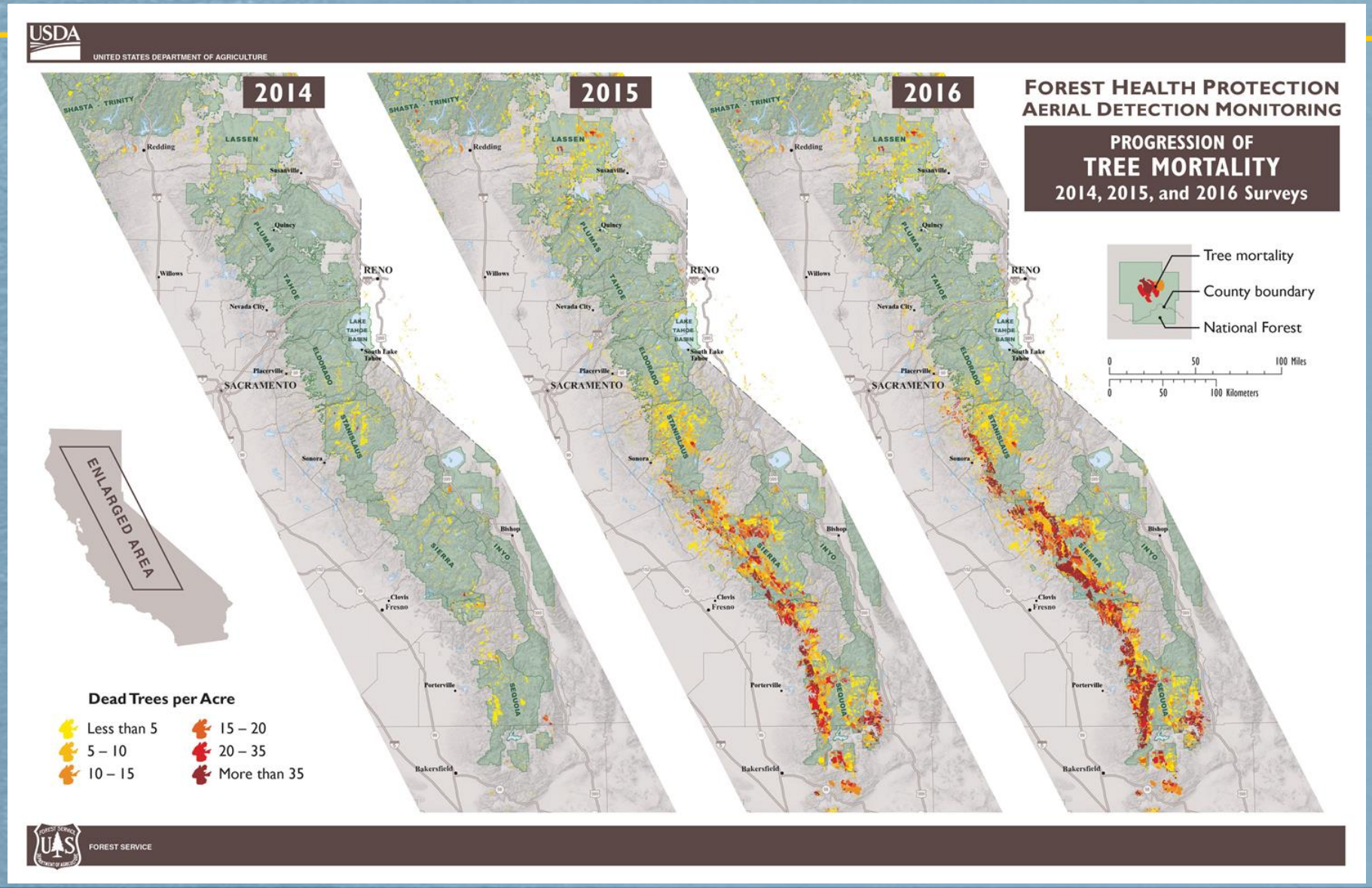
California Tree Mortality

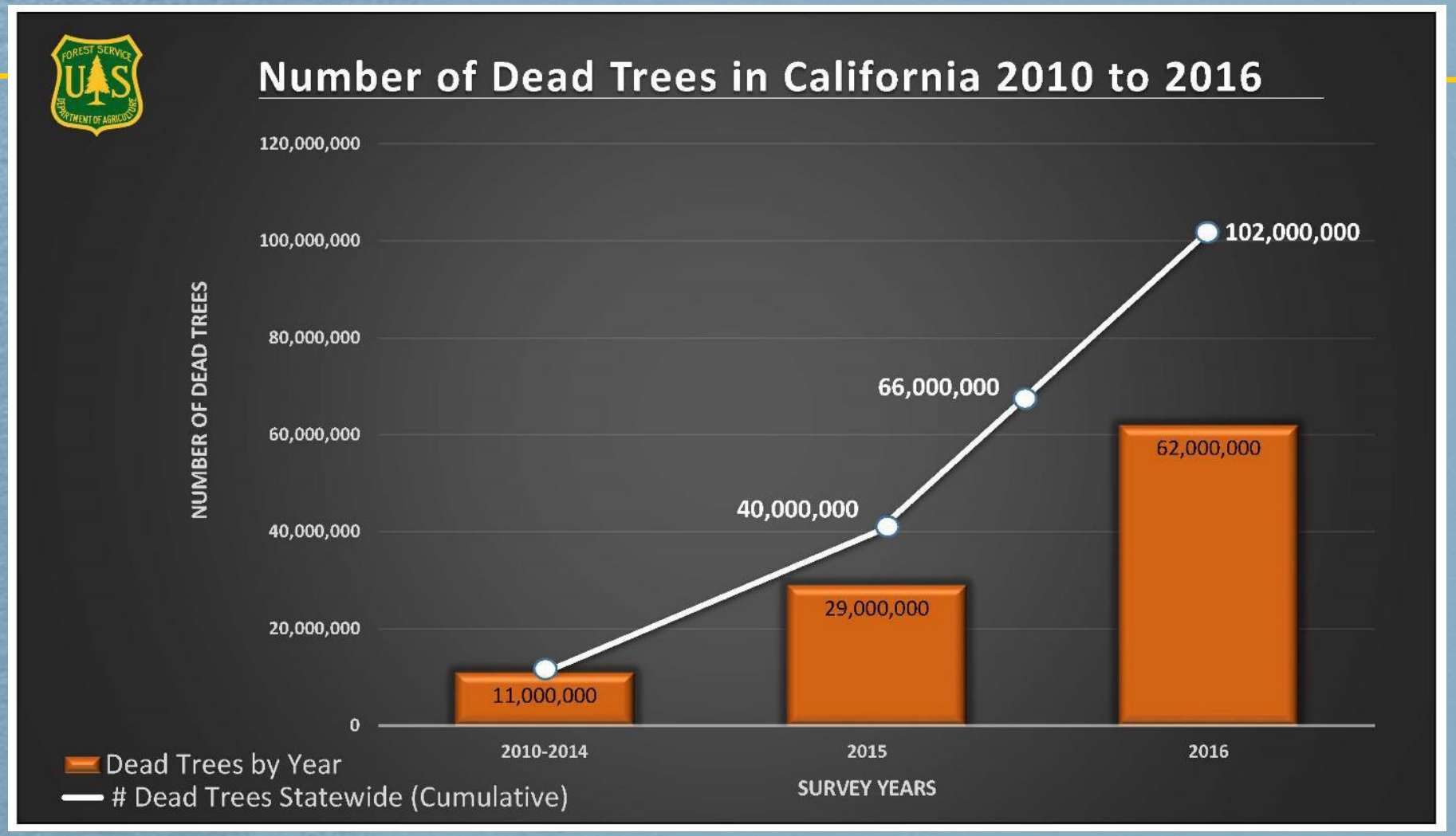
U.S. Forest Service

Pacific Southwest Region

USFS Aerial Detection Surveys



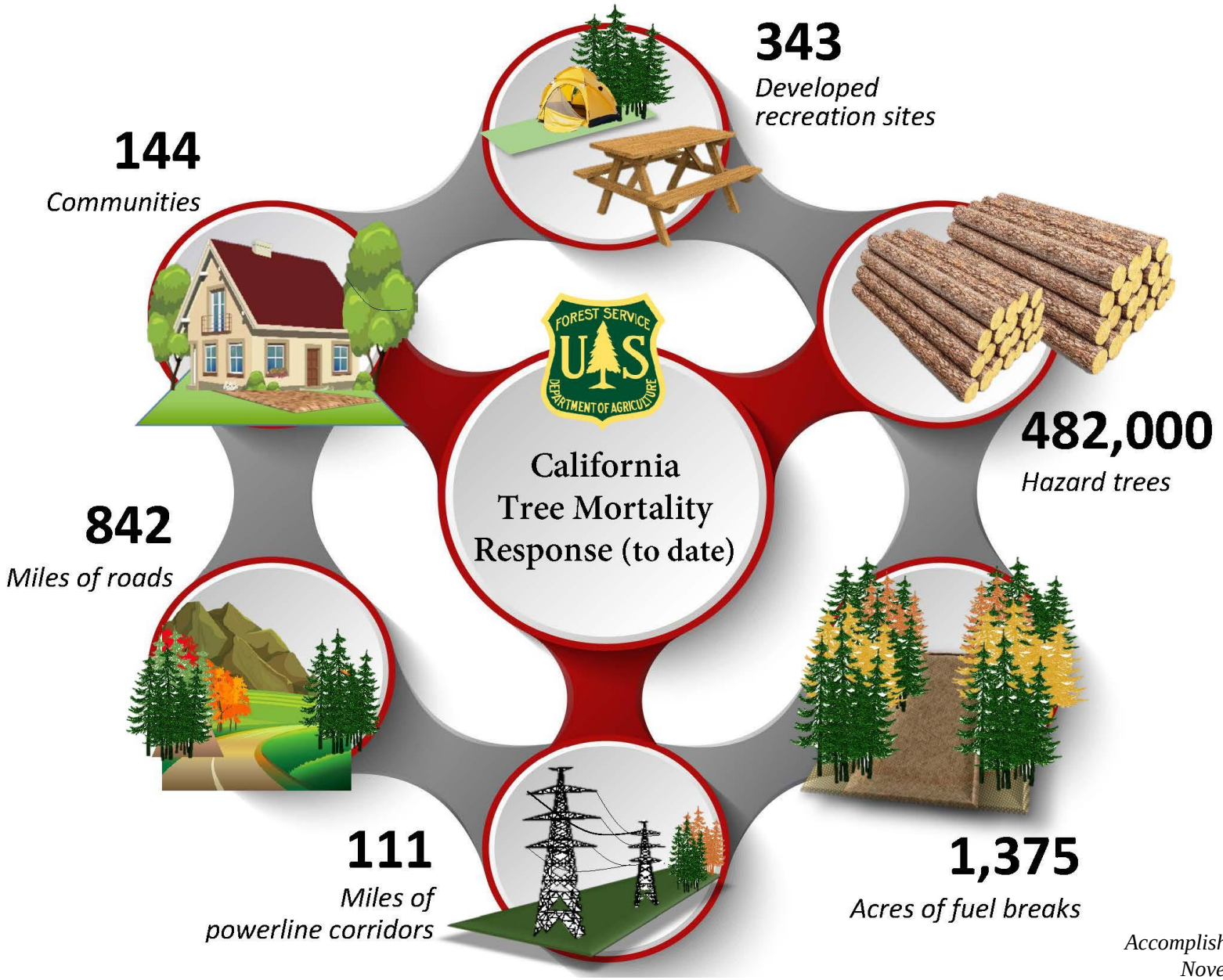

7.7 Million
Acres Mapped Tree Mortality
102+ Million
Dead Trees


Number of Dead Trees in California 2010 to 2016
120,000,000
100,000,000
80,000,000
60,000,000
40,000,000
20,000,000
0
NUMBER OF DEAD TREES
11,000,000
29,000,000
62,000,000
40,000,000
66,000,000
102,000,000
2010-2014
2015
2016
SURVEY YEARS
Dead Trees by Year
Dead Trees Statewide (Cumulative)


Why is this happening?
• 5 years of drought
• Increasing temperatures
• Overstocked stands
• Bark beetles

