

# Environmental Protection Indicators for California



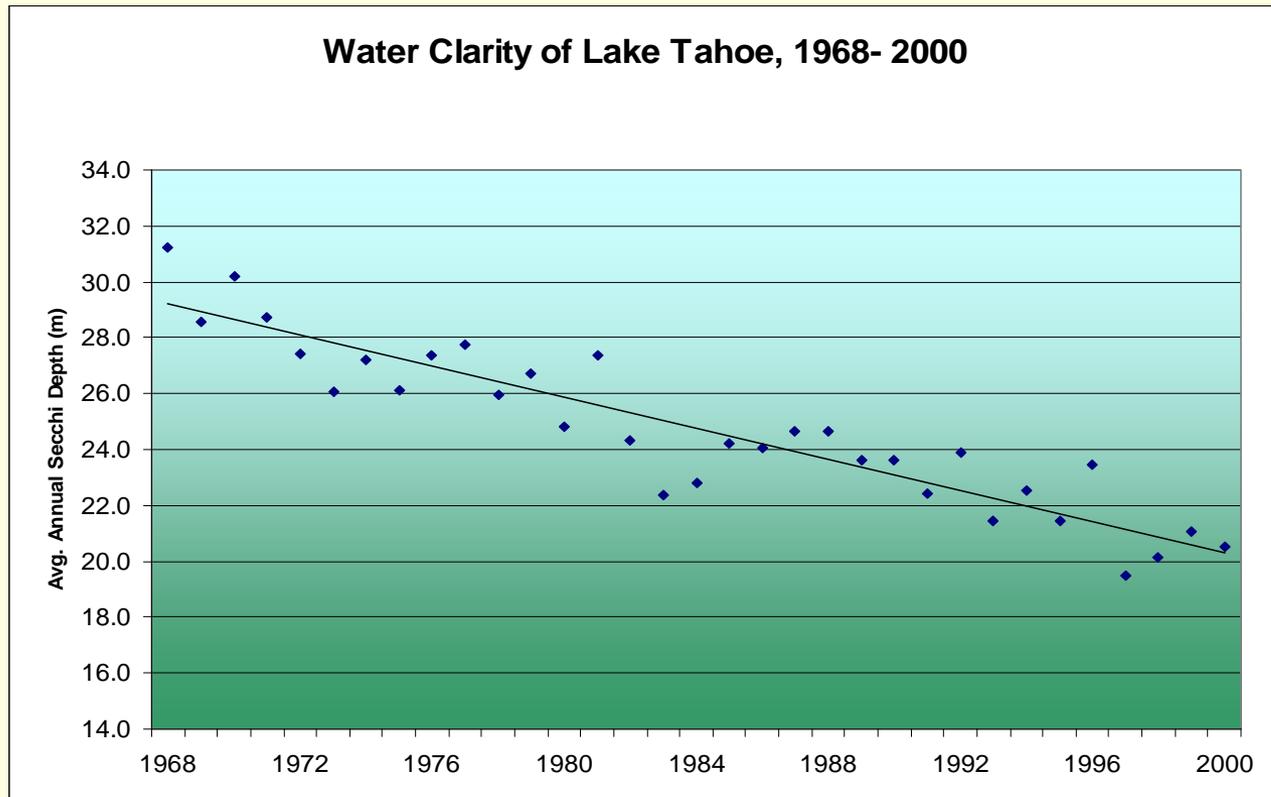
## OVERVIEW and ECOSYSTEM HEALTH INDICATORS

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Office of Environmental Health  
Hazard Assessment, Cal/EPA

# What is an environmental indicator?

- **Scientifically based information on the status of, and trends in, environmentally related parameters**
  - Convey complex information in a concise, easily understood format
  - Have significance beyond that directly associated with the measure itself
- **Example: Trophic Status of Lake Tahoe**

