while less than in high intensity areas, would still be obvious to an untrained observer. Distance between plants would be noticeably reduced as compared to undisturbed areas (1-2 meters between individual plants in many places), remaining plants would have smaller canopies, and soil surface disruption would be present but not extensive. The following areas were assumed to be subject to medium intensity disturbance under the proposed action:

1. The remaining radius from 100 meters from the edge of the MSR out to the boundary of the disturbance footprints. As stated above, the maximum width of the disturbance footprint was assumed to be 2 km.
2. A radius from 250 meters to 500 meters around centers of aviation target arrays to account for lower levels of impact from aviation ordnance explosion.
3. A radius from 2.5 kilometers to 5 kilometers away from the center of the MEB objective to account for lower levels of Marine vehicle and foot traffic.
4. A radius from 1 kilometer to 2 kilometers from the center of MAGTF assembly areas to account for lower levels of Marine vehicle and foot traffic.

I.1.4 Projected Disturbance to Vegetation

The sources of disturbance from military training described above were overlaid on the vegetation map GIS layers for the Combat Center (Agri-chemical and Supply 2008) and study areas (CDF 2003, USGS 2004). Based on these overlays, the acreage of each vegetation type within high- and medium-intensity disturbance areas was quantified within the GIS system. These acreages were summed together for each vegetation type (vegetation types based on California Native Plant Society [2009] classifications). Where medium and high-intensity disturbance areas overlapped, the medium-intensity disturbance was ignored to avoid double counting.

Notes regarding these calculations:

- As for all of the GIS-based calculations, the routes of travel and areas of ordnance explosion are intended to be illustrative of future exercise design, but may not match them exactly. Therefore, actual future impacts to vegetation may differ substantially from those described. However, the use of impact "footprints" (refer to Section 1.3 above) in GIS-based calculations provides for a conservative estimate of impacts, as the areas in which military training is likely to occur have been accounted for.
- The calculated and mapped disturbance to vegetation would occur over the 50-year lifetime of the project. Disturbance would be greatest during the first few years of expanded military training, and would be expected to fairly quickly reach a level of disturbance that would not substantially be affected by new exercises. The area of vegetation disturbed annually would be substantially lower than indicated in GIS-based calculations.
- The CDF (2003) mapping that covers approximately 40% of the west study area is low resolution, so there are likely to be several vegetation communities located within that mapping area that are not captured in that mapping effort.

I.1.5 Projected Disturbance to Occupied Desert Tortoise Habitat

The sources of disturbance from military activities described above were overlaid on the desert tortoise density GIS layers provided by Woodman *et al.* (2001) and Karl (2010a). The acreage of medium and high-intensity disturbance were then calculated separately for each specified tortoise density category, in an effort to capture the area of effect to occupied desert tortoise habitat from project activities. Where medium and high-intensity disturbance areas overlapped, the medium-intensity disturbance was ignored to avoid double counting.

Because different density categories were used for the Combat Center desert tortoise density analysis (MAGTF Training Command 2001) and the study area desert tortoise density analysis (Karl 2010a), the categories for which disturbance was calculated included the following: Study areas – 1-3 adults per km^2, 4-6 adults per km^2, 7-9 adults per km^2, 10-12 adults per km^2, 13-15 adults per km^2; Combat Center – 0-20 adults per mi^2, 21-50 adults per mi^2, and 51-100 adults per mi^2.

Notes regarding these calculations:

- As for all of the GIS-based calculations, the routes of travel and areas of ordnance explosion are intended to be illustrative of future exercise design, but may not match them exactly. Therefore, actual future impacts to desert tortoise habitat may differ substantially from those described. However, the use of impact "footprints" (refer to Section I.1.3 above) in GIS-based calculations provides for a conservative estimate of impacts, as the areas in which military training is likely to occur have been accounted for.
- The desert tortoise density GIS information for the Combat Center (Woodman *et al.* 2001) did not include a true "zero" density class. To more accurately represent the density of tortoises on the

Combat Center, the following areas were assigned a "zero" density for the purposes of assessing impacts:

- o Playas.
- o Elevations above 4,495 feet (1,370 meters).
- o Slopes steeper than 30%.

- · Existing disturbance to occupied desert tortoise habitat has not been subtracted from the calculations of new disturbance; however, it is assumed that substantial existing disturbance to tortoise habitat is reflected in the tortoise densities observed. Therefore, these calculations do account for existing disturbance.
- · The disturbance to desert tortoise habitat calculated via this effort represents that which would occur over the 50-year lifetime of the project. Disturbance would be greatest during the first few years of expanded military training, and would be expected to fairly quickly reach a level of disturbance that would not substantially be affected by new exercises. Annual disturbance levels would be much lower than shown in figures and calculations.

I.1.6 Projected Number of Desert Tortoises in Disturbance Areas

<u>Bounds for Tortoise Abundance in High-Intensity Disturbance Areas</u>

The area of high-intensity disturbance was calculated from GIS overlay on desert tortoise density layers. Areas were output as km^2 or mi^2 of high-intensity disturbance. Each area of disturbance was then multiplied times the lower bound of tortoise density in that area, then by the higher bound of tortoise density. This was repeated for each density class and then summed to provide the high and low bounds for the estimated total number of tortoises located within high-intensity disturbance areas.

<u>Bounds for Tortoise Abundance in Medium-Intensity Disturbance Areas</u>

The number of tortoises located within medium-intensity disturbance areas was calculated in the same manner as above, using the medium-intensity disturbance areas instead of the high-intensity disturbance areas. .

Major assumptions and caveats regarding calculation of projected abundance of desert tortoises:

- · Injury or mortality in low-intensity disturbance areas would be zero and is not calculated.
- · The desert tortoise density GIS information for the Combat Center (Woodman et al. 2001) did not include a true "zero" density class. To more accurately represent the density of tortoises on the Combat Center, the following areas were assigned a "zero" density for the purposes of assessing impacts:
  - o Playas.
  - o Elevations above 4,495 feet (1,370 meters).
  - o Slopes steeper than 30%.

- Densities of tortoises are assumed to remain constant throughout the project lifetime. Calculations do not account for movement of tortoises from outside of disturbed areas into disturbed areas.
- Impacts are calculated over the 50-year project lifetime and do not represent a rate of take, simply a total take over that time.
- Only take of adult tortoises is calculated.
- Take from recreational OHV use and other public access in the west study area is not included in calculations as no existing estimates of take exist. Depending on the alternative, take from recreational use in the west study area would be zero (Alternative 1) due to closure to public access, the same (Alternative 3), or less than currently occurs due to partial closure or access restrictions (Alternatives 2, 4, 5, and 6) .
- As for all of the GIS-based calculations, the routes of travel and areas of ordnance explosion are intended to be illustrative of future exercise design, but may not match them exactly. Therefore, actual future take of desert tortoise may differ substantially from that described. However, the use of impact "footprints" (refer to Section 1.3 above) in GIS-based calculations provides for a conservative estimate of impacts, as the areas in which military training is likely to occur have been accounted for. Because the routes and target locations chosen for the representative exercise largely avoid those areas with higher desert tortoise density, deviation from the representative exercise may result in increased take compared to the values calculated in this EIS.

Estimates of Abundance and Impacts to Juvenile Desert Tortoises

The number of juvenile desert tortoises present within the project area was calculated using the model data for adult tortoises and a "life table" approach, per current direction from USFWS. The approach followed is taken from the Revised Ivanpah Biological Assessment (BLM 2011), and uses the same assumptions that were used in that document. In summary, those assumptions are:

- Juveniles are considered any tortoise less than 160mm midline carapace length.
- There is a 1:1 sex ratio (i.e., 50% of adult tortoises are female).
- In each year, 90 percent of females lay one clutch with 4.5 eggs per clutch, and 50 percent also lay a second clutch with 3.7 eggs (based on Fort Irwin reproduction data).
- Clutch sizes assume a good rain year.
- All juveniles hatched in the last 15 years (Germano 1994).
- Two (2) percent of tortoises survive from hatchling to sub-adult (Germano 1994).

The hypothetical life table based on these assumptions is presented in Table I-2 below, as adapted from the Revised Ivanpah Biological Assessment (BLM 2011).

Table I-2. Hypothetical Life Table for Tortoises Ages 0 to 15 Years

Year	Starting Number of Juveniles	Survival Rate	Remaining Juveniles
0	100	0.5	50
1	50	0.6	30
2	30	0.6	18
3	18	0.7	12.6
4	12.6	0.7	8.8
5	8.8	0.8	7.0
6	7.0	0.8	5.6
7	5.6	0.8	4.5
8	4.5	0.9	4.1
9	4.1	0.9	3.7
10	3.7	0.9	3.3
11	3.3	0.9	3.0
12	3.0	0.9	2.7
13	2.7	0.9	2.4
14	2.4	0.9	2.2
15	2.2	0.9	2.0

Notes: Assumes 2% of hatchlings surviving to sub-adult stage, per Germano 1994.
Source: BLM 2011.

Given the uncertainty of reproductive output during poor rain years, this method should provide a conservative estimate of juvenile tortoise abundance in the project area.

I.1.7 Support for Partial Take in Impacted Areas Rather Than Total Take

Karl's Disturbance Analysis for the West Study Area

Assuming only partial take (e.g., 50% take in high impact areas) cannot be adequately supported by research or existing data, and thus in the EIS analysis impacts are assumed to happen to all tortoises located in the high- and medium-intensity disturbance areas. However, the analysis of disturbance in the study areas (Karl 2010b) indicated average densities only 20% lower in high impact areas (impact from OHV use) as compared to low impact areas (Table C-3). The large sample size and low spread of tortoise density in the study areas (2.3 to 13.6 tortoises/km^2) make the relative densities less meaningful than if spreads were larger. The high impact areas in the study areas are roughly comparable to the high impact areas that would result from military training.

Table I-3. Relative Adult Tortoise Densities in the Study Areas for Different Existing Disturbance Levels

Existing Disturbance Level	Mean Adult Tortoise Density	% Reduction in Density as Compared to Low Disturbance
High	3.7	20%
Medium	4.5	2.2%
Low	4.6	-

Source: Karl 2010b

Woodman *et al.* Surveys on the Combat Center in 1997 and 1999

Of 124 desert tortoise carcasses observed during transect surveys and study plot surveys, 23 tortoises were believed killed by vehicles (18.5% of the carcasses). Six of the adults were estimated to have been killed more than 4 years prior. None were believed killed during the year of the survey. Several other tortoises were crushed by vehicles but, due to the type of bone fractures, were considered by Woodman et al. to probably already have been dead when crushed.

As with range residue, there appeared to be an inverse relationship between numbers of expended ordnance and estimated numbers of live desert tortoises on a transect. Estimated numbers of tortoises declined as numbers of expended ordnance increased, from a high of 18.8 tortoises when 0 to 1 pieces of expended ordnance were counted to 2.5 tortoises when 301 to 700 pieces of expended ordnance were counted. However, it is difficult to speculate that the two are directly correlated, as the range locations have in many instances been chosen to avoid areas of higher desert tortoise density.

Table I-4. Observed Recent Take at the Combat Center

Year	Take from All Activities	Take from Training	Sightings, Live	Sightings, Dead
2007	0	0	10	0
2008	0	0	18	9
2009	3	3	28	11

Notes: Sightings of dead tortoises include those not clearly attributable to training and could be related to disease or predation (e.g., canids, ravens).
Source: Combat Center 2011

Trends at Study Plots

Even if it is not subtracted out of the take estimate, projected mortality or injury rates must take into account the existing rate of decline that is due to other factors not related or only somewhat related to military training: disease and predation (primarily canids and ravens). Study plots at sites relatively undisturbed from military training on the Combat Center have shown declines of 50% to 70% from the 1980s to today (Henen 2010). These declines are consistent with large declines observed at permanent study plots in the west Mojave from 1979 to 1994 (data from K. Berry as compiled in BLM 2005). Thus, considerable mortality or injury to tortoises would be expected to occur in the acquisition areas independent of the proposed action, even with OHV activity not occurring.

Why the Assumptions Are Still Conservative

The beneficial effects of restricting or excluding OHV access to portions of the study areas are not included in quantitative impacts. Mortality from sources not related or tangentially related to military training (e.g., disease, predation) are included in the take estimates, even though such mortality is currently occurring and would not be expected to be substantially affected by the proposed action. Records of observed recent take on the Combat Center do not indicate that extensive take (i.e., 100%) would occur in the acquired lands from military training.

I.2 LIST OF SPECIES REFERENCED IN THE EIS

Common Name	Scientific Name
Reptiles	
Desert iguana	*Dipsosaurus dorsalis dorsalis*
Chuckwalla	*Sauromalus ater*
Banded gecko	*Coleonx variegatus variegatus*
Zebra-tailed lizard	*Callisaurus draconoides*
Mojave fringe-toed lizard	*Uma scoparia*
Great Basin collared lizard	*Crotaphytus bicinctores*
Long-nosed leopard lizard	*Gambelia wislizenii*
Yellow-backed spiny lizard	*Sceloporus magister uniformis*
Desert side-blotched lizard	*Uta stansburiana stejnegeri*
Western long-tailed brush lizard	*Urosaurus graciosus graciosus*
Desert horned lizard	*Phrynosoma platyrhinos calidiarum*
Desert night lizard	*Xantusia vigilis vigilis*
Western whiptail	*Cnemidophorus tigris*
Rosy boa	*Charina trivirgata gracia*
Spotted leaf-nosed snake	*Phyllorhynchus decurtatus perkinsi*
Coachwhip	*Masticophis flagellum piceus*
Desert glossy snake	*Arizona elegans eburnata*
Pine snake	*Pituophis melanoleucus*
Western long-nosed snake	*Rhinocheilus lecontei lecontei*
Mojave shovel-nosed snake	*Chionactis occipitalis occipitalis*
Southwestern speckled rattlesnake	*Crotalus mitchelli pyrrhus*
Mojave desert sidewinder	*Crotalus cerastes cerastes*
Desert tortoise	*Gopherus agassizi*
Plants	
Creosote bush	*Larrea tridentata*
White bursage	*Ambrosia dumosa*
Brittlebush	*Encelia farinosa*
Sweetbush	*Bebbia juncea*
Cheesebush	*Hymenoclea salsola*
Spiny senna	*Senna armata*
Desert lavender	*Hyptis emoryi*
Big galleta	*Pleuraphis rigida*
Indian ricegrass	*Achnatherum hymenoides*
Bush encelia	*Encelia frutescens*
All-scale	*Atriplex polycarpa*
Bush seepweed	*Sueda moquinii*
Fourwing saltbush	*Atriplex canescens*
Desert holly	*Atriplex hymenelytra*
Smoke tree	*Psorothamnus spinosus*
Honey mesquite	*Prosopis glandulosa* var. *torreyana*

Common Name	Scientific Name
Desert willow	*Chilopsis linearis*
Catclaw acacia	*Acacia gregii*
Black brush	*Coleogyne ramosissima*
Storksbill	*Erodium cicutarium*
California buckwheat	*Eriogonum fasciculatum*
Shadscale	*Atriplex confertifolia*
Mojave yucca	*Yucca schidigera*
Joshua tree	*Yucca brevifolia*
Parish's onion	*Allium parishii*
Crucifixion thorn	*Castela emoryi*
Red brome	*Bromus madritensis* ssp. *rubens*
Winged cryptantha	*Cryptantha holoptera*
Utah swallow-wort	*Cynanchum utahense*
Foxtail cactus	*Coryphantha alversonii*
N/A	*Eriastrum harwoodii*
Barrel cactus	*Ferocactus cylindraceus*
Slender bedstraw	*Galium angustifolium* ssp. *gracillimum*
Split grass	*Schismus barbatus, S. arabicus*
Crowned muilla	*Muilla coronata*
Whitemargin beardtongue	*Penstemon albomarginatus*
Spectacle fruit	*Wislizenia refracta* ssp. *refracta*
Cheat grass	*Bromus tectorum*
Biennial mustard	*Hirschfeldia incana*
Sahara mustard	*Brassica tournefortii*
Tumbleweed	*Salsola tragus*
Bristly fiddleneck	*Amsinckia tessellata*
Booth's evening primrose	*Camissonia boothii* spp. *Boothii*
Mojave spineflower	*Chorizanthe spinosa*
Riverside spineflower	*Chorizanthe xanti* var. *leucotheca*
Ribbed cryptantha	*Cryptantha costata*
Panamint liveforever	*Dudleya saxosa* ssp. *saxosa*
Mojave woolly sunflower	*Eriophyllum mohavense*
Coulter's goldfields	*Lasthenia glabrata* ssp. *Coulteri*
Spearleaf	*Matelea parvifolia*
Robison's monardella	*Monardella robisonii*
Thurber's penstemon	*Penstemon thurberi*
Chinese lantern	*Physalis lobata*
Silkcotton purslane	*Portulaca halimoides*
Redspined fishhook cactus	*Sclerocactus polyancistrus*
Salt spring checkerbloom	*Sidalcea neomexicana*
Desert twinbugs	*Dicoria canescens*
Desert sand verbena	*Abronia villosa*
Burrobush	*Ambrosia salsola*
Burgrass	*Cenchrus tribuloides*
Crabgrass	*Digitaria* sp.
Tumble mustard	*Sisymbrium altissimum*
Lambsquarter	*Chenopodium album*
Tansy mustard	*Descaurainia pinnata*
Plantain	*Plantago lanceolata*
Saltcedar	*Tamarix ramossisima*
Puncture vine	*Tribulus terrestris*
Invertebrates	

Common Name	Scientific Name
Versatile fairy shrimp	*Branchinecta lindahli*
Fishes	
Mosquito fish	*Gambusia affinis*
Amphibians	
Western toad	*Anaxyrus boreas halophilus*
Red-spotted toad	*Anaxyrus punctatus*
Birds	
Black-throated sparrow	*Amphispiza bilineata*
House finch	*Carpodacus mexicana*
Gambel's quail	*Callipepla gambellii*
Ground dove	*Columbina passerina*
Mourning dove	*Zenaida macroura*
White-crowned sparrow	*Zonotrichia leucophrys*
Fox sparrow	*Passerella iliaca*
Common raven	*Corvus corax*
Bald eagle	*Haliaeetus leucocephalus*
Eared grebe	*Podiceps nigricollis*
Greater white-fronted goose	*Anser albifrons*
Snow goose	*Chen caerulescens*
Ross' goose	*Chen rossii*
Canada goose	*Branta canadensis*
Mallard	*Anas platyrhynchos*
American wigeon	*Anas americana*
Northern shoveler	*Anas clypeata*
Ruddy duck	*Oxyura jamaicensis*
Redhead	*Aythya americana*
Sora	*Porzana carolina*
American coot	*Fulica americana*
American avocet	*Recurvirostra americana*
Black-necked stilt	*Himantopus mexicanus*
Killdeer	*Charadrius vociferus*
Solitary sandpiper	*Tringa solitaria*
Least sandpiper	*Calidris minutilla*
Golden eagle	*Aquila chrysaetos*
Northern harrier	*Circus cyaneus*
Sharp-shinned hawk	*Accipiter striatus*
Red-tailed hawk	*Buteo jamaicensis*
Cooper's hawk	*Accipiter cooperii*
American kestrel	*Falco sparverius*
Prairie falcon	*Falco mexicanus*
Gambel's quail	*Callipepla gambelii*
Rock dove	*Columba livia*
Mourning dove	*Zenaida macroura*
White-winged dove	*Zenaida asiatica*
Greater roadrunner	*Geococcyx californianus*
Barn owl	*Tyto alba*
Great horned owl	*Bubo virginianus*
Long-eared owl	*Asio otus*
Burrowing owl	*Athene cunicularia*
Common poorwill	*Phalaenoptilus nuttallii*
Lesser nighthawk	*Chordeiles acutipennis*
White-throated swift	*Aeronautes saxatalis*

Common Name	Scientific Name
Costa's hummingbird	*Calypte costae*
Anna's hummingbird	*Calypte anna*
Northern flicker	*Colaptes auratus*
Ladder-backed woodpecker	*Picoides scalaris*
Western kingbird	*Tyrannus verticalis*
Ash-throated flycatcher	*Myiarchus cinerascens*
Black phoebe	*Sayornis nigricans*
Say's phoebe	*Sayornis saya*
Horned lark	*Eremophila alpestris*
Cliff swallow	*Hirundo pyrrhonota*
Common raven	*Corvus corax*
Verdin	*Auriparus flaviceps*
Marsh wren	*Cistothorus palustris*
Canyon wren	*Catherpes mexicanus*
Rock wren	*Salpinctes obsoletus*
Cactus wren	*Campylorhynchus brunneicapillus*
Ruby-crowned kinglet	*Regulus calendula*
Black-tailed gnatcatcher	*Polioptila melanura*
Mountain bluebird	*Sialia currucoides*
American robin	*Turdus migratorius*
Loggerhead shrike	*Lanius ludovicianus*
Northern mockingbird	*Mimus polyglottos*
LeConte's thrasher	*Toxostoma lecontei*
California thrasher	*Toxostoma redivivum*
American pipit	*Anthus rubescens*
Phainopepla	*Phainopepla nitens*
European starling	*Sturnus vulgaris*
Yellow-rumped warbler	*Dendroica coronata*
Common yellowthroat	*Geothlypis trichas*
Spotted towhee	*Pipilo maculatus*
Savannah sparrow	*Passerculus sandwichensis*
Black-throated sparrow	*Amphispiza bilineata*
Sage sparrow	*Amphispiza belli*
Brewer's sparrow	*Spizella breweri*
Dark-eyed junco	*Junco hyemalis*
White-crowned sparrow	*Zonotrichia leucophrys*
Lincoln's sparrow	*Melospiza lincolnii*
Western meadowlark	*Sturnella neglecta*
Yellow-headed blackbird	*Xanthocephalus xanthocephalus*
Red-winged blackbird	*Agelaius phoeniceus*
Brewer's blackbird	*Euphagus cyanocephalus*
Brown-headed cowbird	*Molothrus ater*
Great-tailed grackle	*Quiscalus mexicanus*
Scott's oriole	*Icterus parisorum*
Bullock's oriole	*Icterus bullocki*
Hooded oriole	*Icterus cucullatus*
House sparrow	*Passer domesticus*
Lesser goldfinch	*Carduelis psaltria*
Red crossbill	*Loxia curvirostra*
House finch	*Carpodacus mexicanus*
Western snowy plover	*Charadrius alexandrinus nivosus*
Least Bell's vireo	*Vireo bellii pusillus*

Common Name	Scientific Name
Southwestern willow flycatcher	*Empidonax traillii extimus*
Gilded flicker	*Colaptes chrysoides*
Bank swallow	*Riparia riparia*
Peregrine falcon	*Falco peregrinus anatum*
Ferruginous hawk	*Buteo regalis*
Yellow warbler	*Dendroica petechia brewsteri*
Black tern	*Chlidonias niger*
Double-crested cormorant	*Phalacrocorax auritus*
White-faced ibis	*Plegadis chihi*
Osprey	*Pandion haliaetus*
Merlin	*Falco columbarius*
Short-eared owl	*Asio flammeus*
Vaux's swift	*Chaetura vauxi*
Brown-crested flycatcher	*Myiarchus tyrannulus*
Mammals	
Black-tailed jackrabbit	*Lepus californicus*
Desert cottontail	*Sylvilagus audubonii*
White-tailed antelope ground squirrel	*Ammospermophilus leucurus*
Round-tailed ground squirrel	*Spermophilus tereticaudus*
Merriam's kangaroo rat	*Dipodomys merriami*
Panamint kangaroo rat	*Dipodomys panamintinus*
Desert kangaroo rat	*Dipodomys deserti*
Deer mouse	*Peromyscus maniculatus*
Long-tailed pocket mouse	*Chaetodipus formosus*
Desert pocket mouse	*Chaetodipus penicillatus*
Little pocket mouse	*Perognathus longimembris*
Southern grasshopper mouse	*Onchomys torridus*
California ground squirrel	*Spermophilus beecheyi*
Botta's pocket gopher	*Thomomys bottae*
Pallid San Diego pocket mouse	*Chaetodipus fallax pallidus*
Canyon mouse	*Peromyscus crinitus*
Cactus mouse	*Peromyscus eremicus*
Desert woodrat	*Neotoma lepida*
Feral dog	*Canis lupus familiaris*
Common gray fox	*Urocyon cinereoargenteus*
Common raccoon	*Procyon lotor*
Striped skunk	*Mephitis mephitis*
Domestic cat	*Felis catus*
Coyote	*Canis latrans*
Kit fox	*Vulpes macrotis*
Bobcat	*Lynx rufus*
Badger	*Taxidea taxus*
Nelson's bighorn sheep	*Ovis canadensis nelsoni*
Mountain lion	*Felis concolor*
Townsend's big-eared bat	*Plecotus townsendii*
California leaf-nosed bat	*Macrotus californicus*
California myotis	*Myotis californicus*
Hoary bat	*Lasiurus cinereus*
Western pipistrelle	*Pipistrellus hesperus*
Big brown bat	*Eptesicus fuscus*
Pallid bat	*Antrozous pallidus*
Brazilian free-tailed bat	*Tadarida brasiliensis*

Common Name	Scientific Name
Western mastiff bat	*Eumops perotis*

I.3 DRAFT DISTURBANCE IN THE WEST AND SOUTH STUDY AREAS (KARL 2010)

I.3.1 Draft Summary of Methods and Results

Determination of Disturbance Categories

A variety of anthropogenic activities in the WSA and SSA have likely influenced tortoise densities. These include off-highway-vehicle (OHV) recreation, other outdoor recreation such as shooting and camping, grazing, mining, transmission lines, and nearby residences. The factors resulting from these activities that are expected to be similar to those from military training activities include:

- Loss of habitat (i.e., loss or degradation of vegetation and soils)
- Crushing of tortoises, either in their burrows or aboveground
- Dust deposition
- Attraction of predators to the area
- Introduction and spread of exotic weed species

OHV activity, and to a far lesser extent, influences from transmission lines and residences are the recent and current source of these factors. The entire WSA is in the U.S. Bureau of Land Management's (BLM's) Johnson Valley Off-Highway-Vehicle Area (BLM 1992). While the Johnson Valley OHV area was only designated in 1980, Johnson Valley has been a popular OHV recreation area for over 60 years (BLM 1992). Organized race events that are run annually may include over 12,000 participants (motorcycles and/or four-wheel-drive [4WD] vehicles) and 40,000 spectators (BLM 1992). These cross-country races are concentrated along specific routes, resulting in a dense swath of tracks may be hundreds of meters wide. Other intensive-use areas include staging areas and camping areas that host small cities of motor homes (RV's) during the events. Beyond organized events, the WSA hosts intensive OHV use year-round and in all areas of the Johnson Valley OHV Area. Effects on the native habitat range from entire loss of vegetation and soils in concentrated use areas (staging areas, race routes, RV camp areas, hill-climbs), to well established trails (defined as a multi-pass, compacted path, one to a few meters wide, with no vegetation), to single tracks across the landscape and in washes. In addition to varying levels of focused surface disturbance, other factors associated with OHV recreation that may directly affect tortoises include crushing of tortoises and tortoise collecting. Indirect effects to tortoises in the vicinity of concentrated use areas include dust deposition on neighboring vegetation, which may affect photosynthesis and the growth of tortoise forage and cover, and predator attraction. In most areas where OHV activities are concentrated, surveyors noted the presence of trash. Food and trash are attractants for ravens and coyotes, which may subsequently prey on tortoises in the area after campers depart.

The SSA experiences little OHV use, most of which is confined to minor motorcycle activity in the far southern portion of the SSA, near the Valley Mountain, and in the southwest.

Transmission lines on the western side of the WSA provide recreational access to remote areas. However, there is not a direct association between the level of OHV or recreational use of a particular area and the presence of transmission lines. Thus, the degree of tortoise crushing and collecting that might be associated with a transmission line is difficult to assess. The only direct effect that is quantifiable is the loss of habitat for the twenty-foot-wide access road and tower pads. Indirect effects may result from increased raven predation on the local tortoise population. Transmission lines support the expansion of raven populations into many areas by providing roosts and nest sites and it has been demonstrated that ravens nesting in the towers prey on tortoises.

Scattered residences in the far southwestern corner and along the southeastern border of the WSA, and along the southern SSA border may affect tortoises because of increased localized recreational activity and depredation by domestic dogs.

Exotic weeds, especially Russian thistle (*Salsola tragus*) and Sahara mustard (*Brassica tournefortii*), are associated with disturbed areas. Their introduction and spread is facilitated by construction and agriculture and dense populations of these weeds are especially evident along roads, utility corridors, along agricultural edges or in abandoned cropland, and around towns and tracts cleared for housing or commerce. Heavy equipment that travels between infested sites is likely a major factor in the spread of these species, which is further exacerbated along roads, where seeds are transported long distances by vehicles.

A level of use, which incorporates surface disturbance and possible ancillary impacts to tortoises associated with the use level, was determined for each square kilometer in the study areas. This was accomplished using Google Earth© aerials, descriptions by surveyors, and multiple photographs taken for each square kilometer by the surveyors. Use levels in adjacent square kilometers were also taken into consideration, in the context of similarity of habitat. Three use categories were developed based on examination of the range of surface disturbance observed and the types of anthropogenic influences. The following criteria defined each category. (For purposes of clarification, a track is defined as a single pass by a vehicle, either motorcycle or 4WD. A trail is one to a few meters wide of compacted, unvegetated soils, created by multiple vehicle passes.)

- **High**– More than five established trails or all high-use areas (race routes, staging areas, RV camping areas, hill-climbs, obvious vegetation loss obvious from aerials and photographs) or high track volume or heavy use of specific washes (as described by surveyor)
- **Medium** – Three to five established trails. Single tracks were observed throughout although there were no heavily tracked areas.
- **Low** – None to two established trails with occasional single tracks or tracks in washes and described as low impact by surveyor

Categories were necessarily broad for several reasons. First, information about OHV impacts provided by the tortoise survey was qualitative and descriptions were not consistent or standardized among the surveyors. While anthropogenic features were described for every square kilometer in the study areas, they were not the focus of the tortoise survey and were only one of many factors that were described to characterize the habitat. Second, Google Earth aerials were not adequate to see tracks or very small trails, but was very useful in identifying major trails, race routes, and other intensive-use areas. Finally, categorization was subjective. While I strove to maintain consistency, data interpretation often involved a subjective element.

Summary of Results

Use levels were assessed for 879 square kilometers in the WSA and SSA. For purposes of associating tortoise density to use levels, those square kilometers with no tortoise habitat (n = 69) were removed prior to the analysis.

Average Tortoise Density by Use Level

High Use Areas: A total of 343 km^2 in the WSA and SSA were considered to have high use. Mean adult tortoise density was 3.7 tortoises/km^2 (S.E. = 0.08).

Medium Use Areas: A total of 159 km^2 in the WSA and SSA were considered to have medium use. Mean adult tortoise density was 4.5 tortoises/km^2 (S.E. = 0.16).

Low Use Areas: A total of 306 km^2 in the WSA and SSA were considered to have low use. Mean adult tortoise density was 4.6 tortoises/km^2 (S.E. = 0.12).

Conclusion: Because of the large sample size and low spread in tortoise density in the study areas (2.3 – 13.6 adult tortoises/ km^2) average density is not very meaningful.

Chi-Square Analysis

Tortoise Density Category	Use Level			Total
	High	Medium	Low	
Lowest (1-2 tortoises/km2)	94	28	49	171
Very Low (3-4 tortoises/km2)	157	57	122	336
Low (5-7tortoises/km2)	83	62	111	256
Moderate (8-14 tortoises/km2)	9	12	24	45
Total	343	159	306	808

Conclusion: Chi-square analysis identifies a significant difference in use levels among four tortoise density categories (Chi-square = 843.15, df = 12, P<0.001). In the lowest tortoise density category, there is a higher proportion of square kilometers with high use. In the highest tortoise density category (moderate), there is a higher proportion of square kilometers with low use and a low proportion with high use. This pattern is similar for the next highest tortoise density category (low), although not as clear.

Appendix 1. Adult tortoise density in the WSA and SSA, by square kilometer, and use (disturbance) levels.

Study Area	UTM (NW Corner)		Tortoise Point Density	Confidence Interval		Use Level
	Easting	Northing		Lower	Upper	
WSA	22	15	2.9	1.8	4.0	High
	22	16	2.9	1.8	4.0	Medium
	22	17	2.9	1.8	4.0	Medium
	22	18	2.9	1.8	4.0	High
	22	19	2.9	1.8	4.0	High
	22	20	2.9	1.8	4.0	High
	22	21	2.9	1.8	4.0	High
	22	22	3.5	2.4	4.6	High
	22	23	3.5	2.4	4.6	High
	22	24	3.5	2.4	4.6	High
	22	25	4.2	3.1	5.3	High
	22	26	4.2	3.1	5.3	High
	22	27	4.2	3.1	5.3	High
	22	28	4.2	3.1	5.3	High
	22	29	4.2	3.1	5.3	High
	22	30	4.2	3.1	5.3	High
	23	15	2.9	1.8	4.0	High
	23	16	2.9	1.8	4.0	Medium
	23	17	2.9	1.8	4.0	Medium
	23	18	2.9	1.8	4.0	High
	23	19	2.9	1.8	4.0	High
	23	20	2.9	1.8	4.0	High
	23	21	2.9	1.8	4.0	High
	23	22	2.9	1.8	4.0	High
	23	23	3.5	2.4	4.6	High
	23	24	3.8	2.7	4.9	High
	23	25	4.2	3.1	5.3	High
	23	26	4.2	3.1	5.3	High
	23	27	4.2	3.1	5.3	High
	23	28	4.2	3.1	5.3	High
	23	29	4.2	3.1	5.3	High
	23	30	4.2	3.1	5.3	High
	24	13	2.9	1.8	4.0	High
	24	14	3.0	1.9	4.1	High
	24	15	3.0	1.9	4.1	High
	24	16	3.0	1.9	4.1	High
	24	17	5.5	4.4	6.6	Medium
	24	18	5.5	4.4	6.6	Low
	24	19	5.5	4.4	6.6	Low
	24	20	2.3	1.2	3.4	High
	24	21	2.3	1.2	3.4	High

Study Area	UTM (NW Corner)		Tortoise Point Density	Confidence Interval		Use Level
	Easting	Northing		Lower	Upper	
	24	22	3.5	2.4	4.6	High
	24	23	4.2	3.1	5.3	High
	24	24	4.2	3.1	5.3	High
	24	25	2.9	1.8	4.0	Low
	24	26	4.2	3.1	5.3	Low
	24	27	2.9	1.8	4.0	Medium
	24	28	2.9	1.8	4.0	Medium
	24	29	2.9	1.8	4.0	High
	24	30	4.5	3.4	5.6	High
	24	31	4.5	3.4	5.6	High
	25	13	2.3	1.2	3.4	High
	25	14	2.3	1.2	3.4	High
	25	15	2.3	1.2	3.4	High
	25	16	2.9	1.8	4.0	High
	25	17	2.9	1.8	4.0	Low
	25	18	2.9	1.8	4.0	Low
	25	19	5.5	4.4	6.6	Low
	25	20	5.5	4.4	6.6	Low
	25	21	4.0	2.9	5.1	Medium
	25	22	6.0	4.9	7.1	High
	25	23	4.5	3.4	5.6	High
	25	24	4.2	3.1	5.3	Low
	25	25	2.9	1.8	4.0	Low
	25	26	2.9	1.8	4.0	Low
	25	27	2.9	1.8	4.0	High
	25	28	2.9	1.8	4.0	High
	25	29	2.9	1.8	4.0	High
	25	30	2.9	1.8	4.0	High
	25	31	2.9	1.8	4.0	High
	26	12	2.3	1.2	3.4	High
	26	13	2.3	1.2	3.4	High
	26	14	0.0	0.0	0.0	High
	26	15	2.3	1.2	3.4	High
	26	16	2.3	1.2	3.4	High
	26	17	0.0	0.0	0.0	Low
	26	18	2.9	1.8	4.0	Low
	26	19	2.9	1.8	4.0	Low
	26	20	2.9	1.8	4.0	Low
	26	21	5.5	4.4	6.6	Low
	26	22	5.5	4.4	6.6	High
	26	23	5.5	4.4	6.6	High
	26	24	2.9	1.8	4.0	Low
	26	25	0.0	0.0	0.0	Low
	26	26	0.0	0.0	0.0	Low

Study Area	UTM (NW Corner)		Tortoise Point Density	Confidence Interval		Use Level
	Easting	Northing		Lower	Upper	
	26	27	2.9	1.8	4.0	High
	26	28	2.9	1.8	4.0	High
	26	29	2.9	1.8	4.0	High
	26	30	3.5	2.4	4.6	Medium
	26	31	2.3	1.2	3.4	Medium
	26	32	3.8	2.7	4.9	High
	26	33	5.4	4.3	6.5	High
	26	34	2.3	1.2	3.4	High
	27	12	2.3	1.2	3.4	High
	27	13	0.0	0.0	0.0	High
	27	14	0.0	0.0	0.0	High
	27	15	2.3	1.2	3.4	Low
	27	16	0.0	0.0	0.0	Low
	27	17	0.0	0.0	0.0	Low
	27	18	2.9	1.8	4.0	Medium
	27	19	2.9	1.8	4.0	Medium
	27	20	2.9	1.8	4.0	Medium
	27	21	5.5	4.4	6.6	High
	27	22	5.5	4.4	6.6	High
	27	23	5.5	4.4	6.6	High
	27	24	2.3	1.2	3.4	Medium
	27	25	2.3	1.2	3.4	High
	27	26	2.9	1.8	4.0	High
	27	27	3.8	2.7	4.9	High
	27	28	3.5	2.4	4.6	High
	27	29	4.2	3.1	5.3	High
	27	30	3.5	2.4	4.6	Medium
	27	31	2.3	1.2	3.4	Medium
	27	32	2.3	1.2	3.4	High
	27	33	3.8	2.7	4.9	High
	27	34	3.8	2.7	4.9	High
	28	12	2.3	1.2	3.4	High
	28	13	0.0	0.0	0.0	High
	28	14	2.3	1.2	3.4	High
	28	15	2.3	1.2	3.4	High
	28	16	2.3	1.2	3.4	High
	28	17	2.9	1.8	4.0	High
	28	18	3.5	2.4	4.6	High
	28	19	2.9	1.8	4.0	High
	28	20	2.9	1.8	4.0	Medium
	28	21	4.2	3.1	5.3	High
	28	22	2.9	1.8	4.0	High
	28	23	2.3	1.2	3.4	High
	28	24	2.3	1.2	3.4	Medium

Study Area	UTM (NW Corner)		Tortoise Point Density	Confidence Interval		Use Level
	Easting	Northing		Lower	Upper	
	28	25	2.3	1.2	3.4	High
	28	26	2.9	1.8	4.0	High
	28	27	4.8	3.7	5.9	High
	28	28	4.8	3.7	5.9	High
	28	29	4.5	3.4	5.6	Medium
	28	30	4.2	3.1	5.3	High
	28	31	2.3	1.2	3.4	Medium
	28	32	2.3	1.2	3.4	Low
	28	33	2.3	1.2	3.4	Low
	28	34	2.3	1.2	3.4	Low
	29	12	2.3	1.2	3.4	High
	29	13	2.3	1.2	3.4	High
	29	14	2.3	1.2	3.4	High
	29	15	2.3	1.2	3.4	High
	29	16	2.3	1.2	3.4	High
	29	17	2.3	1.2	3.4	High
	29	18	2.8	1.7	3.9	High
	29	19	2.3	1.2	3.4	High
	29	20	4.2	3.1	5.3	High
	29	21	3.8	2.7	4.9	High
	29	22	2.9	1.8	4.0	High
	29	23	2.9	1.8	4.0	High
	29	24	2.9	1.8	4.0	High
	29	25	2.9	1.8	4.0	Medium
	29	26	2.9	1.8	4.0	High
	29	27	4.8	3.7	5.9	High
	29	28	4.8	3.7	5.9	High
	29	29	2.9	1.8	4.0	Low
	29	30	2.9	1.8	4.0	Low
	29	31	2.9	1.8	4.0	Medium
	29	32	2.3	1.2	3.4	Low
	29	33	4.8	3.7	5.9	Low
	29	34	4.8	3.7	5.9	Low
	30	12	2.3	1.2	3.4	High
	30	13	2.3	1.2	3.4	High
	30	14	2.3	1.2	3.4	High
	30	15	2.3	1.2	3.4	High
	30	16	2.9	1.8	4.0	High
	30	17	2.5	1.4	3.6	High
	30	18	2.9	1.8	4.0	High
	30	19	2.5	1.4	3.6	High
	30	20	2.3	1.2	3.4	High
	30	21	6.0	4.9	7.1	High
	30	22	4.5	3.4	5.6	High

Study Area	UTM (NW Corner)		Tortoise Point Density	Confidence Interval		Use Level
	Easting	Northing		Lower	Upper	
	30	23	3.5	2.4	4.6	High
	30	24	3.5	2.4	4.6	Medium
	30	25	2.9	1.8	4.0	Medium
	30	26	4.2	3.1	5.3	Low
	30	27	2.9	1.8	4.0	High
	30	28	2.9	1.8	4.0	Low
	30	29	2.9	1.8	4.0	Low
	30	30	2.9	1.8	4.0	Low
	30	31	3.5	2.4	4.6	Medium
	30	32	3.5	2.4	4.6	Low
	30	33	4.8	3.7	5.9	Low
	30	34	4.8	3.7	5.9	Low
	31	13	2.3	1.2	3.4	High
	31	14	2.3	1.2	3.4	High
	31	15	2.3	1.2	3.4	High
	31	16	2.9	1.8	4.0	High
	31	17	2.3	1.2	3.4	High
	31	18	2.9	1.8	4.0	High
	31	19	2.3	1.2	3.4	High
	31	20	3.5	2.4	4.6	High
	31	21	3.3	2.2	4.4	High
	31	22	2.9	1.8	4.0	High
	31	23	2.9	1.8	4.0	High
	31	24	2.9	1.8	4.0	High
	31	25	2.9	1.8	4.0	High
	31	26	2.9	1.8	4.0	Low
	31	27	5.4	4.3	6.5	Medium
	31	28	2.9	1.8	4.0	Low
	31	29	2.9	1.8	4.0	Low
	31	30	6.0	4.9	7.1	Low
	31	31	6.0	4.9	7.1	Medium
	31	32	6.0	4.9	7.1	Low
	31	33	4.8	3.7	5.9	Low
	31	34	2.3	1.2	3.4	Low
	32	13	2.3	1.2	3.4	High
	32	14	2.3	1.2	3.4	High
	32	15	2.5	1.4	3.6	High
	32	16	2.9	1.8	4.0	High
	32	17	2.5	1.4	3.6	High
	32	18	2.3	1.2	3.4	High
	32	19	2.3	1.2	3.4	High
	32	20	2.3	1.2	3.4	High
	32	21	2.5	1.4	3.6	High
	32	22	2.5	1.4	3.6	High

Study Area	UTM (NW Corner)		Tortoise Point Density	Confidence Interval		Use Level
	Easting	Northing		Lower	Upper	
	32	23	2.3	1.2	3.4	High
	32	24	2.3	1.2	3.4	High
	32	25	2.3	1.2	3.4	High
	32	26	2.3	1.2	3.4	High
	32	27	5.4	4.3	6.5	High
	32	28	7.3	6.2	8.4	Medium
	32	29	2.9	1.8	4.0	Low
	32	30	6.0	4.9	7.1	Low
	32	31	5.8	4.7	6.9	Medium
	32	32	6.0	4.9	7.1	Low
	32	33	2.3	1.2	3.4	Low
	32	34	0.0	0.0	0.0	Low
	33	13	2.3	1.2	3.4	High
	33	14	2.3	1.2	3.4	High
	33	15	2.5	1.4	3.6	High
	33	16	2.5	1.4	3.6	High
	33	17	2.3	1.2	3.4	High
	33	18	2.3	1.2	3.4	High
	33	19	2.3	1.2	3.4	High
	33	20	2.3	1.2	3.4	High
	33	21	2.3	1.2	3.4	High
	33	22	2.3	1.2	3.4	High
	33	23	2.3	1.2	3.4	High
	33	24	2.3	1.2	3.4	High
	33	25	2.3	1.2	3.4	High
	33	26	2.3	1.2	3.4	High
	33	27	4.8	3.7	5.9	High
	33	28	5.4	4.3	6.5	High
	33	29	7.9	6.8	9.0	Medium
	33	30	7.0	5.9	8.2	Low
	33	31	5.4	4.3	6.5	Low
	33	32	5.8	4.7	6.9	Low
	33	33	0.0	0.0	0.0	Low
	33	34	0.0	0.0	0.0	Low
	34	12	4.2	3.1	5.3	High
	34	13	4.2	3.1	5.3	High
	34	14	4.2	3.1	5.3	High
	34	15	4.2	3.1	5.3	High
	34	16	2.9	1.8	4.0	High
	34	17	2.3	1.2	3.4	High
	34	18	2.3	1.2	3.4	High
	34	19	2.3	1.2	3.4	High
	34	20	2.3	1.2	3.4	High
	34	21	2.3	1.2	3.4	High

Study Area	UTM (NW Corner)		Tortoise Point Density	Confidence Interval		Use Level
	Easting	Northing		Lower	Upper	
	34	22	2.3	1.2	3.4	High
	34	23	2.3	1.2	3.4	High
	34	24	2.3	1.2	3.4	High
	34	25	2.3	1.2	3.4	High
	34	26	3.5	2.4	4.6	High
	34	27	4.3	3.2	5.4	High
	34	28	5.3	4.2	6.4	High
	34	29	6.0	4.9	7.1	High
	34	30	7.9	6.8	9.0	Medium
	34	31	6.8	5.7	7.9	Low
	34	32	5.5	4.4	6.6	Low
	34	33	0.0	0.0	0.0	Low
	34	34	0.0	0.0	0.0	Low
	35	11	6.0	4.9	7.1	High
	35	12	6.0	4.9	7.1	High
	35	13	6.0	4.9	7.1	High
	35	14	6.0	4.9	7.1	High
	35	15	2.9	1.8	4.0	High
	35	16	2.9	1.8	4.0	High
	35	17	2.3	1.2	3.4	High
	35	18	2.3	1.2	3.4	High
	35	19	3.3	2.2	4.4	High
	35	20	2.3	1.2	3.4	High
	35	21	2.5	1.4	3.6	High
	35	22	2.3	1.2	3.4	High
	35	23	3.5	2.4	4.6	High
	35	24	4.8	3.7	5.9	High
	35	25	6.7	5.6	7.8	High
	35	26	5.4	4.3	6.5	High
	35	27	2.9	1.8	4.0	High
	35	28	2.9	1.8	4.0	High
	35	29	2.9	1.8	4.0	High
	35	30	4.5	3.4	5.6	Medium
	35	31	7.3	6.2	8.4	Low
	35	32	6.7	5.6	7.8	Low
	35	33	6.7	5.6	7.8	Low
	35	34	0.0	0.0	0.0	Low
	36	11	6.0	4.9	7.1	High
	36	12	6.0	4.9	7.1	High
	36	13	3.5	2.4	4.6	High
	36	14	2.3	1.2	3.4	High
	36	15	2.9	1.8	4.0	High
	36	16	2.9	1.8	4.0	High
	36	17	2.3	1.2	3.4	High

Study Area	UTM (NW Corner)		Tortoise Point Density	Confidence Interval		Use Level
	Easting	Northing		Lower	Upper	
	36	18	3.3	2.2	4.4	High
	36	19	2.9	1.8	4.0	High
	36	20	2.9	1.8	4.0	High
	36	21	2.9	1.8	4.0	High
	36	22	4.8	3.7	5.9	High
	36	23	4.8	3.7	5.9	High
	36	24	6.8	5.7	7.9	High
	36	25	6.7	5.6	7.8	High
	36	26	5.4	4.3	6.5	Medium
	36	27	5.4	4.3	6.5	Medium
	36	28	2.9	1.8	4.0	Medium
	36	29	4.8	3.7	5.9	High
	36	30	2.9	1.8	4.0	High
	36	31	4.5	3.4	5.6	Medium
	36	32	6.7	5.6	7.8	Medium
	36	33	6.0	4.9	7.1	Low
	36	34	2.3	1.2	3.4	Low
	37	09	0.0	0.0	0.0	High
	37	10	0.0	0.0	0.0	High
	37	11	2.3	1.2	3.4	High
	37	12	2.3	1.2	3.4	High
	37	13	0.0	0.0	0.0	High
	37	14	0.0	0.0	0.0	High
	37	15	3.5	2.4	4.6	High
	37	16	3.0	1.9	4.1	High
	37	17	3.8	2.7	4.9	High
	37	18	5.4	4.3	6.5	High
	37	19	3.8	2.7	4.9	High
	37	20	2.9	1.8	4.0	High
	37	21	4.3	3.2	5.4	High
	37	22	6.0	4.9	7.1	High
	37	23	9.2	8.1	10.3	High
	37	24	6.7	5.6	7.8	High
	37	25	5.4	4.3	6.5	High
	37	26	7.5	6.4	8.7	Medium
	37	27	4.2	3.1	5.3	Medium
	37	28	8.6	7.4	9.7	High
	37	29	5.4	4.3	6.5	Medium
	37	30	5.3	4.2	6.4	Medium
	37	31	4.2	3.1	5.3	Medium
	37	32	6.8	5.7	7.9	Medium
	37	33	5.4	4.3	6.5	Medium
	37	34	2.9	1.8	4.0	Low
	38	08	6.0	4.9	7.1	Medium

Study Area	UTM (NW Corner)		Tortoise Point Density	Confidence Interval		Use Level
	Easting	Northing		Lower	Upper	
	38	09	6.0	4.9	7.1	Medium
	38	10	3.5	2.4	4.6	High
	38	11	0.0	0.0	0.0	High
	38	12	0.0	0.0	0.0	High
	38	13	0.0	0.0	0.0	High
	38	14	0.0	0.0	0.0	High
	38	15	3.5	2.4	4.6	High
	38	16	3.5	2.4	4.6	High
	38	17	5.0	3.9	6.1	High
	38	18	5.8	4.7	6.9	High
	38	19	4.2	3.1	5.3	High
	38	20	5.0	3.9	6.1	High
	38	21	7.3	6.2	8.4	High
	38	22	6.5	5.4	7.7	High
	38	23	5.4	4.3	6.5	High
	38	24	6.0	4.9	7.1	High
	38	25	6.8	5.7	7.9	High
	38	26	6.8	5.7	7.9	Medium
	38	27	11.7	10.6	12.8	Medium
	38	28	11.7	10.6	12.8	High
	38	29	4.8	3.7	5.9	Medium
	38	30	5.4	4.3	6.5	Medium
	38	31	6.0	4.9	7.1	Medium
	38	32	11.7	10.6	12.8	Medium
	38	33	5.4	4.3	6.5	Medium
	38	34	7.9	6.8	9.0	Medium
	39	08	6.0	4.9	7.1	Medium
	39	09	6.0	4.9	7.1	Medium
	39	10	3.5	2.4	4.6	High
	39	11	0.0	0.0	0.0	Medium
	39	12	0.0	0.0	0.0	Medium
	39	13	0.0	0.0	0.0	Medium
	39	14	2.9	1.8	4.0	High
	39	15	2.3	1.2	3.4	High
	39	16	4.8	3.7	5.9	High
	39	17	6.0	4.9	7.1	High
	39	18	5.5	4.4	6.6	High
	39	19	4.8	3.7	5.9	High
	39	20	7.3	6.2	8.4	High
	39	21	7.3	6.2	8.4	High
	39	22	5.5	4.4	6.6	High
	39	23	4.2	3.1	5.3	High
	39	24	7.9	6.8	9.0	High
	39	25	7.8	6.7	8.9	High

Study Area	UTM (NW Corner) Easting	UTM (NW Corner) Northing	Tortoise Point Density	Confidence Interval Lower	Confidence Interval Upper	Use Level
	39	26	8.0	6.9	9.2	High
	39	27	4.8	3.7	5.9	High
	39	28	7.3	6.2	8.4	High
	39	29	5.4	4.3	6.5	High
	39	30	5.0	3.9	6.1	Medium
	39	31	4.2	3.1	5.3	Medium
	39	32	4.8	3.7	5.9	Medium
	39	33	4.2	3.1	5.3	Low
	39	34	11.7	10.6	12.8	Low
	40	07	6.0	4.9	7.1	Medium
	40	08	3.5	2.4	4.6	Medium
	40	09	3.5	2.4	4.6	High
	40	10	0.0	0.0	0.0	Medium
	40	11	0.0	0.0	0.0	Medium
	40	12	0.0	0.0	0.0	Medium
	40	13	2.9	1.8	4.0	Medium
	40	14	3.5	2.4	4.6	High
	40	15	3.3	2.2	4.4	High
	40	16	3.5	2.4	4.6	High
	40	17	4.3	3.2	5.4	High
	40	18	4.8	3.7	5.9	Medium
	40	19	4.5	3.4	5.6	High
	40	20	4.2	3.1	5.3	High
	40	21	4.8	3.7	5.9	High
	40	22	4.8	3.7	5.9	Medium
	40	23	5.4	4.3	6.5	High
	40	24	9.8	8.7	10.9	High
	40	25	7.3	6.2	8.4	High
	40	26	5.0	3.9	6.1	Medium
	40	27	2.9	1.8	4.0	Medium
	40	28	0.0	0.0	0.0	Low
	40	29	6.3	5.2	7.4	Medium
	40	30	4.8	3.7	5.9	Medium
	40	31	3.8	2.7	4.9	Low
	40	32	3.5	2.4	4.6	Medium
	40	33	4.2	3.1	5.3	Medium
	40	34	12.9	11.8	14.1	Medium
	41	07	6.0	4.9	7.1	Low
	41	08	3.5	2.4	4.6	High
	41	09	3.5	2.4	4.6	High
	41	10	3.5	2.4	4.6	High
	41	11	0.0	0.0	0.0	Medium
	41	12	0.0	0.0	0.0	Low
	41	13	2.9	1.8	4.0	Low

Study Area	UTM (NW Corner)		Tortoise Point Density	Confidence Interval		Use Level
	Easting	Northing		Lower	Upper	
	41	14	3.3	2.2	4.4	Medium
	41	15	3.5	2.4	4.6	High
	41	16	3.3	2.2	4.4	High
	41	17	2.9	1.8	4.0	High
	41	18	4.0	2.9	5.1	Medium
	41	19	4.2	3.1	5.3	Medium
	41	20	5.0	3.9	6.1	Medium
	41	21	6.3	5.2	7.4	Medium
	41	22	3.1	2.0	4.2	High
	41	23	4.8	3.7	5.9	High
	41	24	7.5	6.4	8.7	Medium
	41	25	5.5	4.4	6.6	Low
	41	26	2.9	1.8	4.0	Low
	41	27	3.8	2.7	4.9	Low
	41	28	0.0	0.0	0.0	Low
	41	29	0.0	0.0	0.0	Low
	41	30	0.0	0.0	0.0	Low
	41	31	3.5	2.4	4.6	Low
	41	32	3.8	2.7	4.9	Low
	41	33	6.8	5.7	7.9	Medium
	41	34	8.6	7.4	9.7	Low
	42	07	6.0	4.9	7.1	Medium
	42	08	4.8	3.7	5.9	Medium
	42	09	4.8	3.7	5.9	High
	42	10	5.0	3.9	6.1	High
	42	11	6.5	5.4	7.7	Low
	42	12	7.3	6.2	8.4	Low
	42	13	5.4	4.3	6.5	Low
	42	14	2.9	1.8	4.0	Medium
	42	15	3.1	1.9	4.2	Medium
	42	16	3.1	1.9	4.2	Medium
	42	17	2.8	1.7	3.9	High
	42	18	2.3	1.2	3.4	High
	42	19	4.3	3.2	5.4	Medium
	42	20	6.0	4.9	7.1	Medium
	42	21	5.3	4.2	6.4	Medium
	42	22	6.7	5.6	7.8	High
	42	23	5.5	4.4	6.6	High
	42	24	4.3	3.2	5.4	Medium
	42	25	2.3	1.2	3.4	Low
	42	26	4.3	3.2	5.4	Low
	42	27	4.8	3.7	5.9	Low
	42	28	3.8	2.7	4.9	Low
	42	29	2.3	1.2	3.4	Low

Study Area	UTM (NW Corner)		Tortoise Point Density	Confidence Interval		Use Level
	Easting	Northing		Lower	Upper	
	42	30	0.0	0.0	0.0	Low
	42	31	2.3	1.2	3.4	Low
	42	32	3.8	2.7	4.9	Low
	42	33	6.8	5.7	7.9	Low
	42	34	6.8	5.7	7.9	Low
	43	07	6.0	4.9	7.1	High
	43	08	6.0	4.9	7.1	High
	43	09	2.3	1.2	3.4	High
	43	10	5.4	4.3	6.5	Medium
	43	11	6.7	5.6	7.8	Medium
	43	12	6.3	5.2	7.4	Medium
	43	13	7.9	6.8	9.0	Medium
	43	14	2.3	1.2	3.4	Medium
	43	15	2.9	1.8	4.0	Medium
	43	16	2.9	1.8	4.0	Medium
	43	17	2.3	1.2	3.4	Medium
	43	18	2.3	1.2	3.4	Medium
	43	19	2.8	1.7	3.9	Medium
	43	20	4.0	2.9	5.1	Medium
	43	21	2.9	1.8	4.0	Medium
	43	22	6.3	5.2	7.4	Medium
	43	23	5.4	4.3	6.5	Medium
	43	24	3.8	2.7	4.9	Medium
	43	25	3.8	2.7	4.9	Medium
	43	26	5.4	4.3	6.5	Low
	43	27	5.5	4.4	6.6	Low
	43	28	2.9	1.8	4.0	Low
	43	29	2.3	1.2	3.4	Low
	43	30	0.0	0.0	0.0	Low
	43	31	2.3	1.2	3.4	Low
	43	32	2.3	1.2	3.4	Low
	43	33	0.0	0.0	0.0	Low
	43	34	0.0	0.0	0.0	Low
	44	07	2.3	1.2	3.4	High
	44	08	2.3	1.2	3.4	High
	44	09	2.3	1.2	3.4	High
	44	10	4.2	3.1	5.3	High
	44	11	5.4	4.3	6.5	High
	44	12	8.6	7.4	9.7	Medium
	44	13	5.3	4.2	6.4	High
	44	14	4.8	3.7	5.9	Medium
	44	15	6.0	4.9	7.1	Medium
	44	16	7.9	6.8	9.0	Medium
	44	17	2.3	1.2	3.4	Medium

Study Area	UTM (NW Corner)		Tortoise Point Density	Confidence Interval		Use Level
	Easting	Northing		Lower	Upper	
	44	18	2.3	1.2	3.4	Low
	44	19	4.8	3.7	5.9	Medium
	44	20	2.9	1.8	4.0	Medium
	44	21	3.5	2.4	4.6	High
	44	22	4.8	3.7	5.9	Medium
	44	23	5.0	3.9	6.1	Medium
	44	24	3.8	2.7	4.9	High
	44	25	3.8	2.7	4.9	High
	44	26	4.2	3.1	5.3	Medium
	44	27	3.5	2.4	4.6	Low
	44	28	3.0	1.9	4.1	Low
	44	29	2.8	1.7	3.9	Low
	44	30	2.3	1.2	3.4	Low
	44	31	2.3	1.2	3.4	Low
	44	32	2.3	1.2	3.4	Low
	44	33	2.3	1.2	3.4	Low
	44	34	6.8	5.7	7.9	Low
	45	04	4.2	3.1	5.3	Low
	45	05	3.2	2.1	4.3	Low
	45	06	0.0	0.0	0.0	Medium
	45	07	0.0	0.0	0.0	High
	45	08	0.0	0.0	0.0	High
	45	09	0.0	0.0	0.0	High
	45	10	3.1	2.0	4.2	High
	45	11	2.3	1.2	3.4	High
	45	12	5.8	4.7	6.9	Medium
	45	13	2.9	1.8	4.0	High
	45	14	4.8	3.7	5.9	High
	45	15	4.8	3.7	5.9	Medium
	45	16	6.0	4.9	7.1	Medium
	45	17	2.3	1.2	3.4	Medium
	45	18	6.8	5.7	7.9	Medium
	45	19	6.7	5.6	7.8	Medium
	45	20	4.0	2.9	5.1	Medium
	45	21	3.8	2.7	4.9	High
	45	22	2.3	1.2	3.4	High
	45	23	2.3	1.2	3.4	Medium
	45	24	4.8	3.7	5.9	High
	45	25	2.9	1.8	4.0	High
	45	26	2.9	1.8	4.0	Medium
	45	27	3.0	1.9	4.1	Low
	45	28	2.9	1.8	4.0	Low
	45	29	3.0	1.9	4.1	Low
	45	30	2.3	1.2	3.4	Low

Study Area	UTM (NW Corner)		Tortoise Point Density	Confidence Interval		Use Level
	Easting	Northing		Lower	Upper	
	45	31	4.2	3.1	5.3	Low
	45	32	2.3	1.2	3.4	Low
	45	33	2.3	1.2	3.4	Low
	45	34	6.8	5.7	7.9	Low
	46	04	3.2	2.1	4.3	Medium
	46	05	2.3	1.2	3.4	Medium
	46	06	0.0	0.0	0.0	High
	46	07	0.0	0.0	0.0	High
	46	08	0.0	0.0	0.0	High
	46	09	2.6	1.5	3.7	High
	46	10	2.9	1.8	4.0	High
	46	11	2.6	1.5	3.7	High
	46	12	2.3	1.2	3.4	High
	46	13	4.3	3.2	5.4	High
	46	14	4.8	3.7	5.9	High
	46	15	5.0	3.9	6.1	Medium
	46	16	7.3	6.2	8.4	Low
	46	17	9.8	8.7	10.9	Medium
	46	18	6.7	5.6	7.8	High
	46	19	6.7	5.6	7.8	High
	46	20	5.0	3.9	6.1	Medium
	46	21	3.5	2.4	4.6	High
	46	22	2.3	1.2	3.4	High
	46	23	2.3	1.2	3.4	Medium
	46	24	4.8	3.7	5.9	High
	46	25	5.0	3.9	6.1	Low
	46	26	4.3	3.2	5.4	Low
	46	27	2.9	1.8	4.0	Low
	46	28	3.5	2.4	4.6	Low
	46	29	4.2	3.1	5.3	Low
	46	30	4.2	3.1	5.3	Low
	46	31	6.0	4.9	7.1	Low
	47	04	2.3	1.2	3.4	Medium
	47	05	2.3	1.2	3.4	Medium
	47	06	0.0	0.0	0.0	High
	47	07	0.0	0.0	0.0	High
	47	08	0.0	0.0	0.0	High
	47	09	2.9	1.8	4.0	High
	47	10	2.9	1.8	4.0	Medium
	47	11	0.0	0.0	0.0	Medium
	47	12	2.3	1.2	3.4	High
	47	13	4.8	3.7	5.9	High
	47	14	4.8	3.7	5.9	High
	47	15	4.8	3.7	5.9	High

Study Area	UTM (NW Corner)		Tortoise Point Density	Confidence Interval		Use Level
	Easting	Northing		Lower	Upper	
	47	16	8.6	7.4	9.7	High
	47	17	8.6	7.4	9.7	High
	47	18	5.4	4.3	6.5	High
	47	19	6.0	4.9	7.1	Medium
	47	20	2.3	1.2	3.4	Low
	47	21	3.5	2.4	4.6	High
	47	22	2.3	1.2	3.4	High
	47	23	2.3	1.2	3.4	Medium
	47	24	6.0	4.9	7.1	Low
	47	25	7.3	6.2	8.4	Low
	47	26	5.0	3.9	6.1	Low
	47	27	3.5	2.4	4.6	Low
	47	28	4.2	3.1	5.3	Low
	47	29	4.2	3.1	5.3	Low
	47	30	4.2	3.1	5.3	Low
	47	31	5.0	3.9	6.1	Low
	48	04	2.3	1.2	3.4	High
	48	05	2.3	1.2	3.4	Low
	48	06	2.3	1.2	3.4	High
	48	07	0.0	0.0	0.0	High
	48	08	0.0	0.0	0.0	High
	48	09	2.3	1.2	3.4	High
	48	10	2.3	1.2	3.4	Medium
	48	11	2.3	1.2	3.4	Low
	48	12	2.3	1.2	3.4	Low
	48	13	4.8	3.7	5.9	High
	48	14	6.7	5.6	7.8	Medium
	48	15	4.5	3.4	5.6	Low
	48	16	5.5	4.4	6.6	Medium
	48	17	5.4	4.3	6.5	Low
	48	18	5.4	4.3	6.5	Low
	48	19	2.3	1.2	3.4	Low
	48	20	3.5	2.4	4.6	Medium
	48	21	3.5	2.4	4.6	High
	48	22	3.5	2.4	4.6	Medium
	48	23	2.3	1.2	3.4	Medium
	48	24	7.3	6.2	8.4	Low
	48	25	7.3	6.2	8.4	Low
	48	26	7.3	6.2	8.4	Low
	48	27	4.2	3.1	5.3	Low
	48	28	4.2	3.1	5.3	Low
	48	29	4.2	3.1	5.3	Low
	48	30	4.2	3.1	5.3	Low
	48	31	4.3	3.2	5.4	Low

Study Area	UTM (NW Corner)		Tortoise Point Density	Confidence Interval		Use Level
	Easting	Northing		Lower	Upper	
	49	03	2.3	1.2	3.4	High
	49	04	2.3	1.2	3.4	Medium
	49	05	2.3	1.2	3.4	Low
	49	06	4.5	3.4	5.6	High
	49	07	0.0	0.0	0.0	Low
	49	08	0.0	0.0	0.0	Low
	49	09	0.0	0.0	0.0	Low
	49	10	0.0	0.0	0.0	Low
	49	11	2.3	1.2	3.4	High
	49	12	2.3	1.2	3.4	High
	49	13	4.2	3.1	5.3	High
	49	14	5.4	4.3	6.5	Low
	49	15	6.7	5.6	7.8	Low
	49	16	4.2	3.1	5.3	Low
	49	17	2.9	1.8	4.0	High
	49	18	6.3	5.2	7.4	Low
	49	19	2.3	1.2	3.4	Low
	49	20	3.5	2.4	4.6	Low
	49	21	3.5	2.4	4.6	Low
	49	22	3.5	2.4	4.6	Low
	49	23	2.3	1.2	3.4	Medium
	49	24	3.5	2.4	4.6	Low
	49	25	3.5	2.4	4.6	Low
	50	02	2.3	1.2	3.4	High
	50	03	2.3	1.2	3.4	High
	50	04	2.9	1.8	4.0	High
	50	05	4.5	3.4	5.6	High
	50	06	5.4	4.3	6.5	Medium
	50	07	4.5	3.4	5.6	Low
	50	08	0.0	0.0	0.0	Low
	50	09	0.0	0.0	0.0	Low
	50	10	0.0	0.0	0.0	Low
	50	11	2.3	1.2	3.4	Medium
	50	12	2.3	1.2	3.4	Low
	50	13	4.0	2.9	5.1	Low
	50	14	4.2	3.1	5.3	Low
	50	15	4.8	3.7	5.9	Low
	50	16	6.7	5.6	7.8	Low
	50	17	4.8	3.7	5.9	Medium
	50	18	5.8	4.7	6.9	Low
	50	19	5.8	4.7	6.9	Low
	50	20	5.8	4.7	6.9	Low
	50	21	3.5	2.4	4.6	Low
	51	02	0.0	0.0	0.0	Low

Study Area	UTM (NW Corner) Easting	UTM (NW Corner) Northing	Tortoise Point Density	Confidence Interval Lower	Confidence Interval Upper	Use Level
	51	03	2.3	1.2	3.4	Low
	51	04	2.9	1.8	4.0	High
	51	05	3.5	2.4	4.6	Medium
	51	06	4.5	3.4	5.6	Medium
	51	07	4.5	3.4	5.6	Low
	51	08	0.0	0.0	0.0	Low
	51	09	2.3	1.2	3.4	Low
	51	10	2.3	1.2	3.4	Low
	51	11	2.3	1.2	3.4	Low
	51	12	3.5	2.4	4.6	Low
	51	13	4.2	3.1	5.3	Low
	51	14	6.7	5.6	7.8	Low
	51	15	9.2	8.1	10.3	Low
	51	16	7.3	6.2	8.4	Low
	51	17	9.8	8.7	10.9	Low
	51	18	5.8	4.7	6.9	Low
	51	19	2.3	1.2	3.4	Low
	51	20	2.3	1.2	3.4	Low
	51	21	3.5	2.4	4.6	Low
	52	02	2.3	1.2	3.4	Medium
	52	03	2.3	1.2	3.4	Medium
	52	04	2.3	1.2	3.4	Medium
	52	05	2.9	1.8	4.0	Medium
	52	06	2.9	1.8	4.0	Medium
	52	07	6.0	4.9	7.1	Low
	52	08	6.0	4.9	7.1	Low
	52	09	6.0	4.9	7.1	Low
	52	10	0.0	0.0	0.0	Low
	52	11	2.3	1.2	3.4	Low
	52	12	2.3	1.2	3.4	Low
	52	13	7.5	6.4	8.7	Low
	52	14	8.6	7.4	9.7	Low
	52	15	11.1	10.0	12.2	Low
	52	16	7.3	6.2	8.4	Low
	52	17	8.0	6.9	9.2	Low
	52	18	2.3	1.2	3.4	Low
	52	19	5.8	4.7	6.9	Low
	52	20	3.5	2.4	4.6	Low
	52	21	3.5	2.4	4.6	Low
	53	02	2.3	1.2	3.4	Medium
	53	03	2.3	1.2	3.4	Medium
	53	04	2.6	1.5	3.7	Medium
	53	05	2.9	1.8	4.0	Medium
	53	06	2.9	1.8	4.0	Low

Study Area	UTM (NW Corner)		Tortoise Point Density	Confidence Interval		Use Level
	Easting	Northing		Lower	Upper	
	53	07	6.7	5.6	7.8	Low
	53	08	6.0	4.9	7.1	Low
	53	09	6.7	5.6	7.8	Low
	53	10	2.3	1.2	3.4	Low
	53	11	0.0	0.0	0.0	Low
	53	12	2.3	1.2	3.4	Low
	53	13	0.0	0.0	0.0	Low
	53	14	2.3	1.2	3.4	Low
	53	15	9.8	8.7	10.9	Low
	53	16	7.3	6.2	8.4	Low
	53	17	8.0	6.9	9.2	Low
	53	18	2.3	1.2	3.4	Low
	53	19	5.8	4.7	6.9	Low
	53	20	3.5	2.4	4.6	Low
	53	21	3.5	2.4	4.6	Low
	54	03	2.3	1.2	3.4	Medium
	54	04	2.3	1.2	3.4	Medium
	54	05	2.6	1.5	3.7	Medium
	54	06	2.9	1.8	4.0	Medium
	54	07	6.7	5.6	7.8	Low
	54	08	7.3	6.2	8.4	Low
	54	09	6.7	5.6	7.8	Low
	54	10	2.3	1.2	3.4	Low
	54	11	0.0	0.0	0.0	Low
	54	12	0.0	0.0	0.0	Low
	54	13	0.0	0.0	0.0	Low
	54	14	0.0	0.0	0.0	Low
	54	15	0.0	0.0	0.0	Low
SSA	00	86	2.9	1.8	4.0	Low
	00	87	2.3	1.2	3.4	Low
	00	88	2.9	1.8	4.0	Low
	00	89	4.2	3.1	5.3	Low
	00	90	5.9	4.8	7.0	Low
	00	91	9.8	8.7	10.9	Low
	00	92	5.4	4.3	6.5	Low
	00	93	5.0	3.9	6.1	Low
	00	94	7.3	6.2	8.4	Low
	00	95	7.9	6.8	9.0	Low
	00	96	8.6	7.4	9.7	Low
	01	86	2.9	1.8	4.0	Low
	01	87	2.9	1.8	4.0	Low
	01	88	2.9	1.8	4.0	Low
	01	93	5.0	3.9	6.1	Low
	01	94	5.0	3.9	6.1	Low

Study Area	UTM (NW Corner)		Tortoise Point Density	Confidence Interval		Use Level
	Easting	Northing		Lower	Upper	
	01	95	7.9	6.8	9.0	Low
	01	96	7.9	6.8	9.0	Low
	89	87	4.8	3.7	5.9	Low
	89	88	4.8	3.7	5.9	Low
	89	89	4.8	3.7	5.9	Low
	90	88	4.8	3.7	5.9	Low
	90	89	4.8	3.7	5.9	Low
	91	88	3.5	2.4	4.6	Low
	91	89	6.0	4.9	7.1	Low
	92	88	6.0	4.9	7.1	Low
	92	89	4.6	3.5	5.7	Low
	93	86	4.2	3.1	5.3	Low
	93	87	4.2	3.1	5.3	Low
	93	88	4.2	3.1	5.3	Low
	93	89	4.2	3.1	5.3	Low
	93	90	6.8	5.7	7.9	Low
	93	91	2.3	1.2	3.4	Low
	93	92	5.4	4.3	6.5	Low
	93	93	4.2	3.1	5.3	Low
	93	94	3.5	2.4	4.6	Low
	93	95	2.9	1.8	4.0	Low
	93	96	2.9	1.8	4.0	Low
	94	86	4.8	3.7	5.9	Low
	94	87	4.8	3.7	5.9	Low
	94	88	4.8	3.7	5.9	Low
	94	89	5.4	4.3	6.5	Low
	94	90	13.6	12.5	14.7	Low
	94	91	6.0	4.9	7.1	Low
	94	92	4.8	3.7	5.9	Low
	94	93	3.7	2.6	4.8	Low
	94	94	3.5	2.4	4.6	Low
	94	95	2.9	1.8	4.0	Low
	94	96	2.9	1.8	4.0	Low
	95	86	7.3	6.2	8.4	Low
	95	87	7.3	6.2	8.4	Low
	95	88	10.6	9.5	11.7	Low
	95	89	6.0	4.9	7.1	Low
	95	90	8.6	7.4	9.7	Low
	95	91	4.2	3.1	5.3	Low
	95	92	4.0	2.9	5.1	Low
	95	93	2.9	1.8	4.0	Low
	95	94	3.2	2.1	4.3	Low
	95	95	2.9	1.8	4.0	Low
	95	96	2.9	1.8	4.0	Low

Study Area	UTM (NW Corner)		Tortoise Point Density	Confidence Interval		Use Level
	Easting	Northing		Lower	Upper	
	96	86	8.8	7.7	9.9	Low
	96	87	8.8	7.7	9.9	Low
	96	88	8.8	7.7	9.9	Low
	96	89	5.0	3.9	6.1	Low
	96	90	2.3	1.2	3.4	Low
	96	91	5.0	3.9	6.1	Low
	96	92	3.5	2.4	4.6	Low
	96	93	3.2	2.1	4.3	Low
	96	94	3.5	2.4	4.6	Low
	96	95	2.9	1.8	4.0	Low
	96	96	2.9	1.8	4.0	Low
	97	86	7.3	6.2	8.4	Low
	97	87	7.3	6.2	8.4	Low
	97	88	5.5	4.4	6.6	Low
	97	89	6.7	5.6	7.8	Low
	97	90	3.3	2.2	4.4	Low
	97	91	2.9	1.8	4.0	Low
	97	92	4.1	3.0	5.2	Low
	97	93	4.2	3.1	5.3	Low
	97	94	2.7	1.6	3.8	Low
	97	95	2.3	1.2	3.4	Low
	97	96	2.9	1.8	4.0	Low
	98	86	3.5	2.4	4.6	Low
	98	87	3.5	2.4	4.6	Low
	98	88	4.2	3.1	5.3	Low
	98	89	4.6	3.5	5.7	Low
	98	90	3.5	2.4	4.6	Low
	98	91	3.5	2.4	4.6	Low
	98	92	4.1	3.0	5.2	Low
	98	93	4.2	3.1	5.3	Low
	98	94	2.3	1.2	3.4	Low
	98	95	5.4	4.3	6.5	Low
	98	96	5.4	4.3	6.5	Low
	99	86	4.2	3.1	5.3	Low
	99	87	4.2	3.1	5.3	Low
	99	88	3.5	2.4	4.6	Low
	99	89	4.2	3.1	5.3	Low
	99	90	3.8	2.7	4.9	Low
	99	91	9.8	8.7	10.9	Low
	99	92	5.4	4.3	6.5	Low
	99	93	5.0	3.9	6.1	Low
	99	94	6.0	4.9	7.1	Low
	99	95	8.6	7.4	9.7	Low
	99	96	8.6	7.4	9.7	Low

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APPENDIX J
CULTURAL RESOURCES

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J.1 PREVIOUS INVESTIGATIONS

Three major sources of information are available to provide for this project. The first comes from sample inventories completed by the BLM in the late 1970s-early 1980s as part of an overall Mojave Desert Conservation Plan. The second consists of previous inventory reports, archeological site records, historic maps, and related archival materials on file at the Combat Center, at BLM offices in Barstow and Sacramento, and available online from BLM and other websites. The third is a collection of archeological data from recent cultural resources inventories in the three study areas that were completed in support of this EIS.

California Desert Plan

Between 1978 and 1980 the Desert Plan Staff (DPS) collected existing data on known archeological resources and aimed to verify them in the field. These archeologists also developed a standardized approach to information collecting and compiled it in a useable format. They devised a survey that involved randomly placed sample units; these were at first 0.75 mile quadrants (160 acres), but later were changed to transects $^{1}/_{16}$-mile wide and 1 mile long quadrants (80 acres). The DPS inventories ultimately covered approximately 1% of a 12-million-acre conservation area.

Key general documents on the results of the work undertaken by the DPS include:

- The Draft California Desert Conservation Area Plan Alternatives and Environmental Impact Statement (published February 1980),
- The Final Environmental Statement and Proposed Plan: California Desert Conservation Area (published September 1980),
- The California Desert Conservation Plan 1980 (and as amended March 1999), and
- Summary of the California Desert Conservation Plan.

To reach a conclusion as to the significance of resources in the CDCA according the Desert Plan, each of the variables was combined with intuitive and judgmental knowledge of the geographic regions studied, and polygons were drawn indicating the areas of significance and sensitivity. Johnson Valley was part of the Western Mojave Desert Study Area (Stickel et al. 1980) and fell within the Johnson/Morongo Planning Unit. Locations of concern to the BLM were "Hercules' Finger," a solitary rock outcrop in the Cinnamon Roll Buttes area (Ibid 1980:184); the Willie Boy site (Ibid 1980:186) south of California State Highway 62; Giant Rock (Ibid 1980:208); and the Emerson Mill (Ibid 1980:37), which is located in the WSA at Emerson Lake and was revisited and formally recorded in 2009 (Fryman 2009; Lechner et al. 2010).

Ultimately, the BLM analysis stated that:

> "Generally, past activities have resulted in the following, known and expected site types and distribution. Prehistoric sites consist mainly of lithic scatters, artifact isolates, small temporary camps, petroglyph loci, and various other special activity sites (e.g. milling stations). Perhaps as many as 560 such aboriginal sites exist in the expansive (358 square mile) area. These sites would occur primarily along the margins of playas and atop alluvial fans. Obviously these landforms cover a good deal of the proposed area. One could, therefore, expect to have these sites dispersed across the entire area."
>
> "Historically, the area was utilized primarily for mining. Earlier mines included the Elsie Gold Peak-1906 and Gold Pin 1909 mines. Later discoveries included the Emerson –

> 1923, Johnson and Los Padres Mines. Historically, mining sites are located primarily in the mountainous regions with a very few sites in the flatlands (e.g., Man's Well, Emerson Mill and Well.) The majority of the known activity centered in the Fry Mountains, Iron Ridge and smaller mountains along the eastern boundary of this open area. As many as 140+ historic sites are predicted within this entire area."
>
> "Six major areas of known cultural sensitivity/significance are located within the Johnson Valley Open Area. The most important areas though these areas are located along the northern and eastern margins of the vehicle management area."

Archival Records

Prior to the first inventories conducted in the west, east, and south study areas, ASM completed an archival records search at the San Bernardino Archaeological Information Center (SBAIC) for a 5-mile (8.0 km) radius around each study area. Additional searches were made of historic topographic maps, mining maps, GLO maps, and land patent documents to identify any historic roads, homesteads, mines, or other sites in the three study areas.

Full lists of cultural resources reports identified in the SBAIC records search are presented by study area in Table J-1 (see section J.2 below). Most of these reports are dated, indicating that relatively little archeological study had been completed in the three study areas prior to recent inventories. Of note is that few inventories conducted by BLM Field Office staff are represented; these data may be unavailable except through a detailed examination of BLM archives. It is also likely, however, that additional field inventories have been conducted in the various study areas but have not been reported to the SBAIC. Reports for such efforts may be obtainable through direct contact with whatever cultural resources management firm(s) completed the work.

Many previously identified archaeological sites are known to exist in the east and west study areas based on the results of the SBAIC search and archival study. Some had been previously recorded, while others were known but had never been mapped or documented by archeologists. Ultimately, records or specific information was obtained for 29 properties, including 12 in the east study area and 17 in the west study area (Table J-2, see section J.2 below). No information was available on previously identified or recorded sites in the south study area. Some of these sites were relocated and their records updated during inventories and select visits in 2008-2009 (Fryman 2009; Lechner and Giambastiani 2009a, 2009b; Lechner et al. 2010), while others did not fall within surveyed areas (e.g., CA-SBR-1811, SBR-3812 to -3845 in the west study area) or did so and were subsumed within updated site trinomials (e.g., SBR-1810/H and SBR-3405H in the west study area).

Archival work also provided data for 59 previously recorded sites lying outside the three study areas, but within the Area of Indirect Effect (i.e., the 5-mile [8 km] radius, excluding the Combat Center). These include 47 sites outside the east study area (mainly to the north), 11 outside the west study area, and one in the vicinity of the south study area (Table J-3, see section J.2 below).

Cultural Resources Inventory

Inventories completed in 2008-2009 for this EIS total 50,090 acres (20,270 hectares), including 20,560 acres (8,320 hectares) in the east study area, 2,345 acres (948 hectares) in the south study area, and 27,185 acres (11,256 hectares) in the west study area. Initial inventories (11,560 acres [4,678 hectares] in the east study area, 2,345 acres [948 hectares] in the south study area, and 16,485 acres [6,671 hectares] in the west study area) were completed in elongate transects (2-15 km long, 250 to 500 m wide) that were placed more or less systematically within the three study areas. The rest of the inventories consisted of block parcels of various sizes, allocated judgmentally based on the results of transect inventories. The initial boundaries of the east study area, south study area, and west study area were slightly larger than currently outlined, shifted after the first round of inventories in consideration with survey findings. Within the boundaries of the three study areas, as presently configured, inventory acreage amounts to 12.7% of the east study area, 12.1% of the south study area, and 15.1% of the west study area.

In all, approximately 114 archaeological sites and 1,514 isolate finds were recorded during cultural resources inventories for this EIS. In addition, 24 historic sites (19 in the east study area and 5 in the west study area) not encompassed by inventory parcels were visited and recorded or updated (refer to Tables J-4, J-5, and J-6, see section J.2 below). This totals some 138 sites recorded and/or updated, for this EIS, including 75 sites within the original boundaries of the east study area, 9 sites within the initial boundaries of the south study area, and 54 sites within the original boundaries of the west study area. All of these newly identified sites have been assessed for NRHP eligibility based on surface data. However, revisions to the various study area boundaries subsequent to inventories have dropped 14 sites from future consideration; these are now included within the Area of Indirect Effect (refer to Table J-3, see section J.2 below). This leaves a total of 124 evaluated archeological sites within the current study areas to be considered in the context of proposed land acquisition efforts.

J.2 RECORDS SEARCHES AND PREVIOUSLY RECORDED RESOURCES

Table J-1a. Record Search Results for East Study Area – Cultural Resources Reports and Historic Literature

EIC Number	Author and Date	Report Title or Summary
1060004	Campbell (1931)	An Archaeological Survey of the Twentynine Palms Region
1060291	King (1976)	Background to the Prehistory of East Mojave
1060292	Casebier (1976)	Historic Sketch of East Mojave Planning Unit
1060707	Brooks et al. (1978)	Archaeological Inventory of Owlshead/Amargosa Planning Units
1060833	Musser (1979)	Cultural Resources Survey for Drill Permit No. CA 202
1060874	Barker et al. (1979)	Allen-Warner Valley Energy System, Western Transmission Line Corridors Survey
1060888	Knack (1980)	Ethnographic Overview of Amargosa Planning Unit
1060892	Gallegos et al. (1980)	Cultural Resources Inventory of the Central Mojave and Colorado Deserts
1060964	Norwood (1980)	Cultural Resource Survey, Earp to Johnson Valley, Enduro Racecourse Route
1061063	Sutton (1980)	Investigations at SBR-4037 and SBR-4055
1061069	Von Till Warren et al. (1981)	Cultural Resources Overview of the Colorado Desert
1061092	Leonard (1981)	A Cultural Resources Evaluation of Eight Borrow Sites in San Bernardino County
1061154	Musser (1981)	Reclamation Plan for the Bristol Dry Lake Salt Concentrators, Leslie Salt Company
1061449	Weil et al. (1984)	Cultural Resources Literature Search and Sample Survey for Celeron/All-American Pipeline
1061512	Wilke (1985)	Class III Cultural Resources Inventory for a Proposed Road Easement in Cadiz
1061548	Lerch (1986)	Archaeological Survey of Eighteen Sections of Land near Cadiz
1061979	New Mexico State University (1989)	Cultural Resources Report for All-American Pipeline Project
1062017	Jenkins (1982)	A Study of Aboriginal Land Use: Southern Paiute Subsistence in the Eastern Mojave Desert
1062159	Bergin and Lerch (1990)	Archaeological Literature Search and Survey for the America Mine Project Drilling Program
1062166	White (1985)	Archaeological Reconnaissance of Exploratory Drilling Locations at Bristol Lake
1062201	Lerch (1990)	Cultural Resources Site Characterization Study, Class III Cultural Resources Inventory
1062255	Westec Services, Inc. (1973)	Class II Cultural Resources Inventory
1062256	Ludwig (1989)	U.S. Marines at Twentynine Palms, California
1062258	Swanson (1991)	Cultural Resource Survey in Redlands Area
1062388	McGuire (1990)	A Cultural Resources Inventory and Evaluation of the Proposed Mojave Pipeline Corridor
1062408	Lerch (1991b)	Addendum to Cultural Resources Characterization Study, Class II Cultural Resources Inventory
1062450	Lerch (1991a)	Cultural Resources Significance Evaluation and Treatment Plan for Bolo Station Facilities
1062555	Hanks (1976)	Cultural Resources Analysis for East Mojave Planning Unit
1062583	McGuire (1991)	Archaeological Reconnaissance for the Mojave Pipeline
1063203	Lerch (1992)	Cultural Resources Inventory and Significance Evaluation of Rail Cycle Bolo Station Facilities
1063298	Buffington and Macko (1995)	A Class III Intensive Survey for Seismic Reflection Survey Line in Cadiz Valley
1063840	Horne (1999)	Cultural Resources Survey for Cadiz Groundwater Storage and Dry-Year Supply Program
1063894	Duke (1999)	Cultural Resources Assessment
1064234	Earle (2004)	Ethnohistorical/Ethnographic Overview of Fort Irwin

Table J-1a. Record Search Results for East Study Area – Cultural Resources Reports and Historic Literature

EIC Number	Author and Date	Report Title or Summary
1064564	Craft (2004)	Negative Survey Report for Lava 12kV Circuit for SCE Pole Replacement Program
1065047	Schmidt (2004)	Phase I Cultural Resource Investigation for the Automated Switch Project for SCE
1065634	McKenna et al. (2004)	Survey Report for San Bernardino County Bridge Replacement Project (Bridges 81 and 82)
1065635	McKenna et al. (2004)	Evaluation of San Bernardino County Bridges #81 and 82 on Historic National Trails Highway

Note: SCE = Southern California Electric

Table J-1b. Record Search Results for South Study Area – Cultural Resources Reports and Historic Literature

EIC Number	Author and Date	Report Title or Summary
1060004	Campbell (1931)	An Archaeological Survey of the Twentynine Palms Region
1060932	Lippincott (1980)	Negative Survey for Two Uranium Drill Holes
1061031	BLM (1980)	Cultural Resources Assessment for Woodmancy's House Parcel
1062257	BLM (1970s)	Negative Survey for Private Parcels
1062861	DeBarros and Mason (1993)	Cultural Resources Survey for Four Corners Pipeline Company Line
1062982	Taylor (1993)	Archaeological Survey Report for Brose Property
1063544	Love (2000)	Historic Properties Identification for AT&T Wireless Site C981.2

Table J-1c. Record Search Results for West Study Area – Cultural Resources Reports and Historic Literature

EIC Number	Author and Date	Report Title or Summary
NRHP L-82-2240	Hanks (1982)	Rodman Mountain Petroglyph and Archaeological District
1060123	King (1972)	Archaeological Research in the Cinnamonroll Hills
1060153	Hanks (1973)	Impact Assessment for SCE Lucerne Valley Survey
1060701	Stumpf (1978)	Archaeological Reconnaissance Report for Checkers Motorcycle Race
1060874	Barker et al. (1979)	Allen-Warner Valley Energy System, Western Transmission Line Corridors Survey
1060900	Weil (1979)	Summary Report for SCE Lucerne Valley Survey
1060901	Weil (1980)	SCE Lucerne Valley Survey Report
1060956	BLM (1980)	Cultural Resources Assessment of USGS Seismic Test Locations
1060964	Norwood (1980)	Cultural Resources Inventory for the Enduro Racecourse
1061203	Brock (1993)	Negative Records Search for Old Woman Springs
1061306	Robinson (1982)	Rodman Mountain Field Trip – Archaeological Survey Association
1061377	BLM (1983)	Cultural Resources Assessments for Various Parcels
1062153	Mortland (1974)	Impact Assessment for SCE Generating Station
1062470	Cook and Pallette (1991)	Cultural Resources Assessment for 13 Pacific Telephone Microwave Towers
1062515	Lerch (1992)	Class III Inventory for Morongo Basin Pipeline Project
1062800	Brock (1993)	Cultural Resources Assessment for Filling Station at Old Woman Springs Ranch
1063065	Gacs (1978)	Ethnological/Archival Study for SCE Lucerne Valley
1063525	Swope (1999)	Archaeological Survey and Historic Study for Highway 247 Realignment
1065067	Pollock and Lerch (2005)	Survey of Tower 155-2 Access Road on Lugo-Pisgah 220 kV Transmission Line

Table J-2. Previously Recorded and Mapped Cultural Resources, East and West Study Areas

Study Area	Era	Site	Site Record	Description	USGS 7.5' Quad
East	Prehistoric	CA-SBR-3243	Eckhardt 1978	Lithic scatter	Cadiz Lake NW
		CA-SBR-4150	Norwood 1980	Lithic scatter	Cadiz Lake NW
		CA-SBR-4759	Leonard 1981	Lithic scatter	Cadiz Lake NW
		CA-SBR-5815	Dietler 2001	Rock ring	Cadiz Lake NW
		CA-SBR-6682	Lerch 1990	Habitation	Cadiz
		CA-SBR-9848	Inoway et al. 1999	Lithic scatter	Cadiz Summit
		CA-SBR-9852	Inoway et al. 1999	Lithic scatter	Cadiz Lake NW
	Historic	CA-SBR-3282H	Crowley 1978	Cemetery and well	Cadiz Lake NW
		CA-SBR-9849H	Inoway et al. 1999	Refuse deposit– **updated by ASM**	Cadiz Lake NW
		CA-SBR-9850H	Inoway et al. 1999	Refuse deposit – **updated by ASM**	Cadiz lake NW
		CA-SBR-9851H	Inoway et al. 1999	Refuse deposit – **updated by ASM**	Cadiz Lake NW
		CA-SBR-9853H	Easter et al. 1999	AT & SF Railroad – Parker Branch – **updated by ASM**	Cadiz Lake NE, NW, Cadiz Summit
		CA-SBR-9856H	McDougall et al. 1999	Railroad maintenance camp – **updated by ASM**	Cadiz Lake NE
		CA-SBR-10644H	Dietler 2001	Military refuse deposit, WWII-era	Cadiz Lake NW
		CA-SBR-11582H	Underwood and Gregory 2004	Military camp, Desert Strike (1964) – **updated by ASM**	Cadiz Summit
		CA-SBR-11583H	Underwood and Hilliard 2004	Cadiz-Rice Road – **updated by ASM**	Cadiz, Cadiz Lake NW
		CA-SBR-11586H	Underwood and Hilliard 2004	Pacific Telephone/Telegraph Line – **updated by ASM**	Bristol Lake NW, SW, Cadiz, etc.
West	Prehistoric	CA-SBR-1810/H	Strieler 1970	Lithic scatter – **updated by ASM as SBR-12933**	Galway Lake
		CA-SBR-1811	None	Rock Art (unclassified)	Galway Lake
		CA-SBR-1880	Unknown author 1965	Habitation complex – **updated by ASM**	Melville Lake
		CA-SBR-1883	Unknown author and date	Ceramics and "notched point"	Old Woman Springs
		CA-SBR-3812	Aasved 1979	Lithic scatter	Iron Ridge
		CA-SBR-3813	Aasved 1979	Lithic scatter	Iron Ridge
		CA-SBR-3820	Jenkins 1979	Lithic scatter	Iron Ridge
		CA-SBR-3843	Decker et al. 1973	Lithic scatter	Iron Ridge
		CA-SBR-3844	Decker et al. 1973	Lithic scatter	Iron Ridge
		CA-SBR-3845	Decker et al. 1973	Lithic scatter	Iron Ridge
	Historic	CA-SBR-3405H	Unknown author and date	"Los Padres Mine" – **updated as ASM H-13**	Emerson Lake
		CA-SBR-8946H	Hall and Schultze 1998	"Emerson Mill" – **updated by ASM**	Emerson Lake

Table J-3. Identified Cultural Resources Outside Study Areas but Within the Area of Indirect Effect (5-Mile Radius)

Study Area	Era	Site	Site Record	Description	USGS 7.5' Quad
RECORDS SEARCH AND ARCHIVAL RESEARCH					
East	Prehistoric	CA-SBR-3246	Gallegos and Carrico 1978	Lithic scatter	Lead Mountain NE
		CA-SBR-3248	Gallegos and Carrico 1978	Lithic scatter	Amboy Crater
		CA-SBR-3263	Gallegos and Carrico 1978	Lithic scatter	Amboy Crater
		CA-SBR-3264	Gallegos and Carrico 1978	Ceramics and DSN point	Amboy Crater
		CA-SBR-3265	Gallegos and Carrico 1978	Rock cairns and cleared area	Amboy Crater
		CA-SBR-3266/H	Davis 1978	Rockshelter and ethnohistoric refuse	Amboy Crater
		CA-SBR-3267	Lowe 1978	Rockshelter	Amboy Crater
		CA-SBR-5472	Drover 1985	Navajo railworker's sweathouse	Cadiz
		CA-SBR-6677	Lerch and Goodman 1990	Lithic scatter	Amboy
		CA-SBR-6678	Lerch and Goodman 1990	Lithic quarry	Amboy
		CA-SBR-6679	Lerch and Yohe 1990	Lithic scatter	Cadiz
		CA-SBR-6680	Lerch and Yohe 1990	Lithic scatter	Cadiz
		CA-SBR-6681	Lerch and Quintero 1990	Lithic scatter	Cadiz
		CA-SBR-6683	Lerch and Yohe 1990	Lithic scatter	Cadiz
		CA-SBR-6684	Lerch and Yohe 1990	Lithic scatter	Cadiz
		CA-SBR-6794	Bergin 1990	Trail feature (age unknown)	Lead Mountain NE
	Historic	CA-SBR-2910H	McDougall et al. 2004	National Old Trails Highway	Amboy, Amboy Crater, Cadiz, etc.
		CA-SBR-3273H	Davis 1978	Mining/homestead	Cadiz Lake
		CA-SBR-3280H	Crowley 1978	Cadiz railroad camp	Cadiz Summit
		CA-SBR-3284H	Dietler 2001	Refuse deposit	Amboy
		CA-SBR-3285H/5810H	Rose and Berdzar 2001	Town/mining area with structures	Amboy
		CA-SBR-5514H	Turner 1982	Refuse deposit	Amboy
		CA-SBR-5811H	Rose and Berdzar 2001	Refuse deposit	Amboy
		CA-SBR-5812H	Dietler 2001	Refuse deposit	Amboy
		CA-SBR-5813H	Rose and Berdzar 2001	Refuse deposit	Cadiz
		CA-SBR-5814H	Lerch 1990	Railroad camp 1902-1920	Cadiz
		CA-SBR-6685H	Swope and Yohe 1990	Campsite	Amboy
		CA-SBR-6686H	Swope and Yohe 1990	Campsite	Amboy
		CA-SBR-6687H	Swope and Yohe 1990	Refuse deposit	Amboy
		CA-SBR-6688H	Lerch and Yohe 1990	Refuse deposit	Amboy
		CA-SBR-6689H	Swope and Yohe 1990	Campsite	Amboy

Table J-3. Identified Cultural Resources Outside Study Areas but Within the Area of Indirect Effect (5-Mile Radius)

Study Area	Era	Site	Site Record	Description	USGS 7.5' Quad
East (cont.)	Historic (cont.)	CA-SBR-6690H	Swope and Yohe 1990	Refuse deposit	Amboy
		CA-SBR-6691H	Lerch and Quintero 1990	Refuse deposit	Cadiz
		CA-SBR-6692H	Lerch and Goodman 1990	Telephone pole insulator cache	Cadiz
		CA-SBR-6693H	Easter and Bircheff 1999	AT & SF Railroad	Amboy, Cadiz, Cadiz Summit
		CA-SBR-6694H	Lerch 1990	Road and poleline	Cadiz
		CA-SBR-6834H	Lerch and Johnson 1990	Refuse deposit	Cadiz
		CA-SBR-9857H	Dietler and Toenjes 2001	Mining site	Cadiz Lake NE
		CA-SBR-10638H	Dietler and Toenjes 2001	Refuse deposit	Cadiz
		CA-SBR-10652H	Rose and Berdzar 2001	Refuse deposit	Cadiz
		CA-SBR-10653H	Rose and Berdzar 2001	Road segments (3)	Cadiz
		CA-SBR-10654H	Rose and Berdzar 2001	Refuse deposit	Cadiz
		CA-SBR-11503H	Fulton and Gibson 2003	Residential structure remnant	Cadiz Summit
		CA-SBR-11584H	Underwood and Hilliard 2004	Cadiz-Cadiz Summit Road	Cadiz, Cadiz Summit
		CA-SBR-11648H	McDonald and Cottrell 2004	Refuse deposit	Bristol Lake NW
		CA-SBR-13584H	McKenna et al. 2001	Bridge	Cadiz
		CA-SBR-13585H	Sheets and Coats 2007	Cabin foundation	Cadiz
West	Prehistoric	CA-SBR-118/H	Troike 1955	Lithic scatter and historic refuse	Old Woman Springs
		CA-SBR-554	Walker 1969; King 1972; Mone 1979	"Jellyroll Cave"	Grand View Mine
		CA-SBR-1185	MacGregor (no date)	Rockshelter	Grand View Mine
		CA-SBR-1531	Smith and MacGregor (no date)	Rockshelter	Grand View Mine
		CA-SBR-1532	Hammond (no date)	Midden	Grand View Mine
		CA-SBR-1533	Smith and MacGregor (no date)	Rockshelter	Grand View Mine
		CA-SBR-1569	Shepard 1964	Rockshelter	Grand View Mine
		CA-SBR-2846	Wilke 1978	"Going Home Rockshelter"	Grand View Mine
		CA-SBR-4350/H	Teal 1980	Habitation and historic refuse	Old Woman Springs
	Historic	CA-SBR-9590H	Swope and Hammond 1998	Refuse deposit and well	Old Woman Springs
		CA-SBR-9591H	Swope and Hammond 1998	Refuse deposit	Old Woman Springs
South	Historic	CA-SBR-10525H	Purcell 2000	State Route 62	Valley Mountain

Table J-3. Identified Cultural Resources Outside Study Areas but Within the Area of Indirect Effect (5-Mile Radius)

Study Area	Era	Site	Site Record	Description	USGS 7.5' Quad
ASM RECORDED SITES					
East	Prehistoric	CA-SBR-13219	Lechner and Giambastiani 2009b	SRL	Cadiz
		CA-SBR-13220	Lechner and Giambastiani 2009b	SRL	Cadiz
		CA-SBR-13223	Lechner and Giambastiani 2009b	Habitation	Cadiz
		CA-SBR-13232	Lechner and Giambastiani 2009b	SRL	Amboy
		CA-SBR-13233	Lechner and Giambastiani 2009b	SRL	Cadiz Summit
East	Historic	CA-SBR-13234H	Lechner and Giambastiani 2009b	Refuse deposit	Cadiz Summit
		CA-SBR-13235H	Lechner and Giambastiani 2009b	Refuse deposit	Cadiz Summit
		CA-SBR-13236H	Lechner and Giambastiani 2009b	Refuse deposit	Bristol Lake NW
West	Prehistoric	CA-SBR-12937	Lechner and Giambastiani 2009a	SRL	Old Woman Springs
	Historic	CA-SBR-12947H	Lechner and Giambastiani 2009a	Refuse deposit	Fry Mountains
South	Historic	CA-SBR-12957H	Lechner and Giambastiani 2009a	Refuse deposit	Valley Mountain
		CA-SBR-12958H	Lechner and Giambastiani 2009a	Refuse deposit	Valley Mountain
		CA-SBR-12959H	Lechner and Giambastiani 2009a	Refuse deposit	Valley Mountain
		CA-SBR-12960H	Lechner and Giambastiani 2009a	Refuse deposit	Valley Mountain

Legend: DSN = Desert Side-notched; SRL = segregated reduction locus.

