CLIMATE CHANGE ADAPTATION IN SLO COUNTY

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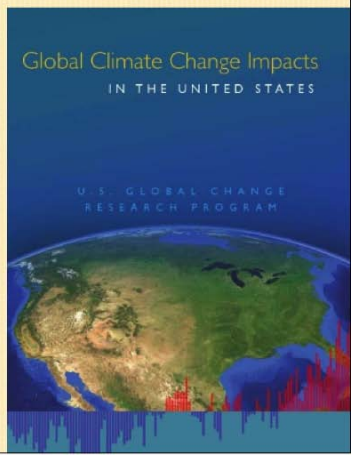
National Center for Conservation Science and Policy

OUTLINE

- Overview of climate change
  - Global
  - San Luis Obispo County
- How might climate change impact ecosystem services?
- What is climate change adaptation?
- Why is it needed?
- How does it work with mitigation?
- Results from natural systems workshop

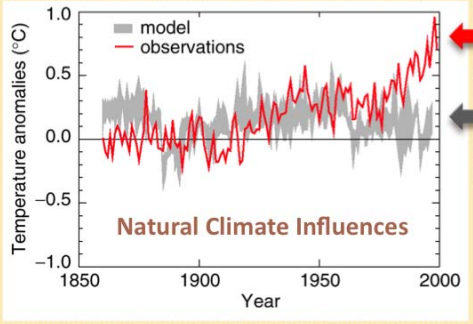
Primary Findings of the Latest U.S. Govt. Report

1. Global warming is unequivocal and primarily human-induced
2. Wide-spread climate-induced changes are already underway and expected to increase
3. Climate change WILL stress water resources worldwide
4. Crop and livestock production WILL be challenged
5. Thresholds WILL be crossed, leading to large changes in climate and ecosystems
6. Future climate change and its impacts depend on choices made today



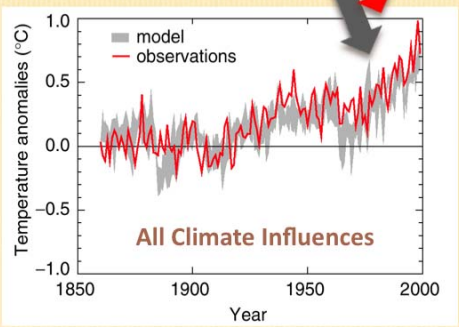
Global Climate Change Impacts in the United States. 2009. T. R. Karl, J. M. Melillo, and T. C. Peterson, eds. Cambridge University Press. US GLOBAL CHANGE RESEARCH PROGRAM

Is Climate Change Human Caused?



Observed temperature

Model prediction



"Unequivocal" evidence: the climate is changing and it is human caused (IPCC 2007)