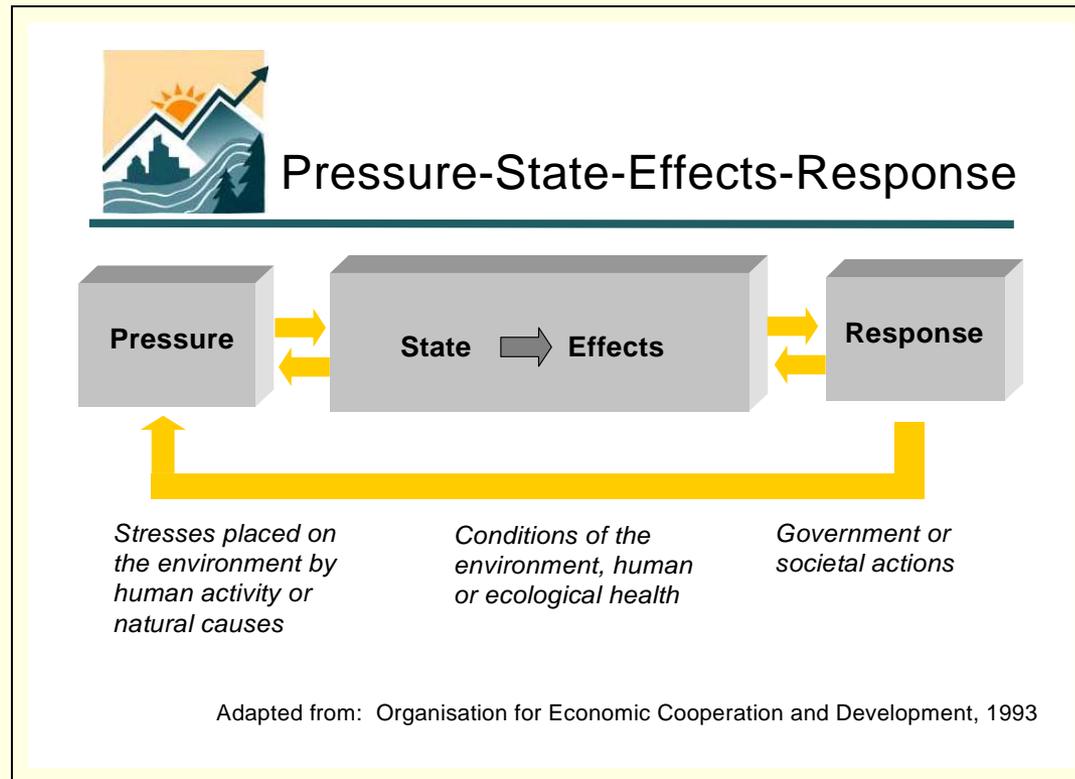
# Clarity of Lake Tahoe



# Brief History of EPIC

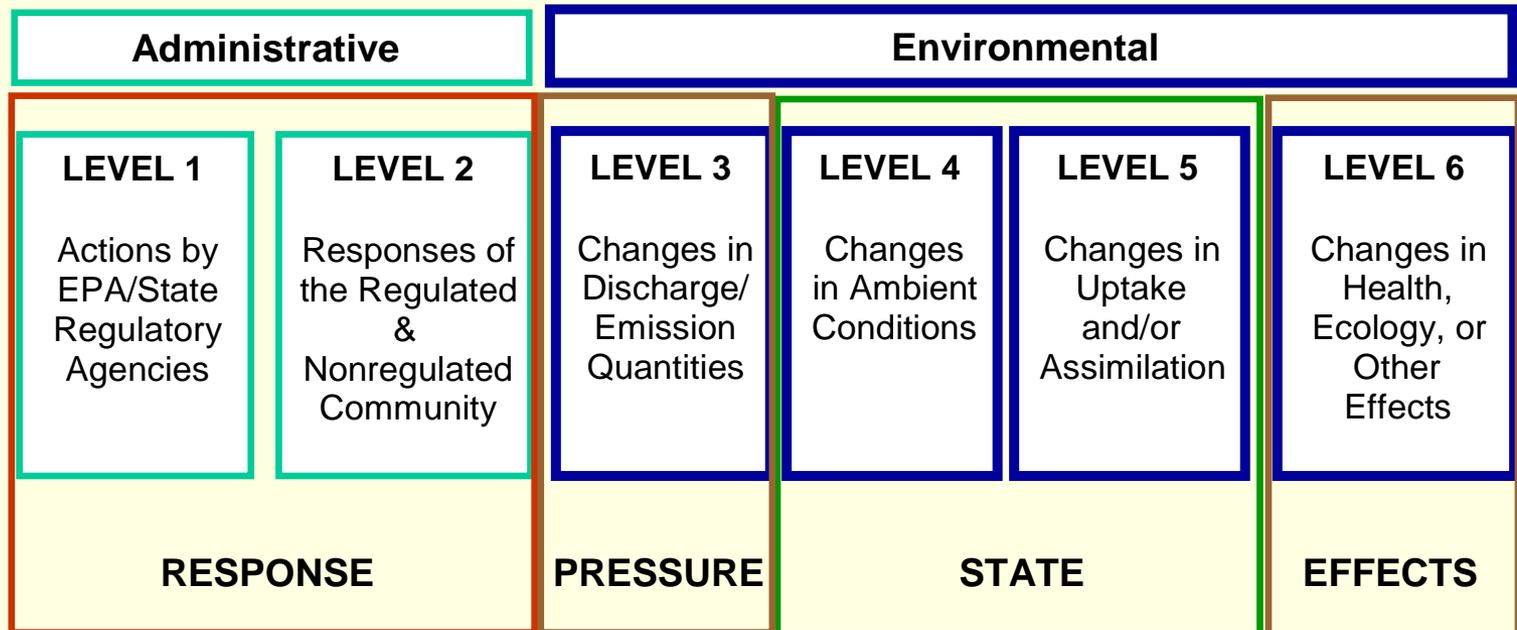
- Project launched Jan. 2001 with conference
- Joint effort of Cal/EPA and Resources Agency
  - Complementary to Legacy Project
- Purpose: develop meaningful objective measures of the outcomes of programs and work of agencies involved in protection of the environment
- Move away from counting activities and towards results-based management

# Pressure-State-Effects-Response Model



# Pressure-State-Effects-Response Model

## Chesapeake Bay Program's Hierarchy of Indicators



# Criteria for Selection of Indicators

- High data quality
- Conceptually relevant
- Sensitivity
- Decision Support

# Issues Identified for EPIC Report

- Air Quality
- Water Quality
- Land, Waste, and Materials Management
- Transboundary Issues
- Pesticides
- Human Health
- Ecological Health

# Overview of Issues

- **AIR QUALITY**

- Criteria Air Pollutants
- Toxic Air Contaminants
- Visibility
- Indoor Air Quality

- **WATER QUALITY**

- Assessment of Beneficial Uses
- Drinking Water Quality
- Fish & Shellfish Consumption
- Water Supply and Use

