

Threats to the Mojave Ecosystem: Past, Present, and Future

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What Constitutes a Threat?



- Threats are subjective, depending on one's perspective
- What constitutes a threat changes with time
- Threats are extremely difficult to predict

What Constitutes a Threat?



The User Perspective



The Environmentalist Perspective



The Science Perspective

What Constitutes a Threat?

- Intensity and areal extent are factors
- Three science – management perspectives
- (1) Decreases in species populations
- (2) Habitat changes
- (3) Change in ecosystem processes

What Constitutes a Threat?

Intense, local impact



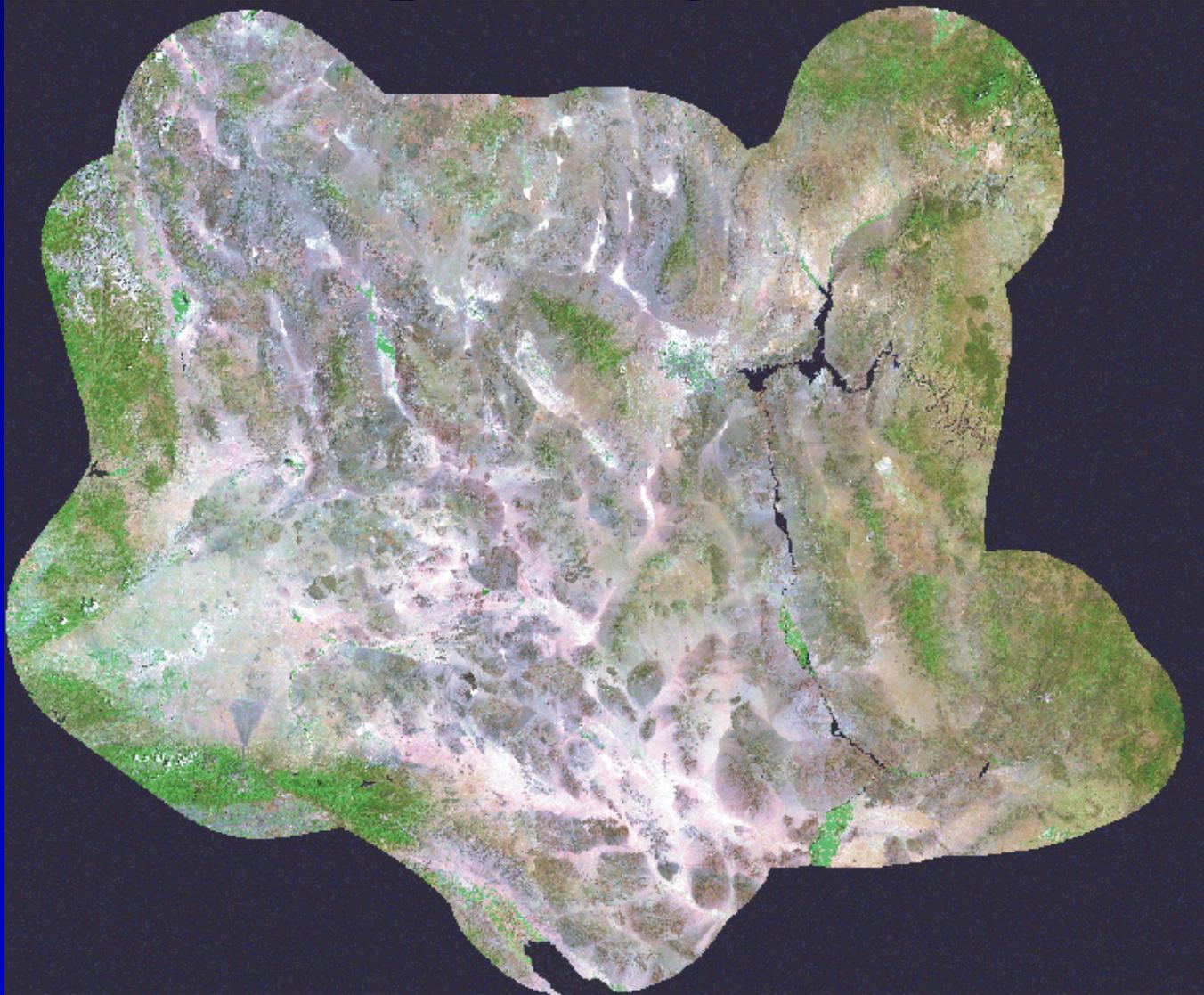
Intense, regional impact

Dispersed, local impact



Dispersed, regional impact

Mojave Ecosystem Threats (19th Through Early 20th Century)



Mining

Prospectors scour the Mojave in search of riches and find them



Skidoo



GREENWATER AND DEATH VALLEY MINE,
GREENWATER, CAL.

LARRY AND PAUL STUPE
GOLD FIELD, NEV.
MAY 1917

Deforestation to Feed Mills



National
Forest
Reserves

Transportation Corridors



Commerce in support of mining required railroads and roads



Tailings Piles

Rhyolite, Nevada



Furnace, California



Livestock Grazing



Livestock were trailed through the Mojave Desert beginning with the Spaniards. Widespread grazing required development of widespread watering sites and occurred in the 20th century.



Initial scientific interest was more concerned with range production and management, not environmental concerns.