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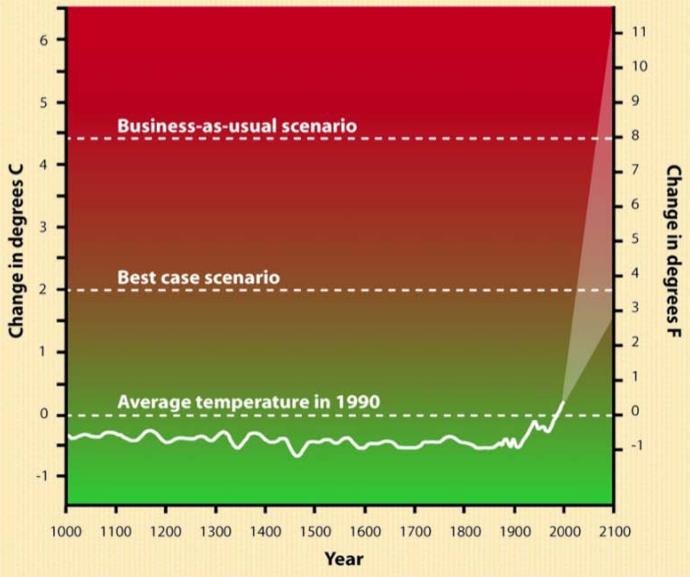
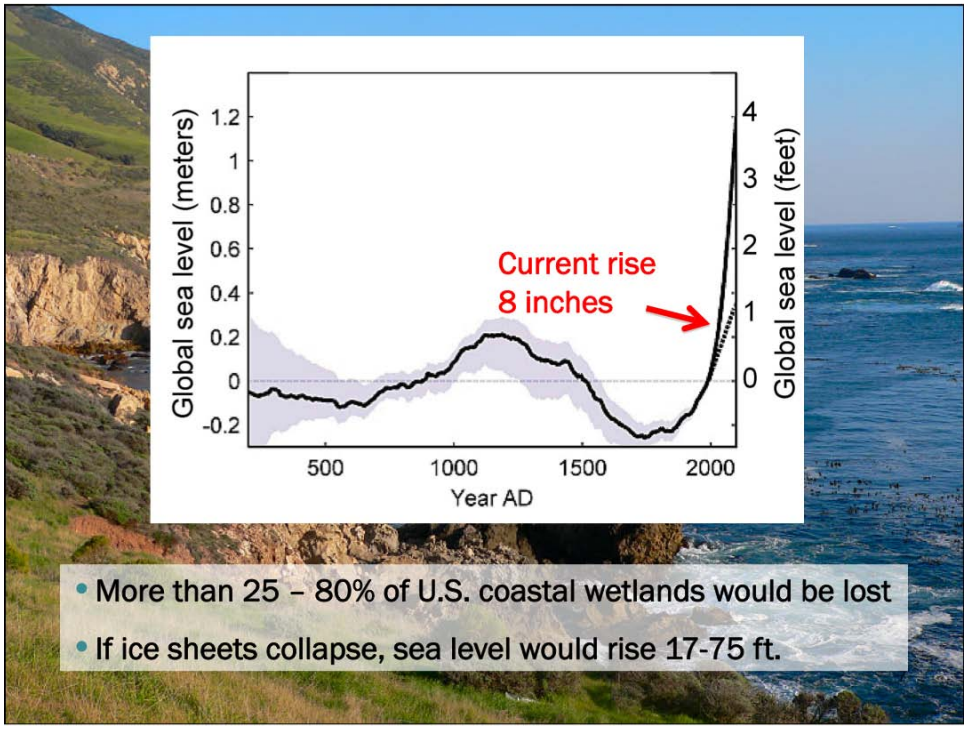
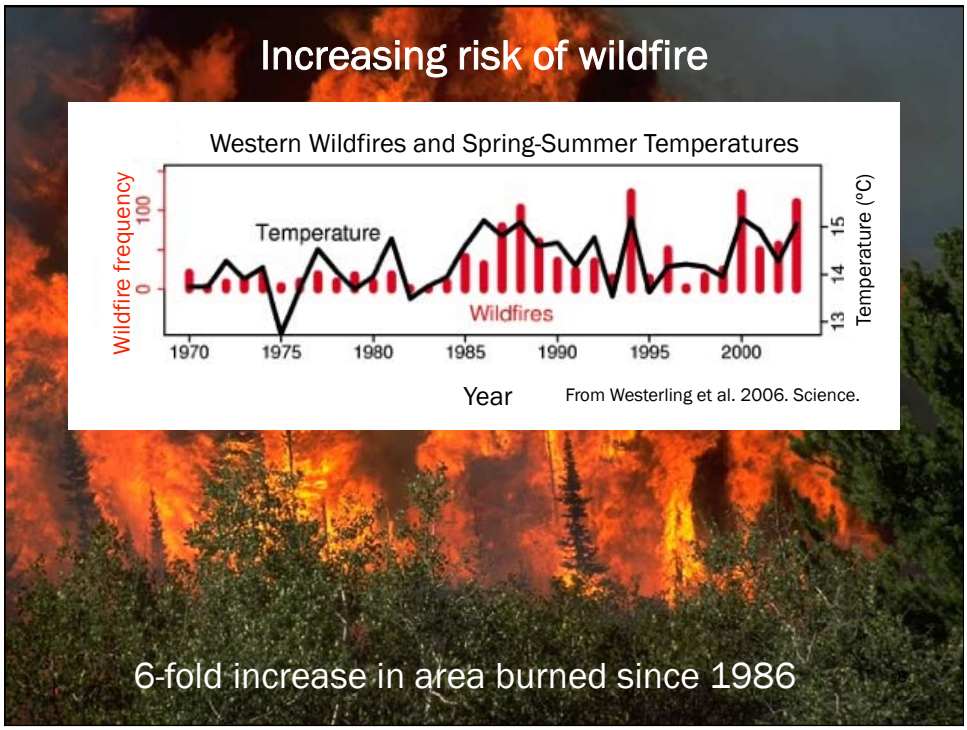
AVERAGE GLOBAL TEMPERATURE