J.3 KNOWN SITES AND PRELIMINARY NRHP ELIGIBILITY

Table J-4. Known Sites and Preliminary NRHP Eligibility, East Study Area

Site	Description	Age	Evaluated for NRHP Eligibility	Data Potential	Preliminary NRHP
CA-SBR-3243	Lithic scatter	Prehistoric	No	NA	U
CA-SBR-4150	Lithic scatter	Prehistoric	No	NA	U
CA-SBR-4759	Lithic scatter	Prehistoric	No	NA	U
CA-SBR-5815	Rock ring	Prehistoric	No	NA	U
CA-SBR-6682	Habitation	Prehistoric	No	NA	U
CA-SBR-9848	Lithic scatter	Prehistoric	No	NA	U
CA-SBR-9852	Lithic scatter	Prehistoric	No	NA	U
CA-SBR-13214	Lithic scatter	Prehistoric	Yes	Low	I
CA-SBR-13215	Habitation	Prehistoric	Yes	High	E
CA-SBR-13216	Habitation	Prehistoric	Yes	High	E
CA-SBR-13217	Habitation	Prehistoric	Yes	High	E
CA-SBR-13218	Habitation	Prehistoric	Yes	High	E
CA-SBR-13219	SRL	Prehistoric	Yes	Low	I
CA-SBR-13220	SRL	Prehistoric	Yes	Low	I
CA-SBR-13221	SRL	Prehistoric	Yes	Low	I
CA-SBR-13223	Lithic scatter	Prehistoric	Yes	Moderate	E
CA-SBR-13225	Habitation	Prehistoric	Yes	Moderate	E
CA-SBR-13227	SRL	Prehistoric	Yes	Low	I
CA-SBR-13228	Lithic scatter	Prehistoric	Yes	Low	I
CA-SBR-13229	Habitation	Prehistoric	Yes	High	E
CA-SBR-13230	Habitation	Prehistoric	Yes	Moderate	E
CA-SBR-13231	Lithic scatter	Prehistoric	Yes	Low	I
CA-SBR-13232	SRL	Prehistoric	Yes	Low	I
CA-SBR-13233	SRL	Prehistoric	Yes	Low	I
CA-SBR-13326	Ceramic scatter	Prehistoric	Yes	Low	I
CA-SBR-13327	SRL	Prehistoric	Yes	Low	I
CA-SBR-13328	Habitation	Prehistoric	Yes	High	E
CA-SBR-13329	Lithic scatter	Prehistoric	Yes	Moderate	E
CA-SBR-13330	Lithic scatter	Prehistoric	Yes	Moderate	E
CA-SBR-13331	Lithic scatter	Prehistoric	Yes	Low	I
CA-SBR-13332	Habitation	Prehistoric	Yes	High	E
CA-SBR-13333	Lithic scatter	Prehistoric	Yes	Low	I
CA-SBR-13334	Habitation	Prehistoric	Yes	Moderate	E

Table J-4. Known Sites and Preliminary NRHP Eligibility, East Study Area

Site	Description	Age	Evaluated for NRHP Eligibility	Data Potential	Preliminary NRHP
CA-SBR-13335	Lithic scatter	Prehistoric	Yes	Moderate	E
CA-SBR-13336	Habitation	Prehistoric	Yes	High	E
CA-SBR-13337	Habitation	Prehistoric	Yes	High	E
CA-SBR-13338	Habitation	Prehistoric	Yes	Moderate	E
CA-SBR-13339	Lithic scatter	Prehistoric	Yes	High	E
CA-SBR-13340	Lithic scatter	Prehistoric	Yes	Moderate	E
ASM-EA-KIS-3✳	SRL	Prehistoric	Yes	Low	I
ASM-EA-KIS-5✳	SRL	Prehistoric	Yes	Low	I
ASM-EA-TL-2✳	Lithic scatter	Prehistoric	Yes	Low	I
ASM-EA-TL-3✳	Habitation	Prehistoric	Yes	Moderate	E
ASM-EA-TL-4✳	Lithic scatter	Prehistoric	Yes	High	E
ASM-EA-TL-5✳	Lithic scatter	Prehistoric	Yes	Low	I
ASM-EA-TL-6✳	Lithic scatter	Prehistoric	Yes	High	E
ASM-EA-TL-7✳	Habitation	Prehistoric	Yes	High	E
ASM-EA-TL-8✳	Habitation	Prehistoric	Yes	High	E
ASM-EA-TL-9✳	Lithic scatter	Prehistoric	Yes	High	E
ASM-EA-TL-10✳	Habitation	Prehistoric	Yes	High	E
CA-SBR-3282H	Cemetery and well	Historic	No	NA	U
CA-SBR-9849H	Refuse deposit	Historic	Yes	Low	I
CA-SBR-9850H	Railroad maintenance camp	Historic	Yes	Moderate	E
CA-SBR-9853H	Santa Fe Railroad - Parker Branch	Historic	Yes	Low	I
CA-SBR-9851H	Railroad maintenance camp	Historic	Yes	Moderate	E
CA-SBR-9856H	Refuse deposit	Historic	Yes	Moderate	E
CA-SBR-10644H	Military refuse deposit, WWII-era	Historic	No	NA	U
CA-SBR-11582H	Military camp, 1964 Desert Strike	Historic	Yes	Low	I
CA-SBR-11583H	Cadiz-Rice Road	Historic	Yes	Low	I
CA-SBR-11586H	Pacific Telephone/Telegraph line	Historic	Yes	Moderate	E
CA-SBR-13213H	Dry well	Historic	Yes	Low	I
CA-SBR-13222H	Refuse deposit	Historic	Yes	Low	I
CA-SBR-13224H	Military	Historic	Yes	Moderate	E
CA-SBR-13226H	Refuse deposit	Historic	Yes	Low	I
CA-SBR-13234H	Refuse deposit	Historic	Yes	Low	I
CA-SBR-13235H	Refuse deposit	Historic	Yes	Low	I
CA-SBR-13236H	Refuse deposit	Historic	Yes	Low	I
CA-SBR-13325H	Pacific Telephone/Telegraph pole	Historic	Yes	Low	I

Table J-4. Known Sites and Preliminary NRHP Eligibility, East Study Area

Site	Description	Age	Evaluated for NRHP Eligibility	Data Potential	Preliminary NRHP
CA-SBR-13341H	Mining and refuse deposit	Historic	Yes	Low	I
ASM-EA-KIS-1✳	Refuse deposit	Historic	Yes	Low	I
ASM-EA-KIS-2✳	Refuse deposit	Historic	Yes	Low	I
ASM-EA-KIS-4✳	Mining	Historic	Yes	Low	I
ASM-EA-TL-1✳	Military	Historic	Yes	Moderate	E
ASM H-1✳	Mining and refuse deposit	Historic	Yes	Low	I
ASM H-2✳	Mining camp	Historic	Yes	Moderate	E
ASM H-3✳	Chambless Homestead	Historic	Yes	High	E
ASM H-4✳	Amboy Road	Historic	Yes	Low	I
ASM H-6✳	Archer Railroad Station	Historic	Yes	High	E
ASM H-7✳	Railroad maintenance camp	Historic	Yes	Moderate	E
ASM H-8✳	Railroad maintenance camp	Historic	Yes	Moderate	E
ASM H-9✳	Railroad maintenance camp	Historic	Yes	Moderate	E
ASM H-10✳	Railroad maintenance camp	Historic	Yes	Moderate	E
ASM H-11✳	Refuse deposit	Historic	Yes	Low	I
ASM H-12✳	Refuse deposit	Historic	Yes	Low	I

Notes: NA. Not Applicable; E = eligible; I = ineligible; U, unevaluated; SRL = segregated reduction locus; ✳, temporary ASM designation for sites not yet assigned state trinomials by the San Bernardino County Information Center.

Table J-5. Known Sites and Preliminary NRHP Eligibility, South Study Area

Site	Description	Age	Evaluated for NRHP Eligibility	Data Potential	Preliminary NRHP
CA-SBR-12961	SRL	Prehistoric	Yes	Low	I
CA-SBR-12962	Lithic scatter	Prehistoric	Yes	Low	I
CA-SBR-12963	Lithic scatter	Prehistoric	Yes	Low	I
CA-SBR-12964	Lithic scatter	Prehistoric	Yes	Low	I
CA-SBR-12956H	Refuse deposit	Historic	Yes	Low	I
CA-SBR-12957H	Refuse deposit	Historic	Yes	Low	I
CA-SBR-12958H	Refuse deposit	Historic	Yes	Low	I
CA-SBR-12959H	Refuse deposit	Historic	Yes	Low	I
CA-SBR-12960H	Refuse deposit	Historic	Yes	Low	I

Notes: I = Ineligible; SRL = segregated reduction locus.

Table J-6. Known Sites and Preliminary NRHP Eligibility, West Study Area

Site	Description	Age	Evaluated for NRHP Eligibility	Data Potential	Preliminary NRHP
CA-SBR-1811	Rock Art (unclassified)	Prehistoric	No	NA	U
CA-SBR-1883	Ceramics and projectile point	Prehistoric	No	NA	U
CA-SBR-3812	Lithic scatter	Prehistoric	No	NA	U
CA-SBR-3813	Lithic scatter	Prehistoric	No	NA	U
CA-SBR-3820	Lithic scatter	Prehistoric	No	NA	U
CA-SBR-3843	Lithic scatter	Prehistoric	No	NA	U
CA-SBR-3844	Lithic scatter	Prehistoric	No	NA	U
CA-SBR-3845	Lithic scatter	Prehistoric	No	NA	U
CA-SBR-1880	Habitation	Prehistoric	Yes	High	E
CA-SBR-12929	Lithic scatter	Prehistoric	Yes	Low	I
CA-SBR-12930	Lithic scatter	Prehistoric	Yes	Low	I
CA-SBR-12931	Lithic scatter	Prehistoric	Yes	Low	I
CA-SBR-12932	SRL	Prehistoric	Yes	Low	I
CA-SBR-12933	Habitation	Prehistoric	Yes	High	E
CA-SBR-12934	Lithic quarry	Prehistoric	Yes	Moderate	E
CA-SBR-12935	SRL	Prehistoric	Yes	Low	I
CA-SBR-12936	SRL	Prehistoric	Yes	Low	I
CA-SBR-12937	SRL	Prehistoric	Yes	Low	I
CA-SBR-12942	Habitation	Prehistoric	Yes	High	E
CA-SBR-12944	Possible trail	Prehistoric	Yes	Low	I
CA-SBR-12949	Lithic scatter	Prehistoric	Yes	Low	I
CA-SBR-12950	Lithic scatter	Prehistoric	Yes	Low	I
CA-SBR-12951	Lithic scatter	Prehistoric	Yes	Low	I
CA-SBR-12952	Lithic scatter	Prehistoric	Yes	Low	I
CA-SBR-12953	Lithic scatter	Prehistoric	Yes	Low	I
CA-SBR-12954	Lithic scatter	Prehistoric	Yes	Low	I
CA-SBR-13358	Habitation	Prehistoric	Yes	Moderate	E
CA-SBR-13359	Lithic scatter	Prehistoric	Yes	Low	I
CA-SBR-13360	Habitation	Prehistoric	Yes	Low	I
CA-SBR-13361	Lithic scatter	Prehistoric	Yes	Low	I
CA-SBR-13362	Habitation	Prehistoric	Yes	High	E
CA-SBR-13363	Lithic scatter	Prehistoric	Yes	Low	I
CA-SBR-13365	Lithic scatter	Prehistoric	Yes	Low	I
CA-SBR-13366	Lithic scatter	Prehistoric	Yes	Low	I
CA-SBR-13368	Habitation	Prehistoric	Yes	High	E

Table J-6. Known Sites and Preliminary NRHP Eligibility, West Study Area

Site	Description	Age	Evaluated for NRHP Eligibility	Data Potential	Preliminary NRHP
CA-SBR-13369	Lithic scatter	Prehistoric	Yes	Low	I
CA-SBR-13370	Habitation	Prehistoric	Yes	High	E
CA-SBR-13371	Lithic scatter	Prehistoric	Yes	Low	I
ASM-WA-CL-1✳	Lithic scatter	Prehistoric	Yes	Low	I
CA-SBR-8946H	“Emerson Mill”	Historic	Yes	Moderate	E
CA-SBR-12938H	Mining and refuse deposit	Historic	Yes	Low	I
CA-SBR-12939H	Military bombing target, WW II-era	Historic	Yes	Moderate	I
CA-SBR-12940H	Prospect and refuse deposit	Historic	Yes	Low	I
CA-SBR-12941H	Prospect and refuse deposit	Historic	Yes	Low	I
CA-SBR-12943H	Prospect	Historic	Yes	Low	I
CA-SBR-12945H	Refuse deposit	Historic	Yes	Moderate	I
CA-SBR-12946H	Prospect and refuse deposit	Historic	Yes	Low	I
CA-SBR-12947H	Refuse deposit	Historic	Yes	Low	I
CA-SBR-12948H	Mining and refuse deposit	Historic	Yes	Moderate	I
CA-SBR-12955H	Mining and road/”Los Padres Mine”	Historic	Yes	Low	I
CA-SBR-13357H	Refuse deposit	Historic	Yes	Low	I
CA-SBR-13364H	Mining	Historic	Yes	Low	I
CA-SBR-13367H	Refuse deposit	Historic	Yes	Low	I
CA-SBR-13372H	Refuse deposit	Historic	Yes	Low	I
ASM-WA-CL-2✳	Mine shaft and refuse deposit	Historic	Yes	Low	I
ASM-WA-TL-1✳	“Means Well”	Historic	Yes	Low	I
ASM-WA-TL-2✳	Refuse deposit	Historic	Yes	Low	I
ASM-WA-TL-3✳	Refuse deposit	Historic	Yes	Low	I
ASM-WA-H-13✳	“Los Padres Mine” (CA-SBR-3405)	Historic	Yes	Moderate	E
ASM-WA-H-14✳	Mining and refuse deposit	Historic	Yes	Moderate	E
ASM-WA-H-15✳	Mining and refuse deposit	Historic	Yes	Moderate	E
ASM-WA-H-18✳	Transmission/telephone line	Historic	Yes	Low	I

Notes: E = eligible; I = ineligible; SRL = segregated reduction locus; ✳, temporary ASM designation for sites not yet assigned state trinomials by the San Bernardino County Information Center.

J.4 REGIONAL CULTURAL CONTEXT

Archaeological research on the prehistory of the Mojave Desert has been conducted for roughly a century, with particular attention directed at chronology and human-environment adaptations. Warren (1984; Warren and Crabtree 1986; see also Whitley et al. 1988; Sutton 1996) has synthesized much of the resulting data, developing a temporal sequence that is widely cited by regional researchers. The summary below largely follows Warren's cultural-historical model.

It is important to note at the outset that the contemporary Mojave Desert climate and environment differ, in some cases substantially, from conditions during the prehistoric past. The earliest human occupation of the region occurred during the Late Pleistocene, or Ice Age. This period was colder and wetter than today, including times when large lakes or lake systems filled the internally-draining basins that are common in the region. The overall trend since the start of the Holocene (or contemporary) period, 10,000 years ago, has been toward the current, relatively warmer and drier Mojave Desert. However, recent research has demonstrated that climatic and environmental changes have been far from unidirectional since the Pleistocene, with oscillations between warm-cold and wet-dry periods (e.g., Bender et al. 1994; Meese et al. 1994; Bach 1995; Ramirez and Bryson 1996; Bond et al. 1999; Perry and Hsu 2000). The latest studies identify 12 wet and 13 dry periods in the last 12,500 years alone (Liu and Broecker 1999, 2007, 2008a, 2008b; Liu et al. 2000; Broecker and Liu 2001). These intervals range from 1,800 to 250 years, averaging 1,000 years in length. One implication of this back-and-forth change is that the dry mud playas currently covering many valley bottoms held lakes for certain periods during the Holocene, and that these lakes may have been important factors in environmental adaptation and prehistoric settlement patterns (Warren n.d.). Another is that human occupation in and adaptation to the Mojave required periodic adjustments to these sometimes rapidly changing conditions and environments.

Prehistoric Context

Late Pleistocene (circa 12,000 – 10,000 YBP)

Although the timing of earliest human entry into the Americas has not yet been determined, substantial evidence indicates that the Mojave Desert was occupied during the Late Pleistocene, by at least 10,000 YBP (years before present) if not earlier (e.g., Rogers 1939; Brott 1966; Davis and Shutler 1969; Davis 1975; Davis and Panlaqui 1978; Skinner 1984; Warren et al. 1989; Basgall and Hall 1991; Yohe 1992; Basgall 2004, 2007; Warren 2008; Giambastiani and Bullard 2010). This interval is commonly called the Paleoindian period and, in the Mojave Desert, has characteristic artifacts such as large, basally-fluted stone spear tips called "Great Basin Concave Base" or, alternatively, "Western Fluted" points (Beck and Jones 2010). These are similar to well known Clovis points from the Plains area of North America but tend to be of somewhat smaller stature. Western Fluted points are most frequently found as isolated surface finds (rather than in site assemblages), complicating interpretations of Paleoindian population size, environmental adaptation, and even chronology. However, many have been discovered near Pleistocene lake shorelines, implying that subsistence patterns at least partly emphasized lacustrine resource use. Human populations in the Mojave Desert during Paleoindian times are generally believed to have been small and very mobile, hence the seeming paucity of substantial residential sites. Studies of obsidian and other stone tool sources also indicate that Paleoindian peoples had extensive settlement ranges and may have participated in long-distance trade.

Early Holocene (10,000 – 7500 YBP)

The Early Holocene occupation of the Mojave Desert is marked by a change in projectile point styles, with the appearance of so-called "Great Basin Stemmed" points. This interval is sometimes called the

Lake Mohave period (see Amsden 1937; Campbell et al. 1937; Harrington 1957; Hunt 1960; Borden 1971; Davis 1973; Davis and Panlaqui 1978; Meighan 1981; Warren 1984; Jenkins 1991; Basgall and Hall 1991, 1994; Basgall 1993). Earlier studies suggested that Lake Mohave sites occurred only along ancient lakeshores, like the Paleoindian sites (Bedwell 1970, 1973; Hester 1973). Recent research indicates that Lake Mohave site distribution is more variable than first thought (e.g., Warren 1967, 1980; Borden 1971; Basgall and McGuire 1988; Jenkins 1991;) and is not restricted to lakeshores alone. Lake Mohave period stone tool assemblages show considerable variability, including diversity in the use of tool stones. Animal bones in sites (and thus the animal-food diet), in contrast, exhibit little change over time during this period (Jenkins 1985; Warren et al. 1986; Douglas et al. 1988; Hall 1991; Basgall 1991, 1993), with a focus on small rather than large game mammals (Douglas et al. 1988; Basgall 1991; Basgall and Hall 1992).

Middle Holocene (7500 – 4000 YBP)

The Pinto period dates to the Middle Holocene, an interval that may include a hot and dry climatic stage known as the Altithermal (Antevs 1955). The Pinto period is signaled by the appearance of "Pinto" projectile points, with tipped darts used with atlatls or spear-throwers (Campbell and Campbell 1935; Rogers 1939, 1966; Harrington 1957; Hunt 1960; Smith 1963; Borden 1971; Warren 1980, 1985; Meighan 1981; Schroth 1994). While Pinto residential sites are somewhat more common than those of Lake Mohave or Paleoindian times, they are still few in number and testify to an increased but relatively low population density. The distribution of Pinto sites may reflect regional population variations: they appear to be more common in the central and southern than in the northern Mojave Desert (Whitley et al. 1988; Lechner and Giambastiani 2009a). Pinto tool assemblages include significant numbers of ground stone implements used for seed grinding (millingstones and handstones), indicating a relatively greater emphasis on vegetal foods. Faunal assemblages from Fort Irwin and Twentynine Palms reflect a hunting focus on small game such as rabbits, hares, rodents, and reptiles, with larger mammals taken opportunistically (Douglas et al. 1988; Basgall 1990; Hall 1992; Basgall and Hall 1993; Welsh 2000). The implication is that subsistence practices were generalized rather than specialized, and diet breadth somewhat greater than during the previous two periods (Giambastiani and Basgall 2000).

Late Holocene (4000 YBP – Historic)

Following Warren (1984), three cultural intervals are recognized during the last 4,000 years of Mojave Desert prehistory: the Gypsum (4000-1500 YBP), Saratoga Springs (1500-700 YBP), and Shoshonean (700-100 YBP) periods. Gypsum sites typically have "Gypsum," "Elko," and/or "Humboldt" style dart points. Residential sites are common and are typically located on valley bottoms near springs. Because many of these sites continued to be occupied through Saratoga and into Shoshonean times, they are assumed to be winter settlements representing the aggregation phase of the seasonal adaptive round—following the ethnographic pattern documented during the historic period. This was the time of year when families congregated at a central habitation site, living off stored resources until the spring when they could disperse into single-family units for greater mobility and efficiency.

The subsequent Saratoga Springs period is marked by the appearance of "Rose Spring" or "Saratoga Springs" arrow points, representing a change in hunting technology from the atlatl-and-dart to the bow-and-arrow (Yohe 1992). A shift in arrow point styles occurred during the following Shoshonean period, with the smaller "Desert Side-Notched" and "Cottonwood Triangular" points in use. A variety of ground stone tools, needed for plant processing, is common throughout the Late Holocene, signaling the importance of vegetal resources for the last 4,000 years.

Two cultural processes further characterize human adaptations in the Mojave Desert during the Late Holocene. The first was a shift toward intensified land-use strategies, resulting from changes in environmental productivity, population size and dynamics, and in subsistence-settlement organization and technology. The second was the influence of Southwestern cultures on desert inhabitants. This was manifested in the development of long-distance trade, the diffusion of material culture and adaptive strategies (e.g., irrigation agriculture), and in the occupation of certain desert regions by Southwest groups.

Ethnographic Context

The ethnographic period began with the entry of the Spanish into the Mojave Desert in the 1770s, although heavy Euro-American influence on the local tribes did not develop until after about 1820. While a number of aboriginal groups shared portions of the central Mojave Desert during contact times, the two main groups known to have regularly used the Johnson Valley-Twentynine Palms region are the Serrano and the Chemehuevi. Both groups are Uto-Aztecans linguistically, although the first are members of the Takic branch, whereas the second are Southern Paiute (Numic branch) speakers.

The broad desert region containing Lucerne Valley, Johnson Valley, and extending east to Twentynine Palms was evidently inhabited by groups of Serrano people (Benedict 1924; Kroeber 1925:Plate 57; Strong 1929: Map 1, Table 1; Bean and Smith 1978). Although possible earlier contacts may have occurred between the Serrano and Euro-Americans, most historical sources mark the first encounter in 1776 when Francisco Garcés visited a community of about 40 people near present-day Victorville. Kroeber (1925) estimates the pre-contact Serrano population at roughly 1,500 people, while Bean and Smith (1978) suggest approximately 2,500. Spanish influence on the Serrano was limited until about 1819, when an asistencia was built near Redlands, and by 1834 most of the western Serrano had been moved to southern California missions like San Gabriel (Cook 1943; Bean and Smith 1978). Strong (1929:5) noted that the 1910 federal census identified 119 Serrano.

Prior to contact, the desert-dwelling Serrano maintained a hunting and gathering economy. Staple plant foods included acorns, pinyon nuts, yucca (flowers, stalks, and roots), mesquite, screwbeans, and cactus fruit, these often supplemented with various roots, bulbs, shoots, and seeds like chia (Salvia columbariae) and ricegrass (Oryzopsis spp.). Principal game included deer, mountain sheep, rabbits and larger rodents, and many birds (Bean and Smith 1978). Various basketry tools were used to gather, winnow, and cook plant foods (Bean and Vane 2002), many of which were stored in large, elevated basketry granaries at village locations. Pottery was also used for food storage, particularly to hold mesquite and pinyon flour (Benedict 1924). Hunting was accomplished with throwing sticks, various types of traps, nets and snares, sinew-backed bows and arrows (Drucker 1937; Bean and Smith 1978). Principal trading partners were the Mojave people to the east and the Gabrielino to the west, but they also traded often with their closer neighbors, the Chemehuevi and Cahuilla.

Families traditionally lived in single-family dwellings that were circular, domed, or conical structures with central fire-pits. The walls were constructed of willow frames with exterior tule thatching secured with yucca withes (Drucker 1937; Bean and Smith 1978). Each house generally had a small "ramada" attached to it, an unwalled shade structure consisting of a willow-framed roof covered with thatching and supported by poles (Benedict 1924; Kroeber 1925; Drucker 1937). The homes of several families were generally clustered in small groups, each of which usually had shared facilities such as granaries, a sweathouse, and a larger ceremonial house where the lineage leader resided (Strong 1929; Bean and Smith 1978).

Basic items of material culture included baskets, pottery, rabbit skin blankets, awls, arrow straighteners, bows and arrows, mortars and pestles, stone pipes, musical instruments, bags and pouches, mats, and cordage (Bean and Smith 1978). Baskets were fabricated from yucca fiber, willow, and other reeds and grasses found in the area, while pots were made by coiling, smoothed with a paddle and anvil, and left undecorated (Benedict 1924; Stickel et al. 1980). Arrows were made of hardwood and tipped with stone points (Drucker 1937), and food-grinding tools featured basketry hoppers with portable stone mortars (attached with adhesive), deep wooden mortars, and bedrock mortars (Benedict 1924; Drucker 1937). Fibers of yucca, agave, and other plants were used to make clothing and other textiles, mats, and cordage.

A series of tribal territorial changes apparently occurred in the Las Vegas area of southern Nevada and along the Colorado River, between Arizona and California, during the historical period. One of these involved the movement of the Chemehuevi, a dialectical group of the Southern Paiute, into the region. The southwestern limits of Chemehuevi territory apparently extended west from the Colorado River to the San Bernardino Mountains (bordering the Serrano), north to the Kingston Range south of Death Valley, and south beyond Joshua Tree National Park to the vicinity of Palm Springs and Indio (bordering the Desert Cahuilla). Kelly and Fowler (1986; Kelly 1934) draw Chemehuevi territory roughly between Needles and Blythe along the Colorado and extending west to Bristol Lake and Danby Lake, but not including Twentynine Palms. Baksh and Hilliard (2005) also place Twentynine Palms within Serrano, not Chemehuevi territory, but allow the latter more acreage west of Bristol and Danby Lake. Kroeber (1925) also argued that Twentynine Palms was not part of traditional, or “old” Chemehuevi territory; but, following a war between the Mojave and Chemehuevi from 1864 to 1867 (Kroeber and Kroeber 1973), many Chemehuevi fled into the Mojave Desert and ultimately settled in places like the Coachella Valley and Twentynine Palms (Kroeber 1925; Johnston 1965; Miller and Miller 1967; Trafzer et al. 1997; Bean and Vane 2002; Baksh and Hilliard 2005).

In 1867, efforts were made to convince the group of Chemehuevi at Twentynine Palms to move to the Colorado River Indian Reservation, but to no avail. The group persisted over the next few years in the face of increasing Euro-American settlement, even when denied access to water at the Oasis of Mara by the Southern Pacific Railroad Company in the early 1870s (Trafzer et al. 1997; Bean and Vane 2002). A reservation for the Chemehuevi at Twentynine Palms (including some Serranos) was patented in 1895, placing the group under the supervision of the Mission Indian Agency. Most of the families were removed to the Morongo Reservation in 1908 so that their children could be (forcibly) enrolled in school. In 1910, the government issued a trust patent for 640 acres jointly to the Cabazon and Twentynine Palms Bands of Mission Indians, and encouraged the Chemehuevi at Twentynine Palms to move to the Cabazon reservation. When conflict eventually arose between Chemehuevis and Cahuillas at Cabazon, most of the Chemehuevis left, some returning to Twentynine Palms for a time. The federal census of that year recorded 260 Chemehuevi in California (Kroeber 1925).

At settlements along the Colorado River, pre-contact Chemehuevi practiced horticulture and grew corn, winter wheat, sunflower, beans, squash, pumpkins, watermelons, muskmelons, and other foods (Kelly and Fowler 1986). Kroeber (1925) downplayed the role of agriculture in Chemehuevi subsistence, as did Bean and Vane (2002), but it was certainly an important part of riverine life. The desert adaptation of the Chemehuevi, however, was very similar to that of their western Serrano neighbors. Staple plant foods in upland and foothill environments included pinyon nuts, yucca (flowers, stalks, and roots), agave, and cactus fruit, along with berries (e.g., Lycium spp.) and ricegrass; aphid sugar from Carrizo grass (Phragmites spp.) was also an important low altitude resource (Earle 2003). Mesquite, screwbeans, and various salt-tolerant, seed-bearing plants (e.g., saltgrass [Distichlis spicata]) were exploited in playa basin landscapes. Principal game included the chuckwalla, lizards, desert tortoise, rabbits and larger rodents, and many birds (Bean and Vane 2002), although antelope and bighorn sheep were pursued whenever present (Kelly and Fowler 1986). The Chemehuevi were skilled basketmakers, using various basketry tools to gather, winnow, and parch pinyon nuts and seeds (Kelly and Fowler 1986) and making water jugs, caps, cradles, and other items of woven plants (Kroeber 1925). Pottery was made occasionally at riverine settlements but was not much used by desert groups. Hunting was accomplished with various types of throwing clubs, traps, nets and snares, sinew-backed bows, and arrows fitted with stone points (Drucker 1937; Kelly and Fowler 1986). The Chemehuevi were amicable with many surrounding groups, including the Shoshone, Kawaiisu, Serrano, Vanyume, Cahuilla, and Diegueño, but were most closely aligned with the Mojave. In fact, Chemehuevi groups that eventually settled along the Colorado River adopted many Mojave cultural traits of material, social, and religious nature (Kroeber 1925; Kelly and Fowler 1986; Earle 2003).

In winter, desert families lived in small dwellings that were circular, domed, or conical structures with central firepits. Walls were constructed of juniper or willow frames with exterior brush, bark, or other thatching. Some of the more permanent villages had a communal, flat-topped shade house, a large, unwalled shade structure consisting of a wood-framed roof covered with thatching and supported by poles (Benedict 1924; Kroeber 1925; Drucker 1937; Kelly and Fowler 1986). Basic items of material culture included baskets, pottery, rabbit skin blankets, awls, arrow straighteners, bows and arrows, mortars and pestles, stone pipes, musical instruments, bags and pouches, mats, and cordage.

<u>Historic Euroamerican Context</u>

Overviews of Euro-American history in the Mojave Desert have been published by Peirson (1970), Stickel et al. (1980), Vredenburgh et al. (1981), and Smith (2006). The brief sketch presented here summarizes these sources, with an emphasis on the Johnson Valley-Twentynine Palms area.

Initial Euro-American interest in the Mojave Desert emphasized exploration and travel, initially with the desert area representing little more than an impediment in east-to-west movements. Francisco Garcés was the first Euro-American credited with crossing the desert. He was a member of Captain Juan Bautista de Anza's 1774-5 expedition, which was tasked with finding an overland route for supplies, livestock, families, and missionaries from New Spain to the coastal settlements of Alta California (Stickel et al. 1980). Garces was followed sporadically by a series of additional explorers, including Jedediah Smith (in 1826), George C. Yount (1827), James O. Pattie (1828), and Ewing Young (1829). In 1830 Antonio Armijo, a Mexican merchant, took the first caravan of pack animals from Santa Fe, NM, all the way across the Mojave and through Cajon Pass. Armijo's route became known as the Spanish Trail and it served as the main caravan route between Santa Fe and Los Angeles (Stickel et al. 1980).

California by the early 1850s had become a part of the United States, and was experiencing significant immigration, partly if not largely due to the 1849 Gold Rush. One result was the need for a transcontinental railroad. In 1853, four surveys were organized by the War Department to find the most practical route to the Pacific. Lt. Robert Stockman Williamson led a survey of the Mojave Desert for this effort. At about the same time, other federal agencies began to sponsor land surveys in and around the Mojave Desert. In 1852, the Boundary Commission sent Col. Henry Washington to erect a baseline monument on Mt. San Bernardino, which became a fixed reference point for all future southern California surveys. In 1855, Washington was dispatched into the central Mojave, mapping areas in Morongo Valley, near the Oasis of Mara, and along the southern end of Johnson Valley (Stickel et al. 1980). The first transcontinental railroad was completed in 1869, linking the Central Pacific and Union Pacific lines. Near the end of its construction in early 1868, General William J. Palmer (Director of Surveys for Union Pacific) began surveying parts of the Mojave Desert in search of a route for a second transcontinental railroad. His surveys brought him through Morongo Valley in an effort to find a connecting route to San Diego.

Westbound wagon traffic also increased in the late 1850s along the Spanish Trail or, as it was then known, the Mormon Road. This ultimately led to a rise in hostilities between native people still living in the desert and the immigrants. In an effort to protect U.S. citizens, the government set out military detachments to construct and man various redoubts and forts in the Mojave Desert. Some of these were located near the Colorado River, including Fort Mojave (active by 1859) and Camp Cady (ca. 1860), but others were erected at Marl Springs, Rock Springs, and Bitter Springs (Belden 1964; Hardesty 1988). The presence of the military in the desert temporarily worsened conditions, resulting in battles and the forced removal of Indians to reservations, but by the early 1870s much of the conflict had ceased.

Mining also played a significant role in Mojave Desert history. The first miners in the region were those passing through on their way to the goldfields of northern California. Gold and silver mining in the Mojave developed in the 1880s, although there are reports of earlier activities. The initial excitement continued until 1885 when the price of silver dropped (Nadeau 1999). There was a brief but short-lived revival in 1890. Later in the 1890s, many men went back into the Mojave looking for gold; this surge continued past the turn of the twentieth century but quickly dwindled. In addition to the precious metals, mining in borates, copper, tungsten, iron, and non-metals established the Mojave as a keystone to the California mining industry in the early decades of the twentieth century. The Great Depression sent the unemployed into the desert in the 1930s to renew efforts in locating gold (Stickel et al. 1980). The mining of various ores and other materials has continued in the Mojave sporadically since that time, depending largely on fluctuations in production costs, as well as demand and value on the world market.

The initial Euro-American settlement of the Johnson and Morongo Valleys area resulted from ranching and homesteading, with grazing apparently occurring as early as the 1870s (Stickel et al. 1980:166). The first homesteader may have been Peter Davidson, who settled at Rabbit Springs (the original name for the area), north of the present-day town of Lucerne Valley, and lived there until he died in 1902. His homestead was an important way-station for miners and prospectors, and became a frequented crossroads in the 1880s and 1890s (Stickel et al. 1980).

In 1895, Albert Swarthout filed on a piece of land in Lucerne Valley in the hopes of establishing a cattle ranch (Wilson 1992), subsequently also homesteading the location of Old Woman Springs. He constructed major developments to the water source there, and by 1909 had a working 400-acre ranch with a house, orchards, and 9 acres of alfalfa (Stickel et al. 1980; Wilson 1992). In 1912, the name Lucerne Valley was given to the area by Dr. F. J. Gobar, a physician from Fullerton, California, who homesteaded near Rabbit Springs because he apparently "liked the climate" (Stickel et al. 1980). The word "lucerne" is a synonym for "alfalfa," and was probably applied to the area for the many alfalfa fields growing there at the time.

The first known Euro-American residents of Morongo Valley (originally called Little Morongo Valley) were the deCrevecouer families, who settled there in 1873. The nearby town of Yucca Valley (first named Yucca Village) was established a few miles west of the crossroads of what are now the Twentynine Palms Highway and Old Woman Springs Road. The former was an old wagon road from Banning to Twentynine Palms, and the latter a route between the Victorville area and the Dale Mining District, both established sometime in the 1860s. Early settlers included Mark Warren (circa 1880), William L. Burton (1888), and Joseph W. Preston and R. J. Martin (both in 1889). Ranches and settlements continued to spread out slowly from Yucca Village subsequently, but a store did not open until 1931. The Twentynine Palms Highway was paved in 1937, and electricity was available in Yucca Village by 1946, leading to the first real population boom in the area (Stickel et al. 1980).

Mining in the general region may have begun as early as 1859, with the first major discovery in Holcomb Valley in 1860. An influx of prospectors quickly followed the discovery with new services for the increasing population (O'Neal 1981:49-89; Vredenburgh et al. 1981). Miners began looking for minerals in the Morongo Valley area in the 1870s, but at that time no major mining operations yet existed.

The main surge in historic mining in the Morongo Valley area took place between 1890 and 1953, focusing on the search for gold, silver, copper, and iron. There are no available estimates of the number of prospectors that explored the area during this period, but it is likely that the bulk of mining occurred between the 1930s and early 1940s. While gold was a strong producer from this area, the extraction of iron from a few local mines was essential for the production of World War II maritime vessels and provided a boost to local settlement and the regional economy during the 1940s and 1950s.

History of the Combat Center

Military interest in the greater Twentynine Palms area began in January 1942 when the U.S. Army took control of a civil Twenty Nine Palms airfield and established Condor Field (Freeman 2002). The U.S. Army Air Corps (predecessor of the U.S. Air Force) constructed Condor Field as one was of the many WWII airfields built across California. Condor Field offered training for the first Army glider pilots and was one of three glider facilities (Bagley 1978; O'Hara 2007). Condor Field was thought to be the most efficient location to train glider pilots due to consistent and favorable wind and thermal conditions, allowing for longer training time for the pilots. From 1941 to 1943, Condor Field became a full-service air station with extensive runways, hangers, refueling, and maintenance facilities. However, it eventually became apparent to the Army Air Corps that sailplanes used at Condor Field for training were far different from the gliders that would be used during the war. Thereafter other advanced glider training bases were established across the U.S. and eventually glider planes made sailplanes training at Condor Field obsolete (National WWII Glider Pilots Association, Inc. 2009). Control of the facility was transferred to the Twentynine Palms Air Academy in 1943 for the purpose of training pilots in powered fighter planes. The next year, the Department of the Navy took command of the area establishing the Naval Auxiliary Air Station (NAAS) and began using the facility for flight training, particularly machine gun strafing and bombing (Ludwig 1989; MCAGCC ICRMP 2007).

The entry of the United States into WWII prompted the establishment of a number of wartime-related facilities across the country. One training facility established by the U.S. Army was the Desert Training Center (DTC)/California-Arizona Maneuver Area (C-AMA), an important stretch of land that crossed the deserts of southern California and western Arizona and provided enough space for wartime training exercises. Opened on April 30, 1942, DTC was the largest military training installation ever created (approximately 10,130 miles^2); it served the military for two years until April 30, 1944. The famed General George S. Patton, Jr. led the missions for training and field testing as its first commanding officer (Bischoff 2000; Meller 1946). Conditioning the troops for desert warfare environs and tactics proved a critical component in preparation for the North African Campaign. The DTC also provided a large space for field testing equipment and supplies before entering combat. Originally the DTC extended from the Colorado River on the east to a point slightly west of present-day Desert Center on the west, and from Searchlight, Nevada, on the north to Yuma, Arizona, on the south. This expansive and relatively isolated region was ideally suited for a military purpose in that it contained a variety of terrain types and no large population centers (Howard 1985:273-274; Schaefer and Laylander 2008). A series of 11 camps served both the DTC and the C-AMA with the headquarters, Camp Young, located near Indio, California. Seven of the 11 camps were located in California and four in Arizona. Larger divisional camps that may have deployed troops into the eastern project area include Camp Iron Mountain, Camp Coxcomb, and Camp Granite, all located approximately 10 to 20 mi. north of Desert Center. Each of these large divisional camps was named after mountains or mountain ranges near the locations of the camps. Troops deployed from these larger divisional camps would then often have to create smaller camps on multiple-day field or deployment exercises scattered throughout the training facility. A network of railroad lines such as the Cadiz-Rice branch AT&SF Railroad and major roads connected all the divisional camps and depots. Smaller camps and bivouacs sporadically dotted the desert landscape as posts for special field exercises such as practicing the defense of a mountain pass behind constructed rock blinds (Schaefer and Laylander 2008; Vredenburgh et al. 1981). The last training exercises were held at the C-AMA on April 30, 1944, when the Army closed C-AMA and abandoned its camps (General Patton Memorial Museum 2009). Deactivation of C-AMA required efforts to police the area, close the camps, and collect, salvage, and ship thousands of pieces of equipment and tons of material for reuse at other facilities (Lynch et al. 1982:15; Schaefer and Laylander 2008).

After WWII, the NAAS (previously Condor Field) was also closed and custody of the installation property transferred to San Bernardino County. On August 20, 1952, the U.S. Marine Corps selected Twentynine Palms as a site for increased open-space training. Necessitated by new developments in weapon technology, the present-day Combat Center property was activated as the Camp Detachment Marine Corps Training Center. Although the size of the installation (more than 998 mi2) has remained the same over the years, the name of the installation has changed several times over the years. The installation was named the Marine Corps Training Center in 1953, Marine Corps Base in 1957, Marine Corps Air Ground Combat Training Center in 1978 and C in 1979 (Ludwig 1989). Finally, in October 2000, command of the installation was transferred to the Marine Air Ground Task Force Training Command (MAGTF Training Command 2007).

The military sporadically trained in the deserts of southern California, including the eastern project area. In 1964, a majority of the old DTC/C-AMA land was utilized once more during a massive war-game training exercise – Joint Exercise Desert Strike (Desert Strike) – from May 17-30 (Underwood and Gregory 2004). The training exercise involved approximately 100,000 military personnel and covered a 12 million-acre area designed for training joint military operations. The military forces employed conventional and tactical nuclear weapons, tested contemporary electronic warfare capabilities, conducted intelligence operations, and evaluated the overall operations and procedures (Underwood and Gregory 2004). The selection of this area for the massive training exercise most likely had less to do with the desire to train in a desert environment than it did with the need for a large expense of land for solving larger operational problems and issues. During Desert Strike, the area just southeast of Cadiz was assigned as an assembly area that was able to utilize both the AT&SF railroad line and Route 66.

From the early days of General Patton's DTC to the expanded C-AMA and then the Cold War-era to contemporary times, the need for realistic and integrated training for the military has been vital to the preparedness of the U.S. military forces. General Patton addressed the importance of realistic training when discussing the proposed DTC and said, "The California desert can kill quicker than the enemy. We will lose a lot of men from heat, but the training will save hundreds of lives when we get into combat" (Bischoff 2000:10). During WWII, the need for realistic training for U.S. soldiers seemed to necessitate desert training at the DTC, but as the war progressed the ability to train in larger formations and operational levels achieved priority as part of C-AMA. It was during WWII that the world first recognized the importance and power of combined or integrated infantry, armor, and air power for military operations. Military establishments, such as Condor Field and the DTC/C-AMA, provided important and necessary training ground during WWII with reuse of DTC/C-AMA during the Cold War.

J.5 SITES AND PRELIMINARY NRHP ELIGIBILITY BY ALTERNATIVE

Table J-7. Sites and Preliminary NRHP Eligibility for Alternatives 1 and 4

Era	Site	Description	Study Area	Preliminary NRHP
Prehistoric	CA-SBR-1880	Habitation	West	E
	CA-SBR-12929	Lithic scatter	West	I
	CA-SBR-12930	Lithic scatter	West	I
	CA-SBR-12931	Lithic scatter	West	I
	CA-SBR-12932	SRL	West	I
	CA-SBR-12933	Habitation	West	E
	CA-SBR-12934	Lithic quarry	West	E
	CA-SBR-12935	SRL	West	I
	CA-SBR-12936	SRL	West	I
	CA-SBR-12942	Habitation	West	E
	CA-SBR-12944	Possible trail	West	I
	CA-SBR-12949	Lithic scatter	West	I
	CA-SBR-12950	Lithic scatter	West	I
	CA-SBR-12951	Lithic scatter	West	I
	CA-SBR-12952	Lithic scatter	West	I
	CA-SBR-12953	Lithic scatter	West	I
	CA-SBR-12954	Lithic scatter	West	I
	CA-SBR-12961	SRL	South	I
	CA-SBR-12962	Lithic scatter	South	I
	CA-SBR-12963	Lithic scatter	South	I
	CA-SBR-12964	Lithic scatter	South	I
	CA-SBR-13358	Habitation	West	E
	CA-SBR-13359	Lithic scatter	West	I
	CA-SBR-13360	Habitation	West	I
	CA-SBR-13361	Lithic scatter	West	I
	CA-SBR-13362	Habitation	West	E
	CA-SBR-13363	Lithic scatter	West	I
	CA-SBR-13365	Lithic scatter	West	I
	CA-SBR-13366	Lithic scatter	West	I
	CA-SBR-13368	Habitation	West	E
	CA-SBR-13369	Lithic scatter	West	I
	CA-SBR-13370	Habitation	West	E
	CA-SBR-13371	Lithic scatter	West	I
	ASM-WA-CL-1✳	Lithic scatter	West	I

Table J-7. Sites and Preliminary NRHP Eligibility for Alternatives 1 and 4

Era	Site	Description	Study Area	Preliminary NRHP
Historic	CA-SBR-8946H	"Emerson Mill"	West	E
	CA-SBR-12938H	Mining and refuse deposit	West	I
	CA-SBR-12939H	Military bombing target, WW II-era	West	I
	CA-SBR-12940H	Prospect and refuse deposit	West	I
	CA-SBR-12941H	Prospect and refuse deposit	West	I
	CA-SBR-12943H	Prospect	West	I
	CA-SBR-12945H	Refuse deposit	West	I
	CA-SBR-12946H	Prospect and refuse deposit	West	I
	CA-SBR-12948H	Mining and refuse deposit	West	I
	CA-SBR-12955H	Mining and road/"Los Padres Mine"	West	I
	CA-SBR-12956H	Refuse deposit	South	I
	CA-SBR-13357H	Refuse deposit	West	I
	CA-SBR-13364H	Mining	West	I
	CA-SBR-13367H	Refuse deposit	West	I
	CA-SBR-13372H	Refuse deposit	West	I
	ASM-WA-CL-2✳	Mine shaft and refuse deposit	West	I
	ASM-WA-TL-1✳	"Means Well"	West	I
	ASM-WA-TL-2✳	Refuse deposit	West	I
	ASM-WA-TL-3✳	Refuse deposit	West	I
	ASM H-13✳	"Los Padres Mine" (CA-SBR-3405)	West	E
	ASM H-14✳	Mining and refuse deposit	West	E
	ASM H-15✳	Mining and refuse deposit	West	E
	ASM H-18✳	Transmission/telephone line	West	I

Source: E =eligible; I = ineligible; SRL = segregated reduction locus; ✳, temporary ASM designation for sites not yet assigned state trinomials by the San Bernardino County Information Center.

Table J-8. Sites and Preliminary NRHP Eligibility for Alternative 2

Era	Site	Description	Study Area	Preliminary NRHP
Prehistoric	CA-SBR-1880	Habitation	West	E
	CA-SBR-12931	Lithic scatter	West	I
	CA-SBR-12932	SRL	West	I
	CA-SBR-12933	Habitation	West	E
	CA-SBR-12934	Lithic quarry	West	E
	CA-SBR-12935	SRL	West	I
	CA-SBR-12936	SRL	West	I
	CA-SBR-12942	Habitation	West	E
	CA-SBR-12944	Possible trail	West	I
	CA-SBR-12949	Lithic scatter	West	I
	CA-SBR-12950	Lithic scatter	West	I
	CA-SBR-12951	Lithic scatter	West	I
	CA-SBR-12952	Lithic scatter	West	I
	CA-SBR-12953	Lithic scatter	West	I
	CA-SBR-12954	Lithic scatter	West	I
	CA-SBR-12961	SRL	South	I
	CA-SBR-12962	Lithic scatter	South	I
	CA-SBR-12963	Lithic scatter	South	I
	CA-SBR-12964	Lithic scatter	South	I
	CA-SBR-13358	Habitation	West	E
	CA-SBR-13359	Lithic scatter	West	I
	CA-SBR-13360	Habitation	West	I
	CA-SBR-13361	Lithic scatter	West	I
	CA-SBR-13362	Habitation	West	E
	CA-SBR-13363	Lithic scatter	West	I
	CA-SBR-13365	Lithic scatter	West	I
	CA-SBR-13366	Lithic scatter	West	I
	CA-SBR-13368	Habitation	West	E
	CA-SBR-13369	Lithic scatter	West	I
	CA-SBR-13370	Habitation	West	E
	CA-SBR-13371	Lithic scatter	West	I
	ASM-WA- CL-1✳	Lithic scatter	West	I

Table J-8. Sites and Preliminary NRHP Eligibility for Alternative 2

Era	Site	Description	Study Area	Preliminary NRHP
Historic	CA-SBR-8946H	“Emerson Mill”	West	E
	CA-SBR-12938H	Mining and refuse deposit	West	I
	CA-SBR-12939H	Military bombing target, WW II-era	West	I
	CA-SBR-12940H	Prospect and refuse deposit	West	I
	CA-SBR-12941H	Prospect and refuse deposit	West	I
	CA-SBR-12943H	Prospect	West	I
	CA-SBR-12955H	Mining and road/”Los Padres Mine”	West	I
	CA-SBR-12956H	Refuse deposit	South	I
	CA-SBR-13357H	Refuse deposit	West	I
	CA-SBR-13364H	Mining	West	I
	CA-SBR-13367H	Refuse deposit	West	I
	CA-SBR-13372H	Refuse deposit	West	I
	ASM-WA-CL-2✳	Mine shaft and refuse deposit	West	I
	ASM-WA-TL-1✳	“Means Well”	West	I
	ASM-WA-TL-2✳	Refuse deposit	West	I
	ASM H-13✳	“Los Padres Mine” (CA-SBR-3405)	West	E
	ASM H-14✳	Mining and refuse deposit	West	E
	ASM H-18✳	Transmission/telephone line	West	I

Legend: E = eligible; I = ineligible; SRL = segregated reduction locus; ✳, temporary ASM designation for sites not yet assigned state trinomials by the San Bernardino County Information Center.

Table J-9. Sites and Preliminary NRHP Eligibility for Alternative 3

Era	Site	Description	Study Area	Preliminary NRHP
Prehistoric	CA-SBR-12961	SRL	South	I
	CA-SBR-12962	Lithic scatter	South	I
	CA-SBR-12963	Lithic scatter	South	I
	CA-SBR-12964	Lithic scatter	South	I
	CA-SBR-13214	Lithic scatter	East	I
	CA-SBR-13215	Habitation	East	E
	CA-SBR-13216	Habitation	East	E
	CA-SBR-13217	Habitation	East	E
	CA-SBR-13218	Habitation	East	E
	CA-SBR-13221	SRL	East	I
	CA-SBR-13225	Habitation	East	E
	CA-SBR-13227	SRL	East	I
	CA-SBR-13228	Lithic scatter	East	I
	CA-SBR-13229	Habitation	East	E
	CA-SBR-13230	Habitation	East	E
	CA-SBR-13231	Lithic scatter	East	I
	CA-SBR-13326	Ceramic scatter	East	I
	CA-SBR-13327	SRL	East	I
	CA-SBR-13328	Habitation	East	E
	CA-SBR-13329	Lithic scatter	East	E
	CA-SBR-13330	Lithic scatter	East	E
	CA-SBR-13331	Lithic scatter	East	I
	CA-SBR-13332	Habitation	East	E
	CA-SBR-13333	Lithic scatter	East	I
	CA-SBR-13334	Habitation	East	E
	CA-SBR-13335	Lithic scatter	East	E
	CA-SBR-13336	Habitation	East	E
	CA-SBR-13337	Habitation	East	E
	CA-SBR-13338	Habitation	East	E
	CA-SBR-13339	Lithic scatter	East	E
	CA-SBR-13340	Lithic scatter	East	E
	ASM-EA-KIS-3✳	SRL	East	I
	ASM-EA-KIS-5✳	SRL	East	I
	ASM-EA-TL-2✳	Lithic scatter	East	I
	ASM-EA-TL-3✳	Habitation	East	E
	ASM-EA-TL-4✳	Lithic scatter	East	E

Table J-9. Sites and Preliminary NRHP Eligibility for Alternative 3

Era	Site	Description	Study Area	Preliminary NRHP
Prehistoric	ASM-EA-TL-5✳	Lithic scatter	East	I
	ASM-EA-TL-6✳	Lithic scatter	East	E
	ASM-EA-TL-7✳	Habitation	East	E
	ASM-EA-TL-8✳	Habitation	East	E
	ASM-EA-TL-9✳	Lithic scatter	East	E
	ASM-EA-TL-10✳	Habitation	East	E
Historic	CA-SBR-9849H	Refuse deposit	East	I
	CA-SBR-9850H	Railroad maintenance camp	East	E
	CA-SBR-9853H	Santa Fe Railroad - Parker Branch	East	I
	CA-SBR-9851H	Railroad maintenance camp	East	E
	CA-SBR-9856H	Refuse deposit	East	E
	CA-SBR-11582H	Military camp, Desert Strike (1964)	East	I
	CA-SBR-11583H	Cadiz-Rice Road	East	I
	CA-SBR-11586H	Pacific Telephone/Telegraph line	East	E
	CA-SBR-12956H	Refuse deposit	South	I
	CA-SBR-13213H	Dry well	East	I
	CA-SBR-13222H	Refuse deposit	East	I
	CA-SBR-13224H	Military	East	E
	CA-SBR-13226H	Refuse deposit	East	I
	CA-SBR-13325H	Pacific Telephone/Telegraph pole	East	I
	CA-SBR-13341H	Mining and refuse deposit	East	I
	ASM-EA-KIS-1✳	Refuse deposit	East	I
	ASM-EA-KIS-2✳	Refuse deposit	East	I
	ASM-EA-KIS-4✳	Mining	East	I
	ASM-EA-TL-1✳	Military	East	E
	ASM H-1✳	Mining and refuse deposit	East	I
	ASM H-2✳	Mining camp	East	E
	ASM H-3✳	Chambless Homestead	East	E
	ASM H-4✳	Amboy Road	East	I
	ASM H-6✳	Archer Railroad Station	East	E
	ASM H-7✳	Railroad maintenance camp	East	E
	ASM H-8✳	Railroad maintenance camp	East	E
	ASM H-9✳	Railroad maintenance camp	East	E
	ASM H-10✳	Railroad maintenance camp	East	E
	ASM H-11✳	Refuse deposit	East	I
	ASM H-12✳	Refuse deposit	East	I

Legend: E = eligible; I = ineligible; SR = segregated reduction locus; ✳, temporary ASM designation for sites not yet assigned state trinomials by the San Bernardino County Information Center.

Table J-10. Sites and Preliminary NRHP Eligibility for Alternative 5

Era	Site	Description	Study Area	Preliminary NRHP
Prehistoric	CA-SBR-1880	Habitation	West	E
	CA-SBR-12929	Lithic scatter	West	I
	CA-SBR-12930	Lithic scatter	West	I
	CA-SBR-12931	Lithic scatter	West	I
	CA-SBR-12932	SRL	West	I
	CA-SBR-12933	Habitation	West	E
	CA-SBR-12934	Lithic quarry	West	E
	CA-SBR-12935	SRL	West	I
	CA-SBR-12936	SRL	West	I
	CA-SBR-12942	Habitation	West	E
	CA-SBR-12944	Possible trail	West	I
	CA-SBR-12949	Lithic scatter	West	I
	CA-SBR-12950	Lithic scatter	West	I
	CA-SBR-12951	Lithic scatter	West	I
	CA-SBR-12952	Lithic scatter	West	I
	CA-SBR-12953	Lithic scatter	West	I
	CA-SBR-12954	Lithic scatter	West	I
	CA-SBR-13358	Habitation	West	E
	CA-SBR-13359	Lithic scatter	West	I
	CA-SBR-13360	Habitation	West	I
	CA-SBR-13361	Lithic scatter	West	I
	CA-SBR-13362	Habitation	West	E
	CA-SBR-13363	Lithic scatter	West	I
	CA-SBR-13365	Lithic scatter	West	I
	CA-SBR-13366	Lithic scatter	West	I
	CA-SBR-13368	Habitation	West	E
	CA-SBR-13369	Lithic scatter	West	I
	CA-SBR-13370	Habitation	West	E
	CA-SBR-13371	Lithic scatter	West	I
	ASM-WA-CL-1✳	Lithic scatter	West	I
Historic	CA-SBR-8946H	"Emerson Mill"	West	E
	CA-SBR-12938H	Mining and refuse deposit	West	I
	CA-SBR-12939H	Military bombing target, WW II-era	West	I
	CA-SBR-12940H	Prospect and refuse deposit	West	I
	CA-SBR-12941H	Prospect and refuse deposit	West	I
	CA-SBR-12943H	Prospect	West	I

Table J-10. Sites and Preliminary NRHP Eligibility for Alternative 5

Era	Site	Description	Study Area	Preliminary NRHP
Historic	CA-SBR-12945H	Refuse deposit	West	I
	CA-SBR-12946H	Prospect and refuse deposit	West	I
	CA-SBR-12948H	Mining and refuse deposit	West	I
	CA-SBR-12955H	Mining and road/"Los Padres Mine"	West	I
	CA-SBR-13357H	Refuse deposit	West	I
	CA-SBR-13364H	Mining	West	I
	CA-SBR-13367H	Refuse deposit	West	I
	CA-SBR-13372H	Refuse deposit	West	I
	ASM-WA-CL-2✳	Mine shaft and refuse deposit	West	I
	ASM-WA-TL-1✳	"Means Well"	West	I
	ASM-WA-TL-2✳	Refuse deposit	West	I
	ASM-WA-TL-3✳	Refuse deposit	West	I
	ASM H-13✳	"Los Padres Mine" (CA-SBR-3405)	West	E
	ASM H-14✳	Mining and refuse deposit	West	E
	ASM H-15✳	Mining and refuse deposit	West	E
	ASM H-18✳	Transmission/telephone line	West	I

Source: E = eligible; I = ineligible; SRL = segregated reduction locus; ✳, temporary ASM designation for sites not yet assigned state trinomials by the San Bernardino County Information Center.

Table J-11. Sites and Preliminary NRHP Eligibility for Alternative 6

Access/Era	Site	Description	Study Area	Preliminary NRHP
Restricted				
Prehistoric	CA-SBR-1880	Habitation	West	E
	CA-SBR-12942	Habitation	West	E
	CA-SBR-12951	Lithic scatter	West	I
	CA-SBR-12952	Lithic scatter	West	I
	CA-SBR-12953	Lithic scatter	West	I
	CA-SBR-12954	Lithic scatter	West	I
	CA-SBR-13369	Lithic scatter	West	I
	CA-SBR-13370	Habitation	West	E
	CA-SBR-13371	Lithic scatter	West	I
Historic	CA-SBR-12938H	Mining and refuse deposit	West	I
	CA-SBR-12940H	Prospect and refuse deposit	West	I
	CA-SBR-12941H	Prospect and refuse deposit	West	I
	CA-SBR-12955H	Mining and road/"Los Padres Mine"	West	I
	CA-SBR-13372H	Refuse deposit	West	I
	ASM-WA-CL-2✳	Mine shaft and refuse deposit	West	I
	ASM-WA-TL-1✳	"Means Well"	West	I
	ASM H-13✳	"Los Padres Mine" (CA-SBR-3405)	West	E
Military Only				
Prehistoric	CA-SBR-12929	Lithic scatter	West	I
	CA-SBR-12930	Lithic scatter	West	I
	CA-SBR-12931	Lithic scatter	West	I
	CA-SBR-12932	SRL	West	I
	CA-SBR-12933	Habitation	West	E
	CA-SBR-12934	Lithic quarry	West	E
	CA-SBR-12935	SRL	West	I
Prehistoric	CA-SBR-12936	SRL	West	I
	CA-SBR-12944	Possible trail	West	I
	CA-SBR-12949	Lithic scatter	West	I
	CA-SBR-12950	Lithic scatter	West	I
	CA-SBR-12961	SRL	South	I
	CA-SBR-12962	Lithic scatter	South	I

Table J-11. Sites and Preliminary NRHP Eligibility for Alternative 6

Access/Era	Site	Description	Study Area	Preliminary NRHP
	CA-SBR-12963	Lithic scatter	South	I
	CA-SBR-12964	Lithic scatter	South	I
	CA-SBR-13358	Habitation	West	E
	CA-SBR-13359	Lithic scatter	West	I
	CA-SBR-13360	Habitation	West	I
	CA-SBR-13361	Lithic scatter	West	I
	CA-SBR-13362	Habitation	West	E
	CA-SBR-13363	Lithic scatter	West	I
	CA-SBR-13365	Lithic scatter	West	I
	CA-SBR-13366	Lithic scatter	West	I
	CA-SBR-13368	Habitation	West	E
	ASM-WA-CL-1✳	Lithic scatter	West	I
Historic	CA-SBR-8946H	"Emerson Mill"	West	E
	CA-SBR-12939H	Military bombing target, WW II-era	West	I
	CA-SBR-12943H	Prospect	West	I
	CA-SBR-12956H	Refuse deposit	South	I
	CA-SBR-13357H	Refuse deposit	West	I
	CA-SBR-13364H	Mining	West	I
	CA-SBR-13367H	Refuse deposit	West	I
	ASM-WA-TL-2✳	Refuse deposit	West	I
	ASM-WA-TL-3✳	Refuse deposit	West	I
	ASM H-14✳	Mining and refuse deposit	West	E

Notes: E =eligible; I = ineligible; SRL = segregated reduction locus; ✳, temporary ASM designation for sites not yet assigned state trinomials by the San Bernardino County Information Center.

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APPENDIX K
SOCIOECONOMICS MODELING

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SOCIOECONOMICS MODELING
TECHNICAL APPENDIX

K.1 Economic Impact Forecast System (EIFS) Model Overview (USACE 1994)

The U.S. Army, with the assistance of many academic and professional economists and regional scientists, developed the Economic Impact Forecast System (EIFS) to address the economic impacts of NEPA-requiring actions and to measure their significance. The entire system is designed for the scrutiny of a populace affected by the actions being studied. The algorithms in EIFS are simple and easy to understand, but still have firm, defensible bases in regional economic theory.

EIFS is developed under a joint project of the U.S Army Corps of Engineers (USACE), the U.S. Army Environmental Policy Institute (AEPI), and the Computer and Information Science Department of Clark Atlanta University, Georgia. EIFS is an on-line system, and the EIFS Web application is hosted by the USACE, Mobile District.

The databases in EIFS are national in scope and cover the approximately 3,700 counties, parishes, and independent cities that are recognized as reporting units by federal agencies. EIFS allows the user to define an economic ROI by identifying the counties, parishes, or cities to be analyzed. Once the Region of Influence (ROI) is defined, the system aggregates the data, calculates multipliers and other variables used in the various models in EIFS, and prompts the user for forecast input data.

The basis of the EIFS analytical capabilities is the calculation of multipliers that are used to estimate the impacts resulting from military-related changes in local expenditures or employment. In calculating the multipliers, EIFS uses the economic base model approach, which relies on the ratio of total economic activity to basic economic activity. Basic, in this context, is defined as the production or employment engaged to supply goods and services outside the ROI or by federal activities (such as military installations and their employees). According to economic base theory, the ratio of total income to basic income is measurable (as the multiplier) and sufficiently stable so that future changes in economic activity can be forecast. This technique is especially appropriate for estimating aggregate impacts and makes the economic base model ideal for the NEPA process.

The multiplier is interpreted as the total impact on the economy of the region resulting from a unit change in its base sector; for example, a dollar increase in local expenditures due to an expansion of its military installation. EIFS estimates its multipliers using a location quotient approach based on the concentration of industries within the region relative to the industrial concentrations for the nation.

The user inputs into the model the data elements that describe the military action: the change in expenditures, or dollar volume of the construction project(s); change in civilian or military employment; average annual income of affected civilian or military employees; the percent of civilians expected to relocate due to the military's action; and the percent of military living on-base. Once these are entered into the EIFS model, a projection of changes in the local economy is provided. These are projected changes in sales volume, income, employment and population. These four indicator variables are used to measure and evaluate socioeconomic impacts. Sales volume is the direct and indirect change in local business activity and sales (total retail and wholesale trade sales, total selected service receipts, and value-added by manufacturing). Employment is the total change in local employment due to the proposed action, including not only the direct and secondary changes in local employment, but also those personnel who are initially affected by the military action. Income is the total change in local wages and salaries due to the proposed action, which includes the sum of the direct and indirect wages and salaries, plus the income of the civilian and military personnel affected by the proposed action. Population is the increase or decrease in the local population as a result of the proposed action.

Once model projections are obtained, the Rational Threshold Value (RTV) profile allows the user to evaluate the significance of the impacts. This analytical tool reviews the historical trends for the defined region and develops measures of local historical fluctuations in sales volume, income, employment, and population. These evaluations identify the positive and negative changes within which a project can affect the local economy without creating a significant impact. The greatest historical changes define the boundaries that provide a basis for comparing an action's impact on the historical fluctuation in a particular area.

Therefore, if the change in a given variable resulting from the proposed action, such as sales volume, income, employment, or population is more than the maximum positive historical deviation, i.e., more than 100 percent of the maximum positive historical deviation, it is considered a significant positive impact. However, if the change in a given variable caused by the proposed action is more than 75 percent of the maximum negative historical deviation of sales, it will be considered a significant negative impact.

The major strengths of the RTV are its specificity to the region under analysis and its basis on actual historical data for the region. The EIFS impact model, in combination with the RTV, has proven successful in addressing perceived socioeconomic impacts. The EIFS model and the RTV technique for measuring the intensity of impacts have been reviewed by economic experts and have been deemed theoretically sound.

K.2 Modeling Methodology and Assumptions

The first step in the methodology used in this analysis involved compiling available data and making reasonable assumptions to conservatively estimate the direct project-related changes in expenditures (both positive and negative) from various sources. Note that the focus was primarily on the anticipated changes in expenditures or personnel more so than any absolute amount (although direct changes in recreation expenditures were derived relative to an estimated baseline scenario). The analysis also considered direct changes in other sources of spending, representing both increases (e.g., new government personnel) as well as decreases (e.g., reduced property taxes due to removal of private property from tax rolls; elimination of sodium chloride mining and agricultural ventures in the east study area). As appropriate for the analysis of each project alternative, all relevant spending changes of appreciable size were combined to yield a net change in direct spending.

The estimates of spending related to recreational use of each project study area were based on a range of variables, including:

- the total average annual visitor-days of use in each area;
- the allocation of OHV visitors by purpose of trip (dispersed-use or attendance at an organized event);
- the tendency to visit for a single day or multiple days, the average number of days per multi-day visit, and the average number of people in the same visitor group;
- the average per capita spending per day (plus appropriate sales taxes);
- for Johnson Valley only, the spending pattern differences based on visitor origin (e.g., "local" visitors are assumed to spend all of the daily amount within the local area, while visitors from outside the county are expected to spend some proportion in their home county before they leave, some on the way, and the rest in the local area during their visit);

- the reduction in recreational visitor-days and annual film industry expenditures that would be likely to result; and
- the proportion of displaced visitors and film industry spending that would potentially transfer to an alternative recreational area or film location within the county, thereby retaining economic benefits that accrue to the region from those activities.

The specific assumptions applied to these variables are described for each action alternative followed by the detailed calculations of each scenario. Several of these assumptions were first applied to estimate the baseline conditions associated with recreational visitor use and associated spending behavior. Additional assumptions were then used to estimate the change in these variables under each of the project alternatives.

Baseline Conditions Assumptions & Input Variables Applicable to All Alternatives:

- **Baseline Visitors - West:** For the west area, the total annual average visitor level for 2010 was 291,348 visitor-days per year (all recreation, not just OHV), as detailed in Table 3.2-9 of the EIS. Based on projected changes in visitor totals by BLM, the year 2015 baseline level was estimated to be 337,000 visitor-days/year, and this was used as the baseline for modeling purposes.
- **Baseline Visitors – East and South:** For purposes of this analysis, 800 visitor-days per year (all recreation, not just OHV) was assumed for the south study area and 500 visitor-days per year was assumed for the east area: all visits to the south area were assumed to be single-day visits and all by local area residents only; 10% of visitor-days to the east area were assumed to be multi-day use, also by local area residents.
- **Purpose of Visits - West:** For the west study area, it was assumed that 17% of the visitor-days/year are directly linked to organized race events ("event-related") and would not occur if race events were not held. The other 83% of visitor-days would be "dispersed-use" (including casual use unrelated to race events plus would-be race spectators that would still recreate in the area even if races were displaced).
- **Day Use vs. Overnight – West:**
  - For both dispersed-use and event-related groups, it was assumed that 20% of visitor-days/year are by single-day users (arrive and depart same day) and the other 80% of visitor-days/year are multi-day visits.
  - Assumed an *average* of 2.5 days/2 nights duration for all multi-day visits.
- **Average Group Size:** Assumed the *average* group size is 3 people for both dispersed-use and event-related trips. This means that there is an average of one main transport vehicle for each 3 visitors to and from the recreational area.
- **Origin of Visitors within the County:**
  - For day-use visits, assumed the origin of users is 50% from "local" area (within 50 miles of JV); 30% from elsewhere in San Bernardino County; and 20% from outside County.
  - For multi-day trips, assumed the origin of visitors is 20% from "local" area; 20% from elsewhere in San Bernardino County; and 60% from outside County.

- **Visitor Spending Patterns:**
  - Assumed that "local" visitors spend 100% of the cost of the trip "locally" (within 50 miles).
  - Visitors from elsewhere in San Bernardino County spend 60% "locally" and 40% elsewhere in the county;
  - Visitors from outside the County spend 30% "locally," 10% in the rest of San Bernardino County, 60% outside San Bernardino County.
  - Average per capita recreation spending was assumed to be $35 per person per visitor-day (based on Kroeger and Manalo 2007 - adjusted to 2015 dollars).
  - Sales tax rate is 8.75%.
  - 35% of total recreational expenditures were assumed to be food-related and not subject to sales tax.
- **Film Industry Assumptions:**
  - The assumed baseline level of film industry spending in the project area is approximately $1.6 million per year, based on the total level of such spending in the Johnson Valley area between 2001 and 2008 (Inland Empire Film Commission 2010a).
  - All benefit from film industry spending was assumed to occur in the "local" area within 50 miles of Johnson Valley.
  - Half of film industry expenditures were assumed to be taxable at a 10% rate (average transient occupancy tax rate for the area).
  - Film industry spending is 50% taxable at 10% (transient occupancy tax) and 50% not taxable (catering, etc.).

Alternative 1 Assumptions:

- **Displacement of Event-Related Visits:** Based on input from the BLM Recreation Branch Chief, the analysis assumed that 100% of organized races (and race-related visits as defined above) would be eliminated from Johnson Valley under Alt 1 and none of these displaced events would be accommodated at other venues in the county (in reality some race events may be able to proceed in a reduced or truncated form, or be held elsewhere as a weekday event, but for the sake of a conservative analysis, it is assumed that no current Johnson Valley race events would be held anywhere in the county).
- **Displacement of Dispersed-Use Visits:**
  - assume that 75% of the baseline dispersed-use visitor-days in Johnson Valley (as defined above) and 100% of the baseline visitor-days in the south study area would be displaced by Alt 1. The other 25% of Johnson Valley dispersed-use visitor-days would continue in Johnson Valley because a few popular areas within the OHV Area would remain available to the public.
  - assume that 90% of the dispersed-use that would be displaced by Alternative 1 would shift to other recreational resources in San Bernardino County. The other 10% of the displaced JV dispersed-users would stay outside the county.

- **Origin of Displaced Visitors within the County:**
  - For day-use visits remaining in the county under Alt 1, assume the origin of users is 65% from "local" area; 25% from elsewhere in San Bernardino County; and 15% from outside County.
  - For multi-day trips remaining in the county, assume the origin of visitors is 20% from "local" area; 20% from elsewhere in San Bernardino County; and 60% from outside County.
- **Displacement of Film In dustry Use:**The assumed direct reduction in "local" area film activity due to implementation of Alternative 1 was assumed to be 75%, with 80% of that displaced filming assumed to be transferred to other potential filming sites in San Bernardino County.
- **Combat Center Personnel:** The mix of required military personnel for Alternative 1 yielded an average salary of $39,602 for military and $38,658 for civilian positions. All new civilian personnel would be expected to live within the 30-minute commute area that currently encompasses 99% of Combat Center personnel living outside the installation. New military personnel were assumed to be distributed 25% living on the installation and 75% living in surrounding communities. It was also assumed that 70% of all new positions would be filled by people migrating from outside the County.

Alternative 2 Assumptions:

- **Displacement of Event- Related Visits:** assume that 60% of the organized races (including "King of the Hammers" in its current form) would be eliminated entirely under Alt 2, along with 60% of the strictly "event-related" visits. The displaced race events would not be absorbed at other county venues.
- **Displacement of Dispersed-Use Visits:**
  - assume that 25% of the baseline dispersed-use visitor-days in the west study area and 100% of the baseline visitor-days in the south study area would be displaced by Alt 2. The other 75% of Johnson Valley dispersed-use visitor-days would continue in Johnson Valley.
  - assume that 90% of the dispersed-use that would be displaced by Alternative 2 would shift to other recreational resources in San Bernardino County. The other 10% of the displaced Johnson Valley dispersed-users would stay outside the county.
- **Origin of Displaced Visitors within the County:** (same as baseline)
  - For day-use visits remaining in the county under Alt 2, assume the origin of users is 50% from "local" area; 30% from elsewhere in San Bernardino County; and 20% from outside County.
  - For multi-day trips remaining in the county, assume the origin of visitors is 20% from "local" area; 20% from elsewhere in San Bernardino County; and 60% from outside County.
- With regard to film industry expenditures, the assumed direct reduction in "local" area film activity due to implementation of Alternative 2 was assumed to be 20%. The analysis also

assumed that 80% of that displaced filming would be transferred to other potential filming sites in San Bernardino County instead of leaving the region entirely.

- The mix of required military personnel for Alternative 2 yielded an average salary of $39,098 for military and $37,408 for civilian positions. All new civilian personnel would be expected to live within the 30-minute commute area surrounding the installation. The analysis assumed that 25% of new military personnel would live on the installation and 75% would live in surrounding communities. It was also assumed that 70% of all new positions would be filled by people migrating from outside the County.

Alternative 3 Assumptions:

- Since the recreational and film industry activities in the west study area would not be affected under Alternative 3, the analysis assumed that the full baseline economic benefit of such activities in that area would be realized in the Alternative 3 modeling scenario.
- Assumed that 100% of the visitors to the south and east study areas would be displaced by Alternative 3 and 90% of those would visit other county recreational areas.
- The mix of required military personnel for Alternative 3 yielded an average salary of $39,098 for military and $36,226 for civilian positions. All new civilian personnel would be expected to live within the 30-minute commute area surrounding the installation. The analysis assumed that 25% of new military personnel would live on the installation and 75% would live in surrounding communities. It was also assumed that 70% of all new positions would be filled by people migrating from outside the County. All 150 employees of the three companies that would be displaced under this alternative were assumed to have the same average salary as the civilian personnel at the installation.

Alternative 4 and 5 Assumptions:

- **Displacement of Event-Related Visits :** assumed that 15% of the organized races in Johnson Valley (not including "King of the Hammers") would be eliminated entirely under Alt 4 or 5, along with 15% of the strictly "event-related" visits. The displaced race events would not be absorbed at other county venues.
- **Displacement of Dispersed-Use Visits:**
  - assume that 15% of the multi-day dispersed-use and 30% of the single-day dispersed-use in Johnson Valley would be displaced by Alt 4 or 5. The other 85% of multi-day and 70% of single-day dispersed-use would continue in Johnson Valley during the 10 months of restricted public access each year. In the south study area, 100% of baseline visitors would be displaced under Alternative 4 only. Under Alternative 5, recreational use would continue to occur in the south study area.
  - assume that 90% of the dispersed-use that would be displaced by Alt 4 or 5 would shift to other recreational resources in San Bernardino County. The other 10% of the displaced JV dispersed-users would stay outside the county.
- **Origin of Displaced Visitors within the County:** (same as baseline)
  - For day-use visits remaining in the county under Alt 4 or 5, assume the origin of users is 50% from "local" area (within 50 miles of JV); 30% from elsewhere in San Bernardino County; and 20% from outside County.

  - For multi-day trips remaining in the county, assume the origin of visitors is 20% from "local" area (within 50 miles of JV); 20% from elsewhere in San Bernardino County; and 60% from outside County.

- With regard to film industry expenditures, it was assumed that "local" area film activity would be reduced an average of 25%. This assumption takes into account the two-month exclusive use period and the generally short lead time for film location scheduling that may cause some productions to bypass Johnson Valley because of the uncertainty in scheduling. The analysis also assumed that 80% of the displaced filming would occur at other potential filming sites in San Bernardino County instead of leaving the region entirely.

- Average salaries of $39,098 for military and $41,583 for civilian positions was assumed based on the pay grade distribution of the required positions and standard 2010 government pay scales. Other assumptions about the distribution of these personnel were the same as for Alternative 1.

Alternative 6 Assumptions:

- **Displacement of Event-Related Visits :** assume that 60% of the organized races in Johnson Valley (not including some modified form of "King of the Hammers") would be eliminated entirely under Alt 6, along with 60% of the strictly "event-related" visits. The displaced race events would not be absorbed at other county venues.

- **Displacement of Dispersed-Use Visits:**
  - assume that 30% of the dispersed-use (both multi- and single-day) would be displaced by Alt 6. The other 70% of dispersed-use would continue in Johnson Valley during the 10 months of restricted public access each year. In the south study area, 100% of recreational visitors would be displaced.
  - assume that 90% of the dispersed-use that would be displaced by Alternative 6 (i.e., 90% of the 30% displaced) would shift to other recreational resources in San Bernardino County. The other 10% of the displaced dispersed-users would stay outside the county.

- **Origin of Displaced Visitors within the County:** (same as baseline)
  - For day-use visits remaining in the county under Alt 6, assume the origin of users is 50% from "local" area; 30% from elsewhere in San Bernardino County; and 20% from outside County.
  - For multi-day trips remaining in the county, assume the origin of visitors is 20% from "local" area; 20% from elsewhere in San Bernardino County; and 60% from outside County.

- With regard to film industry expenditures, it was assumed that "local" area film activity would be reduced an average of 30% due to implementation of Alternative 6. This assumption takes into account the lack of access to the exclusive military use area, the partial lack of access to the RPAA, the diversity of the remaining Johnson Valley film location opportunities not affected by Alternative 6, and the generally short lead time for film location scheduling that may cause some productions to bypass the RPAA portion of Johnson Valley because of the uncertainty in scheduling. The analysis also assumed that 80% of the displaced filming would occur at other potential filming sites in San Bernardino County instead of leaving the region entirely.

- Average salaries of $39,098 for military and $41,583 for civilian positions was assumed based on the pay grade distribution of the required positions and standard 2010 government pay scales. Other assumptions about the distribution of these personnel were the same as for Alternative 1.

K.3 Calculation of Direct Changes in Recreational and Film Industry Expenditures

The following tables illustrate the calculations used to derive the direct changes in spending by visitors to Johnson Valley, and the amount of displacement of such visits that would occur under each action alternative, based on the assumptions above.

SUMMARY of DIRECT CHANGES IN EXPENDITURES				
	Total In-County Expenditures from Recreation & Filming (incl. Sales Taxes)			
	Baseline	ALT	NET Change [1]	% Change
ALT 1	$8,709,328	$8,027,471	($681,857)	-8%
ALT 2	$8,709,328	$8,411,393	($297,936)	-3%
ALT 3	$8,709,328	$8,685,107	($24,221)	-0.3%
ALT 4	$8,709,328	$8,389,227	($320,101)	-4%
ALT 5	$8,709,328	$8,403,905	($305,423)	-4%
ALT 6	$8,709,328	$8,493,481	($215,847)	-2%

	Total Local Area Only Expenditures from Recreation & Filming (incl. Sales Taxes)			
	Baseline	ALT	NET Change	% Change
ALT 1	$5,966,844	$2,372,890	($3,593,953)	-60%
ALT 2	$5,966,844	$4,558,271	($1,408,573)	-24%
ALT 3	$5,966,844	$5,918,386	($48,458)	-0.8%
ALT 4	$5,966,844	$4,987,798	($979,046)	-16%
ALT 5	$5,966,844	$5,017,390	($949,453)	-16%
ALT 6	$5,966,844	$4,494,404	($1,472,440)	-25%

Notes: [1] Input to EIFS model.

Assumptions: % Displaced From Baseline: Recreational Visitor-Days					% Reduction in Film Industry Spending (west	
West Study Area		South Study Area	East Study Area	% Stay in County	% Reduced	% Stay in Co.
Dispersed[1]	Events					
75%	100%	100%	0%	90%	75%	80%
25%	60%	100%	0%	90%	20%	80%
0%	0%	100%	100%	90%	0%	N/A
15%	15%	100%	0%	90%	25%	80%
15%	15%	0%	0%	90%	25%	80%
30%	60%	100%	0%	90%	30%	80%

Notes: [1] For dispersed use in west study area under Alts 4 and 5 only, %

BASELINE CONDITION

Table 1. Visitor-Day Assumptions for Study Areas - 2015 BASELINE

Area	*Annual Visitor-Days*	*Assumed % single-day use*	*Annual Visitor-Days (Day Use Only)*	*Annual Visitor-Days (Multi-Day use)*	*Ave. Days per Multi-Day Visit*	*Total Annual Day Use Visitors*	*Total Annual Multi-Day Visitors*	*Total Annual Visitors*	*Annual Average Visitors per weekend*	*Average group size*	*Total Annual Groups*	*Annual Average Groups per weekend*
West - Dispersed	279,710	20%	55,942	223,768	2.5	55,942	89,507	145,449	2,797	3	48,483	932
West - Events	57,290	20%	11,458	45,832	2.5	11,458	18,333	29,791	573	3	9,930	191
Total West Area	337,000		67,400	269,600		67,400	107,840	175,240	3,370		58,413	1,123
South Study Area	800	100%	800	-	-	800	-	800	15	3	267	5
East Study Area	500	90%	450	50	2.5	450	20	450	9	3	150	3

Johnson Valley OHV Assumptions:

		% of total
126,201	2010 Annual visitor days - Events	
165,147	2010 Annual visitor days - Dispersed	
291,348	Total annual visitor days (2010)	
57,290	2015 Event-related Visitor Days (17%)	17%
279,710	2015 Dispersed Use Visitor Days (83%)	83%
337,000	Total annual visitor days Assumed - 2015 Baseline	100%

Table 2. Estimate of Total Direct Expenditures

Area	Total Day Use Visitors	Total Multi-Day Visitors	Average # Days per Multi-day Trip	Average per capita daily expenditures (2015 $ est.)	Expenditures - Day Use	Expenditures - Multi-Day	Subtotal Annual Expenditures
West -Dispersed	55,942	89,507	3	$35.00	$1,957,970	$9,398,256	$11,356,226
West - Events	11,458	18,333	3	$35.00	$401,030	$1,924,944	$2,325,974
Total West Area	67,400	107,840			$2,359,000	$11,323,200	$13,682,200
South Study Area	800	-	-	$35.00	$28,000	$0	$28,000
East Study Area	450	20	3	$35.00	$15,750	$2,100	$17,850

$13,728,050

Table 3. Estimate of Direct Expenditures by Area (Day Use)

Area	% Visitors Local (within 50 miles)	% Visitors from Rest of County	% Visitors from Outside County	All Rows Must Total 100%
West -Dispersed	50%	30%	20%	100%
West - Events	50%	30%	20%	100%
South Study Area	100%	0%	0%	100%
East Study Area	100%	0%	0%	100%

Table 4. Estimate of Direct Expenditures by Area (Multi-Day)

Area	% Visitors Local (within 50 miles)	% Visitors from Rest of County	% Visitors from Outside County	All Rows Must Total 100%
West -Dispersed	20%	20%	60%	100%
West - Events	20%	20%	60%	100%
South Study Area	100%	0%	0%	100%
East Study Area	100%	0%	0%	100%

	Local Visitors	Rest of Co. Visitors	Outside Co. Visitors
% of Avg. Daily $$ Spent Locally	100%	60%	30%
% of Avg. Daily $$ Spent Rest of Co.	0%	40%	10%
% of Avg. Daily $$ Spent Outside Co.	0%	0%	60%
Amt. of Avg. Daily $$ Spent Locally	$35.00	$21.00	$10.50
Amt. of Avg. Daily $$ Spent Rest of Co.	$0.00	$14.00	$3.50
Amt. of Avg. Daily $$ Spent Outside Co.	$0.00	$0.00	$21.00
	$35.00	$35.00	$35.00

West -Dispersed

Day Use $ - Local	$978,985	$352,435	$117,478	$1,448,898
Day Use $ - Rest	$0	$234,956	$39,159	$274,116
Day Use $ - Outside	$0	$0	$234,956	$234,956
				$1,957,970 Expenditures - Day Use

Multi-Day $ - Local	$1,879,651	$0	$0	$1,879,651	
Multi-Day $ - Rest	$1,127,791	$751,860	$0	$1,879,651	
Multi-Day $ - Outside	$1,691,686	$563,895	$3,383,372	$5,638,954	
				$9,398,256	Expenditures - Multi-Day Use
West - Events					
Day Use $ - Local	$200,515	$72,185	$24,062	$296,762	
Day Use $ - Rest	$0	$48,124	$8,021	$56,144	
Day Use $ - Outside	$0	$0	$48,124	$48,124	
				$401,030	Expenditures - Day Use
Multi-Day $ - Local	$384,989	$0	$0	$384,989	
Multi-Day $ - Rest	$230,993	$153,996	$0	$384,989	
Multi-Day $ - Outside	$346,490	$115,497	$692,980	$1,154,966	
				$1,924,944	Expenditures - Multi-Day Use

Total Recreation Expenditures by Area (incl. South Study Area)

$13,728,050 Total Expenditures

Expenditures by Area		Associated Sales Taxes (8.75%)	Notes
Local Expenditures	$4,056,150	$230,694	Of total expenditures, approx. 35% is for food-related items that are not subject to sales tax.
Rest of Co. Expenditures	$2,594,900	$147,585	
Outside Co. Expenditures	$7,077,000	$402,504	sales tax outside county
	$13,728,050	$780,783	$14,508,833

Total Annual Expenditures in County (excl. sales tax)	For use in EIFS Model			
Recreation	$6,651,050	$378,278		
Filming	$1,600,000	$80,000		Assumes film spending all in County and is 50% taxable at 10% (avg. transient occupancy tax) and 50% not (catering, etc.)
Total In-County	$8,251,050	$458,278	$8,709,328	

Total Baseline (Recreation plus Filming) By Area	
	Baseline
Local Expenditures	$4,056,150
Local sales taxes	$310,694
Filming	$1,600,000
Subtotal Local	$5,966,844
Rest of Co. Expenditure	$2,594,900
Rest of Co. Sales Taxes	$147,585
Subtotal Rest of Co.	$2,742,485
Total County Impact	$8,709,328

ALTERNATIVE 1

ENTER % REDUCTION in USE	
West - Dispersed	75.00%
West - Events	100.00%
South Study Area	100.00%
East Study Area	0.00%

ENTER % of Displaced Visitors Likely to Use Other County Resource	
90.00%	All Study Areas

ENTER % REDUCTION in JV FILMING:	75.00%

ENTER % of Lost Filming that would stay in County
80.00%

If appropriate, also change distribution of user origins in Table 3 below

Table 1. Visitor-Day Assumptions for Study Areas - ALT ONE

Area	*Annual Visitor-Days*	*Assumed % single-day use*	*Annual Visitor-Days (Day Use Only)*	*Annual Visitor-Days (Multi-Day use)*	*Ave. Days per Multi-Day Visit*	*Total Annual Day Use Visitors*	*Total Annual Multi-Day Visitors*	*Total Annual Visitors*	*Annual Average Visitors per weekend*	*Average group size*	*Total Annual Groups*	*Annual Average Groups per weekend*
West - Dispersed	69,928	20%	13,986	55,942	2.5	13,986	22,377	36,362	699	3	12,121	233
West - Events	-	20%	-	-	2.5	-	-	-	-	3	-	-
Total West Area	69,928		13,986	55,942		13,986	22,377	36,362	699		12,121	233
South Study Area	-	100%	-	-	-	-	-	-	-	3	-	-
East Study Area	500	90%	450	50	2.5	450	20	450	9	3	150	3

Johnson Valley OHV Assumptions:

		% of total
126,201	2010 Annual visitor days - Events	
165,147	2010 Annual visitor days - Dispersed	
291,348	Total annual visitor days (2010)	
57,290	2015 Annual Event-related Visitor Days (17%)	17%
279,710	2015 Annual Dispersed Use Visitor Days (83%)	83%
337,000	2015 Total annual visitor days Assumed	100%

Status of Displaced Visitors:

267,873	total visitor-days displaced
90.00%	% goes elsewhere in county
241,085	# visitor-days elsewhere in county
48,217	visitor-days day use
192,868	visitor-days multi-day
48,217	total day use visitors (displaced in Co.)
77,147	total multi-day visitors (displaced in Co.)
125,364	total annual visitors (stay in Co.)

Table 2. Estimate of Total Direct Expenditures

Area	Total Day Use Visitors	Total Multi-Day Visitors	Average # Days per Multi-day Trip	Average per capita daily expenditures	Expenditures - Day Use	Expenditures - Multi-Day	Subtotal Annual Expenditures	
West -Dispersed	13,986	22,377	3	$35.00	$489,493	$2,349,564	$2,839,057	
West - Events	-	-	3	$35.00	$0	$0	$0	
Total West Area	13,986	22,377			$489,493	$2,349,564	$2,839,057	
South Study Area	-	-	-	$35.00	$0	$0	$0	
East Study Area	450	20	3	$35.00	$15,750	$2,100	$17,850	$2,856,907
Displaced stay in Co.	48,217	77,147	3	$35.00	$1,687,597	$8,100,464	$9,788,061	

Table 3. Estimate of Direct Expenditures by Area (Day Use)

Area	% Visitors Local (<= 50 mi of JV)	% Visitors from Rest of County	% Visitors from Outside County	All Rows Must Total 100%
West -Dispersed	65%	25%	10%	100%
West - Events	50%	30%	20%	100%
South Study Area	100%	0%	0%	100%
East Study Area	100%	0%	0%	100%
Displaced stay in Co.	0%	90%	10%	100%

Table 4. Estimate of Direct Expenditures by Area (Multi-Day)

Area	% Visitors Local (<= 50 mi of JV)	% Visitors from Rest of County	% Visitors from Outside County	All Rows Must Total 100%
West -Dispersed	20%	20%	60%	100%
West - Events	20%	20%	60%	100%
South Study Area	100%	0%	0%	100%
East Study Area	100%	0%	0%	100%
Displaced stay in Co.	0%	40%	60%	100%

Daily $$ Distribution - JV Visitors

	Local Visitors	Rest of Co. Visitors	Outside Co. Visitors
% of Avg. Daily $$ Spent Locally	100%	60%	30%
% of Avg. Daily $$ Spent Rest of Co.	0%	40%	10%
% of Avg. Daily $$ Spent Outside Co.	0%	0%	60%

Daily $$ Distribution - Displaced Stay in County Visitors

County-Based Visitors	Outside Co. Visitors	
N/A	N/A	Note: 'local' is relative to JV area only.
100%	40%	
0%	60%	

Amt. of Avg. Daily $$ Spent Locally	$35.00	$21.00	$10.50		N/A	N/A
Amt. of Avg. Daily $$ Spent Rest of Co.	$0.00	$14.00	$3.50		$35.00	$14.00
Amt. of Avg. Daily $$ Spent Outside Co.	$0.00	$0.00	$21.00		$0.00	$21.00
	$35.00	$35.00	$35.00		$35.00	$35.00

West -Dispersed					
Day Use $ - Local	$318,170	$73,424	$14,685	$406,279	
Day Use $ - Rest	$0	$48,949	$4,895	$53,844	
Day Use $ - Outside	$0	$0	$29,370	$29,370	
				$489,493	Expenditures - Day Use
Multi-Day $ - Local	$469,913	$0	$0	$469,913	
Multi-Day $ - Rest	$281,948	$187,965	$0	$469,913	
Multi-Day $ - Outside	$422,922	$140,974	$845,843	$1,409,738	
				$2,349,564	Expenditures - Multi-Day Use
West - Events					
Day Use $ - Local	$0	$0	$0	$0	
Day Use $ - Rest	$0	$0	$0	$0	
Day Use $ - Outside	$0	$0	$0	$0	
				$0	Expenditures - Day Use
Multi-Day $ - Local	$0	$0	$0	$0	
Multi-Day $ - Rest	$0	$0	$0	$0	
Multi-Day $ - Outside	$0	$0	$0	$0	
				$0	Expenditures - Multi-Day Use
Displaced Stay in County					
Day Use $ - Rest	N/A	$1,518,837	$67,504	$1,586,341	
Day Use $ - Outside	N/A	$0	$101,256	$101,256	
					$1,687,597 Expenditures - Day Use
Multi-Day $ - Rest	N/A	$3,240,186	$0	$3,240,186	
Multi-Day $ - Outside	N/A	$1,944,111	$2,916,167	$4,860,279	
					$8,100,464 Expenditures - Multi-Day Use

Total Recreation Expenditures by Area (incl. South Study Area)

$12,644,968 Total Expenditures

Expenditures by Area		Associated Sales Taxes (8.75%)	Notes
Local Expenditures	$894,042	$50,849	Of total expenditures, approx. 35% is for food-related items that are not subject to sales tax.
Rest of Co. Expenditures	$5,350,284	$304,297	
Outside Co. Expenditures	$6,400,642	$364,037	sales tax outside county
	$12,644,968		

Total Annual Expenditures in County (excl. sales tax)	For use in EIFS Model			
Recreation	$6,244,325	$355,146		
Filming	$1,360,000	$68,000		Assumes film spending all in County and is 50% taxable at 10% (avg. transient occupancy tax) and 50% not (catering, etc.)
Total In-County	$7,604,325	$423,146	$8,027,471	

Impact from ALT is the difference b/w BASELINE and ALT total expenditures

	Baseline	ALT	NET Change[1]	% Change
Local Expenditures	$4,056,150	$894,042	($3,162,108)	
Local sales taxes	$310,694	$118,849	($191,845)	
Filming	$1,600,000	$1,360,000	($240,000)	
Subtotal Local	$5,966,844	$2,372,890	($3,593,953)	-60.23%
Rest of Co. Expenditure	$2,594,900	$5,350,284	$2,755,384	
Rest of Co. Sales Taxes	$147,585	$304,297	$156,712	
Subtotal Rest of Co.	$2,742,485	$5,654,581	$2,912,096	106.18%
Total County Impact	$8,709,328	$8,027,471	-$681,857	-7.83%

ALTERNATIVE 2

ENTER % REDUCTION in USE	
West - Dispersed	25.00%
West - Events	60.00%
South Study Area	100.00%
East Study Area	0.00%

ENTER % REDUCTION in JV FILMING:	20.00%

ENTER % of Displaced Visitors Likely to Use Other County Resource

90.00% All Study Areas

ENTER % of Lost Filming that would stay in County

80.00%

If appropriate, also change distribution of user origins in Table 3 below

Table 1. Visitor-Day Assumptions for Study Areas - ALT 2

Area	*Annual Visitor-Days*	*Assumed % single-day use*	*Annual Visitor-Days (Day Use Only)*	*Annual Visitor-Days (Multi-Day use)*	*Ave. Days per Multi-Day Visit*	*Total Annual Day Use Visitors*	*Total Annual Multi-Day Visitors*	*Total Annual Visitors*	*Annual Average Visitors per weekend*	*Average group size*	*Total Annual Groups*	*Annual Average Groups per weekend*
West - Dispersed	209,783	20%	41,957	167,826	2.5	41,957	67,130	109,087	2,098	3	36,362	699
West - Events	22,916	20%	4,583	18,333	2.5	4,583	7,333	11,916	229	3	3,972	76
Total West Area	232,699		46,540	186,159		46,540	74,464	121,003	2,327		40,334	776
South Study Area		100%	-	-	-	-	-	-	-	3	-	-
East Study Area	500	90%	450	50	2.5	450	20	450	9	3	150	3

Johnson Valley OHV Assumptions:

		% of total
126,201	2010 Annual visitor days - Events	
165,147	2010 Annual visitor days - Dispersed	
291,348	Total annual visitor days (2010)	
57,290	2015 Annual Event-related Visitor Days (17%)	17%
279,710	2015 Annual Dispersed Use Visitor Days (83%)	83%
337,000	2015 Total annual visitor days Assumed	100%

Status of Displaced Visitors:

105,102	total visitor-days displaced
90.00%	% goes elsewhere in county
94,591	# visitor-days elsewhere in county
18,918	visitor-days day use
75,673	visitor-days multi-day
18,918	total day use visitors (displaced in Co.)
30,269	total multi-day visitors (displaced in Co.)
49,188	total annual visitors (stay in Co.)

Table 2. Estimate of Total Direct Expenditures

Area	Total Day Use Visitors	Total Multi-Day Visitors	Average # Days per Multi-day Trip	Average per capita daily expenditures	Expenditures - Day Use	Expenditures - Multi-Day	Subtotal Annual Expenditures	
West -Dispersed	41,957	67,130	3	$35.00	$1,468,478	$7,048,692	$8,517,170	
West - Events	4,583	7,333	3	$35.00	$160,412	$769,978	$930,390	
Total West Area	46,540	74,464			$1,628,890	$7,818,670	$9,447,559	
South Study Area	-	-	-	$35.00	$0	$0	$0	
East Study Area	450	20	3	$35.00	$15,750	$2,100	$17,850	$9,465,409
Displaced stay in Co.	18,918	30,269	3	$35.00	$662,139	$3,178,269	$3,840,409	

Table 3. Estimate of Direct Expenditures by Area (Day Use)

Area	% Visitors Local (<= 50 mi of JV)	% Visitors from Rest of County	% Visitors from Outside County	All Rows Must Total 100%
West -Dispersed	50%	30%	20%	100%
West - Events	50%	30%	20%	100%
South Study Area	100%	0%	0%	100%
East Study Area	100%	0%	0%	100%
Displaced stay in Co.	0%	80%	20%	100%

Table 4. Estimate of Direct Expenditures by Area (Multi-Day)

Area	% Visitors Local (<= 50 mi of JV)	% Visitors from Rest of County	% Visitors from Outside County	All Rows Must Total 100%
West -Dispersed	20%	20%	60%	100%
West - Events	20%	20%	60%	100%
South Study Area	100%	0%	0%	100%
East Study Area	100%	0%	0%	100%
Displaced stay in Co.	0%	40%	60%	100%

Daily $$ Distribution - JV Visitors

	Local Visitors	Rest of Co. Visitors	Outside Co. Visitors
% of Avg. Daily $$ Spent Locally	100%	60%	30%
% of Avg. Daily $$ Spent Rest of Co.	0%	40%	10%
% of Avg. Daily $$ Spent Outside Co.	0%	0%	60%
Amt. of Avg. Daily $$ Spent Locally	$35.00	$21.00	$10.50

Daily $$ Distribution - Displaced Stay in County Visitors

County-Based Visitors	Outside Co. Visitors	
N/A	N/A	Note: 'local' is relative to JV area only.
100%	40%	
0%	60%	
N/A	N/A	

Amt. of Avg. Daily $$ Spent Rest of Co.	$0.00	$14.00	$3.50		$35.00	$14.00
Amt. of Avg. Daily $$ Spent Outside Co.	$0.00	$0.00	$21.00		$0.00	$21.00
	$35.00	$35.00	$35.00		$35.00	$35.00

West -Dispersed					
Day Use $ - Local	$734,239	$264,326	$88,109	$1,086,673	
Day Use $ - Rest	$0	$176,217	$29,370	$205,587	
Day Use $ - Outside	$0	$0	$176,217	$176,217	
				$1,468,478	Expenditures - Day Use
Multi-Day $ - Local	$1,409,738	$0	$0	$1,409,738	
Multi-Day $ - Rest	$845,843	$563,895	$0	$1,409,738	
Multi-Day $ - Outside	$1,268,765	$422,922	$2,537,529	$4,229,215	
				$7,048,692	Expenditures - Multi-Day Use
West - Events					
Day Use $ - Local	$80,206	$28,874	$9,625	$118,705	
Day Use $ - Rest	$0	$19,249	$3,208	$22,458	
Day Use $ - Outside	$0	$0	$19,249	$19,249	
				$160,412	Expenditures - Day Use
Multi-Day $ - Local	$153,996	$0	$0	$153,996	
Multi-Day $ - Rest	$92,397	$61,598	$0	$153,996	
Multi-Day $ - Outside	$138,596	$46,199	$277,192	$461,987	
				$769,978	Expenditures - Multi-Day Use
Displaced Stay in County					
Day Use $ - Rest	N/A	$529,712	$52,971	$582,683	
Day Use $ - Outside	N/A	$0	$79,457	$79,457	
					$662,139 Expenditures - Day Use
Multi-Day $ - Rest	N/A	$1,271,308	$0	$1,271,308	
Multi-Day $ - Outside	N/A	$762,785	$1,144,177	$1,906,962	
					$3,178,269 Expenditures - Multi-Day Use
				$13,305,818	Total Expenditures

Total Recreation Expenditures by Area (incl. South Study Area)

Expenditures by Area		Associated Sales Taxes (8.75%)	Notes
Local Expenditures	$2,786,962	$158,508	Of total expenditures, approx. 35% is for food-related items that are not subject to sales tax.
Rest of Co. Expenditures	$3,645,769	$207,353	
Outside Co. Expenditures	$6,873,087	$390,907	sales tax outside county
	$13,305,818		

Total Annual Expenditures in County (excl. sales tax)	For use in EIFS Model			
Recreation	$6,432,731	$365,862		
Filming	$1,536,000	$76,800		Assumes film spending all in County and is 50% taxable at 10% (avg. transient occupancy tax) and 50% not (catering, etc.)
Total In-County	$7,968,731	$442,662	$8,411,393	

Impact from ALT is the difference b/w BASELINE and ALT total expenditures

	Baseline	ALT	NET Change[1]	% Change
Local Expenditures	$4,056,150	$2,786,962	($1,269,188)	
Local sales taxes	$310,694	$235,308	($75,385)	
Filming	$1,600,000	$1,536,000	($64,000)	
Subtotal Local	$5,966,844	$4,558,271	($1,408,573)	-23.61%
Rest of Co. Expenditure	$2,594,900	$3,645,769	$1,050,869	
Rest of Co. Sales Taxes	$147,585	$207,353	$59,768	
Subtotal Rest of Co.	$2,742,485	$3,853,122	$1,110,637	40.50%
Total County Impact	$8,709,328	$8,411,393	-$297,936	-3.42%

ALTERNATIVE 3

ENTER % REDUCTION in USE	
West - Dispersed	0.00%
West - Events	0.00%
South Study Area	100.00%
East Study Area	100.00%

ENTER % of Displaced Visitors Likely to Use Other County Resource	
90.00%	All Study Areas

ENTER % REDUCTION in JV FILMING:	0.00%

ENTER % of Lost Filming that would stay in County
100.00%

If appropriate, also change distribution of user origins in Table 3 below

Table 1. Visitor-Day Assumptions for Study Areas - ALT 3

Area	*Annual Visitor-Days*	*Assumed % single-day use*	*Annual Visitor-Days (Day Use Only)*	*Annual Visitor-Days (Multi-Day use)*	*Ave. Days per Multi-Day Visit*	*Total Annual Day Use Visitors*	*Total Annual Multi-Day Visitors*	*Total Annual Visitors*	*Annual Average Visitors per weekend*	*Average group size*	*Total Annual Groups*	*Annual Average Groups per weekend*
West - Dispersed	279,710	20%	55,942	223,768	2.5	55,942	89,507	145,449	2,797	3	48,483	932
West - Events	57,290	20%	11,458	45,832	2.5	11,458	18,333	29,791	573	3	9,930	191
Total West Area	337,000		67,400	269,600		67,400	107,840	175,240	3,370		58,413	1,123
South Study Area	-	100%	-	-	-	-	-	-	-	3	-	-
East Study Area	-	90%	-	-	2.5	-	-	-	-	3	-	-

Johnson Valley OHV Assumptions:

		% of total
126,201	2010 Annual visitor days - Events	
165,147	2010 Annual visitor days - Dispersed	
291,348	Total annual visitor days (2010)	
57,290	2015 Annual Event-related Visitor Days (17%)	17%
279,710	2015 Annual Dispersed Use Visitor Days (83%)	83%
337,000	2015 Total annual visitor days Assumed	100%

Status of Displaced Visitors:

1,300	total visitor-days displaced
90.00%	% goes elsewhere in county
1,170	# visitor-days elsewhere in county
234	visitor-days day use
936	visitor-days multi-day
234	total day use visitors (displaced in Co.)
374	total multi-day visitors (displaced in Co.)
608	total annual visitors (stay in Co.)