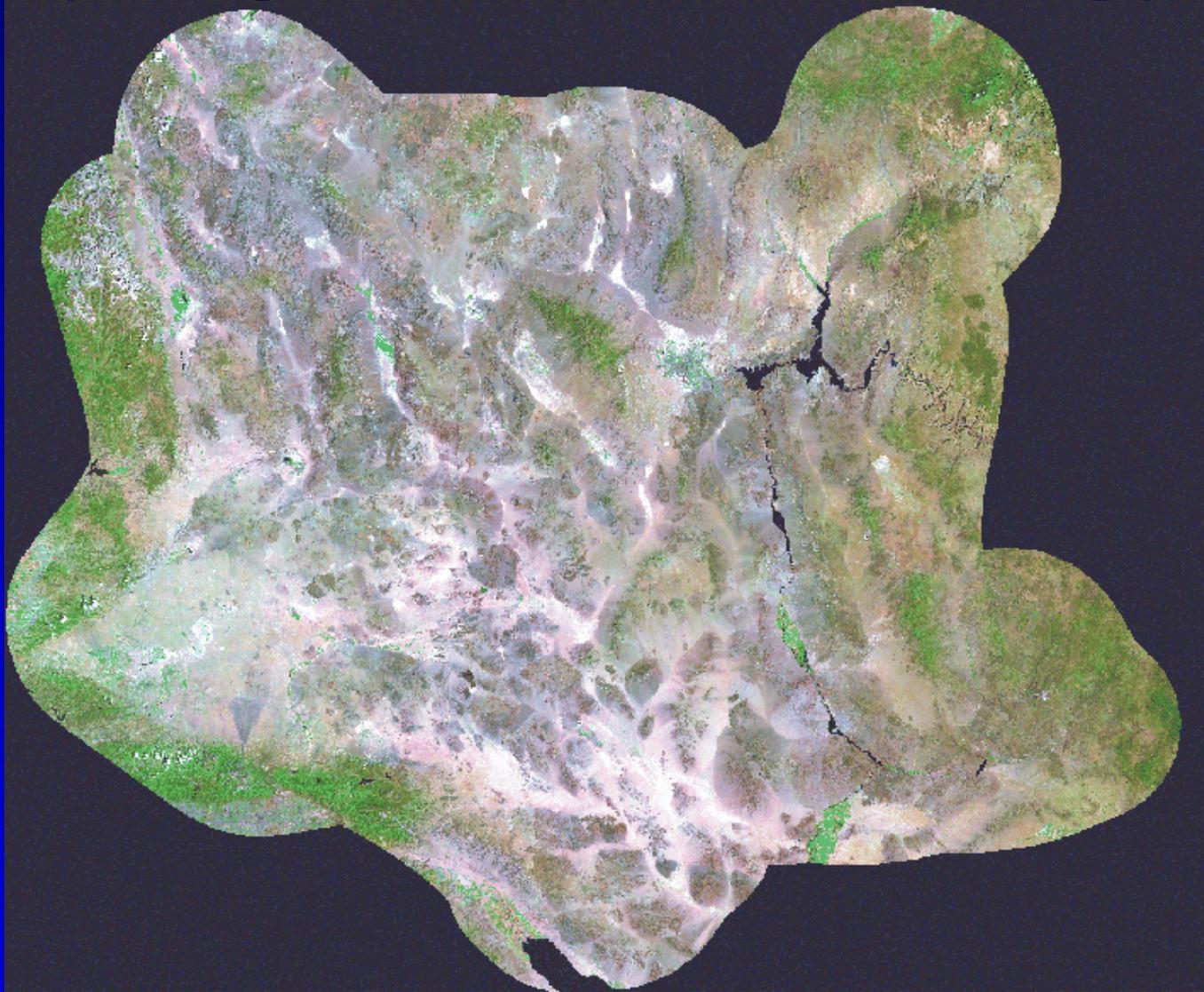
Agriculture



Farmers attempted three types of agriculture: dryland, irrigation with surface water, irrigation with ground water

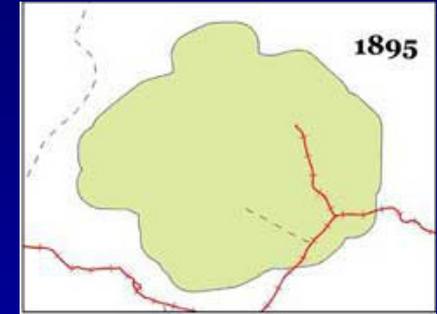


Mojave Ecosystem Threats (Early to Mid-20th Century)



Proliferation of Roads

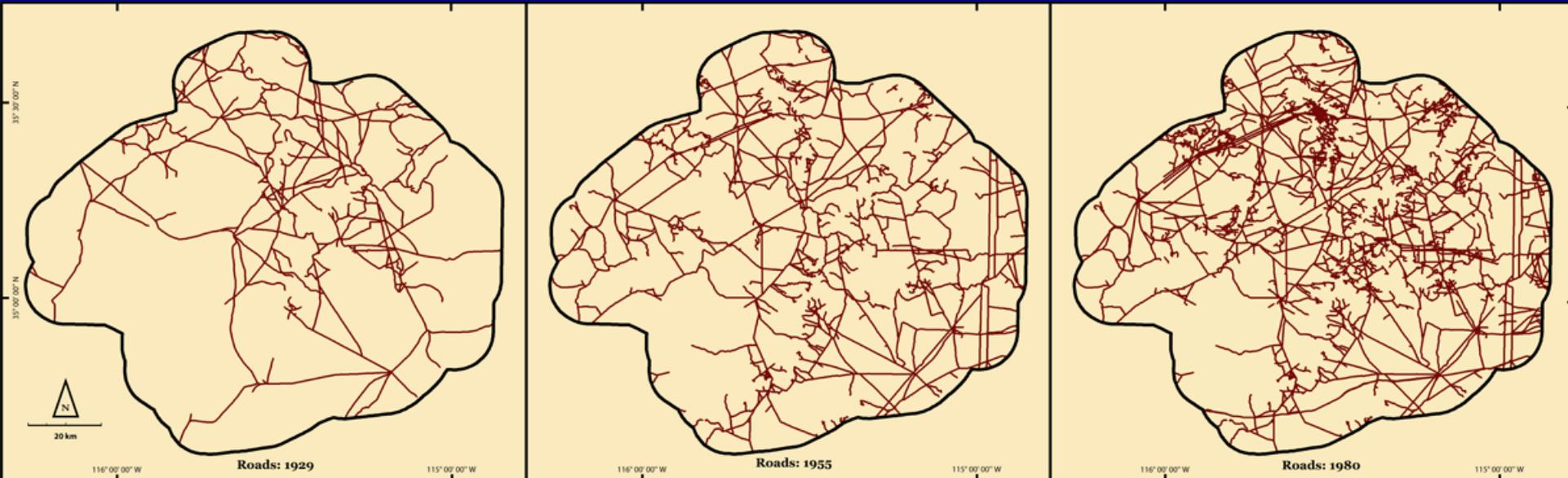
- The density of roads in the Mojave Desert increased through the 20th century
- Mojave National Preserve gives one example (Gass, Vogel, and Wallace, unpublished data)