CLIMATE CHANGE IMPACTS

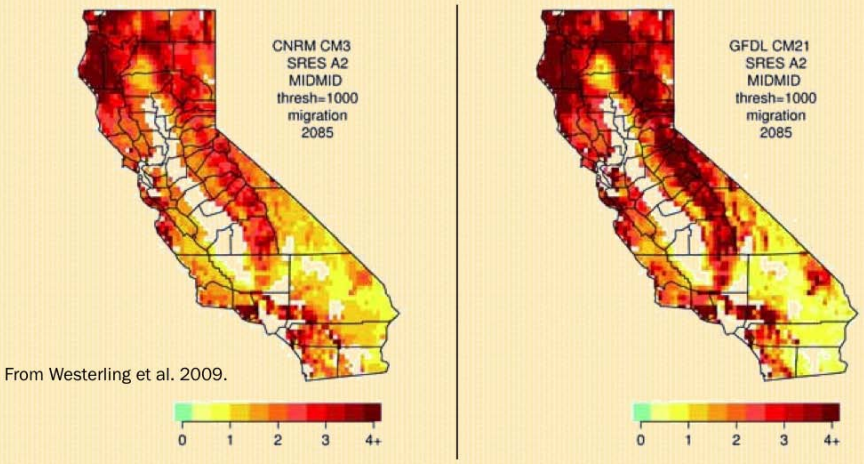
- Higher drought stress in summer
- Increase in severe storms
- Sea level rise
- Increased area burned in wildfire
- Approx 1/3 of species to go extinct


Global sea level (meters)
1.2
1
0.8
0.6
0.4
0.2
0
-0.2
Global sea level (feet)
4
3
2
1
0
500
1000
1500
2000
Year AD
Current rise
8 inches
• More than 25 – 80% of U.S. coastal wetlands would be lost
• If ice sheets collapse, sea level would rise 17-75 ft.


Increasing risk of wildfire
Western Wildfires and Spring-Summer Temperatures
Wildfire frequency
100
0
Temperature
Wildfires
15
14
13
Temperature (°C)
1970
1975
1980
1985
1990
1995
2000
Year
From Westerling et al. 2006. Science.
6-fold increase in area burned since 1986

STATEWIDE WILDFIRE PROJECTIONS

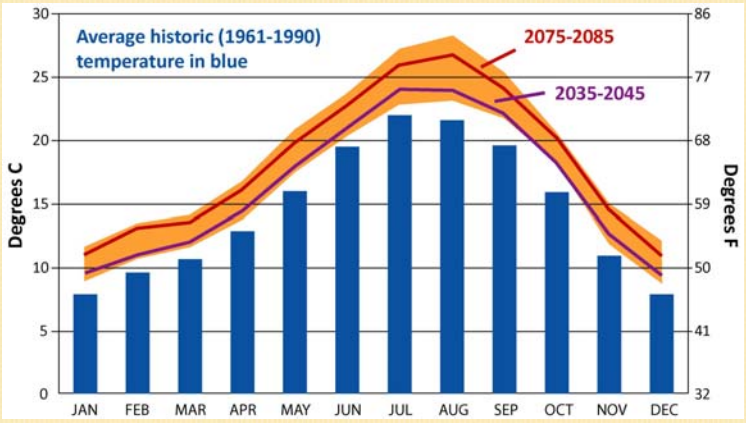
- 157-269% increase by 2070-2099



From Westerling et al. 2009.