Table 2. Estimate of Total Direct Expenditures

Area	Total Day Use Visitors	Total Multi-Day Visitors	Average # Days per Multi-day Trip	Average per capita daily expenditures	Expenditures - Day Use	Expenditures - Multi-Day	Subtotal Annual Expenditures	
West -Dispersed	55,942	89,507	3	$35.00	$1,957,970	$9,398,256	$11,356,226	
West - Events	11,458	18,333	3	$35.00	$401,030	$1,924,944	$2,325,974	
Total West Area	67,400	107,840			$2,359,000	$11,323,200	$13,682,200	
South Study Area	-	-	-	$35.00	$0	$0	$0	
East Study Area	-	-	3	$35.00	$0	$0	$0	$13,682,200
Displaced stay in Co.	234	374	3	$35.00	$8,190	$39,312	$47,502	

Table 3. Estimate of Direct Expenditures by Area (Day Use)

Area	% Visitors Local (<= 50 mi of JV)	% Visitors from Rest of County	% Visitors from Outside County	All Rows Must Total 100%
West -Dispersed	50%	30%	20%	100%
West - Events	50%	30%	20%	100%
South Study Area	100%	0%	0%	100%
East Study Area	100%	0%	0%	100%
Displaced stay in Co.	0%	80%	20%	100%

Table 4. Estimate of Direct Expenditures by Area (Multi-Day)

Area	% Visitors Local (<= 50 mi of JV)	% Visitors from Rest of County	% Visitors from Outside County	All Rows Must Total 100%
West -Dispersed	20%	20%	60%	100%
West - Events	20%	20%	60%	100%
South Study Area	100%	0%	0%	100%
East Study Area	100%	0%	0%	100%
Displaced stay in Co.	0%	40%	60%	100%

Daily $$ Distribution - JV Visitors

	Local Visitors	Rest of Co. Visitors	Outside Co. Visitors
% of Avg. Daily $$ Spent Locally	100%	60%	30%
% of Avg. Daily $$ Spent Rest of Co.	0%	40%	10%
% of Avg. Daily $$ Spent Outside Co.	0%	0%	60%
Amt. of Avg. Daily $$ Spent Locally	$35.00	$21.00	$10.50

Daily $$ Distribution - Displaced Stay in County Visitors

County-Based Visitors	Outside Co. Visitors	
N/A	N/A	Note: 'local' is relative to JV area only.
100%	40%	
0%	60%	
N/A	N/A	

Amt. of Avg. Daily $$ Spent Rest of Co.	$0.00	$14.00	$3.50		$35.00	$14.00
Amt. of Avg. Daily $$ Spent Outside Co.	$0.00	$0.00	$21.00		$0.00	$21.00
	$35.00	$35.00	$35.00		$35.00	$35.00

West -Dispersed					
Day Use $ - Local	$978,985	$352,435	$117,478	$1,448,898	
Day Use $ - Rest	$0	$234,956	$39,159	$274,116	
Day Use $ - Outside	$0	$0	$234,956	$234,956	
				$1,957,970	Expenditures - Day Use
Multi-Day $ - Local	$1,879,651	$0	$0	$1,879,651	
Multi-Day $ - Rest	$1,127,791	$751,860	$0	$1,879,651	
Multi-Day $ - Outside	$1,691,686	$563,895	$3,383,372	$5,638,954	
				$9,398,256	Expenditures - Multi-Day Use
West - Events					
Day Use $ - Local	$200,515	$72,185	$24,062	$296,762	
Day Use $ - Rest	$0	$48,124	$8,021	$56,144	
Day Use $ - Outside	$0	$0	$48,124	$48,124	
				$401,030	Expenditures - Day Use
Multi-Day $ - Local	$384,989	$0	$0	$384,989	
Multi-Day $ - Rest	$230,993	$153,996	$0	$384,989	
Multi-Day $ - Outside	$346,490	$115,497	$692,980	$1,154,966	
				$1,924,944	Expenditures - Multi-Day Use
Displaced Stay in County					
Day Use $ - Rest	N/A	$6,552	$655	$7,207	
Day Use $ - Outside	N/A	$0	$983	$983	
					$8,190 Expenditures - Day Use
Multi-Day $ - Rest	N/A	$15,725	$0	$15,725	
Multi-Day $ - Outside	N/A	$9,435	$14,152	$23,587	
					$39,312 Expenditures - Multi-Day Use
				$13,729,702	Total Expenditures

Total Recreation Expenditures by Area (incl. South Study Area)

Expenditures by Area		Associated Sales Taxes (8.75%)	Notes
Local Expenditures	$4,010,300	$228,086	Of total expenditures, approx. 35% is for food-related items that are not subject to sales tax.
Rest of Co. Expenditures	$2,617,832	$148,889	
Outside Co. Expenditures	$7,101,570	$403,902	sales tax outside county
	$13,729,702		

Total Annual Expenditures in County (excl. sales tax)	For use in EIFS Model			
Recreation	$6,628,132	$376,975		
Filming	$1,600,000	$80,000		Assumes film spending all in County and is 50% taxable at 10% (avg. transient occupancy
Total In-County	$8,228,132	$456,975	$8,685,107	

Impact from ALT is the difference b/w BASELINE and ALT total expenditures

	Baseline	ALT	NET Change[1]	% Change
Local Expenditures	$4,056,150	$4,010,300	($45,850)	
Local sales taxes	$310,694	$308,086	($2,608)	
Filming	$1,600,000	$1,600,000	$0	
Subtotal Local	$5,966,844	$5,918,386	($48,458)	-0.81%
Rest of Co. Expenditure	$2,594,900	$2,617,832	$22,932	
Rest of Co. Sales Taxes	$147,585	$148,889	$1,304	
Subtotal Rest of Co.	$2,742,485	$2,766,721	$24,236	0.88%
Total County Impact	$8,709,328	$8,685,107	-$24,221	-0.28%

ALTERNATIVE 4

ENTER % REDUCTION in USE	
West - Dispersed - Single-Day	30.00%
West - Dispersed- Multi-Day	15.00%
West - Events	15.00%
South Study Area	100.00%
East Study Area	0.00%

ENTER % of Displaced Visitors Likely to Use Other County Resource

90.00% All Study Areas

ENTER % REDUCTION in JV FILMING: 25.00%

ENTER % of Lost Filming that would stay in County

80.00%

If appropriate, also change distribution of user origins in Table 3 below

Table 1. Visitor-Day Assumptions for Study Areas - ALT 4

Area	*Annual Visitor-Days*	*Assumed % single-day use*	*Annual Visitor-Days (Day Use Only)*	*Annual Visitor-Days (Multi-Day use)*	*Ave. Days per Multi-Day Visit*	*Total Annual Day Use Visitors*	*Total Annual Multi-Day Visitors*	*Total Annual Visitors*	*Annual Average Visitors per weekend*	*Average group size*	*Total Annual Groups*	*Annual Average Groups per weekend*
West - Dispersed	229,362	20%	39,159	190,203	2.5	39,159	76,081	115,241	2,216	3	38,414	739
West - Events	48,697	20%	9,739	38,957	2.5	9,739	15,583	25,322	487	3	8,441	162
Total West Area	278,059		48,899	229,160		48,899	91,664	140,563	2,703		46,854	901
South Study Area	-	100%	-	-	-	-	-	-	-	3	-	-
East Study Area	500	90%	450	50	2.5	450	20	450	9	3	150	3

Johnson Valley OHV Assumptions:

		% of total
126,201	2010 Annual visitor days - Events	
165,147	2010 Annual visitor days - Dispersed	
291,348	Total annual visitor days (2010)	
57,290	2015 Annual Event-related Visitor Days (17%)	17%
279,710	2015 Annual Dispersed Use Visitor Days (83%)	83%
337,000	2015 Total annual visitor days Assumed	100%

Status of Displaced Visitors:

59,741	total visitor-days displaced
90.00%	% goes elsewhere in county
53,767	# visitor-days elsewhere in county
10,753	visitor-days day use
43,014	visitor-days multi-day
10,753	total day use visitors (displaced in Co.)
17,205	total multi-day visitors (displaced in Co.)
27,959	total annual visitors (stay in Co.)

Table 2. Estimate of Total Direct Expenditures

Area	Total Day Use Visitors	Total Multi-Day Visitors	Average # Days per Multi-day Trip	Average per capita daily expenditures	Expenditures - Day Use	Expenditures - Multi-Day	Subtotal Annual Expenditures	
West -Dispersed	39,159	76,081	3	$35.00	$1,370,579	$7,988,518	$9,359,097	
West - Events	9,739	15,583	3	$35.00	$340,876	$1,636,202	$1,977,078	
Total West Area	48,899	91,664			$1,711,455	$9,624,720	$11,336,175	
South Study Area	-	-	-	$35.00	$0	$0	$0	
East Study Area	450	20	3	$35.00	$15,750	$2,100	$17,850	$11,354,025
Displaced stay in Co.	10,753	17,205	3	$35.00	$376,370	$1,806,577	$2,182,947	

Table 3. Estimate of Direct Expenditures by Area (Day Use)

Area	% Visitors Local (<= 50 mi of JV)	% Visitors from Rest of County	% Visitors from Outside County	All Rows Must Total 100%
West -Dispersed	50%	30%	20%	100%
West - Events	50%	30%	20%	100%
South Study Area	100%	0%	0%	100%
East Study Area	100%	0%	0%	100%
Displaced stay in Co.	0%	80%	20%	100%

Table 4. Estimate of Direct Expenditures by Area (Multi-Day)

Area	% Visitors Local (<= 50 mi of JV)	% Visitors from Rest of County	% Visitors from Outside County	All Rows Must Total 100%
West -Dispersed	20%	20%	60%	100%
West - Events	20%	20%	60%	100%
South Study Area	100%	0%	0%	100%
East Study Area	100%	0%	0%	100%
Displaced stay in Co.	0%	40%	60%	100%

Daily $$ Distribution - JV Visitors

	Local Visitors	Rest of Co. Visitors	Outside Co. Visitors
% of Avg. Daily $$ Spent Locally	100%	60%	30%
% of Avg. Daily $$ Spent Rest of Co.	0%	40%	10%

Daily $$ Distribution - Displaced Stay in County Visitors

County-Based Visitors	Outside Co. Visitors
N/A	N/A
100%	40%

Note: 'local' is relative to JV area only.

% of Avg. Daily $$ Spent Outside Co.	0%	0%	60%
Amt. of Avg. Daily $$ Spent Locally	$35.00	$21.00	$10.50
Amt. of Avg. Daily $$ Spent Rest of Co.	$0.00	$14.00	$3.50
Amt. of Avg. Daily $$ Spent Outside Co.	$0.00	$0.00	$21.00
	$35.00	$35.00	$35.00

0%	60%
N/A	N/A
$35.00	$14.00
$0.00	$21.00
$35.00	$35.00

West -Dispersed					
Day Use $ - Local	$685,290	$246,704	$82,235	$1,014,228	
Day Use $ - Rest	$0	$164,469	$27,412	$191,881	
Day Use $ - Outside	$0	$0	$164,469	$164,469	
				$1,370,579	Expenditures - Day Use
Multi-Day $ - Local	$1,597,704	$0	$0	$1,597,704	
Multi-Day $ - Rest	$958,622	$639,081	$0	$1,597,704	
Multi-Day $ - Outside	$1,437,933	$479,311	$2,875,866	$4,793,111	
				$7,988,518	Expenditures - Multi-Day Use
West - Events					
Day Use $ - Local	$170,438	$61,358	$20,453	$252,248	
Day Use $ - Rest	$0	$40,905	$6,818	$47,723	
Day Use $ - Outside	$0	$0	$40,905	$40,905	
				$340,876	Expenditures - Day Use
Multi-Day $ - Local	$327,240	$0	$0	$327,240	
Multi-Day $ - Rest	$196,344	$130,896	$0	$327,240	
Multi-Day $ - Outside	$294,516	$98,172	$589,033	$981,721	
				$1,636,202	Expenditures - Multi-Day Use
Displaced Stay in County					
Day Use $ - Rest	N/A	$301,096	$30,110	$331,206	
Day Use $ - Outside	N/A	$0	$45,164	$45,164	
					$376,370 Expenditures - Day Use
Multi-Day $ - Rest	N/A	$722,631	$0	$722,631	
Multi-Day $ - Outside	N/A	$433,578	$650,368	$1,083,946	
					$1,806,577 Expenditures - Multi-Day Use
				$13,536,972	Total Expenditures

Total Recreation Expenditures by Area (incl. South Study Area)

Expenditures by Area		Associated Sales Taxes (8.75%)	Notes
Local Expenditures	$3,209,270	$182,527	Of total expenditures, approx. 35% is for food-related items that are not subject to sales tax.
Rest of Co. Expenditures	$3,218,384	$183,046	
Outside Co. Expenditures	$7,109,317	$404,342	sales tax outside county
	$13,536,972		

Total Annual Expenditures in County (excl. sales tax)	For use in EIFS Model			
Recreation	$6,427,654	$365,573		
Filming	$1,520,000	$76,000		Assumes film spending all in County and is 50% taxable at 10% (avg. transient occupancy tax) and 50% not (catering, etc.)
Total In-County	$7,947,654	$441,573	$8,389,227	

Impact from ALT is the difference b/w BASELINE and ALT total expenditures

	Baseline	ALT	NET Change[1]	% Change
Local Expenditures	$4,056,150	$3,209,270	($846,880)	
Local sales taxes	$310,694	$258,527	($52,166)	
Filming	$1,600,000	$1,520,000	($80,000)	
Subtotal Local	$5,966,844	$4,987,798	($979,046)	-16.41%
Rest of Co. Expenditure	$2,594,900	$3,218,384	$623,484	
Rest of Co. Sales Taxes	$147,585	$183,046	$35,461	
Subtotal Rest of Co.	$2,742,485	$3,401,430	$658,945	24.03%
Total County Impact	$8,709,328	$8,389,227	-$320,101	-3.68%

ALTERNATIVE 5

ENTER % REDUCTION in USE	
West - Dispersed - Single-Day	30.00%
West - Dispersed- Multi-Day	15.00%
West - Events	15.00%
South Study Area	0.00%
East Study Area	0.00%

ENTER % of Displaced Visitors Likely to Use Other County Resource

90.00% All Study Areas

ENTER % REDUCTION in JV FILMING: 25.00%

ENTER % of Lost Filming that would stay in County

80.00%

If appropriate, also change distribution of user origins in Table 3 below

Table 1. Visitor-Day Assumptions for Study Areas - ALT 5

Area	*Annual Visitor-Days*	*Assumed % single-day use*	*Annual Visitor-Days (Day Use Only)*	*Annual Visitor-Days (Multi-Day use)*	*Ave. Days per Multi-Day Visit*	*Total Annual Day Use Visitors*	*Total Annual Multi-Day Visitors*	*Total Annual Visitors*	*Annual Average Visitors per weekend*	*Average group size*	*Total Annual Groups*	*Annual Average Groups per weekend*
West - Dispersed	229,362	20%	39,159	190,203	2.5	39,159	76,081	115,241	2,216	3	38,414	739
West - Events	48,697	20%	9,739	38,957	2.5	9,739	15,583	25,322	487	3	8,441	162
Total West Area	278,059		48,899	229,160		48,899	91,664	140,563	2,703		46,854	901
South Study Area	800	100%	800	-	-	800	-	800	15	3	267	5
East Study Area	500	90%	450	50	2.5	450	20	450	9	3	150	3

Johnson Valley OHV Assumptions:

		% of total
126,201	2010 Annual visitor days - Events	
165,147	2010 Annual visitor days - Dispersed	
291,348	Total annual visitor days (2010)	
57,290	2015 Annual Event-related Visitor Days (17%)	17%
279,710	2015 Annual Dispersed Use Visitor Days (83%)	83%
337,000	2015 Total annual visitor days Assumed	100%

Status of Displaced Visitors:

58,941	total visitor-days displaced
90.00%	% goes elsewhere in county
53,047	# visitor-days elsewhere in county
10,609	visitor-days day use
42,438	visitor-days multi-day
10,609	total day use visitors (displaced in Co.)
16,975	total multi-day visitors (displaced in Co.)
27,585	total annual visitors (stay in Co.)

Table 2. Estimate of Total Direct Expenditures

Area	Total Day Use Visitors	Total Multi-Day Visitors	Average # Days per Multi-day Trip	Average per capita daily expenditures	Expenditures - Day Use	Expenditures - Multi-Day	Subtotal Annual Expenditures	
West -Dispersed	39,159	76,081	3	$35.00	$1,370,579	$7,988,518	$9,359,097	
West - Events	9,739	15,583	3	$35.00	$340,876	$1,636,202	$1,977,078	
Total West Area	48,899	91,664			$1,711,455	$9,624,720	$11,336,175	
South Study Area	800	-	-	$35.00	$28,000	$0	$28,000	
East Study Area	450	20	3	$35.00	$15,750	$2,100	$17,850	$11,382,025
Displaced stay in Co.	10,609	16,975	3	$35.00	$371,330	$1,782,385	$2,153,715	

Table 3. Estimate of Direct Expenditures by Area (Day Use)

Area	% Visitors Local (<= 50 mi of JV)	% Visitors from Rest of County	% Visitors from Outside County	All Rows Must Total 100%
West -Dispersed	50%	30%	20%	100%
West - Events	50%	30%	20%	100%
South Study Area	100%	0%	0%	100%
East Study Area	100%	0%	0%	100%
Displaced stay in Co.	0%	80%	20%	100%

Table 4. Estimate of Direct Expenditures by Area (Multi-Day)

Area	% Visitors Local (<= 50 mi of JV)	% Visitors from Rest of County	% Visitors from Outside County	All Rows Must Total 100%
West -Dispersed	20%	20%	60%	100%
West - Events	20%	20%	60%	100%
South Study Area	100%	0%	0%	100%
East Study Area	100%	0%	0%	100%
Displaced stay in Cc	0%	40%	60%	100%

Daily $$ Distribution - JV Visitors

	Local Visitors	Rest of Co. Visitors	Outside Co. Visitors
% of Avg. Daily $$ Spent Locally	100%	60%	30%
% of Avg. Daily $$ Spent Rest of Co.	0%	40%	10%

Daily $$ Distribution - Displaced Stay in County Visitors

County-Based Visitors	Outside Co. Visitors	
N/A	N/A	Note: 'local' is relative to JV area only.
100%	40%	

% of Avg. Daily $$ Spent Outside Co.	0%	0%	60%		0%	60%
Amt. of Avg. Daily $$ Spent Locally	$35.00	$21.00	$10.50		N/A	N/A
Amt. of Avg. Daily $$ Spent Rest of Co.	$0.00	$14.00	$3.50		$35.00	$14.00
Amt. of Avg. Daily $$ Spent Outside Co.	$0.00	$0.00	$21.00		$0.00	$21.00
	$35.00	$35.00	$35.00		$35.00	$35.00

West -Dispersed

Day Use $ - Local	$685,290	$246,704	$82,235	$1,014,228	
Day Use $ - Rest	$0	$164,469	$27,412	$191,881	
Day Use $ - Outside	$0	$0	$164,469	$164,469	
				$1,370,579	Expenditures - Day Use
Multi-Day $ - Local	$1,597,704	$0	$0	$1,597,704	
Multi-Day $ - Rest	$958,622	$639,081	$0	$1,597,704	
Multi-Day $ - Outside	$1,437,933	$479,311	$2,875,866	$4,793,111	
				$7,988,518	Expenditures - Multi-Day Use

West - Events

Day Use $ - Local	$170,438	$61,358	$20,453	$252,248	
Day Use $ - Rest	$0	$40,905	$6,818	$47,723	
Day Use $ - Outside	$0	$0	$40,905	$40,905	
				$340,876	Expenditures - Day Use
Multi-Day $ - Local	$327,240	$0	$0	$327,240	
Multi-Day $ - Rest	$196,344	$130,896	$0	$327,240	
Multi-Day $ - Outside	$294,516	$98,172	$589,033	$981,721	
				$1,636,202	Expenditures - Multi-Day Use

Displaced Stay in County

Day Use $ - Rest	N/A	$297,064	$29,706	$326,771	
Day Use $ - Outside	N/A	$0	$44,560	$44,560	
					$371,330 Expenditures - Day Use
Multi-Day $ - Rest	N/A	$712,954	$0	$712,954	
Multi-Day $ - Outside	N/A	$427,772	$641,659	$1,069,431	
					$1,782,385 Expenditures - Multi-Day Use

Total Recreation Expenditures by Area (incl. South Study Area)

$13,535,740 Total Expenditures

Expenditures by Area		Associated Sales Taxes (8.75%)	Notes
Local Expenditures	$3,237,270	$184,120	Of total expenditures, approx. 35% is for food-related items that are not subject to sales tax.
Rest of Co. Expenditures	$3,204,272	$182,243	
Outside Co. Expenditures	$7,094,197	$403,482	sales tax outside county
	$13,535,740		

Total Annual Expenditures in County (excl. sales tax)	For use in EIFS Model			
Recreation	$6,441,542	$366,363		
Filming	$1,520,000	$76,000		Assumes film spending all in County and is 50% taxable at 10% (avg. transient occupancy tax) and 50% not (catering, etc.)
Total In-County	$7,961,542	$442,363	$8,403,905	

Impact from ALT is the difference b/w BASELINE and ALT total expenditures

	Baseline	ALT	NET Change[1]	% Change
Local Expenditures	$4,056,150	$3,237,270	($818,880)	
Local sales taxes	$310,694	$260,120	($50,574)	
Filming	$1,600,000	$1,520,000	($80,000)	
Subtotal Local	$5,966,844	$5,017,390	($949,453)	-15.91%
Rest of Co. Expenditure	$2,594,900	$3,204,272	$609,372	
Rest of Co. Sales Taxes	$147,585	$182,243	$34,658	
Subtotal Rest of Co.	$2,742,485	$3,386,515	$644,030	23.48%
Total County Impact	$8,709,328	$8,403,905	-$305,423	-3.51%

ALTERNATIVE 6

ENTER % REDUCTION in USE	
West - Dispersed	30.00%
West - Events	60.00%
South Study Area	100.00%
East Study Area	0.00%

ENTER % of Displaced Visitors Likely to Use Other County Resource	
90.00%	All Study Areas

ENTER % REDUCTION in JV FILMING:	30.00%

ENTER % of Lost Filming that would stay in County
80.00%

If appropriate, also change distribution of user origins in Table 3 below

Table 1. Visitor-Day Assumptions for Study Areas - ALT 6

Area	Annual Visitor-Days	*Assumed % single-day use*	*Annual Visitor-Days (Day Use Only)*	*Annual Visitor-Days (Multi-Day use)*	*Ave. Days per Multi-Day Visit*	*Total Annual Day Use Visitors*	*Total Annual Multi-Day Visitors*	*Total Annual Visitors*	*Annual Average Visitors per weekend*	*Average group size*	*Total Annual Groups*	*Annual Average Groups per weekend*
West - Dispersed	195,797	20%	39,159	156,638	2.5	39,159	62,655	101,814	1,958	3	33,938	653
West - Events	22,916	20%	4,583	18,333	2.5	4,583	7,333	11,916	229	3	3,972	76
Total West Area	218,713		43,743	174,970		43,743	69,988	113,731	2,187		37,910	729
South Study Area		100%	-	-	-	-	-	-	-	3	-	-
East Study Area	500	90%	450	50	2.5	450	20	450	9	3	150	3

Johnson Valley OHV Assumptions:

126,201	2010 Annual visitor days - Events	
165,147	2010 Annual visitor days - Dispersed	
291,348	Total annual visitor days (2010)	
		% of total
57,290	2015 Annual Event-related Visitor Days (17%)	17%
279,710	2015 Annual Dispersed Use Visitor Days (83%)	83%
337,000	2015 Total annual visitor days Assumed	100%

Status of Displaced Visitors:

119,087	total visitor-days displaced
90.00%	% goes elsewhere in county
107,178	# visitor-days elsewhere in county
21,436	visitor-days day use
85,743	visitor-days multi-day
21,436	total day use visitors (displaced in Co.)
34,297	total multi-day visitors (displaced in Co.)
55,733	total annual visitors (stay in Co.)

Table 2. Estimate of Total Direct Expenditures

Area	Total Day Use Visitors	Total Multi-Day Visitors	Average # Days per Multi-day Trip	Average per capita daily expenditures	Expenditures - Day Use	Expenditures - Multi-Day	Subtotal Annual Expenditures	
West -Dispersed	39,159	62,655	3	$35.00	$1,370,579	$6,578,779	$7,949,358	
West - Events	4,583	7,333	3	$35.00	$160,412	$769,978	$930,390	
Total West Area	43,743	69,988			$1,530,991	$7,348,757	$8,879,748	
South Study Area	-	-	-	$35.00	$0	$0	$0	
East Study Area	450	20	3	$35.00	$15,750	$2,100	$17,850	$8,897,598
Displaced stay in Co.	21,436	34,297	3	$35.00	$750,248	$3,601,191	$4,351,439	

Table 3. Estimate of Direct Expenditures by Area (Day Use)

Area	% Visitors Local (<= 50 mi of JV)	% Visitors from Rest of County	% Visitors from Outside County	All Rows Must Total 100%
West -Dispersed	65%	25%	10%	100%
West - Events	50%	30%	20%	100%
South Study Area	100%	0%	0%	100%
East Study Area	100%	0%	0%	100%
Displaced stay in Co.	0%	90%	10%	100%

Table 4. Estimate of Direct Expenditures by Area (Multi-Day)

Area	% Visitors Local (<= 50 mi of JV)	% Visitors from Rest of County	% Visitors from Outside County	All Rows Must Total 100%
West -Dispersed	20%	20%	60%	100%
West - Events	20%	20%	60%	100%
South Study Area	100%	0%	0%	100%
East Study Area	100%	0%	0%	100%
Displaced stay in Co.	0%	40%	60%	100%

Daily $$ Distribution - JV Visitors

	Local Visitors	Rest of Co. Visitors	Outside Co. Visitors
% of Avg. Daily $$ Spent Locally	100%	60%	30%
% of Avg. Daily $$ Spent Rest of Co.	0%	40%	10%
% of Avg. Daily $$ Spent Outside Co.	0%	0%	60%

Daily $$ Distribution - Displaced Stay in County Visitors

County-Based Visitors	Outside Co. Visitors	
N/A	N/A	Note: 'local' is relative to JV area only.
100%	40%	
0%	60%	

Amt. of Avg. Daily $$ Spent Locally	$35.00	$21.00	$10.50		N/A	N/A
Amt. of Avg. Daily $$ Spent Rest of Co.	$0.00	$14.00	$3.50		$35.00	$14.00
Amt. of Avg. Daily $$ Spent Outside Co.	$0.00	$0.00	$21.00		$0.00	$21.00
	$35.00	$35.00	$35.00		$35.00	$35.00

West -Dispersed					
Day Use $ - Local	$890,876	$205,587	$41,117	$1,137,581	
Day Use $ - Rest	$0	$137,058	$13,706	$150,764	
Day Use $ - Outside	$0	$0	$82,235	$82,235	
				$1,370,579	Expenditures - Day Use
Multi-Day $ - Local	$1,315,756	$0	$0	$1,315,756	
Multi-Day $ - Rest	$789,454	$526,302	$0	$1,315,756	
Multi-Day $ - Outside	$1,184,180	$394,727	$2,368,361	$3,947,268	
				$6,578,779	Expenditures - Multi-Day Use
West - Events					
Day Use $ - Local	$104,268	$24,062	$4,812	$133,142	
Day Use $ - Rest	$0	$16,041	$1,604	$17,645	
Day Use $ - Outside	$0	$0	$9,625	$9,625	
				$160,412	Expenditures - Day Use
Multi-Day $ - Local	$153,996	$0	$0	$153,996	
Multi-Day $ - Rest	$92,397	$61,598	$0	$153,996	
Multi-Day $ - Outside	$138,596	$46,199	$277,192	$461,987	
				$769,978	Expenditures - Multi-Day Use
Displaced Stay in County					
Day Use $ - Rest	N/A	$675,223	$30,010	$705,233	
Day Use $ - Outside	N/A	$0	$45,015	$45,015	
					$750,248 Expenditures - Day Use
Multi-Day $ - Rest	N/A	$1,440,476	$0	$1,440,476	
Multi-Day $ - Outside	N/A	$864,286	$1,296,429	$2,160,715	
					$3,601,191 Expenditures - Multi-Day Use

Total Recreation Expenditures by Area (incl. South Study Area)

$13,249,037 Total Expenditures

Expenditures by Area		Associated Sales Taxes (8.75%)	Notes
Local Expenditures	$2,758,324	$156,880	Of total expenditures, approx. 35% is for food-related items that are not subject to sales tax.
Rest of Co. Expenditures	$3,783,870	$215,208	
Outside Co. Expenditures	$6,706,843	$381,452	sales tax outside county
	$13,249,037		

Total Annual Expenditures in County (excl. sales tax)	For use in EIFS Model			
Recreation	$6,542,194	$372,087		
Filming	$1,504,000	$75,200		Assumes film spending all in County and is 50% taxable at 10% (avg. transient occupancy tax) and 50% not (catering, etc.)
Total In-County	$8,046,194	$447,287	$8,493,481	

Impact from ALT is the difference b/w BASELINE and ALT total expenditures

	Baseline	ALT	NET Change[1]	% Change
Local Expenditures	$4,056,150	$2,758,324	($1,297,826)	
Local sales taxes	$310,694	$232,080	($78,614)	
Filming	$1,600,000	$1,504,000	($96,000)	
Subtotal Local	$5,966,844	$4,494,404	($1,472,440)	-24.68%
Rest of Co. Expenditure	$2,594,900	$3,783,870	$1,188,970	
Rest of Co. Sales Taxes	$147,585	$215,208	$67,623	
Subtotal Rest of Co.	$2,742,485	$3,999,078	$1,256,593	46%
Total County Impact	$8,709,328	$8,493,481	-$215,847	-2.48%

Land Acquisition EIS: Consolidated List of Personnel by Alternative

Weighted AVERAGES

Program	Position	Pay Grade	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt. 6	Annual Salary		Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6
Conservation	Conservation Law Enforcement Supv.	GS-12	1	1	1	1	1	1	$80,276		$80,276	$80,276	$80,276	$80,276	$80,276	$80,276
	Conservation Law Enforcement Officer	GS-9/11	1	1	1	2	2	2	$60,963	used GS-10	$60,963	$60,963	$60,963	$121,926	$121,926	$121,926
	Recreation Specialist	GS-9/11	0	0	0	1	1	1	$60,963		$0	$0	$0	$60,963	$60,963	$60,963
	Natural Resources Specialist	GS-9/11	2	1	2	2	2	2	$60,963		$121,926	$60,963	$121,926	$121,926	$121,926	$121,926
	Cultural Resources Specialist	GS-9/11	2	1	2	2	2	2	$60,963		$121,926	$60,963	$121,926	$121,926	$121,926	$121,926
	NEPA Coordinator Assistant	GS-9/11	1	1	1	1	1	1	$60,963		$60,963	$60,963	$60,963	$60,963	$60,963	$60,963
Range Residue Processing	Unexploded Ordanance Supv.	GS-11	1	1	0	1	1	1	$66,974		$66,974	$66,974	$0	$66,974	$66,974	$66,974
	Range Cleanup Technician	WG-7	6	4	0	6	6	6	$44,616		$267,696	$178,464	$0	$267,696	$267,696	$267,696
Recycling Program	Trash Collection Technician	WG-7	0	0	0	1	1	1	$44,616		$0	$0	$0	$44,616	$44,616	$44,616
	Recycling Technician	WG-7	0	0	0	1	1	1	$44,616		$0	$0	$0	$44,616	$44,616	$44,616
Hazardous Waste Processing	Spill Abatement Technician	GS-7/9	1	1	1	1	1	1	$50,117	used GS-8	$50,117	$50,117	$50,117	$50,117	$50,117	$50,117
	Hazardous Waste Handler	WG-7	2	1	2	2	2	2	$44,616		$89,232	$44,616	$89,232	$89,232	$89,232	$89,232
Pollution Prevention	Engineering Technician	GS-7/9	1	1	1	1	1	1	$50,117		$50,117	$50,117	$50,117	$50,117	$50,117	$50,117
Range Maintenance (G3)	Range Maintenance Leader	WL-8	1	1	1	1	1	1	$52,666		$52,666	$52,666	$52,666	$52,666	$52,666	$52,666
	Range Maintenance Laborer	WG-5	4	4	2	4	4	4	$37,814		$151,258	$151,258	$75,629	$151,258	$151,258	$151,258
Range Safety Specialists	Range Safety Officer	GS-11	2	2	2	2	2	2	$66,974		$133,948	$133,948	$133,948	$133,948	$133,948	$133,948
G5 PAO/Comm Rel / Encroach																
	Communications Specialist	GS-9/11	1	1	1	1	1	1	$60,963		$60,963	$60,963	$60,963	$60,963	$60,963	$60,963
	Communications Technician	GS-6/7	2	2	2	2	2	2	$45,258	used GS-7	$90,516	$90,516	$90,516	$90,516	$90,516	$90,516
	Admin Specialist	GS-5/6	1	1	1	1	1	1	$40,723	used GS-6	$40,723	$40,723	$40,723	$40,723	$40,723	$40,723
	Comm Outreach Specialist	GS-9/11	2	2	2	2	2	2	$60,963		$121,926	$121,926	$121,926	$121,926	$121,926	$121,926
EOD									Same for all Alts							
	2305	O3	1	1	1	1	1	1	$64,488	Over 8	$64,488	$64,488	$64,488	$64,488	$64,488	$64,488
	2336	MSgt E8	1	1	1	1	1	1	$54,060	Over 18	$54,060	$54,060	$54,060	$54,060	$54,060	$54,060
	2336	GySgt E7	2	2	2	2	2	2	$47,640	Over 16 yrs	$95,280	$95,280	$95,280	$95,280	$95,280	$95,280
	2336	SSgt E6	2	2	2	2	2	2	$40,728	Over 14 yrs	$81,456	$81,456	$81,456	$81,456	$81,456	$81,456
	2336	Sgt E5	2	2	2	2	2	2	$35,088	Over 12 yrs	$70,176	$70,176	$70,176	$70,176	$70,176	$70,176
PMO added patrols (G7)									All may be Civilian Equivelents							
	58XX	SSgt E6	1	1	1	1	1	1	$40,728	Over 14 yrs	$40,728	$40,728	$40,728	$40,728	$40,728	$40,728
	58XX	Sgt E-5	3	2	2	2	2	2	$35,088	Over 12 yrs	$105,264	$70,176	$70,176	$70,176	$70,176	$70,176
	58XX	Cpl E4	3	4	4	4	4	4	$27,528	Over 8 yrs	$82,584	$110,112	$110,112	$110,112	$110,112	$110,112
	Other (E3 or Civilain FTE)	CIV FTE (E3)	17	17	17	17	17	17	$23,076	Over 4 yrs	$392,292	$392,292	$392,292	$392,292	$392,292	$392,292
Long-Term Management																
	Lead		1	1	1	1	1	1	$80,276	Assume GS-12	$80,276	$80,276	$80,276	$80,276	$80,276	$80,276
	Web master	GS-9/11	1	1	1	1	1	1	$60,963		$60,963	$60,963	$60,963	$60,963	$60,963	$60,963
	Scheduler	GS-12	1	1	1	3	3	3	$80,276		$80,276	$80,276	$80,276	$240,828	$240,828	$240,828
	JV Liaison	GS-9/11	2	2	0	2	2	2	$60,963	Alts 1 / 2 are temporary c	$121,926	$121,926	$0	$121,926	$121,926	$121,926
	Course designer	GS-12	0	0	0	1	1	1	$80,276		$0	$0	$0	$80,276	$80,276	$80,276
	Liaison	GS-12 / 11	2	2	2	2	2	2	$80,276		$160,552	$160,552	$160,552	$160,552	$160,552	$160,552
		Totals	**70**	**65**	**59**	**77**	**77**	**77**								
		Military	**15**	**15**	**15**	**15**	**15**	**15**			$594,036	$586,476	$586,476	$586,476	$586,476	$586,476
		Civilain	**55**	**50**	**44**	**62**	**62**	**62**	Assumes 17 MP are Civ FTEs		$2,126,182	$1,870,408	$1,593,957	$2,578,168	$2,578,168	$2,578,168
									MIL Weighted Avg.		$39,602	$39,098	$39,098	$39,098	$39,098	$39,098
									CIV Weighted Avg.		$38,658	$37,408	$36,226	$41,583	$41,583	$41,583

K.4 EIFS Modeling Results

To estimate the amount of indirect economic impact that would be associated with the direct changes in net spending, the EIFS economic model was identified as an appropriate modeling system for the EIS analysis, given the limited scope of the direct spending (focused largely on relatively few economic sectors such as retail sales). The model was used to calculate direct and indirect impacts in San Bernardino County using 2010 expenditures data adjusted for inflation to 2015 dollars).

The EIFS model takes as input certain details about direct local expenditures, employment, and income, and outputs forecasts of the associated direct, indirect, and total impacts on sales volume, income, employment, and population. Estimated direct changes in net expenditures related to the local area (within 50 miles of the trip destination) and the remainder of the county were then combined for input into the EIFS model. Only the total county spending changes were input to the model to calculate indirect impacts. Estimated direct changes in net spending outside the county (from more distant travelers) were not modeled for evaluation of indirect impacts, and were provided only for comparison to local and in-County expenditure changes.

The following are the EIFS inputs and output data and the RTV values for the baseline scenario and the action alternatives. These data form the basis for the socioeconomic impact analysis presented in Section 4.3 of the EIS.

Economic Impact Forecast System

US Army Corps of Engineers
Mobile District

EIFS Report Date September 8, 2010

EIS Alternative: Alternative 1

PROJECT NAME

EIS

STUDY AREA

06071 San Bernardino, CA

FORECAST INPUT

Change In Local Expenditures	($681,857)
Change In Civilian Employment	55
Average Income of Affected Civilian	$38,658
Percent Expected to Relocate	70
Change In Military Employment	15
Average Income of Affected Military	$39,602
Percent of Militart Living On-post	25

FORECAST OUTPUT

Employment Multiplier	3.54	
Income Multiplier	3.54	
Sales Volume - Direct	$1,286,448	
Sales Volume - Induced	$3,267,579	
Sales Volume - Total	$4,554,028	0.01%
Income - Direct	$2,606,911	
Income - Induced)	$542,996	
Income - Total(place of work)	$3,149,908	0.01%
Employment - Direct	76	
Employment - Induced	14	
Employment - Total	90	0.01%
Local Population	133	
Local Off-base Population	124	0.01%

RTV SUMMARY

	Sales Volume	Income	Employment	Population
Positive RTV	13.46 %	12.75 %	3.64 %	3.64 %
Negative RTV	-5.93 %	-4.33 %	-3.85 %	-2.16 %

Economic Impact Forecast System

US Army Corps of Engineers
Mobile District

EIFS Report Date: September 8, 2010

EIS Alternative: Alternative 2

PROJECT NAME

EIS

STUDY AREA

06071 San Bernardino, CA

FORECAST INPUT

Change In Local Expenditures	($297,936)
Change In Civilian Employment	50
Average Income of Affected Civilian	$37,408
Percent Expected to Relocate	70
Change In Military Employment	15
Average Income of Affected Military	$39,098
Percent of Militart Living On-post	25

FORECAST OUTPUT

Employment Multiplier	3.54	
Income Multiplier	3.54	
Sales Volume - Direct	$1,461,420	
Sales Volume - Induced	$3,712,007	
Sales Volume - Total	$5,173,427	0.01%
Income - Direct	$2,407,360	
Income - Induced)	$616,850	
Income - Total(place of work)	$3,024,210	0.01%
Employment - Direct	71	
Employment - Induced	16	
Employment - Total	88	0.01%
Local Population	124	
Local Off-base Population	115	0.01%

RTV SUMMARY

	Sales Volume	Income	Employment	Population
Positive RTV	13.46 %	12.75 %	3.64 %	3.64 %
Negative RTV	-5.93 %	-4.33 %	-3.85 %	-2.16 %

Economic Impact Forecast System

US Army Corps of Engineers
Mobile District

EIFS Report Date: September 8, 2010

EIS Alternative: Alternative 3

PROJECT NAME

EIS

STUDY AREA

06071 San Bernardino, CA

FORECAST INPUT

Change In Local Expenditures	($24,221)
Change In Civilian Employment	-106
Average Income of Affected Civilian	$36,226
Percent Expected to Relocate	70
Change In Military Employment	15
Average Income of Affected Military	$39,098
Percent of Militart Living On-post	25

FORECAST OUTPUT

Employment Multiplier	3.54	
Income Multiplier	3.54	
Sales Volume - Direct	($2,855,992)	
Sales Volume - Induced	($7,254,219)	
Sales Volume - Total	($10,110,210)	-0.02%
Income - Direct	($3,257,511)	
Income - Induced)	($1,205,484)	
Income - Total(place of work)	($4,462,996)	-0.01%
Employment - Direct	-104	
Employment - Induced	-32	
Employment - Total	-135	-0.02%
Local Population	-147	
Local Off-base Population	-157	-0.01%

RTV SUMMARY

	Sales Volume	Income	Employment	Population
Positive RTV	13.46 %	12.75 %	3.64 %	3.64 %
Negative RTV	-5.93 %	-4.33 %	-3.85 %	-2.16 %

Economic Impact Forecast System

US Army Corps of Engineers
Mobile District

EIFS Report Date: September 8, 2010

EIS Alternative: Alternative 4

PROJECT NAME

EIS

STUDY AREA

06071 San Bernardino, CA

FORECAST INPUT

Change In Local Expenditures	($320,101)
Change In Civilian Employment	62
Average Income of Affected Civilian	$41,583
Percent Expected to Relocate	70
Change In Military Employment	15
Average Income of Affected Military	$39,098
Percent of Militart Living On-post	25

FORECAST OUTPUT

Employment Multiplier	3.54	
Income Multiplier	3.54	
Sales Volume - Direct	$2,008,283	
Sales Volume - Induced	$5,101,038	
Sales Volume - Total	$7,109,321	0.02%
Income - Direct	$3,111,422	
Income - Induced)	$847,675	
Income - Total(place of work)	$3,959,098	0.01%
Employment - Direct	86	
Employment - Induced	22	
Employment - Total	108	0.02%
Local Population	145	
Local Off-base Population	136	0.01%

RTV SUMMARY

	Sales Volume	Income	Employment	Population
Positive RTV	13.46 %	12.75 %	3.64 %	3.64 %
Negative RTV	-5.93 %	-4.33 %	-3.85 %	-2.16 %

Economic Impact Forecast System

US Army Corps of Engineers
Mobile District

EIFS Report Date: September 8, 2010

EIS Alternative: Alternative 5

PROJECT NAME

EIS

STUDY AREA

06071 San Bernardino, CA

FORECAST INPUT

Change In Local Expenditures	($305,423)
Change In Civilian Employment	62
Average Income of Affected Civilian	$41,583
Percent Expected to Relocate	70
Change In Military Employment	15
Average Income of Affected Military	$39,098
Percent of Militart Living On-post	25

FORECAST OUTPUT

Employment Multiplier	3.54	
Income Multiplier	3.54	
Sales Volume - Direct	$2,022,961	
Sales Volume - Induced	$5,138,320	
Sales Volume - Total	$7,161,281	0.02%
Income - Direct	$3,113,862	
Income - Induced)	$853,871	
Income - Total(place of work)	$3,967,732	0.01%
Employment - Direct	86	
Employment - Induced	23	
Employment - Total	108	0.02%
Local Population	145	
Local Off-base Population	136	0.01%

RTV SUMMARY

	Sales Volume	Income	Employment	Population
Positive RTV	13.46 %	12.75 %	3.64 %	3.64 %
Negative RTV	-5.93 %	-4.33 %	-3.85 %	-2.16 %

Economic Impact Forecast System

US Army Corps of Engineers
Mobile District

EIFS Report Date: September 8, 2010

EIS Alternative: Alternative 6

PROJECT NAME

EIS

STUDY AREA

06071 San Bernardino, CA

FORECAST INPUT

Change In Local Expenditures	($215,847)
Change In Civilian Employment	62
Average Income of Affected Civilian	$41,583
Percent Expected to Relocate	70
Change In Military Employment	15
Average Income of Affected Military	$39,098
Percent of Militart Living On-post	25

FORECAST OUTPUT

Employment Multiplier	3.54	
Income Multiplier	3.54	
Sales Volume - Direct	$2,112,536	
Sales Volume - Induced	$5,365,843	
Sales Volume - Total	$7,478,380	0.02%
Income - Direct	$3,128,747	
Income - Induced)	$891,680	
Income - Total(place of work)	$4,020,427	0.01%
Employment - Direct	86	
Employment - Induced	24	
Employment - Total	110	0.02%
Local Population	145	
Local Off-base Population	136	0.01%

RTV SUMMARY

	Sales Volume	Income	Employment	Population
Positive RTV	13.46 %	12.75 %	3.64 %	3.64 %
Negative RTV	-5.93 %	-4.33 %	-3.85 %	-2.16 %

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APPENDIX L
MILITARY CONSTRUCTION PROJECTS AT THE COMBAT CENTER

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Project-specific site improvements or design features, as well as proposed size of each structure or infrastructure footprint for each of the projects, are summarized below for all known and reasonably foreseeable future actions at Mainside that may have impacts additive to the effects of the proposed alternatives.

P-175: Consolidated Emergency Response Center

P-175 would construct a 29,504-square foot, two-story consolidated emergency response center for the Provost Marshalls Office and main base Fire Department. This project is needed to provide an adequate consolidated facility for the emergency response functions of Marine Corps Air Ground Combat Center at Twentynine Palms, CA (Combat Center) that can meet all compliance requirements for life/safety/fire/seismic and quality of life standards, and meet the basic anti-terrorism/force protection standards of construction and set back distances from adjacent roadways and parking. Co-location of Police and Fire Departments would provide a continuity of operations in the emergency response and dispatching areas.

The Fire Station would comprise approximately 22,906 square feet of the building, while the Provost Marshalls Office would comprise 6,598 square feet. Specific building construction would include seven double deep drive-thru bays with large roll-up doors for fire apparatus and equipment, individual sleeping rooms with personnel lockers for 3-Engine Company, hose drying space, radio antenna for receiving fire alarms, secured storage room, combination day room and training area, dining room, kitchen, exercise room and medical deep sinks, and floor drain in each bay with oil/water separator, emergency standby generator, vehicle exhaust system, compressed air system, fireman gear lockers, steam generator and medical vault/secure storage container, a reinforced concrete arms vault with the appropriate security measures, prisoner-holding cells, radio antenna equipped with state of the art Space and Naval Warfare Systems Command security system for Military Police, administrative areas, and Navy Marine Corps Intranet computer room.

Site improvements would include sidewalks, parking lots for organizational vehicles, roadway access, stormwater pollution measures and prevention plans, grading, and landscaping. Supporting facilities would include site and building utility and communication connections (water, sanitary sewers, electrical, telephone, local area network and cable television). Electrical systems would include fire alarms, exterior lighting, energy saving electronic monitoring and control system, intrusion detection system, information systems, and an electrical transformer. Mechanical systems would include plumbing, fire protection, heating, ventilation, and air conditioning, and fire hydrants.

P-175 would also demolish Buildings 1407, 1408, and 1516 (all replaced fire and provost stations).

This project is planned to occur in FY 2014.

P-190: Combat Center Band Facility

P-190 would construct a permanent facility (15,389 square feet) to house Marine Corps Band personnel at the Combat Center. This project would construct a low-rise, single-story band building. The facility would include large and small group rehearsal rooms, recording/audio control room, individual practice rooms, administrative spaces, library, restrooms, storage, and receiving space. Special construction features would include sound attenuation and a loading dock.

Paving and site improvements would include an asphalt-paved area for drilling, 8-foot chain link fencing and gates, non-organizational parking, sidewalks, and a trash enclosure. The pitched standing seam metal roof cannot accommodate the mechanical equipment that used to be located on flat roof systems. Therefore, an enclosed, mechanical yard would be required to house mechanical units.

This project is planned to occur in FY 2015.

P-191: Addition to Camp Wilson Gym (Building 5411)

P-191 consists of a pre-engineered building (3,208 square feet) as an addition to the existing Camp Wilson Gym (Building 5411). The addition is needed to achieve required machine spacing and meet safety requirements of 36 inches between equipment and for pathways. The building would be built adjacent to the southwest wall of Building 5411. The buildings would be accessible through the existing main entrance into Building 5411 and by two 12-foot openings that would be cut into the adjacent walls. The addition would include two unisex restrooms, each with only a sink and a toilet. White lights would be used to light the building and rubber matting would be used for flooring.

Supporting facilities would include electrical utilities, water utilities, sanitary sewer utilities, gas utilities, steam, and controls. Paving and site improvements would include paved roads and parking, curbs and gutters, specialty walks/pavers, sidewalks, pedestrian and bicycle features, stormwater drainage improvements, and fencing and gates.

This project is planned to occur in FY 2016.

P-192: Deadman Lake Subbasin Well Field

P-192 involves developing the Deadman Lake sub-basin aquifer by drilling and installing three new potable water production wells at 750 gallons/minute, a new three-million gallon ground-level reservoir, four new well and pump control buildings, and approximately 15,000 linear feet of 8-inch potable water transmission lines from three wells to the new reservoir and to the existing potable water transmission lines for blending of groundwater from the Surprise Springs subbasin aquifer. The development of the Deadman Lake subbasin and blending would prolong the usefulness of Surprise Springs subbasin and sustain Combat Center potable water demands to an estimated 75 years.

Structural fill is required as a special foundation requirement for the ground-level reservoir. Electrical system includes Systems Control and Data Acquisition (SCADA) system, electrical distribution system, exterior lighting, pad-mounted transformers, and emergency back-up generators. Mechanical system includes well controls and valves, blending manifold, and chemical constituent monitoring meters. Paving and site improvements include gravel access roads to well heads and reservoir, chain link fencing and gates, and anti-terrorism/force protection and Safe Drinking Water Act security requirements at wells, pump houses, and reservoir sites.

This project is planned to occur in FY 2015.

P-193: Consolidated Emergency Response Center

P193 would construct 11,916 SF multipurpose classroom facility. The project consists of constructing a one-story multipurpose classroom facility for use by Marksmanship Training Unit (MTU), Explosive Ordinance Disposal (EOD), & Range Training Area Maintenance Section (RTAMS). MTU, EOD, and RTAMS facilities are located several miles from Mainside, near the Rifle Range and Range 200. The classroom facility will be located close to and used by these organizations for the classroom portions of their training.

This project is planned to occur in FY 2015.

P-194: Convert Building 2025 to Wheeled Vehicle Maintenance Facility

P-194 would renovate and repair Building 2025, a 22,680-square foot facility constructed of pre-cast, tilt-up, concrete in 1986. Building 2025 is used to maintain heavy equipment and Humvees. The south side of the building is used for field utility equipment (lights, generators) and a tire shop. A portion of the building is used for tire storage, and there is a sunshade adjacent to Building 2025 where maintenance is currently being conducted when there is not enough space to complete work in the maintenance bays. Building 2025 is in fair condition, but is a large, poorly designed space.

P-194 would convert the existing warehouse space into 12 wheeled vehicle maintenance bays, while the existing office space would be relocated adjacent to the existing toilet rooms. The existing metal stud walls, doors, ceilings, and flooring would be demolished and replaced with new 20 gauge metal stud walls finished with abuse-resistive drywall. Four openings would be saw cut in the exterior walls on the western and eastern sides of the facility to accommodate new electric roll-up doors. Ramps would be added to the west side of the building, leading to the existing loading dock, to provide access to the new service bays. A new, self-supporting metal canopy would be erected on the west side of the facility, adjacent to the existing tire shop, to provide tire storage. The storage area would be secured with a chain-link fence and gate. Upgrades/improvements would also be made to restrooms, mechanical systems, power distribution equipment, heating systems, ventilation systems, interior (air handling unit) and exterior (remote condensing unit) air conditioning units, lighting, etc.

Site improvements would include stormwater drainage improvements. Electrical systems would include communications, electrical distribution, exterior lighting, and a 500 kilovolt-ampere (KVA) pad-mounted transformer. Special construction includes a separate hazardous materials containment area, with provisions for proper ventilation, expansion of the vehicle exhaust system, and a crane center to accommodate two 20-25,000 pound top running cranes, lube systems, and compressed air systems.

This project is planned to occur in FY 2016.

P-204: ATG COP Shadow Compound

P-204 would construct an ATG training complex which include constructing an area to provide immersion training and an area for administrative functions. The immersion training area would construct buildings to provide billeting for the teams and various mock buildings that can be transformed to depict the culture the team will become partner-security force service-level advisors. Construction in the administrative area would provide operational buildings for instructors and administrative personnel.

This project is planned to occur in FY 2014.

P-212: Child Development Center

P-212 would construct a 35,822 SF single-story Child Development Center (CDC). The facility would be handicapped accessible and comply with the currently adopted International Building Code and latest Unified Facilities Criteria (UFC) standards, including UFC 4-740-14, Child Development Centers. The building would be constructed with a spread footing foundation, concrete floor, concrete masonry exterior walls, and pitched standing seam metal roof. The facility would include a telecommunication system, closed circuit TV system, and public address system, fire protection system including fire hydrants, plumbing system, electrical system, heating ventilation and air conditioning system, storm drainage system, sanitary sewer system, mechanical and electrical utilities, and renewable energy systems. Functional areas include a mechanical room, electrical room, telecommunications room, dedicated NMCI telecommunications room, entrance vestibule, lobby, reception and work area, administration offices, staff break room, training room, central storage, staff and public toilet rooms, kitchen, janitorial and laundry room. Child activity rooms would be provided for infants, pre-toddlers, toddlers and preschool aged children.

This project is planned to occur in FY 2012.

P-504: Consolidated Community Support Facility

P-504 would construct a 114,356-square foot, multi-story consolidated family services and community support facility consisting of an administrative facility (32,442 square feet), family services center (13,003 square feet), religious ministry facility (12,938 square feet), and parking structure (55,972 square feet). This project is needed to provide community and service support facilities that are centrally located to adequately serve the families and service members stationed at the Combat Center. A consolidated facility, prominently sited in the central core area of the base, would provide the visibility and access to the public that these various programs require. Consolidation would also permit an economy of scale with many common functions shared by the different service groups. The single, new facility, with current energy efficient construction and connection to the central heating and cooling system, would also significantly reduce energy consumption, operating, and maintenance costs over the present demands.

Site improvements would include sidewalks, outdoor amenities, roadway access, earthwork, grading, and landscaping. Electrical systems would include fire alarms, energy saving electronic monitoring and control system, and information systems. Mechanical systems would include plumbing, fire protection systems, heating, ventilation, and air conditioning, connections to a central chilled water plant and high temperature hot water lines with secondary distribution loops, and installation of an additional modular chiller unit to the existing central chilled water plant. Special construction features would include two elevators with four stops each.

P-504 would also demolish Buildings 1521, 1523, 1525, and 1551 (a total of 58,388 square feet of inadequate facilities) permitting the redevelopment of the site. The existing buildings to be demolished were built in 1953 and have uninsulated concrete walls and ceilings. Heating and cooling loads due to infiltration and lack of insulation have made these old facilities inefficient and increasingly costly to operate.

This project is planned to occur in FY 2014.

P-571: Roads Southeast Access

P-571 would construct additional roads to and from ranges. The following four routes are being considered:

- From the base of Range 500 in Cleghorn Pass Training Area in a southerly direction to the Bureau of Land Management (BLM) corridor off base, through the corridor in a northeasterly direction through the Bullion Pass into the Bullion Training Area, and intersecting the Bullion main supply route (MSR) within 2500 meters of the southern base boundary (on base).
- From Amboy Road, off base, on the northern side of the Wilderness Area on the southeastern corner of American Mine Training Area, in a westerly direction, to the base boundary, then along the southern base boundary in South American mine, to the Bullion Training Area, to the Bullion Training Area MSR near the southern base boundary.
- From Amboy Road into the center of the American Mine Training Area, (either by the northern jeep trail or by the eastern jeep trail), to the vicinity of Observation Post Buff (base of ridge) and

then as terrain allows into the Bullion Training Area and egressing into Bullion Training Area to the vicinity of Observation Post Frito.

- From Observation Post Crampton road at the base of the mountain and wash to the top of the hill near the old abandoned pre-engineered building via Delta/Prospect/Miner's pass MSRs.

This project is currently unprogrammed

P-581: MCAGCC HQ Building

P-581 would construct a 22,270 SF facility to provide an administration building to house Command Staff of the Training Center and replace 50 year old single story buildings that are safety hazards, and not efficient in the arena of energy consumption.

This project is planned to occur in FY 2015.

P-602: Training Integration Center

P-602 would construct a 41,635-square foot, multi-story Training Integration Center to provide a consolidated, efficiently configured, processing center and adequate temporary billeting for newly arriving junior enlisted students. The first level of the facility would contain a single primary entrance, duty room/control point with linen issue and storage, administrative processing areas, 250 occupant multi-purpose space, recreation/television viewing areas, multi-media classroom, library and study areas, public restrooms, and equipment storage lockers/rooms. The upper levels would consist of open bay barrack spaces for temporary billeting with central laundry, janitorial, and vending spaces. There would be four squad bays per floor; each squad bay would hold 20 students for a total sleeping capacity of 240 students. Each bay would have direct access to its own shower/restroom facilities. Student barracks would comprise 33,583 square feet of the facility, while 8,051 square feet would comprise the processing center. Community and service core areas would consist of laundry facilities, TV lounge, administrative offices, housekeeping areas, and public restrooms.

Site improvements would include sidewalks, outdoor recreation facilities/courts, bus drop off lane, earthwork/grading, stormwater management, and water efficient landscaping. Electrical systems would include fire alarms, energy saving electronic monitoring and control system, and information systems. Mechanical systems would include plumbing, fire protection systems, and heating, ventilation, and air conditioning. Built-in equipment would include one service elevator. Connections to the high temperature hot water lines with secondary distribution loops would also be constructed.

This project is planned to occur in FY 2016.

P-603: Vehicle Training and Equipment Facility

P-603 would include alterations and additions to Building 1855 (27,706 square feet) to provide the required vehicle maintenance space for the assigned communications vehicles of the Marine Corps Communications Electronics School. P-603 would construct classroom and covered exterior instruction space for drivers of tactical vehicles and communications equipment operators. Permanent facilities would be constructed of concrete and masonry construction, steel roof framing, decking, and 5-ply built-up roofing. The project would include the construction of insulated and air conditioned classroom space, a vehicle hoist in the maintenance facility, heads for male and female students, and covered parking space for communications vehicles.

This project is planned to occur in FY 2018.

P-617: Waste Handling and Recovery Complex

P-617 would construct a material recovery facility complex, consisting of four separate buildings: a general waste sorting facility (6,501 square feet), recycled material sorting and bailing facility (8,999 square feet), recycled material storage building (7,502 square feet), vehicle holding shed (2,357 square feet), and a multi-story administrative support facility (11,216 square feet) for the Natural Resources and Environmental Affairs Division that includes the Sections of Administrative, Compliance, Pollution Prevention, Hazardous Waste, Natural and Cultural Resources, Total Waste Management, and Range Residue Processing. The project would allow for complete management of solid waste through a material recovery facility complex to remove all recyclables prior to disposal in the expanded compliant sanitary landfill, thus allowing the Combat Center to meet its regulatory requirements by extending the life of the landfill another 15 to 20 years.

Each facility in the complex would be constructed with concrete slab on grade and insulated standing seam metal roofing over steel framing. The two-bay vehicle holding shed would be cantilever type with a photovoltaic system. Site improvements would consist of site preparation, access roads, appropriate site drainage measures for a 100 year flood, oil/water separator, concrete and asphalt flatwork, screened perimeter fencing, and staff/employee parking lots. Electrical systems would include exterior lighting, electrical utilities, and outside communications lines. Mechanical systems would include heating, ventilation, and air conditioning with the highest Energy Efficiency Ratio per tonnage.

P-617 would also demolish Building 1451 and eight relocatable administrative trailers.

This project is planned to occur in FY 2014.

P-618: Multi-Purpose Administration Building

P-618 would provide an administration building (29,084 square feet) to house the general administration functions that support the Combat Center and replace the six, old, single-story buildings that are safety hazards and energy consuming structures. Building 1551 (old hospital) would also be demolished. A three-story, permanent facility would be constructed of reinforced steel, concrete framing, and masonry block infill. The project would provide sidewalks, landscaping, irrigation, paved parking, curbs and gutters, exterior lighting, and 40 tons of air conditioning.

Supporting facilities include electrical, water, sanitary sewer and gas utilities. Paving and site improvements include signage, landscaping and irrigation, roads, and sidewalks.

This project is planned to occur in FY 2016.

P-641: Addition East Gym 1588

P-641 would construct a 19,999-square foot, multi-story addition including renovation to the existing east gymnasium (Building 1588) at the Combat Center. The addition would be constructed of reinforced concrete slab-on-grade with perimeter footing and spread beam foundation, reinforced concrete masonry exterior walls, and a standing seam metal roof. Special construction features include sound attenuation and upgrades to the building's existing electrical distribution system to handle the increased load.

Site preparation would include excavation, grading, structural fill, and site cleanup. Site improvements would include sidewalks and an additional 160 surface parking spaces. Electrical systems would include communications, fiber optic, electrical distribution, and a 300 kVA transformer to replace the existing 225 kVA transformer. Mechanical systems would include potable water utilities, fire hydrants, mechanical utilities, sanitary sewer utilities, and an Energy Management Control System.

P-641 would also include miscellaneous demolition to permit the expansion of the existing facility, including removal of a store front system, concrete sidewalk, steps, and railing.

This project is planned to occur in FY 2014.

P-662: Expeditionary Fighting Vehicle Maintenance Facility

This project would construct a new Expeditionary Fighting Vehicle Maintenance Facility (67,371 square feet) to accommodate 58 Expeditionary Fighting Vehicle tracked and non-tracked vehicles for the 3rd Amphibious Assault Battalion. The primary facility would consist of a 10,514-square foot Amphibian Vehicle Maintenance Shop and a 3,868-square foot Automotive Organizational Shop. The facilities would be constructed with reinforced concrete masonry block walls, concrete foundation, concrete slab, and a standing seam metal roof over steel trusses. The maintenance facilities would include six Maintenance Bays to perform maintenance on Expeditionary Fighting Vehicles.

This project would also construct a 39,310-square foot Vehicle Holding Shed to protect wheeled and tracked armored vehicles from accelerated deterioration due to extreme environmental conditions and a 9,054-square foot Closed Loop Tactical Vehicle Wash Platform with six washracks, including a crane to remove engines to allow for secondary hull cleaning. This project would construct 4,628 square feet of office space. Paving and site improvements would include paved privately-owned vehicle parking, sidewalks, roadway access, earthwork, grading, and landscaping. Anti-terrorism/force protection features include fencing, barriers, and gates

This project is planned to occur in FY 2018.

P-680: Addition to West Gym, 1518

P-680 would construct a 19,999 SF multi-story addition, including renovation to the existing west gymnasium (B-1518), and the re-location of weight room functions from this facility to the new addition. The addition would consist of aerobics, cardiovascular training, athletic gear issue, physical fitness training, gymnastics, racket/hand-ball courts, spin room and weight training facilities. The building would include a group meeting area(s), expansion of mens/ladies locker/shower areas and an integrated sound system.

This project is planned to occur in FY 2017.

P-688: Public Works Shops

No project DD1391 documentation available at this time. This project would provide maintenance support facilities for installations' facilities management sections.

This project is planned to occur in FY 2019.

P-808: Concrete Ramp, F/W; Expeditionary Air Field (EAF)

P-808 would construct a 742,904-square foot reinforced concrete aircraft parking apron with areas for hangar access, aircraft refueling, supporting yellow gear, and ordnance handling sleds. It would also construct all associated drainage structures and install all airfield lighting. The project would replace the current apron with permanently installed, reinforced concrete pavement. The project would include all necessary excavation cut and fill, shoulders, drainage structures, environmental mitigation, airfield lighting, service area lighting, and security lighting.

This project is currently unprogrammed

P-810: Concrete Taxiway

P-810 would replace the EAF taxiway and throats constructed of interlocking aluminum matting with 943,326 square feet of new, permanently installed, reinforced concrete pavement. The project includes all necessary excavation cut and fill, shoulders, drainage structures, environmental mitigation, airfield lighting, service area lighting, and security lighting as required. This project is planned to occur in FY 2019.

P-811: Concrete Ramp, R/W; EAF

P-811 would replace 89,289 SY of apron constructed of interlocking AM-2 aluminum matting with 93,287 SY of new, permanently installed, reinforced concrete pavement for parking and access for rotary wing aircraft. The project includes all necessary excavation cut and fill, shoulders, drainage structures, environmental mitigation, airfield lighting, service area lighting, and security lighting as required by NAVFAC P-80.

This project is planned to occur in FY 2019.

P-900: Marine Corps Communication and Electronic Classroom

P-900 would construct a 91,762-square foot, three-story academic and applied instruction facility for the training mission at the Combat Center in direct support of the Marine Corps Communications and Electronic School. Community and service core areas would consist of instructor administrative spaces, multipurpose rooms, housekeeping areas, and public restrooms. Special building design would include built-in equipment for two freight elevators, one-hour construction walls for computer areas, and raised flooring in all classroom and laboratory areas.

Site improvements would include paved parking, sidewalks, outdoor furniture, lighting, roadway access, earthwork, grading, and landscaping. Electrical systems would include fire alarms, energy saving electronic monitoring and control system, and information systems. Mechanical systems include plumbing, fire protection systems, heating, ventilation, and air conditioning, and connections to a central chilled water plant and relocation of high temperature hot water lines with secondary distribution loops.

P-900 would also demolish two existing classrooms, Buildings 1757 and 1758 (each 30,160 square feet).

This project is planned to occur in FY 2015.

P-902: Marine Corps Communications and Electronic School Bulk Supply Warehouse

P-902 would provide a new, permanent, single-story, concrete warehouse building (12,109 square feet) in direct support of the Marine Corps Communications and Electronic School, located within the boundaries of the Marine Corps Communications and Electronic School campus. The building would consist of concrete foundation, concrete floor slab reinforcement run continuously through both faces of the slab and into beams and columns, tilt-up concrete walls, and sloped standing seam metal roofing. The building would have open web steel joist roof support. Community and service core areas would consist of administrative offices, housekeeping areas, and public restrooms.

Supporting facilities work would include site and building utility connections (water, sanitary sewers, electrical, telephone, local area network, and cable television). Electrical systems would include fire alarms, energy saving electronic monitoring and control system, and information systems. Mechanical systems would include plumbing, fire protection systems, and heating, ventilation, and air conditioning. Paving and site improvements would include loading docks, sidewalks, roadway access, earthwork, grading, and landscaping.

This project is planned to occur in FY16.

P-903: Marine Corps Communications and Electronic School Consolidated Radar Classroom

P-903 would consolidate radar training that is currently located in three obsolete buildings constructed in 1967. This project would construct an approximately 32,292-square foot consolidated radar classroom. The project would also construct five external radar sites adjacent to the new facility. Buildings 1826, 1828, and 1839 would be demolished as a part of this project.

This project is planned to occur in FY 2014.

P-920: Multi-Battalion Operations Center

P-920 would construct a 65,789 SF multi-story reinforced concrete masonry CMU Battalion and CO Headquarters for two battalions with seismic upgrades, concrete foundation and floors, and standing seam metal roofing, providing administration offices and other support functions such as Navy and Marine Corps Intranet (NMCI). Built-in equipment includes two elevators. Special costs include seismic construction, additional cost of standing seam metal roofing and construction of a temporary prefab building and its supporting facilities at another site.

This project is planned to occur in FY 2016.

P-921: Electronic/Communications Maintenance and Storage Facility

P-921 would construct a consolidated electronic and communications maintenance shop (10,204 square feet) and unit storage facility (24,649 square feet). Community and service core areas would consist of administrative offices, maintenance shops, public restrooms, and storage areas.

Site improvements would include a loading dock, concrete pavement for the loading area, sidewalks with curbs and gutters, new roadway access to the west side of the new building, earthwork, grading, landscaping, shaded vehicle yards surrounded with security fences and gates, repair of storm drainage, and repair of existing roadway access. Electrical systems would include fire alarms, energy saving electronic monitoring and control system, and information systems including public address system and security monitoring system. Mechanical systems would include plumbing, fire protection systems, compressed air system and heating, ventilation, and air conditioning system, and repair of existing high temperature hot water lines.

P-921 would demolish Buildings 1721, 1723, 1724 (totaling 10,215 square feet), including necessary asbestos and lead base paint removal and clearing of existing underground utilities.

This project is planned to occur in FY 2017.

P-926B: Library/Lifelong Learning Center, Phase II

P-926B is Phase II of a two-phase project that constructs a three-story facility to support the library functions at the Combat Center. Phase I of the project is to construct an adjoining three-story Life Long Learning Center (Education Center). P-926B, Phase II, would construct a 21,000-square foot library to be utilized as the Command Reference Center and support the increase of personnel at the Combat Center. The project would construct library spaces to include large areas for office space, classrooms, book racks, computer rooms, reading rooms, and supporting areas.

Site improvement would include excavation, grading, excess material removal, curbs and gutters, parking and an access road, sidewalks, desert landscaping with irrigation, stormwater control features, pedestrian and bicycle features, and a pedestrian bridge to connect the Library and Learning Center. Special construction would include a fire pump, four stop personnel elevator, and basement excavation and shoring for an elevator maintenance room. Electrical systems would include fire alarms, energy saving Electronic Monitoring and Control System, electrical connection to the grid, exterior lighting and information system connections. The mechanical system would include fire protection systems, high temperature hot water and chilled water systems, and water and sewer connections.

This project is planned to occur in FY 2014.

P-927: Marine Corps Communication and Electronic Classroom

P-927 would construct a 91,106-square foot, multi-story academic and applied instruction facility for the training mission at the Combat Center in direct support of training at the Marine Corps Communications and Electronic School. Special design features would include one-hour construction walls for computer areas, raised flooring in all classroom and laboratory areas, and one freight elevator. Community and service core areas would consist of instructor administrative spaces, multipurpose rooms, housekeeping areas, and public restrooms. Supporting facilities would include site and building utility connections, i.e., water, sanitary sewers, electrical, telephone, local area network, and cable television. The building would connect to a central chilled water plant and relocate high temperature hot water lines with secondary distribution loops.

Site improvements would include paved parking, sidewalks, outdoor furniture, lighting, roadway access, earthwork, grading, and landscaping. Electrical systems would include fire alarms, energy saving electronic monitoring and control system, and information systems. Mechanical systems would include plumbing, fire protection systems, and heating, ventilation, and air conditioning.

P-927 would also demolish two existing classrooms (each 30,160 square feet), Buildings 1747 and 1748.

This project is planned to occur in FY 2017.

P-928: MCCES Classroom

No project DD1391 documentation available at this time. This project would provide academic & applied instruction facilities for communications & electronics formal school.

This project is planned to occur in FY 2018.

P-930: Construct PWD, ROICC, NREA Compound

No project DD1391 documentation available at this time. This project would construct facilities management, operational/administrative facilities, and ROICC offices.

This project is planned to occur in FY 2019

P-978: Rifle Range Water Distribution System

P-978 would construct a new 120,000-gallon ground-level reservoir that would provide required demand and pressure for the Rifle Range Area. The projects would also place 3,100 linear feet of new 12-, 8- and 6-inch potable water distribution lines in a new utility corridor connecting the 20-inch water mains to the reservoir and to the Rifle Range Complex Area. Backflow prevention and check valves devices would be installed to standard. The existing 30,000-gallon steel tank would be demolished and the existing 6-inch polyvinyl chloride water line from the 20-inch water main would be abandoned.

Supporting facilities would include a retaining wall constructed to prevent erosion onto the reservoir. Structural fill would be required as a special foundation requirement. Electrical systems would include communication fiber for the SCADA utilities management system, electrical distribution, exterior lighting, and a pad mounted transformer. Mechanical system would be required to reconnect new lines to existing facilities at the Rifle Range Complex. Paving and site improvements would include an access road to the reservoir, chain link fencing and gate, and closed-circuit cameras to meet Safe Drinking Water Act requirements for Anti-Terrorism. The project would provide for site preparation, including excavation and fill for the reservoir and water lines. Demolition of Building 2110 and the existing 30,000-gallon reservoir would be included in this project.

This project is unprogrammed and expected to occur in FY 2015.

P-980: Substation SCADA System

P-980 would provide an Electrical Distribution SCADA system for Mainside of the Combat Center. Construction would include the installation of fiber optic lines and associated equipment from 11 existing substations to existing Main Control Room located in the Heating Plant (Building 1557) via Co-Gen Plant (Building 1574). Construction would include reconfiguration of existing Main Control Room located in the Heating Plant in order to accommodate new SCADA system. The project would also include revising and displaying the substation control wiring and one-line diagram in each of the substations. The one-line diagram would be displayed in a lockable glass case.

This project is planned to occur in FY 2014.

P-987: Addition to Temporary Lodging Facility

P-987 would construct a two-story, 20-room, 8,860-square foot detached addition to the existing facility and a 6,050-square foot macadam parking lot to accommodate the additional occupancy. Other project components include paving and site improvements including parking, sidewalks, earthwork, grading, and landscaping. The Temporary Lodging Facility is required to provide lodging to military members and their families assigned to the Combat Center while they await assignment to government quarters or locate housing in the local community.

This project is planned to occur in FY 2012.

P-988: Combat Center Gate Reconfiguration, Anti-Terrorism/Force Protection Upgrades

P-988 would construct a new gate house facility (2,497 square feet) including vehicle inspection lanes, sentry inspection houses (194 square feet), and related supporting facilities at the Main Gate and two auxiliary gates at the Combat Center.

Supporting facilities would include a special foundation of borrow and fill of entrance areas, electrical requirements of transformer, electrical distribution, overhead lighting, interior communications and telephone; mechanical utilities include connection to water, sewer, and natural gas. Site improvements would include grading, asphalt and concrete pavements, concrete curbs, concrete dividers, traffic medians, sidewalks, parking areas, overhead signs, road striping and traffic signs, flag poles, and landscaping and irrigation.

P-988 would demolish existing gate facilities and related asphalt and concrete pavement, concrete curbs, and related supporting facilities. The project would also demolish five gate facilities totaling 1,456 square feet: Buildings 900, 901, and 904 (Main Gate), 1000 (Condor Gate), and 3334 (Ocotillo Gate).

This project is planned to occur in FY 2015.

P-989: ATFP Perimeter Fence

No project DD1391 documentation available at this time. This project would fence off the MCAGCC Mainside area to provide a secure perimeter for critical assets.

This project is planned to occur in FY 2018

APPENDIX M
DISPLACED OHV RECREATION STUDY

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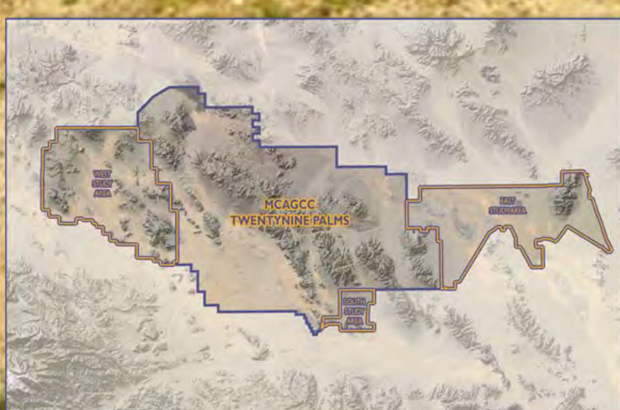
Final Draft

Displaced Off-Highway Vehicle Recreation Study

Prepared for the EIS for Land Acquisition and Airspace Establishment

Marine Corps Air Ground Combat Center Twentynine Palms, CA



December 2011

ACRONYMS AND ABBREVIATIONS

BLM	Bureau of Land Management
CED	Code Enforcement Division
Combat Center	Marine Corps Air Ground Combat Center
DORS	Displaced Off-Highway Vehicle Recreation Study
DWMA	Desert Wildlife Management Area
EIS	Environmental Impact Statement
GIS	Geographic Information System
JV	Johnson Valley Off-Highway Vehicle Area
NEPA	National Environmental Policy Act
NPS	National Park Service
ODA	Open Desert Area
OHV	Off-Highway Vehicle
SBCA	San Bernardino County Area
SBCSD	San Bernardino County Sheriff's Department
SBNF	San Bernardino National Forest
SVRA	State Vehicular Recreation Area
TRED	Tortoise Regional Estimate of Density
U.S.	United States
USFS	United States Forest Service
USFWS	United States Fish and Wildlife Service
WEMO	Western Mojave Plan

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1.0 INTRODUCTION

This Displaced Off-Highway Vehicle (OHV) Recreation Study (DORS) was prepared in conjunction with the *Environmental Impact Statement (EIS) for Land Acquisition and Airspace Establishment to Support Large-Scale Marine Air Ground Task Force Live Fire and Maneuver Training* at the Marine Corps Air Ground Combat Center, Twentynine Palms, CA (the "Combat Center"). The DORS was conducted in response to a request for information during Endangered Species Act Section 7 consultation with the U.S. Fish and Wildlife Service (USFWS) and in response to comments received during the public comment period for the Draft EIS. In May 2011, the Marine Corps submitted to USFWS a Biological Assessment of the project's Preferred Alternative and requested that consultation be initiated in accordance with Section 7 of the Endangered Species Act. The USFWS requested additional information about potential indirect impacts to the threatened Agassiz's desert tortoise (*Gopherus agassizii* - referred to herein as "desert tortoise") that could result from displacement of OHV activity from the West Study Area within Johnson Valley OHV Area (referred to herein as "JV") to other locations. Several project alternatives evaluated in the EIS, including the Preferred Alternative (Alternative 6), would involve land acquisition and subsequent restrictions on recreational access to large portions of JV, currently one of the largest and most popular designated OHV areas in the country. The Draft EIS acknowledged that the Proposed Action would result in significant impacts to recreation because of displacement of OHV and other recreational activity from JV, and that indirect impacts would likely occur at alternative locations that attract the displaced OHV activity. However, the Draft EIS did not identify specific alternative OHV locations, and did not describe a potential distribution of displaced OHV activity to other sites nor detail the specific indirect impacts that would be expected to occur at alternative sites. Some public comments on the Draft EIS noted these limitations in the analysis of indirect impacts and many commenters expressed concerns about a perceived lack of alternative legal OHV sites to absorb the displaced activity from JV, as well as concerns about a potential increase in illegal riding in areas for which OHV riding is not authorized. The DORS was prepared to provide more information about available alternative locations that may receive displaced OHV riding, the potential distribution of displaced OHV activity to these alternative sites, and the potential indirect impacts to desert tortoise populations and critical habitat that may result from the displacement.

The DORS focuses primarily on the desert tortoise, in part because of the questions raised by USFWS, but also because the EIS and studies of the impacts of OHV activities indicate that the desert tortoise is the listed species that would most likely be adversely affected by indirect impacts from the proposed action. As applicable, the DORS also identifies any designated critical habitat for other listed species that occurs in or near the reviewed alternative OHV areas, and it presents a brief qualitative discussion of the potential for indirect impacts to these other species.

The DORS also addresses indirect impacts associated with illegal OHV activity potentially generated by reduced OHV access to portions of JV. Illegal OHV activity has been identified as a problem in public comments on the Draft EIS, by law enforcement officials interviewed for this study, and in biological research related to the desert tortoise. The DORS recognizes illegal OHV use as a contributor to potential impacts to the desert tortoise and as a nuisance to some residents of low-density desert communities. Illegal OHV activity is, by its nature, an elusive and dispersed problem; the DORS does not pinpoint locations of potential illegal OHV activity, but does provide general information on areas where increases and associated impacts may occur.

The DORS utilizes information from and supplements information provided in the Recreation and Biological Resources sections of the Draft EIS, as well as the Biological Assessment for the Proposed Action. The Recreation section of the Draft EIS (Section 4.2) provided quantitative estimates, developed in coordination with the Bureau of Land Management (BLM), for the number of annual OHV visitor-days that would be displaced from JV under each of the project alternatives. The DORS used these same estimates as a starting point, but expands on the analysis in the EIS by identifying alternative areas where displaced OHV use may relocate, and by estimating how the number of displaced visitor-days may be distributed among the identified alternative OHV areas. The Biological Resources section of the Draft EIS (Section 4.10) and the Biological Assessment noted that there may be indirect impacts to the desert tortoise at locations other than JV caused by displaced OHV recreation. The DORS supplements those analyses, and the information and findings contained in this study have been added to the Final EIS.

2.0 METHODOLOGY

The first step in preparing the DORS was to identify areas that would be likely to experience an increase in OHV activity as a result of the elimination or restriction of public access to portions of JV under the Proposed Action. Identification of these alternative areas (also referred to as alternative "locations" or "sites") is important to understanding where indirect environmental impacts might occur. The second step was to estimate the extent of the increase in OHV recreation at the identified alternative areas. Estimates of increased OHV recreation at identified areas are key to understanding the magnitude of any potential environmental impacts. The third step was to collect available information about desert tortoise habitat and population at each identified area and about the types of impacts to desert tortoise habitat and population that can be attributable to OHV activities. In order to provide support for Section 7 consultation with USFWS, the final step in the study was to evaluate the potential for impacts to desert tortoise habitat and population that may occur as a result of displaced OHV activity at alternative OHV areas.

Alternative areas that would be expected to attract displaced OHV recreation from JV were identified based on internet research (websites offering detailed information about OHV recreation areas) and interviews with personnel at federal and local agencies that manage OHV recreational resources, including law enforcement agencies. Having previously established estimates of the total number of displaced OHV visitor-days in the Recreation section of the EIS, percentage distribution factors were used to allocate the visitor-days among alternative locations. The percentage distribution factors were developed as reasonable assumptions for this study; they are not based on previous studies or survey data because no such data or applicable studies exist, but instead are best professional judgment and conservative projections of a possible future scenario based primarily on information obtained during interviews and other personal communication with individuals who are most familiar with the topic and the region. Individuals interviewed include the Bureau of Land Management's (BLM) Barstow Field Office Resources Branch Chief, Field Manager, and Recreation Manager, as well as Sergeants with the San Bernardino County Sheriff's Department who have years of experience with OHV activity in the area, a San Bernardino County Off-highway Vehicle Code Enforcement Division officer, and a National Park Service Ranger familiar with OHV activity in the region.

Having developed a scenario that distributes displaced visitor-days of use to alternative locations, available environmental documentation for the alternative locations was reviewed and all known environmental conditions and constraints were identified. Concurrently, the relationship between OHV activity and desert tortoise habitat and population was researched, with much of that research building upon information contained in the Final Biological Assessment (Combat Center 2011) prepared as part of the Section 7 consultation with the USFWS. Existing tortoise research indicates that increased OHV activity at a given location can have an impact on tortoise habitat and population (Boarman 2002; Bury and Luckenback 2002; Ouren et al 2007), but research into the relationship between OHV activity and tortoise impacts has not yet yielded either a statistical basis for correlating marginal increases in OHV activity to specific degrees of impact to tortoise habitat or populations, nor specific thresholds at which OHV activity of a certain magnitude would trigger a particular type or level of impact. Accordingly, the DORS was limited to identifying instances of geographic concurrence of tortoise populations or critical habitat with the locations of increased OHV activity, and qualitatively assessing any indirect impacts. Quantification of potential impacts to tortoise populations and habitat based on projected increases in OHV activity could not be supported based on available research.

Resources and methodology used in preparing the DORS included a diverse set of tools and techniques. Initial research was conducted utilizing resources available on the internet, including OHV information sites, government agency data publications, news articles, management plans, academic articles, and environmental impact documents. In-depth personal interviews were conducted with experts in the fields of land management and OHV regulatory enforcement to gain a broader and deeper understanding of the issues and availability of data. Analysis of the information gathered included the development of OHV recreation visitor-day distribution factors and Geographic Information System (GIS) layering techniques. The DORS GIS analysis methodology was comparable to the BLM's Western Mojave Desert Off Road Vehicle Designation Project GIS analysis methodology (BLM 2003a), performed to prioritize and designate off-road vehicle routes as open, closed, or open on a limited basis for the protection of natural resources and public safety while continuing commercial and recreational uses. The GIS layering technique utilizes the best available tool to identify the convergence of multiple uses on the same unit of land; convergent land uses that were identified include areas that would attract displaced OHV activity and are designated as desert tortoise critical habitat.

2.1 ALTERNATIVES STUDIED

Section 2.4 of the EIS identifies six action alternatives; the DORS evaluates two of the six – Alternative 1 and Alternative 6. Alternative 1 would close more of JV than any other alternative (about 90% of JV for 12 months per year) and in doing so would result in more displaced OHV recreation than any other alternative. Alternative 1 was therefore included in this study as a worst-case scenario. Alternative 6 was also evaluated, since it was identified as the preferred alternative; Alternative 6 would close about 55% of JV for 10 months per year. Alternatives 2, 4, and 5 were not evaluated as these alternatives would displace fewer OHV visitor-days than those that are evaluated; impacts from Alternative 2, 4, and 5 should be considered similar to alternatives that are evaluated, but to an effect of lower magnitude. Alternative 3 was not evaluated because it would not displace any visitor-days from JV and would thus cause no indirect impacts from displaced OHV activity.

There is a marked difference in the number of displaced visitor-days under Alternative 6 compared to Alternative 1 because Alternative 6 was developed in part to help mitigate the large amount of potential recreational displacement from JV. The total number of estimated displaced visitor-days under Alternative 1 would exceed that of Alternative 6 by 150%. At every alternative location identified, potential displaced OHV visitor-days and potential impacts would be greater under Alternative 1 than they would be under Alternative 6.

2.2 IDENTIFICATION OF ALTERNATIVE OHV AREAS

Areas identified that would be expected to attract OHV activities displaced from JV fall into two major categories – designated OHV areas and the Open Desert Area (ODA). Designated OHV areas refer, in general, to government managed areas with specified boundaries or marked trails. The ODA includes the remainder of the Western Mojave, beyond the boundaries of designated OHV areas. OHV recreation in the ODA is legally permitted on a system of sanctioned routes (the Western Mojave Plan [WEMO] route system), but may also be illegal in many areas as a function of state law or local ordinances (see Appendix A for applicable rules and regulations).

Although OHV areas throughout Southern California are noted in this study, a more detailed focus is given to the area in and around San Bernardino County because, according to BLM estimates (noted in Section 4.2 of the EIS and described below), the vast majority of displaced OHV activity from JV is expected to remain within the County (BLM 2010a). Internet research was conducted to identify the designated OHV areas in Southern California. Relevant websites included sites referenced in the Recreation section of the EIS, as well as OHV information sites (RiderPlanet 2011; California Off-Road Vehicle Association 2011). Websites managed by BLM, U.S Forest Service (USFS), and California State Parks were reviewed as well (BLM 2011a, b, c, d; USFS 2011a, b, c, d, e; California State Parks 2011a). All of the designated OHV areas identified are managed by one of these three agencies.

Geographically, alternative OHV areas are divided into two general areas – the San Bernardino County Area (SBCA) and outside of the SBCA. The OHV areas comprising the SBCA include BLM-designated OHV areas under the jurisdiction of the Barstow, Ridgecrest, and Bakersfield field offices, trail systems in the San Bernardino National Forest (SBNF), privately-owned areas in the SBCA, and the ODA. SBCA locations are mostly located within San Bernardino County; however, three BLM-designated OHV areas in Kern County are also included in the SBCA. The OHV areas outside the SBCA include BLM-designated OHV areas under the jurisdiction of the El Centro field office, California State Vehicular Recreation Areas (SVRAs), and OHV trails in Southern California National Forests including Angeles, Los Padres, Cleveland, and Sequoia.

2.3 DISTRIBUTION OF DISPLACED VISITOR-DAYS OF USE

The number of potential annual displaced OHV visitor-days was established in Section 4.2 of the EIS based on consultation with BLM personnel in the Barstow field office. The recreation analysis in the EIS defines two categories of recreational visits to JV; OHV "event-related use" involving participants and spectators of organized OHV races, and "dispersed use" involving visits for any other reason (e.g., non-event OHV use, family vacations, weekend excursions, non-OHV recreation, etc.). It was established that all of the event-related use would be displaced from JV under Alternative 1 and 60% would be displaced under Alternative 6 (BLM 2010a). According to BLM, none of the displaced event-related visitor-days of use would be accommodated at other legal OHV areas within the SBCA. Interviews with BLM personnel conducted for this study indicate that more restrictive permit requirements enacted since the August 2010 fatal accident at the California 200 Race in JV are already resulting in fewer scheduled race events within the County's OHV areas (BLM 2011e). According to BLM, race organizers have begun to shift future races to other southwestern states instead of the area in and around JV. Since future events, including those that would be displaced from JV, would be shifted to other areas of the southwest, this study does not address the displaced visitor-days associated with race events. For the more numerous dispersed use visitor-days that would be displaced from JV, the assumption used in Section 4.2 of the EIS based on BLM guidance was that 90% of dispersed visitor-days displaced from JV would transfer to other areas within the SBCA (BLM 2010a). The remaining 10% of displaced use would be distributed to all other places outside the SBCA (BLM 2010a). To maintain consistency with the EIS and use the best available data, these assumptions are carried forward throughout this study.

More detailed assumptions for the percentage distribution of displaced annual visitor-days that would remain in the SBCA were primarily based on interviews with local experts (BLM and law enforcement officials) and published visitor-use data. The distribution of displaced use outside of the SBCA was primarily based on the conservative assumption that each BLM-designated OHV area, SVRA, or National Forest would absorb the entirety of the 10% of displaced use that would be expected to occur outside of the SBCA. Distribution of displaced visitor-days among individual areas outside the SBCA (i.e., individual National Forests such as Angeles National Forest or a particular SVRA such as Heber Dunes), were based on visitor data published by USFS and California State Parks, taking into account current proportional visitors and distances from population centers.

To provide some additional perspective on the relative magnitude of increased OHV use at each location, the annual visitor-day numbers are sometimes presented in this study in terms of average daily visitors. Average daily visitor estimates are derived from the annual visitor-days but reflect the number of additional visitors that could be expected on any given weekend day during the most active desert OHV season, between October and April. To estimate the number of average daily visitors, the annual visitor-day estimates are multiplied by the percentage of OHV use that occurs on weekends (85%, established in a previously conducted visitor-use survey) (BLM 1990a) to establish the number of annual visitor-days of use that would occur on weekends. The number of annual weekend visitor-days is then divided by the number of weekend days that occur during the desert OHV season (estimated to be 61), to yield an estimate of the average number of OHV visitors on a typical weekend day during the most active OHV season.

It should be noted that the assumptions developed in this study for the distribution of displaced OHV use from JV to identified locations were based on interviews and available visitor use data, but specific allocations to alternative sites were not provided by the interviewees directly. Interviewees clearly indicated that they could not predict with any precision the potential distribution of displaced OHV activities to alternative OHV locations. In the absence of specific allocations, the anecdotal information (e.g., professional judgment, local knowledge and experience) derived from the interviews was used in conjunction with other available data (e.g., visitor use data, OHV site information, travel distances, etc.) to develop a reasonable allocation scenario that is consistent with the best available information. The resulting distributions of displaced OHV activity from JV to the alternative OHV sites are consistent with all available information and reflect a conservative approximation of what would potentially occur under Alternatives 1 and 6.

2.4 OHV Areas Inside the SBCA

Designated OHV areas in the SBCA would be expected to absorb 90% of the dispersed use OHV recreation that would be displaced from JV, according to Section 4.2 of the EIS (BLM 2010a). The SBCA areas include BLM-designated OHV areas, OHV trails in the SBNF, privately-owned areas, and the ODA. The areas identified are intended to constitute a comprehensive list of OHV areas in the SBCA. The BLM expects that their designated OHV areas would attract the majority of displaced use that would remain in the SBCA (EIS Section 4.2).

2.4.1 BLM-designated OHV Areas (Barstow, Ridgecrest, and Bakersfield field offices)

There are eight individual BLM-designated OHV areas in the SBCA. These areas, like JV, provide open areas for OHV use. Open areas do not limit riders to predetermined trails and vehicles may be operated anywhere within the posted boundaries. Assumptions for the percentage of displaced use that would be relocated to BLM-designated OHV areas, and percentage distributions among individual areas, were based on interviews with BLM (BLM 2011e).

BLM-designated OHV areas that BLM expects would absorb the most dispersed use from JV are Stoddard Valley, El Mirage, and Rasor, due to their proximity to JV and similar terrain. Stoddard Valley was identified as the location that would receive more displaced use than any other. Given information that these locations combined would likely absorb most of the displaced use, they were assumed to absorb 60% of the displaced use that would remain in the SBCA, and over 50% of the total displaced use. Other BLM-designated OHV areas in the SBCA were identified by BLM as having some potential to absorb displaced use, but in certain cases these other areas are incompatible with OHV recreational activities that take place at JV, or do not provide a sufficiently similar environment as the one at JV. Spangler Hills, for instance, is a large area that provides recreational opportunities that are comparable to those at JV, but it is located much further away from populations that frequent JV and is already somewhat crowded (BLM 2010a); this confluence of factors led to the assumption that Spangler Hills would absorb a moderate amount of displaced use (4% of the SBCA total and 3.5% of the overall total). An alternative case, Dumont Dunes, was identified by BLM as having little or no recreational compatibility with JV, because the vehicles most often used at JV would not be viable at Dumont Dunes. This may imply that assumed displaced use at Dumont Dunes should be 0%, however, OHV recreationists often possess more than one type of vehicle and if portions of JV were closed, these recreationists may choose to use their Dumont Dunes compatible vehicles more often than they otherwise would have. Given the confluence of factors, Dumont Dunes was assumed to absorb 1% of displaced use in the SBCA, and a smaller percentage of total displaced use. In total, after detailed assumptions for each area were made, BLM-designated OHV areas in the SBCA were assumed to absorb 70% of displaced use that would remain in the SBCA and 63% of total displaced use.

2.4.2 Open Desert Area (ODA)

Off-highway vehicle riding in the ODA generally occurs on the WEMO route system, where OHV riding is legal, but also occurs off of the WEMO route system where OHV activity is prohibited. The WEMO route system includes 5,098 miles (8,204 kilometers) of OHV routes in the western Mojave Desert (BLM 2005). Off-highway vehicle use in the open desert, outside of the WEMO route system, is technically prohibited but occurs often on routes that have been closed or on illegal extensions of legal routes (BLM 2011e). Areas of concern for illegal activity include environmentally sensitive areas, low-density residential communities, and portions of JV that would be closed as a result of the Proposed Action.

The percentage of displaced use assigned to the ODA was developed after accounting for displaced use at BLM designated OHV areas. BLM-designated OHV areas were assumed to absorb 70% of displaced use in the SBCA, leaving 30% remaining. Given their previous experience with OHV area closures (BLM 2009, BLM 2011e, SBCSD 2011), interviewed personnel were confident in identifying the ODA as a place where displaced OHV use would occur. Similar location, compatible equipment, and comparable riding experience were given as reasons for expecting recreation that would be displaced from JV to occur in the ODA. Since OHV trails in the ODA were identified as popular alternatives to JV, the ODA was assumed to absorb the bulk of the residual displaced visitor-days (20% of displaced use in the SBCA and 18% of total displaced use). This allocation was also supported by information that other SBCA locations left to consider – OHV trails in the SBNF and privately-owned areas – were identified in interviews as somewhat less likely to absorb displaced use as BLM-designated OHV areas and the ODA (BLM 2011e).

2.4.3 OHV Trails in the SBNF

The SBNF currently accommodates more OHV recreation than any other Southern California National Forest (USFS 2011f), and, given its location near JV and population centers, would be expected to attract some displaced OHV activity from JV. The assumption for the percentage of displaced use that would be attracted to SBNF is partially residual – developed after other assumptions were developed – and partially guided by data published by the USFS, which provided reference as to the prevalence of OHV use at SBNF (2011f). In developing the assumed percentage of displaced use at SBNF, along with location and current popularity, compatibility of vehicles (with those used at JV) was considered, as was the availability of camping opportunities.

The residual percentage of displaced use remaining to be distributed (10% of displaced use within the SBCA), needed to be divided between trails in the SBNF and privately-owned OHV areas. Given the attributes of the SBNF trails (compatibility of use with JV and current popularity) compared to attributes of privately-owned OHV areas, most of the residual was assigned to trails in the SBNF. Trails in the SBNF were assumed to absorb 7% of displaced use in the SBCA and privately-owned OHV areas were assumed to absorb 3% of displaced use that would remain in the SBCA.

2.4.4 Privately-owned OHV Areas

Some OHV recreation displaced from JV would be expected to relocate to private land. Private land could include privately operated tracks or parcels of privately-owned land large enough to accommodate OHV recreation. The percentage of displaced use from JV that may be attracted to privately-owned areas is partially residual – developed after other assumptions were developed and only a small portion of displaced use remained – and partially based on interviews with BLM officials, who mentioned the potential for some displaced use relocating to private land (BLM 2011e).

2.5 OHV Areas Outside the SBCA

OHV areas outside the SBCA include: 1) BLM-designated OHV areas; 2) SVRAs; and 3) OHV trails in National Forests. Because there were no data available to indicate rider preferences among these alternative areas, a conservative worst-case assumption was used in this study that each of these three classes of OHV area would be assumed to attract the entirety of the 10% of displaced use that would occur outside of the SBCA.

2.5.1 BLM-designated OHV Areas (El Centro field office)

Four designated OHV areas under the jurisdiction of the El Centro field office were included in the analysis of areas outside the SBCA. Similar to JV, OHV areas under the jurisdiction of BLM's El Centro field office provide vast areas for open riding. The terrain at El Centro locations is generally somewhat different than at JV; however, most equipment that would be used at JV would be similar at El Centro locations. El Centro locations are further away from the greater Los Angeles area than the SBCA, but are not too far for multi-day excursions that include camping, which are also common at JV. Assumptions about displaced OHV use relocated to El Centro locations were based on the attributes of the areas (size, terrain, location, etc.) determined through internet research and consultation with BLM. A fifth area under management by BLM El Centro (Devil's Canyon) was identified but this area is subject to a Special Recreation Permit limitation of a maximum of 210 vehicles per year. Despite being potentially attractive to those who enjoy rock-crawling at JV, no specific allocation of displaced use was made for Devil's Canyon; instead, it is assumed that the permitted maximum number of vehicles would be reached.

2.5.2 SVRAs

There are four Southern California SVRAs that provide a variety of terrain and amenities that would be expected to attract displaced OHV activity from JV. These locations offer large open areas, interesting terrain, and camping opportunities. The percentage distribution of displaced visitor-days among SVRAs was based on location, amenities, and proportion of current visitor use as identified in publications by the California Department of Parks and Recreation (California State Parks 2011b).

2.5.3 Southern California National Forests

Like the SBNF, other National Forests in Southern California provide trail systems for OHV use. Given the wide variety of locations and range of activities available, it would be expected that some displaced

OHV use would be attracted to these trails. The Angeles and Los Padres National Forests are also located in close proximity to major OHV recreationist populations (USDA 2005a). The OHV trails in the Cleveland National Forest are geographically widespread, with some trails near Riverside and Orange Counties, and some near San Diego County. Sequoia National Forest OHV trails are further from population centers but are popular among OHV recreationists. Each of these areas also offers camping opportunities. The percentage distribution of displaced visitor-days among National Forests elsewhere in Southern California was based on visitor use data published by USFS.

2.6 IDENTIFICATION OF ENVIRONMENTAL CONCERNS

To provide an understanding of the nature of potential impacts, environmental concerns related to displaced OHV activity are reviewed in Section 4.0; environmental concerns that are reviewed include potential impacts to the desert tortoise and illegal OHV activity. Concerns related to the desert tortoise are reviewed because one of the primary purposes of this study is to support Section 7 consultation with the USFWS, in support of their development of a Biological Opinion on the Proposed Action. Concerns related to illegal OHV activity are reviewed because it was identified in public comments on the Draft EIS and by law enforcement officials as a potential problem that would be associated with the displacement of OHV recreation from JV.

The review of potential impacts to desert tortoises draws on existing research to outline the ways in which OHV activity can impact desert tortoise habitat and population. Information from academic articles, environmental documentation, and the Biological Assessment is presented to document the correlation between OHV activity and the viability of desert tortoise habitat and population. While the correlation is delineated, and noted to be an inverse correlation, commonly understood limitations in data are also noted. Limitations in existing data include the lack of an established OHV activity threshold that would allow for more certain prediction of tortoise-related impacts, and a numerical correlation that would allow for calculation of the magnitude of potential impacts.

This study’s review of potential impacts from displaced illegal OHV activity takes a two-pronged approach: illegal OHV activity as it may impact the desert tortoise, and illegal OHV activity as it may impact residents of low-density desert communities. For the most part, potential impacts of illegal OHV activity on desert tortoise habitat and population are similar to general impacts that OHV activity may have on other natural resources; however, since illegal OHV activity has the potential to create a proliferation of new trails through desert tortoise habitat, research related to this scenario is pertinent. The review of illegal OHV activity in regard to potential nuisances to residential communities includes information gathered from law enforcement officials in interviews conducted for this study.

2.7 EVALUATION OF IMPACTS

The evaluation of impacts in this study focuses mainly on the indirect effects that displaced OHV activity may have on the desert tortoise and its habitat (particularly designated critical habitat). Additionally, impacts are evaluated that relate to increased illegal OHV activity in low-density residential areas. Impacts related to both the desert tortoise and low-density residential communities are evaluated qualitatively and are presented as potential impacts.

Existing tortoise research has shown that several general types of impacts can be attributed to OHV activity (discussed in Section 4.0). However, as noted above, research efforts to date on OHV impacts to tortoise populations and habitat have not determined a threshold for impact or a quantitative correlation that relates increases in OHV use to specific levels of desert tortoise habitat degradation or mortality. In addition, predicting human behavior (e.g., the choice of alternative OHV area by displaced riders) with any certainty was described by OHV enforcement experts as a near impossibility, as there are too many factors that change dynamically before they can be studied. The enigmatic nature of OHV use in the ODA is even more pronounced as related to illegal OHV use, which is often intentionally elusive.

Lacking a research basis for quantifying the impacts to tortoise populations and habitat, the analysis in this study focused on a qualitative assessment of the relative potential for impacts across different alternative sites. The study estimates the amount of increased OHV activity at locations known to have tortoise populations and habitat, and the relative likelihood that generalized OHV-related tortoise impacts would continue to occur or would potentially increase. GIS overlays were analyzed and areas for which increases in OHV activity coincided with desert tortoise populations or critical habitat were identified. Impacts were qualitatively assessed by comparing the relative occurrence of tortoise populations and habitat with the potential increases in OHV activity at each alternative location. Impacts on low-density residential communities were addressed similarly.

3.0 DISTRIBUTION OF DISPLACED OHV ACTIVITY

Drawing on information provided in Section 4.2 of the EIS, Table 1 shows the estimated baseline number of annual visitor-days at JV and the projected percentage and number of visitor-days that would be displaced under Alternatives 1 & 6. Under Alternative 1, the EIS assumed based on BLM input that 75% of baseline visitor-days would be displaced while under Alternative 6, 30% of baseline visitor-days would be displaced. Alternative 1 would displace 209,783 annual visitor-days while Alternative 6 (the Preferred Alternative) would displace less than 40% of that total (83,913 annual visitor-days).

Table 1. Annual Visitor-Days Displaced from JV – Alternatives 1 and 6

	Alternative 1	**Alternative 6**
Baseline Visitor-Days	279,710	279,710
% Dispersed Use to be Displaced	75%	30%
Visitor-Days Displaced	209,783	83,913

Source: EIS Table 4.2-4.

Table 2 identifies the portion of displaced annual visitor-days that would remain within the SBCA and the portion that would be diverted to other Southern California OHV locations for Alternatives 1 & 6. Recreation and land management authorities at the BLM Barstow field office anticipate that most of the displaced visitor-days would occur elsewhere within the SBCA. As was previously established in Section 4.2, Table 4.2-5, of the EIS – 90% of displaced use would remain within the SBCA (BLM 2010a). The remaining 10% of displaced use is assumed to shift to areas outside the SBCA (BLM 2010a); a conservative assumption is applied that all 10% would remain in Southern California.

Table 2. Distribution of Displaced Annual Visitor-Days – San Bernardino County Area and Other Southern California Areas

Region	**Assumed Displaced Use %**	**Alternative 1**	**Alternative 6**
Total Displaced Use	**100%**	**209,783**	**83,913**
SBCA	90%	188,804	75,522
Other Southern California	10%	20,979	8,391

Sources: EIS Table 4.2-5; BLM 2010a.

3.1 DISPLACED OHV USE INSIDE THE SBCA

Table 3 presents a list of locations inside the SBCA that would be expected to attract displaced OHV activity from JV under Alternatives 1 & 6. These areas include BLM-designated OHV areas, designated OHV trails in the SBNF, privately-owned OHV areas, and the ODA. For each identified location in the SBCA, Table 3 provides the assumed percentage of displaced annual OHV visitor-days and the increase in visitor-days that each location would be expected to attract each year. Annually, alternative OHV areas in the SBCA would be expected to attract an additional 188,804 visitor-days under Alternative 1 and 75,522 additional visitor-days under Alternative 6. In terms of average daily visitors on a typical weekend day during the most active OHV season (October through April), an estimated 2,633 visitors would be displaced to areas in the SBCA under Alternative 1 and 1,053 visitors would be displaced to other areas in the SBCA on a given weekend day under Alternative 6 (40% of Alternative 1 total).

Table 3. Assumed Distribution of Displaced Visitor-Days and Increase in Annual Visitor-Days at Designated OHV Areas in the SBCA – Alternatives 1 and 6

	Assumed Displaced Use %	Increase in Visitor-Days Alternative 1	Increase in Visitor-Days Alternative 6
Total Displaced Use in SBCA	**90%**	**188,804**	**75,522**
BLM-designated OHV Areas	**70%**	**132,163**	**52,865**
Stoddard Valley	45%	84,962	33,985
El Mirage Dry Lake	7%	13,216	5,287
Rasor	7%	13,216	5,287
Spangler Hills	4%	7,552	3,021
Jawbone Canyon	2%	3,776	1,510
Keyesville	2%	3,776	1,510
Dove Springs	2%	3,776	1,510
Dumont Dunes	1%	1,888	755
Open Desert Area	**20%**	**37,761**	**15,104**
WEMO Route System	13%	24,545	9,818
Illegal Areas	7%	13,216	5,287
San Bernardino National Forest	**7%**	**13,216**	**5,287**
Privately-owned OHV Areas	**3%**	**5,664**	**2,266**

Note: Total displaced use is the percentage of total OHV use displaced from JV assumed to be retained in the SBCA (90%). Percentages for individual jurisdictions should equal 100% (100% of the 90% within the SBCA). Displaced use percentages for individual OHV areas are allocations of the jurisdiction percentage. Estimated visitor-days for individual locations are calculated by multiplying respective assumed displaced use percentages by the total number of displaced visitor-days in the SBCA.