U.S. Forest Service
Tree Mortality Response

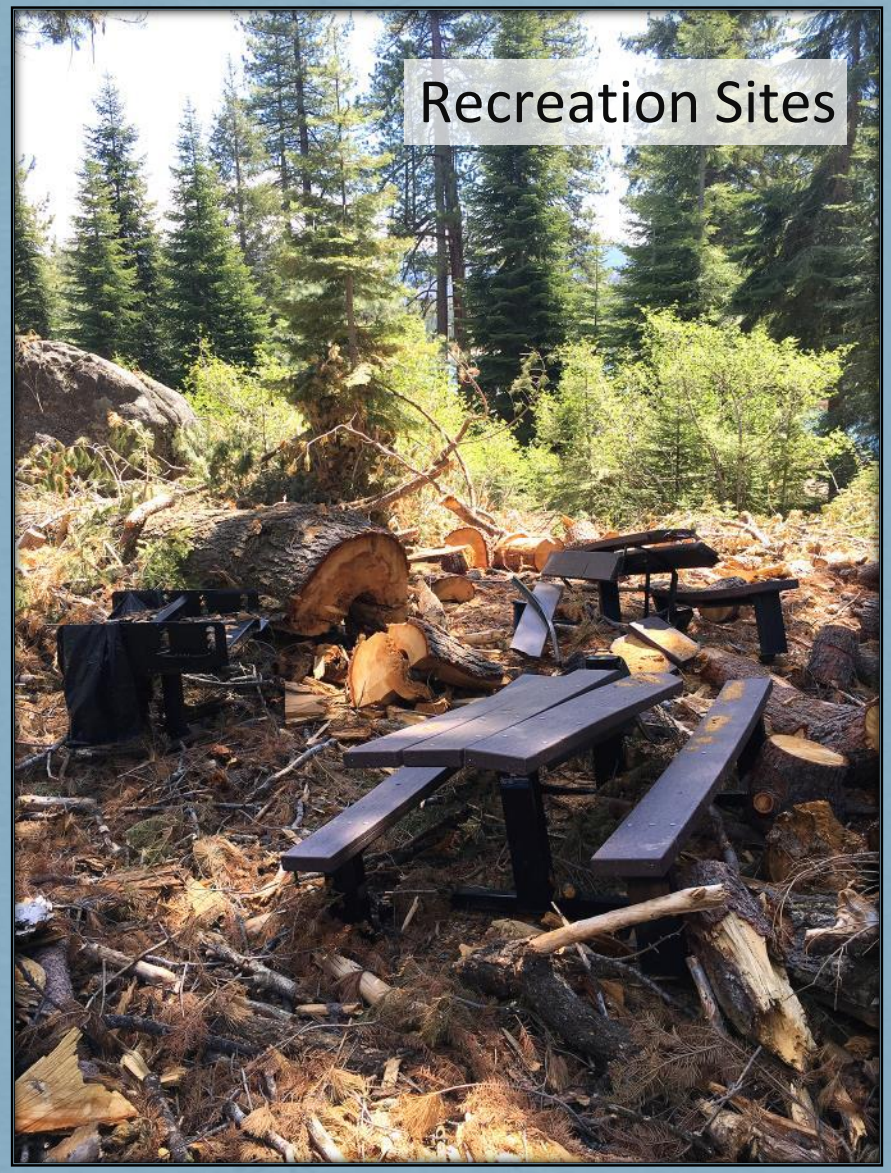
Forest Service Accomplishments

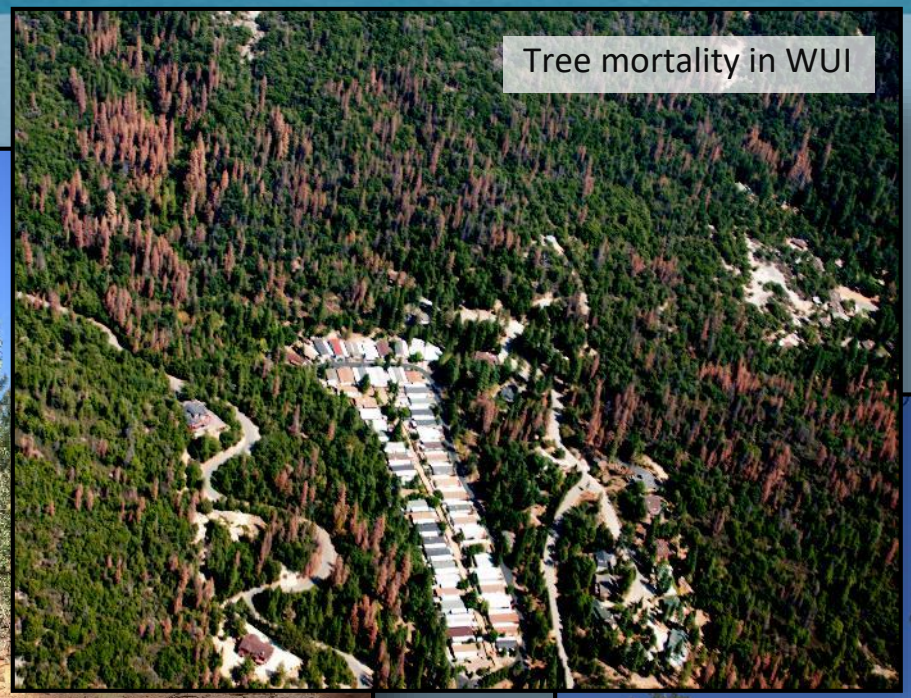


Accomplishments as of November, 2017


Roads & Trails


Utility Corridors

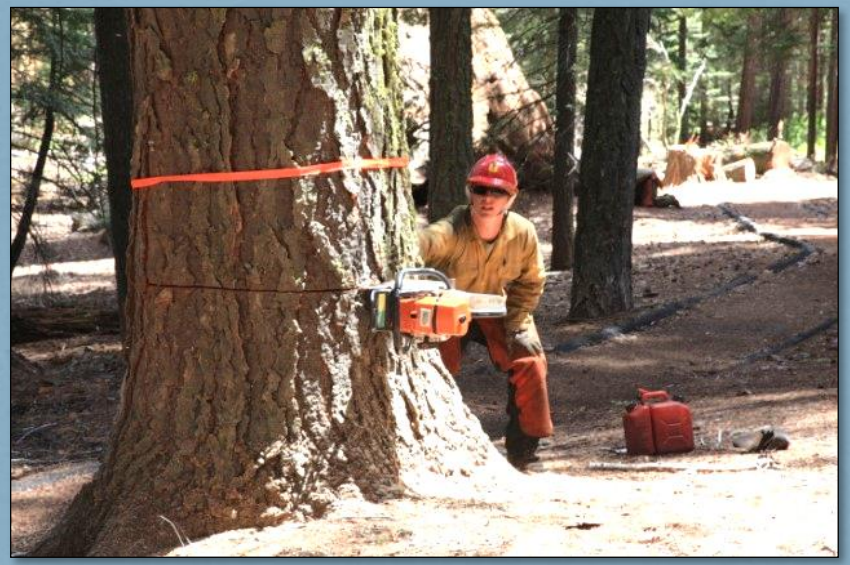

Recreation Sites



Tree mortality in WUI

Dead tree inches from propane tank

Dead trees threaten homes in private inholdings



Biomass Utilization

The Forest Service is concerned about retaining and developing industry infrastructure to assist with forest restoration and fuels reduction. Infrastructure includes the businesses and skills necessary to plan, lay out, harvest or treat stands, remove logs and biomass, transportation, processing, and marketing.

Fire & Tree Mortality in California


Fire seasons are up to 78 days longer across the West than just three to four decades ago

