Integrating Adaptation: How Natural Resource Managers are Addressing the Challenge

Forestry and Climate Change Planning

Chris Keithley, PhD
CALFIRE
Fire and Resource Assessment Program
Chris.keithley@fire.ca.gov

Fire and Resource Assessment Program
California Department of Forestry and Fire Protection

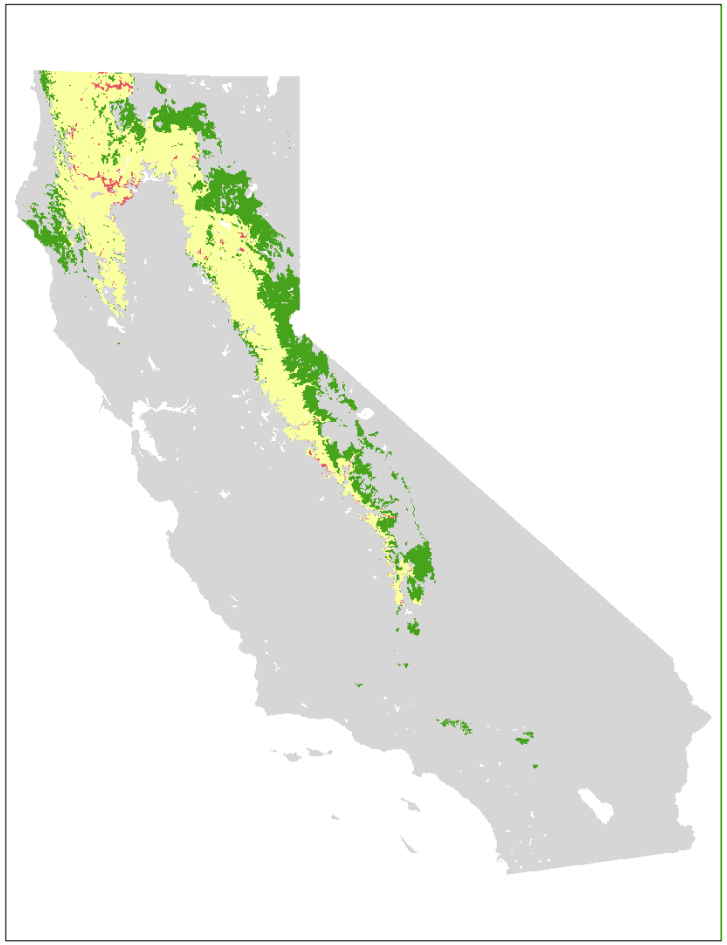
California Forest Land Base

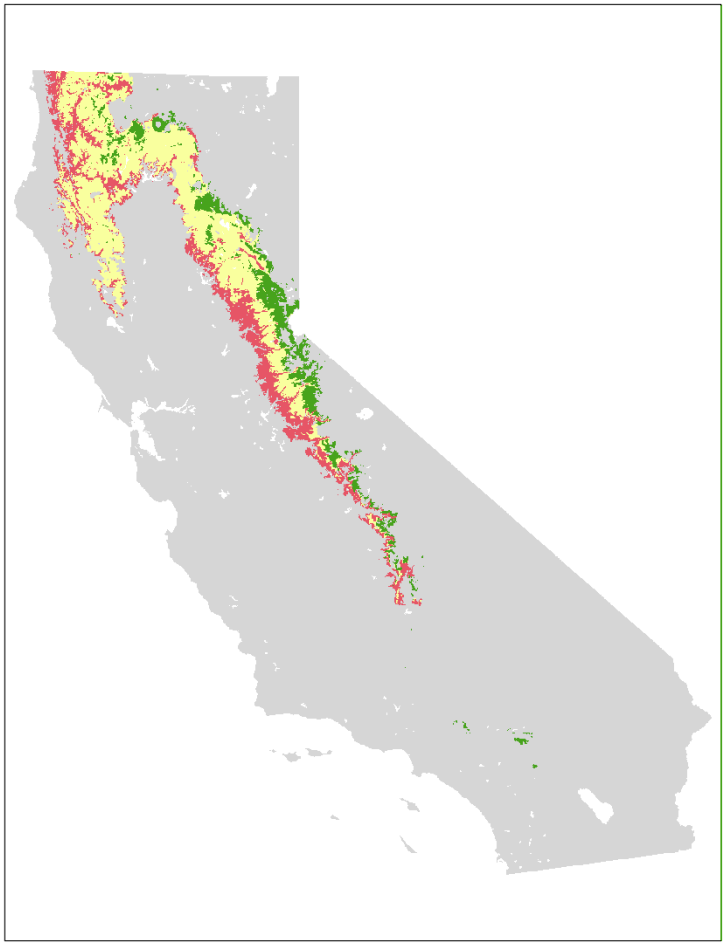
California forestland ownership.		
Ownership Category	Acres of Forestland	Percentage
Private	13,131,000	39.3 %
Federal	19,171,000	57.4 %
State	711,000	2.1 %
Local	374,000	1.1 %
Total	33,387,000	100 %