1929

1955

1980



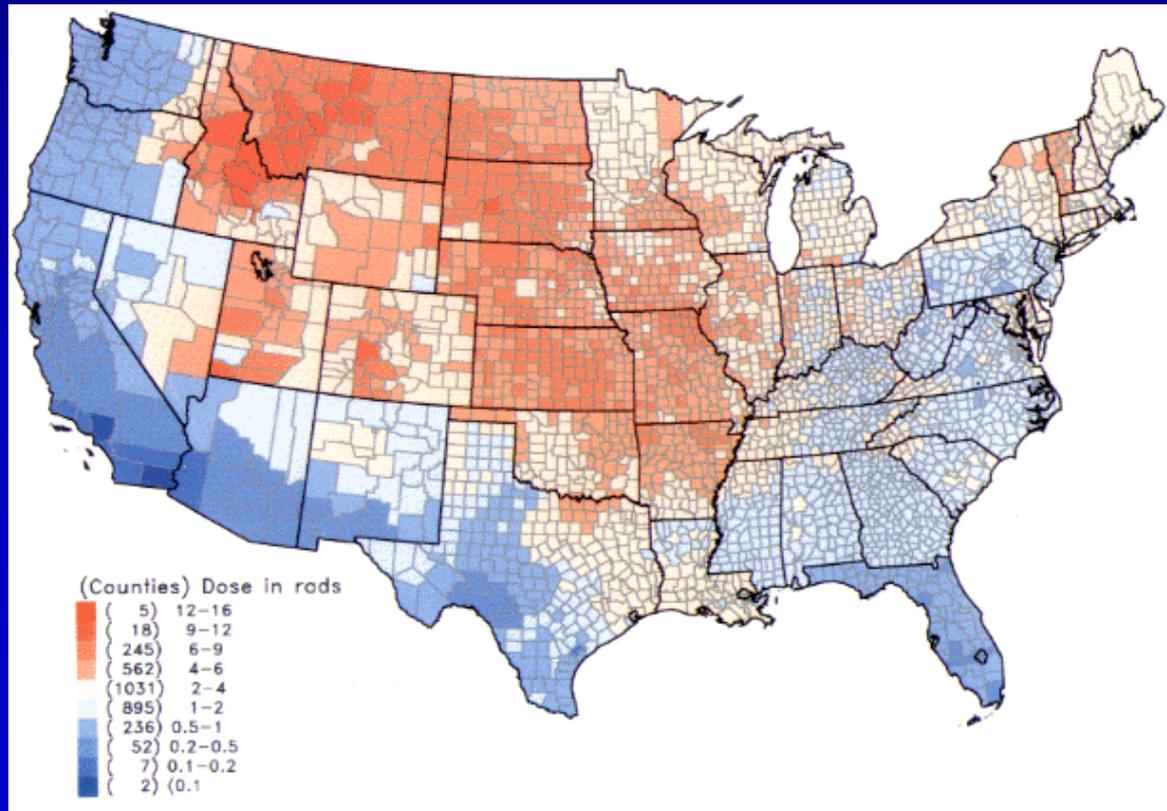
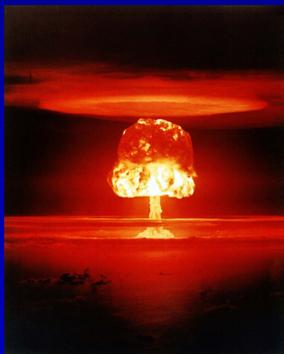
Military Training (1940s)



Nevada Test Site (1950s)



Testing needed to develop nuclear stockpile



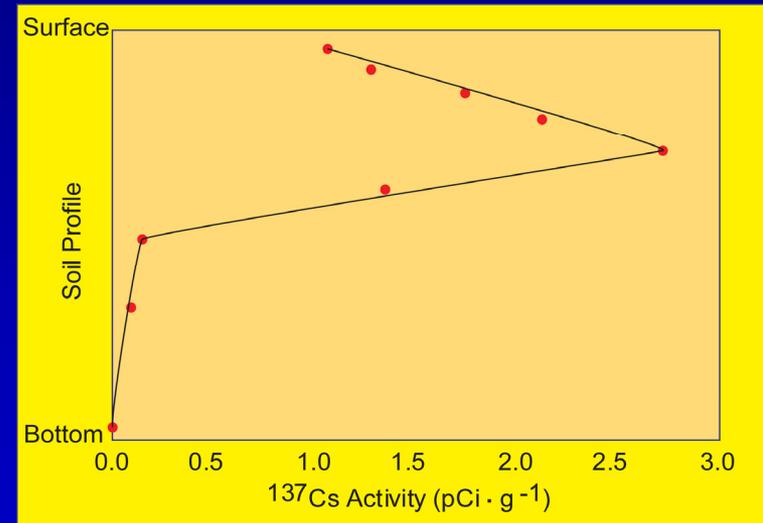
Fallout: Local and Regional



Above-ground testing began in the Mojave Desert in 1951 and ceased in 1963



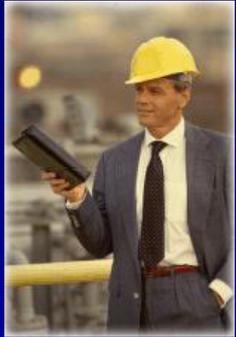
Local, regional, and global fallout was significant in the Mojave