# Overview of Issues

- **LAND, WASTE & MATERIALS MANAGEMENT**
  - Waste generation
  - Contamination of land
- **HUMAN HEALTH**
  - Biocaccumulation of Toxic Chemicals
  - Environmentally-associated Diseases

# Issues

- **PESTICIDES**

- Effects on humans and the ecosystem
- Usage

- **TRANSBOUNDARY**

- Global Warming
- Air Quality along California-Baja California border

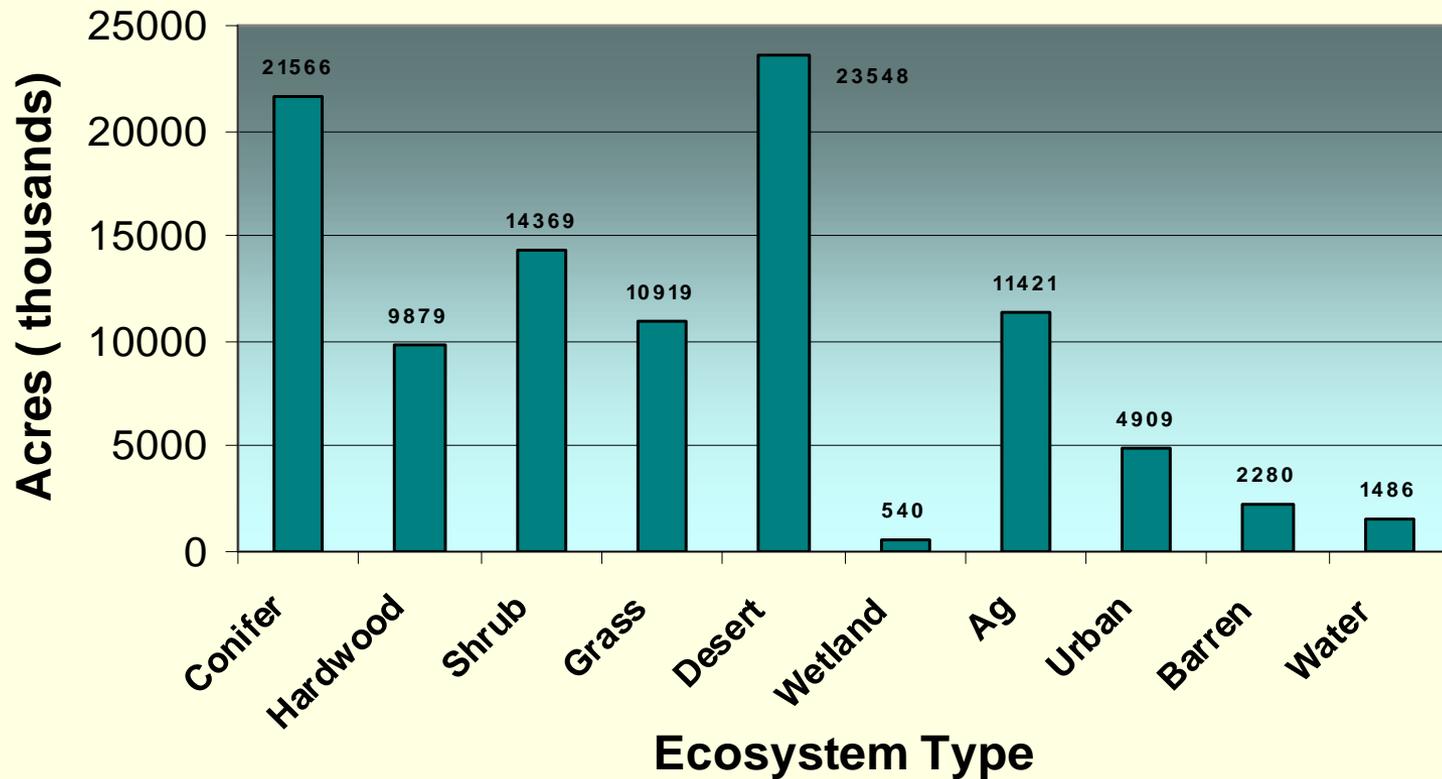
# Overview of Issues

- **ECOSYSTEM HEALTH**

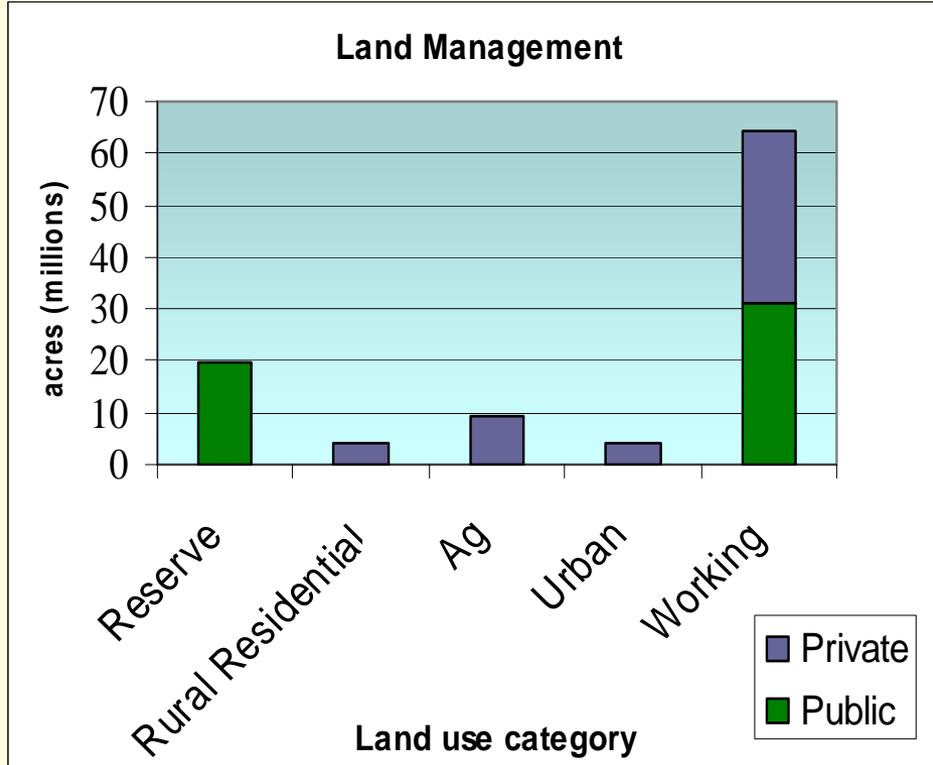
- General Indicators
- Aquatic and Coastal Ecosystems
- Desert Ecosystem
- Forest and Rangeland Ecosystems
- Agricultural Ecosystems
- Urban Ecosystems