Fire Behavior Assessment Team

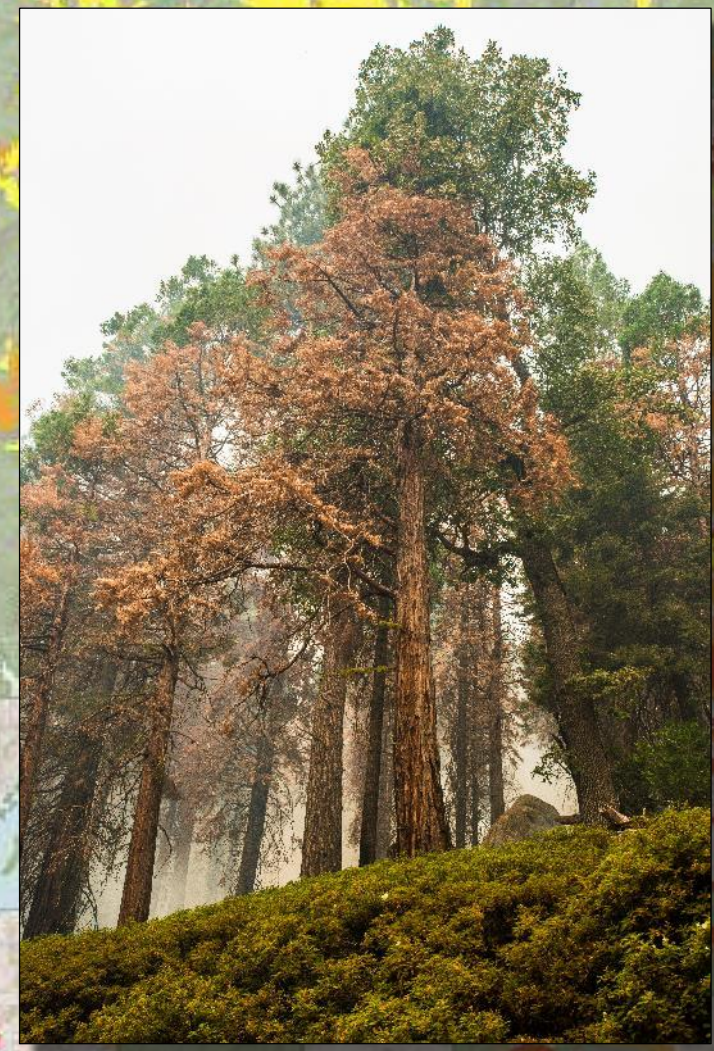
The Region is using a Fire Behavior Assessment Team to study fire behavior in tree mortality areas so we can improve firefighter and public safety when fires burn in tree mortality areas.

PIER

Porterville

TULARE COUNTY

KERN COUNTY



What is fire behavior in tree mortality?

- Ground fire and surface fire in tree mortality areas occurred under lower winds and higher fuel moistures than in live tree area.
- Intense fire behavior occurred in areas with grey phase mortality, presumably due to increased surface fuel loading.
- Fire climbs dead tree trunks and bark more readily than live trees.
- Higher than normal levels of tree top breakage after fire in dead trees.

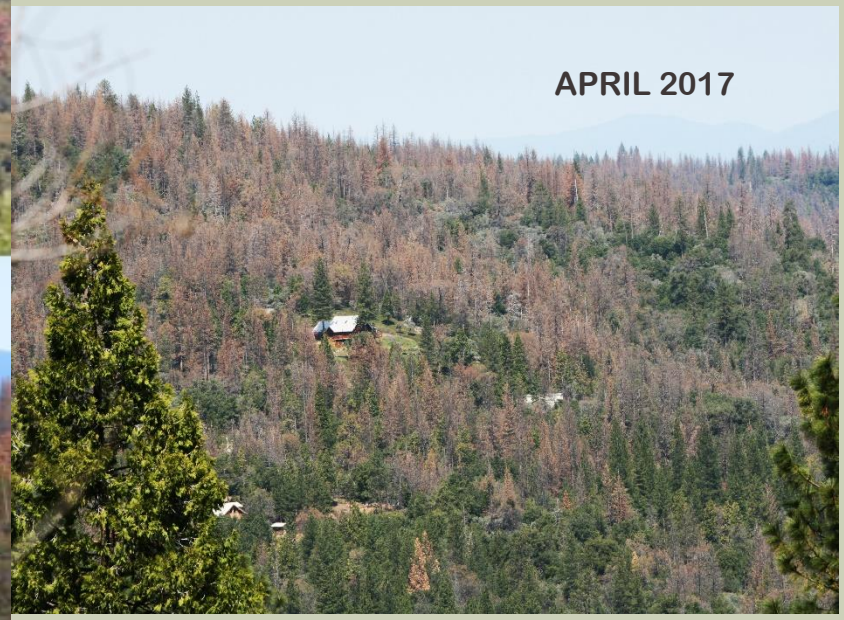
Forest Health: thinning dense stands

Key to our success: we're all in this together

TREE MORTALITY • TASK FORCE

FOREST SERVICE
US
DEPARTMENT OF AGRICULTURE

TREE MORTALITY
NORTHERN FRESNO COUNTY



MARIPOSA COUNTY MARCH 21, 2015

MARIPOSA COUNTY OCTOBER 11, 2015

November 11, 2015 Madera/Fresno County line

TREE MORTALITY TASK FORCE

- October 30, 2015 - Proclamation of a State of Emergency Executive Order

- November 16, 2015 First TMTF meeting in Sacramento

STATE OF EMERGENCY

Executive Department
State of California

PROCLAMATION OF A STATE OF EMERGENCY

WHEREAS the State of California is experiencing record drought conditions, which have persisted for the last four years; and

WHEREAS on January 17, 2014, I proclaimed a State of Emergency to exist throughout the State of California due to severe drought conditions; and

WHEREAS a lack of precipitation over the last four years has made trees in many regions of California susceptible to epidemic infestations of native bark beetles, which are constrained under normal circumstances by the defense mechanisms of healthy trees; and

WHEREAS these drought conditions and resulting bark beetle infestations across broad areas have caused vast tree mortality in several regions of the state, with the United States Forest Service estimating that over 22 million trees are dead and that tens of millions more are likely to die by the end of this year; and

WHEREAS recent scientific measurements suggest that the scale of this tree die-off is unprecedented in modern history; and