Environmental concern led to UCLA studies in Rock Valley (Nevada Test Site) in the 1960s



Utility Corridors



Engineers find increasing need for utility corridors crossing the Mojave Desert



Environmentalists deplore visual impairment of desert vistas and increasing damage to the desert



Scientists warn of increasing habitat fragmentation in the Mojave Desert ecosystem



Mojave Ecosystem Threats (Late-20th Century)





Image courtesy of Todd Esque, USGS

Urbanization

Las Vegas provides an example of the fastest growing region in the US



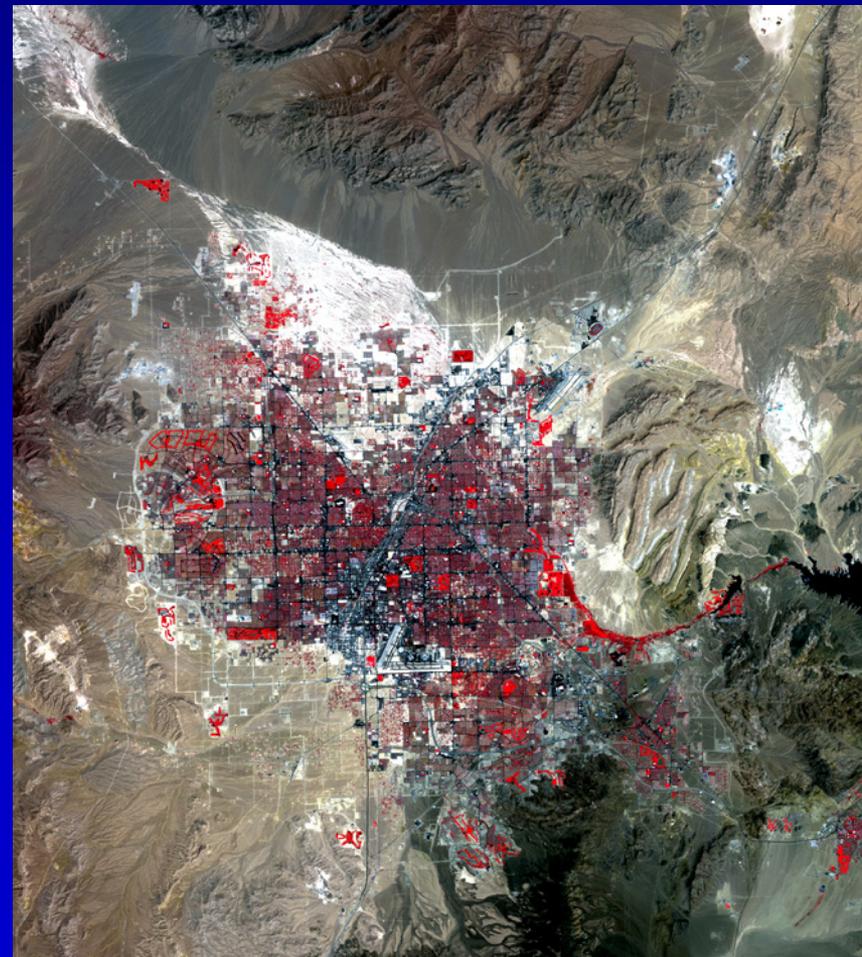
1972



1998



Images
courtesy
of William
Kepner,
EPA

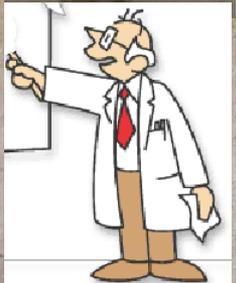


Off-Road Vehicle Use (1970s-present)

Vehicle users want expansive desert areas for motorized recreation

Environmentalists see wanton destruction of an ecosystem that is “easily scarred and slowly healed”

Scientists report large negative effects on the Mojave Desert ecosystem





Expanded Military Training Areas



Modern military vehicles and tactics require larger areas for training exercises.



Environmentalists view training-area expansion as a large threat (severe landscape disruption, habitat fragmentation, declines in endangered species).



Scientists asked to study restoration potential as well as effects on endangered species

Non-Native Plants



Scientists warn that non-native plants create many habitat changes

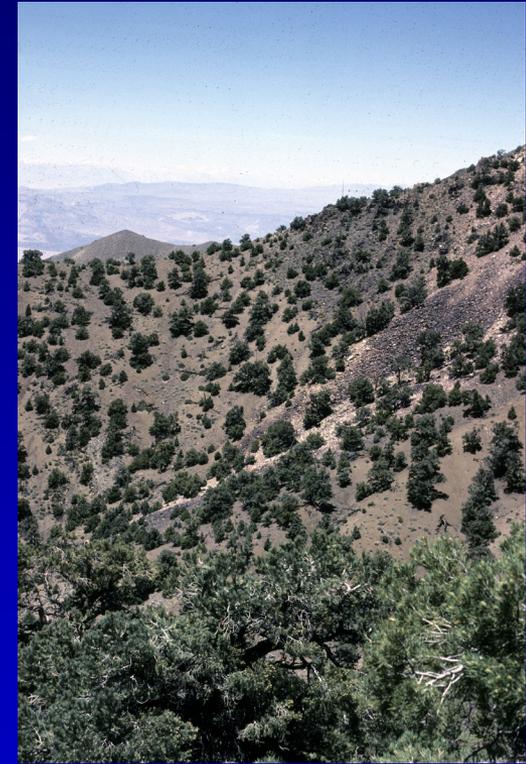


Fires and Non-Native Annuals



Scientists warn that the buildup of non-native annuals could lead to wildfires where fires were unknown historically