Sources: Assumed percentages based on information gathered in personal communication: SBCSD 2011; BLM 2010a; BLM 2011e; NPS 2011; San Bernardino County CED 2011; and published visitor statistics: USFS 2011f.

3.2 DISPLACED OHV USE OUTSIDE OF THE SBCA

Table 4 identifies designated OHV areas outside of the SBCA that would be expected to draw OHV activity displaced from JV under Alternative 1 and Alternative 6, as well as the difference between the two. These locations include BLM-designated OHV areas under the jurisdiction of the El Centro field office, Southern California SVRAs, and Southern California National Forests. As the result of making the conservative, or worst-case, assumption that the entire 10% of displaced OHV activity not occurring within the SBCA would shift to locations under each of these jurisdictions, it would be expected that each would draw an additional 20,979 annual visitor-days under Alternative 1 and 8,391 annual visitor-days under Alternative 6. In terms of average daily visitors on a given weekend day during the active OHV season, an estimated 293 visitors would be displaced to areas outside the SBCA under Alternative 1 and 117 visitors would be displaced to other areas outside the SBCA on a given weekend day under Alternative 6 (40% of the Alternative 1 total).

Table 4. Assumed Distribution of Displaced Visitor-Days and Increase in Annual Visitor-Days at Designated OHV Areas outside the SBCA – Alternatives 1 & 6

	Assumed Displaced Use %	Increase in Visitor-Days Alternative 1	Increase in Visitor-Days Alternative 6
Total Displaced Use outside the SBCA	**10%**	**20,979**	**8,391**
BLM El Centro	**100%**	**20,979**	**8,391**
Imperial Sand Dunes	40%	8,392	3,356
Plaster City	20%	4,196	1,678
Superstition Mountain	20%	4,196	1,678
Lark Canyon	20%	4,196	1,678
Devil's Canyon	Limited Use		
SVRAs	**100%**	**20,979**	**8,391**
Hungry Valley	40%	8,392	3,356
Ocotillo Wells	30%	6,294	2,517
Oceano Dunes	20%	4,196	1,678
Heber Dunes	10%	2,098	839
National Forests	**100%**	**20,979**	**8,391**
Los Padres National Forest	45%	9,441	3,776
Angeles National Forest	35%	7,343	2,937
Cleveland National Forest	10%	2,098	839
Sequoia National Forest	10%	2,098	839

Note: Total displaced use is the percentage of total dispersed OHV use displaced from JV that would be absorbed outside of the SBCA (10%). In the assumed worst-case scenario provided, each jurisdiction would absorb the entirety (100%) of displaced visitor-days. Assumed breakdowns for individual OHV areas, within jurisdictions, are based on existing visitor data and interviews with agency representatives. Estimated visitor-days for individual locations are calculated by multiplying respective assumed displaced use percentages by the total number of displaced visitor-days outside the SBCA.

Sources: Assumed distributions based on: BLM 2010a; BLM 2011e; USFS 2011f; California State Parks 2011b.

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4.0 ENVIRONMENTAL CONCERNS RELATED TO OHV USE

Areas identified as those that would attract displaced OHV use may be subject to environmental impacts caused by the increased OHV activity. As discussed in the Biological Assessment prepared for the EIS and other existing research, OHV activity is known to have the potential to generate impacts on biological resources (Boarman 2002; Ouren *et al.* 2007; Combat Center 2011) and residential communities (BLM 2003a; SBCSD 2011). Most importantly, for the purposes of this study, OHV activity can have impacts on the desert tortoise. Illegal OHV activity, in addition to impacting wildlife habitat, can create a nuisance to residents of low-density desert communities (Bazar 2008; SBCSD 2011).

4.1 DESERT TORTOISE DENSITIES AND GENERAL OHV IMPACTS

The Mojave population of the Agassiz's desert tortoise is designated by state and federal authorities as a threatened species, and desert tortoise critical habitat has been designated within the ODA. The Mojave population of the desert tortoise has a range that encompasses portions of Inyo, Kern, San Bernardino, Los Angeles, and Riverside Counties. Desert tortoises are most common on valley floors, bajadas, on slopes of up to 10% in plains, washes, desert fans, and hills (BLM 2005). Desert tortoises are mostly absent from dry lakebeds and elevations above 4,500 feet, and their densities decrease with increasing latitudes (BLM 2005). OHV activity is common in valley floors, bajadas, and washes. These areas have a high potential for OHV activity and impact to desert tortoises.

OHV activity can result in decreased desert tortoise densities through direct and indirect impacts (Boarman 2002). Direct impacts include the crushing of tortoises and the destruction and fragmentation of their habitat. Heavier OHVs also have the potential to crush tortoise burrows and compact soil, making it difficult to dig burrows (Lovich and Bainbridge 1999; Boarman 2002; BLM 2005, Combat Center 2011, Volume II, Species Accounts). Potential indirect impacts include degradation of habitat quality, erosion and soil disturbance, noise disturbances, toxins from engine exhaust, introduction of non-native vegetation, and an increase in desert tortoise predators due to other human activities (i.e., ravens attracted by discarded refuse, unleashed domestic dogs at campsites, etc.) (Doak *et al.* 1994; Boarman 2002; BLM 2005; Combat Center 2011, Species Accounts Appendix).

Multiple studies have found a significant difference in desert tortoise density between areas with heavy OHV use and topographically comparable areas with limited or no OHV use (Bury and Luckenbach 2002; BLM 2005; Karl 2010). In 2002, Bury and Luckenbach surveyed two 61.8-acre (25-hectare or 0.1 square mile) plots with desert tortoise habitat; one plot was used by OHV riders and the other was not. The plot used by OHV recreationists was located in the Stoddard Valley OHV area, and the unused plot was approximately 1.6 miles (2.5 kilometers) to the west, on the other side of Interstate 15. The authors found that the unused plot had 1.7 times as many live plants, 3.9 times as much plant cover, 4 times the number of tortoise burrows, and 3.9 times as many tortoises as did the heavily used plot. The desert tortoise survey of the JV OHV Area performed for the EIS resulted in similar findings (refer to Appendix I of the EIS). Study plots were classified as having a low (0-2 OHV trails), medium (3-5 trails), or high (more than 5 trails) disturbance level from OHV use. The study results show that medium-intensity OHV areas had a 2.2% reduction in adult desert tortoise density as compared to the low-intensity areas, which was not statistically significant. However, a statistically significant inverse correlation was found as high-intensity areas had a 20% reduction in adult desert tortoise density as compared to the low-intensity areas. Other studies confirm that desert tortoise densities are inversely correlated with the number of OHV trails in an area, and that desert tortoise populations have declined near OHV areas (BLM 2005). Boarman

(2002) states that "very light, basically non-repeated, vehicle use probably has relatively little long-term impact." However, OHV areas with high activity (staging and camping areas, racing courses, high use areas, etc.) can have significant impacts to natural resources, including desert tortoises (BLM 2005).

The Western Mojave Desert tortoise recovery unit as a whole is estimated to have 43,701 desert tortoises (with a 95% confidence interval of 24,361 to 79,126 tortoises) (USFWS 2010c). However, this area has seen a decline in tortoise population densities since monitoring began in the late 1970s (USFWS 1994, 2010c, 2011). Within the ODA, permanent desert tortoise study plots in BLM's West Mojave planning area exhibited a 5% decrease in tortoise abundance at the Stoddard Valley site from 1979 through 1996, and 30% decreases in Johnson Valley and Lucerne Valley (BLM 2005). Analysis performed in the Desert Tortoise Recovery Plan Assessment Report suggested that, "the management strategy and implementation of recommended management actions over the last decade in [the] West Mojave Recovery Unit have not slowed the decline of tortoise populations" (Tracy *et al.* 2004). Population declines have not been quantifiably attributed to likely mortality factors such as disease, OHV activity, predation, etc. (Tracy *et al.* 2004, USFWS 2011b). Primary reasons include the difficulty of estimating desert tortoise population densities in general, and the interconnectedness of desert tortoise impacts (for example, the addition of a paved road in desert tortoise habitat providing increased access to habitat, leading to increased potential for vehicle impacts, collection of tortoises by visitors, etc.) (Tracy *et al.* 2004).

While existing research has established that there is a correlation between OHV activity and impacts to desert tortoise habitat and population, it is acknowledged that research has produced limited data with which to quantify the relationship (Doak *et al.* 1994; Bury and Luckenbach 2002, Boarman 2002; BLM 2005). In researching the subject, this study has not been able to identify any studies that establish a level of increased OHV activity that a particular location would need to experience to establish that impacts would occur.

Recent desert tortoise population density survey results are available for designated OHV areas, desert tortoise critical habitat areas (Desert Wildlife Management Areas, or DWMAs), and the Combat Center Land Acquisition Study West, South, and East Study Areas. These results are presented in Tables 5, 6, and 7.

Desert tortoise sign count surveys performed for the West Mojave Plan from 1998 through 2002 counted tortoise sign (burrows, scats, etc.) in the Open OHV areas and DWMAs listed in Table 5. The survey results found what was described as "above average" counts of tortoise sign. In addition, as shown in Table 5, the miles traveled to see one live tortoise in the Ord-Rodman DWMA was 12.1 miles, and was 13.7 miles in the Superior-Cronese DWMA. The study found that shorter distances were required to see one live tortoise for Stoddard Valley (10.5 miles) and El Mirage (8.0 miles).

Table 5. Tortoises Observed in OHV Areas and DWMAs, in the ODA

Open OHV Area	Linear Miles Surveyed	Live Tortoises Observed	Encounter Rate (tortoises observed per mile)	Miles to See (miles traveled to see one tortoise)
Johnson Valley	346.5	8	0.023	43.3
Stoddard Valley	94.5	9	0.095	10.5
El Mirage	24.0	3	0.125	8.0
Spangler Hills	112.5	2	0.018	56.2
Dove Springs	4.5	0	n/a	n/a
Rasor	39.0	0	n/a	n/a
DWMAs	**Linear Miles Surveyed**	**Live Tortoises Observed**	**Encounter Rate (tortoises observed per mile)**	**Miles to See (miles traveled to see one tortoise)**
Ord-Rodman	352.2	29	0.082	12.1
Fremont-Kramer	858.0	45	0.054	18.6
Superior-Cronese	1,083.0	79	0.073	13.7

Source: Krzysik 2002, as reported in BLM 2005.

The 1994 Desert Tortoise (Mojave Population) Recovery Plan delineated six recovery units within the desert tortoise's range (U. S. Fish and Wildlife Service 1994); monitoring of desert tortoise population densities has occurred in the recovery units since 2001. Table 6 shows the number of live adult desert tortoises found within the Ord-Rodman DWMA, the Superior-Cronese DWMA, and Joshua Tree National Park, from 2001 through 2010 (except for 2006, when no monitoring occurred). Direct comparisons cannot be made across years due to a change in surveying methodology; however, live adult tortoises were observed during every survey year.

Table 7 presents desert tortoise population density data gathered in surveys performed in support of the Biological Assessment for the Proposed Action (Karl 2010). The study areas are defined in relation to the Combat Center (for instance, the West Study Area is to the west of the Combat Center). Two methods were used to estimate tortoise density in the study areas, the Tortoise Regional Estimate of Density (TRED) model and the USFWS 2010 pre-project survey protocol. Both methods categorize tortoise densities as low in all of the study areas, especially the South Study Area and East Study Area. The West Study Area is entirely within the JV Open OHV area, and was found to have the highest desert tortoise population density of the three study areas. The highest tortoise densities were found in the hills and valleys of Emerson Lake (on the JV/Combat Center boundary), and in upper Johnson Valley. In the South Study Area, areas of higher tortoise densities were found in the northeast and central southwest. In general, the East Study Area was sparsely populated with desert tortoises, but higher densities were found along the eastern border and the extreme southwest portion.

Table 6. Desert Tortoise Encounters (2001-2010) and Densities (2007-2010) in Ord-Rodman and Superior-Cronese DWMAs and Joshua Tree National Park

Area Surveyed	Survey Period	Number of Transects	Total Transect Length (km)	Number of adult tortoises observed	Tortoise Density (per km)
Ord-Rodman DWMA	2010	25	270	27	7.5
	2009	20	197.1	13	7.1
	2008	9	102	5	6.0
	2007	12	140.9	10	8.2
	2005	26	310	31	*n/a*
	2004	35	381	47	*n/a*
	2003	127	506	130	*n/a*
	2002	106	424	87	*n/a*
	2001	197	315	66	*n/a*
Superior-Cronese DWMA	2010	113	1301	46	2.6
	2009	69	781.2	36	4.9
	2008	24	281	7	3.1
	2007	38	455.5	25	6.3
	2005	84	1009	85	*n/a*
	2004	62	690	71	*n/a*
	2003	166	663	86	*n/a*
	2002	172	681	62	*n/a*
	2001	211	338	46	*n/a*
Joshua Tree National Park	2010	25	227	6	2.8
	2009	25	244.4	4	2.3
	2008	10	102	4	5.6
	2007	12	134.9	4	2.8
	2005	50	601	22	*n/a*
	2004	23	278	12	*n/a*
	2003	50	200	19	*n/a*
	2002	47	196	11	*n/a*
	2001	77	123	17	*n/a*

Note: *n/a = not available for survey years 2001-2005.*
Source: USFWS 2006; 2009; 2010a, b.

Table 7. Tortoise Density Comparison of 2009 Combat Center Study Area Results with U.S. Fish and Wildlife Service Range-wide Program

Area Surveyed[1]	Survey Period	Tortoise density (per km) using TRED Model[2]	Tortoise density (per km) using USFWS Sampling Protocol[2]
West Study Area	2009	3.7	7.4
South Study Area	2009	4.9	5.7
East Study Area	2009	0.9	0.9

Source: Karl 2010
Notes: [1]Refer to Figure 1 in Karl 2010 (Appendix B in the Biological Assessment [Combat Center 2011]) for boundaries of the study areas.
[2]Both tortoise density methods used tortoise sign (burrows or tortoises) counts to estimate density.

4.2 ILLEGAL OHV ACTIVITY

Illegal OHV activity has proven difficult to monitor effectively and thus has been a continuing problem in the region (BLM 2011e; SBCSD 2011; National Park Service (NPS) 2011; San Bernardino County CED 2011a). Based on previous experience with the closure of other legal areas, law enforcement officials expect the problem to worsen if portions of JV are closed (BLM 2011; SBCSD 2011). For the purposes of this study, areas where OHV activity is prohibited are assumed to attract an additional 13,216 visitor-days per year under Alternative 1, and an additional 5,287 visitor-days per year under Alternative 6 (see Table 3). Some portions of the ODA would not be expected to see an increase in illegal OHV activity. For example, Mohave National Preserve is well enforced, with high penalties for trespassing (SBCSD 2011). Additionally, Joshua Tree National Park has illegal OHV riders who have historically trespassed within the park, in preference to the open and legal Johnson Valley OHV area. An NPS ranger indicated that, due to limited casual access, OHV riders who have historically preferred JV would not be likely to venture into Joshua Tree National Park (NPS 2011).

Based on law enforcement descriptions, illegal OHV activity could be divided into two major categories: 1) deviations from the WEMO route system, and 2) OHV activity in low-density residential communities. Off-highway vehicle riding off of approved trails is an established and widespread issue of concern to desert tortoise habitat, as confirmed by literature (BLM 2005; Wildlife Health Center 2006; Ouren *et al.* 2007). Resource management and law enforcement agencies interviewed for this study confirmed that OHV activity in low-density residential communities is an issue of concern (BLM 2011e; SBCSD 2011; NPS 2011; San Bernardino County CED 2011a).

Management agencies and law enforcement officials identify that illegal OHV activity often takes place in the ODA, just off of the WEMO route system, through the use of closed routes or the creation of new routes extending from open routes. The BLM West Mojave Plan (BLM 2005) reported that “even at 500-feet from an open route, unauthorized tracks were observed at a rate of almost one per 20 linear foot” in the Rand Mountain area of the Ridgecrest BLM District. Within the popular Ord Mountain WEMO route network, the number of unauthorized routes increased by 27% over the 11 years preceding the establishment of the Ord-Rodman DWMA, which was established in 1989 to protect desert tortoise critical habitat (BLM 2005). Since the closure of some routes within the DWMA, BLM has had limited success in preventing use of the closed routes. Due to the destruction of signs that identified closed routes, BLM currently signs open routes, and does not identify closed routes; this practice brings about difficulty in informing OHV riders as to what areas are off-limits for the purpose of preserving desert tortoise habitat (Wildlife Health Center 2006).

Complaints relating to nuisance and trespass are sometimes made to local law enforcement. Often, complaints are related to noise, which is often amplified by after-market parts (Wyle Laboratories Inc. 2005). The San Bernardino County CED registered 108 complaints related to OHV use in residential communities in 2010, and they expect that number would increase if portions of JV were to close (San Bernardino County CED 2011, 2011a). The SBCSD also works to enforce illegal OHV activity in residential communities. The SBCSD notes that illegal riding in residential areas has declined significantly since they began their enforcement and education campaign ten years ago (SBCSD 2011) but expects that if portions of JV were to close, illegal OHV riding in neighborhoods countywide would likely return to previous levels.

The Sheriff's OHV enforcement team has used several methods to curb illegal riding in the ODA, including educating riders about the proximity of legal OHV areas, creating brochures and other educational materials, placing paddle marker signs to mark open routes, and using electric signs during periods of high activity (SBCSD 2011). In addition, the Sheriff's OHV team also applies for grant funding through the green sticker program for enforcement and education equipment and funding. Due to the state's budget shortfalls in recent years, grant funding has been considerably reduced.

Impacts associated with illegal OHV activity are two-pronged; illegal OHV activity can have impacts on desert tortoise habitat and populations and on the human environment by creating a nuisance in low-density residential communities. Impacts on the desert tortoise habitat are similar to general OHV impacts, but unique in that illegal OHV activity often involves the creation of a new route, which can have particularly detrimental effects (Wildlife Health Center 2006). Impacts associated with illegal OHV activity in low-density residential areas within the ODA are associated with nuisance to residents. Common complaints related to illegal OHV use within communities are trespass, objectionable noise, dust, and damage to private property (Bazar 2008).

5.0 ANALYSIS OF DESIGNATED OHV AREAS

Table 8 lists and provides attributes for designated OHV areas that would be expected to experience an increase in visitor-days of use as a result of the closure of portions of JV. The table includes locations of popular designated OHV areas in Southern California; BLM-designated OHV areas, SVRAs, and trails within southern California National Forests. The OHV areas are distributed among eight study blocks; the first three study blocks include locations within the SBCA – BLM Barstow, BLM Ridgecrest and Bakersfield, and SBNF locations – and the final five study blocks include designated locations outside of the SBCA.

Figure 1 illustrates the location of OHV areas, and Figures 2 through 9 include each OHV area as part of a study block, providing a more detailed view. Discussion of each study block includes the potential number of increased visitor-days per year expected to be absorbed by each location, potential impacts to desert tortoises, and identification of any designated critical habitat of threatened and endangered species within or near each area. There is no desert tortoise critical habitat within any of the designated OHV areas identified; however, desert tortoises have been found within some of the OHV areas, including Stoddard Valley, El Mirage, and Spangler Hills.

5.1 STUDY BLOCK 1: DUMONT DUNES, EL MIRAGE, RASOR, AND STODDARD VALLEY

Study Block 1 is composed of four BLM-designated OHV areas under the jurisdiction of the Barstow field office (Figure 2). Each of these designated OHV areas is located in San Bernardino County and is included in the SBCA. Stoddard Valley would be expected to have the largest increase in annual visitor-days as a result of OHV activity displaced from JV, due to its proximity to Johnson Valley and to the populated Los Angeles area, its large size relative to the other designated OHV areas in the southern California area, and because it has terrain similar to that available in JV.

5.1.1 Dumont Dunes

Dumont Dunes consists of 8,150 acres (3,298 hectares) located in northeastern San Bernardino County. The area, which includes large sand dunes and unique desert scenery, would be expected to draw 1,888 and 755 additional visitor-days per year under Alternatives 1 and 6, respectively, as a result of displaced use from JV.

The Dumont Dunes Management Plan does not identify the desert tortoise as present within the OHV area (BLM 1990b), thus there would be no impact to the desert tortoise caused by displaced OHV activity. GIS analysis identified no designated critical habitat in the vicinity of Dumont Dunes.

5.1.2 El Mirage

El Mirage consists of 24,000 acres (9,712 hectares) located in western San Bernardino County. The predominant OHV activity is motorcycle use, but other OHV activities occur, especially on the dry lakebed where alternative vehicles are tested and ridden (e.g., land wind-sailors, aircraft, experimental vehicles) (BLM 2003a). El Mirage would be expected to draw 13,216 and 5,287 additional visitor-days per year under Alternatives 1 and 6, respectively, as a result of displaced use from JV.

Table 8. Designated OHV Areas by Jurisdiction

Designated OHV Area by Jurisdiction	Approximate Location in CA	Open Acres	Miles of Trail	Hours from L.A. County	Hours from Orange County	Hours from Riverside County
BLM Bakersfield						
Keyesville SRMA	Kernville	0	80	3	3.5	3.5
BLM Barstow						
El Mirage Dry Lake OHV	Adelanto	24,000	40	2	1.75	1.5
Dumont Dunes	Baker	8,150	0	3.75	3.75	3.25
Rasor OHV Area	Barstow	30,000	10	2.75	2.5	2.25
Stoddard Valley	Barstow	53,000	100	2	2	1.5
BLM El Centro						
Imperial Sand Dunes	Brawley	83,000	0	3.75	3.5	3
Plaster City	Plaster City	41,000	0	3.5	3	3
Superstition Mountain	El Centro	12,800	0	4	3.75	3
Lark Canyon OHV Area	Live Oak Springs	0	31	3	2.5	2.5
Devil's Canyon	Ocotillo	0	3	3.5	3	3
BLM Ridgecrest						
Dove Springs	California City	0	25	2.25	2.75	2.5
Jawbone Canyon	Cantil	7,000	100	2	2.5	2.25
Spangler Hills	Ridgecrest	57,000	400	3	3	2.5
Angeles National Forest						
Rowher Flat OHV Area	Santa Clarita	0	60	1	1.5	2
Azusa Canyon	Azusa	150	0	0.5	0.75	1
Cleveland National Forest						
Wildomar OHV Area	Lake Elsinore	0	5	1.75	1.25	1
Corral Canyon OHV Area	Morena Village	0	15	2.5	2.5	2.5
Los Padres National Forest						
Ballinger Canyon	Cuyama	0	68	2.5	3	3.5
Ortega Trail	Ojai	0	9	1.75	2.25	2.5
Divide Peak OHV Route	Santa Barbara	0	12.5	2.25	3	3.25
Pozo La Panza	Santa Margarita	21,180	45	3.5	4	4.5
Figueroa Mountain	Solvang	0	2.5	3	3.5	4
San Bernardino National						
Big Bear Lake	Big Bear City	0	6	2	2	1.25
Lake Arrowhead	Lake Arrowhead	0	5	1.5	1.5	1
Cleghorn OHV Trail	San Bernardino	0	15	1.5	1.5	0.75
Sequoia National Forest						
Kennedy Meadows	Inyokern	0	154	3.5	4	3.5
California State Parks						
Ocotillo Wells SVRA	Borrego Springs	80,000	0	3	2.75	2.5
Heber Dunes SVRA	El Centro	343	0	3.75	3.25	3
Hungry Valley SVRA	Gorman	19,000	130	1.5	2	2.25
Oceano Dunes	Oceano	14,700	0	3.25	3.75	4.25

Sources: RiderPlanet 2011; California State Parks 2011a; USFS 2011a, b, c, d, e; BLM 2011a, b, c, d.

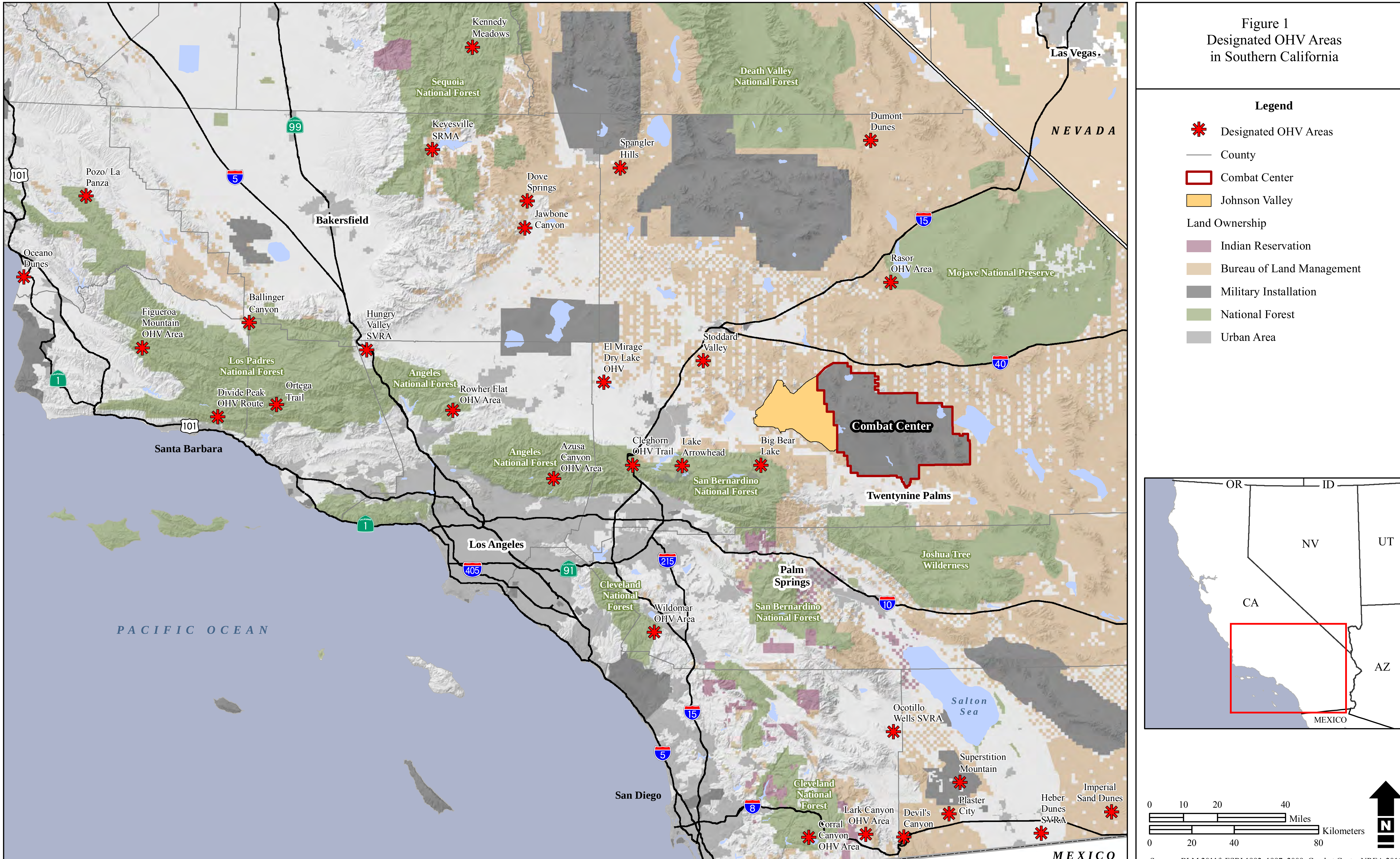


Figure 1
Designated OHV Areas
in Southern California

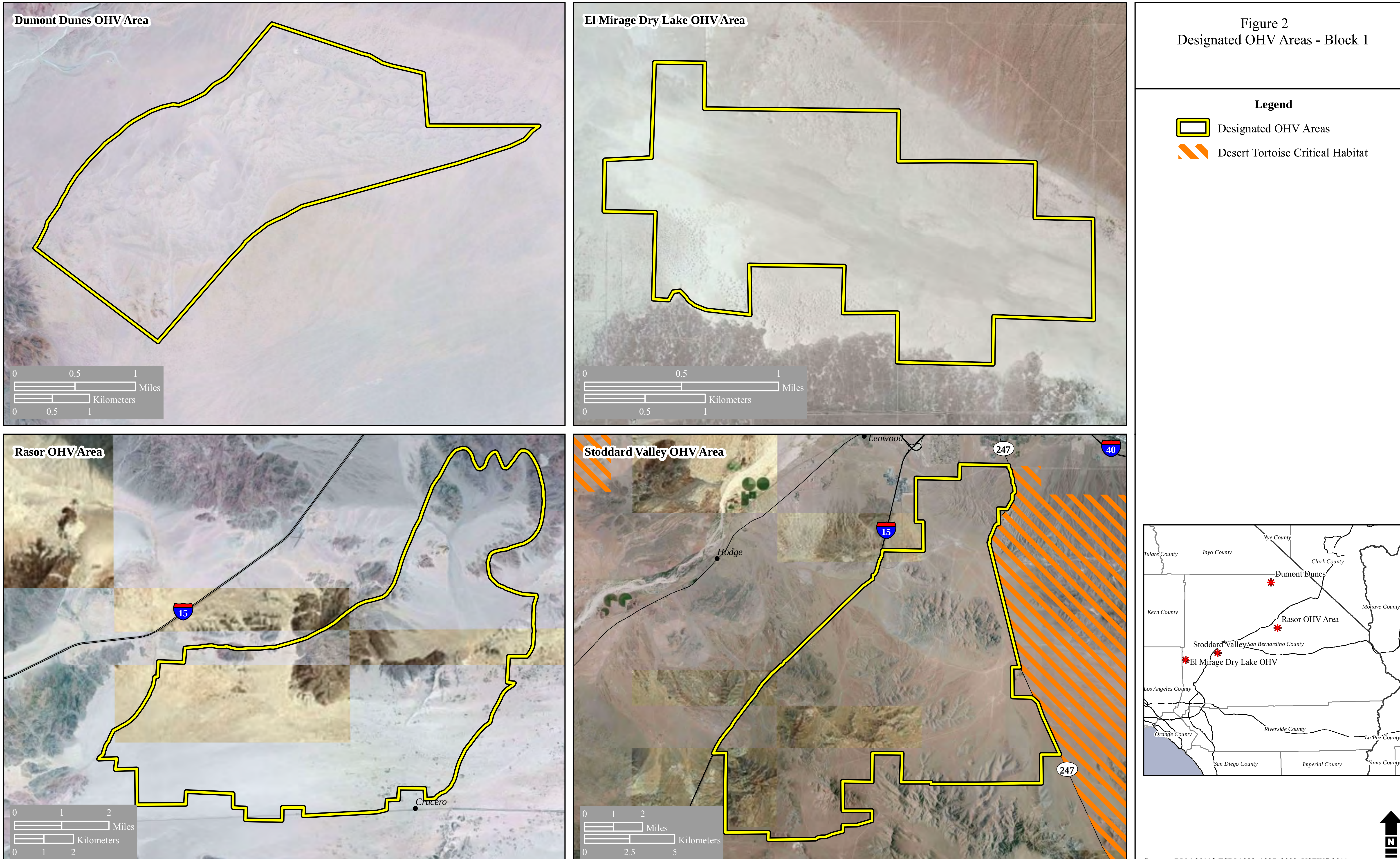


Figure 2
Designated OHV Areas - Block 1

GIS analysis identified no desert tortoise critical habitat in the vicinity of El Mirage. However, desert tortoise surveys performed in 1998-2002 found three live tortoises over 24 miles (38.6 kilometers) surveyed (Krzysik 2002, as reported in BLM 2005). The El Mirage Management Plan notes that some "take" of desert tortoise is expected as a result of OHV use but that the take is not likely to jeopardize the continued existence of the desert tortoise (BLM 1990a). There may be some additional take of desert tortoise as a result of displaced OHV visitor-days of use.

5.1.3 Rasor

Rasor consists of a 30,000 acre (12,141 hectares) open area, including trails and dunes, located in central San Bernardino County. The majority of OHV users are dirt bike motorcyclists, as well as dual sport motorcyclists and 4-wheel drive sightseers (BLM 2003a). Rasor would be expected to attract 13,216 and 5,287 additional visitor-days per year under Alternatives 1 and 6, respectively, as a result of displaced use from JV. GIS analysis revealed no desert tortoise critical habitat near Rasor, and it is located on the edge of the 2002 desert tortoise range (BLM 2005). Surveys conducted in 1998-2000 found no live tortoises or tortoise carcasses (Krzysik 2002, as reported in BLM 2005). Since desert tortoises would be sparsely located at Rasor, impacts to desert tortoises would not be likely to occur.

5.1.4 Stoddard Valley

Stoddard Valley consists of 53,000 acres (21,448 hectares) located in western San Bernardino County. The primary OHV users are dirt bike and dual sport motorcyclists, as well as 4-wheel drive vehicles with approximately 50% of the OHV use in Stoddard Valley associated with permitted events (BLM 2003a). Stoddard Valley would be expected to draw 84,962 and 33,985 additional visitor-days per year under Alternatives 1 and 6, respectively, the bulk of displaced OHV activity that would be displaced to BLM-designated OHV areas in the region. In terms of average daily visitors, on a given weekend day during the most active October through April OHV season, an estimated 1,185 visitors that would have otherwise visited JV would be expected to visit Stoddard Valley under Alternative 1 and an estimated 474 visitors would be displaced to Stoddard Valley on a given weekend day under Alternative 6.

Stoddard Valley abuts the Ord Mountain trail network, which is concurrent with desert tortoise critical habitat. GIS analysis, confirmed by the Stoddard Valley Management Plan (BLM 1993), revealed that there is no designated critical habitat within the Stoddard Valley OHV area. However, as mentioned in Section 4.1, desert tortoises have been found in Stoddard Valley. Although there is no desert tortoise critical habitat within the Stoddard Valley OHV area, an increase in visitors under Alternatives 1 or 6 may result in indirect impacts to desert tortoise habitat and population.

5.2 Study Block 2: Dove Springs, Jawbone Canyon, Keyesville, and Spangler Hills

Study Block 2 is composed of four BLM-designated OHV areas under the jurisdiction of the Ridgecrest and Bakersfield field offices (Figure 3). Each of these locations is included in the SBCA. Keyesville, Dove Springs, and Jawbone Canyon are located in Kern County, and Spangler Hills is located in San Bernardino County.

5.2.1 Dove Springs

Dove Springs contains 5,000 acres (2,023 hectares) of hills and brush located in eastern Kern County. The entire area is open for OHV driving, and all types of OHVs are used (BLM 2003a). Dove Springs would be expected to absorb 3,776 and 1,510 additional visitor-days per year under Alternatives 1 and 6, respectively, as a result of displaced use from JV. GIS analysis identified no desert tortoise critical habitat nearby, and Dove Springs is on the edge of the 2002 desert tortoise range (BLM 2005). No live or dead tortoises were discovered on 4.5 linear miles surveyed within the OHV area from 1998 to 2002 (Krzysik 2002, as reported in BLM 2005), therefore, impacts to desert tortoises would not be likely to occur as a result of displaced OHV use.

5.2.2 Jawbone Canyon

Jawbone Canyon consists of 7,000 acres (2,833 hectares) located in eastern Kern County. The predominant OHV uses are dirt bike motorcycles on steep hillsides, as well as dual sport motorcycles and 4-wheel drive touring vehicles (BLM 2003a). Jawbone Canyon would be expected to draw 3,776 and 1,510 additional visitor-days per year under Alternatives 1 and 6, respectively, as a result of displaced OHV use from JV.

Jawbone OHV area is on the edge of the 2002 desert tortoise range (BLM 2005), but is within an Area of Critical Environmental Concern (Jawbone-Butterbredt) and is adjacent to the Desert Tortoise Natural Area and the Rand Mountains Management Area, both of which contain important desert tortoise habitat. The Desert Tortoise Natural Area contains one of the highest known densities of desert tortoise (BLM 2011i). For this reason, displaced OHV use at Jawbone Canyon may impact desert tortoise habitat and populations.

5.2.3 Keyesville

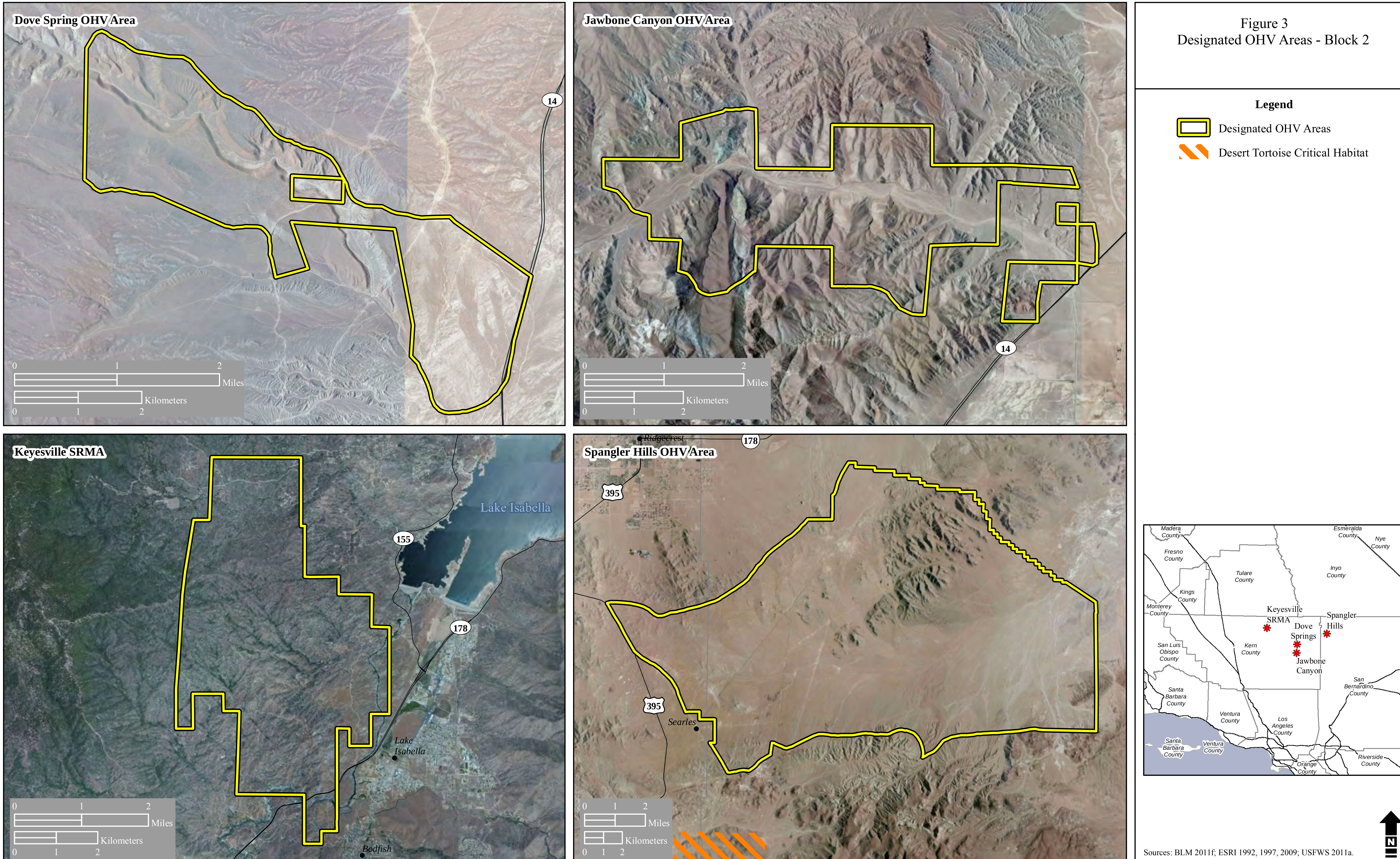
Keyesville, a 7,100 acre (2,873 hectare) area including 80 miles (129 kilometers) of OHV trails, is located in northern Kern County near Lake Isabella. Keyesville would be expected to attract 3,776 and 1,510 additional visitor-days per year under Alternatives 1 and 6, respectively, as a result of displaced use from JV. Keyesville is not located within the desert tortoise's expected range and no desert tortoises are expected to be found in the area (California Department of Fish and Game 2011); since Keyesville is not a desert tortoise habitat, no impacts to desert tortoise habitat or population would be expected. GIS analysis revealed no other designated critical habitat nearby.

5.2.4 Spangler Hills

Spangler Hills consists of 57,000 acres (23,067 hectares) located in northwestern San Bernardino County. OHV use is predominately dirt bikes through desert terrain and hills, as well as dual sport motorcycles, 4-wheel drive vehicles, and organized competitive events (BLM 2003a). Spangler Hills would be expected to draw 7,552 and 3,021 additional visitor-days per year under Alternatives 1 and 6, respectively, as a result of displaced use from JV.

The Spangler Hills Management Plan explains that areas of Spangler Hills are concurrent with desert tortoise habitat. In 1980 an estimated 2,205 desert tortoises were believed to be living in the Spangler Hills OHV area, but the tortoise population decreased over the decade, to an estimated 982 by 1990 (BLM 1992). The Management Plan listed potential reasons for the decline as drought, intense OHV use, grazing, and other activities (BLM 1992). Surveys performed from 1998 to 2002 discovered two live adult tortoises in 112.5 linear miles surveyed (Krzysik 2002, as reported in BLM 2005). Since desert tortoises have been found in Spangler Hills, an increase in OHV recreation may have an impact on desert tortoise habitat and population.

Figure 3
Designated OHV Areas - Block 2



Sources: BLM 2011f; ESRI 1992, 1997, 2009; USFWS 2011a.

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Bighorn sheep habitat and Mojave ground squirrel habitat are also found within the Spangler Hills OHV area (BLM 1992); however, no designated critical habitat for any listed species was identified through GIS analysis.

5.3 STUDY BLOCK 3: BIG BEAR LAKE, LAKE ARROWHEAD, AND CLEGHORN TRAIL

Study Block 3 is composed of three OHV areas in the SBNF (Figure 4). Each of these locations is in San Bernardino County and is included in the SBCA. As a result of the Proposed Action, the number of annual visitor-days of OHV activity throughout the SBNF would be expected to increase by 13,216 and 5,287 visitor-days, under Alternatives 1 and 6, respectively. No data were available to suggest how this additional activity might be divided among the three designated OHV areas in Study Block 3 or individual trails within the SBNF.

5.3.1 Big Bear Lake

Big Bear Lake is a 6-mile (10-kilometer) trail system located in southern San Bernardino County. The SBNF Management Plan indicates that very few desert tortoises are found on USFS land (USDA 2005b), thus impacts to desert tortoise habitat or population from displaced OHV use would be unlikely. GIS analysis identified other designated critical habitat for listed species within and near the Big Bear Lake OHV Area (Figure 4). OHV activity displaced from JV could potentially impact these habitats and species; however the projected increase in activity at this location would be relatively small. Assuming that the projected allocation of displaced OHV activity throughout the SBNF were divided equally between the three OHV areas, the Alternative 1 increase at the Big Bear Lake area would be approximately 4,405 annual visitor-days (13,216/3) and the Alternative 6 increase would be approximately 1,762 visitor-days per year (5,287/3). On a typical weekend day between April and September (note: unlike the desert areas, OHV activity at Big Bear Lake is less likely during the fall and winter), these levels of increased activity would translate to approximately 72 additional visitors per weekend day for the Alternative 1 scenario and approximately 29 added visitors for Alternative 6. As described in Section 2.3, these calculations assume that 85% of annual visitor-days occur on weekends. For purposes of estimating weekend use at Big Bear Lake, it was also assumed that 52 weekend days would occur in the six months between April and September. Based on these assumptions, the intensity of increased use (e.g., for Alternative 6, only 29 more visitors on a typical weekend day during the peak 6 months of use) would be very low. It is not anticipated that this species or its habitat would be adversely affected by the increased use.

5.3.2 Lake Arrowhead

Lake Arrowhead is a 5-mile (8-kilometer) trail system located in southwestern San Bernardino County. The SBNF Management Plan indicates that very few desert tortoises are found on USFS land (USDA 2005b), thus any impact to desert tortoise habitat or population, from displaced OHV use would be unlikely. GIS analysis did not identify any designated critical habitat.

5.3.3 Cleghorn Trail

Cleghorn Trail is a 15-mile (24-kilometer) trail located in southwestern San Bernardino County. The SBNF Management Plan indicates that very few desert tortoises are found on USFS land (USDA 2005b), thus any impact to desert tortoise habitat or population, from displaced OHV use would be unlikely. GIS analysis did not identify any threatened or endangered species critical habitat along the trail.

5.4 STUDY BLOCK 4: DEVIL'S CANYON, IMPERIAL SAND DUNES, PLASTER CITY, SUPERSTITION MOUNTAIN

Study Block 4 is composed of BLM-designated OHV areas under the jurisdiction of BLM's El Centro field office (Figure 5). Each of the four locations is located in Imperial County. None of these locations are included in the SBCA.

5.4.1 Devil's Canyon

Devil's Canyon OHV area, in southwestern Imperial County, consists of a rugged, 3 mile (5 kilometer) trail that requires specialty vehicles. This BLM-designated OHV area requires a special permit to access. Up to 15 vehicles per day are allowed, on up to 7 weekends from October 1 through April 30 (BLM 2011j). The permitted maximum number of vehicles (up to about 210 per year) would be expected at Devil's Canyon if portions of JV were to close.

GIS analysis identified that a portion of the Devil's Canyon trail coincides with Peninsular bighorn sheep critical habitat. An Environmental Assessment was prepared in 2010 to examine the potential effects on sensitive species of allowing limited OHV riding in the Devil's Canyon area. The Environmental Assessment determined that if the BLM and USFWS work to limit OHV riding through a permit system, then adverse impacts to bighorn sheep would be prevented, and a Finding of No Significant Impact was prepared (BLM 2011j). The Finding of No Significant Impact for the Devil's Canyon Vehicular Route Access project did not identify desert tortoise, thus no impacts to the desert tortoise would be expected due to displaced OHV visitor-days.

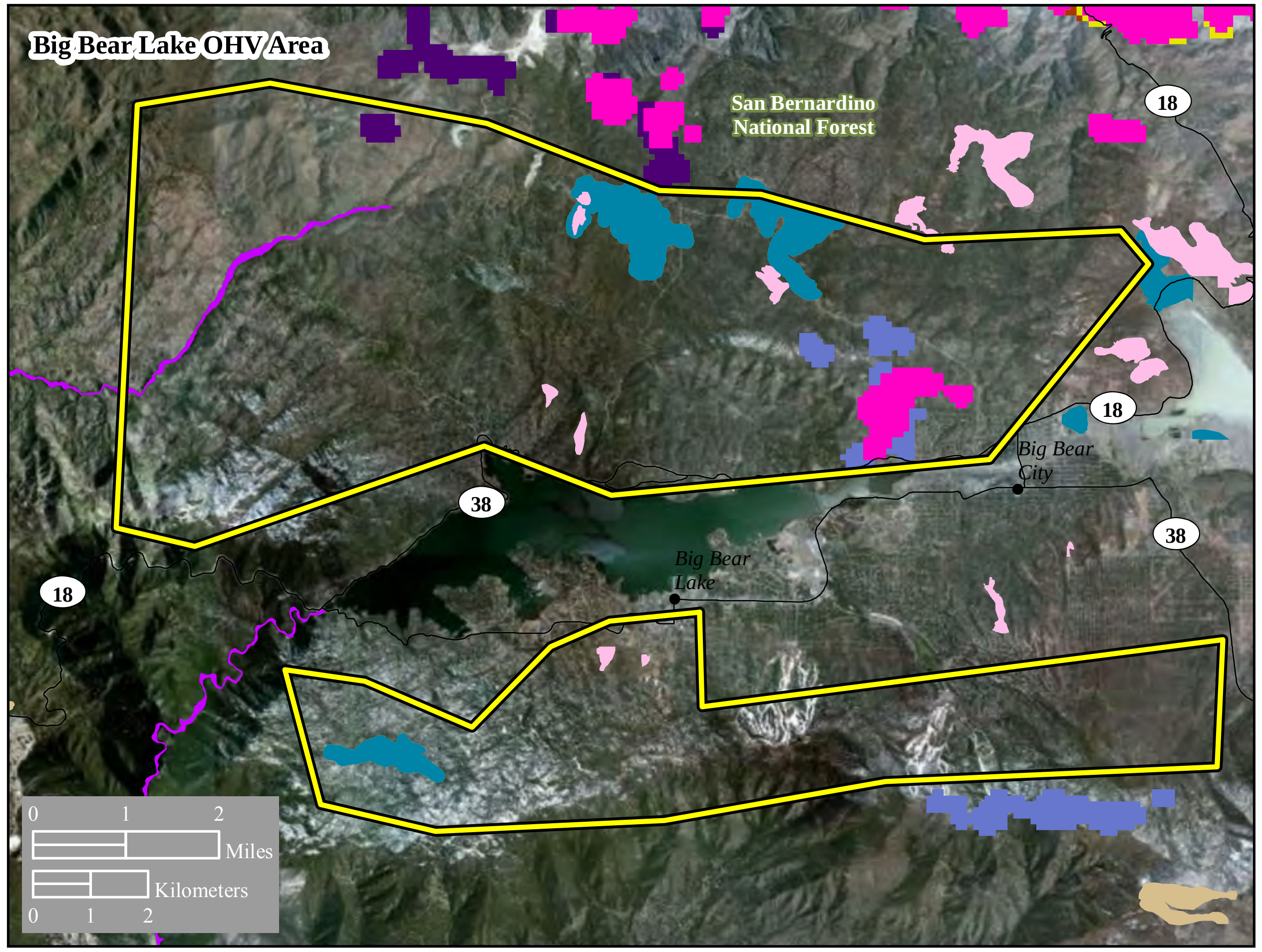
5.4.2 Imperial Sand Dunes

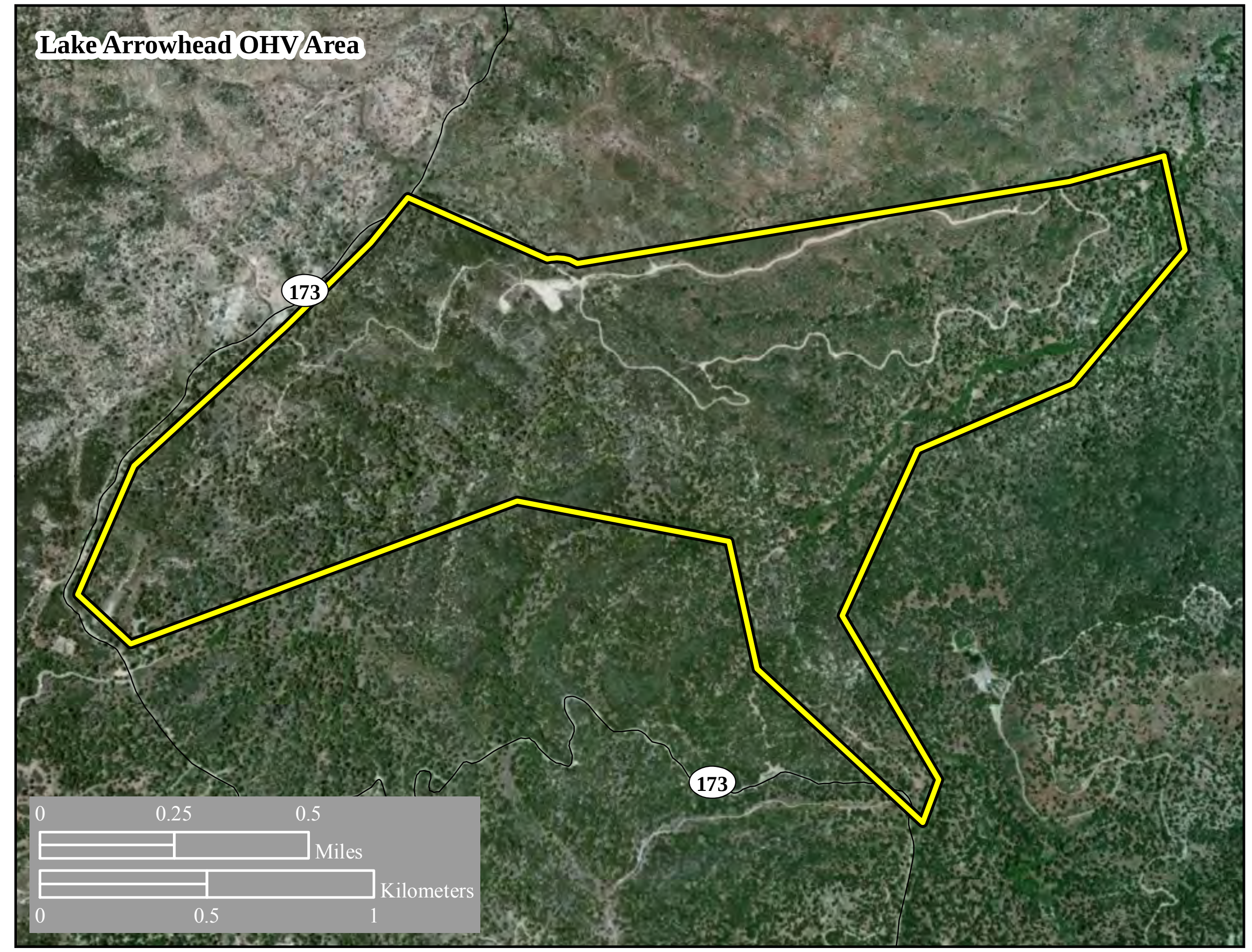
Imperial Sand Dunes consists of 83,000 acres (33,589 hectares) of open BLM-designated OHV land located in eastern Imperial County. Imperial Sand Dunes would be expected to absorb 8,392 and 3,356 additional visitor-days per year under Alternatives 1 and 6, respectively. Due to the size of the open area, Imperial Sand Dunes would be expected to attract more displaced OHV activity than the other BLM-designated OHV areas under the jurisdiction of BLM's El Centro field office.

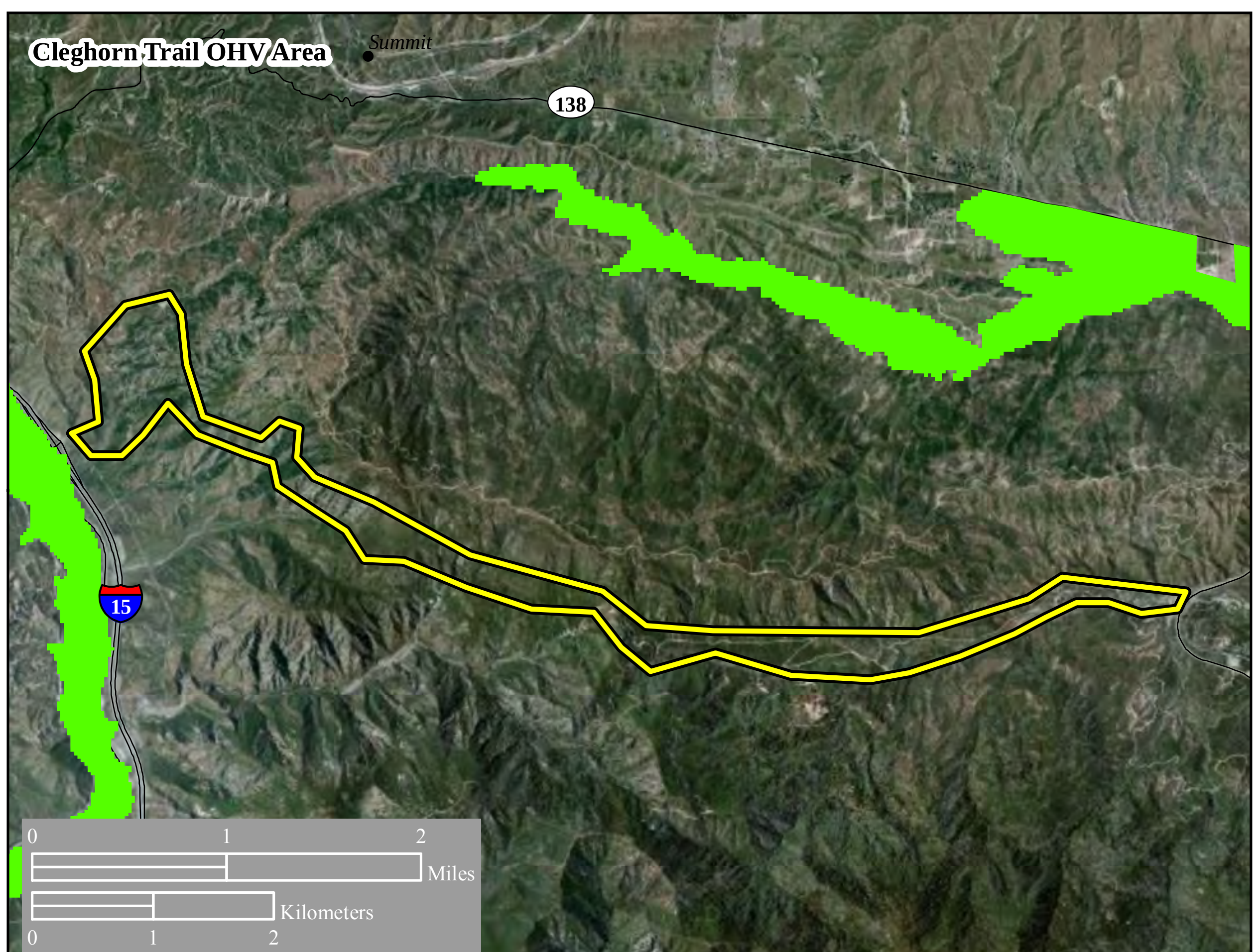
Environmental documentation identifies the presence of desert tortoise within the OHV area (BLM 2003b), thus there may be some impact to desert tortoise habitat and population. Additionally, GIS analysis identified Peirson's milk-vetch critical habitat in and near portions of the OHV area (Figure 5); portions of Imperial Sand Dunes have been closed in the past due to conflict with the Peirson's milk-vetch habitat.

OHV activity displaced from JV could potentially impact the Peirson's milk-vetch and its habitat; however the projected increase in activity at this location would be relatively small. Applying the methodology described in Section 2.3 to evaluate potential use on a typical weekend day during the peak desert OHV season, the projected levels of annual increased activity would translate to approximately 117 additional visitors per weekend day for the Alternative 1 scenario and approximately 47 added visitors per weekend day under Alternative 6. Based on these assumptions, the intensity of increased use would be very low. It is not anticipated that this species or its habitat would be adversely affected by the increased use.

Figure 4
Designated OHV Areas - Block 3







Legend

- Designated OHV Areas

Critical Habitat

- Ash-grey Paintbrush
- Bear Valley Sandwort
- California Taraxacum
- Cushenbury Buckwheat
- Cushenbury Milk-vetch
- Cushenbury Oxytheca
- Parish's Daisy
- San Bernardino Mountains Bladderpod
- San Bernardino Bluegrass
- Southern Mountain Wild-buckwheat
- Southwestern Willow Flycatcher
- Arroyo Toad

Sources: BLM 2011f; ESRI 1992, 1997, 2009; USFWS 2011a.

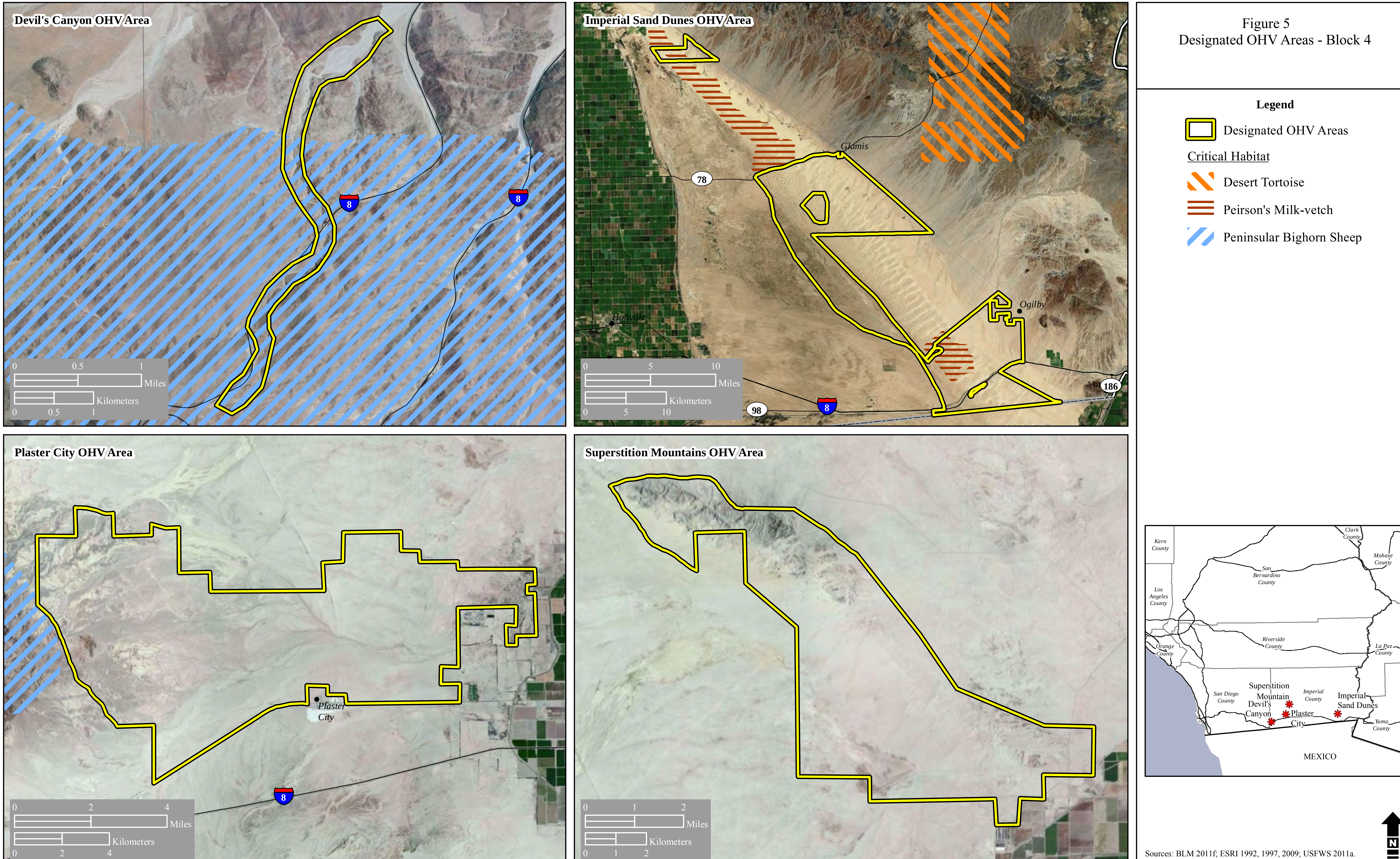


Figure 5
Designated OHV Areas - Block 4

5.4.3 Plaster City

Plaster City BLM-designated OHV area, located in western Imperial County, includes 41,000 acres (16,592 hectares) of open OHV area. Plaster City would be expected to draw 4,196 and 1,678 additional visitor-days per year under Alternatives 1 and 6, respectively, as a result of displaced use from JV.

Plaster City is not located within the desert tortoise's expected range and no desert tortoises are expected to be found there (California Department of Fish and Game 2011); since Plaster City is not in a desert tortoise habitat area, no impacts to desert tortoise habitat or population would be expected. GIS analysis identified a Peninsular bighorn sheep critical habitat nearby.

5.4.4 Superstition Mountain

Superstition Mountain BLM-designated OHV area (El Centro field office), located in western Imperial County, includes 12,000 acres (4,856 hectares) of open OHV area. Superstition Mountain would be expected to absorb 4,196 and 1,678 additional visitor-days per year under Alternatives 1 and 6, respectively, as a result of displaced use from JV.

Superstition Mountain is not located within the expected range for desert tortoise and no desert tortoises are expected to be found there (California Department of Fish and Game 2011); therefore, no impacts to desert tortoise habitat or population would be expected. GIS analysis did not identify any threatened or endangered species critical habitat nearby.

5.5 STUDY BLOCK 5: ROWHER FLAT, HUNGRY VALLEY, KENNEDY MEADOWS, WILDOMAR

Study Block 5 is composed of three locations within Southern California National Forests and one SVRA (Figure 6). None of these OHV areas are included in the SBCA.

5.5.1 Rowher Flat

Rowher Flat, in central Los Angeles County, is a 60 mile (97 kilometer) trail system located in the Angeles National Forest, which would be expected to absorb 7,343 and 2,937 additional visitor-days per year under Alternatives 1 and 6, respectively.

The Angeles National Forest Management Plan indicates that very few desert tortoises are found on USFS land (USDA 2005c), thus any impact to desert tortoise habitat or population, from displaced OHV use would be unlikely. GIS analysis did not identify any threatened or endangered species critical habitat nearby.

5.5.2 Hungry Valley

Hungry Valley SVRA includes 19,000 open acres (7,689 hectares) and a 130-mile (209-kilometer) trail system. The SVRA is primarily located in northwestern Los Angeles County but it extends into eastern Ventura County and southern Kern County. Hungry Valley would be expected to draw 8,392 and 3,356 additional visitor-days per year under Alternatives 1 and 6, respectively.

The Hungry Valley SVRA General Plan states that there is no known habitat for endangered or threatened wildlife within the park, including for desert tortoises (California State Parks 1981); since Hungry Valley is not in a desert tortoise habitat area, no impacts to desert tortoise habitat or population would be expected. GIS analysis identified no designated critical habitat within the SVRA.

5.5.3 Kennedy Meadows

Kennedy Meadows, in southeastern Tulare County, includes over 150 miles (241 kilometers) of OHV trails and is part of Sequoia National Forest, which would be expected to attract 2,098 and 839 additional visitor-days per year under Alternatives 1 and 6, respectively.

Kennedy Meadows is not located within the expected range for desert tortoises and no desert tortoises are expected to be found in the area (California Department of Fish and Game 2011); since Kennedy Meadows is not in a desert tortoise habitat area, no impacts to desert tortoise habitat or population would be expected. GIS analysis identified no other designated critical habitat nearby.

5.5.4 Wildomar

Wildomar, located in southern Riverside County, is a 5-mile (8-kilometer) trail system within the Cleveland National Forest, which would be expected to absorb 1,888 and 755 additional visitor-days annually under Alternatives 1 and 6, respectively.

The Los Padres National Forest Management Plan explains that very few desert tortoises are found on USFS land (USDA 2005d), thus any impact to desert tortoise habitat or population from displaced OHV use would be unlikely. GIS analysis did not identify designated critical habitat for any threatened or endangered species.

5.6 STUDY BLOCK 6: CORRAL CANYON, HEBER DUNES, LARK CANYON, AND OCOTILLO WELLS

Study Block 6 is composed of locations in San Diego and Imperial Counties (Figure 7). Corral Canyon and Lark Canyon are located in San Diego County, Heber Dunes is located in Imperial County, and Ocotillo Wells straddles the San Diego-Imperial county line. All are outside the SBCA.

5.6.1 Corral Canyon

Corral Canyon, in southern San Diego County, is a 15-mile (24-kilometer) trail system located in Cleveland National Forest, which would be expected to draw 1,888 and 755 additional visitor-days per year under Alternatives 1 and 6, respectively. Corral Canyon includes some sturdy rock formations and is popular with 4x4 riders.

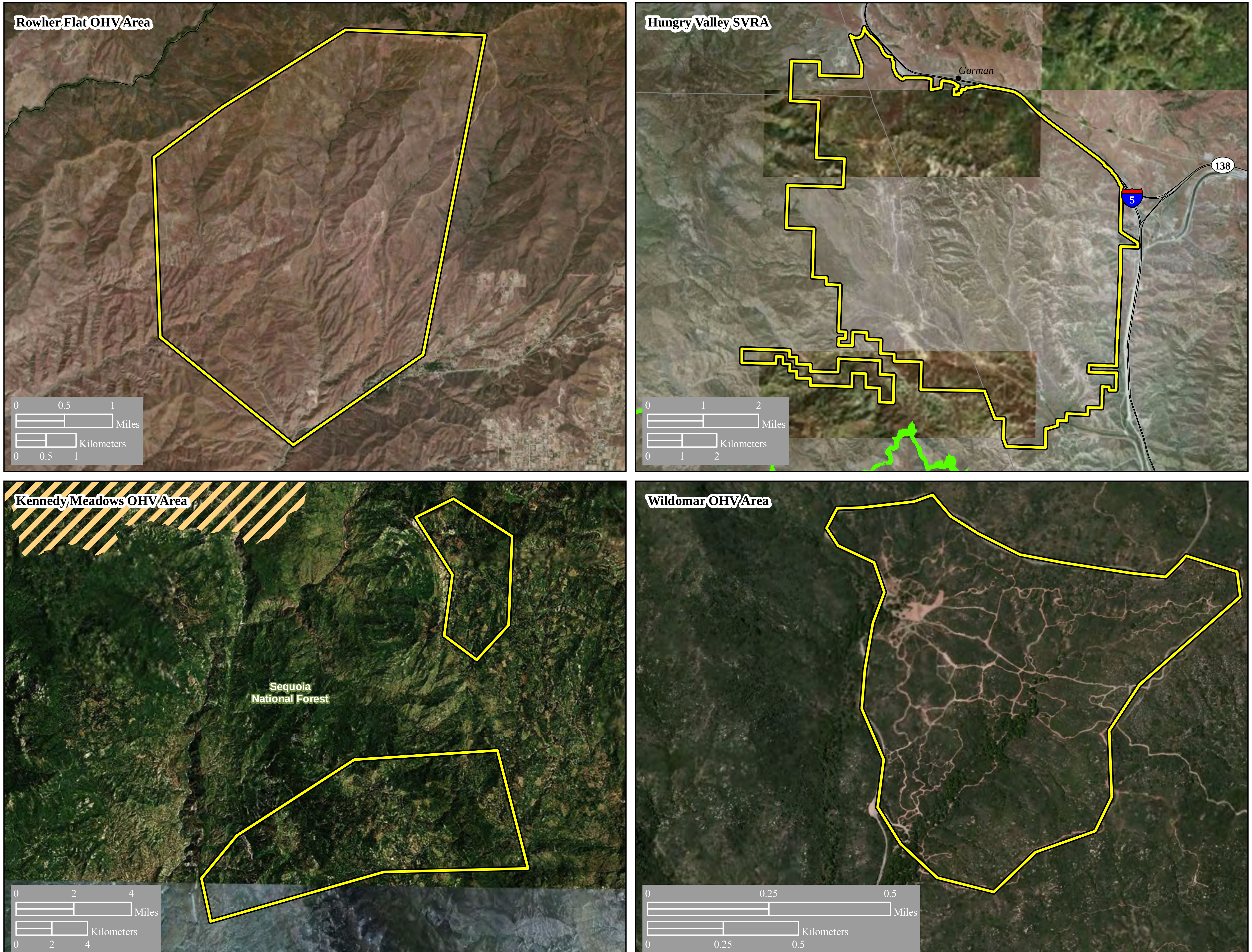
The Cleveland National Forest Management Plan indicates that very few desert tortoises are found on USFS land (USDA 2005e), thus impacts to desert tortoise habitat or population from displaced OHV use would be unlikely. GIS analysis did not identify critical habitat for any threatened or endangered species.

5.6.2 Heber Dunes

Heber Dunes SVRA, a family friendly location, includes 340-acres (138-hectares) in southern Imperial County. Heber Dunes would be expected to attract 1,888 and 755 additional visitor-days per year under Alternatives 1 and 6, respectively, as a result of displaced use from JV.

The Heber Dunes SVRA General Plan confirms that there are no desert tortoises within the park, thus there would be no impact to desert tortoise as a result of displaced OHV visitor-days (California State Parks 2011c). Furthermore, there are no known sensitive plant or animal species within the park (California State Parks 2011c). GIS analysis did not identify critical habitat for any threatened or endangered species.

Figure 6
Designated OHV Areas - Block 5



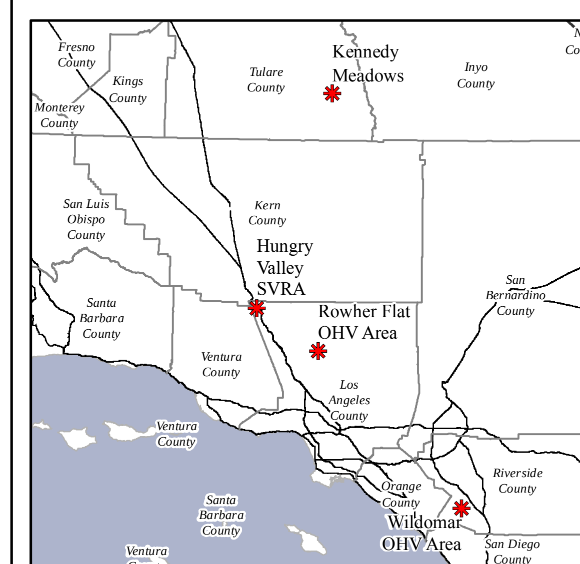
Legend

Designated OHV Areas

Critical Habitat

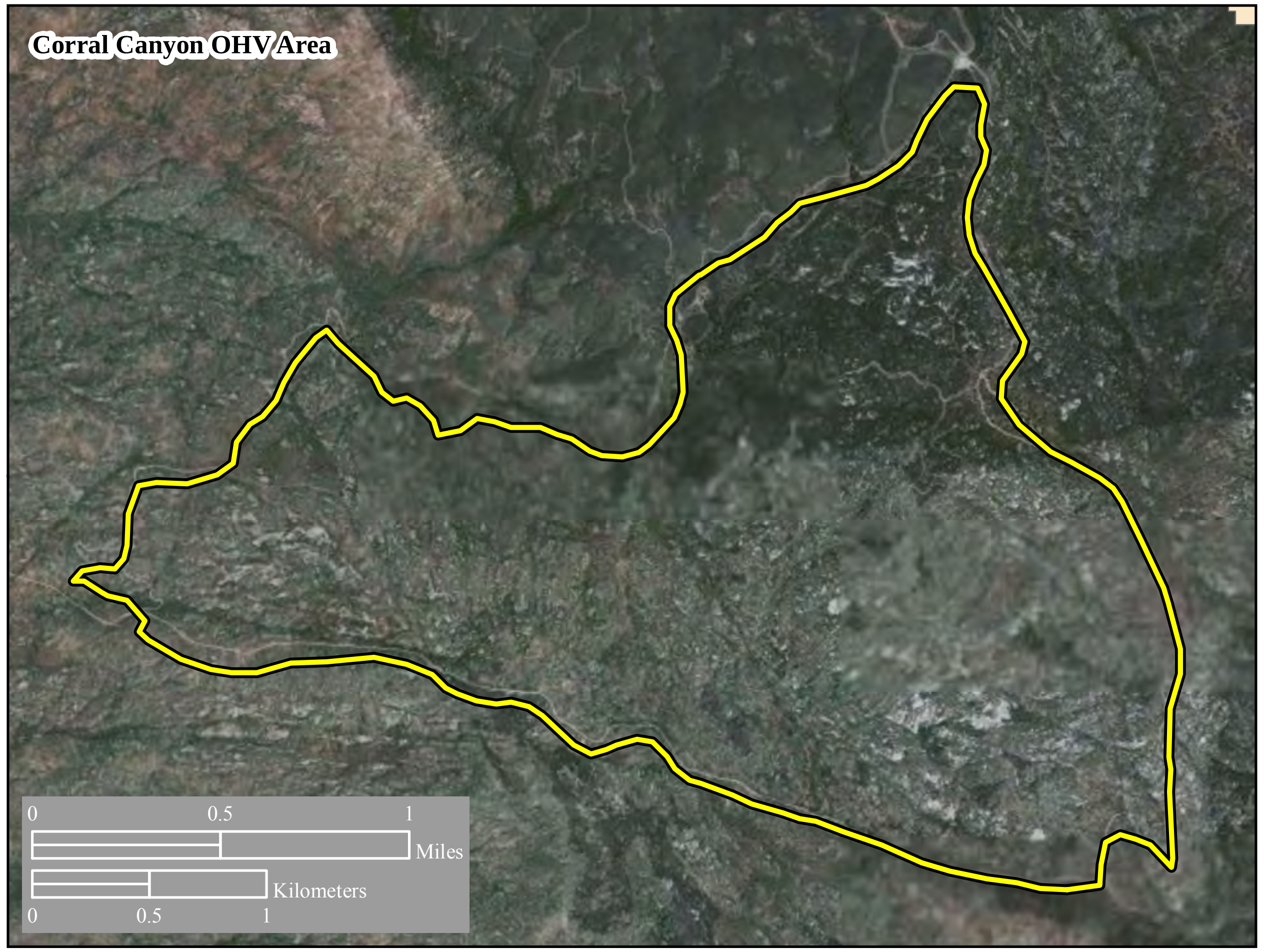
Arroyo Toad

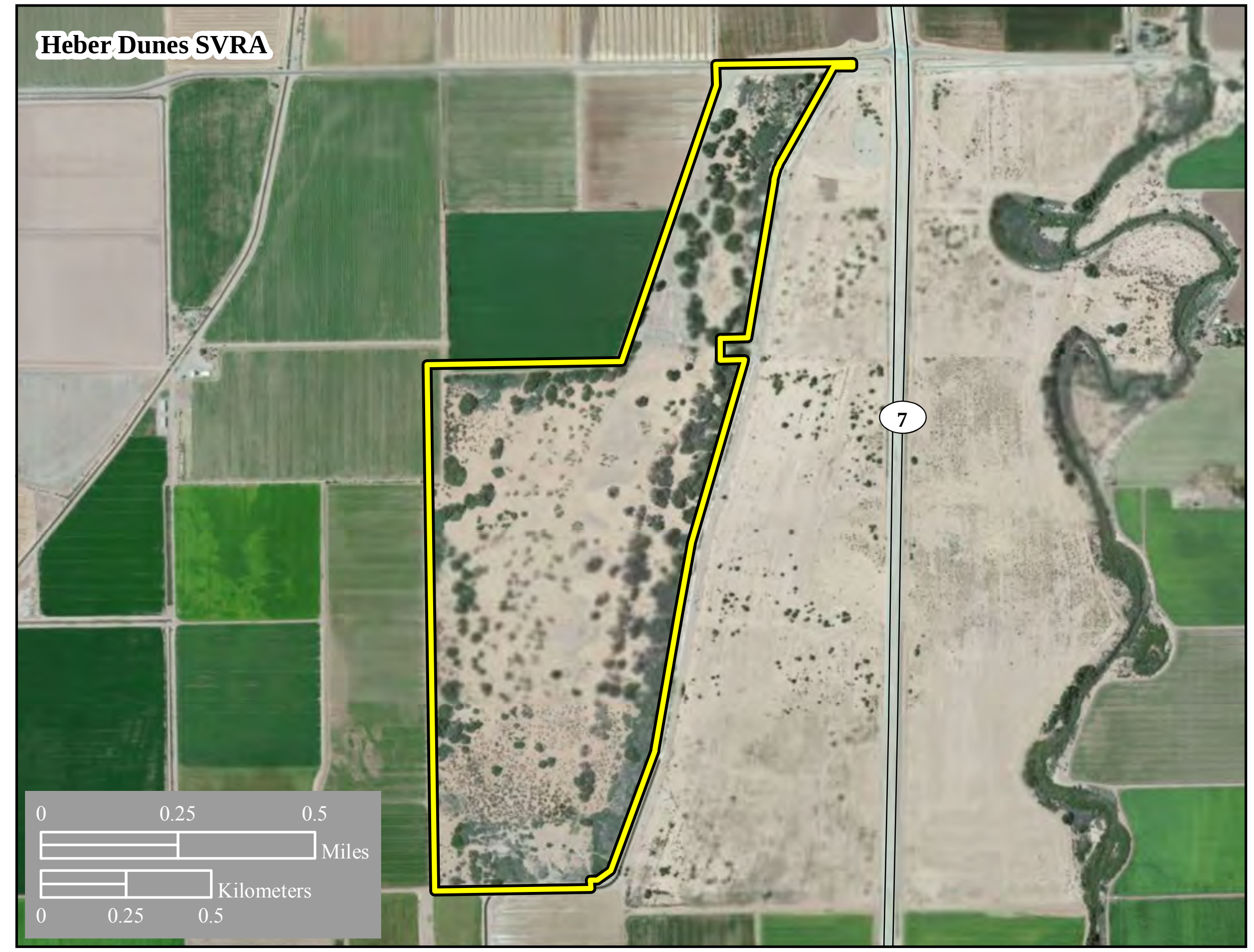
Little Kern Golden Trout

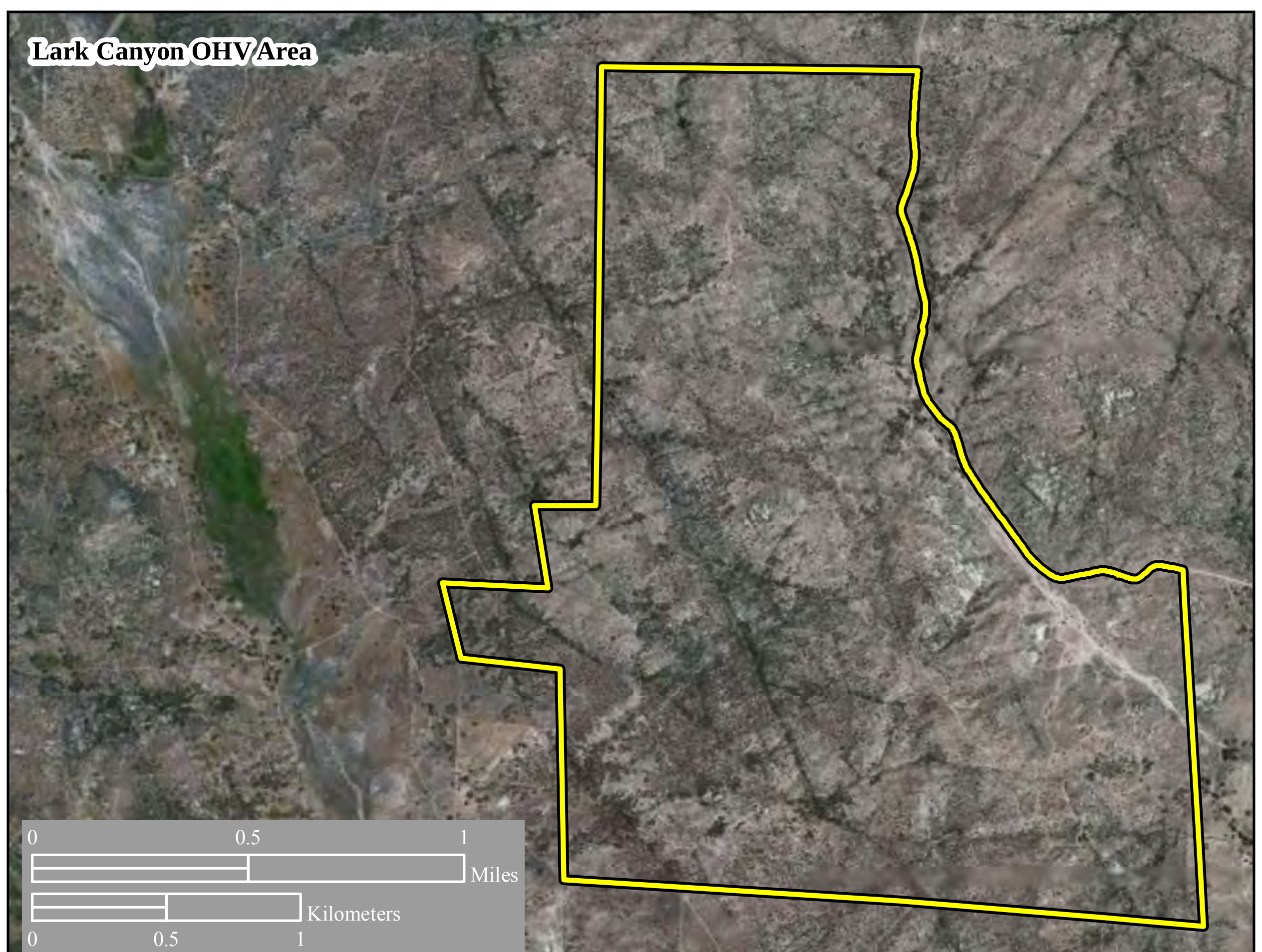


N

Sources: BLM 2011f; ESRI 1992, 1997, 2009; USFS 2011a.







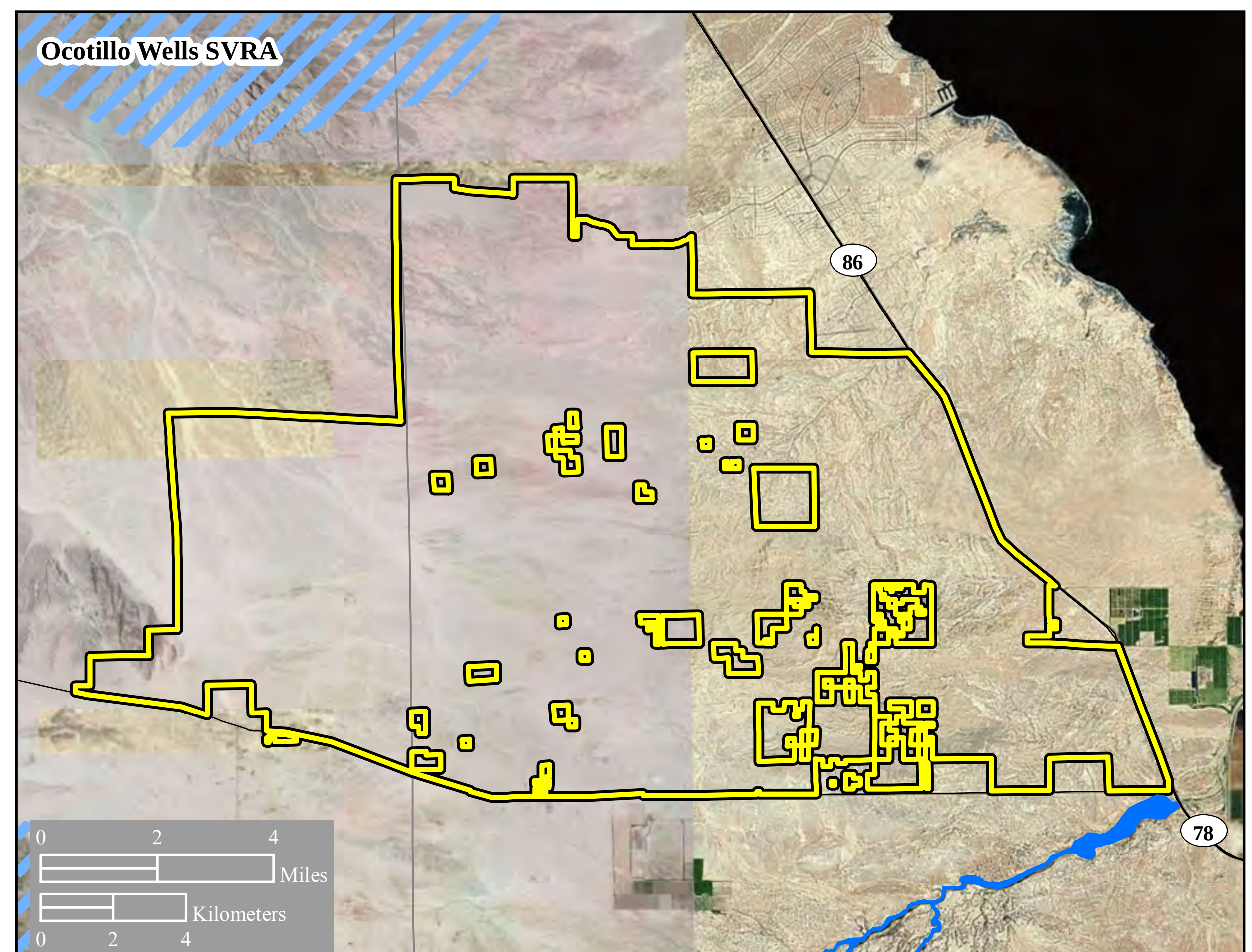


Figure 7
Designated OHV Areas - Block 6

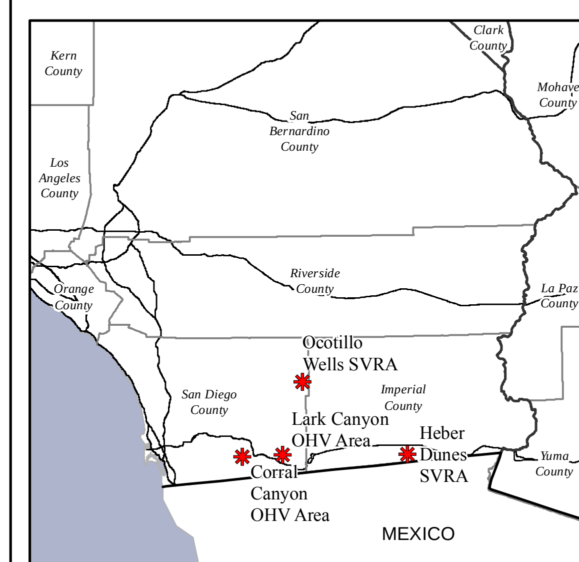
Legend

Designated OHV Areas

Critical Habitat

Desert Pupfish

Peninsular Bighorn Sheep



Sources: BLM 2011f; ESRI 1992, 1997, 2009; USFWS 2011a.

5.6.3 Lark Canyon

Lark Canyon BLM-designated OHV area (El Centro field office), located in eastern San Diego County, includes over 30 miles (48 kilometers) of OHV trails (restricted to motorcycle use). Lark Canyon would be expected to draw 4,196 and 1,678 additional visitor-days per year under Alternatives 1 and 6, respectively, as a result of displaced OHV use from JV.

Lark Canyon is not located within the desert tortoise's expected range (California Department of Fish and Game 2011); therefore, no desert tortoises are expected to be found in the area and there would be no impact to desert tortoises. GIS analysis did not identify critical habitat for any threatened or endangered species.

5.6.4 Ocotillo Wells

Ocotillo Wells SVRA consists of more than 85,000 acres (34,398 hectares) of open OHV land located on the San Diego and Imperial County border. Ocotillo Wells would be expected to attract 6,294 and 2,517 additional visitor-days per year under Alternatives 1 and 6, respectively, as a result of displaced use from JV.

The 1982 Ocotillo Wells SVRA General Plan did not identify the desert tortoise as present within the OHV area (California State Parks 1982), thus no impacts to the desert tortoise would be expected as a result of displaced use. The General Plan did list Orcutt's woody aster and the Colorado Desert fringe-toed lizard as endangered species found within the park. GIS analysis did not identify critical habitat for any threatened or endangered species within the SVRA.

5.7 Study Block 7: Figueroa Mountain, Ortega Trail, Divide Peak, Azusa Canyon

Study Block 7 is composed of three trail systems in the Los Padres National Forest and an OHV area in the Angeles National Forest (Figure 8). The Los Padres National Forest would be expected to absorb an additional 9,441 visitor-days per year under Alternative 1 and an additional 3,776 visitor-days under Alternative 6; respectively. Figueroa Mountain and Divide Peak are located in Santa Barbara County, Ortega Trail is located in Ventura County, and Azusa Canyon is in Los Angeles County. None of these OHV areas are included in the SBCA.

5.7.1 Figueroa Mountain

Figueroa Mountain is a 2.5-mile (4-kilometer) trail located in central Santa Barbara County in an area of the Los Padres National Forest mainly dedicated to camping and hiking.

The Los Padres National Forest Management Plan indicates that very few desert tortoises are found on Forest Service land (USDA 2005d). In addition, Figueroa Mountain is outside of the desert tortoise's expected range (California Department of Fish and Game 2011). Therefore, any impacts to desert tortoise habitat or population from displaced OHV use would be unlikely. GIS analysis revealed that the entirety of Figueroa Mountain OHV area is coincident with a California red-legged frog critical habitat. OHV activity displaced from JV could potentially impact this species and its habitat; however the projected increase in activity at this location would be relatively small. Assuming that the projected allocation of displaced OHV activity throughout the Los Padres National Forest were divided equally between its five OHV areas (three in Study Block 7 and two in Study Block 8), the Alternative 1 increase at the Figueroa Mountain area would be approximately 1,888 annual visitor-days (9,441/5) and the Alternative 6 increase would be approximately 755 visitor-days per year (3,776/5). On a typical weekend day between April and September (note: unlike the desert areas, OHV activity at Figueroa Mountain is less likely during the fall and winter), these levels of increased activity would translate to approximately 31 additional visitors per weekend day for the Alternative 1 scenario and approximately 12 added visitors under Alternative 6. As described in Section 2.3, these calculations assume that 85% of annual visitor-days occur on weekends. For purposes of estimating weekend use at Figueroa Mountain, it was also assumed that 52 weekend days would occur in the six months between April and September. Based on these assumptions, the intensity of increased use would be very low. It is not anticipated that this species or its habitat would be adversely affected by the increased use.

5.7.2 Ortega Trail

Ortega Trail, located in western Ventura County, includes a 9-mile (14-kilometer) single track motorcycle trail. The Los Padres National Forest Management Plan explains that very few desert tortoises are found on Forest Service land (USDA 2005d), and Ortega Trail is located outside of the desert tortoise's expected range (California Department of Fish and Game 2011). Therefore, any impacts to desert tortoise habitat or population from displaced OHV use would be unlikely. GIS analysis identified no threatened or endangered species critical habitat along Ortega Trail.

5.7.3 Divide Peak

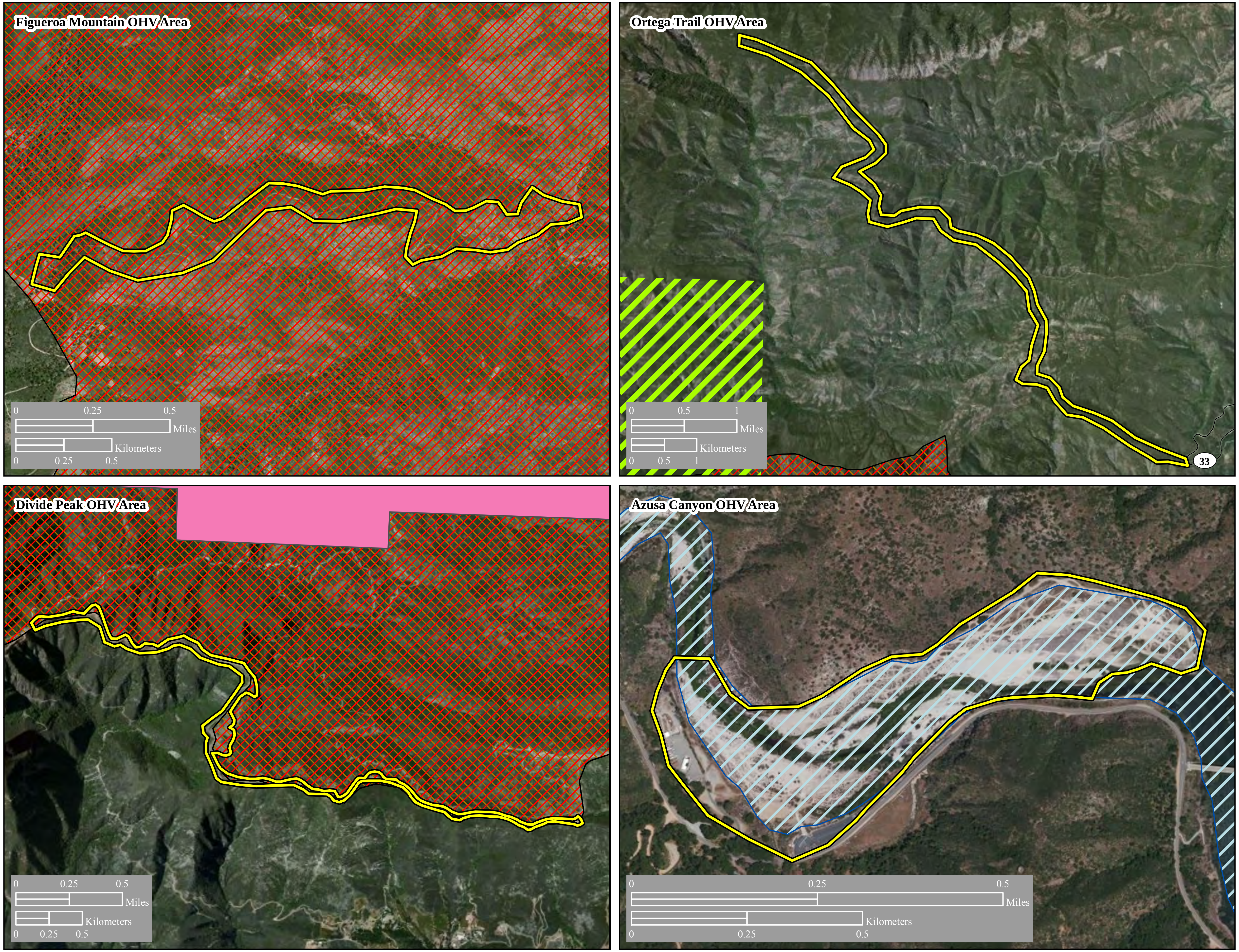
Divide Peak, located in eastern Santa Barbara County, includes a 12.5-mile (20-kilometer) trail and a small motocross track.

The Los Padres National Forest Management Plan indicates that very few desert tortoises are found on Forest Service land (USDA 2005d). In addition, Divide Peak is outside of the desert tortoise's expected range (California Department of Fish and Game 2011). Therefore, any impacts to desert tortoise habitat or population from displaced OHV use would be unlikely. GIS analysis identified a California red-legged frog critical habitat partially concurrent with the OHV trail. OHV activity displaced from JV could potentially impact this species and its habitat; however the projected increase in activity at this location would be relatively small and the potential intensity of increased use would be very low (the same assumptions described above for Figueroa Mountain are assumed to apply for Divide Peak). Based on these assumptions, the intensity of increased use would be very low. It is not anticipated that this species or its habitat would be adversely affected by the increased use.

5.7.4 Azusa Canyon

Azusa Canyon, a 150-acre open OHV area in northeastern Los Angeles County, consists of mud pits and rock piles in the midst of the Angeles National Forest. Azusa Canyon would be expected to attract an additional 7,343 and 2,937 visitor-days per year under Alternatives 1 and 6, respectively.

Figure 8
Designated OHV Areas - Block 7



Legend

Designated OHV Areas

Critical Habitat

California Condor

California Red-legged Frog

Santa Ana Sucker

Least Bell's Vireo

N

Sources: USFWS 2011f; ESRI 1992, 1997, 2009; USFWS 2011a.

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The Angeles National Forest Management Plan explains that very few desert tortoises are found on Forest Service land (USDA 2005c), and Azusa Canyon is outside of the desert tortoises' expected range (California Department of Fish and Game 2011). Therefore, any impacts to desert tortoise habitat or population from displaced OHV use would be unlikely. GIS analysis revealed that most of the OHV area is concurrent with a Santa Ana sucker critical habitat. OHV activity displaced from JV could potentially impact this species and its habitat; however the projected increase in activity at this location would be relatively small. Assuming that the projected allocation of displaced OHV activity throughout the Angeles National Forest were divided equally between the two OHV areas identified in this study (Rowher Flat in Study Block 5 and Azusa Canyon), the Alternative 1 increase at the Azusa Canyon area would be approximately 3,671 annual visitor-days (7,343/2) and the Alternative 6 increase would be approximately 1,468 visitor-days per year (2,937/2). On a typical weekend day between April and September (note: unlike the desert areas, OHV activity at Azusa Canyon is less likely during the fall and winter), these levels of increased activity would translate to approximately 60 additional visitors per weekend day for the Alternative 1 scenario and approximately 24 added visitors under Alternative 6. As described in Section 2.3, these calculations assume that 85% of annual visitor-days occur on weekends. For purposes of estimating weekend use at Azusa Canyon, it was also assumed that 52 weekend days would occur in the six months between April and September. Based on these assumptions, the intensity of increased use would be very low. It is not anticipated that this species or its habitat would be adversely affected by the increased use.

5.8 STUDY BLOCK 8: POZO LA PANZA, OCEANO DUNES, AND BALLINGER CANYON

Study Block 8 includes two locations in the Los Padres National Forest and one SVRA (Figure 9). Oceano Dunes and Pozo La Panza are located in San Luis Obispo County, and Ballinger Canyon borders three counties. None of these OHV areas are included in the SBCA.

5.8.1 Pozo La Panza

Pozo La Panza, in Los Padres National Forest, is a 45-mile (72-kilometer) trail system located in central San Luis Obispo County, just north of the Machesna Wilderness area.

The Los Padres National Forest Management Plan indicates that very few desert tortoises are found on Forest Service land (USDA 2005d). In addition, Pozo La Panza is outside of the desert tortoise's expected range (California Department of Fish and Game 2011). Therefore, any impacts to desert tortoise habitat or population from displaced OHV use would be unlikely. GIS analysis identifies Purple Amole and California red-legged frog critical habitat within the area. OHV activity displaced from JV could potentially impact these species and their habitat; however the projected increase in activity at this location would be relatively small and the potential intensity of increased use would be very low (the same assumptions described above for Figueroa Mountain are assumed to apply for Pozo La Panza). Based on these assumptions, the intensity of increased use would be very low. It is not anticipated that these species or their habitat would be adversely affected by the increased use.

5.8.2 Oceano Dunes

Oceano Dunes SVRA consists of nearly 15,000 acres (6,070 hectares) open for OHV recreation along Pismo Beach in San Luis Obispo County. Oceano Dunes would be expected to absorb an additional 4,196 and 1,678 visitor-days per year under Alternatives 1 and 6, respectively.

The Oceano Dunes SVRA General Plan does not list the desert tortoise as a species found within the park (California State Parks 1994); therefore, there would be no impacts to desert tortoises from displaced

OHV use. GIS analysis did identify critical habitat for California red-legged frog, purple amole, La Graciosa thistle, and western snowy plover. OHV activity displaced from JV could potentially impact these species and their habitat; however this area protects sensitive species habitat with fencing and signage and the projected increase in activity at this location would be relatively small. On a typical weekend day throughout the year, these levels of increased activity would translate to approximately 36 additional visitors per weekend day for the Alternative 1 scenario and approximately 14 added visitors under Alternative 6. As described in Section 2.3, these calculations assume that 85% of annual visitor-days occur on weekends. For purposes of estimating weekend use at Oceano Dunes, however, it was assumed that OHV activity would occur during 100 weekend days per year. Based on these assumptions and the protection of sensitive habitat within the OHV area, the intensity of increased use would be very low. It is not anticipated that these species or their habitat would be adversely affected by the increased use.

5.8.3 Ballinger Canyon

Ballinger Canyon is a 70-mile trail (113-kilometer) system spanning parts of northeastern Santa Barbara, northwestern Ventura, and southwestern Kern counties. The Los Padres National Forest Management Plan indicates that very few desert tortoises are found on Forest Service land (USDA 2005d). In addition, Ballinger Canyon is outside of the desert tortoise's expected range (California Department of Fish and Game 2011); therefore, there would be no impact to desert tortoise from displaced OHV use. GIS analysis did not identify critical habitat for any threatened or endangered species.

Figure 9
Designated OHV Areas - Block 8

Sources: BLM 2011f; ESRI 1992, 1997, 2009; USFWS 2011a

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6.0 ANALYSIS OF THE OPEN DESERT AREA

Figure 10 provides an overview of the ODA; this area includes the WEMO route system, popular locations and networks along the WEMO route system, and is the general area of concern for illegal OHV activity potentially resulting from Alternatives 1 and 6. Areas that are not part of the WEMO route system and are neither BLM-designated OHV areas nor designated OHV routes within the SBNF are off limits for OHV use. Areas of great concern related to illegal OHV activity include environmentally sensitive areas such as Wilderness Areas, desert tortoise critical habitat areas, Joshua Tree National Park, and Mojave National Preserve.