Tree Mortality Task Force

Two Year Review and Status of Executive Order Directives 2015-2017

1. CAL FIRE, the California Natural Resources Agency, Caltrans and the California Energy Commission will identify areas of the State that represent high-hazard zones for wildfire and falling trees.
   Completed with Updates as Needed

2. State agencies, utilities, and local governments will undertake efforts to remove dead or dying trees in these high-hazard zones that threaten power lines, roads, other evacuation corridors and critical infrastructure.
   Ongoing

3. CAL FIRE shall identify potential storage locations for removed trees across impacted areas in partnership with federal agencies and local jurisdictions.
   Completed with Updates as Needed

4. Caltrans will seek emergency federal funding to clear hazard trees that threaten state highways and roads.
   Completed

5. Department of General Services will identify State facilities and Caltrans shall identify highway and road corridors, where woodchips produced from dead trees can be used as mulch.
   Completed

6. State agencies will make available portable equipment such as large volume masticators, chippers and portable saw mills in high-hazard zones to aid local entities in tree removal efforts.
   Completed

7. The California Air Resources Board and CAL FIRE shall work together with federal land managers and the U.S. Environmental Protection Agency to expand the practice of prescribed burns and increase the number of allowable days on a temporary basis to burn tree waste that has been removed in high-hazard zones.
   Completed

8. The California Public Utilities Commission (CPUC) will utilize its authority to extend contracts on existing forest bioenergy facilities receiving feedstock from high-hazard zones.
   Completed

9. The CPUC will increase capacity for forest biomass generation by expediting actions for qualifying facilities in two of its biomass-oriented programs, BioMat and ReMAT.
   Partially Completed

10. The CPUC will work to reduce delays between utilities and facilities in reaching agreement on interconnection terms for new and expanded biomass energy facilities.
    Ongoing

11. The California Energy Commission will prioritize grant funding from the Electric Program Investment Charge for woody biomass-to-energy technology development and deployment, consistent with direction from the CPUC.
    Ongoing

12. CAL FIRE, the California Energy Commission and other appropriate agencies will work with land managers to estimate biomass feedstock availability, storage locations, and volumes that may be available for use as bioenergy feedstock at existing and new facilities.
    Partially Completed

13. CAL FIRE and the California Energy Commission will work with bioenergy facilities that accept forest biomass from high-hazard zones to identify potential funds to help offset higher feedstock costs.
    Partially Completed

14. Cal Recycle and CAL FIRE will work with affected counties and existing wood products markets to determine feasibility of expanded wood products markets in California.
    Ongoing

15. For purposes of carrying out directives 1, 2, and 5 through 8, Division 13 (commencing with section 21000) of the Public Resources Code and regulations adopted pursuant to that Division are hereby suspended.
    Completed with Updates as Needed

16. In order to ensure that equipment and services necessary for emergency response can be procured quickly, state contracts, including, but not limited to, advertising and competitive bidding requirements, are hereby suspended as necessary.
    Completed

17. For purposes of this Proclamation, Chapter 3.5 (commencing with section 11340) of Part 1 of Division 3 of the Government Code is suspended for the development and adoption of regulations or guidelines needed to carry out the provisions in this Order.
    Completed with Updates as Needed

18. The Office of Emergency Services shall provide local government assistance as appropriate under the authority of the California Disaster Assistance Act, and California Code of Regulations.
    Ongoing

19. State agencies shall actively monitor tree removal efforts directed by this Proclamation to assess their effectiveness in protecting forest health and strengthening forest resilience.
    Ongoing