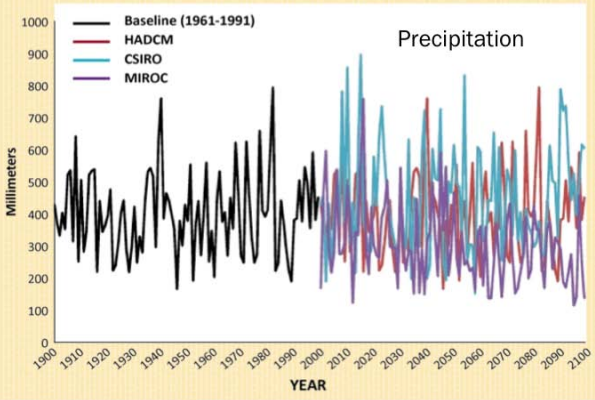
SAN LUIS OBISPO COUNTY PROJECTIONS

- 3-9°F warmer
- Longer, hotter summers



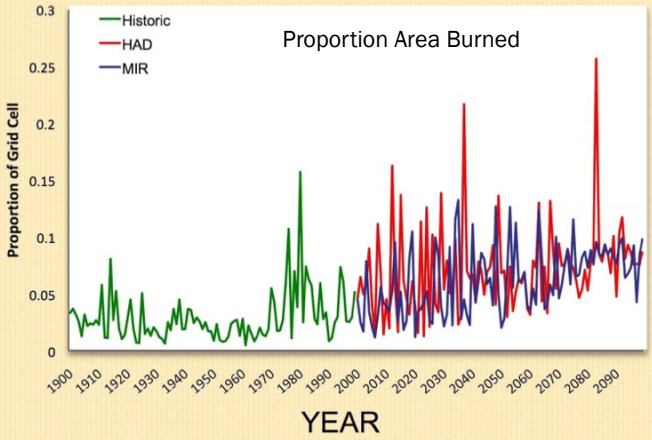
SAN LUIS OBISPO COUNTY PROJECTIONS

- Up to 1/3 less rainfall
- More frequent severe floods and droughts
- Drier soils



SAN LUIS OBISPO COUNTY PROJECTIONS

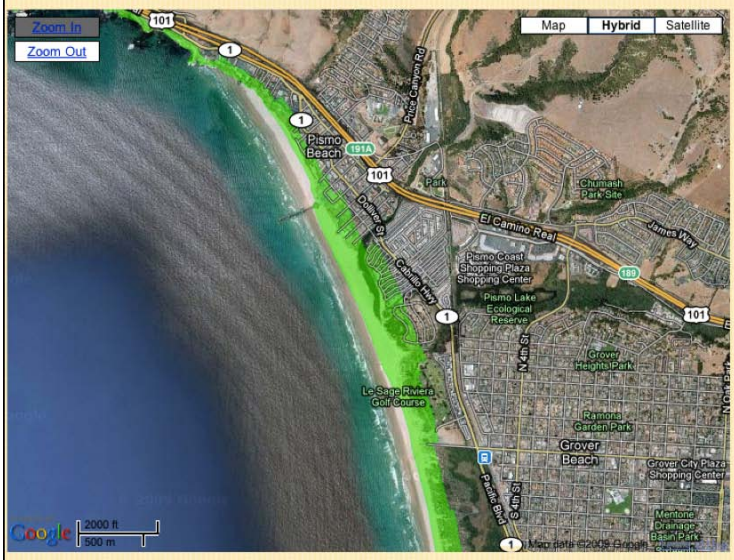
- Double or triple the area burned in wildfire
- 4+ feet of sea level rise



Impacts of Sea Level Rise on the California Coast

Pacific Institute

Areas and infastructure vulnerable to flooding and erosion
Please see full report for assumptions, methods, and conclusions.