Woody Fuel Loading



The problem of woody fuel buildup is greatest at higher elevations

Hazardous Waste Disposal



Yucca Mountain

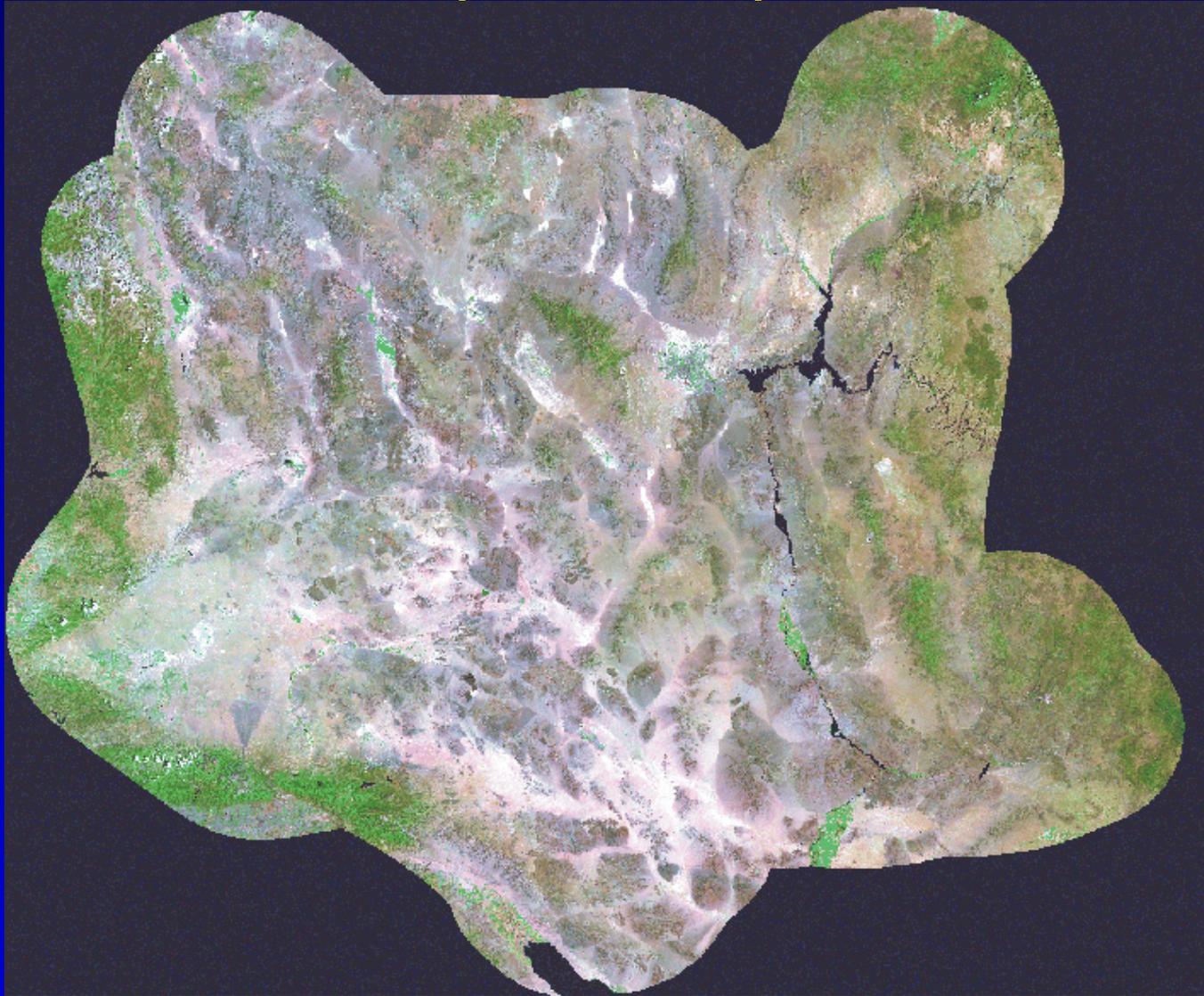


Environmentalists warn that importation of toxic or radioactive wastes could contaminate ground water or diminish air quality

Trash and Wildcat Dumping



Mojave Ecosystem Threats (Future)



Mojave Ecosystem Threats (Future)

- Continued soil disruption and erosion
- Reduction in productivity of native annuals and perennials
- Acceleration of habitat fragmentation



FUTURE THREAT?

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THE NEW YORK TIMES NATIONAL SUNDAY, MARCH 14, 2004



Paul Saffo

There were high hopes for Sandstorm, a robot made at Carnegie Mellon University. Dashed by a fence.

No Winner in a Desert Race for Robots

By JOHN MARKOFF
and JOHN M. BRODER

BARSTOW, Calif., March 13 — Fifteen robot vehicles took off across the Mojave Desert starting at dawn on Saturday, dodging boulders and 15-pound tortoises in search of a place in scientific history and \$1 million in Pentagon cash.

ful robot, covering 7.4 miles, slightly farther than the vehicle built by the SciAutonics II team. The second-place entry was the joint effort of a team of off-road racers and aerospace engineers sponsored by Elbit Systems, an Israeli manufacturer of off-road vehicles.

Stephen Wozniak drove his satellite television-equipped Hummer to the event with his friend Dan Sokol, a Silicon Valley engineer who was the first Horowitz winner.