The WEMO Plan adopts a system of OHV routes, which provide access to nearly 3,000,000 acres (1,214,062 hectares) of public lands within the western Mojave Desert (BLM 2011h). This route system is currently under review by BLM and some open routes may be closed in the future, to protect sensitive resources. Due to location, similar terrain, opportunity for long-distance travel, and abundance of camping opportunities, it is expected that the WEMO routes would attract OHV activities displaced from JV. Under Alternative 1, the WEMO route system would be expected to absorb 24,545 additional visitor-days per year and under Alternative 6 an additional 9,818 visitor-days per year. In terms of average daily visitors on a given weekend day during the most active OHV season, 527 visitors would be displaced from JV to the ODA under Alternative 1 and 211 visitors would be displaced to the ODA on a given weekend day under Alternative 6 (40% of the Alternative 1 total). Popular locations and route networks in the ODA include Juniper Flats, Coolgardie Mesa, Giant Rock, Rainbow Basin, Calico, Afton Canyon, and the Ord Mountain route network.

6.1 ANALYSIS OF OHV ACTIVITY IN ODA FOCUS SEGMENTS

The ODA (Figure 10) was divided into six focus segments to facilitate analysis of the existing land uses, desert tortoise densities and critical habitat, and potential for increased OHV use. For all focus segments, increases in displaced OHV activity (both legal and illegal) and the potential impacts of OHV activity are estimated to be greater under Alternative 1 than under Alternative 6.

6.1.1 Focus Segment 1

Focus Segment 1 (Figure 11) comprises the northwestern section of the ODA. Notably, a large section of the WEMO route system runs through this focus segment, and much of the route system coincides with desert tortoise critical habitat, within the Superior-Cronese DWMA. Desert tortoise surveys performed in 1998-2002 for the WEMO Plan found seven areas of higher than average tortoise abundance within the Superior-Cronese DWMA. The largest concentration area occurred in the Mud Hills and Water Valley areas north of Barstow and Hinkley, with additional concentrations found southwest of Fort Irwin and in the Soda Mountains.

Rainbow Basin and Coolgardie Mesa contain desert tortoise critical habitat areas, and are also popular OHV areas where increases in OHV activity are likely to occur under both Alternatives 1 and 6. Restricted areas that may see increased use as a result of increased OHV activity would include closed routes and routes that are newly created, illegally, by the extension of existing routes. Focus Segment 1 has also been a destination for unauthorized OHV staging and races (BLM 2011e).

Impacts of displaced OHV activity in Focus Segment 1 would be largely related to increased OHV activity in desert tortoise critical habitat areas. The desert tortoise critical habitat in Focus Segment 1 would likely be subject to increased OHV activity as a result of displaced recreation from JV, and desert tortoise habitat and population may be negatively impacted. The heavy convergence of the route system with desert tortoise critical habitat suggests that potential impacts in Focus Segment 1 would be extensive, relative to other focus segments.

6.1.2 Focus Segment 2

Focus Segment 2 (Figure 12) comprises the northeastern portion of the ODA, and largely consists of the Mojave National Preserve. While the preserve is generally coincidental with desert tortoise critical habitat, OHV activity there is well enforced and an increase in illegal OHV activity would not be expected (SBCSD 2011). The Afton Canyon Natural Area is a designated Area of Critical Environmental Concern due to the Mojave River providing important plant and wildlife habitats and scenic vistas. A small portion of the WEMO route system runs through desert tortoise critical habitat, northwest of Afton Canyon.

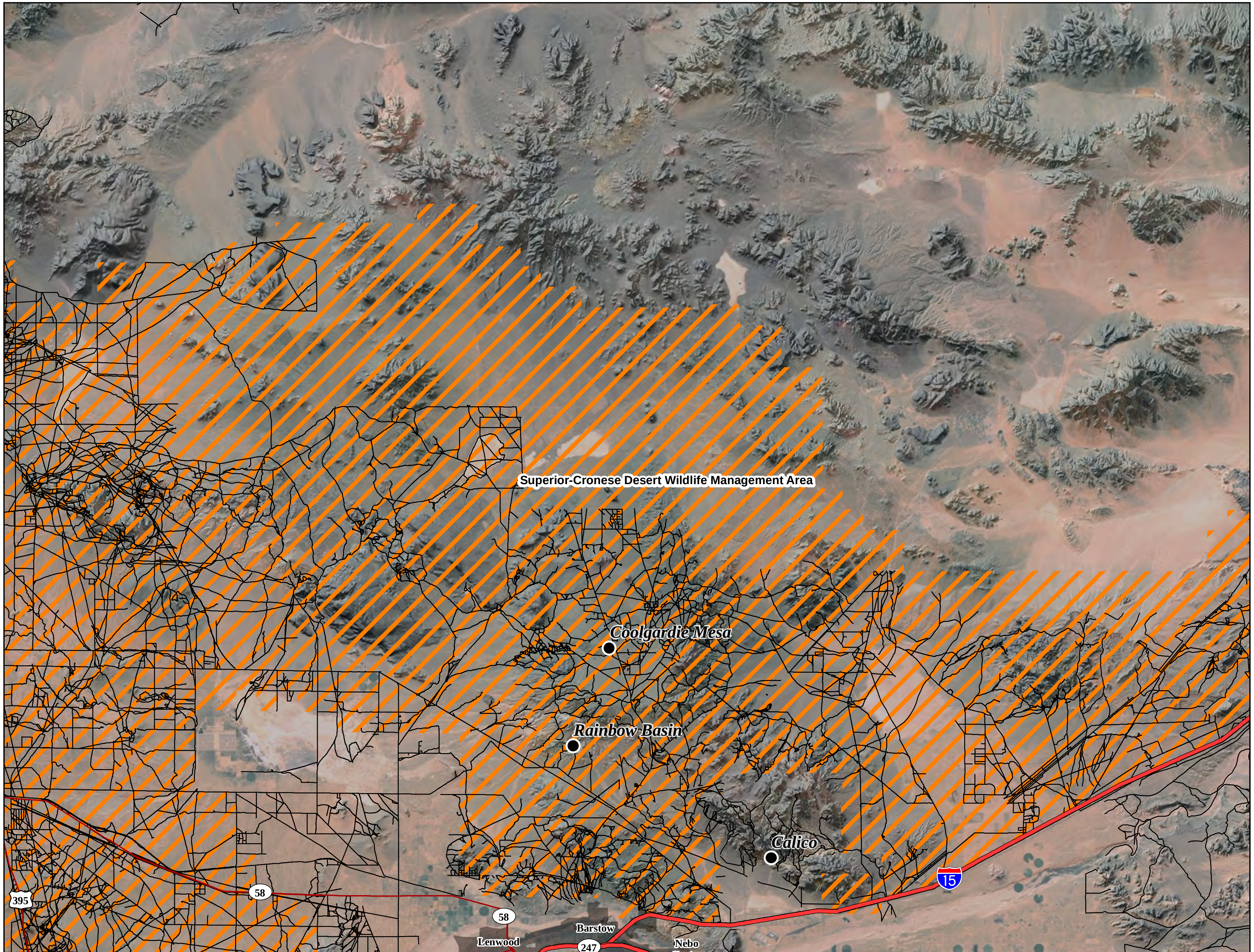
Impacts of displaced OHV activity in Focus Segment 2 would be related to increased OHV activity in the desert tortoise critical habitat northwest of Afton Canyon. Potentially, increased OHV activity at Rasor OHV area could spill out onto northwesterly-directed routes where designated critical habitat is located; any increased use (or, especially) misuse of these routes could impact desert tortoise critical habitat and population. Given that the Mojave National Preserve, and the designated critical habitat within, would not be expected to see an increase in OHV activity, Focus Segment 2 would likely be subject to a low level of potential impacts, relative to other focus segments.

6.1.3 Focus Segment 3

Focus Segment 3 (Figure 13) comprises the central-west portion of the ODA. Similar to Focus Segment 1, WEMO routes in Focus Segment 3, particularly the Ord Mountain route network, are heavily concentrated within desert tortoise critical habitat areas. As part of the West Mojave Plan, the abundance of desert tortoises was measured in OHV areas and designated critical habitat areas. The Ord-Rodman DWMA was found to have the second-highest desert tortoise densities within the plan area, after the Stoddard Valley OHV Area (BLM 2005). The Ord-Rodman DWMA was designated in 1994 and comprises 253,200 acres (BLM 2005). Desert tortoise surveys performed from 1998 to 2002 found that there were five areas of above-average tortoise density based on sign count, totaling approximately 18% of the DWMA, where tortoise sign counts were above average (BLM 2005). These areas of higher desert tortoise density were generally located in the northern portion of Stoddard Valley, in northern Lucerne Valley, and in the northwest corner of the DWMA, north of JV and bordering the Combat Center. The most recent desert tortoise monitoring report found that in 2010, the Ord-Rodman DWMA had an estimated desert tortoise density of 7.5 tortoises per square kilometer, which is consistent with previous years' findings (USFWS 2010).

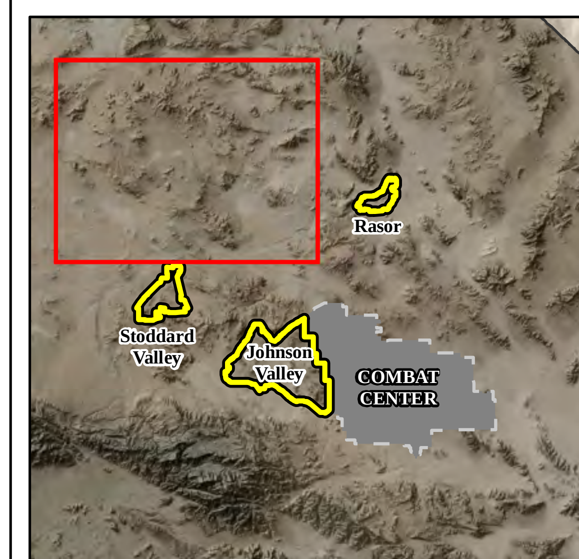
Figure 10
Open Desert Area (ODA)

Figure 11
ODA Focus Segment 1



Legend

- Interstate
- Highway
- City Limit
- Legal OHV Areas
- WEMO Route System
- Area Sensitive to OHV Use
- Desert Tortoise Critical Habitat



0 5 10 Miles
0 5 10 Kilometers

N

Sources: BLM 2011, USFWS 2011

Figure 12
ODA Focus Segment 2

Legend

Interstate
Highway
City Limit
Legal OHV Areas
BLM Designated OHV Area
WEMO Route System
Areas Sensitive to OHV Use
National Park, Forest, or Preserve
Wilderness Area
Desert Tortoise Critical Habitat

Sources: BLM 2011, USFWS 2011

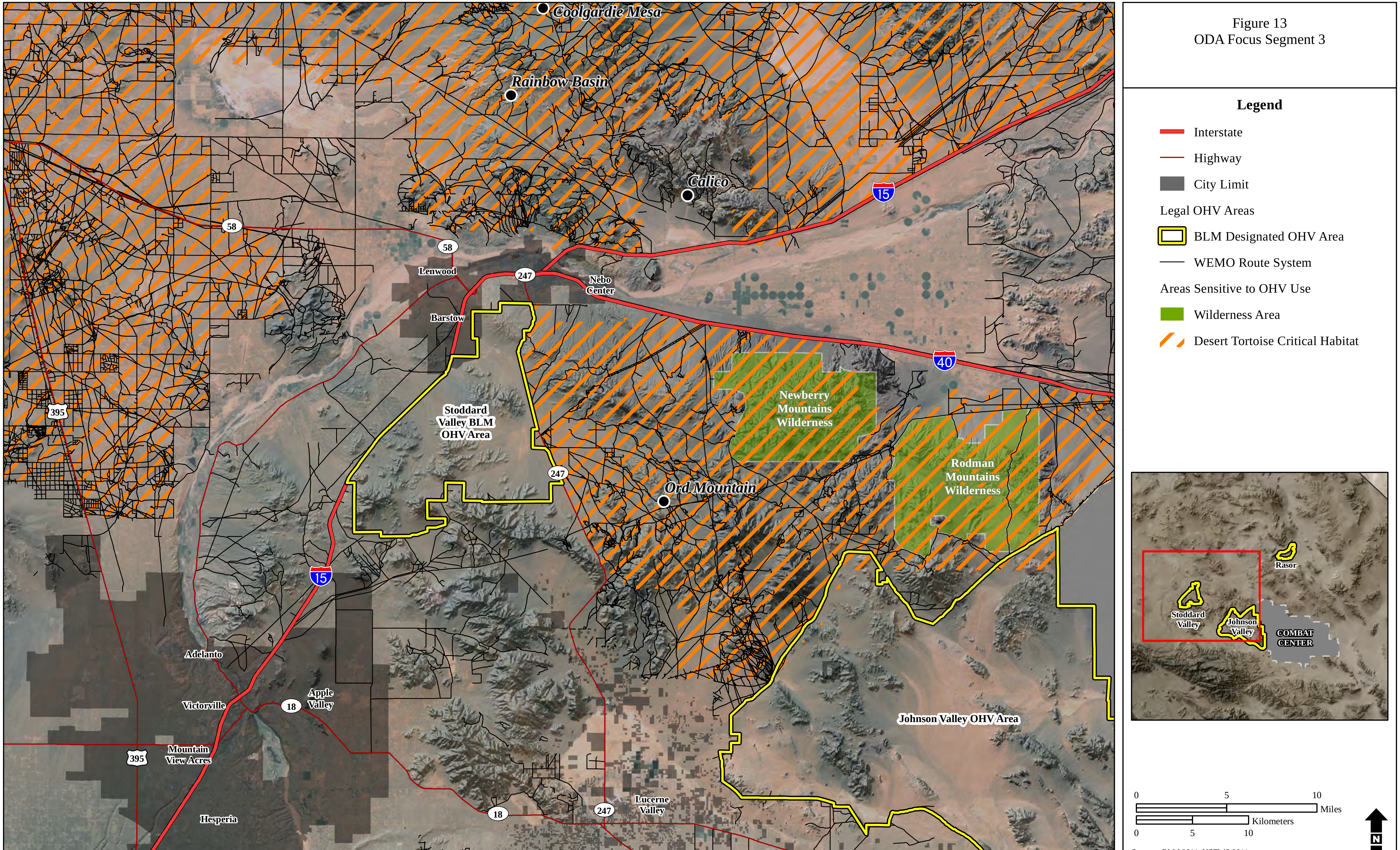


Figure 13
ODA Focus Segment 3
Legend
Interstate
Highway
City Limit
Legal OHV Areas
BLM Designated OHV Area
WEMO Route System
Areas Sensitive to OHV Use
Wilderness Area
Desert Tortoise Critical Habitat
Coolgardie Mesa
Rainbow Basin
Calico
Lenwood
Barstow
Nebo Center
Stoddard Valley BLM OHV Area
Newberry Mountains Wilderness
Rodman Mountains Wilderness
Ord Mountain
Johnson Valley OHV Area
Adelanto
Victorville
Apple Valley
Mountain View Acres
Hesperia
Lucerne Valley
Rasor
Stoddard Valley
Johnson Valley
COMBAT CENTER
0 5 10 Miles
0 5 10 Kilometers
N
Sources: BLM 2011, USFWS 2011

The Ord Mountain route network would be expected to see an increase in OHV activity as a result of displaced use from JV. Increased OHV activity at Stoddard Valley would be expected to generate increased spillover use into the Ord Mountain region (BLM 2011e), as the number of dispersed use visitor-days there would be expected to increase (See Table 3).

Impacts of displaced OHV activity in Focus Segment 3 would be related to increased OHV activity in the Ord Mountain trail network within desert tortoise critical habitat areas. Impacts to desert tortoise critical habitat and the desert tortoise population, caused by displaced OHV use at JV, may occur. The Ord Mountain route network is popular and increased OHV activity there would be heavy; the potential for impacts in Focus Segment 3 would likely be high, relative to other focus segments.

6.1.4 Focus Segment 4

Focus Segment 4 (Figure 14) comprises the central-east portion of the ODA. Focus Segment 4 includes the northern portion of the existing Combat Center, the Kelso Dunes and Bristol Mountains Wilderness areas, and public and private lands to the east. The public lands are sparsely used for OHV recreation (see EIS Section 4.2). Points of interest include WEMO routes leading up to the northern Combat Center boundary, and running along the western boundary of the Kelso Dunes Wilderness Area. Illegal entry onto the Combat Center by OHV does occur, for example by "scrappers" seeking metal debris left after training exercises.

Impacts from displaced OHV activity in this focus segment, relative to other focus segments, would be expected to be low. WEMO routes in Focus Segment 4 do not coincide with designated critical habitat; therefore, OHV activity along WEMO routes would not significantly impact desert tortoise critical habitat or population.

6.1.5 Focus Segment 5

Focus Segment 5 (Figure 15) comprises the southwest portion of the ODA; it contains JV, the communities of Lucerne Valley and Johnson Valley, the Mountaintop District of the SBNF, and the Bighorn Mountains and San Gorgonio Wilderness Areas. Excluding the areas to the north that are discussed in Focus Segment 3, there are no WEMO routes or OHV routes in the SBNF that run through desert tortoise critical habitat. The Johnson Valley community has been the largest source of complaints to the San Bernardino County CED, accounting for approximately 65% of all code violation complaints (San Bernardino County CED 2011b).

Impacts from displaced OHV activity in Focus Segment 5 would relate to nuisance in low-density residential desert communities. Increased illegal OHV activity in and around the communities of Lucerne Valley and Johnson Valley would be expected and nuisances related to illegal OHV activity may increase. Since there are few OHV routes within desert tortoise critical habitat, any potential impacts to desert tortoise critical habitat in Focus Segment 5 would be expected to be low, relative to other focus segments.

6.1.6 Focus Segment 6

Focus Segment 6 (Figure 16) comprises the southeastern portion of the ODA. This focus segment includes a portion of Joshua Tree National Park, the homestead community of Wonder Valley, and a section of the WEMO route system that runs through desert tortoise critical habitat. Officials at Joshua Tree National Park would not expect to see an increase in illegal OHV activity (NPS 2011) within the park. Illegal OHV activity on private property in Wonder Valley has historically resulted in citations and increased tensions among neighbors (SBCSD 2011; San Bernardino County CED 2011a). The San Bernardino County CED estimates that 15% of their OHV code violation calls come from the Wonder

Valley area (San Bernardino County CED 2011a). Some increase in illegal OHV activity on closed routes or on illegal route extensions within desert tortoise critical habitat areas would also be expected.

Impacts of displaced OHV activity in Focus Segment 6 would be related to increased illegal OHV activity in the desert tortoise critical habitat area south of Wonder Valley and increased illegal OHV activity in the community of Wonder Valley. Increased illegal OHV activity in and around the town of Wonder Valley would likely bring about additional nuisance and possibly increased tensions within the community. Increased use of the WEMO routes south of Wonder Valley may have deleterious effects on desert tortoise critical habitat and population.

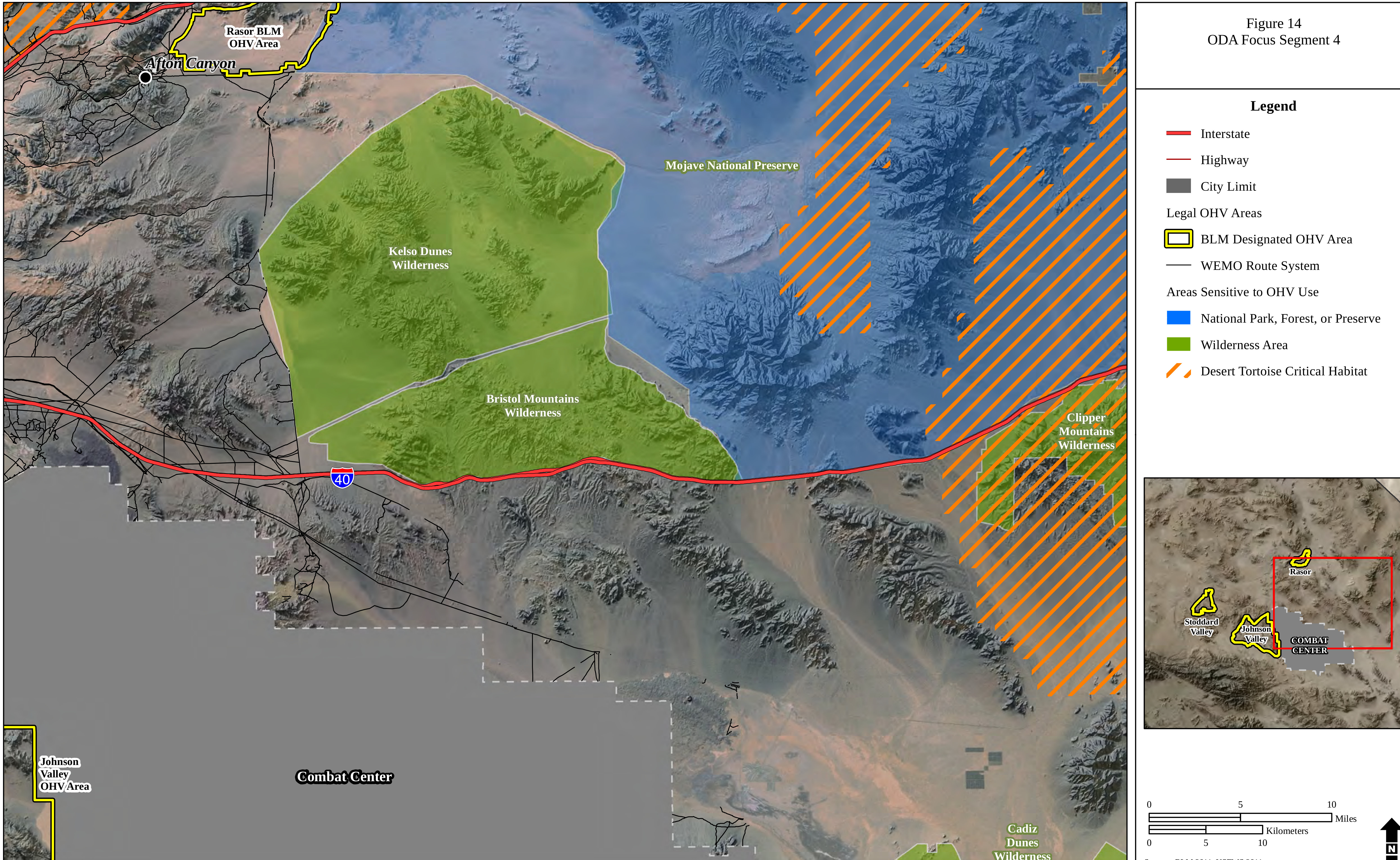


Figure 14
ODA Focus Segment 4

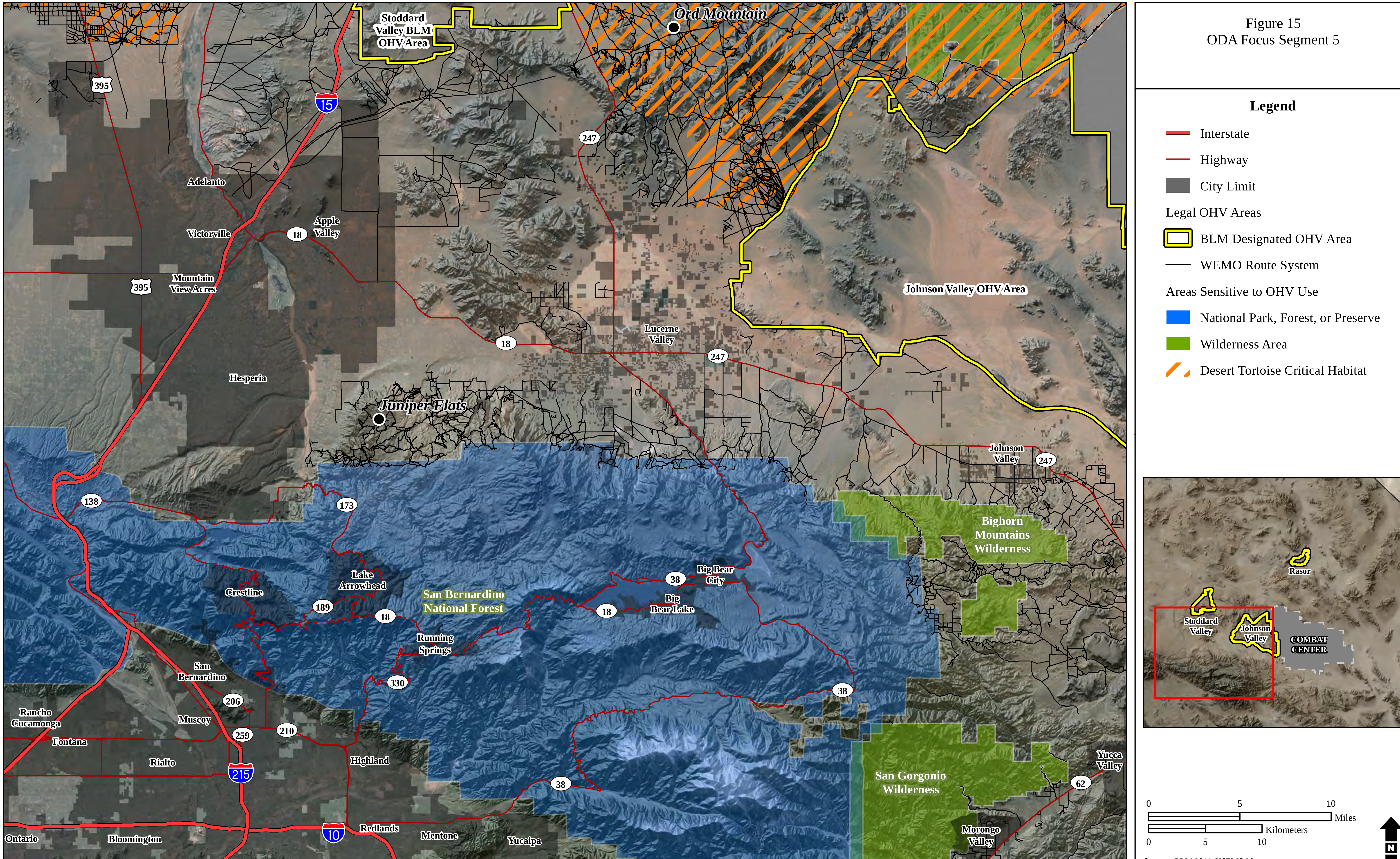
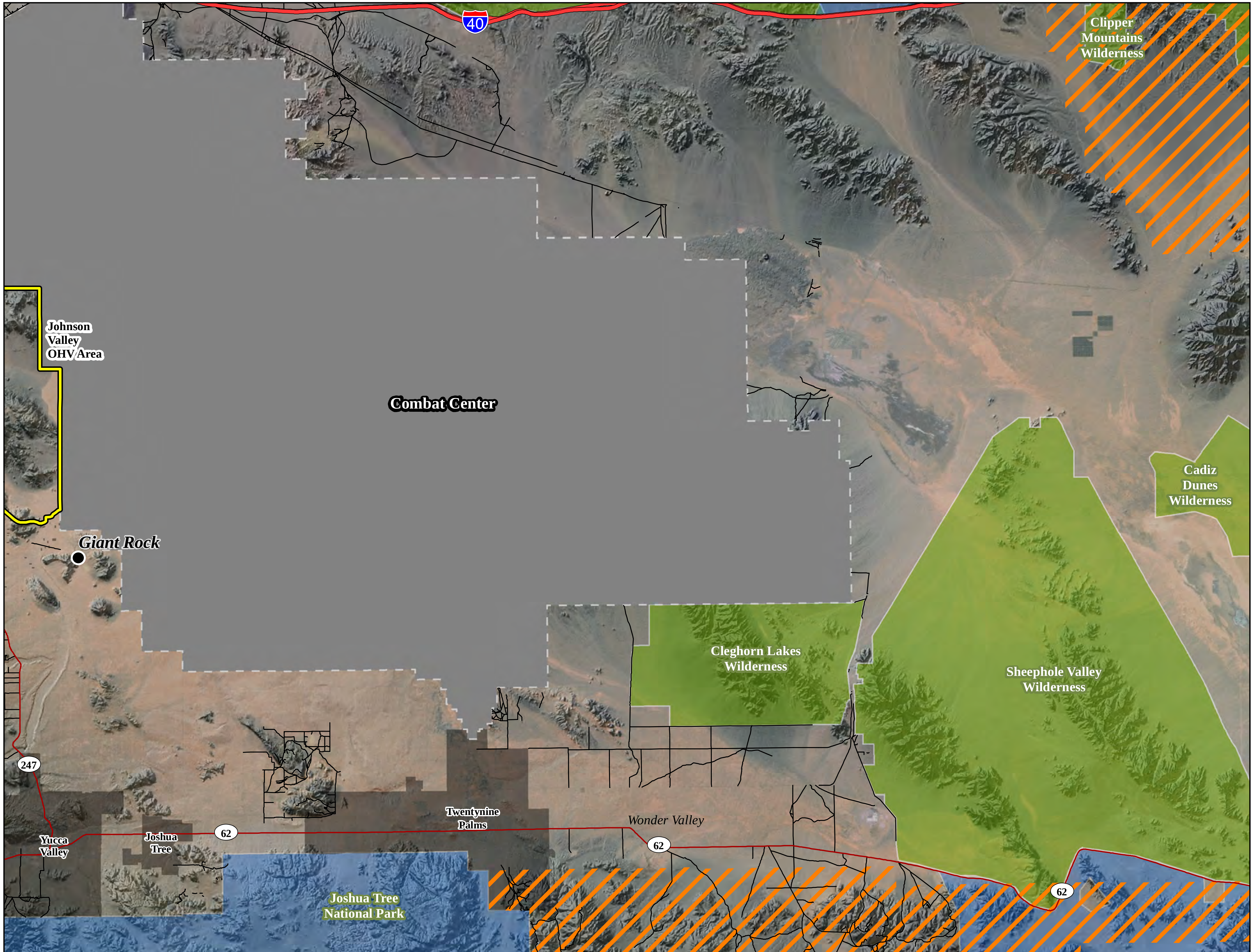


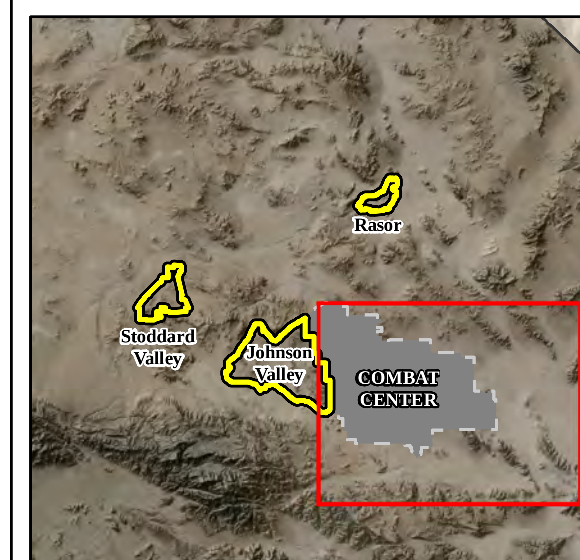
Figure 15
ODA Focus Segment 5

Figure 16
ODA Focus Segment 6



Legend

- Interstate
- Highway
- City Limit
- Legal OHV Areas
- BLM Designated OHV Area
- WEMO Route System
- Areas Sensitive to OHV Use
- National Park, Forest, or Preserve
- Wilderness Area
- Desert Tortoise Critical Habitat



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Sources: BLM 2011, USFWS 2011

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7.0 SUMMARY AND CONCLUSIONS

The proposed acquisition of the Johnson Valley OHV area (JV) would potentially displace over 200,000 annual visitor-days of OHV use under Alternative 1 and more than 80,000 visitor-days under Alternative 6. In the San Bernardino County Area, on a given weekend day during the most active OHV season (October through April), an estimated average of 2,633 visitors would be displaced under Alternative 1 and 1,053 under Alternative 6. This Displaced OHV Recreation Study (DORS) identifies the areas that would be likely to attract the displaced visitor-days of recreational use, including designated OHV areas throughout Southern California and the Open Desert Area (ODA) of San Bernardino County. The DORS also provides a reasonable scenario of how the displaced visitor-days would be distributed among the identified areas. Reviews of environmental documentation and GIS analysis were employed to qualitatively assess relative impacts to the threatened Agassiz's desert tortoise (*Gopherus agassizii*) and its critical habitat at the alternative OHV areas. The DORS focuses primarily on the desert tortoise in response to questions raised by the U.S. Fish and Wildlife Service during Section 7 Endangered Species Act consultation for the proposed action, and because the EIS and studies of the impacts of OHV activities indicate that *Gopherus agassizii* is the listed species that would most likely be adversely affected by indirect impacts from the proposed action. As applicable, the DORS also identifies any designated critical habitat for other listed species that occurs in or near the reviewed alternative OHV areas, and it presents a brief qualitative discussion of the potential for indirect impacts to these other species.

Areas identified that would be expected to attract OHV activities displaced from JV fall into two major categories – designated OHV areas and the ODA. Designated OHV areas refer to government-managed areas with specified boundaries or marked trails. The ODA includes the remainder of the Western Mojave, beyond the boundaries of designated OHV areas. Designated OHV areas where indirect impacts to the desert tortoise would be likely to occur are presented in Table 9. Of the group, Stoddard Valley would be expected to attract the largest amount of displaced OHV visitor-days and would be expected to incur the greatest increase in OHV related impacts to desert tortoise habitat and population. Impacts to desert tortoise would continue to occur at Stoddard Valley and would likely increase. Impacts to desert tortoise habitat and population would also potentially increase at El Mirage, Imperial Sand Dunes, Spangler Hills, and Jawbone Canyon. The number of displaced visitor-days of OHV use would be less under Alternative 6 than under Alternative 1, thus the potential increase in OHV-related impacts to desert tortoise habitat and population would be lower under Alternative 6.

OHV recreation in the ODA is legally permitted on a system of sanctioned routes (the Western Mojave Plan [WEMO] route system), but may also be illegal in many areas as a function of state law or local ordinances. Due to location, similar terrain, opportunity for long-distance travel, and abundance of camping opportunities, it is expected that the WEMO routes would attract OHV activities displaced from JV. Table 9 shows the estimated increase in OHV activity throughout the WEMO route system under Alternatives 1 and 6.

Table 9. Potential Increases in OHV Activity in Areas Subject to Desert Tortoise Impacts

OHV Area	Increase in Annual Visitor-Days Alternative 1	Increase in Annual Visitor-Days Alternative 6
Stoddard Valley	84,962	33,985
El Mirage	13,216	5,287
Imperial Sand Dunes	8,392	3,356
Spangler Hills	7,552	3,021
Jawbone Canyon	3,776	1,510
ODA – WEMO Route System	24,545	9,818

For purposes of this study, the ODA was divided into six focus segments. Focus Segment 1 and Focus Segment 3 each contain large areas of convergent land uses (OHV routes and desert tortoise critical habitat) and displaced OHV activity that relocates to the ODA would potentially be attracted to these areas. Since these areas contain desert tortoise critical habitat, impacts would be expected to be greater relative to other Focus Segments. Focus Segments 2, 4, and 5 contain few OHV routes that coincide with desert tortoise critical habitat and therefore would be expected to incur relatively fewer impacts to desert tortoise habitat and population compared to other focus segments. The area south of Wonder Valley, in Focus Segment 6, contains a convergence of OHV routes and desert tortoise critical habitat, but would not be expected to attract displaced OHV use to the extent that would likely occur at Focus Segments 1 and 3. Therefore, impacts to desert tortoise habitat and population in Focus Segment 6 would be expected to be moderate relative to other focus segments. The communities of Lucerne Valley, Johnson Valley, and Wonder Valley are identified as locations where increased OHV related nuisance to residents may increase; these communities are located in Focus Segments 5 and 6. Alternative 6 would displace less OHV activity to the ODA than would Alternative 1; thus any impacts would be lower under Alternative 6.

The major findings of this study include:

- Displaced OHV activities from the Johnson Valley OHV Area would likely impact desert tortoise habitat and populations at certain alternative OHV areas.
- The network of legal trails traversing the Open Desert Area of San Bernardino County coincides with desert tortoise critical habitat. Impacts to desert tortoise, particularly in Focus Segments 1 and 3, would continue to occur and would likely increase.
- Stoddard Valley OHV Area would be expected to attract the largest amount of displaced OHV visitor-days and would be expected to incur the greatest increase in OHV-related impacts to desert tortoise habitat and population.
- Impacts to desert tortoise habitat and population would also potentially increase at El Mirage, Imperial Sand Dunes, Spangler Hills, and Jawbone Canyon.

- Since the number of displaced visitor-days of OHV use would be less under Alternative 6 than under Alternative 1, the potential increase in OHV related impacts to desert tortoise habitat and population would be lower under Alternative 6.
- OHV activity displaced from JV could potentially have an indirect impact on other listed species and their critical habitat areas in the few alternative OHV areas that include such habitat. While the available data is not sufficient to quantify the level of impact, the projected amount of increased use in these areas would be very low. Based on available information and the assumptions made in this study, it is not anticipated that these species or their habitat would be adversely affected by the limited amounts of increased use.

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DISPLACED OFF-HIGHWAY VEHICLE RECREATION STUDY

APPENDICES

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APPENDIX A
OHV REGULATIONS BY GOVERNMENT AGENCY

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OHV REGULATIONS BY GOVERNMENT AGENCY

1.1. FEDERAL LAWS AND REGULATIONS

Title 43, Section 8341.1 of the Code of Federal Regulations (CFR) regulates the use of OHVs on public lands. These federal regulations are minimum standards in areas where state laws and regulations do not exist or are less stringent. The State of California has comprehensive regulations for OHV vehicles and use (see Section 1.2), which coincide with or are more stringent than the federal regulations.

In regard to OHV use on federal lands, Section 8341.1(c) of the CFR states that "the operation of off-road vehicles is prohibited on those areas and trails closed to off-road vehicle use." Within the study area of the Displaced OHV Recreation Study, the federal lands managed by the U.S. Forest Service (USFS), Bureau of Land Management (BLM), National Park Service (NPS), and U.S. Marine Corps (USMC) each designate specific areas for legal OHV use (if allowed at all). Some federal agencies also have additional regulations for OHV riders on their lands.

1.1.1. BLM OHV Regulations

OHV use on BLM managed lands in the BLM California Desert District (CDD) is sorted into the following classifications (BLM 2011a):

- Open: Open areas are available for all forms of cross-country travel. Vehicles may be operated anywhere within the posted boundaries of open areas.
- Limited: The majority of public lands in the CDD are designated limited use. In these areas, vehicle travel is limited to approved/signed routes of travel. No cross-country vehicle travel is allowed.
- Wilderness: The use of motorized vehicles or equipment is prohibited in wilderness areas. No other form of mechanical transport is allowed in wilderness areas. Travel on foot or horseback is welcome.
- Closed: Most closed areas are closed to motor vehicle use by the general public. Hiking, bicycle riding, equestrian use, and other forms of non-motorized recreation may be permitted. A few closed areas are closed to all use. These areas are closed for safety reasons. These may include military bombing ranges.

Within BLM-designated Limited OHV areas, there are four types of route designations:

- Open: Routes are open to all types of vehicles.
- Limited (Vehicle): Routes are open to street legal vehicles only.
- Limited (Seasonal): Routes are open to all types of vehicles during the open season.
- Limited (Permit Only): A Special Recreation Permit is required for trail access.

Red and green OHV stickers and valid California driver's licenses and vehicle registration (or out-of-state licenses and California nonresident stickers) are required on OHVs using BLM lands. The red sticker riding schedule for BLM designated OHV areas in the California Desert District is generally from the beginning of September or October through the end of April or May, except for those areas (such as Dumont Dunes) that are open year-round. Violations of the red sticker riding schedule are typically infractions, with violators given fines.

Legal OHV Areas and Routes

The BLM Barstow Field Office manages Open, Limited, and Wilderness/Closed OHV areas. The Open and Limited OHV Areas are listed in Table 1.1, with their OHV use classifications.

Table 1.1. OHV Areas Managed by BLM Barstow District

OHV Areas Managed by BLM Barstow District	OHV Use Classification
El Mirage Dry Lake OHV Area	Open Area and Routes
Johnson Valley OHV Area	Open Area
Stoddard Valley OHV Area	Open Area and Routes
Rasor OHV Area	Open Area and Routes
Dumont Dunes OHV Area	Open Area
Ord Mountains	Open Routes in Limited Use Area
Afton Canyon Natural Area	Open Routes in Limited Use Area
Juniper Flats	Open Routes in Limited Use Area
Rainbow Basin Natural Area	Open Routes in Limited Use Area, and staging of OHVs is not allowed.

Source: BLM 2011b.

Additional BLM designated OHV areas in the Southern California region included for analyses are listed in Table 1.2.

Table 1.2. Additional BLM-designated OHV Areas Included in Study

OHV Area	Management Agency	Local Office/District	OHV Access
Keyesville SRMA	BLM	Bakersfield	Open and Limited Routes (portions limited to day use only)
Imperial Sand Dunes	BLM	El Centro	Open Area
Plaster City	BLM	El Centro	Open Area
Superstition Mountain	BLM	El Centro	Open Area
Lark Canyon OHV Area	BLM	El Centro	Open Routes in Limited Use Area
Devil's Canyon	BLM	El Centro	Limited Routes (Permit Only)
Dove Springs	BLM	Ridgecrest	Open Routes in Limited Use Area
Jawbone Canyon	BLM	Ridgecrest	Open Area and Open Routes
Spangler Hills	BLM	Ridgecrest	Open Area and Open Routes

Sources: BLM 2011a, BLM 2011c, BLM 2011d.

Vehicular Camping

Except for "special areas" with specific camping regulations, visitors without vehicles are welcome to camp almost anywhere on BLM managed land, and specific places with vehicles. Each OHV area has individual camping restrictions, but in general OHV users can camp with their vehicles anywhere in Open riding areas, and up to 300 feet off of any posted Open Route, as long as the road or trail is not blocked to other users. Trenching or otherwise modifying the ground or removing vegetation to "improve" the camp site is not allowed. Camping is limited to 14 days unless otherwise specified. Specific camping regulations in BLM Barstow OHV Areas include:

Afton Canyon Natural Area: Camping is only allowed in the Afton Canyon Campground.

Ord Mountains: Camping is allowed 50 feet from the edge of an open route in previously used areas, but campers must obtain permission to camp on private property. There is no camping allowed within the Cinnamon Hills and the north end of Tyler Valley to protect desert tortoises (Massey 2009).

Dumont Dunes: Camping is allowed anywhere except the Competition Hill Corridor and Competition Hill.

Rasor, Stoddard Valley, and Johnson Valley: Camping is allowed anywhere within the riding area as long as it does not block road travel.

El Mirage: Camping is not allowed "in the open" on the lakebed, more than 100 feet away from the shore.

Juniper Flats: Vehicular camping is permitted within 300 feet of a designated open route, except in designated wilderness areas. Camping is not allowed within 200 feet of a wildlife watering place, per California Fish and Game Regulation Title 14.

Rainbow Basin Natural Area: Camping is only permitted in the Owl Canyon Campground. The BLM Barstow Field Office website states that "vehicle trespass is a major concern" in the Rainbow Basin Natural Area (BLM 2011b).

On public lands under Section 303(a) of the Federal Land Policy and Management Act of 1976 (43 U.S.C. 1733(a); 43 CFR 8360.0-7; 43 CFR 2932.57(b)), any person who violates any of these supplementary rules may be tried before a United States Magistrate and fined no more than $1,000 or imprisoned for no more than 12 months, or both. Such violations may also be subject to the enhanced fines provided for by 18 U.S.C. 3571. Those who violate these rules may also be subject to civil action for unauthorized use of the public lands, violations of special recreation permit terms, conditions, or stipulations, or for uses beyond those allowed by the permit under 43 CFR 2932.57(b)(2) (BLM 2011e).

1.1.2. San Bernardino National Forest

The San Bernardino National Forest OHV system comprises designated 24-inch to 50-inch wide trails and forest roads available for green and red sticker use (refer to Section 3.2.3.1. in the Final EIS for a description of green and red stickers). Some roads are primarily 4x4 routes, with others open to Sport Utility Vehicle and four wheel drive travel. There are not any "open areas" for hill-climbing activities, cross country travel, or motor cross tracks for racing. OHV trails are limited to vehicles less than 50 inches wide.

In 2005 the Forest Service announced a new regulation governing OHVs and other motor vehicle use. Each national forest or ranger district must specifically designate those roads, trails, and areas open to motor vehicle use. As a result, all of the designated OHV routes in the San Bernardino National Forest are shown on published Motor Vehicle Use Maps (MVUMs). The MVUMs also display uses allowed by vehicle class, such as highway vehicles, motorcycles, and vehicles less than 50 inches wide, as well as seasonally allowed uses. Routes and trails not shown on the MVUM are not open to motor vehicles. Figure 1 shows the MVUM for the San Bernardino National Forest.

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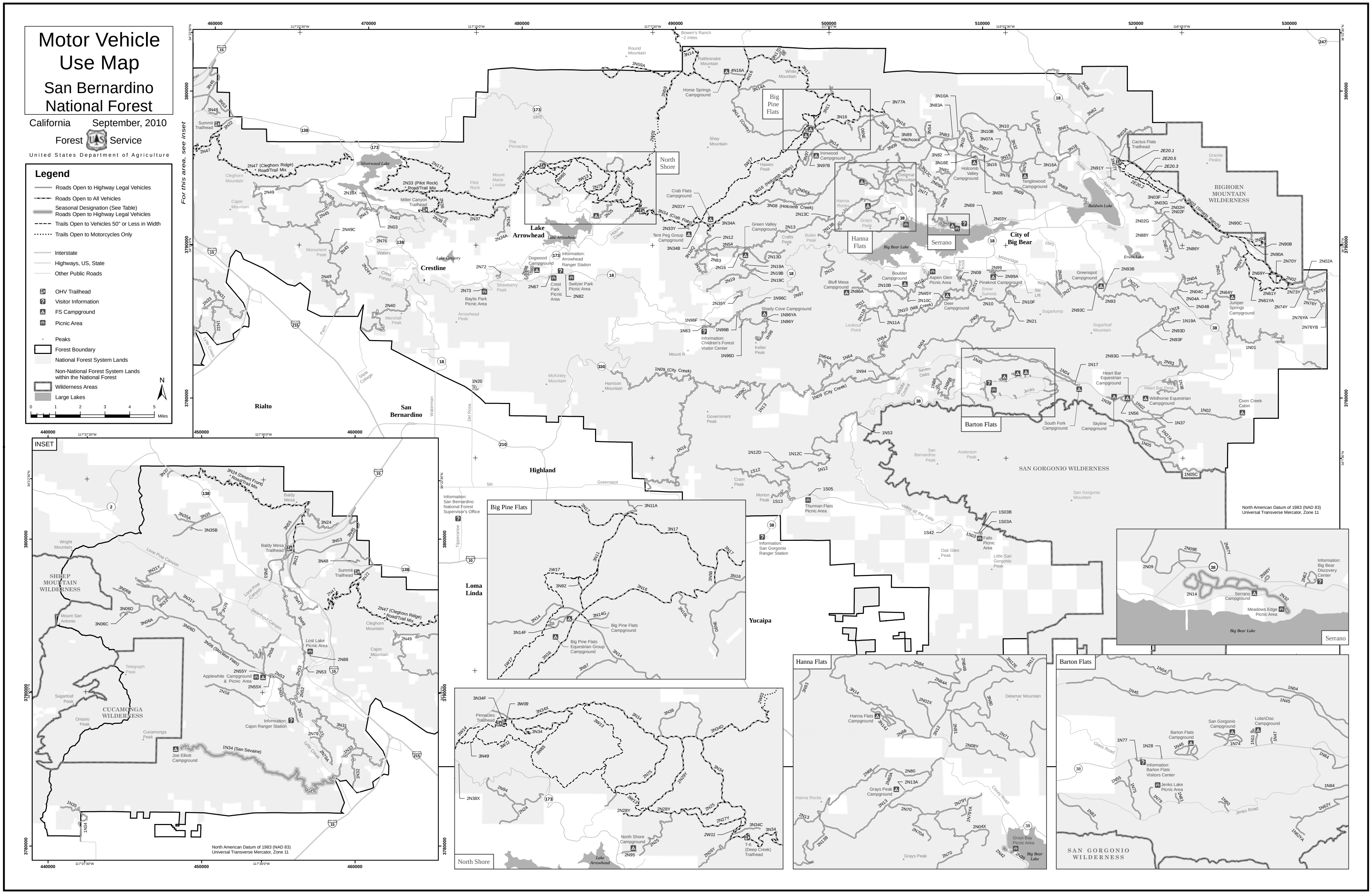

Figure 1
MVUM for San Bernardino National Forest

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OHV users in the San Bernardino National Forest must follow state OHV regulations (see Section 1.2), as well as regulations including the following:

- Utility Terrain Vehicles (also known as UTVs or “side-by-side's”) operators cannot drive on Street Legal Routes or 24- inch to 50-inch wide All-Terrain Vehicle (ATV) and motorcycle routes.
- Red Sticker vehicle riding season in the San Bernardino National Forest is generally 01 October through 30 April, depending upon the area.
- Per 36 CFR 261.54, motor vehicles may be parked within one vehicle length from the edge of the road surface, when it is safe to do so without causing road damage to NFS resources or facilities, unless otherwise prohibited.

NFS-designated OHV areas in the Southern California region included for analysis are shown in Table 1.3.

Table 1.3. NFS Managed OHV Areas in Southern California

OHV Area	Management Agency	Local Office/District	OHV Access
Rowher Flat OHV Area	U.S. Forest Service	Angeles National Forest	Trail
Wildomar OHV Area	U.S. Forest Service	Cleveland National Forest	Trail
Corral Canyon OHV Area	U.S. Forest Service	Cleveland National Forest	Trail
Ballinger Canyon	U.S. Forest Service	Los Padres National Forest	Trail
Ortega Trail	U.S. Forest Service	Los Padres National Forest	Trail
Divide Peak OHV Route	U.S. Forest Service	Los Padres National Forest	Trail
Pozo/ La Panza	U.S. Forest Service	Los Padres National Forest	Trail
Figueroa Mountain	U.S. Forest Service	Los Padres National Forest	Trail
Big Bear Lake	U.S. Forest Service	San Bernardino National Forest	Trail
Lake Arrowhead	U.S. Forest Service	San Bernardino National Forest	Trail
Cleghorn OHV Trail	U.S. Forest Service	San Bernardino National Forest	Trail
Kennedy Meadows	U.S. Forest Service	Sequoia National Forest	Trail

1.1.3. Marine Corps Air Ground Combat Center, Twentynine Palms

OHV riding by non-authorized personnel is not allowed within the Combat Center boundaries, and violators will be detained or escorted off the property. The base has a motorcross track used for shows and competitions.

1.1.4. Joshua Tree National Park

Four-wheel drive vehicles are allowed on designated paved and unpaved roads in Joshua Tree National Park. Vehicular routes include the Geology Tour Road and access to abandoned mines on Old Dale Road (see Figure 2). Some roads can be accessed outside of park boundaries, such as Pinkham Canyon and Thermal Canyon Roads (see Figure 3). Vehicles, including bicycles, are prohibited off established roads (NPS 2011). ATVs are prohibited in the park, and camping is only allowed in established campgrounds. Per CFR Title 36 (Parks, Forests, and Public Property), a person convicted of violating a provision of the National Park regulations shall be punished by a fine, or by imprisonment not exceeding 6 months, or both, and shall be required to pay all costs of the proceedings (VLex 2011).

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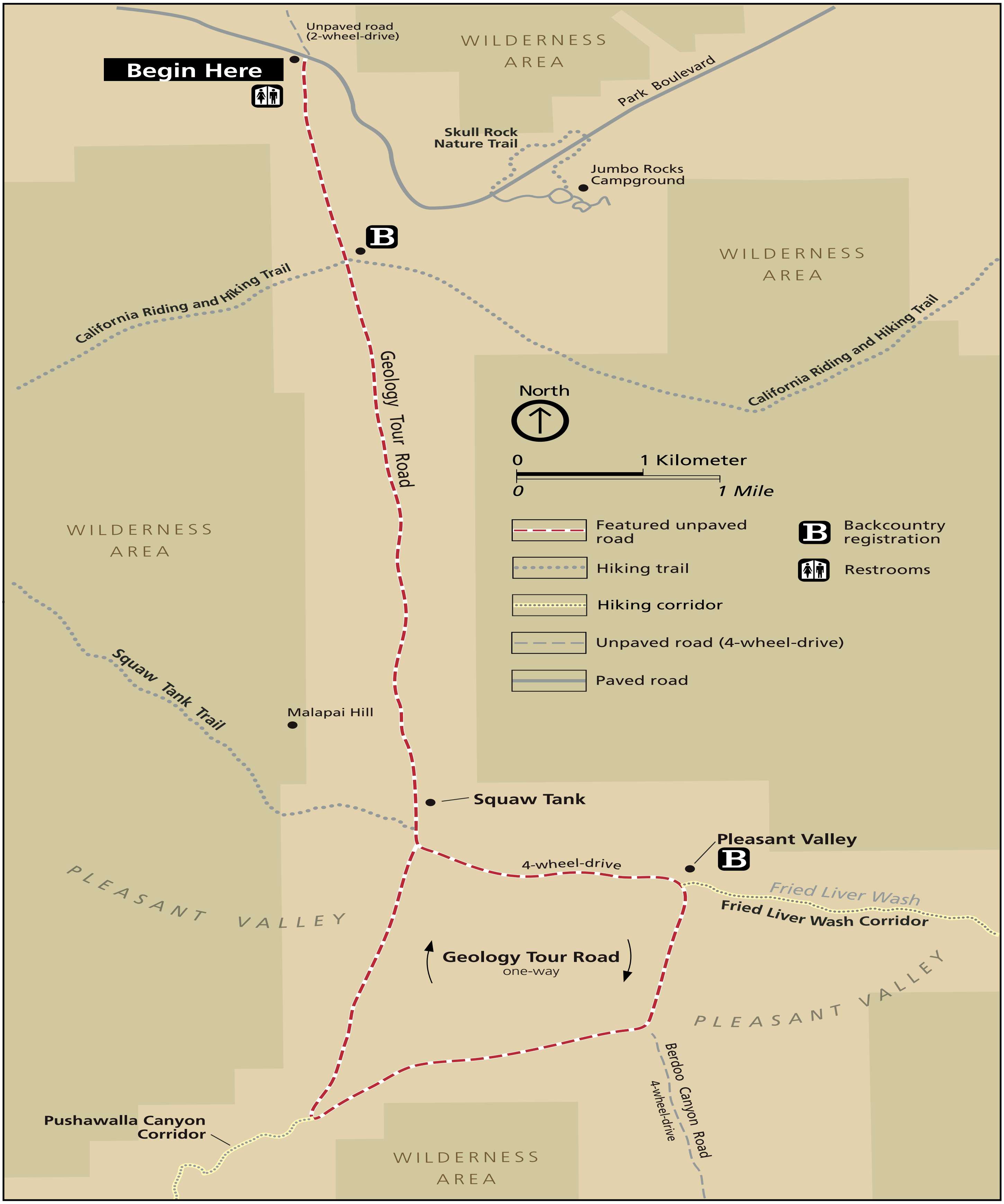

Figure 2
Joshua Tree National Park, Geology Tour Map

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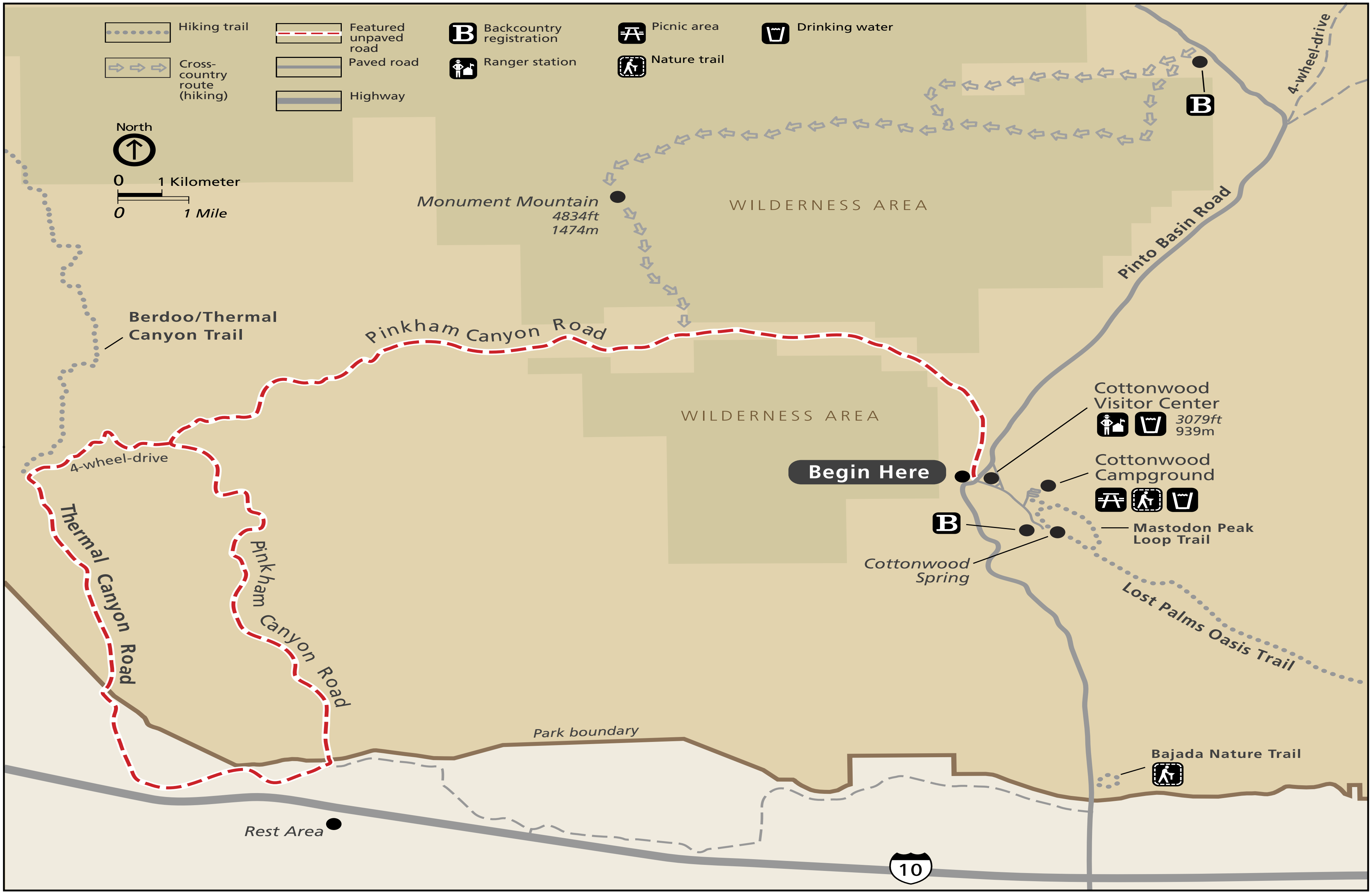

Figure 3
Joshua Tree National Park, Pinkham Canyon Road Map

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1.1.5. Wilderness Areas

The Wilderness Act of 1964 prohibits the use of mechanized or motorized vehicles in Wilderness Areas, except under special provisions described under the Act. Special provisions include providing for emergency access to visitors, and to allow existing private landowners continued access to their land. The Wilderness Act and Federal law (CFR Title 43, Part 6300) prohibit operation of any mechanical or motorized equipment within the boundaries of a Wilderness Area. Even if an OHV is needed to reach the wilderness area boundaries, the OHV must be parked outside of the boundary, and campers or visitors must walk or ride a horse in to the wilderness area. Visitors who commit an action that is prohibited in a Wilderness Area are subject to criminal prosecution, including fines of up to $100,000 and imprisonment for up to 12 months (GPO 2011). Violators may also be subject to an injunction to prohibit them from using public lands in violation of federal regulations.

1.1.6. Mojave National Preserve

Only street legal vehicles are allowed on the dirt roads in Mojave National Preserve. The green and red sticker programs are not recognized. Open roads in Mojave National Preserve do provide access to most Mojave Wilderness boundaries. Off-road vehicle use is not permitted.

Camping is allowed in the following areas, as shown in Figure 4 (NPS 2011b):

- Developed campsites
- Roadside camping allowed in previously used/disturbed sites outside of the day-use-only sites.
- In the backcountry, with the following conditions:
    - Must be more than 200 yards from any natural or constructed water source
    - Prohibited within ¼ mile of paved roads, unless specifically allowed
    - In Kelso Dunes, camping is prohibited along the access road, parking lot, the area north of the road to the crest of the dunes (one mile distance), and the area ¼ mile south of the access road.
    - Prohibited within ¼ mile of Zyzxx Road, and within ½ mile of Fort Piute and the Kelso Depot.

1.2. STATE LAWS AND REGULATIONS

Division 16.5 of the California Vehicle Code regulates OHVs. These regulations apply to all OHV users owning and/or operating an OHV within the State of California, even if on federal or private lands.
Table 1.4 provides a summary of the OHV regulations.

Additional restrictions and violations are spelled out in the California Penal Code. For instance, per Section 384a it is a misdemeanor to cut, destroy, mutilate, or remove any plant growing upon public land or upon private land without permission of the owner. It is also a misdemeanor to trespass with a vehicle, per Section 602(n).

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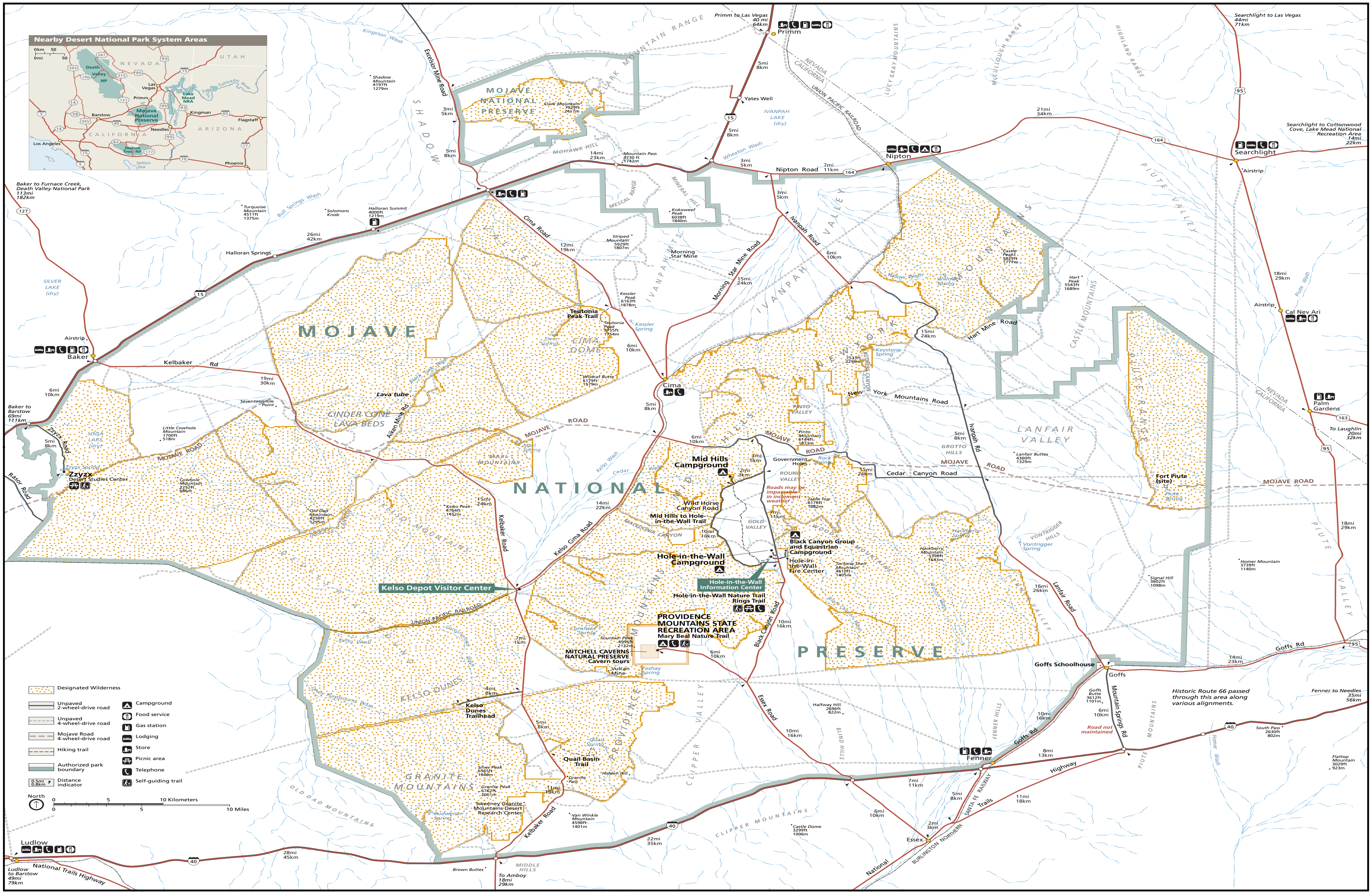

Figure 4
Mojave National Preserve Map

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1.2.1. State OHV Areas

All vehicles operating in the State Vehicular Recreation Areas (SVRA) must follow the State of California laws pertaining to OHVs (see Section 1.2) and have a vehicle registered by the California Department of Motor Vehicles. Regulations from the California Code specific to State Parks also apply to the SVRAs, including the following as listed in Table 1.4:

Table 1.4. Selected Citations from the California Vehicle Code Regarding OHVs

Division 16.5 Section	Selected Citations
Chapter 2, Registration of OHVs	
Article 1, Motor Vehicles Subject to Identification	§ 38010 – OHVs shall be registered by the CA Department of Motor Vehicles unless it is registered in another state, or it is a 4-wheeled vehicle operated solely in a competitive event on a closed course. § 38020 – a violation to obtain registration is an infraction § 38025- 38026.5 – OHVs may not drive on highways, except to cross as needed under certain conditions or on designated Combined Use highways under certain conditions
Article 3, Evidences of Identification	§ 38085 – Registration must be kept with the vehicle. § 38087.5 – Nonresidents may obtain a special permit to operate an OHV.
Chapter 5, Off-Highway Vehicle Operating Rules	
Article 1, Traffic Signs, Signals, and Markings	§ 38301 – Illegal to operate OHVs in areas closed to OHVs, for reasons including, but not limited to, regulating government access, plants, wildlife, water resources, and historical sites. Fines and penalties are stipulated. § 38301.3 – Illegal to operate OHVs in designated federal or state wilderness areas. Fines and penalties are stipulated. § 38301.5 – Illegal to operate OHVs in areas designated as a mountain fire district, by local city ordinance. Fines and penalties are stipulated.
Article 2, Operating Controls	§ 38304.1 – All OHV riders must be able to reach and operate the controls. Adults supervising OHV riders under 14 years of age can be fined if the children cannot safely reach and operate the controls.
Article 3, Speed Laws (Off-Highway Vehicles)	§ 38310- Speed limit within 50 feet of campgrounds/campsites/concentration of people shall be 15 mph unless otherwise posted.
Article 5, Reckless Driving	§ 38317 – Reckless driving causing bodily injury can result in fines and/or imprisonment § 38318 – Throwing a substance at an OHV or OHV driver/rider can result in a misdemeanor, or a felony if the intent was to do great bodily injury § 38318.5 – Removal of trail signage or malicious alteration of trail can result in a misdemeanor. Intent to do great bodily injury can result in a felony. If the violation caused adverse environmental impacts, the violator may liable for the cost of mitigation, restoration, and/or repair.
Article 6, Littering and Environmental Protection	§ 38319-38321 – Unlawful to cause malicious or unnecessary damage to the land or natural resources, and to dump trash/rocks/dirt/waste/etc. The violator may be liable for the cost of the removal operation.
Chapter 6, Equipment of Off-Highway Vehicles	
Article 1, General Provisions (Equipment of Off-Highway Vehicles)	§ 38330 – Illegal to operate an OHV in an unsafe condition by not being property equipped or safely loaded.
Article 2, Lighting Equipment	§ 38335-38346 – OHVs must have proper headlights and taillights from sunset to sunrise, and can only use red or blue warning lights under certain conditions
Article 3, Brakes	§ 38355 – OHVs must be equipped with a service break system in good working order, unless the vehicle can be effectively controlled by other methods (such as an air-cushioned vehicle)
Article 4, Equipment	§ 3836 –38366 - OHVs must have appropriate mufflers, exhaust systems, and spark arrestors. § 38355 – Sets noise limits for OHVs, depending upon their age
Article 5, Emission Control	§ 38355 – OHV pollution control devices must not be disconnected or modified. OHVs

Division 16.5 Section	Selected Citations
Equipment	with modified/disabled pollution control devices cannot be driven until corrected.
Chapter 7, All-Terrain Vehicles	§ 38503 – Minors (under 18) cannot operate ATVs unless taking or having graduated from a safety training course, or being under the supervision of a trained adult. § 38304 – Minors under 14 must be taking or have graduated from a safety training course and be under the supervision or a trained adult

Source: State of California Department of Motor Vehicles, 2011.

Violations of the California Code of Regulations for improper OHV use within an SVRA can result in eviction from the park. More serious offenses may result in a misdemeanor, as shown in Table 1.5.

Table 1.5. Selected California Code Citations Regarding OHVs

Code Citation	Description	Violation
CCR Title 14 Section 4300	Eviction of violators from the state park for the remainder of the day is permitted, with no citation required.	Eviction
Section 4353	Speed over 15 mph in camps, picnic areas, utility areas, or other areas where the general public assembles.	Misdemeanor
Section 4609	OHV operators in the Oceano Dunes SVRA must adhere to additional regulations	Misdemeanor

Source: State of California, Code of Regulations, 2011.

Each SVRA has designated areas for open riding, trail riding, and seasonally allowed riding (to protect wildlife and/or natural resources). The SVRAs included for analysis are Oceano Dunes SVRA, Heber Dunes SVRA, Hungry Valley SVRA, and Ocotillo Wells SVRA.

Oceano Dunes SVRA

OHVs are allowed in the open areas of Oceano Dunes along Sand Highway (see Figure 5), with sensitive resource areas closed to OHV use at all times (such as at the Pismo Dunes Natural Preserve) or seasonally. Approximately 300 acres along the southern coastline of the SVRA are closed to use during the western snowy plover breeding season from March through September (California State Parks 2011a). Infractions for illegally riding in closed areas could include fines and expulsion from the park.

Heber Dunes SVRA

Heber Dunes SVRA allows for open OHV use throughout the park (see Figure 6). There are non-vegetated claypan areas open for OHV recreation, and vegetated trails along the southern area and perimeters (California State Parks 2011b). The SVRA is surrounded by agricultural uses on the north, west, and southern boundaries, and open CalTrans land on the east. A ranger patrols the SVRA to deter unauthorized uses when the park is closed, and the Imperial County Sheriff's Office Off-Highway Vehicle Enforcement Safety Team (OHVEST) provides law enforcement services at the SVRA and all other public lands in Imperial County.

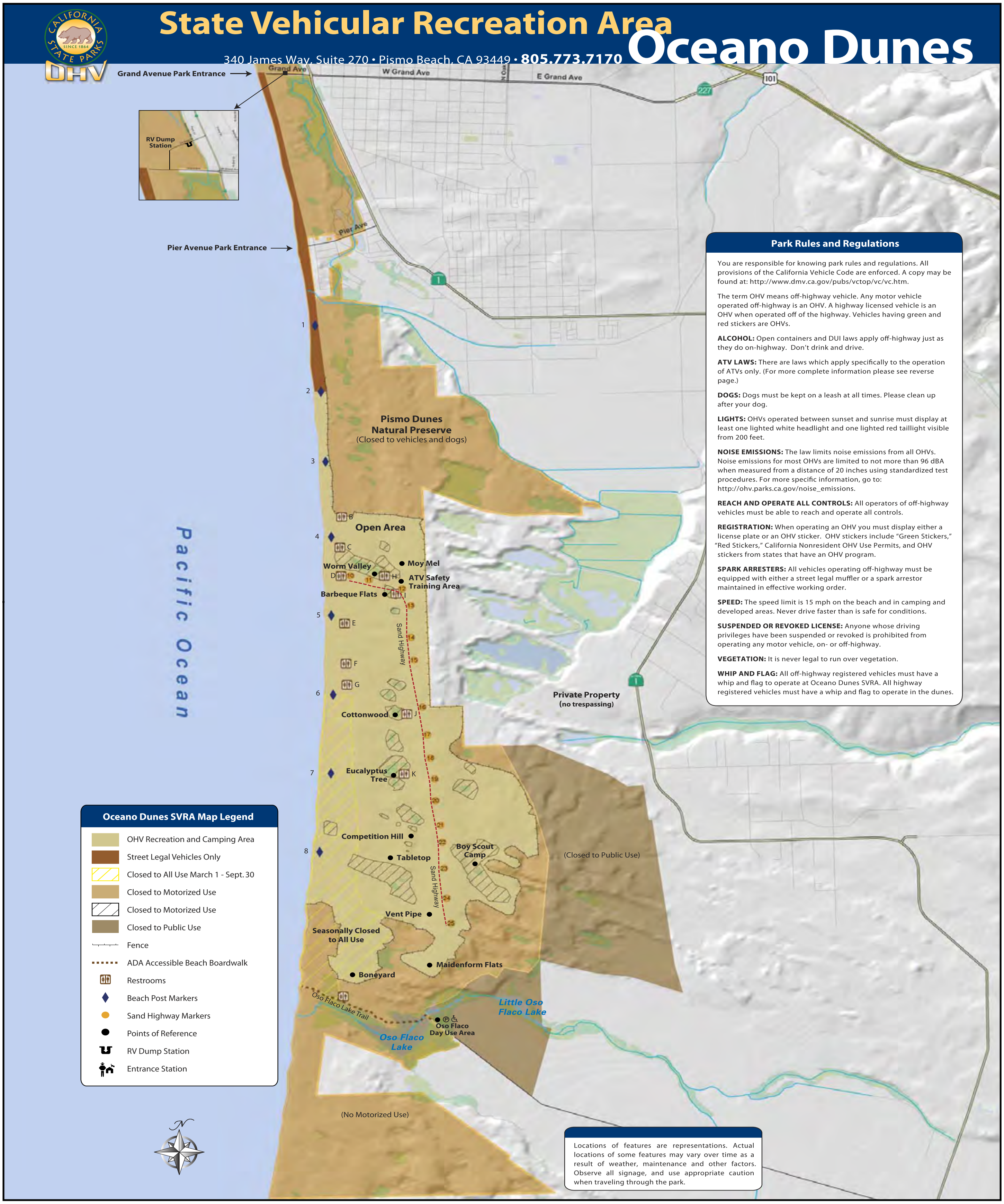

Figure 5
Oceano Dunes SVRA Map

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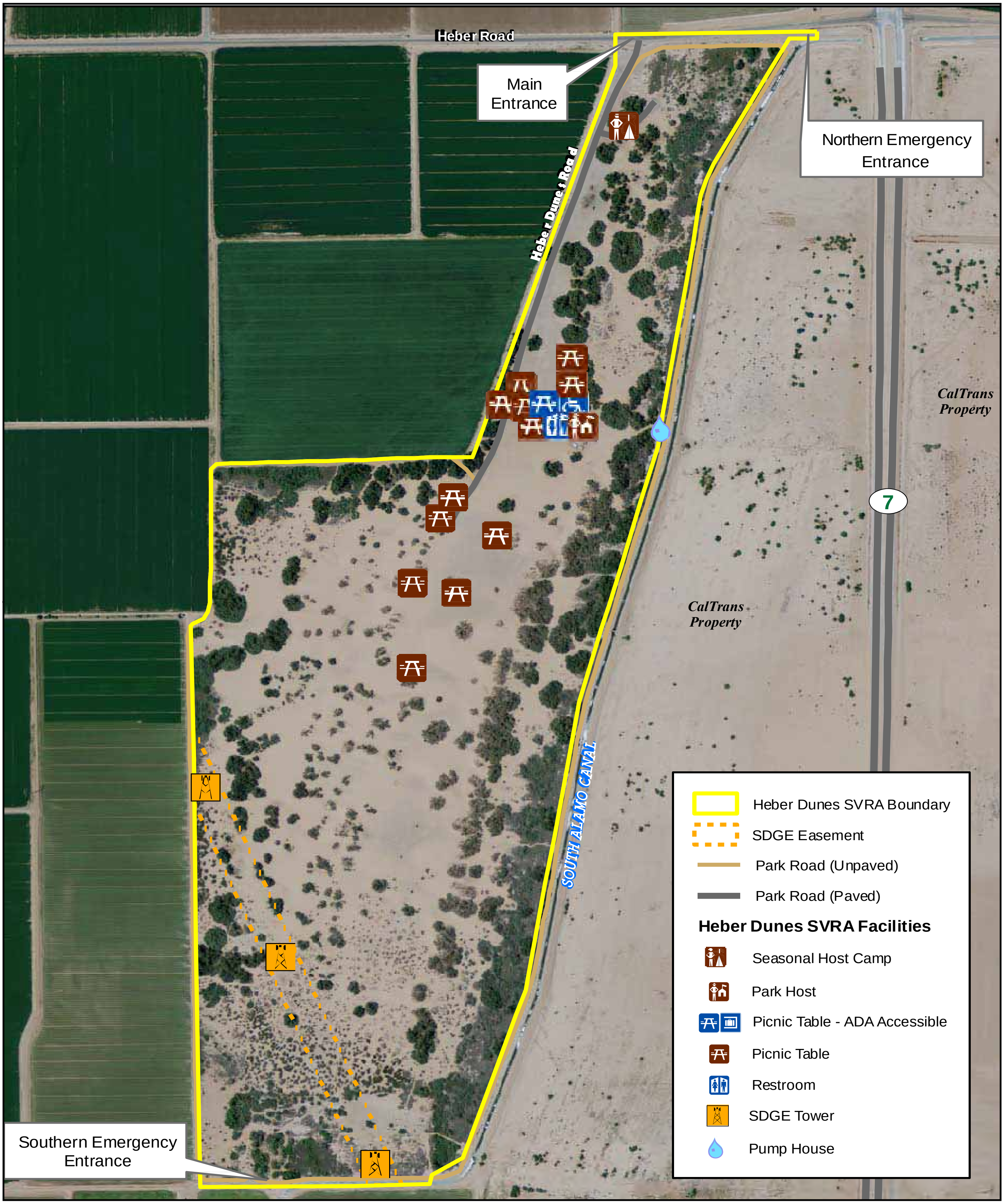

Figure 6
Heber Dunes SVRA Map

Source: California State Parks 2009; NAIP 2009

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Hungry Valley SVRA

Large areas of the park are traversed by a system of dirt trails and dirt roads (see Figure 7). Hungry Valley SVRA contains a mix of designated trails and unmarked trails that traverse a variety of terrain for all levels of experience (California State Parks 2011c). In both the trail-use-only area and the Native Grasslands Management Area, motorized recreation is allowed only on designated trails. Additionally, more than 4,000 acres of open use area are located in the main valley on either side of Gold Hill Road and along Hungry Valley Road. Experienced OHV users only are recommended to continue on into the Los Padres National Forest roads. Riding outside of the designated open areas and designated trails is illegal.

Ocotillo Wells SVRA

The eastern 2/3 of the SVRA is an open use area for OHVs, while OHV riders must stay on designated trails and roads in the western 1/3 of the park (see Figure 8). Camping is allowed throughout the park, except in areas specific surrounding Shell Reef, Devil’s Slide, and The Cove.

In 2007 California State Parks acquired lands north of SR 22 in Imperial County, known as the Freeman Property, which are now part of Ocotillo Wells SVRA. Street legal and green sticker vehicles are permitted on existing routes only. The lands north and west of Ocotillo Wells SVRA are managed by Anza-Borrego Desert State Park and do not permit green sticker vehicles.

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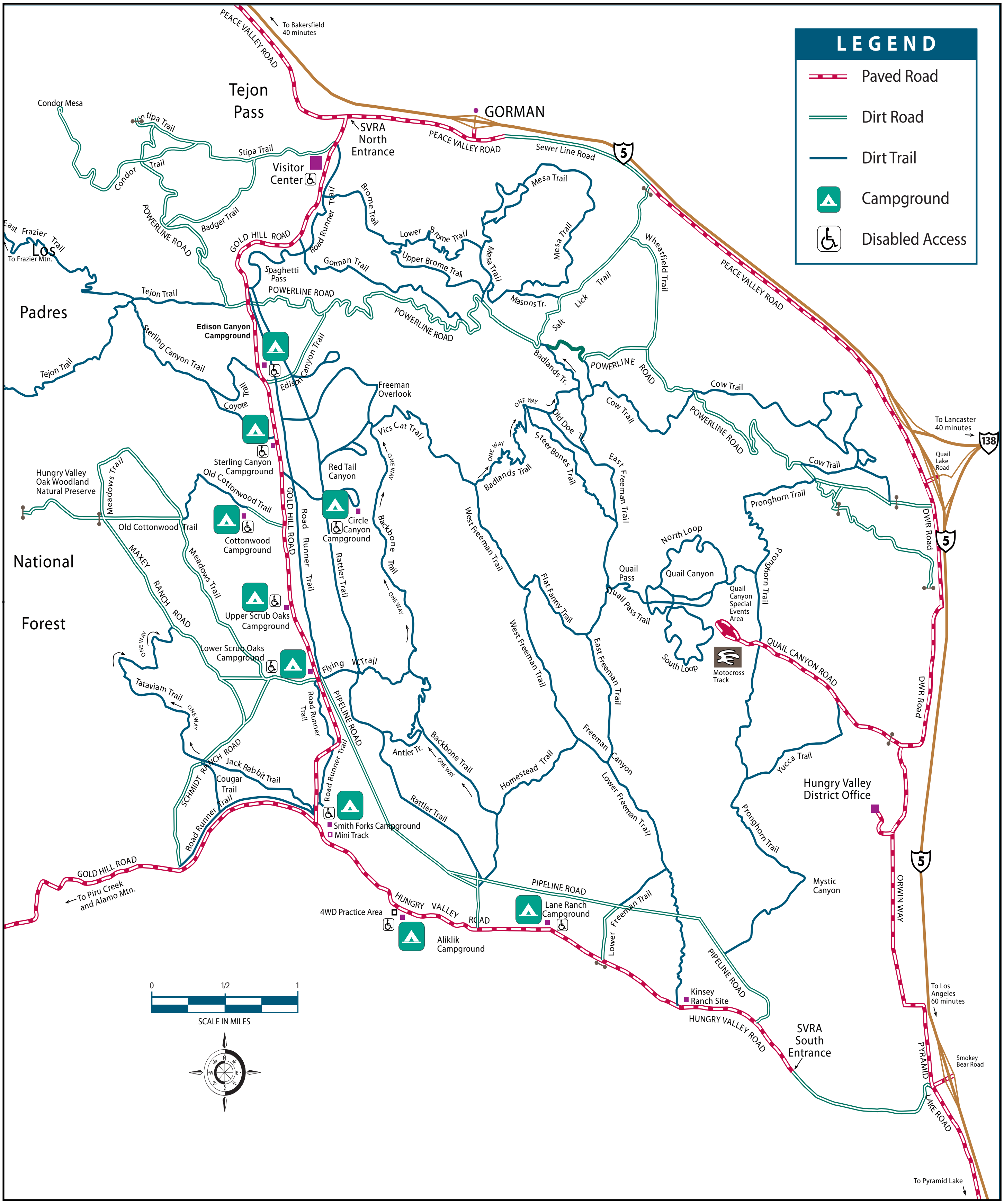

Figure 7
Hungry Valley SVRA Map

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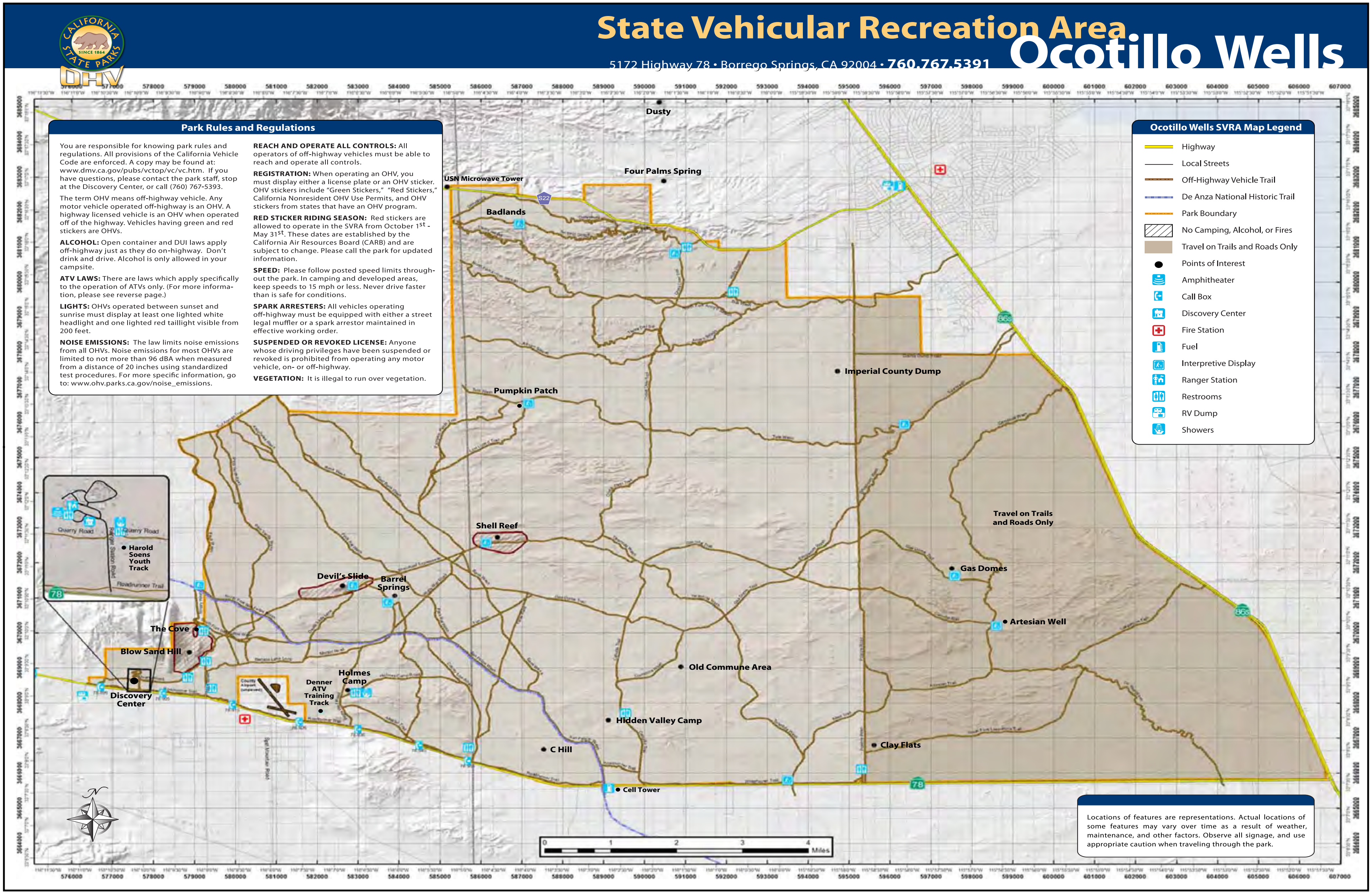

Figure 8
Ocotillo Wells SVRA Map

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1.3. COUNTY ORDINANCES AND REGULATIONS

1.3.1. San Bernardino County Sheriff's Department

The San Bernardino County Sheriff's Department enforces federal, state, and local laws, within the unincorporated areas of the county and within incorporated cities that have contracted with the Sheriff's Department for law enforcement services. The Morongo Basin Sheriff's station has a dedicated Off-Highway Vehicle Enforcement Team responding to OHV complaints and abuses. The OHV Enforcement Team's jurisdiction includes the incorporated towns of Twentynine Palms and Yucca Valley, and the unincorporated communities of Morongo Valley, Landers, Johnson Valley, Joshua Tree, Wonder Valley, Pioneertown, Amboy, Cadiz, and Flamingo Heights.

1.3.2. San Bernardino County Code Enforcement Division

The land frequented by OHV riders in the Morongo Basin that is not owned by federal or state agencies or within incorporated city limits is subject to the San Bernardino County Ordinance. Title 2, Division 8, Chapter 4 of the San Bernardino County Code regulates off-highway vehicle use in the county. Section 28.0403 stipulates that anyone riding an OHV on private property (other than their own) must have written permission from the property owner to ride (San Bernardino County 2011).

In 2007 the county approved an ordinance requiring that staging or groups of ten or more people must have a special event permit from the county code enforcement department, whether on public or private property. However, the ordinance was rescinded in 2010 (SBCED 2011), and now staging is allowed without a permit on private property of no less than 2.5 acres in size, for no more than 6 days in a 30-day period. Figure 9 is a brochure from the Town of Yucca Valley Police Department, showing legal areas to ride in the Morongo Basin.

1.4. LOCAL ORDINANCES AND REGULATIONS

1.4.1. Town of Yucca Valley

Yucca Valley does not have legal OHV trails or roads within the town limits (Yucca Valley Police Department 2010). Community Service Area roads are considered "highways" and are therefore off-limits to OHV riding. The town of Yucca Valley adopted the vehicle code for all dirt roads within the town limits, so OHV riding is also prohibited on those roads. However, numerous private roads and easements provide illegal access to surrounding legal OHV areas. The town of Yucca Valley contracts with the San Bernardino County Sheriff's Department for law enforcement needs. The Sheriff's Department Morongo Basin substation handles OHV complaints in the Yucca Valley and Twentynine Palm areas.

1.4.2. City of Twentynine Palms

The City of Twentynine Palms has a designated OHV route and trail system, and in 2009/2010 underwent a community visioning process to create a Community Trails Plan. Paved roads provide access from Twentynine Palms into Joshua Tree National Park.

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Ride Responsibly

Off-highway vehicles can cause permanent damage to the desert environment by destroying wildlife habitat, killing native vegetation, and creating lasting scars. It is important for you to ride courteously and responsibly so you don't disturb desert residents and the environment.

A responsible rider will always:

- Respect private property and never trespass.
- Ride slowly, being careful not to create noise or dust when in neighborhoods. Remember, sound and dust can travel a long way.
- Stay on roads and trails designated for off-highway vehicle use.
- Remember that much of the open desert in the Morongo Basin is private property.
- Stay out of areas that are closed to riding such as wilderness areas or Joshua Tree National Park.
- Slow down to 15 MPH when passing horses, hikers, houses or campsites.
- Never vandalize signs or ride around barriers.
- Educate yourself by obtaining maps and regulations from public agencies.

Remember, it is critical that you respect the environment and the rights of others. Enjoy your sport but be a part of the solution, not a part of the problem!

Restrictions For Off-Road Riding

Below is a reference of regulations to keep in mind. Remember that any law enforcement officer can enforce these regulations. *Violations of off-highway vehicle regulations can result in a fine and/or jail sentence.*

- Observe all traffic safety laws. If your OHV cannot be registered for highway use, it cannot be used on any road.
- Off-road vehicles are not allowed in wilderness areas.
- All Vehicle Codes apply in County Service Area (CSA) Road Improvement Districts. You may not use your OHV on any CSA maintained road unless it is registered for highway use.
- Driving under the influence (DUI) of a controlled substance or alcohol or on a suspended driver's license applies off-road as well.
- Off-road vehicles are not allowed on public roadways or the shoulders of public roadways.
- Unless you are operating your off-road vehicle on private land, the vehicle must be registered with DMV and have the green sticker visible.
- When traveling within 50 feet of a campsite, horseback rider, bicyclist, hiker, livestock/wildlife, the speed limit is 15 MPH.
- It is a violation to cause damage to vegetation or wildlife.
- Headlights and taillights are required within ½ hour before sunrise and within ½ hour after sunset.
- A muffler and a spark arrester are always required.
- Children under 14 years of age must have direct supervision of a responsible adult.
- Helmets are required on ATVs and passengers are only allowed if the ATV is manufactured for them.

San Bernardino County Ordinance

- Riders must have written permission to ride on private land that is not their own. This includes riding on dedicated roadways, easements not accepted into a road system, fire or service roads, and trails, even if they are roughly graded.
- "Staging" or groups of 10 persons or more must obtain a special event permit from county code enforcement. The permit can be challenged by impacted neighbors.
- All OHV's must comply with state noise restrictions at the tailpipe.
- Riders must comply with all noise, dust and nuisance elements of the ordinance. For complaints contact San Bernardino County Code Enforcement.

Riding Safely

Remember that while enjoying off-road riding, you not only have responsibilities to residents and the environment, but also to yourself! Off-road riding can be a dangerous sport and you must take special precautions so you or your family members are not injured.

- Call 1-877-RIDE-411 for ATV training.
- Always wear a helmet and protective clothing.
- Obey all of the legal restrictions listed in this brochure.
- Drive at a speed that is safe for the current conditions.
- Slow down and ride to the right side on blind curves; you might meet someone.
- Slow down at night.
- Watch out for other traffic.
- Always be aware of what's going on around you.
- *DANGER!* Beware of open mine shafts.
- Do not exceed your skill level! This is how most riders are seriously injured.
- Driving under the influence (DUI) or on a suspended driver's license applies off-road.
- Make sure someone knows where you will be riding.
- Use the buddy system and ride with a friend.
- In the desert, water is more important than gas!

IMPORTANT PHONE NUMBERS/WEB SITES

BLM/NPS/Forest Service Dispatch
(909) 383-5651

Bureau of Land Management–Barstow
(760) 252-6000

CHP Dispatch Center–Barstow
(760) 256-1617

Sheriff's Dispatch
(760) 366-3781

San Bernardino County Code Enforcement
Morongo Basin
(760) 228-5410

American Motorcycle Association
www.ama-cycle.org

California Off-Road Vehicle Association
www.corva.org

Community ORV Watch
www.orvwatch.com

Alliance for Responsible Recreation
www.desertalliance.org

Off-Highway Vehicle Information

Town of Yucca Valley
Police Department

in cooperation with

Figure 9a
Areas to Ride in the Morongo Basin

RIDE RESPONSIBLY

IMPORTANT INFORMATION

This pamphlet provides an information source to off-highway vehicle riders in the Morongo Basin. If you have any questions or require additional pamphlets, call the San Bernardino County Sheriff's Department, Morongo Basin Station at (760) 366-4175.

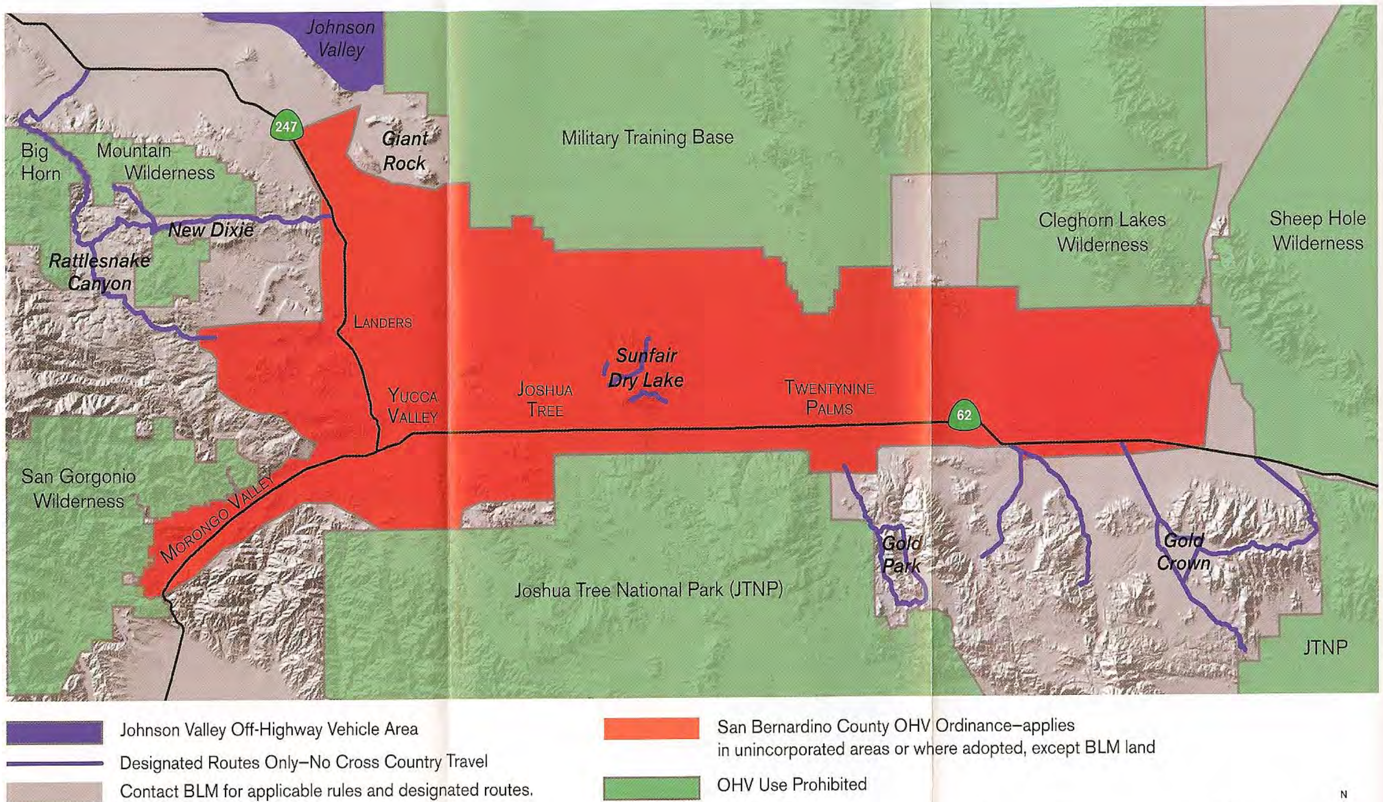
Off-highway operating rules apply to all motor vehicles driven on public lands legally open to vehicle use. Public lands include land managed by the Bureau of Land Management (BLM). Rules of the road are the same for off-road use. It is the responsibility of off-road drivers to follow the same rules as if the vehicle were on a public roadway.

AREAS TO RIDE

The map in this brochure identifies areas where you can ride. *You must stay on designated routes and off private property that you do not have permission to ride on.* If you prefer open riding, you must go to the BLM's Johnson Valley Off-Highway Vehicle Area. OHV areas are those specifically set aside for open cross-country riding and free play. *There is no open riding in the Morongo Basin outside of Johnson Valley OHV area!*

Johnson Valley OHV Area is the largest OHV area in the world and is located off of Highway 247 (Old Woman Springs Road), 35 miles north of Yucca Valley. Entrances include Boone Road, Bessemer Mine Road and Camp Rock Road. It has an excellent varied landscape for off-highway vehicle use, punctuated by steep, red, rocky mountains, rolling hills, open valleys, dry lakebeds, and sandy washes. Stay off rain-soaked dry lakebeds in order to keep vehicles from making permanent deep grooves.

Areas to Ride in the Morongo Basin



The Bureau of Land Management has an open route network available for off-highway vehicle travel and touring in the Morongo Basin. Only Johnson Valley OHV Area, allows open cross-country travel. New Dixie Mine Road, Rattlesnake Canyon, Sunfair Dry Lake, Gold Park, and Gold Crown Road are limited access roads and trails. You must stay on designated, existing trails and roads. All vehicles operated within Joshua Tree National Park must be registered for highway use. This includes the Gold Park access road. The California Vehicle Code laws apply to most roads in the Morongo Basin. Remember, all land in this area is either public land, managed by BLM or someone's private property. Detailed maps are available through the Bureau of Land Management.

Figure 9b
Areas to Ride in the Morongo Basin

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APPENDIX B
SUMMARIES OF ENVIRONMENTAL DOCUMENTATION

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APPENDIX B – SUMMARY OF ENVIRONMENTAL DOCUMENTATION

For the DORS, environmental documentation (Environmental Impact Statements and Area Management Plans) for various OHV areas was reviewed. Not all of the information was included in the body of the report. Appendix B summarizes information gathered from environmental documentation, related to OHV use, at various locations discussed in the body of the study.

Stoddard Valley

T & E Species	Cultural Resources	Public Safety	Other Issues
Chuckwalla can occur in the area, and is a Category 2 candidate for federal listing. The desert tortoise is the only T or E species occurring in the planning area. The entire planning area is designated by the BLM as Interim Category III tortoise habitat.	The potential for discovery of cultural resources within the open areas ranges from high in the northern portion to low in the southern portion.	Goals and actions to protect residents and visitors by fencing the intensive use area from other areas of concern, prohibiting a shooting range, installing left-turn lanes at congested intersections into the OHV area, and marking/signing trails and off-limit areas, among other measures.	
The golden eagle (Aquila chrysaetos), prairie falcon (Falco mexicanus), burrowing owl (Athene cunicularia), and loggerhead shrike (Lanius ludovicianus) "are protected by State and federal laws, with prohibitions against/penalties for harassment of or harm to these animals", and the loggerhead shrike is a Category 2 candidate for federal listing.	17% of the area has been surveyed, with 36 cultural sites identified (as of the 1990 Management Plan). The most common sites include lithic scatters and circles. Site integrities vary from high to low.		
No threatened or endangered plant species are known to occur within the planning area, but it does contain a BLM sensitive species, the Mohave monkeyflower (Mimulus mohavensis).	The northern portion of the area was utilized for seasonal occupation and resource exploitation by prehistoric occupants for at least the last 8,000 years (used by the Serrano Indians, and possibly by the Mojave, Chemehuevi, Kawaiisu and/or Panamint/Shoshones). The southern 2/3 of the planning area appears to have been of marginal importance to the prehistoric populations, with extremely sparse areas of identified cultural resources.		

Source: (BLM 1993)

El Mirage

T & E Species	Cultural Resources	Public Safety	Other Issues
Impact on the Desert Tortoise		Safety hazards such as open vertical mine shafts, road/trail washouts, holes in the lakebed, car bodies, worm tracks, trash on the lakebed, unlimited speed, etc., are causing personal injury, and property and resource damage.	Adverse OHV user patterns such as riding on county maintained roads, riding on the lakebed when it is wet, and circle racing, are either illegal or destructive to the environment.
		Litter (i.e., broken glass, scrap metal, nails, and dirty diapers) is unsanitary, unsightly, and poses a health and safety hazard to visitors of the area.	Uncontrolled and uneducated public use of the Management Area resulting in an unacceptable degradation of resource base.
		Sewage dumped from recreational vehicle holding tanks along routes of travel poses a health hazard to visitors and residents.	Sustainability of the lakebed.
		The discharge of weapons creates a safety hazard and results in accumulation of trash and destroyed targets.	Air quality - the creation of "poof" dust
		As a result the rural nature of the El Mirage area, the influx of recreational visitors often creates demands upon the area's emergency services.	Soil erosion
		The various recreation activities occurring on the lakebed, both organized and unorganized, sometimes conflict with one another.	OHV Trespass and Associated Impacts - "trail proliferation, noise, dust. Visual pollution, crop damage, is excessively degrading to the environment and disturbing to the local residents."
			Commercial use, such as research and development, product testing, commercial photography, and vending, often occurs without authorization and is sometimes in conflict with other users.