Climate Change Impacts on Forests

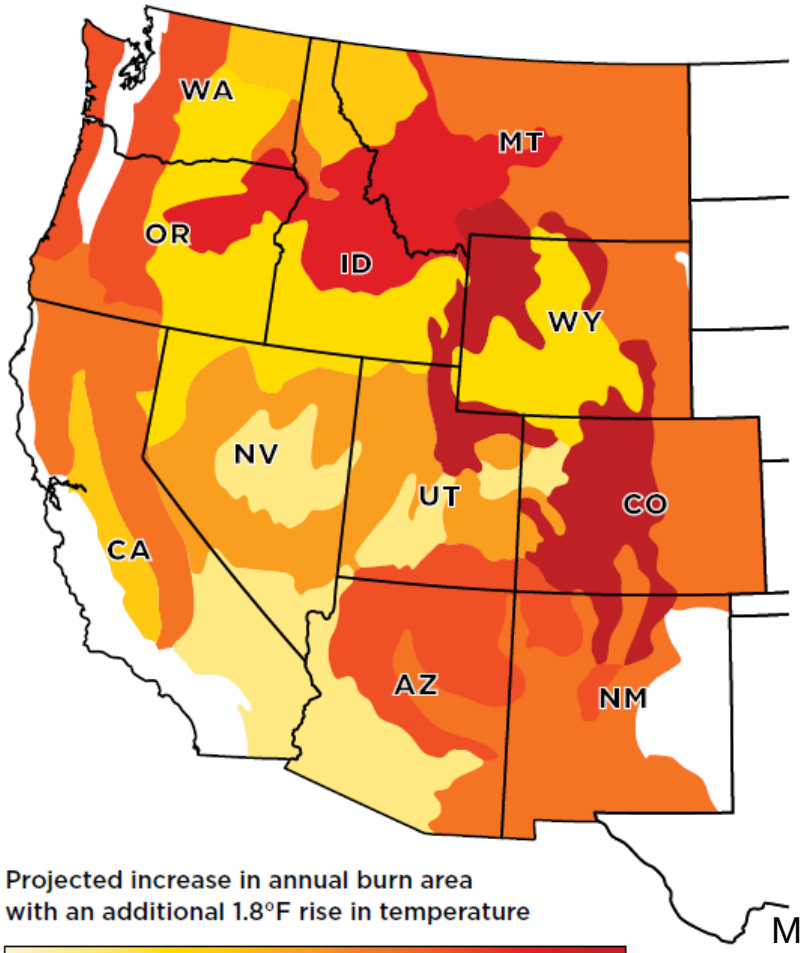
FACTOR	DESCRIPTION
Hydrologic	Changes in temperature, precipitation, and hydrologic processes (i.e. decreased snow pack, earlier spring runoff, lower summer base flows).
Fire	Changes in the extent and frequency of disturbances from wildfires, pests, and disease outbreaks.
Biologic	Conditions may favor the spread of invasive species.
Biologic	Tree species expected to move northward or to higher altitudes.
Biologic	Changes in reforestation and regeneration success.
Biologic	Changes in forest productivity affecting growth and carbon storage. The effect of additional CO2 on forest productivity is uncertain.
Economic	Economic impacts from increased fire damage and fire suppression costs.