# General Indicators: Land Cover

## California Land Cover



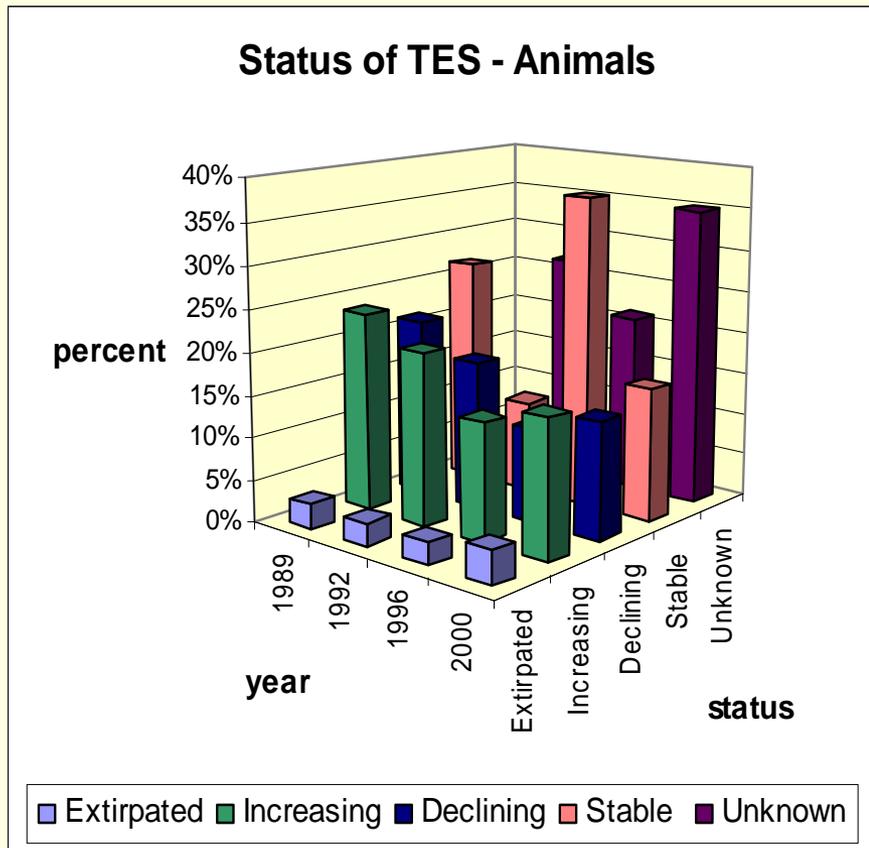
# General Indicators: Land Management



*What is the indicator showing?*

*Nineteen percent of California lands are managed to maintain a high degree of ecological integrity (the Reserve category). Another 64% of "working" lands also provides varying degrees of habitat value. The remaining lands are significantly transformed by human activities.*

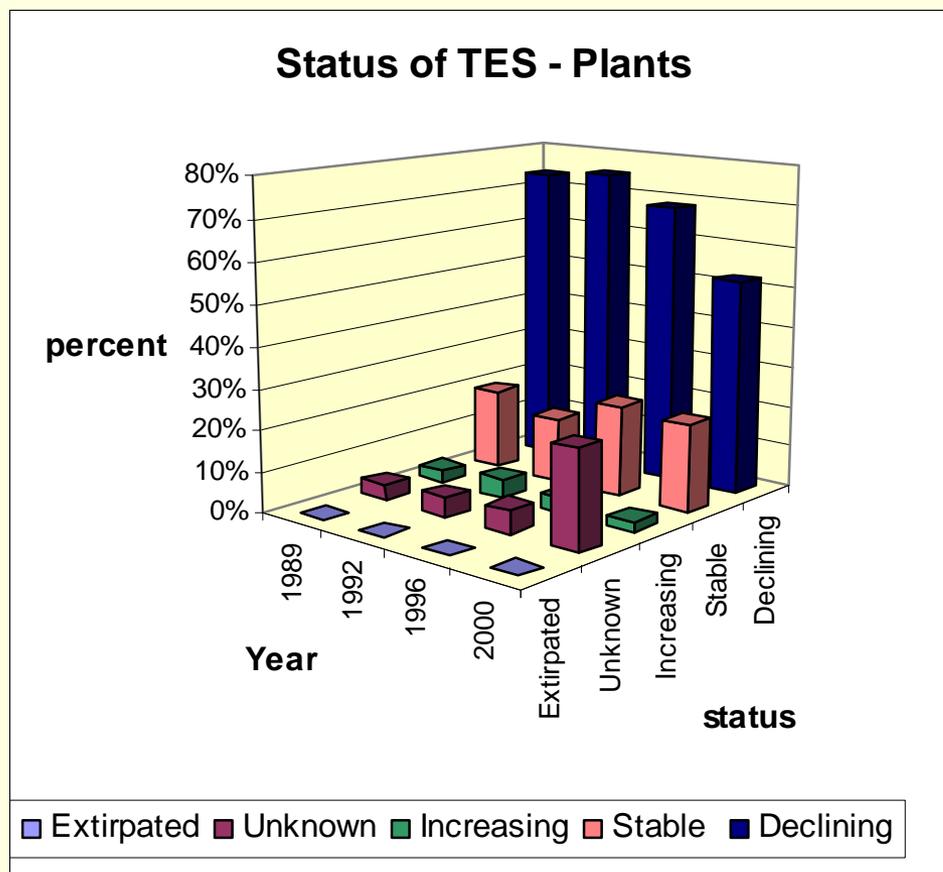
# General Indicators: California Threatened and Endangered Species