Source: (BLM 1990)

Dumont Dunes

T & E Species	Cultural Resources	Public Safety	Other Issues
No known federal or state listed threatened or endangered plant species or BLM recognized sensitive species or plant assemblages have been found in the area.	Zones of known concentrations include the Tonopah & Tidewater RR grade and related town sites; Salt Creek Hills ACEC; an area about 2 mi^2 just west of Sperry Hills, and variety of scattered sites.	The OHV area attracts approx. 60,000 Visitor Use Days each year, 33% from southern Nevada and the remainder from the Los Angeles Basin. Most visitors generally spend all of their time in the dune area, while about 17% explore the surrounding hills.	Areas of Critical Environmental Concern: Salt Creek Hills ACEC and Amargosa Canyon Natural Area ACEC. The Dumont Dunes OHV planning area completely surrounds these two areas. They each have their own management plans.
No known federal or state listed threatened or endangered wildlife species within the Dumont Dunes planning area. The Amargosa Canyon Natural Area contains two BLM listed sensitive species (Amargosa pupfish and Amargosa Dace, also a Category 2 candidate endangered species) and two state and federally listed endangered species (Amargosa Vole and Least Bell's Vireo).	Zones with high probability of cultural resources were predicted because of the environmental context such as washes, desert pavement, probable sources of lithic raw materials, etc. These zones include much of Sperry Hills, Dumont Hills, Valjean Hills, Kingston Wash, Southern Salt Springs Hills, the southern and eastern foothills of Saddle Peak Hills and the northern foothills of the Avawatz Mountains.	Thanksgiving and President's Day weekends receive an estimated 18,000 VUDs each. OHV clubs tend to hold events on these long weekends.	The Salt Creek Hills ACEC contains a stream with year round surface flows and associated wildlife habitat. The area also contains many cultural resources (prehistoric and historic gold mines).
Coachella Valley fringe-toed lizard. Federal: BLM: Sensitive California: Species of Special Concern	The remainder, primarily the area of intensive OHV use and the Little Dumont Dunes area, has either a low probability for containing cultural resources or no cultural resources.	Only 16% of visitation is day use. Day users are usually groups of 2-4 people, while longer term visitors tend to be 5-50 people. Camping is informal, no facilities. Visitation is expected to increase about 5% per year.	The Amargosa Canyon Natural Area ACEC contains the Amargosa River (flows year round) and associated habitat. See T&E Species. Area also contains prehistoric and historic cultural resources, including the Tonopah & Tidewater Railroad.
			Four Wilderness Study areas in DD Planning area: Kingston Range, Saddle Peak Mountains, South Saddle Peak Mountains, and Avawatz Mountains. Only 15% of Kingston Range was recommended as suitable, and is being managed to prevent impairment of wilderness values.

Source: (BLM 1990a)

Imperial Sand Dunes

T & E Species	Cultural Resources	Public Safety	Other Issues
Federally listed species - Peirson's Milk-vetch, Mojave desert tortoise	Loss or degradation of NRHP-listed or eligible cultural resources could occur from natural deterioration...human-caused damage (such as the results of OHV recreation or camping on archeological sites)	Increased visitor density could increase the potential for disputes involving visitors and public safety personnel	Air Quality - The potential impacts to air quality could result from OHV recreation, vehicle emissions, dust, construction and maintenance activities, and mineral extraction activities
California listed species - Wiggin's croton, Algodones Dunes sunflower, Gila woodpecker, and Arizona Bell's vireo.	Unauthorized cross-country travel could inadvertently damage sites from surface disturbance or provide vehicular access to previously remote areas, which may result in artifact collection, breakage, displacement, vandalism, and illegal artifact collection	Restricting major access routes to street-legal vehicles could provide more effective traffic management, which would be a beneficial effect.	Soil Resources - Soils within the Planning Area, which consist primarily of sands, are susceptible to impacts from compaction and erosion. (possibly caused by camping and/or OHV recreation)
BLM sensitive species - Munz's cholla, giant Spanish needle, sand food, Orocopia sage, spotted bat, California leaf-nosed bat, cave myotis, Townsend's big-eared bat, burrowing owl, LeConte's thrasher,	OHV recreation, would involve ground-disturbing actions that could cause the destruction and/or degradation of cultural resources.	Conversely, such restrictions could not only increase OHV traffic and speeding through campsites but also increase dust levels	Vegetative resources - Impact of OHV on vegetative resources from soil compaction and introduction of invasive species
BLM sensitive species: lowland leopard frog, Couch's spadefoot toad, flat-tailed horned lizard, and Colorado Desert fringe-toed lizard	OHV recreation could result in the discovery of an otherwise undetectable resource.		Closed OHV management areas would have coincidental beneficial impacts by protecting known and unknown paleontological resources
			Visual Resources - Facility development associated with recreation and visitor services (buildings, and associated infrastructure) could have an adverse impact on visual resources, as could expansive, high-density RV camping.
			Visual resources - Periodic diminishment of dark night skies resulting from night-time OHV recreation could adversely impact desired visitor visual experience of the night skies

Source: (BLM 2003)

West Mojave Desert

T & E Species	Cultural Resources	Public Safety	Other Issues
Tortoise mortality resulting from interspecific (i.e., raven predation) and intraspecific (i.e., disease) conflicts that likely result from human-induced changes in the ecosystem processes	Potential for substantial degradation of important resources, including the elimination of important examples of the major periods of California history or prehistory.	Law enforcement funding	Habitat to other, listed and sensitive, plant and wildlife species
Establish an upward or stationary trend in the tortoise population of the West Mojave Recovery Unit for at least 25 years	Roads, power lines, trails, camps, lithic reduction, lithic scatter, rock art, food processing, lithic quarry/stone circles/ habitation, Terrace Springs, villages, structures, Desert Training Center, cemetery…	OHV route quality as pertaining to public safety	Substantial overcrowding caused by "spill over" effects resulting from closure of other areas to recreation access
Ensure genetic connectivity among desert tortoise populations, both within the West Mojave Recovery Unit, and between this and other recovery units	Fire hearth, homestead, flaked tool, mining sites, Goldstone historic Mining District, National old trails Highway, military site, Ludlow town site, Mojave Rd., airplane crash site, water storage, town site…	Maintenance of public roads	Provide appropriate motorized vehicle access to public lands for commercial, recreational and other purposes in a manner that is compatible with species conservation
Protect sufficient habitat to ensure long-term tortoise population viability	Rock shelter, historic graffiti, Boulder Dam to LA Power Lines, Mormon Trail		Livestock grazing and other cattle operations
Ensure long-term protection of Mojave Ground Squirrel habitat throughout the species range	Areas of historical recreational importance		Availability of mineral exploration areas. Loss of access to private lands or mining claims
			Hazardous air pollutants (HAPs), Prevention of Significant Deterioration (PSD), fugitive dust and regional haze.
			OHVs impact soils properties in several ways. OHVs increase soil compaction, which in turn effects infiltration and water erosion, soil moisture, wind erosion, and soil chemistry.
			Water Quality - Erosion increases the sediment available in channels for transport by surface water when it occurs

Source: (BLM 2005)

Southern California National Forests

T & E Species	Cultural Resources	Public Safety	Other Issues
Desert tortoise. Arroyo toad , Bald eagle breeding, Southwestern willow flycatcher , Swainson's thrush, Wilson's warbler, Partially armored three-spine stickleback, Baldwin Lake blue butterfly, Vernal blue butterfly - threatened by OHV use.	The protection of cultural properties cannot be assured when the possibility of random, off-road vehicle incursions can happen at any time; the national forests' ability to prevent this type of action is limited.	Incidents of fires caused by off-highway vehicles are very low. For example, for the period of 1981 through 1995 there were only three fires directly attributable to an OHV out of a total of over 5,000 recorded fires in the San Bernardino National Forest	Priority to develop a functional system of OHV trails to avoid or reduce impacts from a number of concerns
OHV use threatens six T & E plant species.		"benefits of designated roads and trails included less interruption of natural processes, such as fire... and increased public safety"	Soil - OHV use affects soils properties in several ways. OHVs increase soil compaction, which in turn affects infiltration and water erosion, soil moisture, wind erosion and soil chemistry.
A restricted off-road vehicle management policy would provide a higher level of protection from vehicle trespass into wilderness areas.		As a result of increasing urbanization within and adjacent to the national forests, safety and law enforcement issues are expected to increase as non-highway licensed riders access riding opportunities via state and county highways, use non-designated National Forest System roads and trails.	Scenic integrity values are compromised by the development of "spaghetti trail systems" as enthusiasts develop their own convoluted riding patterns on the landscape that visually present an uncontrolled and chaotic pattern of line elements not found in natural-appearing landscapes
		Route design or designation problems can result in less experienced riders being directed into situations that require advanced riding skills.	Unmanaged recreation (especially impacts from off-highway vehicle [OHV] use) has been identified...as one of the key concerns facing the nation's forests and grasslands... "Off-highway vehicle travel off designated roads and trails cannot be sustained without damage to basic forest resources or compromising other resource objectives and values"
		OHV enthusiast conflicts with others	1,718 OHV violations from 2001-2003

Source: U.S. Department of Agriculture, Forest Service. 2005. FEIS for Revised Land Management Plans: Angeles National Forest, San Bernardino National Forest, Cleveland National Forest, Los padres National Forest. September.

California State Parks (SVRAs)

T & E Species	Cultural Resources	Public Safety	Other Issues
Consistent, diligent compliance with environmental laws and regulations including protection of endangered species. Promote sustainability and avoid litigation and further closure of areas to OHV use		Water quality impacts include sediment runoff into drinking water sources, human sanitation (fecal coliform), and contamination from heavy metals and petroleum products.	Closure of federal lands - OHV opportunities on federal lands are under threat of closures or severe use limitations as a result of conversion to other uses such as development of alternative sources of energy (geothermal, wind, and solar), as well as the expansion of military training areas. Decisions to allocate lands for these activities threaten to reduce the amount of land available for OHV recreation.
		Air quality impacts include particulates, carbon emissions, and site-specific hazards such as asbestos-bearing serpentine soils and valley fever	Trespass, Conflicts, and Violation of Closed Areas - More comprehensive data and appropriate management responses must be developed regarding the problem of trespass, conflicts regarding appropriate land uses, and violation of sensitive areas not appropriate for OHV use
			Existing trails and routes cannot be adequately maintained to existing standards, and use must be curtailed. This has the undesirable effect of further aggravating overuse problems elsewhere, and exacerbates trespass problems as people become frustrated and look for other places to go
			Urbanization - As more homes and businesses are built in these once remote areas, conflicts between OHV recreation use and neighboring landowners become a management issue, particularly in relation to noise and the generation of dust.

Source: California State Parks OHV Division. 2009. Strategic Plan.

Spangler Hills

T & E Species	Cultural Resources	Public Safety	Other Issues
Desert tortoise population in the area ranges from 0-20 tortoises per square mile near the Summit range and 20-50 per square mile north of Randsburg Wash Road.	Area has been exploited ethnographically by the Koso and/or the Kawaiisu. Aboriginal use mainly consisted of temporary habituation.		Vegetation - Creosote Brush Scrub, Desert-Holly Scrub, and Joshua Tree Woodland. Total vegetation has through OHV use. As a result, a number of invasive herbaceous species have been introduced.
Mojave Ground Squirrel present in the area.	Area used for early Anglo mining and subsequent historic railroads.		

Source: BLM. 1992. Spangler Hills OHV Area Management Plan.

Keyesville

T & E Species	Cultural Resources	Public Safety	Other Issues
		Management of the area, specifically the trail system, and off-road visitor service patrol is hampered by the Field Office's lack of OHV equipment necessary to access the majority of the area.	
		Level of service for restroom facilities is often inadequate, posing potential health and safety issues for visitors.	
		Regular visitor service patrols (principally provided by BLM volunteers) are limited to a small area within the SRMA and personnel are insufficient to address demands over holiday weekends and special events.	
		Level of trash removal service is often inadequate.	

Source: Keyesville SRMA Ground Operations Grant Application. February, 2010.

APPENDIX N
RESPONSE TO PUBLIC COMMENTS ON THE DRAFT EIS

Appendix N, *Response to Public Comments on the Draft EIS*, is included electronically in four separate .pdf files on CD.

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APPENDIX O
USFWS BIOLOGICAL OPINION

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United States Department of the Interior

FISH AND WILDLIFE SERVICE
Ventura Fish and Wildlife Office
2493 Portola Road, Suite B
Ventura, California 93003

IN REPLY REFER TO:
81440-2011-F-0580

July 17, 2012

Commanding General
Marine Corps Air Ground Combat Center
Marine Air Ground Task Force Training Command
Attention: Major W.M. Rowley
Natural Resources and Environmental Affairs Division
Building 1451, Box 788110
Twentynine Palms, California 92778-8100

Subject: Biological Opinion for Land Acquisition and Airspace Establishment to Support Large-scale Marine Air Ground Task Force Live-fire and Maneuver Training, Twentynine Palms, California (8-8-11-F-65)

Dear Commanding General:

This document transmits the U.S. Fish and Wildlife Service's (Service) biological opinion based on our review of the Marine Corps' land acquisition and airspace establishment proposal for the Marine Corps Air Ground Combat Center (MCAGCC) and its effects on the federally threatened Mojave desert tortoise (*Gopherus agassizii*) and its critical habitat. This document was prepared in accordance with section 7 of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 et seq.). The proposed action involves modification of existing training on MCAGCC and expansion of training activities onto 167,971 acres of public and private land to the west and southeast of the existing installation. Your February 18, 2011 request for consultation was received in our office on February 22, 2011.

The "Mojave desert tortoise" denotes individuals listed as threatened under the Act (55 Federal Register 12178; April 2, 1990). Use of "Mojave" in the common name distinguishes these animals from the Sonoran desert tortoise, which is a candidate for listing and is not addressed in this biological opinion. Throughout the remainder of the document, we use only the common name of "desert tortoise" in referring to the "Mojave desert tortoise."

We based this biological opinion on information that accompanied your February 22, 2011 request for consultation and additional information, provided at our request in July and December of 2011, regarding estimates of the number of desert tortoises affected, translocation, displacement of off-highway vehicles (OHV) from the Johnson Valley Off-highway Vehicle Management Area, and mitigation strategies. This information includes the final biological assessments (Department of the Navy [DoN] 2011a), desert tortoise translocation plan (Karl and Henen 2011), the draft environmental impact statement (DoN 2011b), and an analysis of OHV displacement (DoN 2011c). A record of this consultation is available at the Ventura Fish and Wildlife Office.

Consultation History

On February 18, 2011, the Marine Corps requested formal consultation on its land expansion and airspace establishment proposal (DoN 2011e). On April 1, 2011, we denied the Marine Corps' initial request for consultation due to insufficient information and provided comments (Service 2011a) on the initial biological assessment (DoN 2011d). On June 30, 2011, we met with the Marine Corps to discuss our comments. On July 11, 2011, the Marine Corps requested formal consultation (DoN 2011f) a second time and provided a final biological assessment (DoN 2011a). In August 2011, we met with the Marine Corps via teleconference to discuss the new biological assessment and the remaining pieces of information required for consultation (e.g., translocation plan).

On September 16, 2011, we denied the Marine Corps' second request for formal consultation and identified the remaining items needed for consultation, which primarily focused on translocation of desert tortoises (Service 2011b). Following revisions to the biological assessment and further discussion of additional information needed to complete consultation, the Service acknowledged the initiation of formal section 7 consultation on October 18, 2011; we considered consultation to have been initiated on September 21, 2011.

On November 9, 2011, we met with the Marine Corps to discuss the remaining information required for consultation and the development of a consultation agreement that would identify time lines for completion of our biological opinion. At this meeting, the Marine Corps agreed to finalize a desert tortoise translocation plan and we agreed to provide recommendations to offset the unavoidable effects of the proposed expansion.

On November 28, 2011, we met with the Marine Corps to discuss the framework for the translocation plan and to provide guidance on development of this document. On December 8, 2011, we received the Marine Corps' final desert tortoise translocation plan (Karl and Henen 2011). On December 9, 2011, the Marine Corps and the Service signed a consultation agreement that identified specific time frames for completion of the consultation (Service and DoN 2011).

On January 17, 2012, we provided the Marine Corps with a recommended strategy for offsetting the unavoidable effects of the proposed action (Service 2012a). On February 2, 2012, the Marine Corps responded to these recommendations (DoN 2012a) and identified portions of our recommendation that it would commit to implement.

On February 10, 2012, we provided the Marine Corps with a draft project description for the biological opinion and requested comments. On February 14 and March 2, 2012, the Marine Corps provided comments on the draft project description for the biological opinion (Henen 2012a, 2012b), which we have incorporated herein.

On February 29, 2012, the Marine Corps provided further clarification of the conservation actions it was proposing to offset the adverse effects of the proposed action (DoN 2012b). On March 12, 2012, we proposed changes to the Marine Corps' action that would reduce adverse effects to the desert tortoise. On March 22, 2012, the Marine Corps provided a follow-up letter, pursuant to its February 29, 2012 letter, that proposed additional conservation actions and provided details to its previous letter (DoN 2012c).

We met with the Marine Corps on April 5, 2012, to discuss the effects of the proposed action and recommended changes to the proposed action and conservation actions that would reduce and offset its effects. The Marine Corps provided further clarification and commitments regarding changes to its conservation strategy on April 12, 2012, to respond to the recommendations made at the April 5 meeting (Rowley 2012a).

On May 3, 2012, we provided the Marine Corps with a revised description of its conservation proposal that clarified what we would include in the biological opinion (Noda 2012). On May 10, 2012, the Marine Corps provided a finalized description of conservation measures to minimize and offset effects to the desert tortoise (Henen 2012c). On May 17, 2012, the Marine Corps provided a memorandum for the record, indicating that it would move the location of the staging area in the southern expansion area to the north into areas that contained a lower density of desert tortoises (Cottrell 2012). On May 21, 2012, the Marine Corps provided a description and map of the location of OHV exclusion barriers it would install to reduce effects to the Ord-Rodman DWMA (Henen 2012d).

We provided a draft biological opinion to the Marine Corps on June 25, 2012 (Service 2012d). The Marine Corps provided comments on the draft biological opinion via electronic mail, dated July 2, 2012 (Rowley 2012b); we have incorporated the comments, as appropriate.

BIOLOGICAL OPINION

DESCRIPTION OF THE PROPOSED ACTION

We summarized the following description of the proposed action from the biological assessment (DoN 2011a); the proposed action is training within the expanded boundaries of the MCAGCC. Expansion of the existing MCAGCC boundaries would occur through the withdrawal or purchase of 167,971 acres of public and private lands. These lands are to the west and south of the existing installation and include portions of the Bureau of Land Management's (Bureau) Johnson Valley Off-highway Vehicle Management Area (western expansion area; 146,667 acres) and the area north of Wonder Valley (southern expansion area; 21,304 acres) (DoN 2011a; Figure 1-2). The western expansion area would include a 108,530-acre exclusive military use area and a 38,137-acre restricted public access area (RPAA). The southern expansion area would be an exclusive military use area. In the western expansion area, the Marine Corps would allow continued public use of the RPAA for recreational purposes (e.g., OHV use, rock hounding, rocketry, film production, camping, etc.) when it is not being used for military training activities.

Military training would also continue on the existing installation and would include activities similar to those analyzed in the Marine Corps' biological opinion for base-wide operations (Service 2002; 1-8-99-F-41). The 2002 base-wide operations biological opinion analyzed the effects of the ten combined arms exercises (CAX) that occur annually on the existing installation. Following expansion of MCAGCC, the Marine Corps would modify training on the existing installation by reducing the number of CAX exercises and instituting the Marine Expeditionary Brigade exercises and Building Block exercises described below. Although this change would constitute a shift in the type of exercises on MCAGCC, the areas affected and the number of personnel and vehicles used annually would not substantially change.

We have described the Marine Corps' proposed use of the existing installation as it relates to the modified training scenarios on the expanded installation. The biological assessment (DoN 2011a) and draft environmental impact statement (DoN 2011b) provide a more detailed description of the proposed military training. The Service's 2002 biological opinion (1-8-99-F-41) provides a description of the CAX exercises that would also continue to occur at a lower frequency.

Description of Military Training Activities

Marine Expeditionary Brigade Exercises

Expanded training activities would involve air-ground, live-fire maneuvers within the existing installation and the expanded training areas. These work up and final training exercises are collectively termed Marine Expeditionary Brigade (MEB) exercises. Each MEB exercise would involve an entire MEB, consisting of 3 battalion task forces totaling approximately 15,000 Marines, 1,786 wheeled and tracked vehicles, and 1,657 aircraft sorties. Two MEB exercises, lasting 24 days each, would occur each year with 6 days of cleanup activities following each MEB exercise. The first 17 days of each MEB exercise would consist of work-up exercises in which individual battalion task forces (approximately 5,000 Marines; one third of the MEB) would take turns conducting live-fire maneuvers followed by a 2-day exercise where individual battalion task forces would defend and attack set objectives. The biological assessment provides a representative depiction of the type of maneuvers that MEB work-up exercises would involve (DoN 2011a; Figure 2-2).

Following these work-up scenarios, each MEB exercise would involve a final exercise, in which the entire MEB (i.e., 3 battalion task forces) would maneuver from 3 separate staging areas to converge on a single MEB objective over the course of a 48- to 72-hour period. During the transition to the MEB objective, the battalion task forces would maneuver along three separate maneuver corridors beginning at the three staging areas in the eastern portion of the existing installation and ending at the MEB objective in the western expansion area. Various units within each battalion task force would attack smaller company objectives during these maneuvers. Each battalion task force would re-supply several times during these maneuvers at different re-supply points that may change between MEB exercises. The biological assessment provides a representative depiction of the final MEB exercise, including staging areas, maneuver routes, firing zones, intermediate company objectives, and the MEB objective (DoN 2011a; Figure 2-3). As noted in the Consultation History, the Marine Corps has agreed to modify the location of the staging area in the southern expansion area to avoid areas of higher desert tortoise density.

During both work-up and final portions of the MEB exercise, the Marine Corps would implement a combined-arms training program that would include live-fire ordnance from tanks, aircraft, and artillery. The Marines would also fire at fixed targets, perform tank maneuvers, air operations, bombing, and strafing, use artillery and anti-tank warfare, and employ various vehicles (i.e., light-wheeled, heavy-wheeled, and tracked) both on and off of existing routes of travel. Marines would also set staging areas, camps, and fighting positions in various locations that would require clearing of vegetation, establishment of vehicle staging areas, installation of barbed wire, and trenching. All weapons systems employed by the Marine Corps would be used during military training, including small arms, armored vehicle cannon and automatic weapons, mortars, grenades, anti-tank missiles, artillery, and attack aircraft (DoN 2011a).

The single MEB objective, intermediate company objectives, and starting point staging areas used in the final MEB exercises would not change following establishment. Although re-supply points may change between exercises, these points would remain close to the maneuver corridors (see moderate-intensity disturbance in Figure 6-2 of the biological assessment; DoN 2011a). The Marine Corps would establish up to eight company objectives within the western expansion area for use in the MEB exercise. Two of these objectives would be within the RPAA and the other six would combine to form the single MEB objective. Each company objective would consist of permanent trench lines, obstacles, targets, and bunkers that the Marines would construct within a 984-by-984-foot area. Military training would result in severe ground disturbance in all portions of the company objectives. In addition, heavy ground disturbance would occur in all portions of the three starting point staging areas and re-supply points.

Outside of the areas identified in the previous paragraph, Marines would primarily use existing travel routes, but periodically would need to travel cross-country to react to training scenarios. Cross-country travel would be concentrated in the vicinity of the staging areas, MEB and intermediate objectives, and along the periphery of the main supply routes, and it would diminish in other portions of the installation and expansion areas that are farther away from these locations. In addition, training activities would require the establishment of temporary fighting positions and bivouacking areas in some locations that are outside of the MEB and company objectives. These positions would require the installation of barbed wire and excavation of bunkers, tank ditches, and personnel and vehicle trenches. Some excavations could be as much as 10 feet wide, 10 feet deep, and 33 feet long. The biological assessment provides a representative depiction of the varying intensities of ground disturbance associated with training maneuvers (DoN 2011a; Figure 6-2). As noted in the Consultation History, the Marine Corps has agreed to modify the location of the staging area in the southern expansion area to avoid areas of higher desert tortoise density.

Although military training would focus on the maneuver corridors and disturbance areas depicted in the biological assessment, cross-country maneuvers could occur in virtually any portion of the expanded installation except for special use areas (see below). In general, maneuvers would occur in areas of level to gently sloping terrain, with steeper and rockier areas and areas farther from the main maneuver corridors subjected to less surface disturbance. The Effects of the Action section of this biological opinion provides the Marine Corps' estimates for high-intensity and moderate intensity habitat disturbance associated with expanded military training.

Building Block Exercises

When MEB exercises are not occurring, the Marine Corps would use the western expansion area's exclusive military use area to perform building block exercises that are consistent with the type of military training that currently occurs on the existing installation. These building block exercises may replace similar training activities that currently occur on the MCAGCC. Building block exercises would consist of 4-day training exercises repeated throughout the year for a total of approximately 160 days each year. Building block exercises would involve the same activities described above for the MEB exercises, but they would involve smaller units (i.e., 2,000 Marines), fewer vehicles (i.e., approximately 276 wheeled and tracked vehicles and 56 aircraft sorties), and a smaller and more localized footprint. The biological assessment provides a representative depiction of a typical building block exercise (DoN 2011a; Figure 2-4).

Training Range Maintenance

Following exercises, participating units would perform a sweep of the training ranges to remove discarded training equipment, trash, and other materials (DoN 2011a). Maintenance personnel would then use existing routes of travel to access various portions of the training range to reset targets, grade and repair existing travel routes, and dispose of unexploded ordinance. Unexploded ordinance disposal would likely require detonation of identified materials in place. Maintenance activities would require 2 vehicles and occasionally a tractor trailer, at a maximum of 10 days per MEB exercise, for a total of 20 days per year. Limited amounts of similar range maintenance would occur in association with building block exercises. Range maintenance activities, especially unexploded ordinance sweeps, would be more intensive in the RPAA.

RPAA

The RPAA encompasses a 38,137-acre area in the southern portion of the western expansion area where the Marine Corps would allow limited public access when the area is not being used for the MEB training exercises. The Marine Corps would control public access through a permit system. The Marine Corps estimates that the RPAA would be open to public use approximately 10 months out of the year. Public activities that would occur in this area include OHV travel, rock hounding, hiking, rocketry, film production, camping, and other desert activities. The Marine Corps would continue to permit organized recreational events (e.g., sponsored OHV races) and would allow marking of racecourses.

Proposed Measures to Avoid, Reduce, and Offset the Adverse Effects of the Proposed Action

The Marine Corps will implement measures to avoid and reduce the potential effects of military training on the desert tortoise and will perform conservation actions within the Western Mojave Recovery Unit to offset the adverse effects of military training. This biological opinion will focus primarily on the effects of those actions and activities that the Marine Corps has planned within the boundaries of MCAGCC and the expansion areas, and consider the general effects of proposed conservation actions outside those boundaries. We do not have sufficient information on the conservation actions to conduct a detailed analysis of their effects on the desert tortoise and its critical habitat. For example, without information on the timing and location of specific actions, we cannot estimate the number of desert tortoises or the amount of critical habitat that may be involved. Consequently, we will provide a general analysis of the effects of these actions, and the Marine Corps or other Federal agencies will consult with us as implementation of the conservation measures proceeds.

The Marine Corps will refine the proposed compensatory actions as a result of field work conducted in 2012 through 2014, analyses derived from the Service's spatial decision support system, and our recommendations (Rowley 2012a). Information gained from the fieldwork (e.g., the health and density of and risk or threats to desert tortoises in the project area) and the spatial decision support system will help the Service and Marine Corps adaptively manage the proposed conservation measures to specific issues as they arise.

Minimization Measures

To minimize adverse effects to the desert tortoise, the Marine Corps will implement the following protective measures during use of the expanded MCAGCC. (By "expanded MCAGCC," we mean the current MCAGCC and the proposed acquisition areas.) We developed these measures with the Marine Corps based on the measures in the biological opinion for base-wide operations and existing Service guidance (Service 2002, 2009a, 2011c). Through coordination with the Marine Corps, we have modified the wording of some measures from that provided in the biological assessment. We have done this to improve clarity and to incorporate more current Service guidance, but we have not substantially changed the intent of the measures identified in the biological assessment (DoN 2011a).

1. The Marine Corps will appoint an official representative to oversee compliance with all protective measures for the desert tortoise. This person will receive and investigate reports of non-compliance and will have the authority to stop all activities that may violate these measures.

2. The Marine Corps will continue to implement a desert tortoise education program for military and civilian personnel that train or work on MCAGCC. All personnel will receive this program prior to proceeding with training exercises, construction projects, or other activities that may affect desert tortoises. This program will also be required of RPAA users through the permitting system that the Marine Corps will establish. The program will include the following: a) information on the biology and distribution of the species, b) its sensitivity to human activities, c) legal protection for the species and penalties for violation of Federal laws intended to protect it, d) its general activity patterns, e) the required measures for minimizing effects during training and construction-related activities, f) reporting requirements and measures to take if a desert tortoise is encountered, and g) measures that personnel can take to promote the conservation of desert tortoises.

3. The Marine Corps will inform all personnel of their responsibility to report any form of injury or mortality of desert tortoises to the official responsible for overseeing compliance with the protective measures.

4. The Marine Corps will place signs promoting awareness of desert tortoises in key locations to encourage personnel not to stray off established main and secondary routes.

5. The Marine Corps will require all personnel on MCAGCC to remove or contain foodstuffs, trash, or other wastes that may attract predators. The Marine Corps will require the use of latching or locking lids on all trash receptacles used for extended stays.

6. The Marine Corps will concentrate training activities that cause increased surface disturbance to pre-designated hardened sites, or within 656 feet (200 meters) of main supply routes, once these sites and routes are established. The Marine Corps will limit off-road activity to that which is necessary to support the mission directly and will plan maneuvers to emphasize use of already disturbed sites.

7. During training maneuvers, the Marine Corps will limit “neutral steer” turns of tracked vehicles (i.e., running tracks in the opposite directions from each other, so that the vehicle pivots in place) to emergency situations. The Marine Corps will identify authorized areas for practicing “neutral steer” turns that are away from special use areas and other biologically sensitive areas.

8. The Marine Corps will require that temporary fighting positions and other types of temporary excavations are filled to original grade and excess material leveled after each training exercise.

9. Contractor and maintenance personnel will remain on main or secondary main supply routes whenever possible. Personnel will only travel off the supply routes when no other route exists to the objective.

10. The Marine Corps will post and enforce a 20-mile-per-hour speed limit for contractor, construction, and maintenance personnel on all roads within desert tortoise habitat.

11. The Marine Corps will require personnel to obtain approval of the G-3 Directorate and the Natural Resources and Environmental Affairs (NREA) Division prior to clearing land (grading) or conducting any other vegetation removal action in the training areas.

12. The Marine Corps will ensure that all personnel immediately report to a MCAGCC-authorized biologist (i.e., a biologist authorized by the Service) any desert tortoises if they are within or immediately adjacent to training exercises or construction projects that may kill or injure them.

13. The Marine Corps will ensure that only authorized biologists handle desert tortoises or their eggs except in circumstances where the desert tortoise is in immediate danger of injury and mortality or is impeding an active training exercise. Use of authorized biologists and biological monitors will be in accordance with the most recent Service guidance. The current guidance is Service (2008a). The Marine Corps will ensure that biologists do not perform specialized handling activities (e.g., transmitter placement, health assessments, or blood collection) for which they are not specifically authorized by the Service.

14. If a desert tortoise is in immediate danger, the Marine Corps will ensure that it is moved into adjacent undisturbed habitat and placed in a shaded area, out of direct sunlight. If a desert tortoise is not in danger but is impeding military training, Marine units will notify Range Control and request instructions. Only appropriately briefed Marines, with direct radio or telephone communication with Range Control and authorization from NREA authorized biologists, will move desert tortoises. In these instances, the Marine Corps will move desert tortoises only the minimum distance to ensure their safety.

15. The Marine Corps will ensure that personnel inspect beneath and around all parked vehicles, located in desert tortoise habitat, prior to moving the vehicle. If a desert tortoise is located beneath a vehicle and is not in immediate danger or impeding training, the Marines will allow the tortoise to move on its own or they will contact Range Control for instructions. Only appropriately briefed Marines, with direct radio or telephone communication with and authorization from Range Control, will move desert tortoises. In these instances, the Marine Corps will move desert tortoises only the minimum distance to ensure their safety.

16. When requesting authorization of biologists to handle desert tortoises, the Marine Corps will submit the credentials to the Service for review and approval at least 30 days prior to the need for the biologist to perform those activities in the field. For authorization of specialized handling activities (e.g., transmitter placement or health assessments), the Marine Corps will clearly define activities for which it is requesting authorization and provide credentials that are specific to those activities.

17. All handling of desert tortoise and their eggs will comply with the protocols outlined in the Desert Tortoise Field Manual (Service 2009a) unless specifically modified by this biological opinion. When performing tasks where tools and equipment may contact desert tortoises, the Marine Corps will ensure that biologists disinfect all tools via the Service's disease prevention protocols (Service 2011c) or most recent Service guidance.

18. The Marine Corps will ensure that desert tortoises are handled only when air temperature, measured at 2 inches above the ground (shaded bulb) is not expected to exceed 95 degrees Fahrenheit during the handling session. If air temperature exceeds 95 degrees

Fahrenheit during handling or processing, desert tortoises will be shaded in an environment where the ambient air temperatures do not exceed 91 degrees Fahrenheit. The Marine Corps will not release desert tortoises until the air temperature at the release site has declined to below 95 degrees Fahrenheit and is expected to remain below 95 degrees Fahrenheit for the remainder of that day.

19. The Marine Corps will ensure that authorized biologists follow the protocols outlined in Service (2011c) or the most current Service guidance when performing health assessments on the desert tortoise.

20. The Marine Corps will ensure that authorized biologists re-hydrate desert tortoises that void their bladder using epicoelomic injections of sterile saline or by nasal or oral administration of drinking water. If a desert tortoise smaller than 4 inches in carapace length voids its bladder, the Marine Corps will offer fluids nasally or orally.

21. The Marine Corps will not translocate or otherwise move wild desert tortoises that show clinical signs of disease. If the Marine Corps locates a desert tortoise that must be moved, and it has clinical signs of upper respiratory tract disease, they will quarantine this individual and contact the Service to determine appropriate disposition of the animal.

22. The Marine Corps will ensure that authorized biologists mark desert tortoises in accordance with the Desert Tortoise Field Manual (Service 2009a) or other Service-authorized method.

23. The Marine Corps will ensure that authorized biologists attach only transmitters of appropriate size to desert tortoises. Transmitter mass will not exceed 10 percent of the desert tortoise's mass.

24. The Marine Corps will ensure that authorized biologists attach transmitters to the fifth vertebral scute of adult male and juvenile desert tortoises. For female desert tortoises, the Marine Corps will attach transmitters to the anterior carapace in the most appropriate place to preclude interference with righting. The Marine Corps will attach an antenna sheath just above the marginal scutes of each desert tortoise's shell. The antenna sheath will be slightly larger diameter than the antenna and will be split at each scute seam to prevent interference with natural shell growth.

25. The Marine Corps will ensure that authorized biologists replace transmitters earlier than the recommended battery life of the transmitter to reduce the potential of losing desert tortoises.

26. The Marine Corps will ensure that desert tortoise exclusionary fencing complies with the Desert Tortoise Field Manual (Service 2009a). Fence material will be galvanized, one inch by two-inch vertical wire mesh and will incorporate tortoise-proof gates or cattle

guards at all entry points. In instances where temporary exclusion of desert tortoises is required, the Marine Corps may use a temporary exclusion fence design after receiving approval by the NREA Division.

27. The Marine Corps will inspect all permanent desert tortoise exclusion fencing monthly and after rainfall events (i.e., the same day or the morning after an evening rain). The Marine Corps will inspect all temporary desert tortoise exclusion fencing monthly and after rainfall events. Repairs will occur on all damaged exclusion fencing within two days; temporary fencing will be used to close gaps until the permanent fencing is repaired. If monitoring identifies gaps in exclusion fencing that cannot be adequately closed by temporary fencing, the Marine Corps will post a biological monitor at the gap until fence repairs are made.

28. During fence installations, the Marine Corps will employ at least one biological monitor for each construction team, such that no driving, trenching, fence pulling, or surface disturbance occurs without the presence of a biological monitor. The Marine Corps will supply these biological monitors with maps of burrows located during pre-project surveys to assist them in minimizing effects on desert tortoises. Biological monitors will have the authority to halt activities if a desert tortoise enters work areas, and they will contact an authorized biologist to move the animal out of harm's way prior to commencement of activities.

29. Following installation of any desert tortoise exclusion fence, the Marine Corps will ensure that an authorized biologist checks the fence alignment for desert tortoises that are exhibiting fence-pacing behavior. From April 1 to October 15 and during other unseasonably warm periods of the year, fence checks will occur two times daily for 2 weeks following completion of fence construction. If midday temperatures are likely to be above 105 degrees Fahrenheit, one of these checks will occur one hour prior to the forecasted temperature high. If a given fence alignment is installed in the winter, inspections will occur 3 times per day for the first 3 weeks of the next active season.

30. Desert tortoises exhibiting fence-pacing behavior on construction and maintenance projects will be moved to a safe location away from the fence and monitored. If temperatures are above 95 degrees Fahrenheit, an authorized biologist will construct an artificial burrow for the desert tortoise or hold it in a climate-controlled location until temperatures fall below 91 degrees Fahrenheit and are expected to remain below 95 degrees Fahrenheit for the remainder of that day.

31. When marking and flagging burrows, the Marine Corps will follow the guidance in the Desert Tortoise Field Manual (Service 2009a).

32. The Marine Corps will conduct surveys for desert tortoises in the earliest possible planning stages for construction and maintenance projects that require clearing of land within training areas. The Marine Corps will use the information gained from these

surveys to reduce adverse effects to desert tortoises to the greatest extent practicable in the project plan.

33. For maintenance or construction projects outside of the Mainside Cantonment Area and in areas known to support desert tortoises, the Marine Corps will install temporary desert tortoise exclusion fencing around work sites and/or use biological monitors.

34. Prior to ground disturbance on maintenance and construction projects, an authorized biologist will perform pre-construction clearance surveys for desert tortoises. The authorized biologist will mark all desert tortoises moved from the construction site.

35. If a construction or maintenance project does not use desert tortoise exclusion fencing, the Marine Corps will ensure that clearance survey timing reduces the likelihood that a desert tortoise could enter a work area between the time of surveys and the onset of work. If desert tortoises are unlikely to be active, clearance surveys may occur within 48 hours prior to ground disturbance. The Marine Corps will determine whether desert tortoises are likely to be active based on the biology of the species, time of year, and weather conditions.

36. During pre-construction clearance surveys for construction and maintenance projects, the Marine Corps will inspect all desert tortoise burrows for small and large desert tortoises and all mammal burrows that may host larger desert tortoises. The Marine Corps will flag and avoid all active burrows wherever feasible.

37. If training exercises or construction activities cannot avoid an active burrow, an authorized biologist will excavate the burrow according to the protocols in the Desert Tortoise Field Manual (Service 2009a). Authorized biologists will move all desert tortoises excavated from active burrows to the nearest unoccupied natural burrow, an artificially constructed burrow, or place it under a shrub if it can be released within specified temperature limits. The Marine Corps will ensure that further construction activities do not disrupt the release location.

38. If an inactive burrow is near a construction or maintenance activity but in no danger of disturbance, the Marine Corps will block it and flag it for avoidance. The Marine Corps will follow the guidance provided in the Desert Tortoise Field Manual (Service 2009a) when blocking and marking the burrow. After completion of construction activities, the Marine Corps will remove materials used to block and flag the burrow. The Marine Corps will collapse all inactive burrows that construction activities are likely to disturb.

39. The Marine Corps will only confirm a burrow as inactive if close inspection can locate all interior edges of the burrow, such that hidden chambers are not missed.

40. On construction and maintenance projects that require biological monitoring, the biological monitors will work with the construction supervisor to minimize disturbance. The Marine Corps will ensure that an adequate number of biological monitors are present to monitor all aspects of the activities that have the potential to injure or kill desert tortoises. Biological monitors will have the authority to halt construction activities if they locate a desert tortoise in the construction area. The Marine Corps will cease all construction activity if they identify a desert tortoise within a construction area following initial clearance surveys. Construction activities will not resume until an authorized biologist has marked the desert tortoise and moved it to a safe location. The Marine Corps may forego the use of biological monitors in fenced construction areas where clearance surveys have occurred. MCAGCC biological staff will make this determination based on site-specific circumstances.

41. During construction in areas that are not fenced with desert tortoise exclusion fencing, biological monitors will check open trenches at least two times a day, in the morning and evening, throughout the duration of construction. If midday temperatures are likely to be above 95 degrees Fahrenheit, one of these checks will occur one hour prior to the forecasted high temperature. The Marine Corps will leave open excavations only if they are temporarily fenced or covered to exclude desert tortoises. The Marine Corps will inspect all excavations for desert tortoises prior to filling.

42. The Marine Corps will require that personnel stake all camouflage netting 18 inches off the ground to prevent entanglement of desert tortoises.

43. The Marine Corps will prohibit accessing or departing the southeastern ranges of MCAGCC through the Cleghorn Lakes Wilderness Area. The Marine Corps will also prohibit access to Cleghorn Pass and Bullion or America Mine Training Ranges from a southerly direction. The Marine Corps will prohibit personnel from entering the Ord-Rodman Desert Wildlife Management Area (DWMA) except for the purposes of implementing the translocation program.

44. The Marine Corps will take necessary steps to reduce effects to the desert tortoises caused by feral or free-roaming dogs at MCAGCC. These steps may include increased public awareness, cooperation with other agencies, and other methods of control.

45. The Marine Corps will prohibit pets within the MCAGCC training areas, with the exception of pets in the Mainside Cantonment Area and military working dogs that are under the control of their handler.

46. The Marine Corps will prohibit the possession of otherwise legal captive desert tortoises on any portion of MCAGCC, with the exception of animals used for desert tortoise

awareness and education programs. The Marine Corps will prohibit the release of legal captive or wild desert tortoises from off base into the MCAGCC population.

47. The Marine Corps will prohibit the feeding of wildlife on MCAGCC.

48. The Marine Corps will prohibit recreational use of the MCAGCC training areas, with the exception of those specifically identified above in the RPAA.

49. The Marine Corps will prohibit the introduction of exotic plant species on MCAGCC.

50. The Marine Corps will prohibit open fires and the harvesting or cutting of native vegetation, with limited exceptions within the RPAA.

Special Use Areas

The Marine Corps would establish two special use areas (SUA) in the western expansion area (12,015 acres combined) and one SUA in the southern expansion area (2,935 acres) (DoN 2011a; Figure 3-2). Two of these SUAs are adjacent to existing protected areas (i.e., Ord-Rodman DWMA [adjacent to the western expansion area] and Cleghorn Lakes Wilderness [adjacent to the southern expansion area]). The third is located in the western portion of the western expansion area and is not contiguous with existing or proposed conservation areas. The Marine Corps would place all newly established SUAs off-limits to mechanized maneuvers, off-road vehicle travel, bivouac sites, and any other military training involving off-road vehicle activity. The Marine Corps would sign these SUAs, and fence them on the sides near proposed maneuver areas and the Johnson Valley Off-highway Management Vehicle Area, to reduce the potential for effects from training activities and unauthorized access. Some SUAs would serve as recipient sites for desert tortoises translocated from maneuver corridors and training objectives within the expansion areas (see below).

The Marine Corps will also create a new SUA within the Sunshine Peak Training Area (1,987 acres) and upgrade an existing SUA within the Sunshine Peak and Lavic Training Areas (8,901 acres; see attachment to electronic mail dated April 12, 2012, from Major Rowley) to increase the protection of desert tortoises within the boundaries of the existing installation.

Management of Adjacent Public Lands

The Marine Corps will coordinate with and support the Bureau to develop the appropriate plans, agreements or other documents, such as an amendment to the California Desert Conservation Area Plan, to change the management of two adjacent parcels of land to be more protective of desert tortoises (DoN 2012b, 2012c). This management could be the incorporation of these parcels into the Ord-Rodman DWMA. Specifically, the western expansion area would isolate the northeastern-most portion of the Johnson Valley Off-highway Vehicle Management Area from the remainder of the off-highway vehicle area; it would also isolate an area of Class M public land between the northwestern edge of the western expansion area, the Ord-Rodman DWMA, and the northwestern tip of the Johnson Valley Off-highway Vehicle Management

Area. The Marine Corps, in coordination with the Bureau, would complete the appropriate administrative procedures to implement this change within 24 months of publishing the record of decision for the proposed action. The Marine Corps and Bureau have begun preliminary coordination on this proposal (Rowley 2012a). The Marine Corps shall notify the Service if the proposed timelines cannot be met at the earliest possible time. If changes to this proposed timeline cause an effect to the desert tortoise that we have not considered in this biological opinion, the Marine Corps may need to re-initiate consultation (50 Code of Federal Regulations 402.16).

Law Enforcement

The Marine Corps would continue to implement its Conservation Law Enforcement Program with the purpose of patrolling and monitoring sensitive resource areas to curtail resource damage. The Marine Corps Conservation Law Enforcement Program enforces nine Federal conservation laws, including the provisions of the Act. The Marine Corps would sustain the current level of law enforcement and increase it based on identified needs and the availability of resources.

In addition, the Marine Corps would develop the appropriate agreements with the Bureau to provide for increased law enforcement presence and patrols in nearby sensitive resource areas, such as the Ord-Rodman DWMA (DoN 2012b, 2012c). The Marine Corps would do this through appropriate agreements with the Bureau and would provide sufficient resources for two additional officers to focus their efforts in these areas for a period of 30 years, or the term enacted via the necessary land withdrawal legislation.

Desert Tortoise Translocation

We have summarized the following information from the Marine Corps' general translocation plan for desert tortoises (Karl and Henen 2011). The Marine Corps is requesting an amendment to its existing section 10(a)(1)(A) recovery permit to provide legal authorization for its pre-translocation surveys, translocation of the desert tortoises in the expansion areas, and the post-translocation effectiveness monitoring and research. Although our authorization of these actions would occur through a separate process (i.e., section 10(a)(1)(A) of the Act), we are describing and analyzing these activities in this biological opinion to provide a more complete analysis of the effects of the proposed action. The Marine Corps will perform extensive pre-translocation surveys of recipient sites that will provide information that may result in modifications to the current translocation plan. The Marine Corps will develop a final plan that includes refinements to this translocation program. Substantial modifications may require re-initiation of consultation prior to the commencement of translocation activities.

The Marine Corps will translocate desert tortoises in accordance with the final translocation plan prior to initiating training activities in the high- and moderate-impact areas. The biological assessment provides a representative depiction of these high- and moderate-intensity training lands (DoN 2011a; Figure 6-2). While this depiction provides information for assessing the potential effects of the translocation, the precise area where MEB objectives and other training-related disturbances would occur may change prior to commencement of training within the expansion areas. The Marine Corps will translocate all desert tortoises it finds within areas identified for heavy and moderate disturbance to the nearest translocation recipient site as identified and supported by the final translocation plan. If changes to the MEB objective or other training-related disturbances cause an effect to the desert tortoise that we have not considered in this biological opinion, the Marine Corps may need to modify the translocation plan and re-initiate consultation (50 Code of Federal Regulations 402.16).

Translocation Recipient Sites

The Marine Corps has identified a larger area for the proposed recipient sites for translocated desert tortoises than it anticipates needing. Extensive pre-translocation surveys of these areas will provide information for refinement of the final translocation areas over the next three years.

The Marine Corps proposes to use seven recipient sites to accommodate translocated desert tortoises from the western expansion area (Table 1; see also Karl and Henen 2011; Figure 7). The two newly established SUAs in the western expansion area will serve as recipient sites. In addition, the Marine Corps identified three recipient sites within the Ord-Rodman DWMA. One of these areas is immediately south of the Rodman Mountains Wilderness Area and contiguous with the northern SUA in the western expansion area. The others are located to the southwest and to the east of the Rodman Mountains Wilderness Area, respectively. The final two proposed recipient sites are located in the Sunshine Peak Training Area, which the Marine Corps does not use for mechanized training, in the northwestern corner of the existing installation. In addition, the Marine Corps has identified an alternative translocation site for the western expansion area in the existing Emerson Lake SUA, located on the existing installation, near the southeastern corner of the RPAA. The alternative site would be used if pre-translocation surveys reveal the need for an additional or replacement translocation area.

The SUA would be the primary recipient site for the southern expansion area (Karl and Henen 2011; Figure 7). The alternative recipient site for the southern expansion area is in the Bullion SUA, located on the existing installation, immediately north of the Cleghorn Lakes Wilderness Area.

Table 1. Size and location of proposed recipient sites for desert tortoise translocation.

	Expansion Area	Recipient site	Size (acres)
Proposed Recipient Site	Western Expansion Area	North Special Use Area	6,822.0
		West Special Use Area	5,193.0
		Ord-Rodman Areas	19,199.0
		Sunshine Peak Areas	3,706.5
	Southern Expansion Area	Special Use Area	2,935.0
Total			**37,855.5**
Alternative Recipient Sites	Western Expansion Area	Emerson Lake Special Use Area	2,471.0
	Southern Expansion Area	Bullion Special Use Area	2,471.0
Total			**4,942**

Pre-translocation Surveys of Desert Tortoise Populations

For 3 years, following execution of the record of decision, the Marine Corps will collect baseline information on the density, distribution, and health status of desert tortoises and habitat within the recipient sites. The same information will be collected within areas from which desert tortoises would be translocated and on control plots that it will establish within portions of the Ord-Rodman DWMA (Karl and Henen 2011; Figure 7). The Marine Corps will use this information, along with a threats analysis of the recipient sites, to determine if the proposed translocation plan requires modification. This assessment will occur in coordination with the Service and require our approval prior to translocation of desert tortoises.

The Marine Corps will perform extensive surveys of the control and recipient populations using both the Service's pre-project survey protocol (Service 2010a) and the Tortoise Regional Estimate of Density (TRED) protocol (Karl 2002). In addition, the Marine Corps will establish up to 12 one-square-kilometer (247-acre) plots (4 in the control population and 6 to 8 in the recipient area population) for focused, mark-recapture surveys to assess population structure, trends in local population size, and other metrics. These mark-recapture surveys will require authorized biologists to handle desert tortoises, mark them with an identification tag, and attach transmitters in some instances.

The Marine Corps will also perform pre-translocation surveys of desert tortoises at the recipient, control, and translocation sites to assess disease prevalence. Population sampling will occur at a level that is sufficient to detect 10-percent disease prevalence at the 95-percent confidence limit. Disease sampling will require qualified biologists to handle desert tortoises, collect blood samples, and check animals for clinical signs of disease.

Lastly, the Marine Corps will perform surveys of the recipient and control sites to assess habitat attributes and anthropogenic threats. These surveys will include assessments of plant species composition, vegetation density, shrub cover percentage, shrub height, characterization of understory vegetation, identification of forage species, and characterization of soils, hydrology, and topography. In addition, the Marine Corps will perform literature searches and field surveys to assess current threats within the translocation recipient sites (e.g., predators, unauthorized OHV use, invasive species, proximity to major roadways and other human developments).

Following the collection and review of this baseline information and preliminary approval of the recipient sites by the Service, the Marine Corps will perform a final pre-translocation survey of the control and recipient population in the year prior to translocation. This survey will focus on attaching transmitters to a sufficient number of control and resident animals to facilitate post-translocation research and monitoring (see below) and to collect final data on the health status of these populations. The Marine Corps will submit these data to the Service for consideration in its decision regarding final translocation approval.

Translocation Process

<u>Fence Line Translocations</u> - Prior to translocation of desert tortoises from the expansion areas, the Marine Corps will install permanent desert tortoise exclusion fencing along portions of the translocation area boundaries that are near maneuver areas. Based on the location of recipient areas, the Marine Corps would likely install these fences along the southern boundary of the northern SUA and on the boundary of the Ord-Rodman translocation area where it would be adjacent to the Johnson Valley Off-highway Vehicle Management Area. It may also install desert tortoise exclusion fencing in portions of the recipient site and in parts of the expansion area or existing installation that are near high-use areas (e.g., OHV areas).

Within 24 hours prior to fence installation, authorized biologists will perform 100-percent coverage surveys of the proposed fence alignment and a 45-foot buffer on either side of the alignment in accordance with the pre-project survey protocols (Service 2010a). Surveyors will identify, mark, and map all burrows that desert tortoises may use and determine occupancy status to the extent possible using reflective mirrors, tapping, probing, or fiber-optic scopes. The Marine Corps will use this information to adjust fence alignments to avoid active burrows or burrows over 1.64 feet (0.5 meter) in length by placing the fence between the burrow and the training area. For all other burrows (i.e., inactive or shorter than 1.64 feet) on the side of the fence within the training area, an authorized biologist will carefully excavate the burrow.

Desert tortoises located along installed fence lines in the expansion areas will become part of the translocation research study according to the following criteria. If the animal is fenced within the recipient site, it will become part of the recipient site population. Conversely, if a fence alignment places a given desert tortoise in a portion of the training area where translocation will occur, it will become part of the translocated population. If a fence alignment places a desert tortoise in a portion of the training area where training effects are unlikely to occur or be substantial (i.e., not within highly or moderately disturbed areas), it will not become part of the translocation research study. Following fence installation, if an animal exhibiting a substantial amount of fence pacing behavior is attempting to enter the recipient site during post-installation fence checks, an authorized biologist will place it within the recipient site and it will become part of the recipient site population.

Acquisition Area Translocations – In the year prior to initiation of MEB exercises in the expansion areas, the Marine Corps will implement a clearance-level survey for desert tortoises and nests in the MEB medium- and high-intensity areas (DoN 2011a; Figure 6-2) according to current guidance (Service 2010k). 'Clearance-level surveys' are defined in measure 2 under the Translocation Minimization Measures section of this biological opinion. The Marine Corps will attach transmitters to all desert tortoises located during these surveys and perform full health assessments, including blood collection for ELISA testing. The Marine Corps will move located desert tortoises that are too small (less than 4.4 inches) to wear transmitters to its headstart facility (TRACRS: Tortoise Research and Captive Rearing Site) or to a similar temporary enclosure in the SUAs. Temporary enclosures would be small, about 9 square meters, enclose native food and refuge vegetation and suitable soil for burrowing, and use predator-proof design similar to TRACRS' pens. The predator-proof design would use four 10-foot long chain-link panels, fitted with metal flashing and hardware cloth bent to prevent predator entry by digging underneath, and nylon or polypropylene netting to exclude avian predators. This design would obviate digging that disturbs the habitat. These animals will become part of the Marine Corps' existing desert tortoise head-starting program or remain quarantined in predator-proof pens for later release into the identified translocation areas (see Translocation Minimization Measures, below). The Marine Corps will leave all other desert tortoises located during the clearance-level surveys in place and will monitor them *in situ* until it receives ELISA test results. The Marine Corps will follow the protocols outlined in the desert tortoise translocation guidance (Service 2010k) for *in situ* monitoring until translocation occurs.

The biological assessment states that the Marine Corps would survey high- and moderate-impact areas prior to each MEB exercise to clear remaining desert tortoises to translocation sites. MEB exercises could occur at times of the year that are not conducive to finding and translocating desert tortoises. Additionally, surveying the approximately 37,828 acres that are likely to be heavily and moderately disturbed may be of limited value because of the low density of desert tortoises in portions of the area. Consequently, as a result of discussions during the development of the biological opinion, the Marine Corps and Service agreed on the following procedure (Bransfield 2012):

1. Prior to the initial clearance survey, the Marine Corps will divide the survey areas into square kilometer grids.

2. Prior to the first MEB exercise, during a time of the year when desert tortoises are active, the Marine Corps will conduct the first clearance survey and carefully map where desert tortoises are found.

3. In subsequent years, during a time of the year when desert tortoises are active, the Marine Corps will conduct the additional clearance surveys of any square kilometer grid where three or more desert tortoises were found during the previous survey.

4. This procedure will continue until such time that fewer than three desert tortoises are found in any grid.

The Marine Corps will translocate all desert tortoises located during these surveys to the recipient sites identified above in accordance with the translocation guidance (Service 2010k) except as specifically modified in this biological opinion.

Post-translocation Effectiveness Monitoring

Mark-recapture and Tracking Surveys - Following translocation of desert tortoises, the Marine Corps will monitor a subset of the translocated population for 30 years to determine the effectiveness of the translocation effort and to adaptively manage the effort as needed. In addition to monitoring the translocated population, the Marine Corps will monitor the resident and control populations. The Marine Corps will establish control plots that are at least 6.25 miles from recipient areas. Effectiveness monitoring will focus on determining survival rates, gathering information on demography, identifying threats to the translocation area, measuring habitat stability and changes, and monitoring health and disease status.

The Marine Corps will monitor survival, demography, and population health status through a combination of mark-recapture plots and tracking. The mark-recapture studies will involve surveying 10 to 12 mark-recapture plots every 5 years for the 30-year monitoring period, using standard mark-recapture survey techniques. The Marine Corps will establish four of these plots within the control population and six to eight plots within the translocation recipient areas. During these surveys, the Marine Corps will mark and assess all desert tortoises that can be located on each plot. Field workers will perform basic measurements, photograph each individual, collect blood samples for *Mycoplasma*-ELISA tests, and perform visual health assessments on all desert tortoises that they locate during these surveys. In addition, they will collect qualitative and quantitative information related to threats within the translocation recipient areas (i.e., common raven (*Corvus corax*) and coyote (*Canis latrans*) activity, unauthorized OHV use, free-ranging or feral dogs, and other threats) and data on habitat stability (i.e., percent cover, plant density, frequency, species richness, species evenness, robustness of perennial plants, annual plant biomass and presence of non-native weeds). Data collection on threats, surface disturbance, and annual plants will occur each time the Marine Corps surveys the plot, while habitat stability surveys for perennial plants, soil, and hydrology metrics will occur every 10 years. The Marine Corps will also conduct additional research on these mark-recapture plots that is relevant to the use of translocation as a population augmentation tool in species recovery efforts (see below).

In addition to the mark-recapture effort, the Marine Corps will implement a long-term tracking study in which 20 percent of the translocated population will initially carry transmitters and be monitored. Of these, the Marine Corps will seek to ensure that a subset of the monitored population includes smaller juvenile desert tortoises. The Marine Corps will also track and monitor an equal number of larger desert tortoises in the control and resident population and juvenile desert tortoises found during searches of the control and recipient plots. The Marine Corps will monitor these desert tortoises for 5 years. During this period, the Marine Corps will monitor desert tortoises in the tracking study according to the frequency outlined in the translocation guidance (Service 2010k) for the first year. After the first year, monitoring will occur: 1) weekly in April, May, October, and the last half of September, 2) every other week from June to mid-September, and 3) monthly from November to February. At the end of 5 years, the Marine Corps will remove radio transmitters to reduce the size of the study group to 50 per cohort (i.e., 50 translocated, 50 recipient and 50 control animals) and monitor it for an additional 5 years. During the tracking study, the Marine Corps will collect data similar to that collected on the mark-recapture plots, including data on threats. Habitat stability surveys will not occur in combination with tracking surveys.

During mark-recapture and tracking studies, the Marine Corps will monitor body condition indices, clinical signs of disease, serology, and visual signs of injury. The Marine Corps will collect this information from all transmittered desert tortoises located during mark-recapture studies and from a subset (i.e., 50 from each cohort) of the translocated, recipient site, and control populations that it will monitor through tracking. Each desert tortoise involved in disease monitoring will undergo a full health assessment, including visual assessments and blood collection, in October of each year for the first 5 years following translocation. In addition, the Marine Corps will perform health assessments on all transmittered desert tortoises at the end of the 10-year tracking study.

Post-translocation Research

In addition to the translocation effectiveness monitoring described above, the Marine Corps will perform research with some desert tortoises involved in the translocation. These research studies will focus on disease and on answering critical questions that are relevant to future use of population augmentation as a species recovery tool (e.g., use of translocated or head-started desert tortoises to re-populate identified dead zones). This research is directly relevant to the current recovery strategy for the species. As with all other aspects of the translocation, the Marine Corps will conduct these activities under a section 10(a)(1)(A) recovery permit. Refinement of the research design is likely to occur during the 3 to 4 years prior to translocation. Substantial changes may require re-initiation of consultation.

<u>Vertical Transmission of Disease</u> – During translocation and post-translocation monitoring, the Marine Corps will move desert tortoises showing clinical signs of Upper Respiratory Tract Disease Syndrome (URTDS) to their head-start facility (i.e., TRACRS facility or the newly constructed enclosures). The Marine Corps will hold these desert tortoises in existing or newly constructed enclosures. These desert tortoises will undergo health assessments according to the techniques and frequency described above for desert tortoises in the mark-recapture and tracking studies. At least half of the quarantined adult females will be involved in research related to vertical transmission of disease from females to their progeny. Female desert tortoises will be ultrasonographed and radiographed to assess their reproductive status.

<u>Experimental Translocation Densities</u> – To answer questions on appropriate stocking densities for population augmentation, the Marine Corps will use the mark-recapture plots in the translocation recipient site (see above) to examine the effects of various post-translocation population densities. The Marine Corps will stock the plots with translocated desert tortoises, such that post-translocation densities are 1.5 times greater on 4 plots and 2 times greater on 4 plots than the density for the Ord-Rodman DWMA as has been determined through the Service's range-wide monitoring program. The Marine Corps will compare these data to control plots to determine the effects of stocking densities on individual survival and long-term population

density, structure, and health status. During the first 5 years after translocation, 100 percent coverage surveys of the mark-recapture plots will occur annually using a single pass of the plot to monitor mortality, presence of translocatees, and relative abundance. As described in the post-translocation effectiveness monitoring section (above), the Marine Corps will also perform full mark-recapture surveys of these plots every 5 years for 30 years.

Repatriation Research – The Marine Corps will also use translocated desert tortoises to conduct research on whether fencing translocation plots can improve home range establishment and integration into the recipient population's social structure. The Marine Corps will fence four to six one-square-mile release sites with desert tortoise exclusion fencing and release translocated desert tortoises on these plots so that post-translocation densities are approximately twice the current recipient population density. The Marine Corps expects these densities to approximate historical densities in the newly established SUAs where these repatriation plots will likely occur. Desert tortoises involved in the repatriation study will carry transmitters and will form a subset of the larger population used in the tracking portion of the post-translocation effectiveness monitoring (see above). The Marine Corps will implement the same monitoring program described above for the tracking surveys on desert tortoises in the repatriation study. Tracking of desert tortoises in the repatriation study will occur for 10 years. The Marine Corps will remove the desert tortoise exclusion fencing 2 years after release of translocated individuals on the repatriation plots.

Translocation Minimization Measures

In addition to the *General Minimization Measures* identified above, the Marine Corps will implement the following measures when translocating desert tortoises.

1. During translocation, the Marine Corps will comply with the translocation guidance (Service 2010k) unless specifically modified by the measures below, the translocation design discussed above, or more recent guidance agreed to by the Marine Corps and the Service.

2. The Marine Corps will utilize clearance survey transects that are spaced no more than 15 feet apart and will decrease the spacing of transects in areas of difficult terrain and dense vegetation. During the final translocation clearance surveys, in which desert tortoises are moved to the translocation area, the Marine Corps will not declare the area clear of desert tortoises until at least two consecutive clearance survey passes have found no new desert tortoises. Consecutive clearance survey passes will occur at differing angles. During each pass, the Marine Corps will collect all desert tortoise scat. If the Marine Corps discovers fresh scat on a subsequent clearance survey pass, it will implement additional focused searches of the area where the scat was located. Desert tortoises encountered by chance in the clearance areas will also be moved to the nearest identified translocation recipient site.

3. During translocation clearance surveys, the Marine Corps will only excavate and collapse active desert tortoise burrows. To determine the need for excavation of burrows where occupancy cannot be verified, the Marine Corps will gate the burrow (i.e., place small

sticks along the entrance of the burrows) and use other means to determine use by desert tortoises during clearance survey passes. If disturbance of the gate during a subsequent clearance survey pass indicates an occupied burrow, the Marine Corps will investigate it further. If this occurs during the final clearance surveys, in which desert tortoises are moved to the translocation area, an authorized biologist will excavate the burrow.

4. The Marine Corps will time final movement of desert tortoises to the translocation areas to avoid high ambient temperatures, and at least one week before daily, midday temperatures are expected to exceed 90 degrees Fahrenheit air temperature or 109 degrees Fahrenheit ground surface temperature.

5. The Marine Corps will release all translocated desert tortoises under shrubs.

6. The Marine Corps will release located desert tortoises smaller than 4.4 inches in length, and any translocated nests, to TRACRS or temporary predator-proof enclosures in the recipient sites (see Acquisition Area Translocations, above). For individuals in temporary enclosures, the Marine Corps will monitor these smaller desert tortoises and any hatchlings once a month until late November. At the end of this period, the Marine Corps will remove the predator-proof enclosure, permit passive translocation, or actively translocate the hatchlings to rodent burrows away from the enclosures, depending on common raven and other predator activity at or near the enclosures.

Desert Tortoise Head-starting Program

The Marine Corps will implement an experimental population augmentation within designated SUAs and/or Bureau lands using head-started desert tortoises from its existing head-start facility. The Marine Corps will also establish a new head-starting facility in the western most SUA in the proposed western expansion area. The Marine Corps will raise hatchling desert tortoises until they are of sufficient size to resist predation and then release them into areas that survey and analysis have identified. The Marine Corps will coordinate with the Service in development of the population augmentation strategy and cover this work under its existing section 10(a)(1)(A) recovery permit.

Control of Human Access

The Marine Corps will monitor, fence, erect barriers, and install signs in areas where high human use occurs in or near the project areas. The Marine Corps will install approximately 24 miles of fencing to prevent desert tortoises from returning to high- and medium-impacts areas, 5.5 miles of exclusion barrier to prevent human intrusion into the western SUA from the adjacent Bureau-designated OHV area, and 40 miles of exclusion barrier between the Ord-Rodman DWMA where it is adjacent to Bureau-designated OHV areas (i.e., Johnson and Stoddard Valley OHVA). The Marine Corps will coordinate with the Bureau, Service, and California Department of Fish and Game in identifying priority routes and areas for patrol by its Conservation Law Enforcement Officers; the results of future surveys and spatial decision support system will assist in informing this prioritization. The Marine Corps will emphasize areas near the project that may be vulnerable to displaced OHV activity that could affect the translocation.

ANALYTICAL FRAMEWORK FOR THE JEOPARDY AND ADVERSE MODIFICATION DETERMINATIONS

Determination of Jeopardy

Section 7(a)(2) of the Endangered Species Act requires that Federal agencies ensure that any action they authorize, fund, or carry out is not likely to jeopardize the continued existence of listed species. "Jeopardize the continued existence of" means to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species (50 Code of Federal Regulations 402.02).

The jeopardy analysis in this biological opinion relies on four components: (1) the Status of the Species, which describes the range-wide condition of the desert tortoise, the factors responsible for that condition, and its survival and recovery needs; (2) the Environmental Baseline, which analyzes the condition of the desert tortoise in the action area, the factors responsible for that condition, and the relationship of the action area to the survival and recovery of the desert tortoise; (3) the Effects of the Action, which determine the direct and indirect impacts of the proposed Federal action and the effects of any interrelated or interdependent activities on the desert tortoise; and (4) the Cumulative Effects, which evaluate the effects of future, non-federal activities in the action area on the desert tortoise.

In accordance with policy and regulation, the jeopardy determination is made by evaluating the effects of the proposed Federal action in the context of the current status of the desert tortoise, taking into account any cumulative effects, to determine if implementation of the proposed action is likely to cause an appreciable reduction in the likelihood of both the survival and recovery of the desert tortoise in the wild.

The jeopardy analysis in this biological opinion places an emphasis on consideration of the range-wide survival and recovery needs of the desert tortoise and the role of the action area in the survival and recovery of the desert tortoise as the context for evaluation of the significance of the effects of the proposed federal action, taken together with cumulative effects, for purposes of making the jeopardy determination.

Determination of Destruction or Adverse Modification of Critical Habitat

Section 7(a)(2) of the Endangered Species Act requires that Federal agencies ensure that any action they authorize, fund, or is not likely to result in the destruction or adverse modification of the critical habitat of listed species. This biological opinion does not rely on the regulatory definition of "destruction or adverse modification" of critical habitat at 50 Code of Federal Regulations 402.02. Instead, we have relied on the statutory provisions of the Act to complete the following analysis with respect to critical habitat.

In accordance with policy and regulation, the adverse modification analysis in this biological opinion relies on four components: (1) the Status of Critical Habitat, which describes the range-wide condition of designated critical habitat for the desert tortoise in terms of primary constituent elements, the factors responsible for that condition, and the intended recovery function of the critical habitat overall; (2) the Environmental Baseline, which analyzes the condition of the critical habitat in the action area, the factors responsible for that condition, and the recovery role of the critical habitat in the action area; (3) the Effects of the Action, which determines the direct and indirect impacts of the proposed Federal action and the effects of any interrelated and interdependent activities on the primary constituent elements and how that will influence the recovery role of the affected critical habitat units; and (4) Cumulative Effects, which evaluates the effects of future non-federal activities in the action area on the primary constituent elements and how that will influence the recovery role of affected critical habitat units.

STATUS OF THE SPECIES AND CRITICAL HABITAT

Status of the Desert Tortoise

Section 4(c)(2) of the Act requires the Service to conduct a status review of each listed species at least once every 5 years. The purpose of a 5-year review is to evaluate whether or not the species' status has changed since it was listed (or since the most recent 5-year review); these reviews, at the time of their completion, provide the most up-to-date information on the range-wide status of the species. For this reason, we are appending the 5-year review of the status of the desert tortoise (Appendix 1; Service 2010b) to this biological opinion and are incorporating it by reference to provide most of the information needed for this section of the biological opinion. The following paragraphs provide a summary of the relevant information in the 5-year review.

In the 5-year review, the Service discusses the status of the desert tortoise as a single distinct population segment and provides information on the Federal Register notices that resulted in its listing and the designation of critical habitat. The Service also describes the desert tortoise's ecology, life history, spatial distribution, abundance, habitats, and the threats that led to its listing (i.e., the 5-factor analysis required by section 4(a)(1) of the Endangered Species Act). In the 5-year review, the Service concluded by recommending that the status of the desert tortoise as a threatened species be maintained.

With regard to the status of the desert tortoise as a distinct population segment, the Service concluded in the 5-year review that the recovery units recognized in the original and revised recovery plans (Service 1994 and 2011h, respectively) do not qualify as distinct population segments under the Service's distinct population segment policy (61 Federal Register 4722; February 7, 1996). We reached this conclusion because individuals of the listed taxon occupy habitat that is relatively continuously distributed, exhibit genetic differentiation that is consistent with isolation-by-distance in a continuous-distribution model of gene flow, and likely vary in behavioral and physiological characteristics across the area they occupy as a result of the transitional nature of, or environmental gradations between, the described subdivisions of the Mojave and Colorado deserts.

In the 5-year review, the Service summarizes information with regard to the desert tortoise's ecology and life history. Of key importance to assessing threats to the species and to developing and implementing a strategy for recovery is that desert tortoises are long-lived, require up to 20 years to reach sexual maturity, and have low reproductive rates during a long period of reproductive potential. The number of eggs that a female desert tortoise can produce in a season is dependent on a variety of factors including environment, habitat, availability of forage and drinking water, and physiological condition. Predation seems to play an important role in clutch failure. Predation and environmental factors also affect the survival of hatchlings.

In the 5-year review, the Service also discusses various means by which researchers have attempted to determine the abundance of desert tortoises and the strengths and weaknesses of those methods. The Service provides a summary table of the results of range-wide monitoring, initiated in 2001, in the 5-year review. This ongoing sampling effort is the first comprehensive attempt to determine the densities of desert tortoises across their range. Table 1 of the 5-year review provides a summary of data collected from 2001 through 2007; we summarize data from the 2008 through 2010 sampling efforts in subsequent reports (Service 2010b, 2010c, 2010d). As the Service notes in the 5-year review notes, much of the difference in densities between years is due to variability in sampling; determining actual changes in densities will require many years of monitoring. Additionally, due to differences in area covered and especially to the non-representative nature of earlier sample sites, data gathered by the range-wide monitoring program cannot be reliably compared to information gathered through other means at this time.

In the 5-year review, the Service provides a brief summary of habitat use by desert tortoises; more detailed information is available in the revised recovery plan (Service 2011e). In the absence of specific and recent information on the location of habitable areas of the Mojave Desert, especially at the outer edges of this area, the 5-year review also describes and relies heavily on a quantitative, spatial habitat model for the desert tortoise north and west of the Colorado River that incorporates environmental variables such as precipitation, geology, vegetation, and slope and is based on occurrence data of desert tortoises from sources spanning more than 80 years, including data from the 2001 to 2005 range-wide monitoring surveys (Nussear et al. 2009). The model predicts the probability that desert tortoises will be present in any given location; calculations of the amount of desert tortoise habitat in the 5-year review and in this biological opinion use a threshold of 0.5 or greater predicted value for potential desert tortoise habitat. The model does not account for anthropogenic effects to habitat and represents the potential for occupancy by desert tortoises absent these effects.

To begin integrating anthropogenic activities and the variable risk levels they bring to different parts of the Mojave and Colorado deserts, the Service completed an extensive review of the threats known to affect desert tortoises at the time of their listing and updated that information with more current findings in the 5-year review. The review follows the format of the five-factor analysis required by section 4(a)(1) of the Act. The Service described these threats as part of the process of its listing (55 Federal Register12178; April 2, 1990), further discussed them in the original recovery plan (Service 1994), and reviewed them again in the revised recovery plan (Service 2011e).

To understand better the relationship of threats to populations of desert tortoises and the most effective manner to implement recovery actions, the Desert Tortoise Recovery Office is developing a spatial decision support system that models the interrelationships of threats to desert tortoises and how those threats affect population change. The spatial decision support system describes the numerous threats that desert tortoises face, explains how these threats interact to affect individual animals and habitat, and how these effects in turn bring about changes in populations. For example, we have long known that the construction of a transmission line can result in the death of desert tortoises and loss of habitat. We have also known that common ravens, known predators of desert tortoises, use the transmission line's pylons for nesting, roosting, and perching and that the access routes associated with transmission lines provide a vector for the introduction and spread of invasive weeds and facilitate increased human access into an area. Increased human access can accelerate illegal collection and release of desert tortoises and their deliberate maiming and killing, as well as facilitate the spread of other threats associated with human presence, such as vehicle use, garbage and dumping, and invasive plants (Service 2011e). Changes in the abundance of native plants because of invasive weeds can compromise the physiological health of desert tortoises, making them more vulnerable to drought, disease, and predation. The spatial decision support system allows us to map threats across the range of the desert tortoise and model the intensity of stresses that these multiple and combined threats place on desert tortoise populations.

The threats described in the listing rule and both recovery plans continue to affect the species. Indirect impacts to desert tortoise populations and habitat occur in accessible areas that interface with human activity. Most threats to the desert tortoise or its habitat are associated with human land uses; research since 1994 has clarified many mechanisms by which these threats act on desert tortoises. As stated earlier, increases in human access can accelerate illegal collection and release of desert tortoises and deliberate maiming and killing, as well as facilitate the spread of other threats associated with human presence, such as vehicle use, garbage and dumping, and invasive weeds.

Some of the most apparent threats to the desert tortoise are those that result in mortality and permanent habitat loss across large areas, such as urbanization and large-scale renewable energy projects, and those that fragment and degrade habitats, such as proliferation of roads and highways, OHV activity, and habitat invasion by non-native invasive plant species. However, we remain unable to quantify how threats affect desert tortoise populations. The assessment of the original recovery plan emphasized the need for a better understanding of the implications of multiple, simultaneous threats facing desert tortoise populations and of the relative contribution of multiple threats on demographic factors (i.e., birth rate, survivorship, fecundity, and death rate; Tracy et al. 2004).

We have enclosed a map that depicts the 12 critical habitat units of the desert tortoise and the aggregate stress that multiple, synergistic threats place on desert tortoise populations (Appendix 2). The map also depicts linkages between conservation areas for the desert tortoise (which include designated critical habitat) recommended in the revised recovery plan (Service 2011e) that are based on an analysis of least-cost pathways (i.e., areas with the highest potential to support desert tortoises) between conservation areas for the desert tortoise. This map illustrates that areas under the highest level of conservation management for desert tortoises remain subjected to numerous threats and stresses. This indicates that current conservation actions for the desert tortoise are not substantially reducing mortality sources for the desert tortoise across its range.

Since the completion of the 5-year review, the Service has issued several biological opinions that affect large areas of desert tortoise habitat because of numerous proposals to develop renewable energy within its range. These biological opinions concluded that proposed solar plants were not likely to jeopardize the continued existence of the desert tortoise primarily because they were located outside of critical habitat and DWMAs that contain most of the land base required for the recovery of the species. The proposed actions also included numerous measures intended to protect desert tortoises during the construction of the projects, such as translocation of affected individuals. Additionally, the Bureau and California Energy Commission, the agencies permitting these facilities, have required the project proponents to fund numerous measures, such as land acquisition and the implementation of recovery actions intended to offset the adverse effects of the proposed actions. In aggregate, these projects resulted in an overall loss of approximately 30,180 acres of habitat of the desert tortoise; three of the projects (BrightSource Ivanpah, Stateline Nevada, and Desert Sunlight) constricted linkages between conservation areas that are important for the recovery of the desert tortoise. We also predicted that these projects would translocate, injure, or kill up to 1,621 desert tortoises (see table below); we concluded that most of the individuals in these totals would be juveniles. The mitigation required by the Bureau and California Energy Commission will result in the acquisition of private land within critical habitat and DWMAs and funding for the implementation of various actions that are intended to promote the recovery of the desert tortoise; at this time, we cannot assess how successful these measures will be.

Table 2 summarizes information regarding the proposed solar projects that have undergone formal consultation with regard to the desert tortoise. Data are from Service (2010e [Chevron Lucerne Valley], f [Calico], g [Genesis], h [Blythe]; 2011f [BrightSource Ivanpah], g [Desert Sunlight], h [Abengoa Harper Lake], i [Palen]; and Burroughs (2012; Nevada projects). Projects are in California, unless noted.

Table 2. The number of desert tortoises and acreage of habitat for solar projects having undergone formal consultation.

Project	**Acres of Desert Tortoise Habitat**	**Estimated Number of Desert Tortoises Onsite**	**Recovery Unit**
BrightSource Ivanpah	3,582	1,136	Eastern Mojave
Stateline Nevada - NV	2,966	123	Eastern Mojave
Amargosa Farm Road - NV	4,350	4	Eastern Mojave
Calico*			Western Mojave
Abengoa Harper Lake	Primarily in abandoned agricultural fields	4	Western Mojave
Chevron Lucerne Valley	516	10	Western Mojave
Nevada Solar One - NV	400	**	Northeastern Mojave
Copper Mountain North - NV	1,400	30 **	Northeastern Mojave
Copper Mountain - NV	380	**	Northeastern Mojave
Moapa K Road Solar - NV	2,152	202	Northeastern Mojave

Genesis	1,774	8	Colorado
Blythe	6,958	30	Colorado
Palen	1,698	18	Colorado
Desert Sunlight	4,004	56	Colorado
Total	30,180	1,621	

* The applicant has proposed changes to the proposed action; the Bureau has re-initiated formal consultation with the Service, pursuant to section 7(a)(2) of the Endangered Species Act, as part of its re-evaluation of the project (Service 2012e)
** These projects occurred under the Clark County Multi-species habitat conservation plan; we estimate that all three projects combined will affect fewer than 30 desert tortoises.

In addition to the biological opinions issued for solar development within the range of the desert tortoise, the Service (2012c) also issued a biological opinion to the Department of the Army for the use of additional training lands at Fort Irwin. As part of this proposed action, the Army removed approximately 650 desert tortoises from 18,197 acres of the southern area of Fort Irwin, which had been off-limits to training. The Army would also use an additional 48,629 acres that lie east of the former boundaries of Fort Irwin; much of this parcel is either too mountainous or too rocky and low in elevation to support numerous desert tortoises.

As the Service notes in the 5-year review (Service 2010b), "(t)he threats identified in the original listing rule continue to affect the (desert tortoise) today, with invasive species, wildfire, and renewable energy development coming to the forefront as important factors in habitat loss and conversion. The vast majority of threats to the desert tortoise or its habitat are associated with human land uses." Oftedal's work (2002 in Service 2010b) suggests that invasive weeds may adversely affect the physiological health of desert tortoises. Modeling with the spatial decision support system indicates that invasive species likely affect a large portion of the desert tortoise's range; see Appendix 3. Furthermore, high densities of weedy species increase the likelihood of wildfires; wildfires, in turn, destroy native species and further the spread of invasive weeds.

Global climate change is likely to affect the prospects for the long-term conservation of the desert tortoise. For example, predictions for climate change within the range of the desert tortoise suggest more frequent and/or prolonged droughts with an increase of the annual mean temperature by 3.5 to 4.0 degrees Celsius. The greatest increases will likely occur in summer (June-July-August mean increase of as much as 5 degrees Celsius [Christensen et al. 2007 in Service 2010b]). Precipitation will likely decrease by 5 to 15 percent annually in the region, with winter precipitation decreasing by up to 20 percent and summer precipitation increasing by 5 percent. Because germination of the desert tortoise's food plants is highly dependent on cool-season rains, the forage base could be reduced due to increasing temperatures and decreasing precipitation in winter. Although drought occurs routinely in the Mojave Desert, extended periods of drought have the potential to affect desert tortoises and their habitats through physiological effects to individuals (i.e., stress) and limited forage availability. To place the consequences of long-term drought in perspective, Longshore et al. (2003) demonstrated that even short-term drought could result in elevated levels of mortality of desert tortoises. Therefore, long-term drought is likely to have even greater effects, particularly given that the current fragmented nature of desert tortoise habitat (e.g., urban and agricultural development, highways, freeways, military training areas, etc.) will make recolonization of extirpated areas difficult, if not impossible.

The Service notes in the 5-year review that the combination of the desert tortoise's late breeding age and a low reproductive rate challenges our ability to achieve recovery. When determining whether a proposed action is likely to jeopardize the continued existence of a species, we are required to consider whether the action would "reasonably be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species (50 Code of Federal Regulations 402.02). Although the Service does not explicitly address these metrics in the 5-year review, we have used the information in that document to summarize the status of the desert tortoise with respect to its reproduction, numbers, and distribution.

In the 5-year review, the Service notes that desert tortoises increase their reproduction in high rainfall years; more rain provides desert tortoises with more high quality food (i.e., plants that are higher in water and protein), which, in turn, allows them to lay more eggs. Conversely, the physiological stress associated with foraging on food plants with insufficient water and nitrogen may leave desert tortoises vulnerable to disease (Oftedal 2002 in Service 2010b), and the reproductive rate of diseased desert tortoises is likely lower than that of healthy animals. Young desert tortoises also rely upon high-quality, low-fiber plants (e.g., native forbs) with nutrient levels not found in the invasive weeds that have increased in abundance across its range (Oftedal et al. 2002; Tracy et al. 2004). Compromised nutrition of young desert tortoises likely represents an effective reduction in reproduction by reducing the number that reaches adulthood. Consequently, although we do not have quantitative data that show a direct relationship, the abundance of weedy species within the range of the desert tortoise has the potential to negatively affect the reproduction of desert tortoises and recruitment into the adult population.

Data from long-term study plots, which were first established in 1976, cannot be extrapolated to provide an estimate of the number of desert tortoises on a range-wide basis; however, these data indicate, "appreciable declines at the local level in many areas, which coupled with other survey results, suggest that declines may have occurred more broadly" (Service 2010b). Other sources indicate that local declines are continuing to occur. For example, surveyors found "lots of dead [desert tortoises]" in the western expansion area of Fort Irwin (Western Mojave Recovery Unit) in 2008 (Fort Irwin Research Coordination Meeting 2008). After the onset of translocation, coyotes killed 105 desert tortoises in Fort Irwin's southern translocation area (Western Mojave Recovery Unit); other canids may have been responsible for some of these deaths. Other incidences of predation were recorded throughout the range of the desert tortoise during this time (Esque et al. 2010). Esque et al. (2010) hypothesized that this high rate of predation on desert tortoises was influenced by low population levels of typical prey for coyotes due to drought conditions in previous years. Recent surveys in the Ivanpah Valley (Northeastern Mojave Recovery Unit) for a proposed solar facility detected 31 live desert tortoises and the carcasses of 25 individuals that had been dead less than 4 years (Ironwood 2011); this ratio of carcasses to live individuals over such a short period of time may indicate an abnormally high rate of mortality for a long-lived animal. In summary, the number of desert tortoises range-wide likely decreased substantially from 1976 through 1990 (i.e., when long-term study plots were initiated through the time the desert tortoise was listed as threatened), although we cannot quantify the amount of this decrease. Additionally, more recent data collected from various sources throughout the range of the desert tortoise suggest that local declines continue to occur (e.g., Bureau et al. 2005, Esque et al. 2010).

The distribution of the desert tortoise has not changed substantially since the publication of the original recovery plan in 1994 (Service 2010b) in terms of the overall extent of its range. Prior to 1994, desert tortoises were extirpated from large areas within their distributional limits by urban and agricultural development (e.g., the cities of Barstow, Lancaster, Las Vegas, St. George, etc.; agricultural areas south of Edwards Air Force Base and east of Barstow), military training (e.g., Fort Irwin, Leach Lake Gunnery Range), and off-road vehicle use (e.g., portions of off-road management areas managed by the Bureau and unauthorized use in areas such as east of California City). Since 1994, urban development around Las Vegas has likely been the largest contributor to habitat loss throughout the range. Desert tortoises have been essentially removed from the 18,197-acre southern expansion area at Fort Irwin (Service 2012c).

Table 3 depicts acreages of habitat (as modeled by Nussear et al. 2009) within various regions of the desert tortoise's range and of impervious surfaces as of 2006 (Xian et al. 2009). Impervious surfaces include paved and developed areas and other disturbed areas that have zero probability of supporting desert tortoises.

Table 3. Acreage of modeled desert tortoise habitat (Nussear et al. 2009) and impervious surfaces therein (Xian et al. 2009.

Regions1	Modeled Habitat (acres)	Impervious Surfaces within Modeled Habitat	Percent of Modeled Habitat that is now Impervious
Western Mojave	7,582,092	1,864,214	25
Colorado Desert	4,948,900	494,981	10
Northeast Mojave	7,776,934	1,173,025	15
Upper Virgin River	232,320	80,853	35
Total	20,540,246	3,613,052	18

[1]The regions do not correspond to recovery unit boundaries; we used a more general separation of the range for this illustration.

On an annual basis, the Service produces a report that provides an up-to-date summary of the factors that were responsible for the listing of the species, describes other threats of which we are aware, describes the current population trend of the species, and includes comments of the year's findings. The Service's (2011d) recovery data call report describes the desert tortoise's status as 'declining,' and notes that "(a)nnual range-wide monitoring continues, but the life history of the desert tortoise makes it impossible to detect annual population increases (continued monitoring will provide estimates of moderate- to long-term population trends). Data from the monitoring program do not indicate that numbers of desert tortoises have increased since 2001. The fact that most threats appear to be continuing at generally the same levels suggests that populations are still in decline. Information remains unavailable on whether mitigation of particular threats has been successful."

In conclusion, we have used the 5-year review (Service 2010b), revised recovery plan (Service 2011e), and additional information that has become available since these publications to review the reproduction, numbers, and distribution of the desert tortoise. The reproductive capacity of the desert tortoise may be compromised to some degree by the abundance and distribution of invasive weeds across its range; the continued increase in human access across the desert likely continues to facilitate the spread of weeds and further affect the reproductive capacity of the species. Prior to its listing, the number of desert tortoises likely declined range-wide, although we cannot quantify the extent of the decline; since the time of listing, data suggest that declines have occurred in local areas throughout the range. The continued increase in human access across the desert continues to expose more desert tortoises to the potential of being killed by human activities. The distributional limits of the desert tortoise's range have not changed substantially since the issuance of the original recovery plan in 1994; however, desert tortoises have been extirpated from large areas within their range (e.g., Las Vegas, other desert cities). The species' low reproductive rate, the extended time required for young animals to reach breeding age, and the multitude of threats that continue to confront desert tortoises combine to render its recovery a substantial challenge.

Status of Critical Habitat of the Desert Tortoise

The Service designated critical habitat for the desert tortoise in portions of California, Nevada, Arizona, and Utah in a final rule published February 8, 1994 (59 Federal Register 5820). The Service designates critical habitat to identify the key biological and physical needs of the species and key areas for recovery and to focus conservation actions on those areas. Critical habitat is composed of specific geographic areas that contain the biological and physical features essential to the species' conservation and that may require special management considerations or protection. These features, which include space, food, water, nutrition, cover, shelter, reproductive sites, and special habitats, are called the primary constituent elements of critical habitat. The specific primary constituent elements of desert tortoise critical habitat are: sufficient space to support viable populations within each of the six recovery units and to provide for movement, dispersal, and gene flow; sufficient quality and quantity of forage species and the proper soil conditions to provide for the growth of these species; suitable substrates for burrowing, nesting, and overwintering; burrows, caliche caves, and other shelter sites; sufficient vegetation for shelter from temperature extremes and predators; and habitat protected from disturbance and human-caused mortality.

Critical habitat of the desert tortoise would not be able to fulfill its conservation role without each of the primary constituent elements being functional. As examples, having a sufficient amount of forage species is not sufficient if human-caused mortality is excessive; an area with sufficient space to support viable populations within each of the six recovery units and to provide for movement, dispersal, and gene flow would not support desert tortoises without adequate forage species.

The final rule for designation of critical habitat did not explicitly ascribe specific conservation roles or functions to the various critical habitat units. Rather, it refers to the strategy of establishing recovery units and DWMAs recommended by the recovery plan for the desert tortoise, which had been published as a draft at the time of the designation of critical habitat, to capture the “biotic and abiotic variability found in desert tortoise habitat” (59 Federal Register 5820, see page 5823). Specifically, we designated the critical habitat units to follow the direction provided by the draft recovery plan (Service 1993a) for the establishment of DWMAs. The critical habitat units in aggregate are intended to protect the variability that occurs across the large range of the desert tortoise; the loss of any specific unit would compromise the ability of critical habitat as a whole to serve its intended function and conservation role.

Despite the fact that desert tortoises do not necessarily need to move between critical habitat units to complete their life histories, both the original and revised recovery plans highlight the importance of these critical habitat units and connectivity between them for the recovery of the species. Specifically, the revised recovery plan states that “aggressive management as generally recommended in the 1994 Recovery Plan needs to be applied within existing (desert) tortoise conservation areas (defined as critical habitat, among other areas being managed for the conservation of desert tortoises) or other important areas … to ensure that populations remain distributed throughout the species’ range …. (Desert tortoise) conservation areas capture the diversity of the Mojave population of the desert tortoise within each recovery unit, conserving the genetic breadth of the species, providing a margin of safety for the species to withstand catastrophic events, and providing potential opportunities for continued evolution and adaptive change …. Especially given uncertainties related to the effects of climate change on desert tortoise populations and distribution, we consider (desert) tortoise conservation areas to be the minimum baseline within which to focus our recovery efforts (pages 34 and 35, Service 2011e).”

The 12 critical habitat units range in area from 85 to 1,595 square miles. However, the optimal reserve size recommended to preserve viable desert tortoise populations was 1,000 square miles (Service 1994); only four critical habitat units meet this threshold. Consequently, for some smaller critical habitat units, their future effectiveness in conserving the desert tortoise is largely dependent on the status of populations immediately adjacent to their boundaries or within intervening linkages that connect these smaller critical habitat units to other protected areas. Although the Service (1994) recommended the identification of buffer zones and linkages for smaller desert tortoise conservation areas, land management agencies have generally not established such areas.

Population viability analyses indicate that reserves should contain from 10,000 to 20,000 adult desert tortoises to maximize estimated time to extinction (i.e., 390 years or so, depending on rates of population change; Service 1994). However, during the three most recent years of monitoring within the critical habitat units, only three (in 2009 and 2010) to five (in 2008) of the critical habitat units met this target (McLuckie et al. 2010; Service 2010c, 2010d). Some critical habitat units share boundaries and form contiguous blocks (e.g. Superior-Cronese and Fremont-Kramer Critical Habitat Units), and those blocks in California include combined estimated abundances of over 10,000 adult desert tortoises. These blocks are adjacent to smaller, more isolated units (e.g., Ord-Rodman Critical Habitat Unit) that are not currently connected to other protected habitat by preserved habitat linkages.

We did not designate the Desert Tortoise Natural Area and Joshua Tree National Park in California and the Desert National Wildlife Refuge in Nevada as critical habitat because they are “primarily managed as natural ecosystems” (59 Federal Register 5820, see page 5825) and provide adequate protection to desert tortoises. Since the designation of critical habitat, Congress increased the size of Joshua Tree National Park and created the Mojave National Preserve. A portion of the expanded boundary of Joshua Tree National Park lies within critical habitat of the desert tortoise; portions of other critical habitat units lie within the boundaries of the Mojave National Preserve.

Within each critical habitat unit, both natural and anthropogenic factors affect the function of the primary constituent elements of critical habitat. As an example of a natural factor, in some specific areas within the boundaries of critical habitat, such as within and adjacent to dry lakes, some of the primary constituent elements are naturally absent because the substrate is extremely silty; desert tortoises do not normally reside in such areas. Comparing the acreage of desert tortoise habitat as depicted by Nussear et al.'s (2009) model to the gross acreage of the critical habitat units demonstrates quantitatively that the entire area within the boundaries of critical habitat likely does not support the primary constituent elements (Table 4). The acreage for modeled habitat is for the area in which the probability that desert tortoises are present is greater than 0.5. The acreages of modeled habitat are from Service (2010b); they do not include loss of habitat due to human-caused impacts. The difference between gross acreage and modeled habitat is 653,214 acres; that is, approximately 10 percent of the gross acreage of the designated critical habitat is not considered modeled habitat.

Table 4. Gross acreages of critical habitat units and of modeled desert tortoise habitat within the critical habitat units (Nussear et al. 2009).

Critical Habitat Unit	**Gross Acreage**	**Modeled Habitat**
Superior-Cronese	766,900	724,967
Fremont-Kramer	518,000	501,095
Ord-Rodman	253,200	184,155
Pinto Mountain	171,700	144,056
Piute-Eldorado	970,600	930,008
Ivanpah Valley	632,400	510,711
Chuckwalla	1,020,600	809,319
Chemehuevi	937,400	914,505
Gold Butte-Pakoon	488,300	418,189
Mormon Mesa	427,900	407,041
Beaver Dam Slope	204,600	202,499
Upper Virgin River	54,600	46,441
Totals	6,446,200	5,792,986

Condition of the Primary Constituent Elements of Critical Habitat

Human activities can have obvious or more subtle effects on the primary constituent elements. The grading of an area and subsequent construction of a building removes the primary constituent elements of critical habitat; this action has an obvious effect on critical habitat. The revised recovery plan identifies human activities such as urbanization and the proliferation of roads and highways as threats to the desert tortoise and its habitat; these threats are examples of activities that have a clear effect on the primary constituent elements of critical habitat.

We have included the following paragraphs from the revised recovery plan for the desert tortoise (Service 2011e) to demonstrate that other anthropogenic factors affect the primary constituent elements of critical habitat in more subtle ways. All references are in the revised recovery plan (i.e., in Service 2011e); we have omitted some information from the revised recovery plan where the level of detail was unnecessary for the current discussion.

> Surface disturbance from OHV activity can cause erosion and large amounts of dust to be discharged into the air. Recent studies on surface dust impacts on gas exchanges in Mojave Desert shrubs showed that plants encrusted by dust have reduced photosynthesis and decreased water-use efficiency, which may decrease primary production during seasons when photosynthesis occurs (Sharifi et al. 1997). Sharifi et al. (1997) also showed reduction in maximum leaf conductance, transpiration, and water-use efficiency due to dust. Leaf and stem temperatures were also shown to be higher in plants with leaf-surface dust. These effects may also impact desert annuals, an important food source for [desert] tortoises.
>
> OHV activity can also disturb fragile cyanobacterial-lichen soil crusts, a dominant source of nitrogen in desert ecosystems (Belnap 1996). Belnap (1996) showed that anthropogenic surface disturbances may have serious implications for nitrogen budgets in cold desert ecosystems, and this may also hold true for the hot deserts that [desert] tortoises occupy. Soil crusts also appear to be an important source of water for plants, as crusts were shown to have 53 percent greater volumetric water content than bare soils during the late fall when winter annuals are becoming established (DeFalco et al. 2001). DeFalco et al. (2001) found that non-native plant species comprised greater shoot biomass on crusted soils than native species, which demonstrates their ability to exploit available nutrient and water resources. Once the soil crusts are disturbed, non-native plants may colonize, become established, and out-compete native perennial and annual plant species (DeFalco et al. 2001, D'Antonio and Vitousek 1992). Invasion of non-native plants can affect the quality and quantity of plant foods available to desert tortoises. Increased presence of invasive plants can also contribute to increased fire frequency.
>
> Proliferation of invasive plants is increasing in the Mojave and Sonoran deserts and is recognized as a substantial threat to desert tortoise habitat. Many species of non-native plants from Europe and Asia have become common to abundant in some areas, particularly where disturbance has occurred and is ongoing. As non-native plant species become established, native perennial and annual plant species may decrease, diminish, or die out (D'Antonio and Vitousek 1992). Land managers and field scientists identified 116 species of non-native plants in the Mojave and Colorado deserts (Brooks and Esque 2002).
>
> Increased levels of atmospheric pollution and nitrogen deposition related to increased human presence and combustion of fossil fuels can cause increased levels of soil nitrogen, which in turn may result in significant changes in plant communities (Aber et al. 1989). Many of the non-native annual plant taxa in the Mojave region evolved in more fertile Mediterranean regions and benefit from increased levels of soil nitrogen, which gives them a competitive edge over native annuals. Studies at three sites within the central, southern, and western Mojave Desert indicated that increased levels of soil nitrogen can increase the dominance of non-native annual plants and promote the invasion of new species in desert regions.

Furthermore, increased dominance by non-native annuals may decrease the diversity of native annual plants, and increased biomass of non-native annual grasses may increase fire frequency (Brooks 2003).

This summary from the revised recovery plan (Service 2011e) demonstrates how the effects of human activities on habitat of the desert tortoise are interconnected. In general, surface disturbance causes increased rates of erosion and generation of dust. Increased erosion alters additional habitat outside of the area directly affected by altering the nature of the substrate, removing shrubs, and possibly destroying burrows and other shelter sites. Increased dust affects photosynthesis in the plants that provide cover and forage to desert tortoises. Disturbed substrates and increased atmospheric nitrogen enhance the likelihood that invasive species will become established and outcompete native species; the proliferation of weedy species increases the risk of large-scale fires, which further move habitat conditions away from those that are favorable to desert tortoises.

The following paragraphs generally describe how the threats described in the revised recovery plan affect the primary constituent elements of critical habitat of the desert tortoise.

Sufficient space to support viable populations within each of the six recovery units and to provide for movement, dispersal, and gene flow.

In considering the following discussion, bear in mind the information provided previously in this biological opinion regarding the recommended and actual sizes of critical habitat units for the desert tortoise. The original recovery team based the recommended size of DWMAs on the amount of space required to maintain viable populations. (The recovery plan [Service 1994] defined conservation areas for the desert tortoise as 'DWMAs;' we based the boundaries of critical habitat on the recovery team's general recommendation for the DWMAs.) The current low densities of desert tortoises within critical habitat units exacerbate the difficulties of effecting recovery within these areas.

Urban and agricultural development, concentrated use by off-road vehicles, and other activities of this nature completely remove habitat. Although we are aware of local areas within the boundaries of critical habitat that have been heavily disturbed, we do not know of any areas that have been disturbed to the intensity and extent that this primary constituent element has been compromised. To date, the largest single loss of critical habitat is the use of 18,197 acres of additional training land in the southern portion of Fort Irwin. In our biological opinion for that proposed action (Service 2012c), we stated:

> The proposed action would essentially eliminate the primary constituent elements from approximately 2.40 percent of the Superior-Cronese Critical Habitat Unit; additionally, the conservation role of the remainder of this critical habitat unit and the other critical habitat units has been compromised by substantial human impact on the second and sixth primary constituent elements. However, the conservation measures that the Army implemented as part of the proposed action offset, at least to some extent, the adverse effects of the use of the additional training lands in the southern expansion area. Consequently, we have concluded that, although the second and sixth primary constituent

> elements are not functioning appropriately throughout most of designated critical habitat of the desert tortoise and the proposed action would result in substantial disturbance to 18,197 acres of the Superior-Cronese Critical Habitat Unit, the change in the condition of critical habitat brought about by the Army's proposed action (i.e., use of the southern expansion area for training and implementation of the conservation actions) is not likely to cause an overall decrease in the conservation value and function of the Superior-Cronese Critical Habitat Unit.

The widening of existing freeways likely caused the second largest loss of critical habitat. Despite these losses of critical habitat, which occur in a linear manner, the critical habitat units continue to support sufficient space to support viable populations within each of the six recovery units.
In some cases, major roads likely disrupt the movement, dispersal, and gene flow of desert tortoises. Highways 58 and 395 in the Fremont-Kramer Critical Habitat Unit and Fort Irwin Road in the Superior-Cronese Critical Habitat Unit are examples of large and heavily travelled roads that likely disrupt movement, dispersal, and gene flow. Roads that have been fenced and provided with underpasses may alleviate this fragmentation to some degree; however, such facilities have not been in place for sufficient time to determine whether they will eliminate fragmentation.

The threats of invasive plant species described in the revised recovery plan generally do not result in the removal of this primary constituent element because they do not convert habitat into impervious surfaces, as would urban development.

<u>Sufficient quality and quantity of forage species and the proper soil conditions to provide for the growth of these species</u>.

This primary constituent element addresses the ability of critical habitat to provide adequate nutrition to desert tortoises. As described in the revised recovery plan and 5-year review, grazing, historical fire, invasive plants, altered hydrology, drought, wildfire potential, fugitive dust, and climate change/temperature extremes contribute to the stress of "nutritional compromise." Paved and unpaved roads through critical habitat of the desert tortoise provide avenues by which invasive native species disperse; these legal routes also provide the means by which unauthorized use occurs over large areas of critical habitat. Nitrogen deposition from atmospheric pollution likely occurs throughout all of the critical habitat units and exacerbates the effects of the disturbance of substrates. Because paved and unpaved roads are so widespread through critical habitat, this threat has compromised the conservation value and function of critical habitat throughout the range of the desert tortoise, to some degree. Appendix 3 depicts the routes by which invasive weeds have access to critical habitat; the routes shown on this map are a subset of the actual number of routes that actually cross critical habitat of the desert tortoise.

<u>Suitable substrates for burrowing, nesting, and overwintering</u>.

Surface disturbance, motor vehicles traveling off route, use of OHV management areas, OHV events, unpaved roads, grazing, historical fire, wildfire potential, altered hydrology, and climate change leading to shifts in habitat composition and location, storms, and flooding can alter substrates to the extent that they are no longer suitable for burrowing, nesting, and overwintering. Erosion caused by these activities can alter washes to the extent that desert tortoise burrows placed along the edge of a wash, which is a preferred location for burrows, could be destroyed. We expect that the area within critical habitat that is affected by off-road vehicle use to the extent that substrates are no longer suitable is relatively small in relation to the area that desert tortoises have available for burrowing, nesting, and overwintering; consequently, off-road vehicle use has not had a substantial effect on this primary constituent element.

Most livestock allotments have been eliminated from within the boundaries of critical habitat. Of those that remain, livestock would compact substrates to the extent that they would become unsuitable for burrowing, nesting, and overwintering only in areas of concentrated use, such as around watering areas and corrals. Because livestock grazing occurs over a relatively small portion of critical habitat and the substrates in most areas within livestock allotments would not be substantially affected, suitable substrates for burrowing, nesting, and overwintering remain throughout most of the critical habitat units.

Burrows, caliche caves, and other shelter sites.

Human-caused effects to burrows, caliche caves, and other shelter sites likely occur at a similar rate as effects to substrates for burrowing, nesting, and overwintering for the same general reasons. Consequently, sufficient burrows, caliche caves, and other shelter sites remain throughout most of the critical habitat units.

Sufficient vegetation for shelter from temperature extremes and predators.

In general, sufficient vegetation for shelter from temperature extremes and predators remains throughout critical habitat. In areas where large fires have occurred in critical habitat, many of the shrubs that provide shelter from temperature extremes and predators have been destroyed; in such areas, cover sites may be a limiting factor. The proliferation of invasive plants poses a threat to shrub cover throughout critical habitat as the potential for larger and more frequent wildfires increases.

In 2005, wildfires in Nevada, Utah, and Arizona burned extensive areas of critical habitat (Service 2010b). Although different agencies report slightly different acreages, table 5 provides an indication of the scale of the fires.