Hazard Zones

- ☐ Area at risk from a 100-year coastal flood event
  - Current area at risk
  - Area at risk with a 1.4 meter sea-level rise
- ☑ Erosion
  - Area at risk from erosion in 2100 with a 1.4 meter sea-level rise
- ☐ Wetland Frontier
  - Areas where wetlands may migrate by 2100 if unimpeded

Data Layer Opacity

1/4 | 1/2 | 3/4 | Solid

Infrastructure at Risk

Click map icon for details

- ☐ CA Coastal Zone
- ☐ Health-care facilities
- ☐ Schools
- ☐ Police stations

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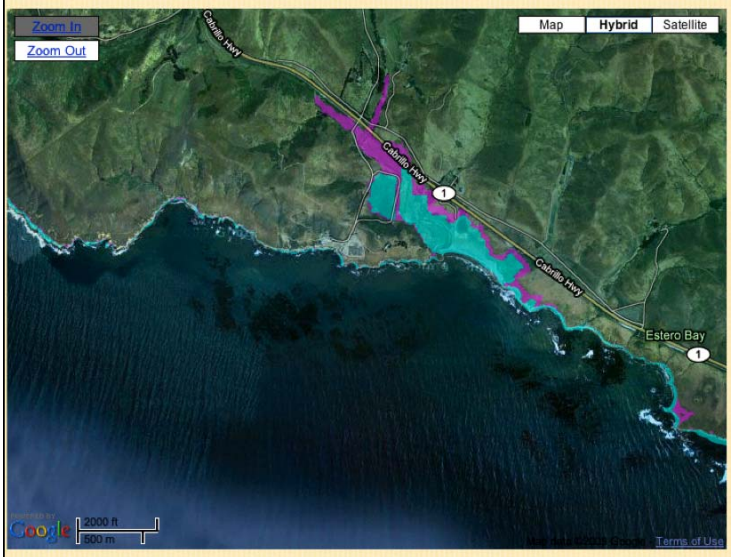

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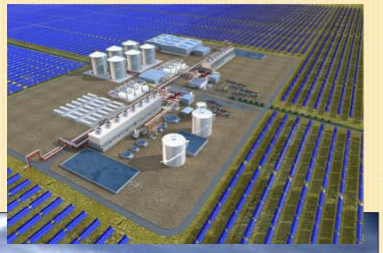
Human response to climate change



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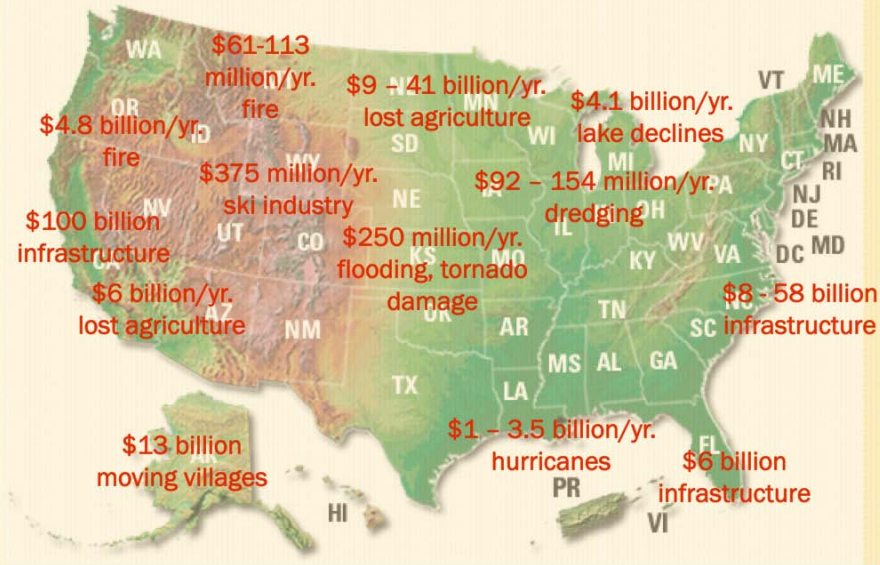
THE COST OF CLIMATE CHANGE

In California alone, nearly $100 billion worth of property is at risk from sea level rise of 1.4m (Heberger et al. 2009).