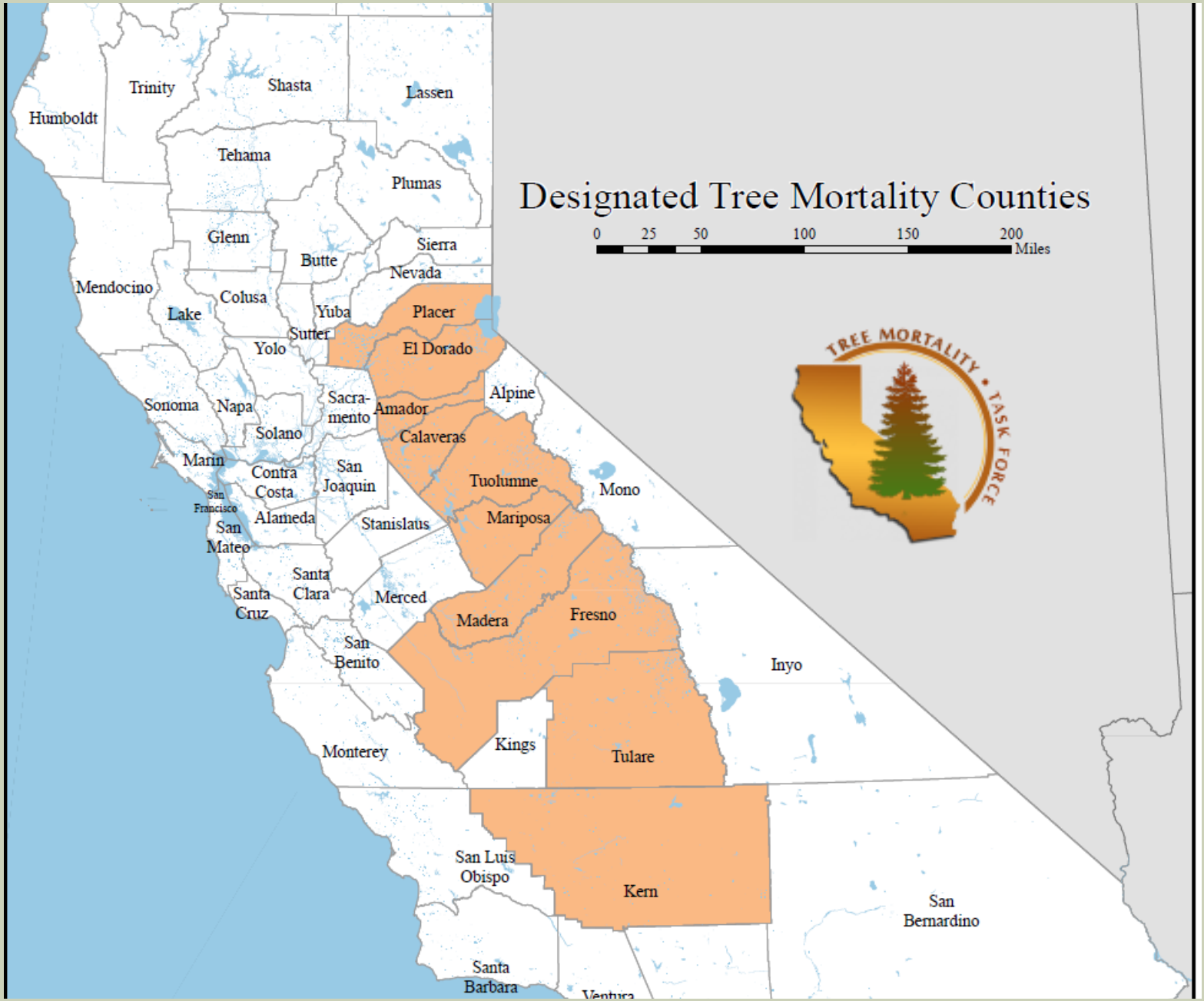
TREE MORTALITY TASK FORCE