What is the indicator showing?

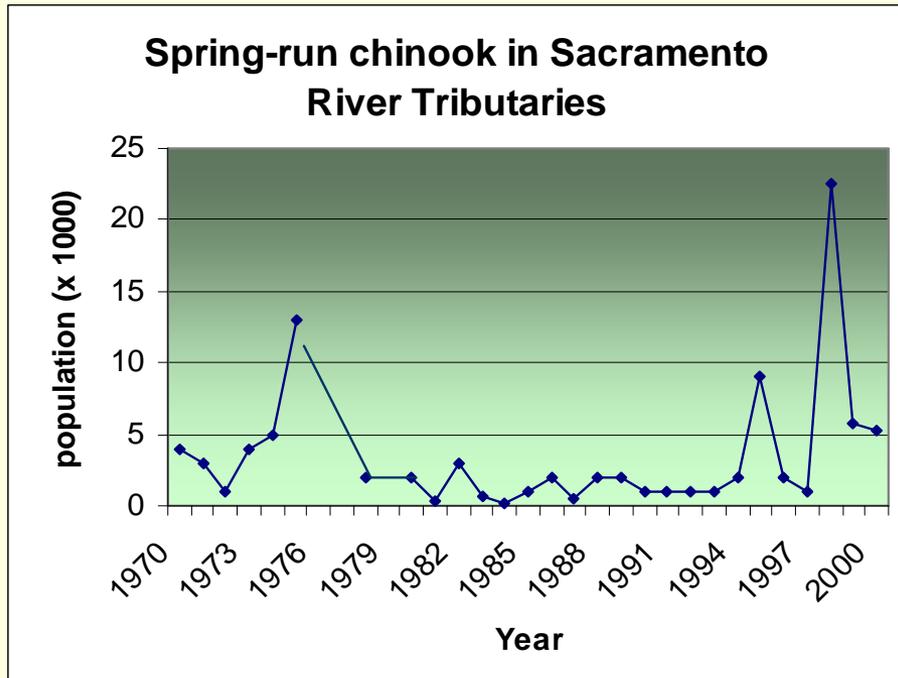
*Trends for TES animals between 1989 -2000 show that the percent of animals in the "unknown" category has increased. Over this same period, there appear to be fewer animals whose populations are "increasing" or "decreasing".*

# General Indicators: California TES



*Over the past 12 years, the number of plants on the California threatened and endangered species list that are "increasing" has been the smallest of any category. The number of plants in the unknown category are increasing. Extirpated refers to species no longer found in California.*

# Aquatic & Coastal Ecosystems: Chinook Salmon Population

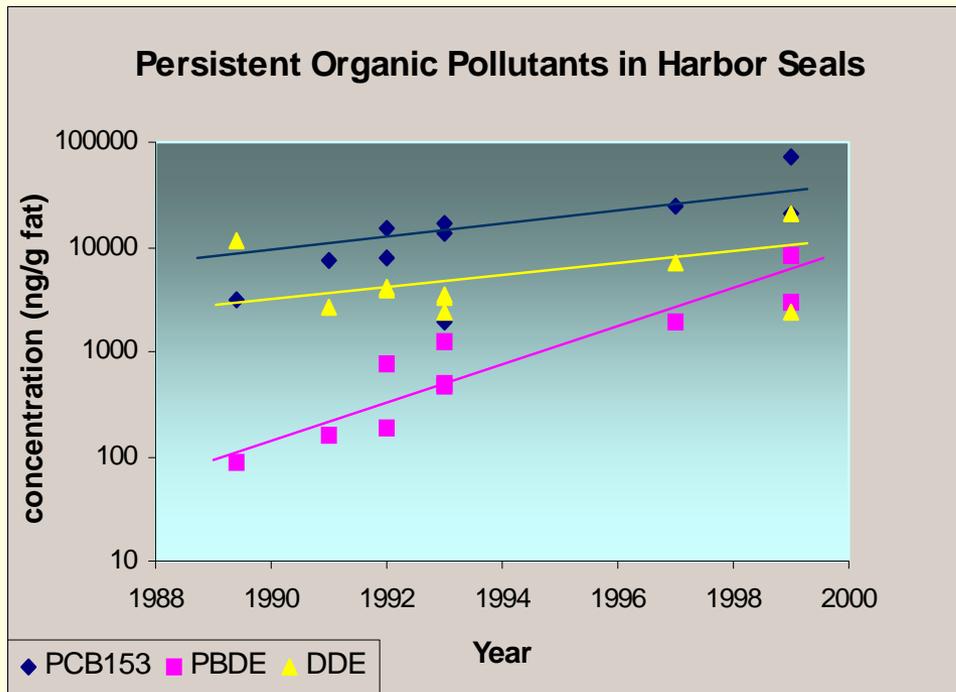


What is the indicator showing?