Table 5. Acreage of critical habitat units that burned in 2005 (Service 2010b).

Critical Habitat Unit	**Total Area Burned (acres)**	**Percent of the Critical Habitat Unit Burned**
Beaver Dam Slope	53,528	26
Gold-Butte Pakoon	65,339	13
Mormon Mesa	12,952	3
Upper Virgin River	10,557	19

The revised recovery plan notes that the fires caused statistically significant losses of perennial plant cover, although patches of unburned shrubs remained. Given the patchiness with which the primary constituent elements of critical habitat are distributed across the critical habitat units and the varying intensity of the wildfires, we cannot quantify precisely the extent to which these fires disrupted the function and value of the critical habitat.

Habitat protected from disturbance and human-caused mortality.

In general, the Federal agencies that manage lands within the boundaries of critical habitat have adopted land management plans that include implementation of some or all of the recommendations contained in the original recovery plan for the desert tortoise. (See pages 70 to 72 of Service 2010b.) To at least some degree, the adoption of these plans has resulted in the implementation of management actions that are likely to reduce the disturbance and human-caused mortality of desert tortoises. For example, these plans resulted in the designation of open routes of travel and the closure (and, in some cases, physical closure) of unauthorized routes. Numerous livestock allotments have been relinquished by the permittees; cattle no longer graze these allotments. Because of these planning efforts, the Bureau's record of decision included direction to withdraw some areas of critical habitat from mineral entry. Because of actions on the part of various agencies, many miles of highways and other paved roads have been fenced to prevent desert tortoises from wandering into traffic and being killed. The Service and other agencies of the Desert Managers Group in California are implementing a plan to remove common ravens that prey on desert tortoises and to undertake other actions that would reduce subsidies (i.e., food, water, sites for nesting, roosting, and perching, etc.) that facilitate their abundance in the California Desert (Service 2008b).

Despite the implementation of these actions, disturbance and human-caused mortality continue to occur in many areas of critical habitat (which overlap the DWMAs for the most part and are the management units for which most data are collected) to the extent that the conservation value and function of critical habitat is, to some degree, compromised. For example, many highways and other paved roads in California remain unfenced. Twelve desert tortoises were reported to be killed on paved roads from within Mojave National Preserve in 2011, and we fully expect that desert tortoises are being killed at similar rates on many other roads, although these occurrences are not discovered and reported as diligently as by the National Park Service. Employees of the Southern California Gas Company reported two desert tortoises in 2011 that were crushed by vehicles on unpaved roads.

Unauthorized off-road vehicle use continues to disturb habitat and result in loss of vegetation within the boundaries of critical habitat (e.g., Coolgardie Mesa in the Western Mojave Recovery Unit); although we have not documented the death of desert tortoises as a direct result of this activity, it likely occurs. Additionally, the habitat disturbance caused by this unauthorized activity exacerbates the spread of invasive plants, which displace native plants that are important forage for the desert tortoise, thereby increasing the physiological stress faced by desert tortoises.

Although the Bureau has approved, through its land use planning processes, the withdrawal of areas of critical habitat from mineral entry, it has not undertaken the administrative procedures to complete withdrawals in all areas. Absent this withdrawal, new mining claims can be filed and further disturbance of critical habitat could occur.

Finally, the Bureau has not allowed the development of solar power plants on public lands within the boundaries of its DWMAs (which largely correspond to the boundaries of critical habitat). Conversely, the County of San Bernardino is considering the approval of the construction and operation of at least two such facilities within the boundaries of the Superior-Cronese Critical Habitat Unit north of Interstate 15 near the Minneola Road exit.

Summary of the Status of Critical Habitat of the Desert Tortoise

As noted in the revised recovery plan for the desert tortoise and 5-year review (Service 2011e, 2010c), critical habitat of the desert tortoise is subject to landscape level impacts in addition to the site-specific effects of individual human activities. On the landscape level, atmospheric pollution is increasing the level of nitrogen in desert substrates; the increased nitrogen exacerbates the spread of invasive plants, which outcompete the native plants necessary for desert tortoises to survive. As invasive plants increase in abundance, the threat of large wildfires increases; wildfires have the potential to convert the shrubland-native annual plant communities upon which desert tortoises depend to a community with fewer shrubs and more invasive plants. In such a community, shelter and forage would be more difficult for desert tortoises to find.

Invasive plants have already compromised the conservation value and function of critical habitat to some degree with regard to the second primary constituent element (i.e., sufficient quality and quantity of forage species and the proper soil conditions to provide for the growth of these species). These effects likely extend to the entirety of critical habitat, given the numerous routes by which invasive plants can access critical habitat and the large spatial extent that is subject to nitrogen from atmospheric pollution. Appendix 3 demonstrates the extent of the threat of invasive plants; Appendix 2 illustrates the 12 critical habitat units of the desert tortoise and the aggregate stress that multiple threats, including invasive plants, place on critical habitat.

Critical habitat has been compromised to some degree with regard to the last primary constituent element (i.e., habitat protected from disturbance and human-caused mortality) as a result of the wide variety of human activities that continues to occur within its boundaries. These effects result from the implementation of discrete human activities and are thus more site-specific in nature.

Although the remaining primary constituent elements have been affected to some degree by human activities, these impacts have not, to date, substantially compromised the conservation value and function of the critical habitat units. We have reached this conclusion primarily because the effects are localized and thus do not affect the conservation value and function of large areas of critical habitat.

Land managers have undertaken actions to improve the status of critical habitat. For example, as part of its efforts to offset the effects of the use of additional training maneuver lands at Fort Irwin (Service 2004), the Army acquired the private interests in the Harper Lake and Cronese Lakes allotments, which are located within critical habitat in the Western Mojave Recovery Unit;

as a result, cattle have been removed from these allotments. Livestock have been removed from numerous other allotments through various means throughout the range of the desert tortoise. The retirement of allotments assists in the recovery of the species by eliminating disturbance to the primary constituent elements of critical habitat by cattle and range improvements.

ENVIRONMENTAL BASELINE

Action Area

The implementing regulations for section 7(a)(2) of the Act define the "action area" as all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action (50 CFR 402.02). For the purposes of this biological opinion, we consider the action area to include all areas that the Marine Corps may affect through management of the RPAA, military training on the expanded installation, and desert tortoise translocation. The action area also includes those regions of California where the Marine Corps predicted OHV recreation displaced from the Johnson Valley Off-highway Vehicle Management Area was likely to occur.

In its biological assessment, the Marine Corps also included the "new and modified airspace, and adjacent surrounding lands in San Bernardino County, California that underlie the proposed airspace establishment" as part of its action area. We did not include that area in our biological opinion because the use of the airspace will not affect desert tortoises. (See Bowles et al. 1999).

The Marine Corps provided estimates of the amount of OHV displacement that is likely to occur following expansion of the MCAGCC installation and provided information on the locations likely to receive this displaced recreation (DoN 2011c); table 8 of that document provides a list of the sites that the Marine Corps evaluated. All of these sites are within the action area for this biological opinion; however, for various reasons, we have not included all of these areas in our discussions of the Environmental Baseline and Cumulative Effects sections of this biological opinion. The reasons for defining the extent of the action area are to determine the status of the listed species and critical habitat that would be affected by the proposed action and to assess the potential for cumulative effects, as defined at 50 Code of Federal Regulations 402.02.

We did not include discussions of areas outside of the range of the desert tortoise in the Environmental Baseline section because these areas have no bearing on the status of the desert tortoise or its critical habitat. We have also determined that lands outside of the range of the desert tortoise either do not support other federally listed species or their critical habitat or that consultation has been completed for areas that support listed species and critical habitat.

We did not include discussions of these areas in the Cumulative Effects section because these areas are either so distant from the range of the desert tortoise that future non-federal actions will not affect desert tortoises or their critical habitat or the areas are on Federal lands. Future actions on Federal lands would not be considered cumulative to the proposed action because the Federal action agency would be required to consult with us under the provisions of section 7(a)(2) of the Act.

Table 6 lists the areas for which we have not carried forward additional analysis in this biological opinion and describes the rationale for our determination.

Table 6. OHV areas excluded from further analysis in the Environmental Baseline and Cumulative Effects sections of the biological opinion.

Area of Displaced OHV Use	**General Location**	**Reasons for Not Including in the Environmental Baseline or Cumulative Effects Analysis**
Keyesville Special Recreation Management Area	Kern County, near lake Isabella	Not within or near habitat of desert tortoise. No listed species or critical habitat present.
Imperial Sand Dunes Off-highway Vehicle Management Area	Southeastern Imperial County	Desert tortoises, threatened Peirson's milk-vetch present in a portion of this OHV area. Effects of the amount of displaced use would be indistinguishable from current use.
Plaster City	Southwestern Imperial County	Not within habitat of any listed species.
Superstition Mountain	Southwestern Imperial County	Not within habitat of any listed species.
Lark Canyon OHV Area	Southeastern San Diego County	Not within habitat of any listed species.
Bureau's West Mojave Route System	San Bernardino, Inyo, and Kern Counties	Effects of the amount of displaced use would be indistinguishable from current use. Biological opinion is in place for the effects of casual use of the route system.
Devil's Canyon	Southwestern Imperial County	Consultation is in place for the effects of OHV use on the endangered Peninsular bighorn sheep.
Rowher Flat OHV Area	Angeles National Forest, Los Angeles County	Not within habitat of any listed species.
Azusa Canyon	Angeles National Forest, Los Angeles County	Threatened Santa Ana sucker and its critical habitat present in this OHV area. Effects of the amount of displaced use would be indistinguishable from current use. Biological opinion is in place for the effects of OHV use on the Santa Ana sucker and its critical habitat.
Wildomar OHV Area	Cleveland National Forest	Not within habitat of any listed species.

Corral Canyon OHV Area	Cleveland National Forest	Potentially within habitat of the endangered arroyo toad. Effects of the amount of displaced use would be indistinguishable from current use. Biological opinion is in place for the effects of OHV use on the arroyo toad.
Ortega Trail	Los Padres National Forest	Not within habitat of any listed species.
Ballinger Canyon	Los Padres National Forest	The endangered Kern mallow and threatened Kern primrose sphinx moth were recently found in this region. The endangered San Joaquin kit fox and giant kangaroo rat have been found just below the system on private lands in the upper Cuyama Valley. The Forest Service is in the process of developing a biological assessment for recreational use in this area. Effects of the amount of displaced use would likely be indistinguishable from current use.
Divide Peak OHV Route	Los Padres National Forest	The threatened California red-legged frog and its critical habitat are near this area but unlikely to be affected because OHV use is away from the river. Effects of the amount of displaced use would be indistinguishable from current use.
Pozo La Panza	Los Padres National Forest	Effects of the amount of displaced use would be indistinguishable from current use. The threatened purple amole is protected by an extensive pipe barrier system. Habitat of the California red-legged frog is not adjacent to any trail system.
Figueroa Mountain	Los Padres National Forest	The California red-legged frog occurs near this area but not along the OHV trail. Effects of the amount of displaced use would be indistinguishable from current use.
Big Bear Lake	San Bernardino National Forest	Several listed plant species, their critical habitat, and the southwestern willow flycatcher occur in this area. Biological opinions are in place for the effects of OHV use on these species. Effects of the amount of displaced use would be indistinguishable from current use.
Lake Arrowhead	San Bernardino National Forest	Not within habitat of any listed species.

Cleghorn OHV Trail	San Bernardino National Forest	Near habitat of the arroyo toad. Effects of the amount of displaced use would be indistinguishable from current use. Biological opinion is in place for the effects of OHV use on the arroyo toad.
Kennedy Meadows	Sequoia National Forest, Tulare County	Not within habitat of any listed species.
Ocotillo Wells SVRA	Eastern San Diego County	Not within habitat of any listed species.
Heber Dunes SVRA	Southern central Imperial County	Not within habitat of any listed species.
Hungry Valley SVRA	Northwestern Los Angeles County	Not within habitat of any listed species.
Oceano Dunes	Western San Luis Obispo County	Within habitat of several federally listed species. The increase in visitors would probably go unnoticed based on existing limits on the numbers of campers (1,000 registered campers) and daily visitors. California Department of Parks and Recreation has measures in place to reduce interactions between listed species and OHV/visitor use.

We based the discussion in the previous table on the analysis conducted by the Marine Corps (DoN 2011c). We acknowledge that OHV use that is displaced from the Johnson Valley Off-highway Vehicle Management Area may occur in more places than we have discussed herein. However, because of all of the unknown factors that are involved in predicting where displaced use may occur, we consider the information provided by the Marine Corps to be the best scientific and commercial data available, which is the standard required by our regulations (50 Code of Federal Regulations 402.14(d)). The likelihood also exists that, if displaced use occurred in additional areas than the ones identified by the Marine Corps, the use of even more sites would further dilute its effects on listed species and their critical habitat. Consequently, we will restrict our analysis to areas within the range of the desert tortoise that are likely to receive displaced OHV use.

We used the information provided by the Marine Corps along with baseline recreation data (Schiffer-Burdet 2012) and information on areas of historically above average OHV use (Bureau et al. 2005) to define the action area as it relates to OHV displacement. Table 7, which we have developed from several sources (DoN 2011a, 2011c, Karl and Henen 2011, and Bureau et al. 2005), provides information on the acreages of the various portions of the action area.

Table 7. Acreages of areas within the action area.

Areas to be Affected by Military Activities and Desert Tortoise Translocation[1]	
Existing Installation	**~598,000**
Exclusive Military Use Areas	~598,000
Special Use Areas-Category 1	29,900
Special Use Areas-Category 2	29,800
Sunshine Peak Translocation Areas	3,706
Alternate Translocation Areas (Emerson Lake and Bullion)	4,942
Southern Expansion Area	**21,304**
Exclusive Military Use	21,304
Special Use Areas (i.e., translocation areas) Category 1	2,935
Western Expansion Area	**146,667**
Exclusive Military Use	108,530
Special Use Areas (i.e., translocation areas) Category 1	12,015
RPAA	38,137
Ord-Rodman DWMA	**276,756**
Translocation Areas	19,199
Control Areas	494
Areas to be Affected by OHV Displacement	
Bureau of Land Management OHV Management Areas[2]	
Stoddard Valley	91,720
Remaining Portions of Johnson Valley and RPAA	141,042
El Mirage	30,080
Rasor	36,357
Spangler	100,480
Jawbone Canyon/Dove Springs	24,920
Illegal OHV Use Areas[3]	
California City/Rand Mountains	107,520
Edward Bowl (south of Edwards Air Force Base)	19,840
East Sierra (north of Dove Springs OHV Management Area)	8,960
Coyote Corner (areas south of Fort Irwin)	24,960
Silver Lakes (areas north of Helendale, south of Highway 58, east of Highway 395)	23,680
Hinkley (areas north and northwest of Barstow)	19,840

We have chosen to incorporate the unauthorized OHV use areas from Bureau et al. (2005) in the action area because the Marine Corps (DoN 2011c) has predicted that some displacement was likely to occur on private lands and in unauthorized areas. However, OHV displacement is not

[1] All values provided in acres. The acreages under each bold-faced acreage overlap; for example, the special use areas described for the existing installation are also included in the total acreage for the existing installation.
[2] Values include size of OHV management area and areas of above average unauthorized OHV recreation in adjacent areas (Bureau et al. 2005; Table 3-26).
[3] Based on *High OHV Use Areas* and *Residential Vehicle Impact Areas* in Table 3-26 and Map 3-14 from (Bureau et al. 2005).

likely to occur evenly across the western Mojave Desert; additionally, its displacement to private lands or unauthorized-use areas is likely to concentrate in locations historically used for these activities. Because the areas identified above are based on extensive surveys of the western Mojave Desert, they encompass discrete locations historically used for these activities, which are likely to receive some proportion of the predicted OHV displacement.

In the following sections, we discuss those aspects of the environmental baseline that are relevant to the analysis of effects associated with this consultation. We have organized each subsection in the Environmental Baseline based on the following geographic regions of the action area: 1) Existing MCAGCC installation and expansion areas, 2) Ord-Rodman DWMA, and 3) areas likely to be affected by OHV displacement areas. In instances where we have not provided information for one of these geographic regions, we have done so because the information is either already adequately considered in the Status of the Species section or we have determined that we do not require the information to analyze the effects of the proposed action.

Existing Conditions in the Action Area

In this section, we discuss the anthropogenic effects and natural conditions within the action area as they relate to desert tortoises and their habitat. Unless we have noted otherwise by citing a biological opinion, the anthropogenic conditions present in the action area were present prior to the listing of the desert tortoise. The following discussion includes only the biological opinions for major actions that have likely had a long-term effect on the status of the desert tortoise and its critical habitat within the action area.

Smaller projects have also occurred within the action area. We have not provided a list or analysis of the biological opinions that addressed these actions because they did not measurably influence the overall status of the desert tortoise or its critical habitat in the action area. These additional biological opinions are available upon request from the Ventura Fish and Wildlife Office.

Existing Installation

The Department of Defense manages the existing installation and currently uses it for military training activities similar to those discussed in the proposed action for this biological opinion. Approximately 27.5 percent of the 600,000-acre installation is unavailable for training due to rough terrain (Service 2002; 1-8-99-F-41) and approximately 60,000 acres are within SUAs where training activities are limited. The remaining portions of the base are open to military training. Approximately 30 percent of MCAGCC has experienced at least 25 percent shrub loss due to mission-related activities. Areas that have experienced this degree of disturbance but which have been otherwise undisturbed for 40 to 50 years have experienced only partial recovery at best (Marine Corps 1999b in Service 2002; 1-8-99-F-41). Woodman et al. (2001) also noted that surveys could not locate desert tortoises on 6.6 percent of the base, probably partially due to a large amount of vehicle activity and limited habitat in the northeastern portions of MCAGCC, where tortoise sign were not found. Another 18.9 percent of the base had substantially decreased desert tortoise abundance, probably partially due to vehicle activity (Woodman et al 2001, Henen

2012e). Figure 5-2 of the biological assessment (DoN 2011a) depicts the areas of heaviest vehicle use on the existing installation.

In 2002, we issued a biological opinion for base-wide operations (Service 2002; 1-8-99-F-41) that analyzed the effects of the current training activities. We concluded that military use has degraded, and will continue to degrade, habitat quality and likely cause further declines in the number of desert tortoises on MCAGCC. However, we determined that desert tortoises were likely to persist in low numbers on the installation and concluded that the ongoing military training on MCAGCC was not likely to jeopardize the continued existence of the desert tortoise because habitat and populations on MCAGCC were not key to the long-term survival and recovery of the species.

Expansion Areas

The proposed western expansion area occurs within the existing Johnson Valley Off-highway Vehicle Management Area (DoN 2011a). Bureau (1980) designated this area for intensive multiple uses under the California Desert Conservation Area (CDCA) Plan. Historically, the area was used for mining and livestock grazing (DoN 2011a), but the primary land use in recent decades has been OHV recreation with the highest concentrations of use in the central, southern, and southwestern portions of the proposed western expansion area (Stow 1988 in Bureau et al. 2005, DoN 2011a). The Bureau et al. (2005) estimated that above-average OHV disturbance occurred over 205 square miles of the Johnson Valley Off-highway Vehicle Management Area with an additional 91 square miles of unauthorized OHV disturbance occurring outside but in the immediate vicinity. DoN (2011a) estimated that areas of high disturbance (i.e., areas containing race routes used for large OHV events, designated OHV routes, and camping areas) and moderate disturbance (i.e., areas containing 3 to 5 routes and lower vehicle traffic; Karl 2010b, as noted in DoN 2011a) currently occur on 105 and 53 square miles of the western expansion area, respectively. The difference in the size of the area surveyed (i.e., entire OHV area versus western expansion area) likely accounts for the lower amount of disturbance identified by the Marine Corps. Given the rate at which desert habitats recover from disturbance, the apparent decrease in the amount of land disturbed between 2005 and 2011 is highly unlikely to be due to recovery of disturbed areas.

In the biological opinion for the Johnson Valley Off-highway Vehicle Area Management Plan (Service 1991; 1-6-90-F-39), we concluded that OHV use in this area was not likely to jeopardize the continued existence of the species. We reached this conclusion because large portions of the area were already compromised by existing impacts, the area was unlikely to contribute to long-term survival and recovery of the species, and concentration of OHV activity in these areas was likely to reduce these activities in other areas to the northwest that were considered important to the species. In that biological opinion, we anticipated the loss of 136,320 acres of desert tortoise habitat (already in various stages of deterioration) and the injury or mortality of 1,000 desert tortoises over the life of the management plan.

Bureau-managed cattle and ephemeral sheep grazing allotments also overlap portions of the western expansion area, but sheep grazing has not occurred in this area since 1992 (DoN 2011a). Cattle grazing currently occurs on the Ord Mountain allotment at low levels (approximately 25 head per year; Chavez 2012a). Most of this allotment lies within the Ord-Rodman DWMA but the southern portion extends into the western expansion area.

Transmission lines traverse the northern portion of the Johnson Valley Off-highway Vehicle Management Area (DoN 2011a; Bureau 2008). Several existing mining operations (e.g., Bessemer Mine) currently occur on private lands within the western expansion area (Bureau 2008).

Little activity is occurring in the southern expansion area with the exception of minor prospecting and limited dispersed recreational use (Karl 2010a).

Ord-Rodman DWMA

The proposed action would result in translocation of desert tortoises into the Ord-Rodman DWMA (DoN 2011a) and would result in displacement of OHV recreation that would also affect the DWMA. Although the Marine Corps and Bureau have proposed specific areas where these effects would occur, the following information is relevant to the DWMA as a whole. We consider this approach reasonable because we do not have site-specific information regarding the localized effects of many activities and desert tortoises and habitat conditions are not static.

Two livestock allotments lie within the boundaries of the Ord-Rodman DWMA (i.e., Ord Mountain, Valley Well). Large portions of the Ord Mountain Allotment are located at or above 4,000 feet in elevation (Bureau 2004). Luckenbach (1982) states that most desert tortoises reside at elevations between 1,000 and 3,000 feet; during range-wide monitoring, we have regularly found desert tortoises up to 4,000 feet, although they are most common between 1,300 and 2,800 feet in elevation (Allison 2012). Two key grazing areas on the allotment are located below 4,000 feet in elevation, but these areas have historically had grazing utilization levels that the Bureau would characterize as light to non-use (Service 2006c). Between 1990 and 2003, the number of head of cattle within the allotment ranged from 145 to 385. In 6 of those years, more than 300 head were present; less than 200 were present during 4 years (Service 2006c). Currently, only 25 head of cattle typically occur on the allotment (Chavez 2012a). The Valley Well Allotment covers 520 acres and is grazed by a few horses (Service 2007, 1-8-07-F-37R).

Unless otherwise noted, the information in the following paragraphs is from LaPre (2005 in Service 2006c). The Ord-Rodman DWMA contains three active utility corridors. Corridor G, which is 2 miles wide, lies along Interstate 40 at the northern boundary; one 30-inch pipeline is located in this corridor. Corridor D is 2 miles wide; it contains two 287-kilovolt power lines and one 500-kilovolt power line. Corridor H contains one 34-inch pipeline; it is 2 miles wide.

Several off-highway vehicle routes occur within the Ord-Rodman DWMA, which is situated between the Johnson Valley and Stoddard Valley Off-highway Vehicle Management Areas. The Western Mojave Off-Road Vehicle Designation Project, completed by the Bureau in June 2003, designated all routes as open, closed or limited in use within the DWMA (Service 2003). Unauthorized off-highway vehicle activity occurs in the western portion of the DWMA along Highway 247. Bureau et al. (2005) documented above-average OHV use within portions of the

Ord-Rodman DWMA. Most of this unauthorized use is associated with recreation that emanates from the Stoddard Valley and Johnson Valley Off-highway Vehicle Management Areas.

In the biological opinion for the Bureau's West Mojave Plan, we evaluated the effects of route designation and livestock grazing throughout the western Mojave Desert (Service 2006c; 1-8-03-F-58). We concluded that the proposed revisions to the CDCA Plan were not likely to jeopardize the continued existence of the desert tortoise or result in adverse modification or destruction of its critical habitat. We reached these conclusions primarily because most of the actions proposed by the Bureau would result in fewer effects to desert tortoises and their critical habitat than had occurred under the previous CDCA Plan.

Berry (1996) documented evidence of disease, poaching, and environmental contaminants at the Stoddard Valley permanent study plot in the northwestern portion of the DWMA. Common ravens and feral or free-ranging dogs have also killed desert tortoises at the Lucerne Valley permanent study plot in the southwestern portion of the DWMA.

Areas Likely to be Affected by OHV Displacement

In the Existing Conditions in the Action Area – Expansion Areas section of this biological opinion, we provided information on the existing conditions within the portions of the Johnson Valley Off-highway Vehicle Management Area that the western expansion area would overlap. Much of the information on existing conditions described therein also applies to the portions of the OHV area outside of the western expansion area. We have provided additional information where appropriate to characterize the existing condition more fully.

OHV recreation currently occurs in all areas likely to be affected by OHV displacement. Table 8 lists data from Bureau et al. (2005), collected between 1998 and 2002, that provide information on the magnitude of OHV recreation effects within various portions of the action area. All of the areas identified below experience above-average OHV-related effects when compared to other portions of the western Mojave Desert.

Table 8. Average amounts of sign of human activity in areas of above-average OHV-related effects in the western Mojave Desert (Bureau et al. 2005).

Area[4]	Trails[5]	OHV tracks	Litter	Dumps[5]	Evidence of Target Shooting	Evidence of Hunting	Evidence of Camping
Stoddard Valley OHV Management Area	12	138.9	35.9	0	10.3	3	3.1
Johnson Valley OHV Management Area	22.5	179.6	41.1	0	17.4	1.6	1.9
El Mirage OHV Management Area	16.9	120.7	21.9	0	11.3	2.3	1
Spangler OHV Management Area	19.3	95.6	39.1	0	18	1.1	2.4
Jawbone Canyon/Dove Springs OHV Management Area	15.4	18.5	17.3	0	17.6	1	2.5
California City/Rand Mountains	8	52.3	21.1	0	6.5	1.5	1.5
Edwards Bowl	5.5	42.8	16.6	0	1.7	1.8	1
East Sierra	1.7	10.1	47.6	0	7.8	0	0
Silver Lakes	3.4	12.8	33.7	1	6.2	3.3	1
Hinkley	5.1	14.9	103.8	0	1.8	1.8	1.8
Coyote Corner	3.6	57	52.7	1.2	37.5	1.6	1.8

This information indicates that the effects and human uses associated with OHV recreation, especially the prevalence of OHV trails, tracks, and litter, were more common in the Bureau's OHV management areas and their adjacent areas of unauthorized use than in any of the other areas identified. Among the Bureau's OHV management areas, surveyors documented more OHV-related effects in Johnson Valley than any other portion of the action area. The Bureau concluded that the California City/RandMountains, Edwards Bowl, and East Sierra areas contained fewer OHV effects than the Bureau's OHV management areas, but more effects than the Silver Lakes, Hinkley, or Coyote Corner areas (Bureau et al. 2005). Among this group, the California City/Rand Mountains area contained the highest level of effects (Bureau et al. 2005). The Silver Lakes, Hinkley, and Coyote Corner areas all receive the lowest OHV-related effects within the action area (Bureau et al. 2005) but still at levels that are above average when compared with the entire western Mojave Desert. The fact that these portions of the action area are all located within DWMAs is of key importance. In addition, the Rand Mountains are located within a DWMA; the Bureau recognized the high levels of unauthorized use in this area (see Bureau et al. 2005) and instituted controls to manage recreational use (Bureau 2012).

[4] Survey data cover both authorized and unauthorized (i.e., in adjacent areas) use associated with the Bureau's OHV management areas. No data exist for the Rasor Off-highway Vehicle Management Area. All units are the number of units divided by the number of square miles covered.
[5] Dumps encompass areas showing evidence of long-term illegal disposal of trash.

Outside of the OHV management areas, cross-country travel for recreation is unauthorized; vehicles may leave open routes to stop, park, and camp. The prescriptions for stopping, parking, and camping differ within and outside of the DWMAs; we analyzed the effects of these uses in our biological opinion for the amendment of the CDCA Plan for the western Mojave Desert (Service 2006c; 1-8-03-F-58).

We have issued four biological opinions that address the effects of the Bureau's OHV management areas on desert tortoises (Service 1990, El Mirage; 1991, Johnson Valley; 1992, Spangler; 1993b, Stoddard Valley). In each biological opinion, we concluded that the management of the OHV area was not likely to jeopardize the continued existence of the desert tortoise because all of the areas were degraded prior to the listing of the desert tortoise and were not necessary for its recovery. In total, we anticipated that approximately 3,018 desert tortoises would be killed or injured and 209,680 acres of habitat would be degraded. The biological opinions concluded that expanding recreational use of these areas would eventually extirpate desert tortoises from these areas. Clearly, at least in the case of the Johnson Valley Off-highway Vehicle Management Area, more desert tortoises persist in the area than we predicted in the biological opinion. One reason may be that recreational use has remained more concentrated in specific areas than we predicted in the biological opinions.

Livestock grazing has occurred in all areas that will receive OHV displacement, with the exception of the Rasor Off-highway Vehicle Management Area. Within recent years, livestock grazing has been removed from all of the allotments within DWMAs, except for the Ord Mountain and Valley Well allotments within the Ord-Rodman DWMA. Sheep and cattle allotments are still open within the remaining areas. Table 9, which provides information on the allotments that overlap this portion of the action area, is based on information in Bureau et al. (2005, Chavez 2012b, Fitton 2012).

Table 9. Livestock allotments within the action area.

Allotment	Action Area Location	Livestock Type
Cantil	California City and Rand Mountains Heavy OHV Use Area	Sheep (Ephemeral)
Boron	California City and Rand Mountains Heavy OHV Use Area	Sheep (Ephemeral)
Spangler Hills	Spangler Hills OHV Management Area	Sheep (Ephemeral)
Lava Mountain	Spangler Hills OHV Management Area	Sheep (Ephemeral)
Rudnick Common	Jawbone Canyon, Dove Springs, East Sierra	Cattle and Sheep
Walker Pass North	East Sierra Heavy OHV Use Area	Cattle
Walker Pass Middle	East Sierra Heavy OHV Use Area	Cattle
Walker Pass South	East Sierra Heavy OHV Use Area	Cattle
Middle Stoddard Mountains	Stoddard Valley OHV Management Area (Unauthorized OHV Use Area)	Sheep (Ephemeral)
Valley Well	Ord-Rodman DWMA	Horse
Shadow Mountain	El Mirage OHV Management Area/Edwards Bowl Heavy OHV Use Area	Sheep (Ephemeral)
Ord-Mountain	Ord-Rodman DWMA	Cattle

Utility corridors containing above ground transmission lines, natural gas pipelines, and/or telecommunication lines also cross several of these areas. These linear facilities have resulted in loss of habitat, mortality of desert tortoises during construction, and serve as an ongoing subsidy for common ravens by providing roosting and hunting perches.

Status of the Desert Tortoise in the Action Area

Existing Installation, Expansion Areas, and Ord-Rodman DWMA

The Marine Corps conducted surveys for desert tortoises in the western and southern expansion areas in October of 2009 using the TRED method (Karl 2002) and pre-project survey protocols (Service 2010a). Woodman et al. (2001) conducted strip transect surveys on the existing installation in 1997 and 1999. In addition, the Service conducts annual line distance sampling surveys of the Ord-Rodman DWMA to estimate the abundance of larger desert tortoises (Buckland et al. 2001 in Service 2010c).

Many documents characterize desert tortoises as ‘adult,’ subadult,’ or ‘juvenile.’ For the purposes of this biological opinion, when size matters, we will generally refer to larger (i.e., larger than 160 millimeters) and smaller (i.e., smaller than 160 millimeters) desert tortoises. We will use this convention because the size at which desert tortoises reach adulthood (i.e., sexual maturity) varies depending upon the gender and geographic location of the animal. We use 160 millimeters as the break between larger and smaller animals because experience has shown that workers generally do not detect desert tortoises smaller than 160 millimeters in length during surveys.

Table 10 summarizes the available information for larger desert tortoises on the existing installation, the expansion areas, and the Ord-Rodman DWMA. This table provides estimates from both the TRED and Service protocols for the western and southern expansion areas. The point estimates for both methods are comparable, but the confidence interval using the Service's protocol is wider.

Table 10. Estimates of the number of large desert tortoises.

Area	Large Desert Tortoises (Point Estimate and 95 Percent Confidence Intervals)							
	TRED Surveys (DoN 2011a)		Service Protocol (DoN 2011a)		Strip Transects (Woodman et al. 2001)		Line Distance Sampling (Service 2010c)	
	Point Estimate	Confidence Intervals	Point Estimate	Confidence Intervals	Point Estimate	Confidence Intervals	Point Estimate	Confidence Intervals
Existing Installation	-	-	-	-	9,593	1,482 - 13,908	-	-
Western Expansion Area	2,046	1,563 - 2,528	2,860	1,442 - 5,670	-	-	-	-
Southern Expansion Area	369	305 - 433	356	134 - 941	-	-	-	-
Ord-Rodman DWMA	-	-	-	-	-	-	6,453	3,911 - 10,646

Given the uncertainties associated with estimating desert tortoise population size (see below), a wider confidence interval will provide for a more conservative and encompassing analysis of effects. Consequently, we have chosen to use the estimates provided by the Service's protocol throughout the remainder of this biological opinion when addressing the western and southern expansion areas.

Because of the difficulty in locating smaller desert tortoises (i.e., animals under 160 millimeters), the estimates from these survey methods do not incorporate these smaller size classes. A methodology for estimating population size for smaller size classes through direct survey does not currently exist, so the Marine Corps employed indirect methods that use adult population estimates and a life history table that the Bureau employed in the revised biological assessment for the Ivanpah Solar Electric Generating System (Bureau 2011). This method incorporates numerous assumptions detailed in Appendix C of the biological assessment (DoN 2011a). We have also used indirect methods for estimation of population size for smaller size classes in previous biological opinions (Service 2011f). These methods incorporate information from Turner et al. (1987), which estimated the size-class distribution of desert tortoises on the Goffs permanent study plot in the early 1980s. The life history table provided in Turner et al. (1987) indicated that individuals smaller than 180 millimeters comprised approximately 87 percent of the total population.

Table 11 provides the estimates for smaller individuals from the biological assessment (DoN 2011a) and by using Turner et al. (1987) and the adult population estimates discussed above. For example, in the western expansion area, we provided a point estimate of 2,860 large desert tortoises. Given the proportion of the total population composed of smaller desert tortoises per Turner et al. (1987) (i.e., 87 percent), we assume that the larger desert tortoises in the population comprise 13 percent of the population. Consequently, if 2,860 large desert tortoises comprise 13 percent of the total population in the western expansion areas, then the total population there is 22,000 individuals and the number of smaller individuals (i.e., 87 percent of the total population) is 19,140. We estimated the number of larger desert tortoises with a cut-off size of 160 rather than 180 millimeters. Therefore, this method tends to overestimate the total population because it accounts for the individuals in size classes between 160 and 180 millimeters in the estimates for both the large and small individuals.

Table 11. Estimated number of smaller desert tortoises. The ranges are based on the 95 percent confidence limits for larger desert tortoises.

Area	Desert Tortoises in Smaller Size Classes			
	USMC Estimates using Bureau Life Table (DoN 2011a)		Service Estimates using Turner et al. (1987)	
	Point Estimate	Range	Point Estimate	Range
Existing Installation	45,281	-	64,199	9,918 - 93,077
Western Expansion Area	19,123	9,639 - 37,935	19,140	9,650 - 37,945
Southern Expansion Area	2,970	1,120 - 4,909	2,382	897 - 6,297
Ord-Rodman DWMA	-	-	43,185	26,174 - 71,246

For this biological opinion, we will use the estimates derived from the Turner et al. (1987) information because the life history table used in the Bureau’s biological assessment is hypothetical and not based on demographic survey information.

We emphasize that, although we used the best available information, these numbers are only an estimate; the overall number of individuals may be different. For portions of the action area where direct survey occurred (i.e., existing installation, expansion areas, and Ord-Rodman DWMA), the survey data used for these estimates represent a single point in time and the number of individuals in these areas may change by the onset of activities. For example, desert tortoises may leave or enter the surveyed area, hatch, die, or been missed during the initial surveys.

In addition, population estimates for smaller size classes are based on a life-table distribution that has limited predictive ability because it assumes invariant schedules of reproduction and death and constant annual rates of increase or decrease in size. Use of this information for our estimates also assumes that current egg production and survival rates in our action area are similar to that on the Goffs study site in the early 1980s. However, differences in resource availability, threats, and a variety of other variables can result in differences in the overall mortality rate of individuals at different sites and times and thereby create differences in the proportion of the population composed of individuals in these smaller classes. The desert tortoise population on the Goffs study site may have been more robust in the early 1980s than that currently within our action area because of declines that have occurred since the time of that study; consequently, use of the Goffs data may overestimate the actual number of smaller desert tortoises. The magnitude of this overestimate is unknown.

The Goffs study relied on a survey that does not account for the dynamic changes in the number of juveniles that are present over the course of a year. Therefore, depending on the time of year, the number of desert tortoises could vary considerably. For example, many more desert tortoises will be present immediately following the hatching of multiple egg clutches in late summer or early fall than in the early spring when many juveniles from the previous reproductive season's cohort would likely have died.

We also derived all of the estimates for smaller size classes from adult population estimates that used different survey methods. Some of these methods are meant to estimate population size for a specific size range of larger desert tortoises (i.e., larger than 160 millimeters for the Service's pre-project survey protocol; larger than 180 millimeters for line distance sampling). Other methods, such as strip transects (e.g., Woodman et al. 2001), derive an estimate based on detection of sign that correlates to the abundance of adult desert tortoises. Because these estimates for larger animals are the basis for the calculation of smaller size classes, their inherent flaws also serve as sources of error in the population estimate for smaller size classes.

The preceding tables provide the best available information regarding the number of desert tortoises within this portion of the action area (existing installation, expansion areas, and Ord-Rodman DWMA); the data for the existing installation are over 10 years old. These numbers do not provide information to characterize trends in population size and distribution. The following discussion provides information on trends in the number and distribution of desert tortoises. This information is important in assessing whether the effects of the proposed action are affecting declining, stable, or recovering populations.

The Marine Corps maintains three study plots on three training areas (Henen 2012). One plot, established in the mid-1980s, is located in the Sand Hill Training Area in the southwestern portion of MCAGCC. The remaining two plots, established in the early 1990s, were in the southwestern portion of the Emerson Lake Training Area (western portion of MCAGCC), the southearn portion of the Bullion Training Area (southeastern portion of MCAGCC). The Marine Corps relocated the Lava Training Area plot to the southern portion of the Bullion Training Area (southeastern portion of MCAGCC). These plots are part of designated SUAs. Permanent study plots also occur in the western portion of the western expansion area, the southwestern portion of the Ord-Rodman DWMA, and the northwestern portion of the Ord-Rodman DWMA.

In addition to these permanent study plots, survey efforts from the late 1970s, early 1980s, late 1990s, and 2001 provide information on density and relative abundance of desert tortoises and their sign (Berry and Nicholson 1984, Bureau et al. 2005). Surveys from the late 1990s and 2001 also identify die-off areas. These data provide information on the relative condition of desert tortoise populations in different areas and at different times within this portion of the action area.

The current distribution of desert tortoises across MCAGCC consists of large areas of low density with scattered higher-density population centers. Woodman et al. (2001) found that 70 percent of the existing installation had desert tortoise densities of less than 21 per square mile in the late 1990s; higher density patches (51 to 100 desert tortoises per square mile) occurred in the Sand Hill, south-central West, southern Bullion, southwestern Emerson Lake, Sunshine Peak, Quackenbush, Gays Pass, and Prospect Training Areas. Based on work at the permanent study plots in 1997 and 1999 within the Emerson and Sand Hill Training Areas, Woodman et al. (2001) concluded that the number of desert tortoises seemed to be stable. Henen (2010 in DoN 2011a) notes, however, that "long-term studies on these plots indicate declines of 50 to 70 percent since the 1980s." The Marine Corps is resurveying other portions of MCAGCC.

Approximately 90 percent of the western expansion area has desert tortoise densities of less than 16 per square mile, with higher-density patches ranging from 18 to 31 desert tortoises per square mile in the northern and eastern portions (DoN 2011a). The higher density patches in the northern portion of the western expansion area (i.e., south, west, and north of Iron Ridge) overlap areas previously estimated to contain 20 to 100 desert tortoise per square mile in the late 1970s (Berry and Nicholson 1984). This population center is immediately east of areas noted as having densities of between 50 and 250 adults per square mile in the late 1970s (Berry and Nicholson 1984). However, this adjacent higher density patch, which extended from just south of Nellie Bly Mountain, south to the vicinity of the Rock Pile OHV staging area seems to have declined substantially since the late 1970s. Surveys of the Johnson Valley permanent study plot, located in this area, have shown declines of 77 percent since the early-1980s (Bureau et al. 2005). Current densities in this area are between 6 and 16 adults per square mile (DoN 2011a). The northern portion of the western expansion area supports a region of higher densities of desert tortoises that is contiguous with an area of the Ord-Rodman DWMA in which workers consistently located desert tortoises during range wide monitoring over the last 12 years (Bureau et al. 2005; Service 2006b, 2009b, 2010c, 2010d). We discuss trends in the number and distribution of desert tortoises in the Ord-Rodman DWMA later in this section.

Higher density patches (20 to 50 adults per square mile) in the eastern portion of the western expansion area are in locations mapped as having between 1 and 20 adults per square mile in Berry and Nicholson (1984). However, these areas are in close proximity to Emerson Lake, which contained densities of 20 to 50 adults per square mile in the late 1970s (Berry and Nicholson 1984). These higher density patches are also in areas identified as having above-average desert tortoise sign during surveys in the late 1990s (Bureau et al. 2005).

In addition to these locations, another location of apparent population change is between Soggy and Melville Lakes in the RPAA, which contained densities of 50 to 100 adults per square mile in the late 1970s (Berry and Nicholson 1984) (Bureau et al. 2005). Current densities are between 3 and 16 desert tortoises per square mile (DoN 2011a). Throughout the remainder of the western expansion area, current densities of 6 to 16 adults per square mile are not substantially different from the densities of 1 to 20 adults per square mile that the Bureau (et al 2005) estimated for the majority of the OHV area in the late 1970s.

No permanent study plots were located within or near the southern expansion area; consequently, we do not have any information on population trends in this area. Approximately 70 percent of the southern expansion area has desert tortoise densities of less than 16 per square mile, with higher-density patches ranging from 18 to 38 desert tortoises per square mile in the southwestern and northern portions of the southern expansion area.

Although desert tortoises are widely distributed throughout the Ord-Rodman DWMA (Tracy et al. 2004), extensive areas in the central portion of the DWMA exhibit low habitat potential (i.e., less likely to support desert tortoises; Nussear et al. 2009). Extensive survey work from the late 1990s to the present has documented four areas that consistently yield desert tortoise observations during the Service's range-wide monitoring surveys (Service 2006b, 2009b, 2010c, 2010d). These areas include the northwestern corner of the DWMA in Stoddard Valley, the southwestern corner of the DWMA in Lucerne Valley, the northwestern corner of the DWMA adjacent to the Sunshine Peak Training Area, and the southeastern portion of the DWMA adjacent to the northern portion of the western expansion area (Bureau et al. 2005). Permanent study plots in the northwestern (Stoddard Valley Plot) and southwestern portions (Lucerne Valley Plot) of the Ord-Rodman DWMA have shown declines of 5 percent and 30 percent since the early 1980s, respectively (Bureau et al. 2005). We cannot extrapolate information from permanent study plots across large areas, but it provides us with a general idea of the population trends in the areas containing these plots. Although these data seem to indicate that population declines have been low in the northwestern corner of the DWMA, sign-count surveys performed in the late 1990s identified a 5-square-mile die-off area in this region (Bureau et al. 2005).

Estimates of the desert tortoise densities in the areas containing these plots from the late 1970s were 50 to 100 and 20 to 50 per square mile, respectively (Berry and Nicholson 1984). Berry and Nicholson (1984) also noted a high-density area in the northeastern portion of the DWMA in the late 1970s, containing between 20 and 50 desert tortoises per square mile. The Service (1994) concluded that desert tortoise densities across most of the DWMA are much lower than that observed on the Stoddard Valley and Lucerne Valley permanent study plots and that the overall density for the DWMA as a whole was between 5 and 150 desert tortoises per square mile. Current DWMA-wide density estimates are approximately 19 desert tortoises per square mile (Service 2010c), with the highest-density areas occurring in the four locations identified above. All four of these higher density areas are continuous with areas of higher desert tortoise abundance outside of the DWMA. We have already described two of these areas (i.e., northern portion of the western expansion area and the Sunshine Peak Training Area). The two other areas are continuous with areas of higher relative abundance in the Stoddard Valley Off-highway Vehicle Management Area and the portion of the Johnson Valley Off-highway Vehicle Management Area that would remain following expansion. We have discussed the populations in the OHV areas as part of the discussion below.

Areas Likely to be Affected by OHV Displacement

To assess the status of the desert tortoise in the areas of the western Mojave Desert that the displacement of OHVs is likely to affect, we evaluated information in Berry and Nicholson (1984), Bureau et al. (2005), Keith et al. (2005), and Service (2006, 2009b, 2010c, 2010d). In reviewing the information in this reports, we encountered the same issues that the Desert Tortoise Recovery Plan Assessment Committee (DTRPAC) confronted in 2004. In the executive summary of its final report, the DTRPAC (Tracy et al. 2004) stated:

> The assessment provides a highly detailed meta-analysis of desert tortoise population status and trends. The DTRPAC found the data on status and population trends often to be statistically unwieldy due to inconsistencies in data collection, suboptimal data

> collection design, and the truly daunting task of measuring animals that are difficult to detect and that occupy a harsh environment. Because much of the data currently available to address tortoise recovery was originally collected for purposes other than tortoise recovery, the DTRPAC analyses are meta-analyses using data of mixed quality. To adjust for very low statistical power in current data sets, DTRPAC used transect sampling carried out by various agencies and managers to derive tortoise occurrence data, then used spatial analysis of tortoise occurrence to map tortoise status and possible trends. Results are complex, but resulting maps suggest that in many areas tortoise populations appear be facing continued difficulty. Spatial analyses did not indicate zones of recovery. Kernel analyses of transect data – limited to only one year due to lack of additional sufficient data – identified several regions that may have experienced significant local die-offs. Statisticians consulting with DTRPAC derived an original analysis called "Conditional Probability of Being Alive" that spatially illustrated regions of low, intermediate, and high probability of encountering live tortoises during surveys. These analyses identified large regions within historic desert tortoise habitat as being associated with having a low probability of detecting live tortoises during surveys. In other words, probably few tortoises occur in these areas currently. The West Mojave recovery unit stood out within overall tortoise range as unambiguously experiencing continued population decline.

To illustrate the DTRPAC's findings, we have enclosed a graph that depicts trends in relative population density among permanent study plots in the western Mojave Desert and a map of the same area that depicts an analysis of the likelihood of finding a live desert tortoise (appendix 5; from Tracy et al. 2004). We have labeled the map to indicate the areas where we expect displaced OHV use to occur. We have also enclosed a table that summarizes the information from Berry and Nicholson (1984), Bureau et al. (2005), Keith et al. (2005), and Service (2006, 2009b, 2010c, 2010d) (appendix 4). Because the summary is composed of information compiled through several different methodologies, we cannot use this information to show trends at any given site. As the assessment by the DTRPAC noted, however, the trend for desert tortoises in the Western Mojave Recovery Unit as a whole is one of decline; we have no reason to believe that the trends in the localized portions of the action area for this biological opinion differ. Appendix 4 summarizes additional information regarding the status of desert tortoises in various portions of the action area that off-highway vehicle displacement may affect.

Summary of the Status of the Desert Tortoise in the Action Area

Desert tortoises occur in low densities throughout much of the action area when compared to historical levels. The declines observed on permanent study plots, a large number of die-off areas, low site-specific densities in many areas, and low DWMA densities are all consistent with the conclusions drawn by Tracy et al. (2004) that the Western Mojave Recovery Unit is in a state of overall population decline. However, the rate of decline, current population densities, and likelihood of maintaining viability are not uniform across the action area. Because a desert tortoise population's viability is primarily affected by its ability to maintain a threshold density within a given area (i.e., 10 adults per square mile; Service 1994), areas that show high densities, persistent evidence of occupation, lower population declines, and a lack of die-off areas have a greater chance of maintaining a density necessary to ensure viability. Areas with low densities, high rates of population decline, or areas showing evidence of substantial die-offs are at a higher risk of losing viability. We have summarized various pieces of information for the portions of the action area that would be affected by off-highway vehicle displacement in Appendix 4. Below, we use this information in combination with the information discussed previously for MCAGCC, the expansion areas, and the Ord-Rodman DWMA to assess the relative potential for the maintenance of population viability in various portions of the action area.

Specific areas of severe decline include the western portion of the western expansion area, the California City and Rand Mountains Heavy OHV Use Area, the southern portion of the Silver Lakes Residential Vehicle Impact Area, and some portions of MCAGCC. The areas in and around Johnson Valley, El Mirage, California City/Rand Mountains, Coyote Corner, and Hinkley experienced die-offs that encompassed approximately 222 square miles. The Ord-Rodman DWMA has experienced a slower decline.

Desert tortoises in the some areas seem to have a better chance of maintaining viability in comparison to the rest of the action area and the Western Mojave Recovery Unit. These areas are the: 1) northwestern portion of the Ord-Rodman DWMA and northern end of the Stoddard Valley Off-highway Vehicle Management Area, 2) southwestern portion of the Ord-Rodman DWMA, 3) northeastern portion of the Ord-Rodman DWMA and the Sunshine Peak Training Area, 4) northern portion of the western expansion area and southeastern portion of the Ord-Rodman DWMA, 5) the vicinity of Emerson Lake in the Emerson Lake Training Area and the eastern portion of the western expansion area, 6) Sand Hill Training Area, 7) Bullion Training Area, and 8) southern expansion area. Evidence of this consists of either high densities, above-average desert tortoise sign, consistent location of desert tortoises during range-wide monitoring, lower documented declines on permanent study plots, or some combination of these. All of the above areas also lack any substantial die-off areas with the exception of the northwestern portion of the Ord-Rodman DWMA, where a small die-off area was documented near Daggett. MCAGCC also has several other isolated areas of relatively high density in the south-central West, Quackenbush, Gays Pass, and Prospect Training Areas. It is important to note that 4 of these 8 areas are within or substantially overlap the Ord-Rodman DWMA, which is essential to recovery of the species and contains the highest density of desert tortoises of the 3 DWMAs in this recovery unit (i.e., 20 adults per square mile; Service 2010c).

The western portion of the western expansion area and areas of the Johnson Valley Off-highway Vehicle Management Areas that would remain following the MCAGCC expansion, 2) RPAA, 3) Edwards Bowl Heavy Use OHV Area, and 4) the Silver Lakes, Hinkley, and Coyote Corner Residential Vehicle Impact Areas seem to support viable populations that are declining in status at a faster rate and to be at a greater risk than the Western Mojave Recovery Unit as a whole. All of these areas continue to contain desert tortoises at low to moderate densities, they contain above average sign of desert tortoise occupation, or they consistently contain desert tortoises during range-wide monitoring. However, these areas also either contain major die-off areas or they contain permanent study plots that have shown severe population declines in at least some portion of the area of interest. All of the heavy use OHV areas and recreational vehicle impact areas identified above occur in the southern or eastern portions of either the Superior-Cronese or Fremont-Kramer DWMAs. Both of these DWMAs have densities (i.e., 6 to 7 adults per square mile) that are low when compared to the other DWMA (Ord-Rodman) in the recovery unit. Both

DWMAs have also experienced major die-offs in their northern (Fremont-Kramer) or northwestern (Superior-Cronese DWMAs) portions and have large areas with no evidence of desert tortoise occupation (Tracy et al. 2004).

The portion of the action area containing populations that are likely in the poorest condition and at the greatest risk is the California City and Rand Mountains Heavy Vehicle Use Area. Although this area once contained among the highest densities in the recovery unit, this portion of the western Mojave Desert has experienced precipitous declines (up to 90 percent on some permanent study plots) since the late 1970s. Large die-off areas have also been documented in this area and in adjacent areas located in the northern portion of the Fremont-Kramer DWMA. Surveys in the late 1990s did not note above average sign in this area.

The remaining portions of the action area (i.e., the Dove Springs, Jawbone Canyon, Spangler Hills, and Rasor Off-highway Vehicle Management Areas and the East Sierra Heavy Use OHV Area) do not support habitat with a high potential for occupancy or they do not currently contain large numbers of desert tortoises. All of these areas, with the exception of the southeastern corner of the Spangler Hills Off-highway Vehicle Management Area, have historically contained low desert tortoise densities when compared to other parts of the western Mojave Desert. More recent encounter rate data from the Spangler Hills OHV Management Area and density survey data from the Jawbone-Butterbredt ACEC indicate that population densities in these areas continue to remain low relative to other portions of the western Mojave Desert. ('Encounter rates' are the frequency at which desert tortoises are detected per unit distance of survey.) Because we have no information on population trends, we cannot determine if these low densities reflect a decline in desert tortoise numbers or maintenance of naturally low population densities. However, the southeastern portion of the Spangler Hills OHV Management Area was not identified as having above average desert tortoise sign in the late 1990s.

It is difficult to determine the status of the desert tortoise populations in the El Mirage OHV Management Area. Surveys of the OHV area in the late 1990s detected high encounter rates, but not above-average sign of desert tortoises. During this survey, relatively few transects were performed in the OHV area, so the information on the encounter rate and sign count is not likely representative of the status of the desert tortoise within the OHV area.

Status of Desert Tortoise Critical Habitat in the Action Area

The action area overlaps critical habitat in the Ord-Rodman, Fremont-Kramer, and Superior-Cronese critical habitat units. Table 12, which we modified from the table contained in the Environmental Baseline - Action Area section of this biological opinion and from Bureau et al. (2005; see table 3-26 and map 3-14), lists the areas of critical habitat that we expect would experience OHV use displaced by the expansion. The proposed action would also affect the portion of the Ord-Rodman Critical Habitat Unit that would receive translocated desert tortoises from the western expansion area.

Table 12. Areas within critical habitat likely to be affected by OHV displacement.

Unauthorized OHV Use Areas	**Critical Habitat Unit(s)**
California City/Rand Mountains	Fremont-Kramer/ Superior/Cronese
Edward Bowl (south of Edwards Air Force Base)	Fremont-Kramer
Silver Lakes (areas north of Helendale, south of Highway 58, east of Highway 395)	Fremont-Kramer
Hinkley (areas north and northwest of Barstow)	Fremont-Kramer/ Superior-Cronese
Coyote Corner (areas southwest of Fort Irwin)	Superior-Cronese
Ord-Rodman DWMA	Ord-Rodman

We expect that the condition of critical habitat within the action area generally resembles that of critical habitat range wide, as we described it in the Status of Critical Habitat section of this biological opinion. In the following paragraphs, we added additional information on the areas listed in the previous table.

California City/Rand Mountains. The area described as the California City unauthorized OHV use area is largely private land; recreationists have used this area for unregulated OHV play for decades. Most of this area is south of designated critical habitat; however, some use extends into critical habitat. The Rand Mountains lie north of the California City area; the Bureau manages almost all of the land in the Rand Mountains. This area experienced substantial unauthorized OHV use in the past but has been managed extensively by the Bureau in recent years, with a concomitant decrease in unauthorized OHV use. The Bureau's management actions have included designation of camping sites, closure of unauthorized routes, posting of open routes, increased enforcement, and institution of a permitting system for OHV riders (Bureau 2012). This area has been closed to sheep grazing since approximately 1990. To the east of Highway 395, the Bureau et al. (2005) also identified the Red Mountain area as a region of above average unauthorized OHV use.

A few small mines have eliminated the primary constituent elements of critical habitat from a small area in the steeper, eastern portion of the Rand Mountains. Highway 395 and a large transmission line cross through the eastern portion of this area.

We expect that, under current conditions, the primary constituent elements of critical habitat are generally functional. The ongoing effects of grazing and OHV use have likely caused some degradation of the second through fifth primary constituent elements of critical habitat; however, we expect that the Bureau's current management would allow for improvement of the biological and physical factors that support desert tortoises over time. The decreased level of OHV use, as intended by the Bureau's management goals, is not likely to cause human-caused mortality and disturbance at a level that would compromise the function of the sixth primary constituent element.

Edwards Bowl. This area straddles the Los Angeles/San Bernardino County line. Within Los Angeles County, most of the land is in private ownership; the San Bernardino County side of the county line is divided roughly equally between private and public lands. This area has experienced a high level of unauthorized OHV use for decades; numerous tracks and trails crisscross the area. The Bureau has closed the portion of the Shadow Mountain Allotment within San Bernardino County; the portion of this sheep allotment in Los Angeles County remains open (map 2-14 in Bureau et al. 2005). We are unaware of any other activities in this area that may be affecting the primary constituent elements of critical habitat.

Given the level of OHV use and the past and present (in the western portion) sheep grazing of this area, we expect that the primary constituent elements of critical habitat are not functioning at optimal levels in this portion of the Fremont-Kramer Critical Habitat Unit.

Silver Lakes. This area is composed of a patchwork of private and public lands. The Buckhorn and Stoddard Allotments overlapped this area in part; however, these areas have not been grazed by sheep since approximately 1990 (map 2-14 in Bureau et al. 2005). Other than the information on the level of unauthorized OHV use provided in Bureau et al. (2005), we are unaware of other activities in this area that may be affecting the primary constituent elements of critical habitat.

Given the level of OHV use and the past sheep grazing of this area, we expect that the primary constituent elements of critical habitat are not functioning at optimal levels in this portion of the Fremont-Kramer Critical Habitat Unit.

Hinkley. The Bureau manages approximately two-thirds of the lands in this area; the remainder is privately owned. The Superior Valley and Stoddard Allotments overlapped this area in part; however, these areas have not been grazed by sheep since approximately 1990 (map 2-14 in Bureau et al. 2005). A large transmission line crosses the area north of Barstow from east to west. Other than the information on the level of unauthorized OHV use provided in Bureau et al. (2005), we are unaware of other activities in this area that may be affecting the primary constituent elements of critical habitat.

Given the level of OHV use and the past sheep grazing of this area, we expect that the primary constituent elements of critical habitat are not functioning at optimal levels in this portion of the Superior-Cronese Critical Habitat Unit.

Coyote Corner. Most of the land in this area is managed by the Bureau and U.S. Department of the Army; the Army acquired these lands to mitigate for the effects of its expansion of Fort Irwin. The Superior Valley Allotment overlapped this area in part; however, this allotment has not been grazed by sheep since approximately 1990 (map 2-14 in Bureau et al. 2005).

Other than the unauthorized OHV use that the Bureau et al. (2005) identified, the northern portion of this area is affected by recreational prospecting and mining clubs that operate under the Bureau's casual use provisions. They may continue to do so as long as they reclaim their hand-dug pits and the cumulative disturbance does not cause more than "negligible" disturbance (Bureau et al. 2005). In its amendment to the CDCA Plan, the Bureau et al. (2005) proposed to close this area to mineral entry; to date, to the best of our knowledge, it has not initiated this process.

The Bureau has implemented numerous measures to control unauthorized OHV use in the northern portion of this area (i.e., Coolgardie Mesa). It has installed signing to describe the appropriate use of the area and post and cable barriers to prevent vehicles from leaving designated routes. The Bureau also physically closed unauthorized staging areas and increased law enforcement in this area.

Given the level of OHV use and the past sheep grazing of this area, we expect that the primary constituent elements of critical habitat are not functioning at optimal levels in this portion of the Superior-Cronese Critical Habitat Unit.

Ord-Rodman Critical Habitat Unit. The western edge of this critical habitat unit is composed of Bureau-managed and private lands in approximately equal amounts. The southern area of the critical habitat unit is primarily managed by the Bureau with some inclusions of private land. The Bureau et al. (2005) documented that portions of this critical habitat unit receive above-average levels of unauthorized OHV use.

We discussed the presence of grazing allotments in this area in the Existing Conditions in the Action Area – Ord-Rodman DWMA section of this biological opinion. The Valley Well Allotment, a small allotment for horses adjacent to Highway 247, does not provide any unique feature of critical habitat necessary for the conservation of desert tortoises in comparison with the remainder of the Ord-Rodman Critical Habitat Unit (Service 2007). Other than a small area near the water trough, the primary constituent elements of critical habitat are generally present within this allotment although grazing has likely altered the floral component to some degree (e.g,. potentially a decrease in native shrubs and annual plants and an increase in non-native annual plants).

The biological opinion for the West Mojave amendment to the CDCA Plan (Service 2006c) notes large portions of the Ord Mountain Allotment are located at 4,000 feet or higher in elevation. Although the areas over 4,000 feet in elevation are within the boundaries of the Ord-Rodman Critical Habitat Unit, they likely do not support the primary constituent elements of critical habitat on a widespread basis. The following information regarding current use of the allotment is from Chavez (2012a). The current stocking rate is 25 head. The exclusion area described in the CDCA Plan for West Mojave Plan has been in effect since March 15, 2012, due to the lack of ephemeral production; consequently, the eastern portion of the allotment is closed to grazing. Utilization studies over the last few years have determined that use is slight (less than 10 percent). We expect that the second through fifth primary constituent elements have likely been degraded to some degree by cattle grazing in this allotment. We cannot determine the extent to which they have recovered as a result of the low stocking rate in recent years but expect that areas around water sources likely exhibit heavy use, which decreases as the distance from the water sources increases.

A large transmission line and a gas line cross the western edge of the critical habitat unit. A second transmission and another gas line cross the southern portion of the critical habitat unit. Habitat disturbed during construction of these lines has, in large part and with the exception of access roads, recovered to the point where the primary constituent elements of critical habitat are functional. Transmission towers and pipelines need occasional repair; consequently, primary constituent elements are periodically disturbed during maintenance. The access roads also provide opportunities for recreationists to use the area legally and illegally.

In general, the primary constituent elements of critical habitat within the areas to be used for translocation and that are likely to experience elevated levels of unauthorized OHV use as a result of the proposed expansion have been compromised to some degree by past and present cattle grazing, the maintenance of gas and electrical transmission lines, and authorized and unauthorized OHV use.

EFFECTS OF THE ACTION

In the following section, we analyze the direct and indirect effects of the proposed action, including the effects of displaced recreation. In assessing the effects of military training, we have analyzed the modified training scenario (i.e., MEB-level training and building block exercises) that the Marine Corps would implement following expansion. CAX exercises on the existing installation occur at annual levels (numbers of personnel and vehicles) and in locations similar to those identified for use in the modified training scenario. However, the new training scenario would result in fewer CAX exercises and a concentration of activities into two large-scale exercises each year (i.e., two MEB exercises). To address this concentration of training activities, we analyzed the effects of the modified training scenario on the existing installation along with the effects that would occur within the expansion areas.

We have also analyzed the Marine Corps' translocation strategy for desert tortoises and the beneficial and adverse effects, if any, of conservation measures the Marine Corps has proposed to implement to avoid, minimize, and offset effects to desert tortoises. Although we would authorize desert tortoise translocation under a section 10(a)(1)(A) recovery permit, we have analyzed its effects because the translocation program is a result of the proposed action. Other agencies or individuals would implement several of the conservation actions; these actions would require future section 7 consultation. Because of the relative lack of detail and the future review required on these specific actions, our analysis of these actions is more general in nature.

Effects of Military Activities

Effects of the Preparation of Training Lands within the Expansion Areas

Prior to commencement of training activities, the Marine Corps would prepare the expansion areas by grading and improving roads, installing permanent features at the MEB objective, company objectives, and staging areas (i.e., bunkers, trenches, barbed wire, etc.), and installing additional fencing and signs at SUAs and other appropriate locations. The Marine Corps will perform clearance surveys of these areas and implement numerous measures to reduce the potential for injury or mortality. However, because of the difficulty in locating desert tortoises, it is likely that clearance surveys will miss some larger desert tortoises and most desert tortoises in smaller size classes. Construction would likely kill or injure these animals, but some potential exists that biological monitors or authorized biologists may locate and save a few animals during construction.

Accessing construction sites along existing paved and unpaved routes would likely result in injury or mortality due to vehicle strikes. The Marine Corps will implement protective measures, such as speed limits, to reduce the potential for vehicle strikes, but it is unlikely that use of the access roads and speed limits would avoid all desert tortoises. This is especially true of smaller individuals that are difficult to see.

The digging of permanent trenches and other excavations could kill or injure desert tortoises; once constructed, these features could entrap desert tortoises, which would likely kill these individuals if they are not rescued. The potential to kill or injure desert tortoises during construction is low because the Marine Corps will temporarily fence the construction site, employ authorized biologists to regularly inspect the excavations, and implement numerous other measures to reduce the potential for entrapment. However, following construction, the Marine Corps would remove fences and desert tortoises could become entrapped.

Although the Marine Corps will translocate all desert tortoises found during clearance surveys of construction sites, it may miss some that are hidden or off-site when surveys occur. Some of these desert tortoises are likely to have home ranges that incorporate habitat within the construction site. When fences are installed that block their access, animals may exhibit fence-pacing behavior that places them at a greater risk of injury or mortality due to exposure to temperature extremes and predators. The Marine Corps will implement specific minimization measures to address desert tortoises that exhibit this type of behavior (including regular patrols of the fences after they are installed). These measures are likely to reduce the potential for injury and mortality during construction.

Temporary fencing may prevent desert tortoises from using a portion of their home ranges for some time. Although construction inside the fencing would not direct affect these animals, project activities may damage their home ranges through loss of foraging and sheltering sites. This loss of habitat may result in a decreased chance of survival because of the diminished resources; desert tortoises may also die as they adjust their home ranges into new areas with which they are unfamiliar. This readjustment could also lead to adverse social interactions with desert tortoises in adjacent areas (e.g., increased fighting as males compete for females and resources).

The preparation of training lands would attract common ravens to construction sites. The Marine Corps will implement numerous measures to control common raven subsidies during construction that may reduce this effect. However, construction activities are still likely to result in some increase in predation of desert tortoises. Given that common ravens will fly great distances for water, they could affect a substantial area of adjacent lands. If construction sites are in locations that currently experience substantial human activities (i.e., MCAGCC and southern portion of western expansion area), the increase in the number of common ravens and the subsequent increase in predation attributable to the proposed expansion is likely to be marginal; the converse is also true.

We cannot quantify the precise number of desert tortoises that the preparation of training lands would kill or injure for the following reasons. First, we do not know the ultimate location where construction of training features would occur, so we cannot assess site-specific population size, baseline levels of human disturbance, or other variables. Second, we cannot quantify the extent to which the proposed minimization measures will reduce injury and mortality. Third, we cannot predict the proportion of available desert tortoises that clearance surveys would find. Finally, we cannot predict the number of desert tortoises with home ranges that may overlap construction site boundaries. Although, precise estimation of injury and mortality is not possible, we have provided a rough characterization of its magnitude below (see Quantification of Effects Related to Military Activities).

Effects of Expanded Training Activities

Training exercises would have similar effects to those discussed in the previous section, but these effects would likely be more intense and affect a larger portion of the action area over a longer period. Use of existing routes on MCAGCC and the expansion areas during training is likely to result in injury and mortality of desert tortoises due to vehicle strikes. Cross-country vehicle travel is also likely to injure or kill unobserved desert tortoises that are above ground or in their burrows; foot travel may injure or kill smaller desert tortoises (e.g., hatchlings) that are difficult to see. Excavation of temporary trenches and fighting positions would likely kill or injure desert tortoises in their burrows; desert tortoises may also be entrapped in these trenches when they are not in use.

The Marine Corps will implement several measures during training to reduce the magnitude of these effects. The primary measure for minimizing direct effects will be translocation of desert tortoises out of areas that would experience heavy and moderate levels of disturbance, such as the MEB objective, company objectives, main supply routes, staging areas, and areas around these features that training activities are likely to affect. The biological assessment provides a representative depiction of these areas (Figure 6-2; DoN 2011a), but the Marine Corps has not determined the final location of these features. Although training would be concentrated around these features, the training activities, including cross-country travel, could occur in most parts of the expanded installation at lower levels. As noted in the Consultation History section of this biological opinion, the Marine Corps has committed to locate the staging area in the southern expansion area to avoid areas of higher desert tortoise density.

Translocation will reduce the number of desert tortoises injured or killed due to training activities by removing them from areas where most direct effects would occur in the expansion areas. The Marine Corps is likely to translocate most of the larger desert tortoises (i.e., those larger than 160 millimeters). However, authorized biologists are unlikely to find and translocate most desert tortoises in smaller size classes. Because the Marine Corps would not translocate desert tortoises from the existing installation, this measure would not reduce injury and mortality in that portion of the action area.

Because the Marine Corps would not permanently exclude desert tortoises from cleared areas, individuals in adjacent habitat may be injured or killed when they enter these areas later. The Marine Corps will perform annual clearance-level surveys of areas that support three or more desert tortoises per square kilometer, which would reduce the magnitude of this effect. However, given the limitations of clearance surveys that we have previously discussed, the Marine Corps is unlikely to find all desert tortoises within these areas; additionally, if the training occurs during periods when desert tortoises are active, individuals could enter the training areas between the time the surveys are conducted and the conclusion of the military exercises.

In addition to translocation, the Marine Corps will implement numerous additional measures prior to and during training exercises (e.g., environmental awareness training, inspecting under vehicles prior to moving them, moving desert tortoises out of harm's way, etc.). These measures would likely reduce the potential for injury and mortality of desert tortoises that are missed by clearance surveys and that enter the area after clearance surveys are complete. However, because the focus of the Marine Corps during exercises will be training, desert tortoises are still likely to be injured or killed.

Training exercises are also likely to result in numerous indirect effects to desert tortoises. Cross-country travel would likely collapse unoccupied burrows and other cover sites, leaving desert tortoises prone to injury or mortality from exposure, predation, or other threats. Areas of concentrated use, such as staging areas, the MEB objective, company objectives, and re-supply points, are likely to attract common ravens that would prey on desert tortoises in the surrounding area.

Habitat degradation because of long-term use of the training lands would facilitate the spread of non-native weeds that may eliminate or reduce the prevalence of native forage species for the desert tortoise. The reduction in the amount of suitable of native plants could affect the reproductive success of desert tortoises remaining in these areas post-translocation, and may make them more susceptible to disease. The spread of non-native weeds may also increase the prevalence of wildfires, which could directly kill desert tortoises and further reduce resources (i.e., shrubs that animals use for shelter, forage species) within existing home ranges.

The identified effects to habitat would degrade resources within existing desert tortoise home ranges in these areas. Survival rates for desert tortoises on MCAGCC and the expansion areas would likely decrease because of reduced resources. The loss or degradation of habitat may also result in injury or mortality as desert tortoises adjust their home ranges into new areas with which they are unfamiliar because they would experience increased exposure to predators, temperature extremes, and aggressive interactions with resident animals.

The Marine Corps predicts the direct loss or heavy degradation of 28,790 acres of desert tortoise habitat and the moderate disturbance of an additional 96,537 acres on MCAGCC and the expansion areas (DoN 2011a). The following table provides information on how much of this habitat loss and degradation would occur in various portions of the action area. Many of these areas are already in various stages of habitat degradation due to existing military training or off-highway vehicle effects.

Table 13. Habitat disturbance associated with proposed areas at MCAGCC and proposed expansion areas.

Area	Habitat Loss or Heavy Degradation (acres)[6]	Moderate Disturbance (acres)[7]
MCAGCC Installation	18,231	69,206
Western Expansion Area	9,652	24,652
Southern Expansion Area	907	2,617

The Marine Corps will implement numerous measures to reduce the magnitude of the adverse effects of training. Environmental awareness programs, concentration of training activities within previously disturbed areas, filling of temporary excavations following training exercises, and containment of predator subsidies will reduce the magnitude and extent of these effects to some degree, but these effects are still likely to occur, albeit at a lower level than without the proposed measures.

We cannot precisely quantify the number of desert tortoises that training exercises would kill or injure for several reasons. First, we do not know the ultimate location of the MEB objective, company objectives, staging areas, or other features where the majority of training disturbance would occur, so we cannot assess site-specific population size, baseline levels of human disturbance, or other variables. Second, we cannot predict the number of desert tortoises that are likely to enter high- and moderate-disturbance areas from adjacent habitats after clearance surveys. Third, we have limited information on the anticipated magnitude of disturbance in areas away from the MEB objective and other primary training features. Finally, we cannot quantify the extent to which the proposed minimization measures would reduce injury and mortality during training. Although, precise estimation of injury and mortality is not possible, we have provided a rough characterization of its magnitude below (see Quantification of Effects Related to Military Activities).

Effects of Training Range Maintenance

Following training exercises, the Marine Corps, and its civilian contractors would perform maintenance activities, such as range clean up, ordinance disposal, target maintenance, and road grading. These activities would occur primarily along existing routes or within areas that training activities have disturbed, but some low level of cross-country travel would occur occasionally. The Marine Corps will implement numerous measures designed to reduce the potential for injury and mortality of desert tortoises. Effects similar to those discussed above are likely to occur during training range maintenance, but these effects would be substantially less intense because of the lower scale of human activity within desert tortoise habitat, the lower level of cross-country vehicle travel, and the performance of most of these activities in previously disturbed areas.

We cannot precisely estimate the number of desert tortoises that training range maintenance is likely to kill or injure for the reasons we have identified previously in this biological opinion.

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[6] Incorporates all areas of "High Intensity Habitat Disturbance" identified by the Marine Corps (DoN 2011a).
[7] Incorporates all areas of "Medium Intensity Habitat Disturbance" identified by the Marine Corps (DoN 2011a).

However, we anticipate that relatively few desert tortoises are likely to injured or killed because most maintenance activities would occur in areas where from which most, if not all, desert tortoises have been translocated, the maintenance activities are not as intense as training, and the Marine Corps will implement numerous minimization measures. Although we cannot precisely quantify the number of desert tortoises that are likely to be injured or killed, we have provided a rough characterization of its magnitude below (see Quantification of Effects Related to Military Activities).

Quantification of Effects Related to Military Activities

The various military activities discussed above would occur in the same areas over the life of the training program, which the Marine Corps estimates to be 50 years. Consequently, we have provided an estimate of the cumulative injury and mortality that would result from all of these effects, rather than try to assign specific numbers to each activity. This estimate accounts for injury and mortality associated with MEB and Building Block exercises and for future CAX exercises that would occur in the same areas at a decreased annual frequency. To arrive at our estimates, we have used the population estimates for various portions of the action area, information on the effectiveness of clearance surveys, the characteristics of populations of desert tortoises occurring on lands currently used for training on MCAGCC, and information on the intensity of training.

Table 14 provides the Marine Corps' estimates for the number of desert tortoises within areas that it would disturb through training activities (DoN 2011a). We based the estimates for larger desert tortoises on survey results and a GIS analysis of a representative training scenario (i.e., figure 6-2; DoN 2011a); we used a life table analysis to derive the numbers of smaller animals. For the purpose of our analysis, we have used the point estimates provided in these tables. As noted in the Consultation History section, the Marine Corps committed to moving the proposed staging area in the southern expansion area to avoid areas of higher desert tortoise density. Consequently, the number of desert tortoises estimated for disturbed portions of the southern expansion area is likely higher than will occur in the new staging area's location.

Table 14. Estimates of the number of desert tortoises in the expanded MCAGCC (based DoN [2011a]). The upper number represents the point count; the lower number is the 95 percent confidence interval.

Area	Disturbance Class	Population Estimate	
		Larger	**Smaller**
Existing Installation	Heavily Disturbed	312 23 – 602	1,471 108 - 2,838
	Moderately Disturbed	1,226 119 - 2,333	5,779 561 - 10,997
Western Expansion Area	Heavily Disturbed	276 139 – 547	1,301 655 - 2,578
	Moderately Disturbed	724 365 – 1436	3,413 1,077 - 6,769
Southern Expansion Area	Heavily Disturbed	26 10 – 70	66 47 – 85
	Moderately Disturbed	79 30 – 209	372 141 – 985
Total		2,838 686 - 5,197	9,564 2,589 - 24,252

<u>Military Activities in Areas Identified for Heavy and Moderate Disturbance on the Existing Installation</u>

The Marine Corps will not translocate desert tortoises from training areas on the existing installation, so military activities will affect all animals within areas identified for heavy and moderate disturbance on MCAGCC (Figure 6-2; DoN 2011a). We anticipate that injury and mortality will be greater in heavy disturbance areas than in moderate disturbance areas, but we anticipate that desert tortoises would continue to occupy all but the most heavily disturbed locations, albeit at lower densities.

Woodman et al. (2001) found that abundance of desert tortoises was lower in areas where more than 400 vehicle tracks per mile were present; approximately 18.9 percent of MCAGCC exhibited such track density. Desert tortoises were absent from the approximately 6.6 percent of MCAGCC that had more than 700 tracks per mile. When contemplating the portions of MCAGCC that no longer support desert tortoises, bear in mind that a substantial portion of the base [approximately 27.5 percent] is too mountainous to allow training; these areas also likely support few, if any desert tortoises. Also, low elevation areas had little or no sign, regardless of vehicle activity, suggesting that desert tortoises did likely did not use these areas extensively (Woodman et al 2001). Henen (2012e) also noted a relationship between high numbers of vehicle tracks and lower desert tortoise densities when re-analyzing these data. However, this analysis indicated that desert tortoises continued to occupy areas of existing heavy use. Table 15 provides density estimates from the Henen (2012e) analysis.

Table 15. Desert tortoise densities in relation to track counts within the MCAGCC.

<table>
<tr><th>Disturbance Level</th><th>Track Count</th><th colspan="2">Mean Density (larger individuals per square mile)[8]</th><th>Density Range (larger individuals per square mile)</th></tr>
<tr><td>Very High</td><td>> 700 per mile</td><td>2</td><td rowspan="2">8.5</td><td>0.7 to 3.3</td></tr>
<tr><td>High</td><td>400 to 699 per mile</td><td>12.5</td><td>6.9 to 18.1</td></tr>
<tr><td>Moderate</td><td>100 to 399 per mile</td><td colspan="2">15.6</td><td>12.4 to 18.8</td></tr>
<tr><td>Low</td><td><100 per mile</td><td colspan="2">12.6</td><td>10.9 to 14.3</td></tr>
</table>

Woodman et al. (2001) observed that large amounts of denuded or partially denuded habitat were associated with areas containing large numbers of vehicle tracks. Of 17 transects that were completely or partially denuded, 16 contained more than 700 vehicle tracks. In the biological assessment, the Marine Corps anticipates that the “high intensity disturbance” portions of the representative training scenario will result in a complete or near complete loss of vegetation and disruption of the soil surface. Because this definition closely approximates previous observations of denuded areas in locations with more than 700 tracks per mile, observed desert tortoise densities in these areas are likely to approximate what we would see within areas that are heavily disturbed under the proposed action. Consequently, we anticipate that all portions of the representative training scenario identified for heavy disturbance will decrease to a density of between 0 and 2 larger desert tortoises per square mile over the next 50 years due to the effects of military activities.

Prior to beginning our analysis, we would like to make two key points. First, we cannot attribute the low densities that Woodman et al. (2001) observed solely to military activities. (We note, however, that Woodman (2012) states that the Marine Corps’ increased protection of the Sand Hills plot over the last 5 years seems to have resulted in a more stable population.) Although military training is responsible, at least in part, for the lower densities in some areas, these desert tortoises are also subject to many of the same stresses that animals face elsewhere in the Western Mojave Recovery Unit. Second, we expect that the rate of decline in the density of desert tortoises would be greater at the onset of training and then slow over time; we do not expect the decline to occur at a linear rate. In the following analysis, we will not attempt to predict how many desert tortoises would be affected within any specific period.

Areas that would receive heavy disturbance cover approximately 28.5 square miles within MCAGCC and currently contain approximately 312 large desert tortoises (11 per square mile). A decrease in density from 11 to 2 large desert tortoises per square mile would result in an 81.8 percent decline; this decline equates to the loss of 255 individuals. If training extirpated desert tortoises from these areas, this 100 percent decline would equate to the loss of 312 individuals. The magnitude of the decline does not directly equate to anticipated mortality. To equate the two directly, we would need to assume that the current population of 312 individuals would remain stable in the absence of military activities (i.e., recruitment rate would equal natural mortality rate and that the immigration rate balanced that of emigration) and that military activities would be the only source of added mortality.

[8] We provided both the individual and combined values for mean density for the very high and high disturbance levels.

We anticipate that the existing populations in areas identified for heavy disturbance are currently declining given the current effects on MCAGCC and the status of most populations in the Western Mojave Recovery Unit. We also anticipate that military activities are likely to be the greatest source of mortality in the heavily disturbed areas. Consequently, we anticipate that mortality of 255 to 312 adults is a reasonable estimate of the maximum number of adults that military activities are likely to kill in areas identified for heavy disturbance on MCAGCC.

We have no data on the degree to which the number of small desert tortoises could decrease. However, if the number of large animals decreases as we predict, the number of small desert tortoises is also likely to decrease at a similar rate because fewer reproductive females will occur in the population, which will result in a lower reproductive output. If the number of individuals in the two size classes decreases by the same magnitude, the current number of smaller desert tortoises would decrease by 81.7 to 100 percent in heavily disturbed areas. This would equate to a decline in the current population size of 1,202 to 1,471 juveniles. This decline would result from mortality rates and/or recruitment rates among smaller animals exceeding reproductive output of the adult females.

Equating this decline with mortality or lost reproductive output caused by the proposed military activities assumes that the juvenile population would have remained at a constant size from year-to-year (i.e., annual reproductive output would equal annual mortality/recruitment) in the absence of military training. Consequently, use of this number assumes a currently stable juvenile population and assumes that the effects of military activities would be the only source of added juvenile mortality and decreased reproductive output within the population. As stated previously, we anticipate that the existing population is declining, and we anticipate that military activities would be the greatest source of mortality in the heavily disturbed areas. Consequently, we anticipate that loss of 1,202 to 1,471 juveniles in these populations will be the result of mortality or loss of reproductive output associated with the proposed military activities.

The Marine Corps defined “moderately disturbed” areas in its representative training scenario as areas where distance between plants would be noticeably increased, plants would have smaller canopies, and soil surface disruption would be present but not extensive. We anticipate that this change in vegetation would affect desert tortoise abundance in higher density areas. As discussed above, the abundance of desert tortoises decreased substantially in areas where the density of vehicle tracks per mile exceeds 400 (Woodman et al. 2001, Henen 2012e).

Henen (2012e, see Table 15 above) determined that areas of MCAGCC containing more than 400 vehicle tracks per mile contained a density of 8.5 large desert tortoises per square mile. Although this density is an average across all transects containing more than 400 tracks per mile, including those with more than 700 per mile, it provides a reasonable estimate of the density that is likely to occur under the moderate disturbance training scenario presented by the Marine Corps.

Based on this information, we estimate that the current number of larger desert tortoises within the portions of MCAGCC identified for moderate disturbance would decrease from 1,226 to 919 (= 8.5 per square mile x 108.1 square miles) for a loss of 307 larger desert tortoises. As discussed previously, we cannot attribute this decline solely to military activities and the magnitude of the decline does not directly equate to the amount of anticipated mortality that is likely to result from the expanded training. In areas where moderate disturbance is likely to occur, other sources of mortality, unrelated to military activities, are likely to play a more pronounced role in population declines than they will in heavily disturbed areas. Therefore, the proportion of the decline that we can attribute to mortality from military activities will be lower than in the high intensity disturbance areas. Consequently, as a reasonable worst-case scenario, we anticipate that military activities will kill 307 larger desert tortoises in moderately disturbed areas of MCAGCC; this amount is likely an overestimate.

We have no data on the degree to which the population of smaller desert tortoises could decrease in moderately disturbed portions of MCAGCC. However, if they decrease by the same magnitude as the larger animals, the number of smaller animals would decrease by 25 percent in moderately disturbed areas of MCAGCC. This decrease would equate to a loss of 1,445 (= 25 percent of 5,779; see Table 14) individuals. As in the heavily disturbed areas, this decline would result from mortality rates and/or recruitment rates that exceed the reproductive output of the adult females. In moderately disturbed areas, we anticipate that military activities are likely to contribute to this decline by decreasing the number of reproductive females and directly killing some smaller desert tortoises. However, other sources of mortality, unrelated to military activities, are likely to play a more pronounced role in the heavily disturbed areas than in those that are moderately disturbed.

Consequently, as a reasonable worst-case scenario, we anticipate that military activities will kill 1,445 smaller desert tortoises in moderately disturbed areas of MCAGCC; this amount is likely an overestimate. Table 16 depicts our estimates of the number of desert tortoises that training would likely kill within the current boundaries of the MCAGCC.

Table 16. Estimates of the number of desert tortoises likely to be killed within the current boundaries of the MCAGCC.

	Larger	**Smaller**
Heavily Disturbed Areas	255 to 312	1,202 to 1,471
Moderately Disturbed Areas	307	1,445
Total	562 to 619	2,647 to 2,916

Although the estimates in this table are the result of a reasonable application of the best available data, they contain numerous sources of potential error. First, we have based these estimates on survey data that are more than 10 years old. Second, the Marine Corps based its estimates of the current population size within areas identified for heavy or moderate disturbance on broad generalizations of density across the landscape that do not account for existing site-specific disturbances (e.g., existing road, staging area, areas of high cross-country vehicle travel) that may result in lower densities in specific locations. Third, estimates of juvenile population size derived using Turner et al. (1987) likely overestimate the current number of juveniles. Fourth, the Service estimates assume that the level of military training determines the density of desert tortoises, which likely ignores other sources of mortality that may influence density. Fifth, the Service's density estimates assume a stable state for populations of desert tortoises (e.g., 2 adults per square mile is a density indicative of an area with 700 tracks per mile). Our estimates, however, only reflect the density at the time the surveys were performed and ignore the potential that these populations were continuing to decline due to the level of disturbance. Sixth, the correlation of desert tortoise density to track counts is based on survey data collected at the same time that the population estimate surveys were performed. Therefore, it is more accurate to say that these densities reflect a fine-scale look at the disturbed portions of the area where population estimation occurred rather than the probable decline in density that may occur under the new training scenario. Although these sources of error only allow for a rough characterization of the injury and mortality that may occur from the proposed action, these sources of error would tend to overestimate the level of injury and mortality that military activities will cause.

Military Activities in Areas Identified for Heavy and Moderate Disturbance in the Expansion Areas

The Marine Corps will translocate desert tortoises from the areas identified for heavy and moderate disturbance within both expansion areas, so military activities will only injure or kill the animals that are not located during clearance surveys. The Marine Corps is not likely to detect all of the individuals that are present during clearance surveys because desert tortoises in general are difficult to find and smaller animals are very difficult to detect. Table 17 compares pre-project survey estimates and data on located desert tortoises for Units 2 and 3 of the Ivanpah Solar Electric Generating System (ISEGS) facility, which provides information that we use in our analysis for estimating the number of individuals that the Marine Corps is likely to miss during clearance surveys.

Table 17. Numbers of desert tortoises estimated and founds at the ISEGS facility.

Carapace Length (millimeters)	Pre-project Population Estimate [9]	Desert Tortoises Located During Clearance and Construction Monitoring[10]	Percentage of Estimate Located	
0 - 119	467/555	54	11.7/9.7	13.5/11.5
120 - 159	30	13	43.0	
> 160	64	55	85.9	

Similar information is also available from Fort Irwin, where the Army predicted that its southern expansion area supported between 526 and 565 adult desert tortoises on approximately 22, 214 acres. To date, it has found 565 desert tortoises greater than 160 millimeters in length on approximately 19,643 acres. The Army also found 103 desert tortoises smaller than 160 millimeters in this area (Service 2012c). Given the number of individuals larger than 160 millimeters located during these clearance surveys, and the large proportion of the population that individuals smaller than 160 millimeters generally comprise, it is likely that the Fort Irwin clearance surveys located only a small proportion of the smaller individuals.

[9] Numbers based on Service 2011f (8-8-10-F-24R). This biological opinion grouped hatchlings (i.e., smaller than 49.7 millimeters) and eggs together into a single estimate. The first row of this column reports individuals 119 millimeters or smaller, which includes hatchlings and eggs. The larger number assumes that all individuals smaller than 49.7 millimeters are still in egg form, while the smaller number assumes that all viable eggs have hatched and become the hatchling portion of the population. The predicted number of hatchlings assumes a 55 percent egg-hatching rate per Turner et al. (1987).
[10] Numbers based on Jackson 2012.

Based on the information above, we expect that clearance surveys and subsequent construction monitoring generally locate most of the estimated number of larger individuals (i.e., >160 millimeters carapace length); the percentage of the estimate located decreases for smaller size classes. This outcome is logical because smaller desert tortoises are more difficult for surveyors to locate. We noted in the Environmental Baseline Section of this biological opinion that the use of Turner et al. (1987) likely causes us to overestimate the number of animals in the smaller size classes.

Because the Marine Corps would perform an initial clearance survey of heavily and moderately disturbed areas according to Service protocols, followed by annual clearance surveys of higher density areas (i.e., three or more desert tortoises per square kilometer) in the active season prior to each MEB exercise, we anticipate that it will locate most of the larger animals (i.e., at least 85.9 percent of the individuals larger than 160 millimeters; see table 17). Based on the results from the ISEGS project, we anticipate that the Marine Corps will also locate approximately 13.5 percent of the individuals smaller than 160 millimeters, which is the percentage of the estimated number of smaller animals that were detected at the Ivanpah site. Most of these animals will be in size classes that are larger and therefore closer to reproductive age.

We developed the following tables to indicate the number of desert tortoises that are likely to remain in the areas that would be heavily and moderately disturbed by training following translocation. We based our estimates on the current number of desert tortoises in these areas and the predicted efficiency of clearance surveys. We used the efficiency rates from the ISEGS project to develop the estimates because this clearance was the most-recent, large-scale clearance conducted and, as such, benefitted from work that preceded it (e.g., Fort Irwin). Despite the fact that the information from the ISEGS project comprises the best available data, several factors exist that are likely to cause the results to differ between that project and the proposed action. These factors are:

1. The proposed moderate and heavy disturbance areas in the expansion areas are more than four times the size of the ISEGS project; as the area to be cleared of desert tortoises increases, so does the difficulty in finding all of the desert tortoises that are present.
2. Biologists searched the ISEGS site more thoroughly than required by the Service's protocols and employed intensive search techniques to find smaller animals.
3. The removal of vegetation from the ISEGS site as construction progressed allowed for the discovery of additional desert tortoises; the Marine Corps will not remove vegetation from the training areas prior to military maneuvers.

Because we based the following tables in part on Turner et al. (1987), we remind the reader of the predictive limitations of this method of estimating the number of smaller animals, as we have mentioned previously in this biological opinion. By using Turner et al. (1987), we have likely overestimated the number of smaller desert tortoises; consequently, our estimate of the number of smaller desert tortoises remaining after clearance surveys is also likely an overestimate. Despite developing these tables with the best available information, we do not know the exact number of desert tortoises that would be present before and after translocation. We expect that the numbers in table 18 provide a reasonable worst-case scenario for our analysis because we have likely overestimated the number of smaller desert tortoises that are present.

Table 18. Estimates of the number of desert tortoises before and after translocation.

Larger Desert Tortoises - - Projected Clearance Efficiency = 85.9 percent	**Size (Square Miles)**	**Pre-Clearance**		**Post-Clearance**	
		Number of Animals	**Density (per square mile)**	**Number of Animals**	**Density (per square mile)**
Western Expansion Area					
Heavy Disturbance	15.08	276	18.3	39	2.6
Moderate Disturbance	38.52	724	18.7	102	2.7
Southern Expansion Area					
Heavy Disturbance	1.42	26	18.3	4	2.6
Moderate Disturbance	4.09	79	19.3	11	2.7

Smaller Desert Tortoises - - Projected Clearance Efficiency = 13.5 percent	**Size (Square Miles)**	**Pre-Clearance**		**Post-Clearance**	
		Number of Animals	**Density (per square mile)**	**Number of Animals**	**Density (per square mile)**
Western Expansion Area					
Heavy Disturbance	15.08	1,301	86.3	1,125	74.6
Moderate Disturbance	38.52	3,413	88.6	2,952	76.6
Southern Expansion Area					
Heavy Disturbance	1.42	66	46.5	57	40.2
Moderate Disturbance	4.09	372	90.9	322	78.7

As we stated for our estimates of mortality within the existing installation, we cannot attribute all the declines in the following discussion solely to military activities. To the best of our knowledge, the overall population in the expansion areas is declining. We anticipate that military activities are likely to be the greatest source of mortality in the high intensity disturbance areas; other factors may influence desert tortoises more intensely in areas of moderate disturbance.

Areas of Moderate Disturbance. Based on the size of the areas, the estimated number of animals present, and the likely percentage of animals translocated, we anticipate that 102 larger desert tortoises and 2,952 smaller desert tortoises would remain in the portion of the western expansion area proposed for moderate disturbance prior to the commencement of military activities. For the southern expansion area, we anticipate that 11 larger desert tortoises and 322 smaller desert tortoises would remain after translocation.

We anticipate that the individuals remaining within these regions of the expansion areas would experience a similar magnitude of effects to those that we predict for moderate disturbance areas on the existing installation (i.e., >400 tracks per mile). Based on information from existing training on MCAGCC, we indicated that the density of larger desert tortoises was likely to decrease to approximately 8.5 per square mile in areas that will experience this level of disturbance. Because the post translocation density of larger desert tortoises will be below this, we do not anticipate that training within the moderate disturbance areas would result in a substantial decline in the number of larger desert tortoises that remain following clearance surveys.

We have no data on how training would affect the number of smaller desert tortoises in moderately disturbed areas. The best available information stems from the Marine Corps' work on the density of larger desert tortoises in training areas on base. Therefore, we will use the same predictions for smaller animals that we did for larger desert tortoises and assume that populations of smaller desert tortoises would decline in proportion to the decline in larger desert tortoises. Based on the size of the areas, the estimated number of animals present, and the likely percentage of animals translocated, we anticipate that 2,952 smaller desert tortoises would remain in the portion of the western expansion area proposed for moderate disturbance prior to the commencement of military activities. For the southern expansion area, we anticipate that 322 smaller desert tortoises would remain after translocation. Consistent with our predictions regarding larger desert tortoises, we do not anticipate that training within the moderate disturbance areas would result in a substantial decline in the number of larger desert tortoises that remain following clearance surveys.

Although use of the moderate disturbance areas would be infrequent and would overlap a low-density population (i.e., post-translocation), we cannot rule out all likelihood of injury and mortality because cross-country vehicle travel would still occur. We anticipate, however, that training in these areas would injure or kill relatively few desert tortoises; given the variables involved, we are unable to predict how many desert tortoises are likely to be killed by training in these areas.

Areas of Heavy Disturbance. For the same reasons we described in the previous section, we anticipate that 39 and 4 larger desert tortoises (table 18) would remain in the areas identified for heavy disturbance in the western and southern expansion areas, respectively. In contrast with the moderate disturbance areas, we expect that training would further reduce the number of animals in these areas. Based on information from existing training on MCAGCC, the density of larger desert tortoises is likely to decrease to between 0 and 2 per square mile [i.e., density reported by Henen (2012) and Woodman (2001) for areas experiencing more than 700 tracks per mile] in heavily disturbed areas as a result of military activities. Consequently, we anticipate that the mortality of 10 to 43 larger desert tortoises within areas identified for heavy disturbance in the expansion areas is a reasonable estimate of the worst-case scenario. This loss of individuals and the resultant density would comprise a 23 to 100 percent decline in the original post-translocation population in these areas (i.e., a decline in density from 2.6 larger individuals per square mile to either 2 per square mile or 0 per square mile). Subsequent clearance surveys would reduce densities and mortality further.

As with our estimates for the moderately disturbed areas, we have no data on how training would affect the number of smaller desert tortoises, so we assume that populations of smaller desert tortoises would decline in proportion to the decline in larger desert tortoises. For the same reasons we described in the previous section, we anticipate that 1,125 and 57 smaller desert tortoises would remain in the portions of the western and southern expansion areas, respectively, proposed for heavy disturbance prior to the commencement of military activities. We expect that training would likely further reduce the number of animals in these areas. If the numbers of smaller desert tortoises decreases between 23 and 100 percent, as predicted for the population of larger individuals, this would equate to the worst-case loss of between 272 and 1,182 smaller desert tortoises from heavily disturbed portions of the expansion areas.

Summary. As we stated previously, equating any of these declines with mortality caused by the proposed military activities assumes a stable population in the absence of military training and assumes that the proposed military activities would be the only source of added mortality. We anticipate that the existing population is likely declining and that military activities would be the greatest source of mortality in training areas (except for larger animals in moderately disturbed areas). Consequently, our quantification of the loss of desert tortoises in the training areas represents a reasonable worst-case scenario associated with the proposed military activities. As we have stated previously, the Marine Corps' movement of the staging area in the southern expansion area would further reduce effects and result in the loss of fewer juvenile desert tortoises.

Although our estimates result from a reasonable application of the best available data, they contain numerous sources of potential error. First, estimates of the number of smaller desert tortoises derived by using Turner et al. (1987) likely overestimate the current number of juveniles; this overestimate affects the estimate of population size and clearance survey efficacy. Second, these estimates assume that the level of military training determines the density of desert tortoises, which ignores other sources of mortality that may influence density. Third, these estimates assume the level of disturbance anticipated in the expansion areas will affect its population to the same extent as populations on the existing installation. Fourth, our density estimates assume a stable state for populations of desert tortoises under various levels of disturbance (i.e., 2 adults per square mile is a density indicative of an area with 700 tracks per mile), when they actually only reflect the density at the time the surveys were performed and ignore the potential that these populations were continuing to decline.

Military Activities in the Remaining Portions of the Existing Installation and Expansion Areas

In addition to the heavily and moderately disturbed areas, mortality of desert tortoises is also likely to occur in other portions of the existing installation and expansion areas due to military activities. On the existing installation, we do not anticipate that these areas will receive an increase in military training because the Marine Corps has indicated that the new training scenarios will focus within areas identified for heavy and moderate disturbance. Our biological opinion regarding the effects of the current level of military training on MCAGCC (Service 2002; 1-8-99-F-41) addresses these areas. As we describe in the following paragraphs with regard to future training in portions of the expansion areas that would undergo lighter use, we are unable to quantify the number of desert tortoises that are likely to be killed or injured in these areas.

Within the expansion areas, we also anticipate some level of injury and mortality in areas that are away from heavily and moderately disturbed locations. Disturbance in these locations would be substantially less; however, because the Marine Corps would not translocate desert tortoises from these areas, more animals would be subject to the effects of the disturbance. Henen (2012e) indicated that the portions of the existing installation that experienced low (i.e.,<100 tracks per transect) to moderate disturbance (i.e., 100 to 399 tracks per transect) supported densities between 12.6 and 15.6 adults per square mile. Although we cannot predict the intensity of military training in areas that would not be heavily and moderately disturbed, the disturbance in these areas is unlikely to exceed that identified as low to moderate.

We developed the table 19 using data on population size in the SUAs from Karl and Henen (2011) and other data that we have previously identified in other portions of this biological opinion (i.e., size of SUAs, expansion area population size, population size in areas proposed for heavy and moderate disturbance, and size of heavy and moderate disturbance areas). It provides information on the number and density of desert tortoises in portions of the expansion area that are open to cross-country vehicle travel but outside of areas identified for heavy and moderate disturbance.

Table 19. Desert tortoises in portions of the expansion area open to cross-country travel but outside of heavy and moderate disturbance areas.

Areas Open To Training outside of Proposed Heavy and Moderate Disturbance Areas	Size (Square Miles)[11]	Adult Population Size[12]	Adult Population Density (per square mile)	Juvenile Population Size[13]	Juvenile Population Density (per square mile)
Western Expansion Area	156.8	1640	10.5	10,975	70
Southern Expansion Area	23.2	169	7.3	1,131	49

Currently, our analysis indicates that the density of larger desert tortoises in the expansion areas is below that of similar disturbance regimes on MCAGCC. Therefore, the anticipated effects within these areas are unlikely to result in substantial declines in the overall number of desert tortoises that remains following clearance surveys. Although use of these areas would be infrequent, we cannot rule out all likelihood of injury and mortality of desert tortoises due to the cross-country vehicle travel that could occur. When the Marine Corps undertakes activities that would result in ground disturbance, it would move desert tortoises out of harm's way if they are located. We anticipate that the relatively few desert tortoises are likely to be injured and killed. As with the analysis of effects on other portions of the existing installation and expansion area, numerous assumptions and potential sources of error exist; we have not re-stated those

[11] Size = expansion area size – (SUA size + size of heavily and moderately disturbed areas)
[12] Adult Population Size = Service point estimate from Environmental Baseline – (SUA population estimate from Karl and Henen 2011 + population size of heavily and moderately disturbed areas from DoN 2011a)
[13] We used the same method for calculating juvenile population size as was used for adult population size (see footnote above). However, Karl and Henen (2011) did not calculate juvenile population size in the SUAs. We estimated this by assuming that the juvenile population estimate comprised 87 percent of the total population per Turner et al. (1987).

assumptions or caveats here. Given the variables involved, we are unable to predict how many desert tortoises are likely to be killed by cross-country vehicle travel in these areas

Because heavily and moderately disturbed areas would not be fenced to exclude desert tortoises, some potential also exists that they would act as a mortality sink; therefore, military training would continue to injure or kill desert tortoises that disperse into these areas from adjacent locations. This movement of desert tortoises into these areas could occur as the result of animals reoccupying a portion of their former home range, adult males seeking females, and juveniles dispersing from their nests. We cannot reasonably predict the number of desert tortoises that this effect could kill or injure. However, the Marine Corps has proposed to implement annual clearance surveys of higher density areas (i.e., three or more desert tortoises per square kilometer), within areas to be moderately or heavily disturbed. Consequently, we anticipate that this effect would result in the injury and mortality of few, if any, larger desert tortoises.

Effects of Translocation

Effects to Desert Tortoises

Although we would later authorize desert tortoise translocation under a section 10(a)(1)(A) recovery permit, we have analyzed its effects here because they are part of the proposed action. The recovery permit will govern and authorize all activities performed as part of the translocation. Translocation will only proceed following the Service's approval of the Marine Corps' final translocation plan and research design.

Prior to the initiation of training activities, the Marine Corps will translocate desert tortoises from the areas identified for heavy and moderate disturbance in the expansion areas to release sites in the Ord-Rodman DWMA, Sunshine Peak Training Area, and the newly established SUAs within the expansion areas. We anticipate the Marine Corps will capture and translocate most of the larger animals, but it is unlikely to find most individuals in smaller size classes. As discussed previously, we anticipate that the clearance surveys will locate 85.9 and 13.5 percent of the larger and smaller desert tortoises, respectively. Based on the current number of animals within these areas, we anticipate the Marine Corps would translocate 949 adult and 696 juvenile desert tortoises, respectively. The Marine Corps' movement of the southern staging area to locations that contain fewer desert tortoises would result in a decrease in these estimates.

These estimates provide a rough characterization of the number of animals that the Marine Corps will translocate; we cannot precisely quantify the number of desert tortoises it would translocate for several reasons. First, we do not know the ultimate location of the MEB objective, company objectives, staging areas, or other features where clearance surveys would occur. Second, even if we knew the location of these features, the estimates provided for the representative design have wide confidence intervals that do not allow for precise quantification of effects. Finally, the Marine Corps will conduct annual clearance surveys of higher density areas that should find additional desert tortoises that may move into the heavy or moderate disturbance areas after the initial clearance surveys. The Marine Corps will conduct these clearances in the active season prior to MEB exercises.

In preparation for translocation, the Marine Corps will collect 3 years of baseline information on desert tortoise density, distribution, health status, and habitat within the areas occupied by the recipient and translocated populations. In addition, the Marine Corps will collect similar information from populations on control plots. The Marine Corps will use this information in refining its translocation plan and research design prior to moving desert tortoises. We do not know how many animals the Marine Corps would handle during this process, but it is unlikely that it would exceed the number of individuals associated with post-translocation monitoring.