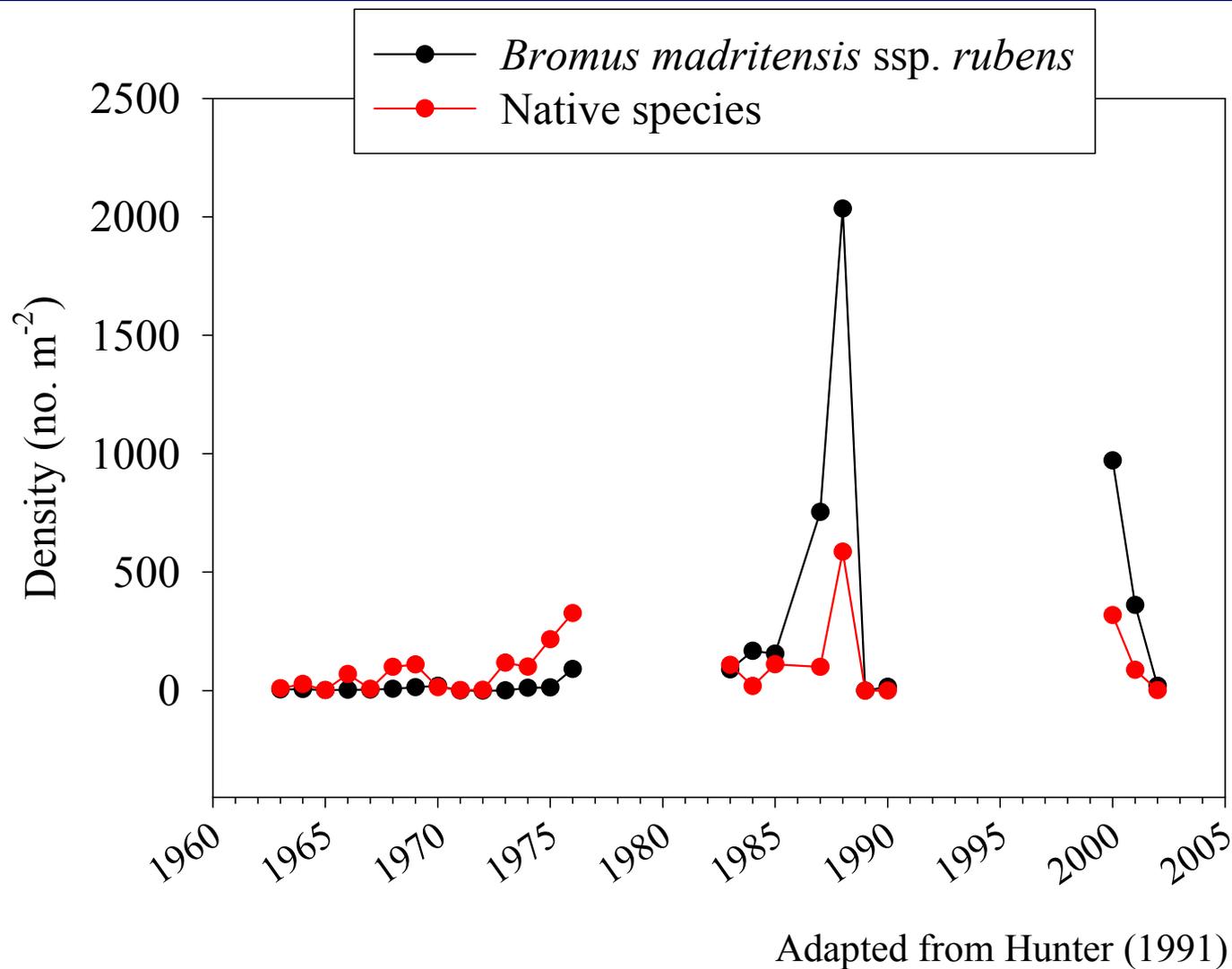
Unmanned
off-road
vehicle
races in
the future
of the
Mojave
Desert?