*Winter and spring run chinook salmon in the Sacramento River are state and federally listed species.*

*In recent years, the spring-run appears to be making some steps towards improvement in the population status.*

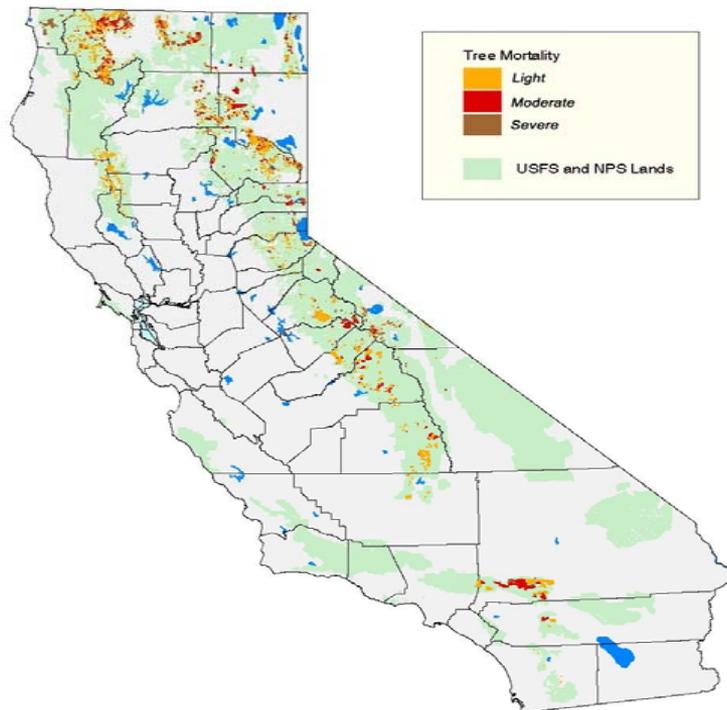
# Aquatic & Coastal Ecosystems: Persistent Organic Pollutants in Harbor Seals



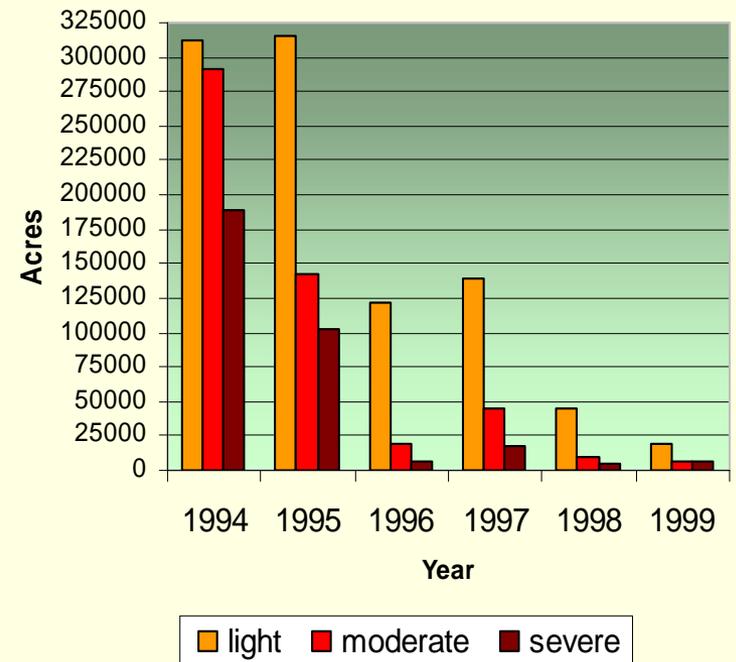
*This pilot study shows that certain POPs are accumulating in harbor seal blubber. There was an exponential increase in PBDEs, a small increase in PCBs and no change in organochlorine pesticides (DDE shown) over the last decade. Data for this graph came from analysis of fat tissue of 9 harbor seals killed in boating or other accidents.*