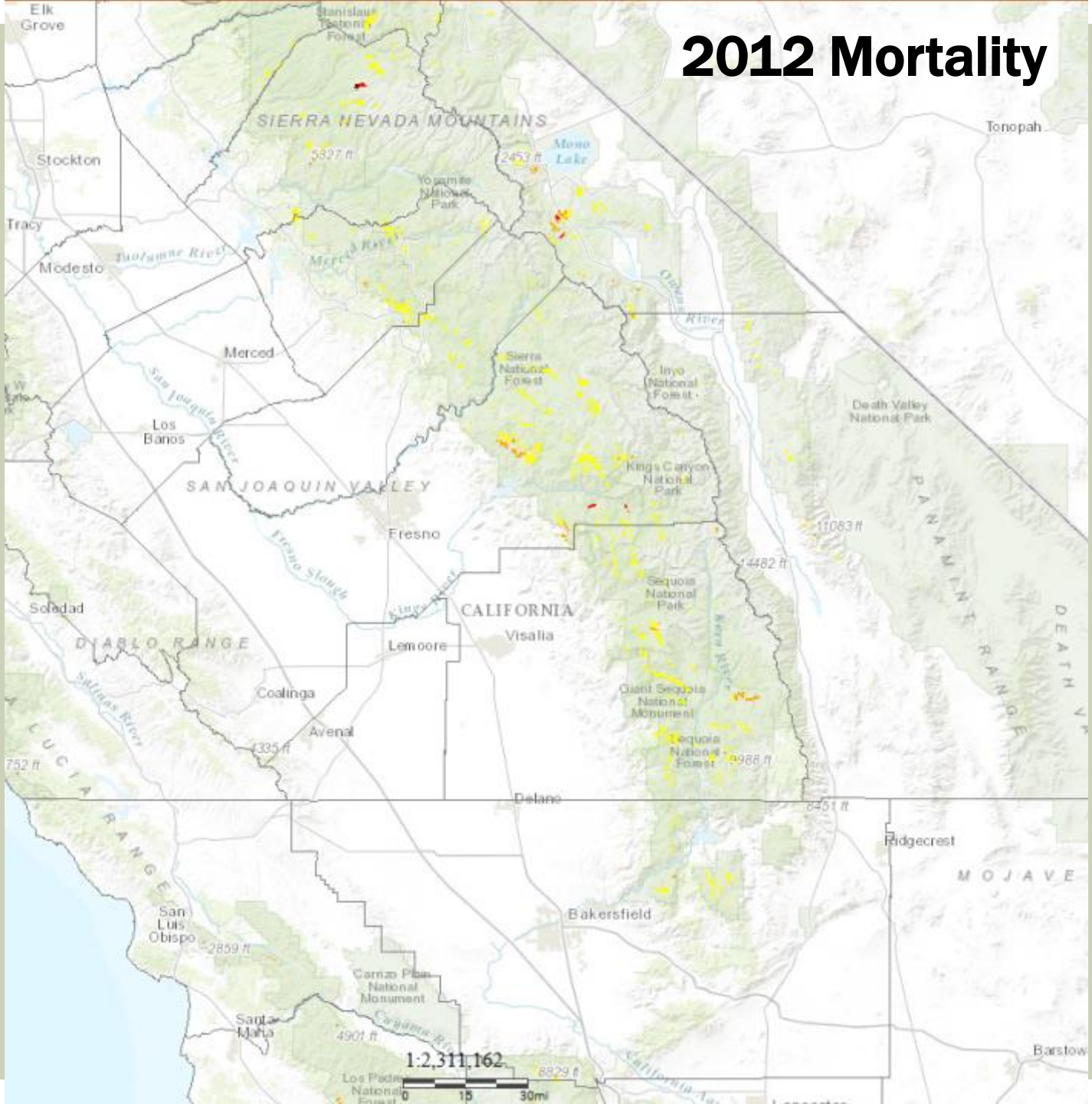
- 19 DIRECTIVES
- 80 ENTITIES
- 10 COUNTIES