Hypothetical Future Scenario

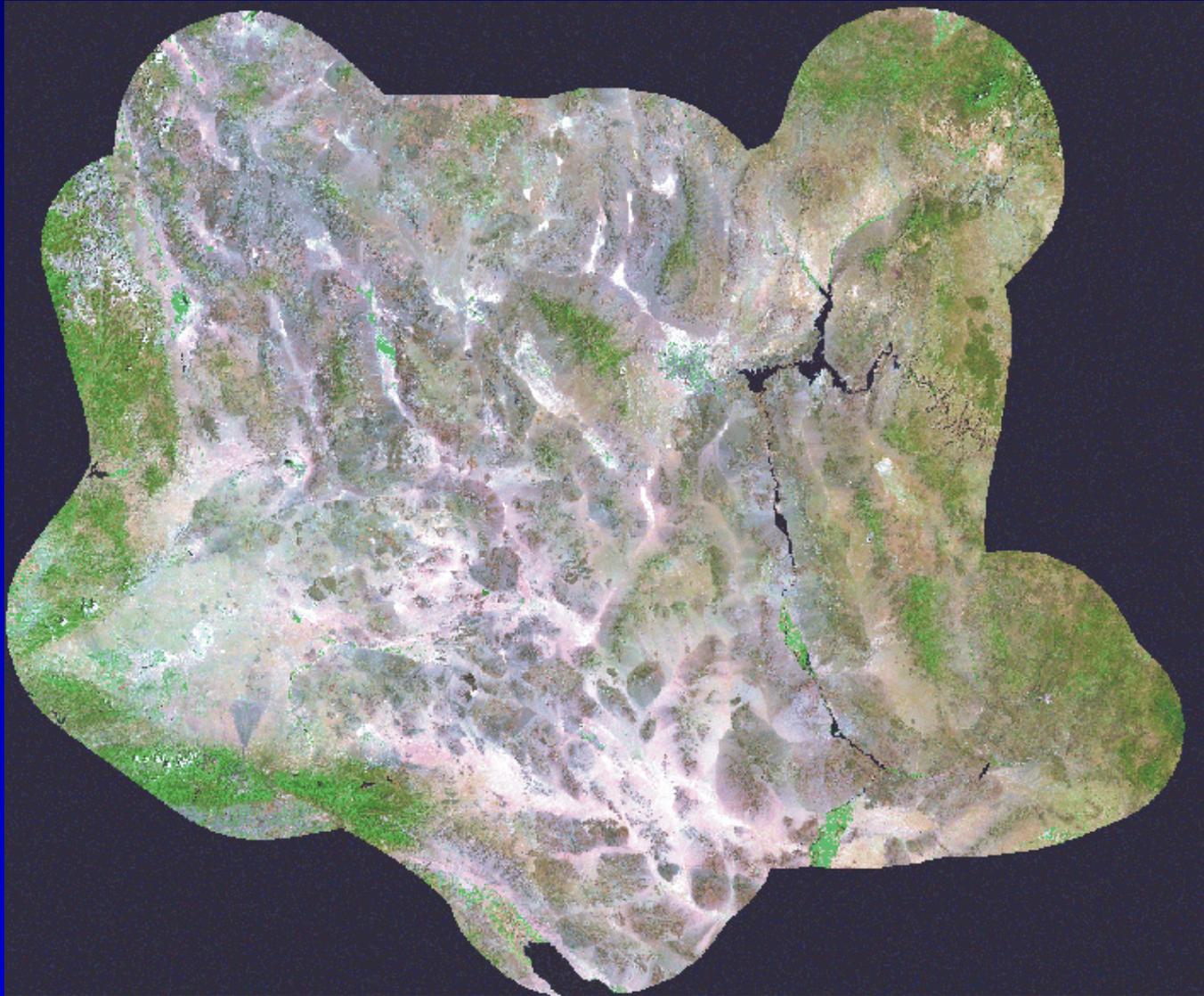


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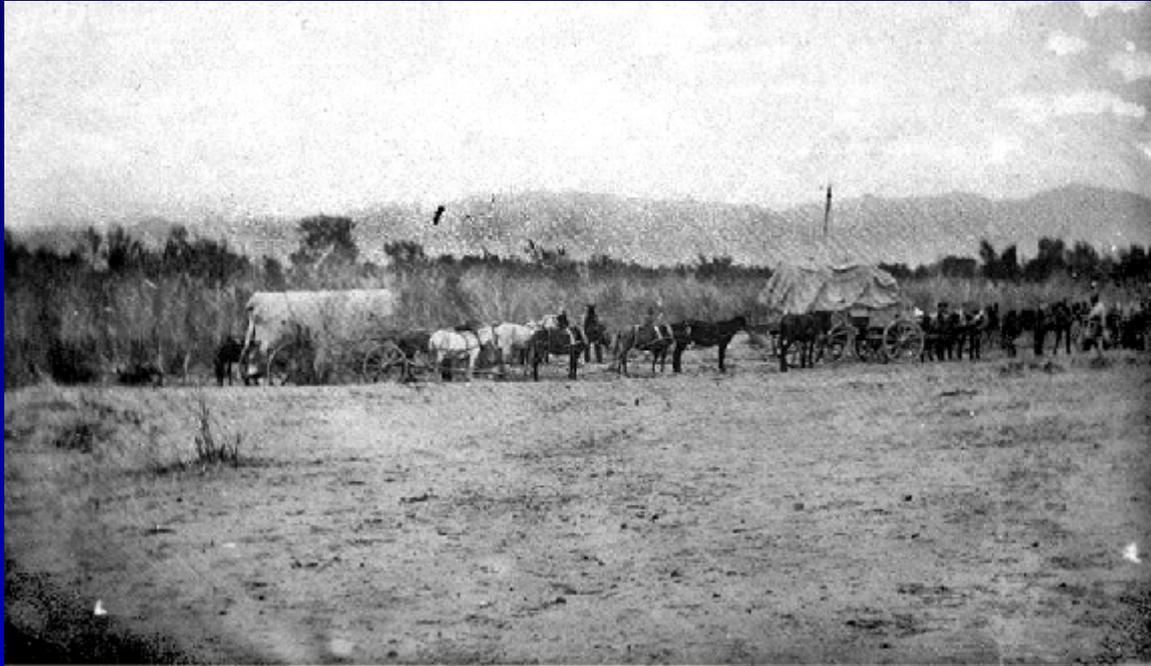
Non-Native Annuals: Will Drought Prevail?