# Pests and Disease in the Forest

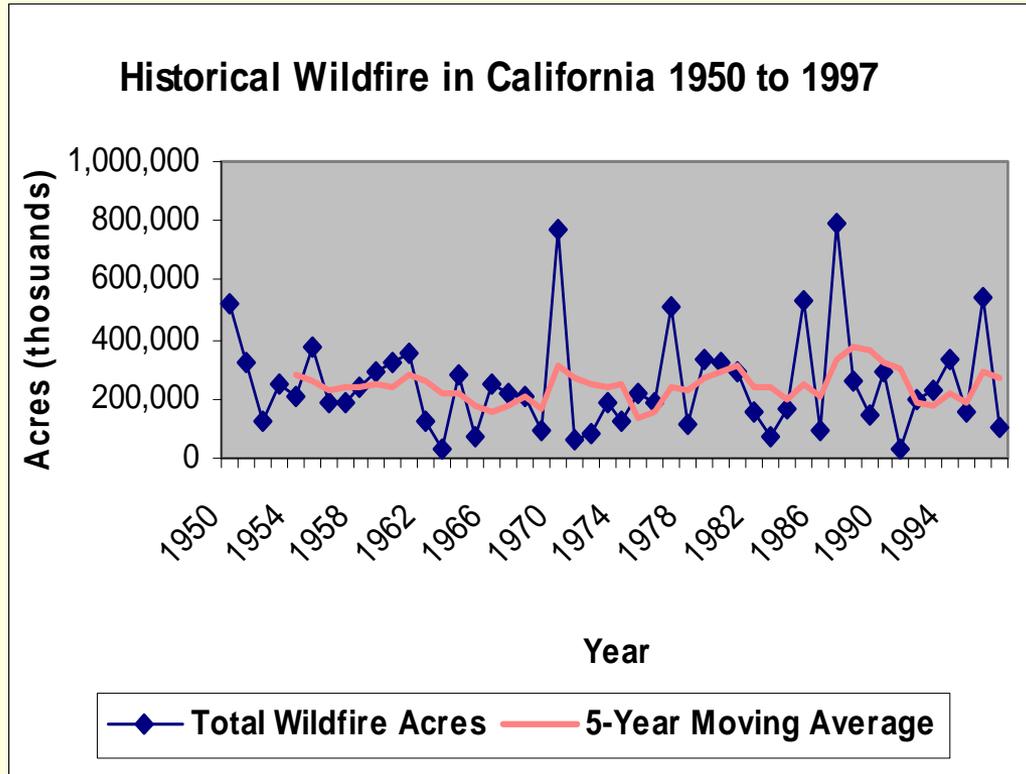
Statewide Mortality, 1994-1999  
Based on Aerial Surveys



Acres of Forest Affected by Pest & Disease  
(classified by severity of problem)



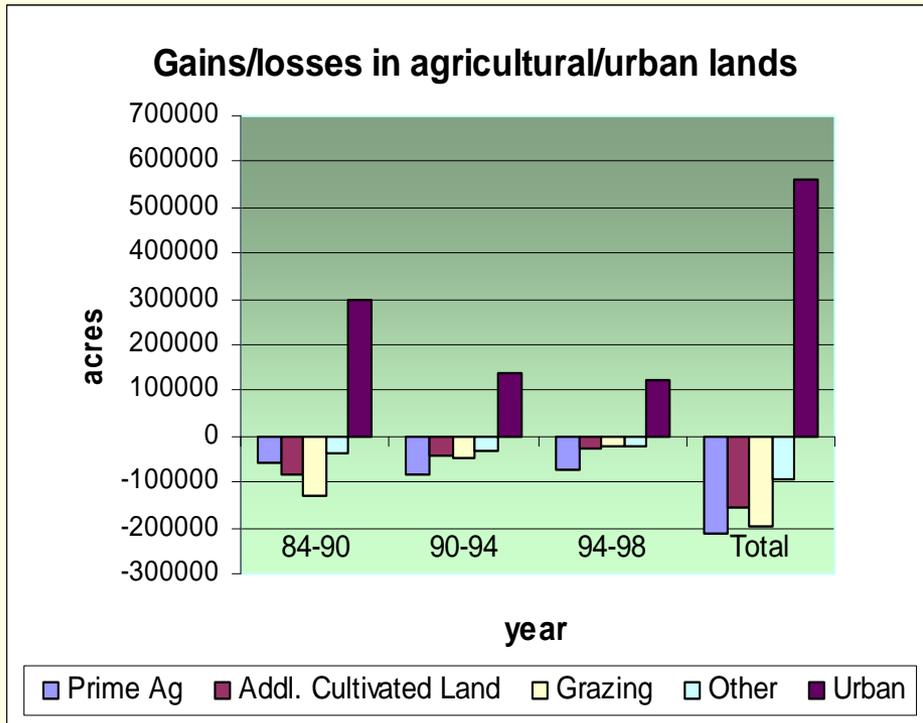
# Wildfires in Forests and Grasslands



**What is the indicator showing?**

*The frequency of stand-replacing wildfires has increased in recent years, possibly associated with fuel build-up caused by fire suppression efforts, droughts, and other factors.*