Following translocation, the Marine Corps will monitor 20 percent of the translocated adult population (i.e., 190 adults), 5 percent of the translocated juvenile population (i.e., 35 juveniles) and an equal number of individuals that are resident to the recipient site (i.e., 225 individuals) and control site (i.e., 225 individuals). The Marine Corps will monitor these animals for 5 years using radio tracking, periodic health assessments, blood collection, and collection of other data. After 5 years, the Marine Corps will monitor 50 animals in each group (control, recipient and translocation; Karl & Henen 2011) In addition, the Marine Corps will monitor desert tortoises on 10 to 12 0.4-square-mile plots in the recipient and control sites every 5 years for 30 years. Based on the overall density of the Ord-Rodman DWMA (almost 20 per square mile), where most plots would be located, the number of desert tortoises monitored on study plots could be approximately 91 adults. However, the final location of the plots and their site-specific density could result in some variation from this estimate.

The Marine Corps will use some of the desert tortoises involved in translocation monitoring to answer specific research questions concerning desert tortoise repatriation and stocking densities. These studies will involve experiments that include stocking specific plots in the recipient site at varying levels to look at density effects and fencing of some plots to determine if short-term containment of translocated animals will increase the speed at which they adopt new home ranges. The Marine Corps will move translocated desert tortoises found to have clinical signs of disease to the MCAGCC head-start facility where it will use them in research on vertical transmission of disease.

This translocation strategy would involve the periodic handling, blood collection, marking for later identification, placement and replacement of transmitters, and movement of large numbers of desert tortoises over a 30-year period. Based on the frequency of monitoring described in the translocation strategy, the Marine Corps is likely to capture and perform these activities on most animals numerous times over the course of the monitoring period, with the number of animals subjected to these activities decreasing over time. Capturing and handling desert tortoises and performing blood collection and transmitter placement may cause elevated levels of stress that render them more susceptible to disease or dehydration from loss of fluids. Information from the Fort Irwin translocation project indicates that translocations in that study did not cause a measurable physiological stress response (Averill-Murray 2011, Drake et al 2012). Additionally, because the Marine Corps will use experienced biologists approved by the Service and approved techniques, we do not anticipate that these animals are likely to be injured or killed because of improper handling.

This translocation strategy would also involve short- and long-term quarantine of individuals to assess disease status or for disease research. Because the Marine Corps is proposing to leave animals in the field while awaiting blood test results, we anticipate that the number of individuals held for short-term quarantine would be small. We anticipate that short-term quarantine is unlikely to result in injury or mortality of desert tortoises because the Marine Corps will hold these individuals in an approved facility and use approved handling and husbandry techniques during the quarantine period.

Previous studies have documented desert tortoise mortalities at long-term quarantine and head-start facilities (Nagy 2010, Hillard et al. 2006). These studies have noted specific problems related to predation of juvenile desert tortoises by ground squirrels (*Spermophilus* spp.) and fire ants (*Solenopsis xyloni*) and potential predation by roadrunners (*Geococcyx cailfornianus*) and burrowing owls (*Athene cunicularia*). Based on 5 years of data on desert tortoise survivorship at the Marine Corps' head-start facility, Nagy (2010) reported that up to 80 percent of hatchlings survived their first year of life and yearly survival for individuals larger than hatchlings was up to 90 percent. This mortality rate is probably substantially less than what individuals in these size classes would experience in the wild. Adult desert tortoises that have lower natural susceptibility to mortality factors are likely to experience little, if any, mortality while in captivity.

Previous studies have documented numerous effects that could occur following translocation. Translocation studies have shown that straight-line movement distances following release can be over 3.73 miles in the first year for some desert tortoises (Berry 1986, Field et al. 2007, Nussear 2004). Mean dispersal distances observed on 3 study plots south of Fort Irwin ranged from 0.09 to 3.5 miles, with maximum dispersal distances of between 7.8 to 14.3 miles (Walde et al. 2008). For short-distance translocations, data seem to indicate shorter post-translocation dispersal distances (0.5 to 0.9 miles) (Walde et al. 2008). Translocated desert tortoises can also substantially expand the area they occupy in the first year following translocation (e.g., from 3.9 to 6.9 square miles at a Nevada site; from 0.2 to 10.3 square miles at a Utah site). The degree to which these animals expand the area they use depends on whether the translocated animals are released into typical or atypical habitat; that is, if the recipient site supports habitat that is similar to that of the source area, desert tortoises are likely to move less (Nussear 2004).

Some translocation studies have found that translocated animals seem to reduce movement distances following their first post-translocation hibernation to a level that is not substantially different from resident populations (Nussear 2004, Field et al. 2007). As time increases from the date of translocation, most desert tortoises change their movement patterns from dispersed, random patterns to more constrained patterns, which suggest an adoption of a new home range (Nussear 2004). However, translocation studies at Fort Irwin have found that desert tortoises that were released a substantial distance from their capture site moved greater distances than both resident and control groups over a 3-year period, but animals released a short distance from their capture site had similar movement patterns to those of resident and control groups (Averill-Murray 2011). This may indicate that some translocations result in translocated animals taking longer to settle into new home ranges after release, but the distance that the animals are moved from their capture site likely influences this result.

We cannot predict the direction that translocated animals are likely to move. In some studies, translocated desert tortoises have exhibited a tendency to orient toward the location of their capture and attempt to move in that direction (Berry 1986), but in other instances, no discernible homing tendency has been observed in translocated animals (Field et al. 2007). Information specific to short-distance translocations indicates that at least some individuals will attempt to return to their former home ranges after release (Rakestraw 1997, Stitt et al. 2003).

Studies have documented various sources of injury and mortality for translocated individuals, including predation, exposure, fire, disease, crushing by cattle, and flooding (Nussear 2004, Field et al. 2007, Berry 1986, U.S. Army 2009, 2010). Because of the post-translocation movements exhibited by desert tortoises, some potential also exists for desert tortoises to die on roads during the period when translocated individuals are seeking new home range locations. As with other translocations (Nussear 2004, Field et al. 2007, U.S. Army 2009, 2010), we anticipate that predation is likely to be the primary source of post-translocation mortality. The level of winter rainfall may dictate the amount of predation observed in desert tortoises (Drake et al. 2010). Study of translocated desert tortoises at Fort Irwin has documented a statistically significant relationship between decreased precipitation and increased predation. Specifically, predation by coyotes affected translocated, resident, and control desert tortoises at the same rate (Drake et al. 2010)

Based on this information, we anticipate that some of the translocated desert tortoises will move substantial distances after their release. However, the Marine Corps will perform studies of the recipient site to identify suitable desert tortoise habitat for the final release sites. Ensuring that desert tortoises are moved only into suitable habitat is likely to reduce post-translocation movement to some extent. Translocated desert tortoises may also exhibit homing behavior and orient their movement towards training lands. Animals released into fenced areas as part of the repatriation study would not move long distances because of their confinement, which would continue until these animals establish defined home ranges.

These predicted movement patterns are likely to place desert tortoises at risk of injury and mortality as they experience exposure to mortality sources while they are seeking new home ranges. Sources of injury and mortality during this period are likely to include those identified above, but predation is likely to affect translocated animals to the greatest degree (as it would control and resident desert tortoises, particularly during periods of drought). We anticipate that the fencing proposed by the Marine Corps to prevent desert tortoises from re-entering training areas from the translocation areas would be effective in reducing mortality. However, when desert tortoises encounter exclusion fencing, they often exhibit fence-pacing behavior that can increase their exposure to predators and temperature extremes; the Marine Corps has proposed to monitor new fences after they are installed to reduce the likelihood that desert tortoises would be killed while pacing fences.

Translocating desert tortoises may also adversely affect resident desert tortoises within the action area due to local increases in population density. Increased densities may result in an increased spread of upper respiratory tract disease or other diseases, an increased incidence of aggressive interactions between individuals, and an increased incidence of predation that may not have occurred in the absence of translocation. Saethre et al. (2003) evaluated the effects of density on desert tortoises in nine semi-natural enclosures at the Desert Tortoise Conservation Center in Nevada. The enclosures housed from approximately 289 to 2,890 desert tortoises per square mile. Saethre et al. (2003) observed a greater incidence of fighting during the first year of the experiment but did not detect any trends in body condition index, reproduction, or presence of the symptoms of upper respiratory tract disease among the enclosures. Body condition index and reproduction are important indicators of how translocation may affect resident desert tortoises; generally, stress suppresses body condition index and reproduction in desert tortoises. This study did not draw any conclusions regarding density-dependent effects on predation of desert tortoises.

The Marine Corps has proposed to conduct repatriation research that will involve the enclosure of resident and translocated populations in a confined space. In addition, the Marine Corps has proposed to investigate stocking rates for translocation through analysis of plots that they stock at varying densities. Installation fences for repatriation enclosures result in similar effects to those discussed previously for fence installation in other portions of the action area (i.e., handling of desert tortoises, home range effects, fence pacing, etc.). However, given the information above and the density levels proposed by the Marines for this study, post-translocation densities would not approach those where Saethre et al. (2003) observed adverse effects.

Translocation has the potential to increase the prevalence of diseases, such as upper respiratory tract disease, in a resident population. Stress associated with handling and movement or due to density-dependent effects could exacerbate this threat if translocated individuals with subclinical upper respiratory tract disease or other diseases begin to exhibit clinical signs of disease due to the stress associated with handling and movement. However, as we noted previously in this biological opinion, the study at Fort Irwin indicated that translocation did not cause a measurable physiological stress response (Averill-Murray 2011, Drake et al 2012). Because the Marine Corps will use qualified biologists and approved techniques to perform translocation tasks, we do not anticipate that these animals would experience increased stress during handling. Increased stress may occur after release while animals are seeking new home ranges, but we do not anticipate that post-translocation density would play a role. Finally, the Marine Corps will perform full health assessments on all desert tortoises associated with the translocation to determine if they carry disease. The Marine Corps will not translocate any animals showing clinical signs of disease and will only release individuals following review and approval of test results by the Service. For these reasons, we do not anticipate that translocation will result in an increase in disease prevalence in the translocation area.

Although we have qualitatively analyzed translocation effects, quantitative assessment of the magnitude of each effect is difficult for the following reasons. First, we cannot precisely quantify the number of desert tortoises that the Marine Corps would ultimately translocate. Second, we cannot quantify the degree to which protective measures will reduce adverse effects. Third, we cannot predict the current disease prevalence within the populations discussed above, which would affect the number of individuals released. Finally, we cannot predict the amount of time it will take for desert tortoises to settle into new home ranges, where they would be relatively safer from mortality sources. Although, we cannot provide a precise estimate of the level of injury and mortality for the proposed translocation, we have attempted to provide a rough characterization of its magnitude below.

During various studies, the observed levels of mortality in translocated desert tortoises have ranged from 0 to 24.9 percent (Field et al. 2007, Cook et al. 1978 in Nussear 2004). None of these studies compared mortality rates in resident and translocated populations to the mortality rate in populations not affected by translocation (i.e., controls); therefore, we cannot determine whether translocation or other factors caused these mortalities. Nussear (2004) found that mortality among translocated animals was not statistically different from mortality observed in resident populations. Esque et al. (2010) found that mortality in resident (29 of 140 desert tortoises; 20.7 percent mortality), control (28 of 149; 18.8 percent), and translocated (89 of 357; 24.9 percent) animals did not differ statistically and concluded that the translocation was not the cause of the observed mortality. All of the studies identified above are short-term studies that did not investigate the long-term effects of translocation. We currently have no information on the long-term effects of desert tortoise translocation.

Some aspects of the Marine Corps' translocation, such as the proposed repatriation and translocation density studies are different from the studies discussed above and could introduce sources of mortality that were not part of previous studies. Fence pacing within the repatriation research plots may result in exposure or predation risk. Increased densities on experimental plots may result in effects that are unforeseen. However, repatriation plots are also likely to reduce the movement distances of desert tortoises following translocation; in theory, reducing the amount of wandering would reduce mortality. Past density studies have also shown that the densities proposed by the Marines on experimental translocation plots are far below that in which desert tortoises would experience adverse effects.

We have already indicated that the Marine Corps would place some desert tortoises, in short- or long-term quarantine and may use them for future research, which the Marine Corps has not yet proposed. However, as we have already concluded, desert tortoises that are placed in quarantine are likely to have a mortality rate that is equal to or better than they would have experienced in the wild. If the Marine Corps proposes additional research in the future, we will evaluate in under the guidelines of section 10(a)(1)(A) of the Endangered Species Act to ensure that it results in information that would be useful in supporting the conservation of the desert tortoise and includes appropriate safeguards to protect individuals.

Drake et al. (2011) note that mortality rates among translocated, resident, and control animals in Fort Irwin's southern translocation area ranged from 34 percent in 2009 to 1.5 percent in 2011. Drake et al. (2011) also note other studies that demonstrate variable mortality rates in consecutive years and that "(d)rought) can also indirectly increase mortality through increased predation on adult (desert) tortoises as the result of a functional response (prey switching) of predators to a decrease in prey availability." Consequently, we cannot estimate the level of post-translocation mortality in the three groups because of regional factors that we cannot control or predict (e.g., drought, predation related to a decreased prey base during drought, etc.). Based on Esque et al. (2010), however, we anticipate that post-translocation mortality will be approximately equal among the resident, control, and translocated populations.

Consequently, based on this range of rates, we anticipate the mortality of 329 to 411 translocated desert tortoises. Because past studies have documented similar levels of mortality between translocated, recipient, and control site populations, we also estimate that a similar proportion of the control and recipient site populations would die. Because the Marine Corps will only monitor 225 individuals in each of the 3 populations (i.e., translocated, resident, and control), mortality within the monitored populations would be between 45 and 56 in each group. We do not anticipate this mortality will be the direct result of translocation; past studies indicate that predation influenced by drought may be an important driver of the mortality in the region, although individuals will also likely die from other causes. The monitoring of the control population will assist us in determining whether this prediction is realized. We have no information with which to predict the long-term population-level effects of this translocation. We acknowledge that other factors may affect mortality rates in the region; in such cases, we expect that mortality rates may vary widely between years and the key measure of the effects of translocation will be the comparison of the rates of mortality among translocated, resident, and control animals.

Effects to Critical Habitat of the Desert Tortoise

Installation of up to 24 linear miles of desert tortoise exclusion fence for 6 one-square-mile repatriation pens could disturb habitat in certain locations within the Ord-Rodman Critical Habitat Unit; these fences would be in place for 2 years. The Marine Corps has not identified the final location of these pens, but the potential exists that some or all of them could occur within the Ord-Rodman Critical Habitat Unit. To address the potential worst-case scenario, our analysis assumes that the Marine Corps would construct all pens within the critical habitat unit. On the ISEGS project, BrightSource Energy estimated the need for a 10-foot-wide disturbance area for installation of desert tortoise exclusion fencing (Service 2010j, 8-8-10-F-24). A similar right-of-way associated with repatriation pens would disturb approximately 29 acres of critical habitat. We will consider how the installation of the fencing would affect the primary constituent elements of critical habitat.

The first primary constituent element of critical habitat is sufficient space to support viable populations within each of the six recovery units and to provide for movement, dispersal, and gene flow. The installation of the fencing would not result in the long-term removal of habitat. Although the ability of the critical habitat unit to allow for the movement, dispersal, and gene flow of desert tortoises would be disrupted for a relatively short time, the fencing would not compromise the long-term conservation value and function of the Ord-Rodman Critical Habitat Unit because these functions would be restored upon the removal of the fence.

Depending on the exact manner in which the Marine Corps installs the fence, the effects on the second primary constituent element (sufficient quality and quantity of forage species and the proper soil conditions to provide for the growth of these species) would vary. For example, a bladed road would remove most of the forage species from the right-of-way and disrupt soil conditions for a relatively long time; these effects would diminish if the Marine Corps uses less intrusive means of installation. We expect that, even in the worst-case scenario of a bladed right-of-way, the loss of the forage plants and disruption of soil conditions on 29 acres distributed in a linear manner would not compromise the long-term conservation value and function of the Ord-Rodman Critical Habitat Unit. We have reached this conclusion because, over time, forage plants and soil conditions would return to a more functional condition; additionally, the disruption of forage and soil on such a small area would not measurably affect the critical habitat unit as a whole.

The third primary constituent element, suitable substrates for burrowing, nesting, and overwintering, would likely undergo short-term impacts because of the installation of the fence. Again, depending on the nature of the installation, the effects to these substrates would vary from negligible to rendering them non-functional. Even in this worst-case situation, the disruption of substrates on such a small area would not measurably affect the critical habitat unit as awhile.

The fourth primary constituent element is burrows, caliche caves, and other shelter sites. We expect that the installation of the fence along the right-of-way would not any caliche caves because these structures are likely sufficiently rigid to withstand the equipment that would the Marine Corps would likely use. Burrows and other shelter sites may be destroyed if the Marine Corps does not avoid them during construction. We expect that the installation of the fence would not compact substrates to the degree that desert tortoises would be unable to construct new burrows and shelter sites; thus, this work is unlikely to affect this primary constituent element to a measurable degree.

The installation of the fence would affect the fifth primary constituent element (sufficient vegetation for shelter from temperature extremes and predators) in a more substantial manner because shrubs comprise its main component. If the Marine Corps removes shrubs during installation of the fence, they would require a relatively long time to grow to a size where they again provide shelter; drought would lengthen time required for them to grow back. Because the installation would affect a narrow band of habitat within a much larger critical habitat unit, we do not expect that the long-term conservation value and function of the Ord-Rodman Critical Habitat would be measurably affect as a result of effects to the perennial vegetation along the right-of-way.

The last primary constituent element, habitat protected from disturbance and human-caused mortality, would experience short-term effects during construction and removal of the fence. Otherwise, the fence will not measurably affect the level of disturbance and human-caused mortality within the right-of-way.

Given the total size of the Ord-Rodman Critical Habitat Unit (i.e., 184,155 acres, see Status of Critical Habitat section), this level of disturbance to the primary constituent elements would not result in measurable change in the conservation value and function of the critical habitat unit as a whole. Additionally, over time, at least some of the disturbances caused by the installation and removal of the fence would likely diminish.

We expect that all other activities related to the translocation of desert tortoises to the Ord-Rodman Critical Habitat Unit would have little, if any, effect on the primary constituent elements. We have reached this conclusion because most activities associated with the translocation would be conducted on existing roads, which do not support the primary constituent elements. A small amount of critical habitat adjacent to roads may be temporarily disturbed; we expect the size of this disturbance to be minimal and its effects on the function of critical habitat to not be measurable. We do not expect translocated desert tortoises to affect critical habitat.

Effects of Reduced Densities and Population Fragmentation on Population Viability

In previous sections, we discussed habitat loss and several sources of injury and mortality of desert tortoises that are associated with military activities. We anticipate that the predicted level of habitat loss and mortality will reduce desert tortoise densities and fragment desert tortoise populations to some degree. Extensive habitat loss or installation of impermeable barriers to movement can reduce population connectivity, which can reduce or eliminate the exchange of genetic information or place populations at risk from demographic imbalances. If isolated populations are small or have a low density, long-term population viability is unlikely.

The Service (1994) recommended a viable population density threshold of 10 desert tortoises per square mile because male and female desert tortoises were less likely to locate one another and reproduce below this density. At a minimum density of 10 individuals per square mile, desert tortoise populations require at least 500 square miles of area to maintain evolutionary potential. The maintenance of evolutionary potential requires a population of at least 5,000 adult individuals to maintain sufficient genetic diversity for long-term genetic potential and a density of at least 10 desert tortoises per square mile is needed to protect against genetic deterioration and demographic stochasticity (Service 1994). To protect against demographic consequences of small population size and buffer population size so the population persists, population size must be at least 10,000 adult animals (Service 1994). A population that has a high density (i.e., well above 10 adults per square mile) and is relatively stable requires less contiguous area because individuals are able to find one another to mate; such a population is more likely to maintain the minimum size necessary for long-term viability. Low-density populations require more contiguous area to meet the minimum viable population size. Loss of individuals from a low-density population in a smaller area that is not connected to other blocks of occupied habitat could mean that it drops below the threshold density necessary to ensure mating and reproduction. This would result in loss of population viability due to the effects of genetic deterioration and demographic stochasticity.

The Marine Corps did not provide information on the percentage of the existing installation that is at or below the minimum density threshold, but we know that 71 percent of the installation, primarily in areas used for training, have densities of between 0 and 20 per square mile based on surveys from the late 1990s (DoN 2011a). We do not know what portion of MCAGCC currently contains desert tortoises at a density of less than 10 per square mile, but Henen (2012e) showed that areas with more than 400 vehicle tracks per transect (i.e., moderately to heavily disturbed) contained approximately 8.5 adults per square mile; this density decreased as the density of tracks increased. Approximately 52 percent of the western expansion area contains densities of less than 10 desert tortoises per square mile (DoN 2011a). Approximately 20 percent of the southern expansion area contains densities below 10 desert tortoises per square mile.

We have provided extensive information in the Environmental Baseline section to show that desert tortoises occur throughout MCAGCC and the expansion areas. In addition, desert tortoises occur adjacent to these areas (Bureau et al. 2005). Habitat potential across MCAGCC, the expansion areas, and into adjacent areas like the Ord-Rodman DWMA indicate a large contiguous block of desert tortoise habitat that connects low-density portions of MCAGCC and the expansion areas to other areas containing more desert tortoises (Nussear et al. 2009). Although populations are declining, this contiguous expanse of occupied habitat contains substantially more desert tortoises (more than19,000 adults) than is required to maintain population viability, and numerous concentrations of desert tortoises at densities that well exceed 10 desert tortoises per square mile. We have estimated a substantial loss of individuals within areas that would be heavily and moderately disturbed by military activities, but this reduction in population size is unlikely to reduce the overall population size or density to a level that would threaten population viability within the expanded installation.

Despite our conclusion about the overall population viability of the expanded installation, the potential exists that habitat loss associated with military activities could result in isolation or near isolation of desert tortoises in some portions of the expanded installation. Large expanses of denuded habitat that separate a low density of desert tortoises from those in adjacent areas could reduce connectivity and create isolated or near-isolated groups of animals that are below the minimum density and number of animals necessary to maintain population viability. Loss of population viability in these instances could result in loss of desert tortoises from localized areas within the expanded installation. However, the magnitude of effects associated with military activities indicates that habitat within the moderately disturbed areas is likely to still be conducive to some level of desert tortoise occupation. As we have indicated, denuded areas associated with heavy disturbance (e.g., MEB objective) may lose desert tortoises completely, but these areas occupy relatively small discrete locations that would not isolate populations. Consequently, we anticipate that the disturbance associated with military activities is unlikely to result in loss of population viability as a result of isolation.

On a regional scale, loss of population connectivity can affect the viability of populations in areas that we have identified as important to recovery of the species (e.g., DWMAs, national parks, etc.). Ensuring connectivity between these areas is important to allow for climate change adaptation, to provide sufficient area for viable populations, and for the maintenance of gene flow across the range (Service 2012b).

We have identified linkage areas that connect the Ord-Rodman DWMA to other desert tortoise conservation areas (Service 2012b). Current training on the MCAGCC installation and expanding training into the western expansion area would have adverse effects on one of these linkages that connects the southeastern portion of the Ord-Rodman DWMA to the northern end of Joshua Tree National Park. This linkage incorporates areas occupied by desert tortoises in the Johnson Valley Off-highway Vehicle Management Area, the western portion of the existing installation, and portions of the Morongo Basin that are south of the existing installation. Existing anthropogenic disturbances that affect desert tortoises and their habitat within this linkage include OHVs, predation by common ravens, urban development, military training, and a variety of other human uses. Because of extensive development in Landers, Yucca Valley, and Joshua Tree, we anticipate that this linkage is likely to be heavily affected on its southern end.

We have already concluded that the effects of military activities will injure and kill desert tortoises in the portions of the linkage that it would occupy (i.e., MCAGCC and the western expansion area). However, we also concluded that these activities would not extirpate desert tortoises from the linkage as a whole or from large portions of it. Consequently, the proposed action is unlikely to appreciably affect connectivity. Based on this information, we anticipate that the proposed action is likely to result in increased effects to this linkage by increasing population declines on its northern end.

Effects of Off-highway Vehicle Displacement

In general, off-highway vehicle effects include mortality of desert tortoises, collapsing of desert tortoise burrows, destruction of plants needed for cover and forage, soil erosion and compaction that reduces the ability for desert tortoises to construct burrows, proliferation of weeds, and increases in the number and location of wildfires. The 5-year review, which we have appended and incorporated by reference, provides an extensive discussion of these effects, so we have not re-stated that information. In this section, our analysis focuses on where and to what extent these identified effects would occur in the action area and seeks to characterize the level of injury and mortality we anticipate

Effects to Desert Tortoises

The Marine Corps predicts that 70 percent (195,797 visitor-days) of the existing use at the Johnson Valley Off-highway Vehicle Management Area would remain in this area and become concentrated into the RPAA and the portions of the OHV area that would remain after the expansion. The Marine Corps anticipates displacement of 30 percent of the current OHV use (83,913 visitor-days[14] per year) to other areas in southern California (DoN 2011c). This would equate to the displacement of 1,053 OHV users to other portions of southern California on an average weekend day during the most active OHV season. We anticipate that the Stoddard Valley OHV Management Area would receive the largest single share of this displacement (40 percent), based on estimates provided by the Marine Corps (DoN 2011c). The El Mirage, Spangler, Rasor, and Jawbone/Dove Springs Off-highway Vehicle Management Areas would receive 20 percent of the estimated displacement. We anticipate that displaced OHV use would affect both the areas of authorized use within these OHV areas and adjacent areas where the use of OHVs off of designated routes is not authorized.

The Marine Corps also predicts levels of authorized and unauthorized use of public and private lands not associated with designated OHV areas. Although it did not provide specific locations where this would occur, we have defined these areas based on surveys of above-average OHV use (Bureau et al. 2005). These areas would receive approximately 9 percent of the predicted displacement. We have assumed an even distribution of this displacement across these areas. For these areas, we have no information on the current level of use, so we cannot quantify the increase in OHV effects that would occur. However, surveys in the late 1990s indicate that observations of OHV related effects (see Environmental Baseline section) were lower within these areas than in the Bureau’s designated OHV areas. This indicates that, although OHV use

[14] One visitor-day equates to one person visiting a given area for a 12-hour period or a 12-hour cumulative total from multiple visitors spending shorter periods of time in a given area (i.e., 4 people spending 3 hours each equates to 1 visitor-day).

in these areas is still above average relative to the western Mojave Desert as a whole, the baseline use is likely lower than in designated OHV areas or at least results in fewer effects.

The remaining 30 percent of the predicted displacement would go to areas identified by the Marine Corps where either listed species do not occur, the displacement to these areas would not result in a measureable increase in effects, or the predicted increase would result in effects already adequately analyzed in previous biological opinions. Table 20, developed using information from DoN (2011c), Shiffer-Burdett (2012), and Bureau et al. (2005), provides estimates for the distribution of the displaced visitor-days and the resultant increase in use at each location.

Table 20. projected changes in visitor use resulting from displaced OHVs.

Area	Affected Area (Acres)	Annual Visitor-Days Displaced to this Area	Baseline Annual Visitor-Days in each Area	Baseline Annual Visitor-Days per Acre[15]	Annual Visitor-Days per Acre Increase
Stoddard Valley	91,720	33,985	151,520	1.7	0.4
El Mirage	30,080	5,287	119,591	4.0	0.2
Rasor	36,357	5,287	8,997	0.2	0.1
Spangler Hills	100,480	3,021	1,821	0.02	0.03
Jawbone Canyon/Dove Springs	24,920	3,020	285,916	11.5	0.1
Cal City/Rands	107,520	1,259	Unknown	Unknown	0.01
Edwards Bowl	19,840	1,259	Unknown	Unknown	0.1
East Sierra	8,960	1,259	Unknown	Unknown	0.1
Silver Lakes	23,680	1,259	Unknown	Unknown	0.1
Hinkley	19,840	1,259	Unknown	Unknown	0.1
Coyote Corner	24,960	1,259	Unknown	Unknown	0.1
Other Areas[16]	-	25,759	-	-	-

Given the Marine Corps' predictions, we anticipate that the RPAA and the portions of the Johnson Valley Off-highway Vehicle Management Area remaining after the land acquisition would experience increased OHV-related effects due to 70 percent of the current use concentrating into an OHV area that has decreased in size by 56 percent (i.e., 188,160 acres to 82,802 acres). As discussed in the Environmental Baseline section, much of the historical and current use of the OHV area concentrates in its central, southern, and southwestern portions. Large portions of the southern and southwestern portions of the OHV area would remain open, including popular staging, camping, and riding areas, such as Cougar Buttes, Anderson Lake, and Soggy Lake (DoN 2011b). However, closure of the remainder of the OHV area and closure of some popular areas, such as areas previously used as race routes for the "King of the

[15] Size includes both authorized and unauthorized areas of OHV use in each location.
[16] These areas are those discussed in the Environmental Baseline section that either do not contain listed species, the displacement to these areas would not result in a measureable increase in effects, or the predicted increase would result in effects already adequately analyzed in previous biological opinions

Hammers" race would result in a concentration of use and an increase in OHV-related effects in the RPAA and the remaining portions of the OHV area.

Based on the existing use of the Johnson Valley Off-highway Vehicle Management Area and the Marine Corps predictions regarding displacement, approximately 195,796 visitor-days would remain after the expansion. We have estimated the area of effect to be 141,042 acres (i.e., authorized and unauthorized historical use associated with the RPAA and the remaining portions of the OHV area), which equates to approximately 1.4 annual visitor-days per acre. We do not have baseline information on the current use in these areas, so we cannot quantify how the concentration of OHV use would increase the magnitude of effects. However, as discussed above, a substantial proportion of the current use already concentrates in these areas. Based on this information, we anticipate that concentration of OHV use into these areas will result in a small increase in use from existing levels, which may result in a small increase in the level of injury and mortality to desert tortoises due to the effects of OHV recreation. The biological assessment (DoN 2011a, figure 6-1) illustrates that high levels of disturbance already exist within large areas of the RPAA; these areas overlap, at least to some degree, the areas of estimated lowest density of desert tortoises in this area (DoN 2011a, figure 6-2). The existing low densities likely result mostly from existing recreational use (see also Karl 2010a,b).

As noted in the Environmental Baseline section, the area associated with this concentration of use includes areas of unauthorized use in the southwestern portion of the Ord-Rodman DWMA. This area contains a population that is essential to recovery of the species and is more stable than populations in other portions of the western Mojave Desert. The Marine Corps has proposed to install barriers to control human access along the boundary between the Johnson Valley Off-highway Vehicle Management Area and the Ord-Rodman DWMA, which will reduce the level of direct effects to this population.

Other non-DWMA portions of the affected area include populations that seem to be at a greater risk of losing viability based on the information discussed in the Environmental Baseline section. Although these areas are not essential to recovery of the species, they include areas containing desert tortoises that form a continuous population with animals in the southwestern portion of the Ord-Rodman DWMA. We anticipate that the other populations in the non-DWMA portions of this area will continue to decline in status based on existing sources of mortality. The small level of increased mortality that we identify above will add to this decline, but we anticipate that it will not appreciably accelerate the decline that is already occurring.

Based on baseline visitor use data and predicted levels of OHV displacement (see table above), we anticipate that use of the Stoddard Valley OHV Management Area would increase by 22 percent and result in a visitor use level of 2.1 visitor-days per acre. This increase is likely to result in effects that substantially increase injury and mortality of desert tortoises within the Stoddard Valley Off-highway Vehicle Management Area and the areas of unauthorized use associated with it. However, we cannot quantify the magnitude of this increase or the absolute number of individuals that would be killed or injured because we do not have specific information on current population size, mortality rates, or rates of decline.

The northern portion of the Stoddard Valley Off-highway Vehicle Management Area is contiguous with the northwestern portion of the Ord-Rodman DWMA and both areas contain desert tortoises that comprise a relatively stable population when compared to other portions of the western Mojave Desert. The northwestern portion of this DWMA supports a high-density group of desert tortoises. (Because the center of the Ord-Rodman DWMA contains large areas with low potential to support desert tortoises, the higher densities are found around its periphery.) Desert tortoises that reside adjacent to DWMAs are sometimes important to maintain evolutionary potential; see the previous section of this biological opinion (Effects of Reduced Densities and Population Fragmentation on Population Viability) regarding the required densities and areas needed. In this situation, however, the Ord-Rodman DWMA currently has a density (i.e., 20 per square mile) that is twice that required to maintain population viability and the population in its northwestern portion has historically shown low population declines relative to other areas. In addition, the Marine Corps would install barriers to control vehicular access along portions of the boundary between the Stoddard Valley Off-highway Vehicle Management Area and the Ord-Rodman DWMA and would provide law enforcement officers to reduce the current effects of unauthorized OHV use within the DWMA. These measures would result in a reduction in the current level of effects to this portion of the DWMA and would likely reduce the current mortality rates in this area. Although the increase in OHV effects predicted for the Stoddard Valley Off-highway Vehicle Management Area could affect desert tortoises in that area, we do not anticipate that it would compromise the viability of the desert tortoise population in the northwestern corner of the Ord-Rodman DWMA that is essential to recovery of the species.

Based on the information provided above (see table), we anticipate that the visitor-days in the Rasor, Spangler Hills, and Jawbone Canyon/Dove Springs Off-highway Vehicle Management Areas will increase by 59, 165, and 1 percent, respectively. This will result in a post-displacement increase use for these areas of 0.4, 0.5, and 11.5 annual visitor-days per acre, respectively. None of these OHV sites would affect desert tortoises in areas that are essential to recovery of the species.

Based on this information, the Jawbone Canyon/Dove Springs Off-highway Vehicle Management Areas and the unauthorized use areas associated with them will receive marginal increases in OHV effects in an area that is already heavily used for OHV recreation. These areas contain desert tortoises at low numbers and in low densities. Consequently, the small predicted increase in effects will result in little if any additional injury or mortality of desert tortoises.

The Rasor and Spangler Hills Off-highway Vehicle Management Areas would receive a substantial increase in OHV recreation from baseline levels. However, the current levels of use in these areas are low so the percent increase would result in an annual number of per acre visitor-days that is still relatively low. This use would occur within areas that do not contain habitat with a high potential to support desert tortoises or evidence of their occupancy (i.e., Rasor Off-highway Vehicle Management Area) or in areas that do not support large numbers of desert tortoises (i.e., Spangler Hills). Based on the low amount of post-displacement use and the low number of desert tortoises, we anticipate that OHV displacement will result in a small amount of injury and mortality in these areas.

We do not have information on number and density of desert tortoises in the El Mirage Off-highway Vehicle Management Area; existing information does not provide a clear picture of the status of the desert tortoise in this area. We anticipate that OHV displacement would result in less than a one percent increase in use. Consequently, we anticipate that OHV displacement will result in injury or mortality of few, if any, desert tortoises in this portion of the action area because the increase in OHV use is likely to be minor.

Based on the information provided by the Marine Corps and the assumptions we have described previously, we anticipate that the East Sierra Heavy OHV Use Area will receive an annual increase in use of 0.1 visitor-days per acre. Based on this low level of use and the low density of desert tortoises in this area, OHV displacement is likely to result in the injury and mortality of few, if any, desert tortoises.

We have provided detailed information on populations in and in the vicinity of the Edwards Bowl Heavy OHV Use Area and the Silver Lakes, Hinkley, and Coyote Corner Residential Vehicle Use Areas. Although we do not have information on current population size or density, these areas likely support more desert tortoises relative to other portions of the western Mojave Desert that are important to the recovery of the species. Displacement of OHV recreation to these areas would result in an increase of 0.1 visitor-days per acre in each area, which is unlikely to result in an appreciable change in the existing effects associated with OHV recreation. Consequently, OHV displacement to these areas is likely to result in injury and mortality of few desert tortoises.

In the Environmental Baseline section, we indicated that the California City and Rand Mountains Heavy OHV Use Area was an area that previously contained high densities of desert tortoises, but that precipitous declines in this portion of the desert had likely resulted in low overall densities at present. Based on this information and the very small amount of displacement per acre that we anticipate for this area, OHV displacement is likely to injure or kill few, if any, desert tortoises.

In the preceding analysis of OHV displacement effects, we have assumed that the predicted levels and locations of displaced OHV use provided by the Marine Corps are correct. However, this information is largely conjectural. We included several areas of potential displaced OHV use, based on information in the Bureau's West Mojave Plan (Bureau et al. 2005), in our analysis that the Marine Corps did not. Although those results are based on survey data that shows them to be areas of historically above-average OHV use, the OHV use patterns in the western Mojave Desert may have changed since the collection of the data for these areas. The anticipated displacement may also create new areas of increased OHV effects that we are unable to predict with the available information. Finally, the available information does not allow for quantification of injury and mortality in any of these areas, so our analysis is largely qualitative and based on the predicted level of increased use and various pieces of information that indicate the importance of desert tortoises in a given area to recovery of the species. Despite these caveats, we based our analysis on the best available information, which provides a reasonable prediction of the effects that are likely to occur due to the proposed action.

Effects to Critical Habitat of the Desert Tortoise

As discussed previously, the Marine Corps' acquisition of the western expansion area would result in OHV displacement to various portions of the western Mojave Desert, including areas of desert tortoise critical habitat. Displacement to the Edwards Bowl Heavy OHV Use Area and the Silver Lakes, Hinkley, and Coyote Corner Residential Vehicle Impact Areas would result in effects to desert tortoise critical habitat. In addition, unauthorized use adjacent to the Stoddard Valley, Spangler Hills, and Johnson Valley Off-highway Vehicle Management Areas would also affect critical habitat. In the previous section, we provided information on the anticipated level of increased use that these areas would experience under the proposed action. Activities within these areas would affect the Fremont-Kramer, Superior-Cronese, and Ord-Rodman Critical Habitat Units.

Based on this information, we anticipate that displaced recreation would affect large areas within the Superior-Cronese and Fremont-Kramer Critical Habitat Units, but the intensity of effects across these areas would be low because the amount of recreation displaced to these areas would be small or would result in a marginal increase over existing use. Displaced recreation is likely to affect smaller areas of the Ord-Rodman Critical Habitat Unit, but the level of increased use is likely to be greater. However, we anticipate that vehicle barriers and law enforcement officers, which the Marine Corps will fund, will control much of the unauthorized use within the critical habitat unit and reduce effects to the primary constituent elements.

We listed the primary constituent elements of critical habitat in the Status of Critical Habitat section of this biological opinion. We conducted the following analysis by generally using the primary constituent elements as the basis for our discussion.

The first primary constituent element (sufficient space to support viable populations within each of the six recovery units and to provide for movement, dispersal, and gene flow) addresses the issue of maintenance of evolutionary potential. We discussed this issue previously in the Effects of Reduced Densities and Population Fragmentation on Population Viability section of this biological opinion.

As discussed in the Status of Critical Habitat section, the Superior-Cronese and Fremont-Kramer Critical Habitat Units, which are contiguous, have a combined size of 2,007 square miles and contain 1,915 square miles of habitat with a high potential to support desert tortoises. The Ord-Rodman Critical Habitat Unit is 395 square miles in size and contains approximately 288 square miles of habitat with a high potential to support desert tortoises. Although the Ord-Rodman unit is smaller than needed to maintain evolutionary potential and long-term population persistence at a minimum density of 10 per square mile, we have previously indicated that the Ord-Rodman DWMA, which encompasses this critical habitat unit, has densities of almost 20 larger desert tortoises per square mile. However, its current population size is smaller than that recommended for maintenance of long-term population persistence.

Displacement of OHV recreation has the potential to remove habitat from small, localized areas within the critical habitat units. However, it would not appreciably reduce the space available to desert tortoises. We have reached this conclusion because the increase in use in the Superior-

Cronese and Fremont-Kramer Critical Habitat Units would be small and would not completely remove habitat that can support desert tortoises from large areas. Within the Ord-Rodman Critical Habitat Unit, the anticipated area of effects would be small and the use of vehicle barriers and law enforcement is likely to result in a level of effects that would not completely remove habitat from large areas. Consequently, displaced recreation is unlikely to reduce space available to desert tortoises within these critical habitat units to a point that they cannot maintain viable populations or provide for movement, dispersal, and gene flow.

We have combined a discussion of the second and fifth primary constituent elements (sufficient quality and quantity of forage species and the proper substrate conditions to provide for the growth of these species; and sufficient vegetation for shelter from temperature extremes and predators) because they both deal with the plant communities that support desert tortoises. Additionally, the effects are similar in that the disturbance or removal of annual and perennial plants often occurs as a result of the same activities.

As discussed in the 5-year review, which we have incorporated by reference, OHV activity can destroy shrubs, reduce the prevalence of annual forage plants, exacerbate erosion, and spread non-native plant species. These changes would adversely affect the quality and quantity of forage species, the proper substrate conditions to provide for the growth of these species, and vegetation for shelter from temperature extremes and predators. Disturbance or removal of annual plants and shrubs reduces the ability of the desert tortoise to find food and shelter. Without a diverse assemblage of plant species upon which to forage, desert tortoises cannot maintain an appropriate nutritive balance (Oftedal 2005); without the cover of shrubs, desert tortoises are more vulnerable to predators and the temperature extremes that are common in the desert.

These effects are likely to occur within the action area. However, given the low level of displacement predicted and the conservation measures proposed by the Marine Corps (i.e., vehicle barriers and law enforcement in the Ord-Rodman Critical Habitat Unit), the direct effects are unlikely to eliminate forage species or vegetation cover from a sufficient portion of the critical habitat unit to compromise the conservation value or function of the critical habitat units.

Disturbance associated with OHV use can exacerbate the spread of invasive non-native plant species. OHVs can import weeds from outside of critical habitat on the vehicles and on the trailers that transport them. These weeds initially colonize the areas where they are dropped and then spread to adjacent areas by wind, storm flows, and transport by other OHVs; therefore, invasive weeds can degrade habitat that is distant from the point of introduction.

As discussed in the 5-year review, OHV recreation can accelerate the spread of invasive non-native plant species, which in turn, can compete with the native plant species that the desert tortoise requires for nutrients and shelter. Non-native plants can also increase the ability of the desert to carry wild fires. The plant species upon which desert tortoises depend are not adapted to fire; consequently, fires could severely alter the plant community structure by removing species upon which the desert tortoise is dependent and facilitating the spread of fire-tolerant taxa.

Of all of the threats to critical habitat posed by displaced OHV use, increasing the spread of non-native invasive plants has the potential to compromise the conservation role and function of critical habitat. The areas that would receive displaced OHV recreation because of the proposed action currently experience above-average levels of OHV use. Consequently, these areas already experience the effects of non-native plants. Additionally, because displaced vehicles would be coming from the Johnson Valley Off-highway Vehicle Management Area, they would be less likely to transport new species of weeds. Given the small amount of displaced recreation that critical habitat would receive and the measures that the Marine Corps has proposed to control human access within the Ord-Rodman Critical Habitat Unit, we do not anticipate that the proposed action would increase the prevalence of non-native plants in critical habitat to an appreciable degree.

The third and fourth primary constituent elements are suitable substrates for burrowing, nesting, and overwintering and burrows, caliche caves, and other shelter sites. We have combined a discussion of these two primary constituent elements because they both deal with shelter sites; additionally, the potential effects to these primary constituent elements are similar in that the disturbance or removal of shelter sites or the substrates in which they are constructed often occurs as a result of the same activities.

As discussed in the 5-year review, OHV recreation results in collapsing of burrows, soil erosion, and compaction. All of these effects could remove existing cover sites and make the areas unsuitable for the construction of new ones.

Although displaced recreation is likely to affect these primary constituent elements, it is unlikely to result in loss of shelter sites or loss of suitable substrates for shelter sites across large areas of the critical habitat units. Given the low level of displacement predicted and the conservation measures proposed by the Marine Corps (within the Ord-Rodman Critical Habitat Unit), increases in the current level of effects to these primary constituent elements would be small. Consequently, we do not anticipate that the proposed action would compromise the conservation value or function of the critical habitat units.

The displacement of OHV recreation will exacerbate the effects of unauthorized OHV recreation in the Superior-Cronese and Fremont-Kramer Critical Habitat Units in relation to the final primary constituent element, habitat protected from disturbance and human-caused mortality. Given the low level of displacement to these areas, unauthorized recreation that results in disturbance or mortality would not increase by a substantial amount. Within the Ord-Rodman Critical Habitat Unit, we also anticipate some small increase in human-caused disturbance and mortality, but this increase would be small because the Marine Corps has proposed to increase law enforcement and install vehicle barriers that would control human access. Consequently, displaced recreation would not reduce the amount of habitat protected from disturbances or human-caused mortality to a degree that would compromise the conservation value or function of these critical habitat units.

In summary, displacement of OHV recreation because of the MCAGCC expansion is likely to adversely affect all of the primary constituent elements of critical habitat. However, these effects would be minimal in the Superior-Cronese and Fremont-Kramer Critical Habitat Units because of the small increase above current OHV use. Although the predicted level of displacement to the Ord-Rodman Critical Habitat is greater, we anticipate that the conservation measures proposed by the Marine Corps will control human use in these areas and substantially reduce adverse effects to the primary constituent elements.

Effects of Conservation Actions

SUAs and Management of Adjacent Public Lands

The Marine Corps will establish five Category 1 special use areas within the expansion areas and portions of the existing installation adjacent to the Ord-Rodman DWMA. These areas will be off limits to training that requires cross-country travel and ground disturbance and will have a combined size of 25,844 acres. In addition, the Marine Corps will work with the Bureau to change land management designations of two areas adjacent to the Ord-Rodman DWMA to provide for increased conservation of the desert tortoise. These areas encompass approximately 14,214 acres that are contiguous with the Ord-Rodman DWMA and the SUA in the northern end of the western expansion area (Darst 2012). Several of the areas discussed above overlap areas of relatively high desert tortoise abundance (i.e., Sunshine Peak Training Area, northern end of Johnson Valley, portions of the southern expansion area).

These changes would result in a reduction in threats and mortality sources for desert tortoises in the newly protected locations. The proposed SUAs in the Sunshine Peak Training Area currently experience threats associated with military training. In addition, unrestricted OHV recreation currently occurs in the proposed SUAs in the western expansion area and one of the areas for which the Bureau would increase conservation. These areas are all currently open to unrestricted cross-country vehicle travel that can kill or injure desert tortoises and degrade desert tortoise habitat. The Marine Corps proposed action would reduce threats and mortality sources in these areas.

The Marine Corps proposed SUAs and the Bureau's proposed land use changes would increase the amount of conserved land that is contiguous with the Ord-Rodman DWMA by 31,980 acres. It would also increase the amount of conserved land associated with the Cleghorn Lakes Wilderness by 2,935 acres.

As we have discussed previously, at a minimum density of 10 individuals per square mile, desert tortoise populations require at least 500 square miles of area to maintain evolutionary potential. To protect against adverse demographic effects of small population size and to maintain the likelihood of population persistence, a desert tortoise population must contain at least 10,000 adults, which would require 1,000 square miles of area at the minimum viable population density of 10 adults per square mile.

Currently, the Ord-Rodman DWMA covers approximately 432 square miles, but contains some habitat with a low potential to support desert tortoises. The area contiguous to the Ord-Rodman DWMA containing desert tortoises in this region is much larger. This larger aggregation of desert tortoises currently allows for maintenance of population persistence within the DWMA despite its small size and declining population trend. However, our recovery strategy cannot rely on areas outside of the DWMA boundaries because they contain land uses that are not conducive to reversing declining population trends.

Although we have determined that the density of desert tortoises within the DWMA currently indicates a viable population, declines in the number of individuals could eventually decrease density to a point where the population cannot maintain the threshold for viability within the boundaries of the existing DWMA. The Marine Corps' proposal would increase the amount of conservation land associated with the Ord-Rodman DWMA to approximately 482 square miles. This increase would provide more area for achievement of population viability thresholds. In addition, the size of the protected lands would be close to that required for maintenance of evolutionary potential as recommended in the original recovery plan (Service 1994). In addition, the proposed SUA in the southern expansion area would increase the size of the protected lands adjacent to the Cleghorn Lakes Wilderness Area by approximately 4.6 square miles, which would increase the potential for long-term persistence of desert tortoises in these areas.

The western SUA in the western expansion area currently supports low densities of desert tortoises and is highly disturbed, most likely by OHV use. It is not adjacent to other lands being managed for desert tortoises. For these reasons, this area does not have substantial immediate value as a conservation area for desert tortoises. This area could assist in achieving recovery goals as a site to test various restoration techniques and conduct specific recovery-related experiments.

In summary, the proposed SUAs and Bureau's management changes would reduce threats to desert tortoises within several portions of the action area, which is likely to increase the potential for these populations to maintain or achieve stability. This increase in conservation area would offset some of the unavoidable effects associated with the proposed action. In addition, increasing the functional size of the Ord-Rodman DWMA would aid in the maintenance of population viability there by increasing the area across which desert tortoises are conserved. This measure will better ensure our ability to maintain population viability in the event that desert tortoise declines reduce densities further.

Head-starting and Population Augmentation

The Marine Corps will continue to conduct research into desert tortoise head-starting and will use desert tortoises produced by this program in population augmentation trials in some SUAs. These experiments are likely to provide important information for future recovery efforts that would use head-started animals for augmentation of depleted populations. It may also increase population growth and survivorship and decrease the time needed to recover populations in the locations where head-started animals are released. No information is currently available with which to analyze the effectiveness of population augmentation. The following information from (Henen 2012f) provides a summary of an assessment on how the proposed head-starting and population augmentation could affect desert tortoise populations. Henen (2012e) performed this analysis using information from Turner et al. (1987) and data on the effectiveness of head starting desert tortoises.

> Current growth and survivorship data indicate that head-starting may increase population growth rates, and decrease population recovery times, significantly. Compared to 1.9 percent annual population increases for model or life table for Goffs, head-starting would improve rates of annual increase from 2.9 to 7.3 percent per year, depending on how much protection is provided and growth rates are enhanced via head-starting. For these same head-start actions, the time required for a population to double is decreased from 36 years for the Goffs model, to 24 and 10 years, respectively.

Henen's projections may be overly optimistic. Reed et al. (2009) used the life table in Turner et al. (1987) to assess what management actions would be most effective in promoting recovery of the desert tortoise. Reed et al. (2009) found in their model that releasing adults had a greater effect on meeting target population numbers than did releasing juveniles and that "annual head-starting of 7-year old (presumably near raven-proof) animals is unlikely to be detectable at the population level after 5 years." Reed et al.'s comments regarding "near raven-proof' desert tortoises raises an important concern with head-starting; that is, until the threats that have caused the declines in the first place are defined and ameliorated, releasing additional desert tortoises into the wild is merely a stop gap measure.

In addition, Averill-Murray (2012) calculated that a head–start program would need to collect eggs from a minimum of 40 females annually for 20 years (15 cohorts including the initial 5 years to raise the first cohort) to produce 384 adult desert tortoises. Averill-Murray based his calculations on information from a variety of sources and assumed optimistic assumptions about survival, growth, and sexual maturity; that is, the annual cohort of 26 individuals assumes high survival rates and rates of growth that may not occur in all years. Averill-Murray also did not account for variation (and decreases) in growth rates observed in existing head-starting facilities that suggest over-crowding may alter the optimistic results described herein. To evaluate fully the net benefit of a head-starting program, one would also have to take into account desert tortoises that are not born into the wild because the collected adult females have laid their eggs in captivity. Assuming that 2 percent of eggs that would have been laid in the wild reach adulthood, desert tortoises would have produced approximately 29 adult animals over the same period absent the head-starting, for a net benefit of 355 adults.

Augmentation of desert tortoise populations through head-starting is still in a highly experimental stage. Although head-starting has the potential to increase the number of animals more rapidly than a wild population can, we have not resolved all issues related to its successful implementation and certainly have not removed threats from the environment that cause current declines. Additionally, several other facilities are pursuing research on head-starting. For these reasons, we do not consider the use of head-starting to be the most effective means of attempting to offset the long-term effects of the proposed expansion of MCAGCC.

Although population augmentation using head-started desert tortoises is experimental, the potential for decreasing the recovery times for desert tortoise populations could greatly increase the potential for recovery where it is applied.

Law Enforcement

The Marine Corps will use conservation law enforcement officers on the existing installation and expansion areas to enforce resource protections and ensure the integrity of the SUAs. In addition, it will work with the Bureau to increase the number of law enforcement officers present in the Ord-Rodman DWMA. We anticipate the current level of law enforcement on the existing installation will continue to provide a benefit in reducing effects to desert tortoises. The Marine Corps' proposal regarding law enforcement within the expansion areas will increase the current level of conservation protection provided by Bureau's rangers. Within the newly established SUAs, law enforcement will provide increased conservation benefits for the desert tortoise by ensuring the integrity of these areas . Conservation law enforcement within the Ord-Rodman DWMA will also result in benefits to desert tortoise conservation by reducing the amount of unauthorized human-caused disturbance (i.e., trespass OHV activity). We have no information with which to analyze quantitatively the decrease in injury and mortality of desert tortoises, the change in population trends, or the decrease in habitat disturbance that may occur due to implementation of this action.

Control of Human Access in the Ord-Rodman DWMA

The Marine Corps has proposed to implement actions in coordination with the Bureau to control human access into the Ord-Rodman DWMA and specific SUAs through installation of barriers and signs designed to reduce the level of adverse human effects to desert tortoise habitat. Although the location of private lands may prevent the installation of barriers in some limited areas, we anticipate that these actions will reduce the level of anthropogenic disturbance in the Ord-Rodman DWMA and reduce effects from trespass OHVs. It will also reduce or eliminate the effects of military training within SUAs. In addition, protection of these areas may allow restoration and regeneration of degraded habitats that would allow them to support higher densities of desert tortoises. Because we do not know the location or extent where all of these areas are needed or would be implemented, we cannot quantify the magnitude of their beneficial effects. However, we anticipate that in combination with the proposed law enforcement, proposed SUAs, and changes in Bureau management of some lands adjacent to the Ord-Rodman DWMA, this action will improve the potential for ensuring long-term population viability within the DWMA and reduce effects to desert tortoises within the action area.

Summary of Effects to the Desert Tortoise

Military activities will remove or heavily degrade up to 28,790 acres of desert tortoise habitat and moderately disturb an additional 96,475 acres within the expanded installation. These activities will also injure and kill desert tortoises. Although the Marine Corps would translocate approximately 949 larger desert tortoises (85.9 percent of the larger individuals) and 696 smaller animals (13.5 percent of the smaller animals) from the expansion areas, we anticipate military activities would kill approximately 662 larger desert tortoises in areas identified for heavy and moderate disturbance. We anticipate that military activities will also result in a decline in the current population of 4,098 smaller desert tortoises. This decline would result from direct mortality of juveniles or a loss of reproductive potential caused by mortality of adult females.

We also anticipate the mortality of a small number of additional individuals in other portions of the expanded installation.

MCAGCC and the proposed expansion areas currently contain an estimated population of 12,809 larger desert tortoises. Through its range-wide monitoring program, which only covers a subset of the occupied habitat across the species' range, the Service estimates that 96,140 adult desert tortoises reside in the portions of the range outside of MCAGCC and the expansion areas (Service 2010c). Of this total, the three DWMAs in the Western Mojave Recovery Unit contain 20,760 larger individuals (Service 2010c). Although we have no population estimates to cover other occupied habitat across the species' range, the Environmental Baseline section identifies additional areas within the recovery unit where desert tortoises occur. Similar occupied areas with no population estimates exist in other recovery units. Consequently, the estimated adult mortality associated with the proposed action comprises a small percentage of the adult population in the Western Mojave Recovery Unit and range wide. Given our admitted overestimate in the characterization of mortality, the actual loss of individuals will likely comprise an even smaller percentage. Although we have no range-wide estimates of the number of smaller desert tortoises, given the number of larger animals documented through range-wide monitoring and the information we have discussed regarding yearly female reproductive output, the loss of smaller desert tortoises associated with the proposed action would comprise a very small percentage of the recovery unit and range-wide populations.

We anticipate that desert tortoises will continue to persist in all but the most heavily disturbed areas of the existing installation. Although, desert tortoises could be lost from areas identified for heavy disturbance, these areas are localized relative within MCAGCC and the action area as a whole. Our analysis of population fragmentation indicates that the proposed action is unlikely to result in extirpation of desert tortoises from the expanded installation. We have indicated that these losses would not be of sufficient magnitude to result in genetic deterioration, demographic stochasticity, or other effects that could compromise population viability over a large area. Even if military activities resulted in the loss of desert tortoises from all 28,790 acres identified for heavy disturbance, this loss would not appreciably affect the distribution of the species given the extent of occupied habitat across the species' range.

We have reached this conclusion because the 28,790 acres that would be heavily disturbed comprise approximately 0.05 percent of the modeled desert tortoise habitat in the western Mojave Desert region. (See the calculations of modeled habitat and impervious surfaces in the Status of the Desert Tortoise section of this biological opinion.) Consequently, even if we assumed that training would eliminate all desert tortoises from within this area, the loss of this area would comprise a minor portion of the western Mojave Desert. Training would not eliminate desert tortoises from most of the heavily disturbed areas, the 28,790 acres are disbursed across a large area, and the range-wide modeled habitat of the species covers approximately 16,927,194 acres; again, see calculations in the Status of the Desert Tortoise section of this biological opinion. For these reasons, the proposed action would clearly not appreciably reduce the distribution of the desert tortoise.

We anticipate that the Marine Corps will handle approximately 2,186 desert tortoises during clearance surveys and post-translocation monitoring activities. Although we anticipate that this is an overestimate, it likely represents a reasonable worst-case scenario. Many of these animals will be part of post-translocation monitoring for up to 30 years and would be handled multiple times over this period. We have indicated that this handling is likely to kill few, if any, desert tortoises. Consequently, post-translocation mortality is unlikely to be the result of translocation and translocation is unlikely to increase the overall mortality rate of the population.

OHV displacement would result in injury and mortality of desert tortoises in several portions of the action area. With the exception of the Stoddard Valley Off-highway Vehicle Management Area, RPAA, the remaining portions of the Johnson Valley Off-highway Vehicle Management Area, and the areas of unauthorized OHV use associated with them, the amount of unauthorized use resulting from displacement is likely to be minor; consequently, we expect that this use would injure or kill few desert tortoises. In the Johnson Valley OHV Management Area, RPAA, and their associated areas of unauthorized use, we anticipate a greater amount of injury and mortality, but this would not create a substantial increase in the existing mortality rate in these areas. In the Stoddard Valley OHV Off-highway Vehicle Management Area and its associated areas of unauthorized use, we anticipate that mortality rates will increase substantially due to the proposed action. We cannot equate this increase to a quantifiable number of individuals. We anticipate that some of the injury and mortality caused by displacement of OHV recreation will occur in the Ord-Rodman DWMA, but barriers and increased law enforcement proposed by the Marine Corps would substantially reduce this from what would occur inside the designated OHV area.

Because of a lack of sufficient information, we cannot quantify the mortality associated with OHV displacement. However, all locations that would receive displaced OHV recreation already experience injury and mortality associated with OHV use. With the exception of the Stoddard Valley OHV Management Area and the areas of unauthorized OHV use associated with it, we do not anticipate that the existing mortality rate would substantially increase because the amount of visitor use would not substantially increase. Consequently, OHV displacement in these areas is unlikely to have an appreciable additive effect on desert tortoise abundance, distribution, or reproduction beyond what these areas currently experience. The increased mortality rate in the Stoddard Valley Off-highway Vehicle Management Area and its associated areas of unauthorized use would be unlikely to reduce appreciably the distribution of desert tortoises on a range-wide basis because we expect that they would persist in this area, albeit at lower densities. We expect that the range-wide number of desert tortoises and their reproduction would decrease by a minor amount because of the increase in mortality rates; these reductions are unlikely to diminish appreciably the ability of the species to survive and recover because this area is not crucial to the long-term conservation of the species.

Preservation of connectivity between areas of protected habitat (i.e., DWMAs) is needed for recovery to address the potential effects of climate change and to preserve long-term gene flow and genetic variability (Service 2012b). Our analysis shows that the proposed expansion would affect an identified linkage area that connects the Ord-Rodman DWMA to Joshua Tree National Park. However, we have also concluded that desert tortoises would continue to occupy this linkage under the proposed training scenario.

In summary, the proposed action would undeniably affect desert tortoises on MCAGCC and the proposed expansion areas through the injury and mortality of a large number of individuals; most of the deaths would result from smaller desert tortoises being missed during translocation from areas of moderate and heavy disturbance and being killed during training. We also expect that a relatively small number of desert tortoises are likely to be killed or injured outside of these areas by OHV use that would be displaced from the Johnson Valley Off-highway Vehicle Management Area. Training would likely extirpate desert tortoises from localized areas within the expanded boundaries of MCAGCC; their densities would decrease in some areas of the expanded base and within the Johnson Valley and Stoddard Off-highway Vehicle Management Areas. The Marine Corps' proposes to translocate desert tortoises from the areas to be used for moderate- and high-intensity training, to implement general protective measures during construction, training and translocation, and relocate the MEB in the southern expansion area to an area of lower density to reduce the number of desert tortoises that are likely to be killed by training. For these reasons, we anticipate under the proposed action would not substantially affect the distribution, abundance, or reproduction of the desert tortoise.

Effects on the Recovery of the Desert Tortoise

Above, we have considered how injury and mortality would affect current recovery unit and range-wide distribution, abundance, and reproduction of the species. We must also consider how the proposed action would affect the recovery potential of the desert tortoise. To achieve recovery, each recovery unit must contain well distributed, self-sustaining populations across a sufficient amount of protected habitat to maintain long-term population viability and persistence (Service 2011e). Based on the information we have discussed in this biological opinion, the current amount of protected habitat (i.e., DWMAs and other Tortoise Conservation Areas) in the Western Mojave Recovery Unit is sufficient to achieve these requirements if declines do not reduce each DWMA's densities and population size below that needed to maintain population viability and long-term population persistence.

Although the Ord-Rodman DWMA is small, its current density is almost twice that needed for population viability. The Superior-Cronese and Fremont-Kramer DWMAs are larger than that recommended for long-term population persistence. Although the density within these two units is below that identified for population viability (i.e., 10 adults per square mile), their combined population size (i.e., 14,307 adults, Service 2010c) is higher than that identified for maintenance of long-term population persistence (Service 1994). In addition, all of these DWMAs are not isolated from populations in contiguous areas, which functionally increases the area across which desert tortoises are distributed and currently helps to maintain viability associated with the DWMAs.

Clearly, the Marine Corps' proposed action is likely to alter existing conditions and affect desert tortoises in the action area, including portions of the DWMAs identified above. Displaced OHV use is likely to increase the amount of OHV disturbance in all of these DWMAs, but we anticipate that this effect will be minor because either the predicted displacement to these areas is small and/or the Marine Corps will implement measures to control illegal OHV use. We conclude that these minor effects would not reduce population size and density across a sufficient area to compromise population viability or persistence within the identified DWMAs.

The remaining non-DWMA portions of the action area are not essential to the recovery of the desert tortoise; loss of individuals and removal of habitat within these areas is unlikely to compromise our recovery strategy. In addition, the SUAs and additional protected areas identified by the Marine Corps would functionally increase the protected areas associated with the Ord-Rodman DWMA and bring it closer the geographic size needed for long-term viability in the event that populations in the contiguous areas are lost. The measures proposed to control human access would also reduce threats within the Ord-Rodman DWMA, which may improve its resiliency.

Preservation of connectivity between areas of protected habitat (i.e., DWMAs) is needed for recovery to address the potential effects of climate change and to preserve long-term gene flow and genetic variability (Service 2012b). Our analysis shows that the proposed expansion would affect an identified linkage area that connects the Ord-Rodman DWMA to Joshua Tree National Park. However, we have also concluded that desert tortoises would continue to occupy this linkage under the proposed training scenario.

In summary, the proposed action would have undeniable effects to desert tortoises on MCAGCC and the proposed expansion areas through the injury and mortality of a large number of individuals. However, some portion of this injury and mortality would occur regardless of the proposed action under the authorization of other biological opinions. Even ignoring this fact, the injury and mortality we anticipate under the proposed action would not substantially affect the distribution, abundance, or reproduction of the species. In addition, we have concluded that the proposed action would not compromise population viability within areas that are important to the recovery strategy for the species (i.e., DWMAs and linkage areas).

Summary of Effects to Critical Habitat of the Desert Tortoise

The proposed action would result in effects to critical habitat associated with OHV displacement and translocation of desert tortoises. We have concluded that OHV displacement would occur in the Ord-Rodman, Fremont-Kramer, and Superior-Cronese Critical Habitat Units and would affect each of the primary constituent elements. However, these effects would be minimal because the increase above current OHV use would be low in most areas; in the Ord-Rodman Critical Habitat Unit the Marine Corps has proposed measures that would control human use in this area. We have also concluded that effects to critical habitat associated with construction of repatriation pens for translocation research would be minimal due to the small amount of disturbance and that the translocation of and translocated desert tortoises themselves would have little, if any, effect on the primary constituent elements of critical habitat. Consequently, the proposed action will not reduce the conservation role and function of critical habitat. To some extent, the placement of barriers to control OHV use and the increase in law enforcement in the Ord-Rodman Critical Habitat Unit will enhance the management of this critical habitat unit and improve its function.

CUMULATIVE EFFECTS

Cumulative effects include the effects of future State, tribal, local, or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future

Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act.

We consider actions that are reasonably certain to occur as actions that have received approval from municipal, State, or tribal governments, and have no pending discretionary approvals left. We contacted local agencies whose jurisdictions overlapped the areas that the Marine Corps identified as likely to experience OHV use displaced from the Johnson Valley Off-highway Vehicle Management Area. These local agencies included the counties of Kern, San Bernardino, Los Angeles, and Inyo, the City of California City, and the California State Lands Commission. After receiving information on projects from these agencies, we compared the location of the proposed action to determine whether it overlapped our action area or lands managed by the Bureau. We have not included any discussion of the effects of actions that are likely to occur on public lands because the Bureau is required to consult on those action pursuant to section 7(a)(2) of the Act. This process resulted in our determination that only two non-federal projects in the action area met the criteria to be included in this analysis.

In San Bernardino County, the planning commission has conditionally approved a 26-acre solar project near El Mirage. In general, we do not consider the El Mirage area to be important for the long-term conservation of the desert tortoise; it is outside the boundaries of critical habitat and DWMAs and, in many areas (outside of the El Mirage Off-highway Vehicle Management Area), disturbed by unauthorized vehicular recreation.

We expect that few, if any, desert tortoises would be affected by that project because that area has historically been subjected to large amounts of human disturbance. If desert tortoises are present on the site, we would recommend that the project proponent apply for an incidental take permit, pursuant to section 10(a)(1)(B) of the Act; in general, the County of San Bernardino contacts us if its reviews under the California Environmental Quality Act indicate that desert tortoises are present on a project site.

Based on our screening of projects in the action area and the analysis in the previous two paragraphs, we do not expect that the cumulative effects associated with the proposed expansion of the Marine Corps' base are likely to have a measurable effect on the desert tortoise. The project at El Mirage will not affect critical habitat because it is located approximately 7 miles to the south of the southern boundary of the Fremont-Kramer Critical Habitat Unit.

CONCLUSION

Desert Tortoise

After reviewing its status, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is our biological opinion that the proposed action is not likely to jeopardize the continued existence of the desert tortoise. We have reached this conclusion because:

1. The Marine Corps would implement numerous measures to reduce the level of injury and mortality associated with the proposed action.

2. Relative to the number of desert tortoises that occur in the Western Mojave Recovery Unit and range wide, the proposed action would injure or kill a small portion of the population.

3. Relative to the amount of occupied desert tortoise habitat in the Western Mojave Recovery Unit and range wide, the proposed action would result in complete loss of desert tortoises from only small, localized areas but would not appreciably affect distribution of the species.

4. Population and habitat fragmentation associated with the proposed action would not result in loss of desert tortoises from large areas.

5. Adverse effects in areas that are important to desert tortoise recovery (i.e., DWMAs and linkage areas) would be minor and would not result in loss of population viability.

6. The majority of injury and mortality associated with the proposed action would occur in areas that are not important to recovery of the species.

7. The injury and mortality of desert tortoises within MCAGCC, the western expansion area, and most Bureau-designated OHV areas would not result in an appreciable change in what these areas currently experience under existing land uses that we have previously analyzed in other biological opinions.

8. The Marine Corps' funding of vehicle barriers, law enforcement, and signs in the Ord-Rodman DWMA will improve protection of this area and reduce threats to its important populations, which, along with its funding of monitoring, will improve our ability to recover the desert tortoise.

9. The Marine Corps' proposed SUAs and the proposed changes in the Bureau's land use classification for areas adjacent to the Ord-Rodman DWMA will functionally increase the size of the protected areas associated with this DWMA and improve the long-term potential for maintaining population viability there. These changes in land use will improve our ability to recover the desert tortoise.

After reviewing the status of critical habitat of the desert tortoise, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is our biological opinion that the proposed action is not likely to destroy or adversely modify critical habitat of the desert tortoise. We have reached this conclusion because:

1. The small amount of anticipated OHV displacement that would occur in critical habitat would result in a minimal increase in effects to the primary constituent elements.

2. The disturbance of habitat containing the primary constituent elements associated with the proposed translocation strategy would be minimal.

3. The Marine Corps' funding of vehicle barriers and law enforcement in the Ord-Rodman Critical Habitat Unit will improve protection of the primary constituent elements.

INCIDENTAL TAKE STATEMENT

Section 9 of the Act and Federal regulation pursuant to section 4(d) of the Act prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harm is further defined by the Service to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. Harass is defined by the Service as intentional or negligent actions that create the likelihood of injury to listed species by annoying it to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the Act provided that such taking is in compliance with the terms and conditions of an incidental take statement.

The measures described in this document are non-discretionary. The Marine Corps has a continuing duty to regulate the activities covered by the incidental take statement in the biological opinion. If the Marine Corps fails to implement the terms and conditions of this incidental take statement, the protective coverage of section 7(o)(2) may lapse. To monitor the impact of incidental take, the Marine Corps must report the progress of its action and its impact on the desert tortoise to the Service as specified in the incidental take statement [50 *Code of Federal Regulations* 402.14(i)(3)].

Overview

The proposed action will likely result in the take of desert tortoises associated with authorized and unauthorized OHV use by recreationists displaced from the Johnson Valley Off-highway Vehicle Management Area; increased use in the remaining portions of the Johnson Valley Off-highway Vehicle Management Area is likely to increase the amount or extent of take above its current levels. The translocation of desert tortoises from the western expansion areas and training and preparation work will result in take. In the following sections, we will address each of these specific circumstances.

Displaced Use within the Areas Authorized for OHV Recreation

We anticipate that OHV use displaced from the Johnson Valley Off-highway Vehicle Management Area is likely to increase the level of vehicular recreation within the areas of the western Mojave Desert that have been authorized for such use. Specifically, we expect that the Bureau’s remaining OHV management areas (i.e., Stoddard Valley, Rasor, El Mirage, Dove Springs, Jawbone Canyon, and the remaining portion of Johnson Valley) and its route network in the western Mojave Desert are likely to experience an increase in use. Because of their proximity to the western expansion area, the Stoddard Valley Off-highway Vehicle Management Area and the remaining portion of Johnson Valley are likely to receive higher levels of use than the other OHV areas and the route network. Because of the increased levels of use, we expect that the amount of take of desert tortoises (in the form of injury or mortality) is likely to increase in these areas to a degree commensurate with the increase in use.

We are not providing an exemption, in this biological opinion, from the prohibitions against take that are contained in section 9 of the Endangered Species Act for this take. The Service and Bureau have completed consultation on several of the off-highway vehicle management areas and the route network; these biological opinions have adequately evaluated the effects of the expected use of these areas and exempted the take associated with such activities.

Displaced Use within the Areas Not Authorized for OHV Recreation

The exemption for incidental take statement applies only to lawful activities. Because unauthorized OHV recreation is not a legal activity, we cannot provide an exemption to the prohibition against take for this activity.

Translocation of Desert Tortoises from the Expansion Areas

We anticipate that the translocation of desert tortoises from the heavy and moderate disturbance areas of the western expansion area will result in the take of approximately 949 larger and 696 smaller individuals. Most of these animals are likely to be taken in the form of capture when they are collected and moved to pens or release sites. We anticipate that a few desert tortoises may be killed or injured during translocation activities.

Because of all of the variables involved, which we have discussed in depth in the biological opinion, the numbers we have provided in the previous paragraph are estimates. Translocation of desert tortoises from the heavy and moderate disturbance areas of the western expansion area will reduce the number of desert tortoises that are directly killed or injured by training; consequently, we are not basing re-initiation of formal consultation on the number of individuals that may be removed from these areas. Additionally, we have no means of predicting how many desert tortoises are likely to be killed or injured during translocation activities; based on previous translocations, we anticipate that few individuals are likely to be killed or injured during this process. For these reasons, we will use the terms and conditions of this biological opinion to establish appropriate thresholds for re-initiation of consultation.

The Service will evaluate the issuance of a recovery permit, under the auspices of section 10(a)(1)(A) of the Endangered Species Act, for the take of desert tortoises that would be used for controls and residents for monitoring the translocated animals. After translocation, all testing and other work on translocated desert tortoises would be transferred to that recovery permit. The Ventura Fish and Wildlife Office and Desert Tortoise Recovery Office will work closely with the Marine Corps and permittee to resolve any confusion over which legal authority (section 7(a)(2) or 10(a)(1)(A) of the Endangered Species Act) is involved.

Training and Preparation Work within the Expanded MCAGCC

We anticipate that desert tortoises will be taken in the form of capture, injury, and mortality during training and the preparation of training sites within the entire base (i.e., existing boundaries and the expansion areas). We previously exempted take associated with training, the preparation of training sites, and construction and maintenance of infrastructure (up to 150 acres per year) within the existing boundaries of MCAGCC (Service 2002; 1-8-99-F-41). This incidental take statement supersedes the 2002 biological opinion for training and the preparation of training sites. For all other aspects of base operations that are not associated with the proposed action in this biological opinion (e.g., the construction and maintenance of infrastructure), the take exemptions from the 2002 biological opinion (1-8-99-F41) remain in effect.

We anticipate that desert tortoises will be taken in the form of capture when they are moved from harm's way during training and the preparation of training sites within the entire base. As we discussed in this biological opinion, moving desert tortoises from harm's way during training and the preparation of training sites is unlikely to kill or injure these individuals; it is a protective measure that removes the animal from danger. For this reason, we are not establishing any threshold for re-initiation of formal consultation for this form of take.

We anticipate that desert tortoises will be taken in the form of injury or mortality during training and the preparation of training sites within the entire base. Based on our analysis in this biological opinion, we estimate that between 572 and 662 larger and 2,919 and 4,098 smaller desert tortoises are likely to be killed or injured in areas identified for heavy and moderate disturbance. We derived this number from the total of the larger and smaller desert tortoises that we anticipate will remain within the heavily and moderately disturbed areas within the entire base after translocation (which would occur only in the expansion areas). In addition, we anticipate that a small amount of injury and mortality will occur when desert tortoises in the surrounding areas periodically move into the heavy and moderate disturbance areas after clearance surveys. We also anticipate that military activities will injure or kill a small number of desert tortoises of all sizes in areas away from those identified for heavy and moderate disturbance. We cannot quantify the take discussed in this paragraph because of all the variables involved, including but not limited to predicting the number of desert tortoises of various sizes and the effectiveness of clearance surveys.

An additional factor compounds the difficulty in monitoring the amount of take. Most of the individuals missed during clearance surveys (both for translocation and for moving animals from harm's way) are likely to be smaller desert tortoises; many of the desert tortoises that are missed are likely to be killed or injured during training. The Marine Corps is unlikely to locate most of their carcasses; the Marine Corps will not detect even the carcasses of larger desert tortoises, particularly if they are in their burrows or moved by a coyote. The inability to locate these carcasses will make it difficult for the Marine Corps to monitor the amount of take that occurs during training and the preparation of training sites; we expect that more desert tortoises die than are found. For these reasons, we will use the terms and conditions of this biological opinion to establish appropriate thresholds for re-initiation of consultation.

REASONABLE AND PRUDENT MEASURES

The Service believes the following reasonable and prudent measures are necessary and appropriate to minimize take of desert tortoises during the implementation of the proposed action:

1. The Marine Corps must ensure that the rate of mortality or injury of translocated and resident desert tortoises is not elevated above the rate of mortality or injury for other populations within the action area that are not affected by translocation.

2. The Marine Corps must ensure that the level of incidental take anticipated in this biological opinion is commensurate with the analysis contained herein.

Our evaluation of the proposed action includes consideration of the protective measures described in the Description of the Proposed Action section of this biological opinion. Consequently, any changes in these protective measures may constitute a modification of the proposed action that causes an effect to the desert tortoise that was not considered in the biological opinion and require re-initiation of consultation, pursuant to the implementing regulations of the section 7(a)(2) of the Act (50 Code of Federal Regulations 402.16).

TERMS AND CONDITIONS

To be exempt from the prohibitions of section 9 of the Act, the Marine Corps must comply with the following terms and conditions, which implement the reasonable and prudent measures described in the previous section and must comply with the reporting and monitoring requirements. These conditions are non-discretionary.

1. The following term and condition implements reasonable and prudent measure 1:

   If monitoring of translocated and recipient site desert tortoises indicates a statistically significant elevation in mortality rates above that observed in the control population, the Marine Corps must request re-initiation of consultation, pursuant to the implementing regulations for section 7(a)(2) of the Endangered Species Act at 50 Code of Federal Regulations 402.16, on the proposed action.

2. The following term and condition implements reasonable and prudent measure 2:

   The Marine Corps must re-initiate formal consultation, pursuant to the implementing regulations for section 7(a)(2) of the Act at 50 Code of Federal Regulations 402.16, with the Service if

   a. ten individuals of any size are injured or killed during the translocation of desert tortoises from the expansion areas. This number is only for desert tortoises that would be injured or killed during the process of moving them between the expansion and translocation areas; the recovery permit for post-translocation monitoring and research will address injury and mortality associated with that work.

b. 20 desert tortoises of any size are killed or injured in any calendar year as a result of training and preparation work for training within the expanded boundaries of MCAGCC (i.e., the expansion areas and the former boundaries).

REPORTING REQUIREMENTS

By January 31 of each year this biological opinion is in effect, the Marine Corps must provide a report to the Service that provides details on each desert tortoise that is found dead or injured within expanded installation and translocation recipient sites. The information must include the location of each mortality, the circumstances of the incident, and any actions undertaken to prevent similar instances from occurring in the future. We request that the annual report also describe activities that the Marine Corps implemented or funded as part of its conservation program for the desert tortoise within habitat of the desert tortoise. The Marine Corps must also describe actions that it took during the previous year to prepare the new training lands for military exercise, if the activities occurred in habitat of the desert tortoise. We request that you provide us with an evaluation of the effectiveness of the protective measures that the Marine Corps implemented; this information allows us to be more effective in protecting desert tortoises and in developing protective measures that are efficient for project proponents to implement.

We recognize that the procedures we are likely to develop in close cooperation with the Marine Corps in the future may indicate a more efficient way of collecting this information. We welcome recommendations to improve the reporting method, provided that any new method meets the requirements of the implementing regulations for section 7(a)(2) of the Act (50 CFR 402.14(i)(3)).

DISPOSITION OF DEAD OR INJURED DESERT TORTOISES

Within 3 days of locating any dead or injured desert tortoises, you must notify the Ventura Fish and Wildlife Office by telephone (805 644-1766) and by facsimile (805 644-3958) or electronic mail. The report must include the date, time, location of the carcass, a photograph, cause of death, if known, and any other pertinent information.

We will advise you on the appropriate means of disposing of the carcass when you contact us. We may advise you to provide it to a laboratory for analysis. Until we provide information on the disposition of the carcass, you must handle it such that the biological material is preserved in the best possible state for later analysis. If possible, the Marine Corps should keep the carcass on ice or refrigerated (not frozen) until we provide further direction.

The Marine Corps must take injured desert tortoises to a qualified veterinarian for treatment. If any injured desert tortoises survive, the Marine Corps must contact us regarding their final disposition.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the Act directs Federal agencies to use their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information.

1. We recommend the Marine Corps use the results of the spatial decision support system analysis to work with us to develop and implement an integrated set of recovery actions for the Ord-Rodman DWMA and the contiguous SUAs. Such a program would include, but not be limited to range-wide monitoring and effectiveness monitoring, monitoring of OHV use, restoration of disturbed areas, fencing of heavily used roads, and management of common ravens. As part of such an integrated program, we recommend that the Marine Corps work with us to develop and implement a program to collect baseline data as soon as possible so we would have a baseline against which to measure the effectiveness of recovery actions.

2. We recommend that the Marine Corps coordinate closely with the Service to investigate specific research questions associated with head-starting. Through such coordination among the Marine Corps, the Service, and the several other head-starting facilities already in existence, we could determine whether the existing facilities are adequate to meet the recovery needs of the desert tortoises of the desert tortoise at this time.

3. We recommend that the Marine Corps work with the Service and re-initiate formal consultation of the 2002 biological opinion regarding other activities that may affect desert tortoises within MCAGCC. Our primary goal with such a consultation would be to address a broader array of Marine Corps actions than the current biological opinion.

We request notification of the implementation of any conservation recommendations so we may be kept informed of actions minimizing or avoiding adverse effects or benefitting listed species or their habitats.

RE-INITIATION NOTICE

This concludes formal consultation on the Marine Corps' land acquisition and air space establishment project in San Bernardino County, California. Re-initiation of formal consultation is required where discretionary Federal involvement or control over the action has been retained or is authorized by law and: (a) if the amount or extent of taking specified in the incidental take statement is exceeded; (b) if new information reveals effects of the action that may affect listed species or critical habitat in a manner or to an extent not previously considered; (c) if the identified action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in the biological opinion; or (d) if a new species is listed or critical habitat designated that may be affected by the identified action (50 Code of Federal Regulations 402.16).

In instances where the amount or extent of incidental take is exceeded, the exemption issued pursuant to section 7(o)(2) will have lapsed and any further take would be a violation of section 4(d) or 9. Consequently, we recommend that any operations causing such take cease pending re-initiation.

If you have any questions regarding this biological opinion, please contact Brian Croft of my staff at (909) 382-2677.

Sincerely,

Diane K. Noda

Diane K. Noda
Field Supervisor

Appendices
1 - Mojave population of the desert tortoise (*Gopherus agassizii*). 5-year review: summary and evaluation. Available on disk or hard copy by request or at http://ecos.fws.gov/docs/five_year_review/doc3572.DT%205Year%20Review_FINAL.pdf or.
2 - Map illustrating the 12 critical habitat units of the desert tortoise and the aggregate stress that multiple threats place on critical habitat.
3 - Map depicting the risk of invasion by exotic plants.
4 – Information on status of desert tortoises in areas that displaced off-highway vehicle activity may affect.
5 – Graph of relative population density among permanent study plots in the western Mojave Desert and map of the same area depicting an analysis of the likelihood of finding a live desert tortoise (from Tracy et al. 2004).

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Appendix 4. Information on status of desert tortoises in areas that displaced off-highway vehicle activity may affect.

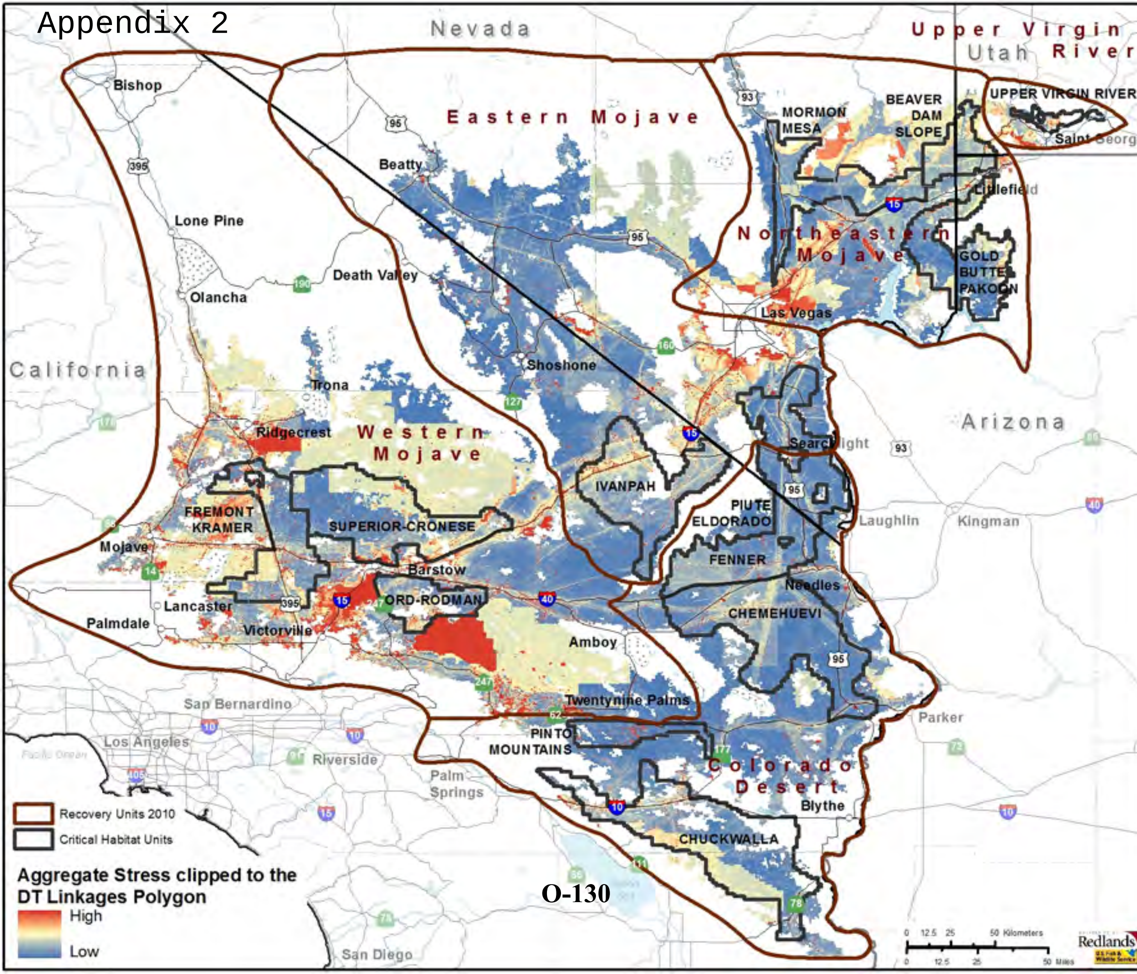
	Information Source	Time Frame and Status
Stoddard Valley OHVMA	Berry and Nicholson 1984 Bureau et al. 2005	late 1970s; 50 to > 250 adults in the northern portion of the area, 1 to 20 adults in the southern portion of this area. 1998 to 2002; above-average desert tortoise sign[17] in the northern portion of the area and in Brisbane Valley to the west of the OHV area; encounter rate was 0.095[18].
Brisbane Valley	Berry and Nicholson 1984 Bureau et al. 2005	late 1970s; 50 to > 250 adults in this area. 1998 to 2002; above-average desert tortoise sign.
Johnson Valley OHVMA	Berry and Nicholson 1984 Bureau et al. 2005	late 1970s; southern portion contained 20 to >250 adults. late 1990s; above-average desert tortoise sign in the same location and at another location to the northeast, a 15-square-mile die-off area. early 1980s to mid-1990s; the Lucerne Valley permanent study plot, located within the DWMA contiguous with a higher-density area of the Johnson Valley OHVMA declined by 30 percent.
El Mirage OHVMA Edwards Bowl Heavy Use OHV Area	Berry and Nicholson 1984 Bureau et al. 2005	late 1970s; 50 to 100 adults. late 1990s; 4-square-mile die-off area in the Edwards Bowl, Encounter rate was 0.125 within the OHV area.
Rasor OHVMA	Bureau et al. 2005	late 1990s; very low densities, probably absent from large portions of the OHVMA.

[17] Areas of above-average desert tortoise sign potentially have more desert tortoises than other portions of the western Mojave Desert, but they do not necessarily indicate a lack of population decline or a large number of desert tortoises.
[18] The encounter rate represents the number of desert tortoises observed per mile of transect.

	Information Source	Time Frame and Status
Spangler Hills OHVMA	Berry and Nicholson 1984 Bureau et al. 2005	late 1970s; most of the area is 1 to 20; 20 to 50 adults in southeastern corner. late 1990s; no areas of above-average sign, except for one small area northwest of the OHV area Encounter rate was 0.018.
Dove Springs and Jawbone Canyon OHVMAs East Sierra Area Heavy Use OHV Area	Keith et al. 2005 (citations from other sources) Bureau et al. 2005 Keith et al. 2005	late 1970s; few sign detected, anecdotal observations. late 1990s; no live desert tortoises within Dove Springs. 2002 to 2004; less than 3 adults, unauthorized use outside of the OHV management areas is "widespread and frequent."
<u>California City</u> <u>Rand Mountains</u>	Berry and Nicholson 1984 Bureau et al. 2005	late 1970s and early 1980s; 50 to more than 250. late 1970s to mid-1990s; declines of 74, 84, and 91 percent within 3 permanent study plots within or near this heavy use area, a permanent study plot east of this area declined by 93 percent over the same period, 2 die-off areas totaling 100 square miles overlapping or immediately adjacent to this heavy-use OHV are.
Silver Lakes Residential Vehicle Impact Area	Berry and Nicholson 1984 Bureau et al. 2005 Service 2006, 2009b, 2010c, 2010d	1970s and early 1980s, 50 to 250 adults. late 1970s to early 1990s; declines of 69 percent within a permanent study plot. late 1990s; a 19-square-mile die-off area overlapping the northern portion of this area, above-average levels of sign across most of this area. Mid to late 2000s; more desert tortoises consistently located south of Highway 58 than north of highway.

	Information Source	Time Frame and Status
Hinkley Residential Vehicle Impact Area	Berry and Nicholson 1984 Bureau et al. 2005 Service 2006, 2009b, 2010c, 2010d	late 1970s and early 1980s; 20 and 250. late 1990s; 21-square-mile die off area, above-average sign across most of this area. Mid to late 2000s; 7 adults, desert tortoises consistently located across most of this area.
Coyote Corner Residential Vehicle Impact Area	Berry and Nicholson 1984 Bureau et al. 2005 Service 2010c Service 2012c	late 1970s and early 1980s; most of the area 20 to 100 adults. late 1990s; above-average sign; a 63-square-mile die-off area overlaps much of this area. Mid to late 2000s; 7 adults, desert tortoises consistently located across most of this area. 2008 to present; 586 desert tortoises were translocated from Fort Irwin into this general area, 245 desert tortoises (resident, translocated, and control animals) died. The deaths and translocations occurred over a broader area than identified as Coyote Corner.

Appendix 2



Nevada
Upper Virgin River
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Eastern Mojave
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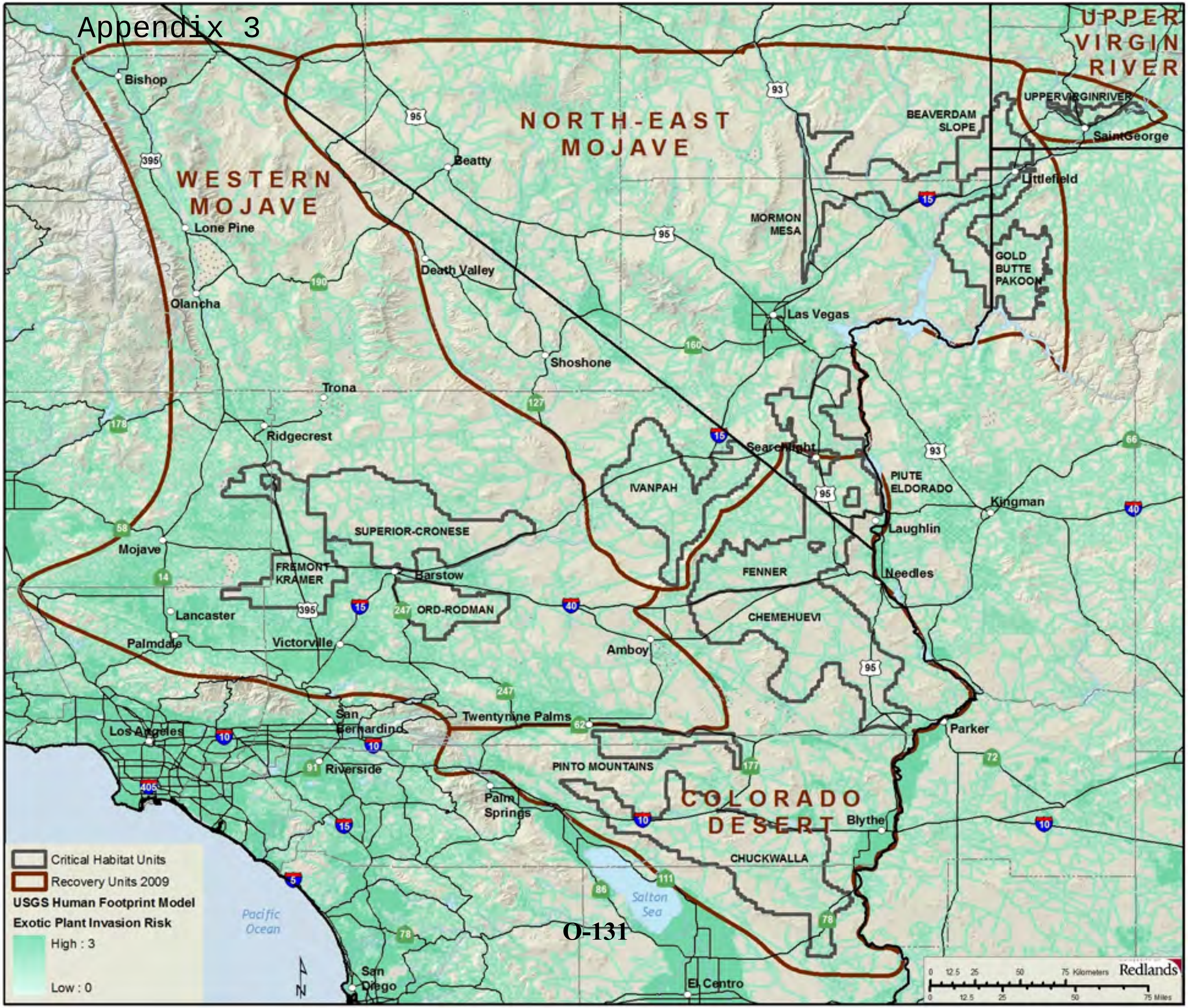
Colorado Desert
California
Arizona
Bishop
Beatty
Lone Pine
Olancha
Death Valley
Trona
Ridgecrest
Shoshone
Las Vegas
Littlefield
Saint George
Searchlight
Laughlin
Kingman
Needles
Mojave
Barstow
Lancaster
Palmdale
Victorville
Amboy
Twentynine Palms
San Bernardino
Los Angeles
Riverside
Palm Springs
Parker
Blythe
San Diego
Pacific Ocean
MORMON MESA
BEAVER DAM SLOPE
UPPER VIRGIN RIVER
GOLD BUTTE PAKOON
IVANPAH
PIUTE ELDORADO
FENNER
CHEMEHUEVI
FREMONT KRAMER
SUPERIOR-CRONESE
ORD-RODMAN
PINTO MOUNTAINS
CHUCKWALLA
Recovery Units 2010
Critical Habitat Units
Aggregate Stress clipped to the DT Linkages Polygon
High
Low
50 Kilometers
50 Miles
Redlands

Appendix 3



UPPER VIRGIN RIVER
NORTH-EAST MOJAVE
WESTERN MOJAVE
COLORADO DESERT
UPPERVIRGINRIVER
BEAVERDAM SLOPE
MORMON MESA
GOLD BUTTE PAKOON
PIUTE ELDORADO
IVANPAH
SUPERIOR-CRONESE
FREMONT KRAMER
ORD-RODMAN
FENNER
CHEMEHUEVI
PINTO MOUNTAINS
CHUCKWALLA
Bishop
Beatty
Lone Pine
Olancha
Death Valley
Shoshone
Trona
Ridgecrest
Las Vegas
Littlefield
SaintGeorge
Searchlight
Laughlin
Kingman
Needles
Mojave
Barstow
Lancaster
Palmdale
Victorville
Amboy
Twentynine Palms
San Bernardino
Los Angeles
Riverside
Palm Springs
Parker
Blythe
Salton Sea
Pacific Ocean
San Diego
El Centro
Critical Habitat Units
Recovery Units 2009
USGS Human Footprint Model
Exotic Plant Invasion Risk
High : 3
Low : 0
Kilometers
Miles
Redlands

Appendix 5. Graph of relative population density among permanent study plots in the western Mojave Desert and map of the same area depicting an analysis of the likelihood of finding a live desert tortoise (from Tracy et al. 2004).

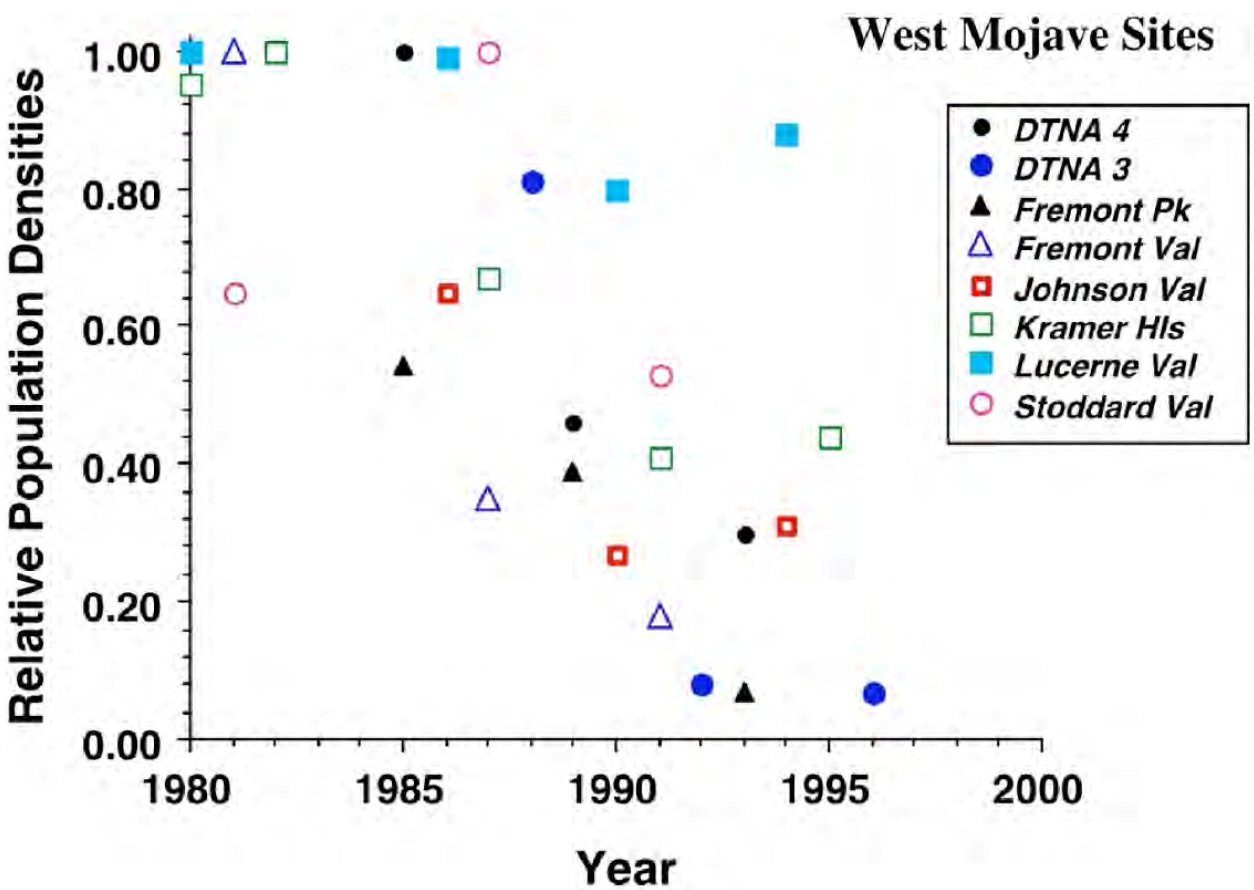


Fig. 4.6 Trends in relative population densities for desert tortoises in the eastern and western permanent study plot sites. From Tracey et al. (2004).

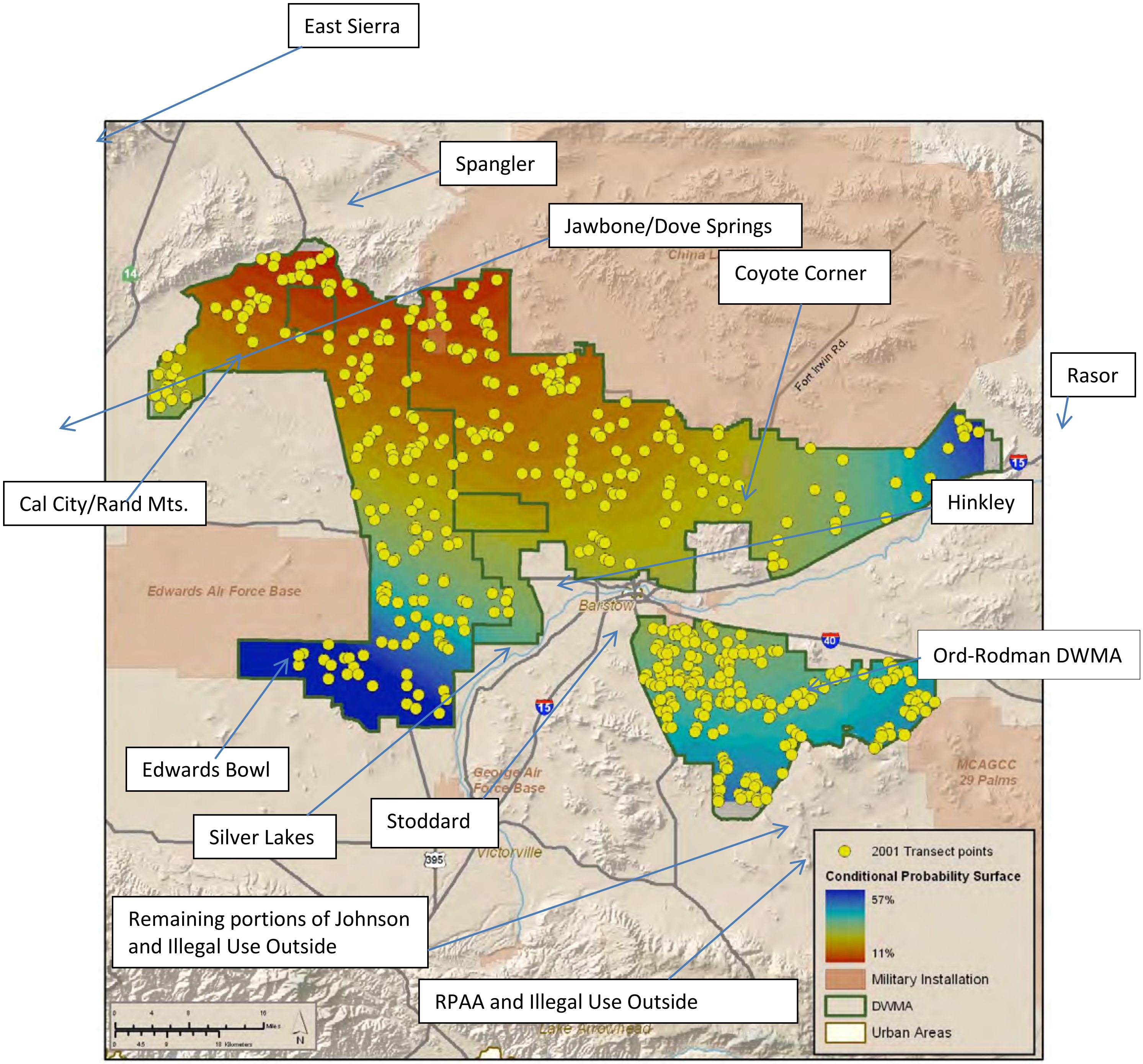


Fig. 4.21 Results from the logistic regression analysis. Cooler colors indicate higher probabilities of encountering a live tortoise, and warmer colors indicate a lower probability. From Tracey et al. (2004).