Mojave Ecosystem Threats: Future Water Resource Development



Riparian Vegetation on the Mojave River



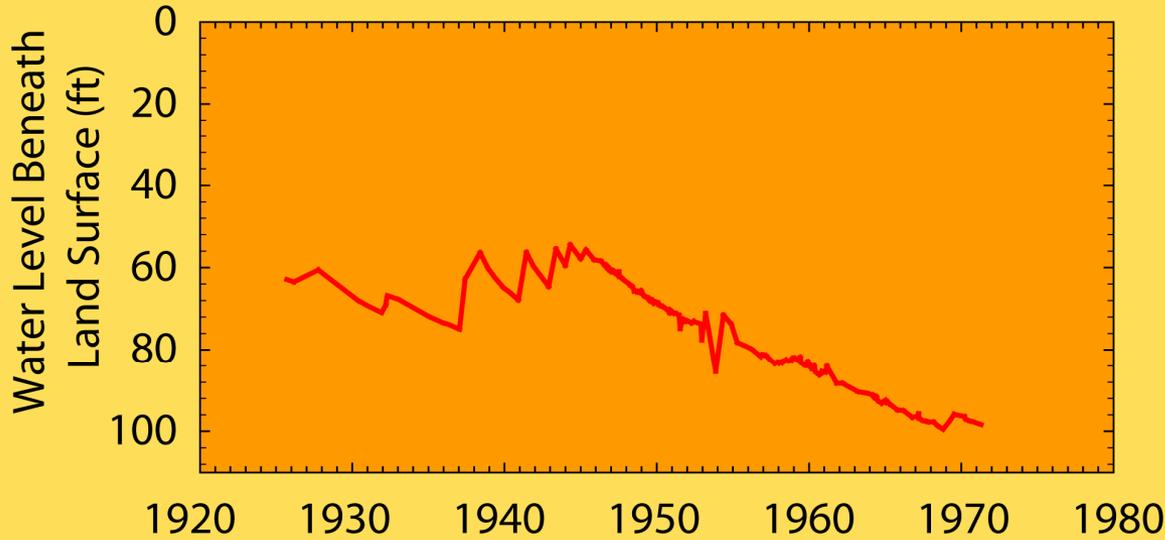
1863

2001

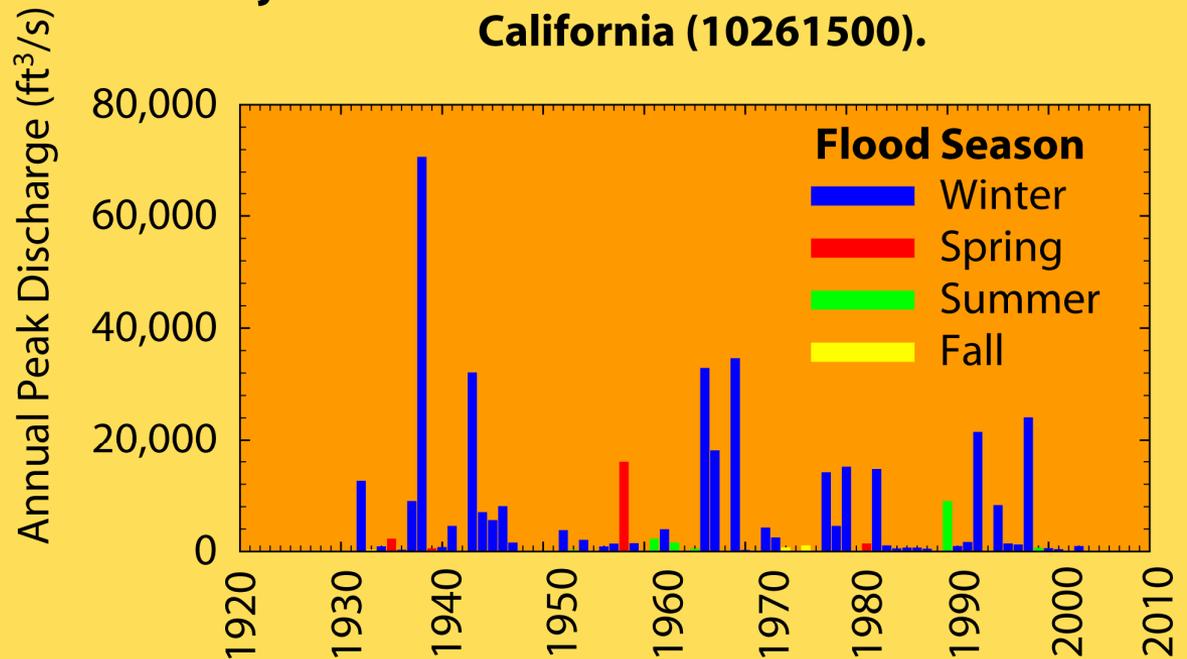


Water Resources Development and Riparian Vegetation

Well 9N/1E-13E-25 near the Mojave River downstream from Barstow



Mojave River at the lower Narrows near Victorville, California (10261500).

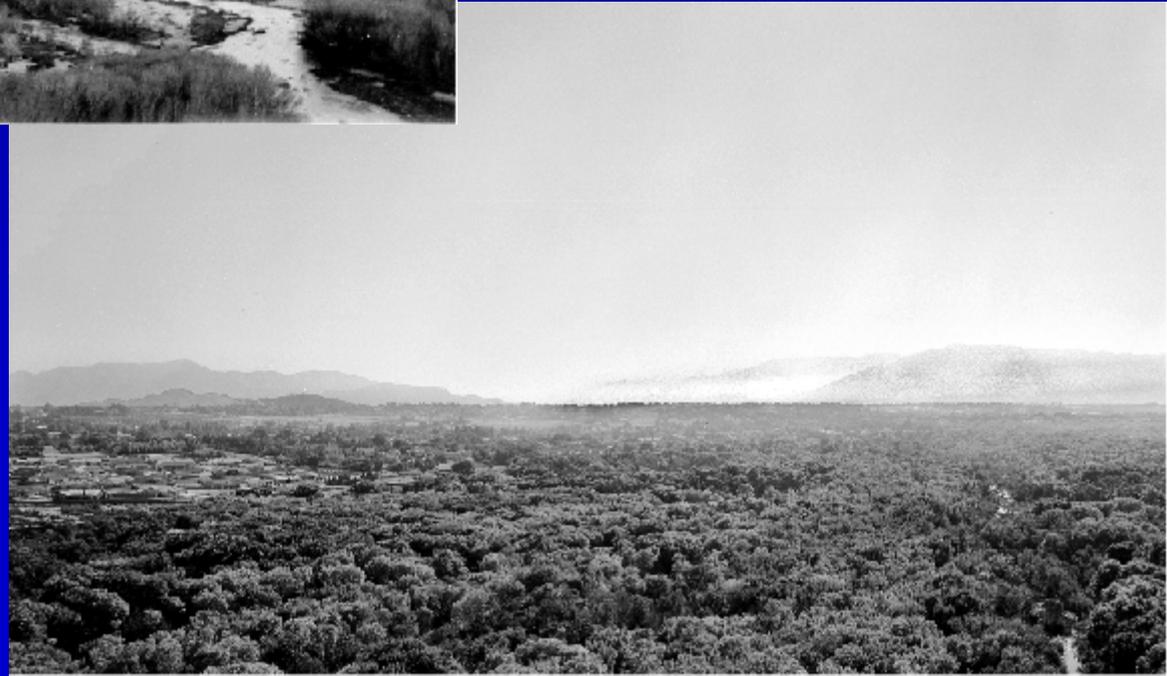


Increases in Riparian Vegetation



1919

2000



Conclusions

- Predicting the next major threat to the Mojave Desert ecosystem is extremely difficult – there are so many to choose from
- If there is a consensus, the largest general threat is from climatic change, and the largest local threat is the influx of non-native species