Predicting Vegetation Response





Projected Increase in Area Burned by Wildfires



- Increased temperatures, potential for increased frequency of a drought; leading to more frequent and more severe wildland fires
- WUI areas at risk
  - also the fringes of development
- Smoke impacts on air quality
- Changes to fire return intervals

Midcentury Increase in Area Burned by Wildfires in the Western United States (NRC, 2011; UCS, 2013 cited in (Cleetus & Mulik, 2014 p. 6)).

Wildfire Impacts - Vegetation Management

Types of impacts:

- *Post-Fire Erosion*
- *Sediment/water quality*
- *Peak Flow*
- *Nutrients*
- *Water Yields*
- *Smoke and air pollution*


Low severity ground fire


High severity crown fire

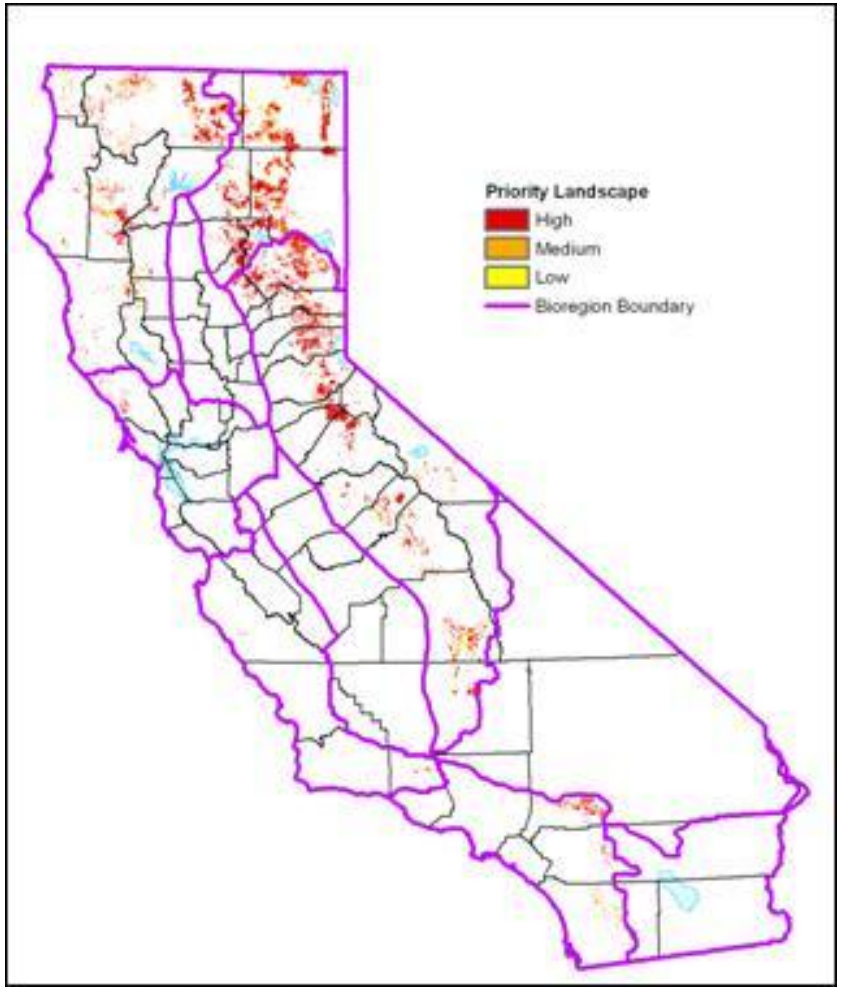
Forest Health Concerns

Evaluating Trends in Forest Health

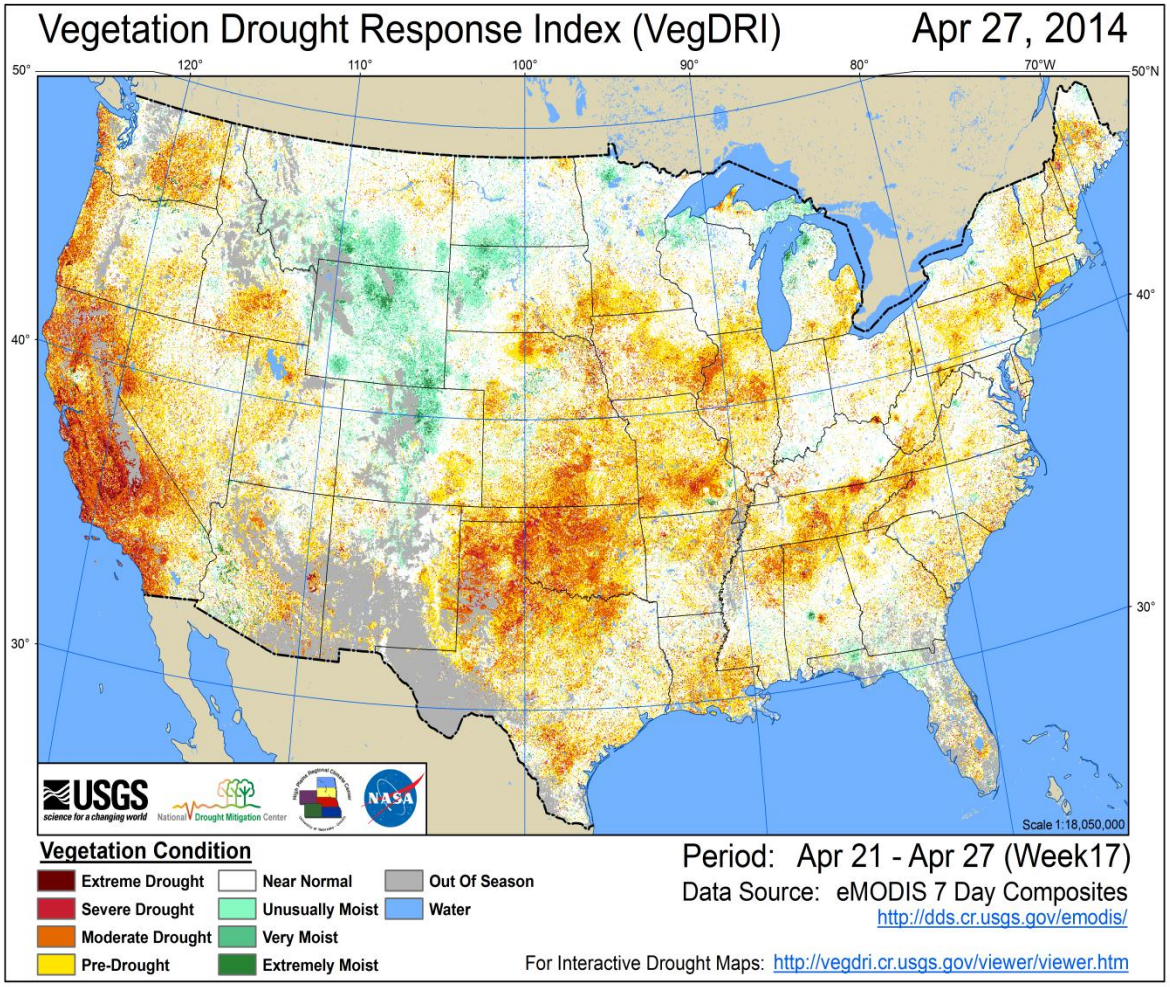
1.2 million acres of forested land in California that would benefit from thinning.