More than 330 hazardous waste facilities, 55 healthcare facilities, 140 schools, 30 power plants, 3,500 miles of roads and highways, and numerous international airports.

Heberger et al. 2009 (California Energy Commission Report)

THE COST OF CLIMATE CHANGE



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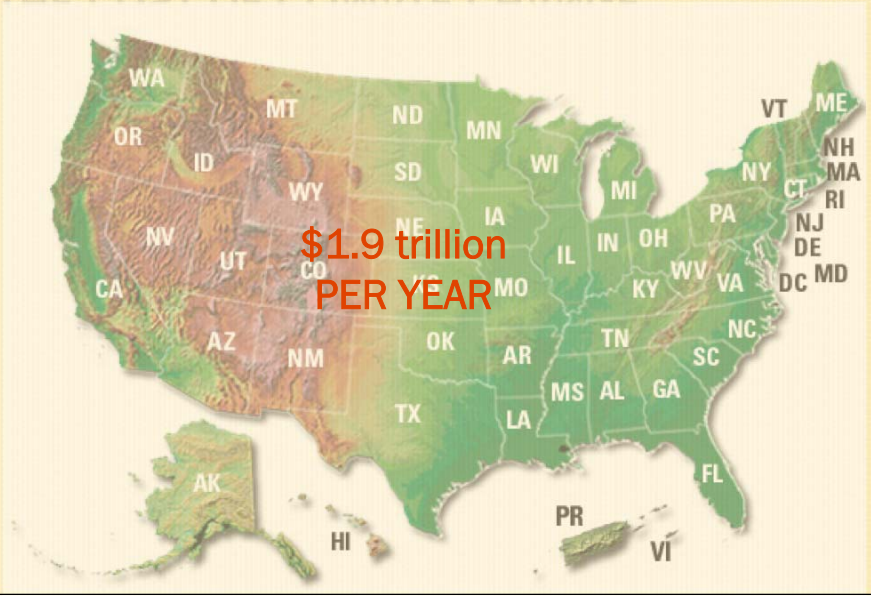
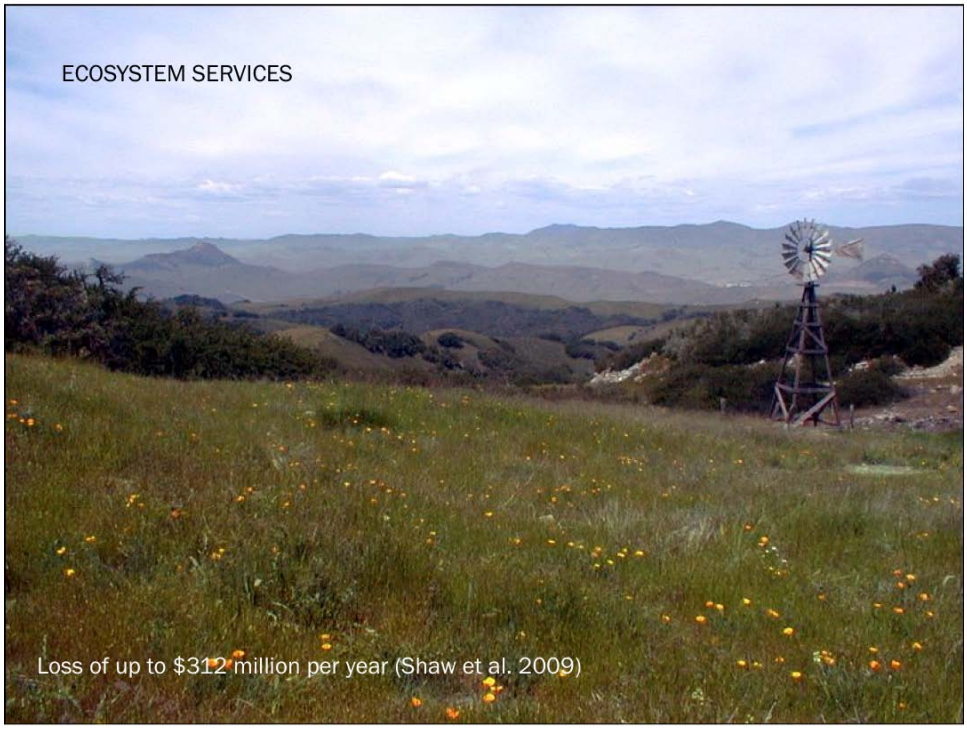
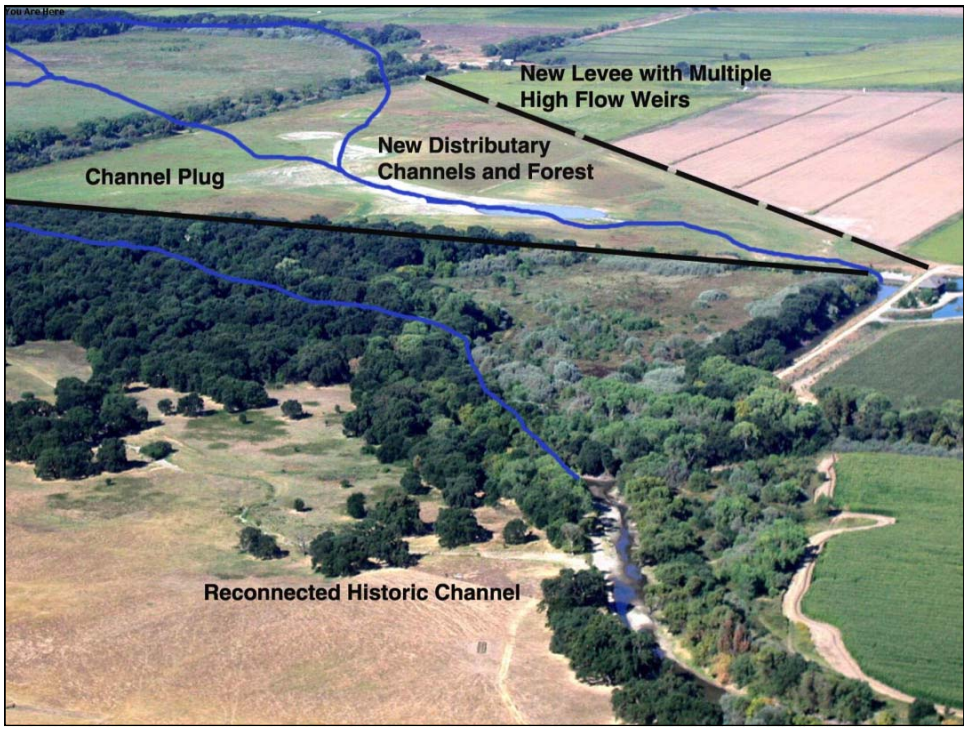