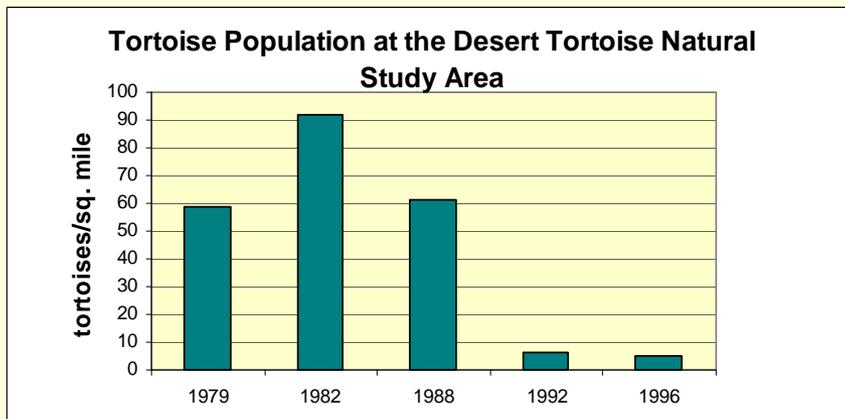
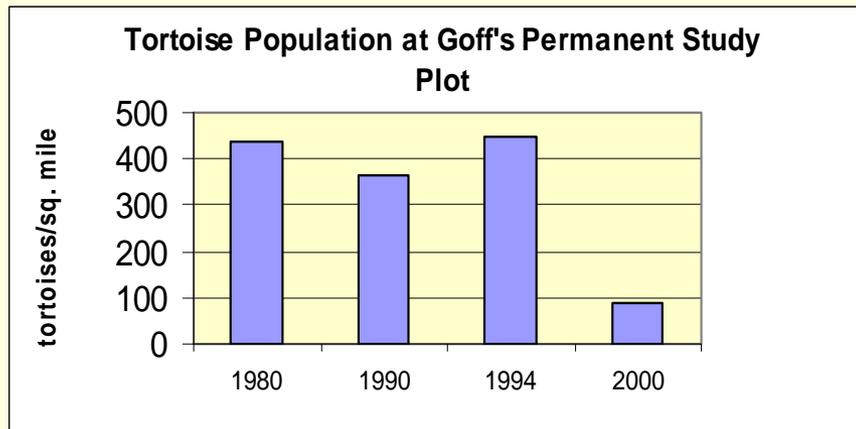
# Indicators of Ecosystems Managed for Human Use – Agriculture & Urban



What is the indicator showing?

*Prime farmland and grazing land have been the source of the majority of farmland conversions. 'Additional cultivated land' includes non-prime agricultural land. 'Other' refers to low density rural residential, mined lands, and related uses.*

# Desert Ecosystems: Status of Desert Tortoise (type I)

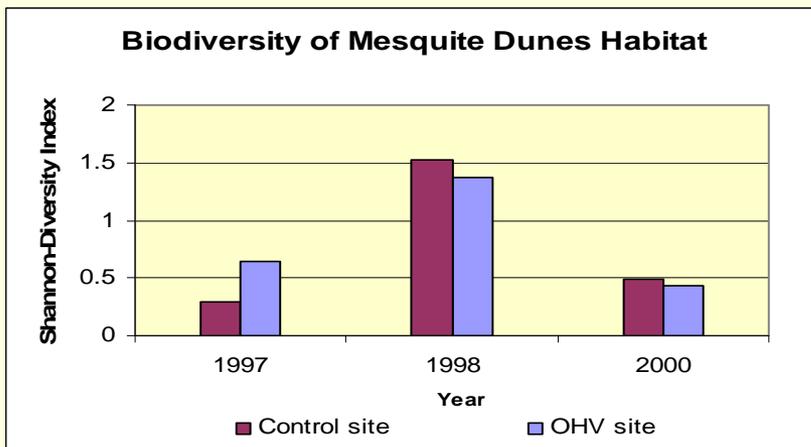
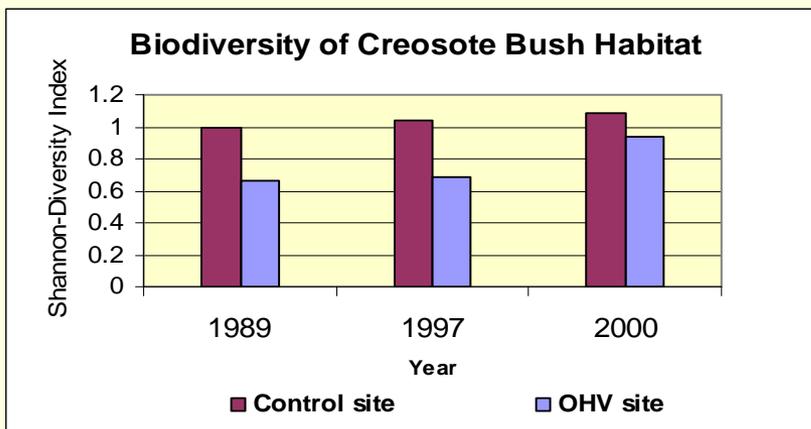


**What is the indicator showing?**

*Desert tortoise populations, based on data from two study plots, have declined substantially in the past decade due to a wide variety of causes.*

Source: K. Berry, USGS, BRD, Riverside

# Impacts of OHVs on the Desert (type II)



What is the indicator showing?

*In creosote bush habitat used by OHVs, plant biodiversity is reduced compared to non-OHV sites. In contrast, in mesquite dunes habitat, plant species diversity is similar at OHV and control (non-OHV) sites. This suggests that different types of habitat are more or less sensitive to the damage caused by OHV use.*

Source: E. Hollenbeck, Ocotillo Wells SVRA

# Additional Indicators for the Desert

- Indicator of exotic desert plants
- Others???
  - Suggestions for future indicators
  - Strengths and weaknesses of existing indicators

# Indicator Evaluation

- Is indicator conceptually relevant?
  - Do the desert indicators do a good job of reflecting the health of the desert ecosystem?
- Is the data of high quality?
- Is it sensitive enough to differentiate signal from background noise?
- Does indicator provide information needed to make appropriate policy decisions?

# Future Plans for EPIC

- Improve process of identifying and developing indicators
  - Improve quality and relevancy
  - Less bean counting (permits) and data based on hot spots
- Develop policy-related indicators
  - Environmental justice
  - Sustainability
- Build new and strengthen existing partnerships
- Update biannually

# For more information

- About the EPIC report:
  - Sign up for notification of release
  - Website: [www.oehha.ca.gov](http://www.oehha.ca.gov)
- Contact me:
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