3.1 million acres of timberland in California on which replanting or "reforestation" could occur in order to boost forest sector productivity and carbon storage.

Source: FIA database

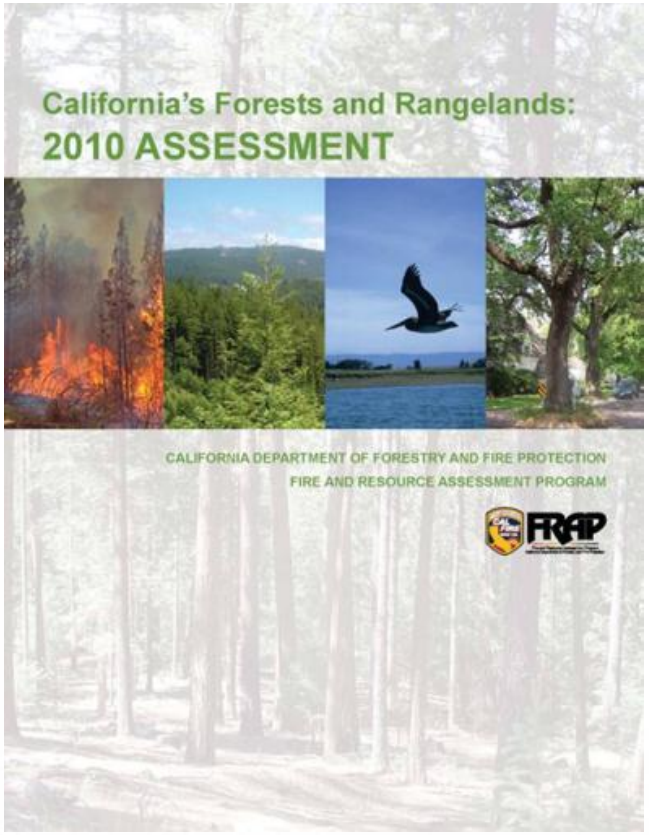


Drought – Stress of Forests



Assessing Forest Resources and Wildfire Planning

California Forest and Rangeland Assessment



California Fire Plan

State Planning Framework for Climate Change

AB 32 Scoping Plan - Update

- Assembly Bill 32, the California Global Warming Solutions Act of 2006, requires a reduction of GHG emissions in California to 1990 levels by 2020. A guide for reducing GHG emission.

- Cap and Trade program includes a number of forestry offset protocols.

- Forest Carbon Plan – GHG targets and recommended actions

Forest Sector Strategies and Investments

Reforestation and Afforestation*

Fuels Management

Urban Forestry *

Conservation*

Forest Management*

Forest Materials & Bioenergy

Note (*): ARB has adopted protocols for all of these strategies.

Co-benefits from Wildland and Urban Forest Strategies

- Watershed protection - water quality and water supply.
- Wildlife habitat and encourage adaptation.
- Sustains long-term carbon banking.
- Reduces wildfire risks, costs, and reduces emissions.
- Reduces energy consumption.
- Produces renewable energy
- Provides recreational and tourism opportunities.

Safeguarding California

Proposed Goals/Actions for Forest Sector Include:

A. Improve Understanding of Forest Climate Impacts

B. Improve Capacity of Forests to Recover from Climate Impacts.

C. Assessing Role of Urban Forest

D. Information Sharing and Education

Research Needs and Challenges – Forest Sector

Monitoring

- Ongoing investment needed in FIA forest plot data.
- Continued mapping and monitoring to improve estimates and track changes in carbon sequestration.

Knowledge Gaps

Improve understanding of how climate change will alter disturbance regimes and affect ecosystem services.

Cost/Benefit analysis of management strategies to enhance carbon sequestration or avoided loss.

Capacity

Improve tools to transfer scientific understanding of climate impacts to planners and land managers.