ECOSYSTEM SERVICES
Loss of up to $312 million per year (Shaw et al. 2009)


Loss of up to $62 billion per year (Shaw et al. 2009)


New Levee with Multiple
High Flow Weirs
New Distributary
Channels and Forest
Channel Plug
Reconnected Historic Channel

BOTH MITIGATION AND ADAPTATION ARE NEEDED

MITIGATION = brakes
ADAPTATION = airbags

Mitigation AND Adaptation

WHAT IS CLIMATE CHANGE ADAPTATION?

- Increasing the resilience and resistance of natural and socioeconomic systems to climate change.
- Resilience = ability to bounce back after disturbance
- Resistance = ability to withstand disturbance

Integrating Climate Change Adaptation

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HOW DO WE ADAPT TO/PREPARE FOR CHANGE?

- Issue #1: Unsustainable ground water withdrawal reduces the resilience of riparian and aquatic species to climate change

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  - Monitor and regulate ground water withdrawal
  - Incentives for water conservation
  - Consider new types of crops that use less water

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  - Develop regional plans for habitat connectivity
  - Develop incentives for private land owners to provide habitat
  - Retain ranches and large tracts of land

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  - Encourage/educate changes to land use

  - Restore wetlands and riparian zones
  - Prescribed burning to retain healthy uplands

HOW DO WE ADAPT TO/PREPARE FOR CHANGE?

- Issue #4: Loss of wetlands, riparian areas, and floodplains has reduced aquatic and riparian species resilience to climate change

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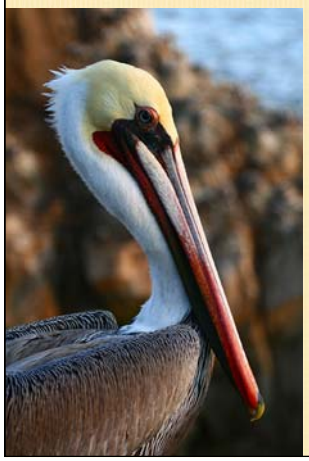
- Issue #4: Loss of wetlands, riparian areas, and floodplains has reduced aquatic and riparian species resilience to climate change
  - Restore/create wetlands, riparian zones, and floodplains
  - Protect remaining ones from cattle, development

HOW DO WE ADAPT TO/PREPARE FOR CHANGE?

- Issue #5: Sea level rise threatens coastal wetlands and intertidal zones



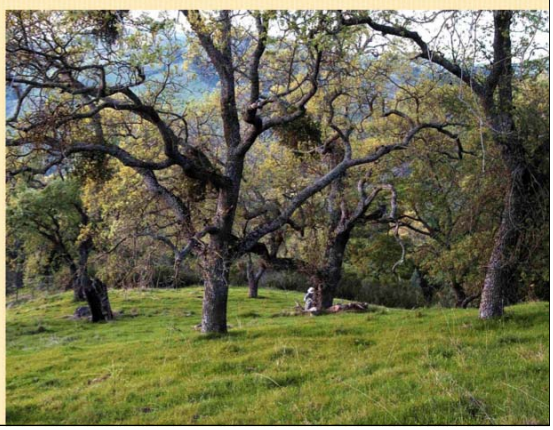
HOW DO WE ADAPT TO/PREPARE FOR CHANGE?

- Issue #5: Sea level rise threatens coastal wetlands and intertidal zones

  - Do not armor the coast
  - Rolling easements
  - Relocation of key developments

HOW DO WE ADAPT TO/PREPARE FOR CHANGE?

- Issue #6: Loss of oak woodlands will be exacerbated by climate change



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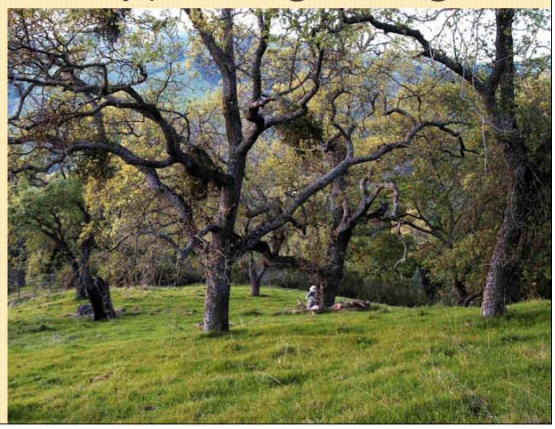
- Issue #6: Loss of oak woodlands will be exacerbated by climate change
  - Restore oak woodlands by protecting seedlings from cattle
  - Incentives for oak woodlands on private land
  - Develop more drought resistant oak



HOW DO WE ADAPT TO/PREPARE FOR CHANGE?

- Issue #7: Most productive habitat for T&E species often found on private land

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  - Rework "Critical habitat" designations
  - Include future habitat and movement corridors as well as current strongholds

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- Issue #8: Renewable energy installations could further reduce the resilience of species and ecosystems to climate change

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- + Incentives for rooftop solar over large solar plants
- + Take advantage of already degraded land –no developments in viable habitat or corridors

"Some say its irrevocable. Others say its irreversible. Given such an absence of consensus, I suggest we do nothing drastic".