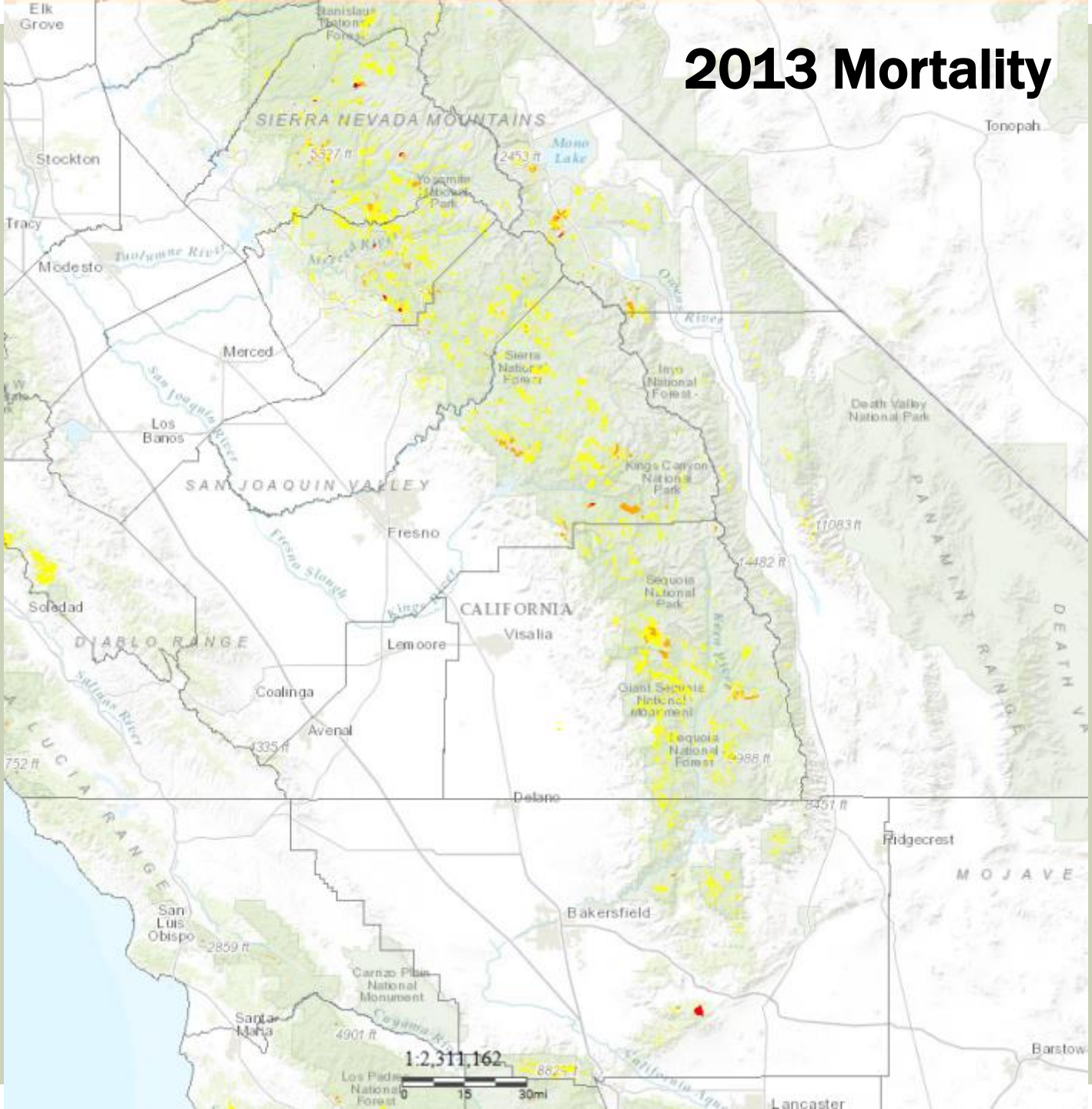
SEAL OF THE GOVERNOR OF THE STATE OF CALIFORNIA
XXXIX

CALIFORNIA DEPARTMENT OF FORESTRY & FIRE PROTECTION
CAL FIRE
SINCE 1885

Cal OES
GOVERNOR'S OFFICE
OF EMERGENCY SERVICES


Designated Tree Mortality Counties
0 25 50 100 150 200
Miles
TREE MORTALITY • TASK FORCE
Trinity
Shasta
Lassen
Humboldt
Tehama
Plumas
Glenn
Butte
Sierra
Nevada
Mendocino
Colusa
Lake
Yuba
Placer
Sutter
Yolo
El Dorado
Sonoma
Napa
Sacra-
mento
Amador
Alpine
Solano
Calaveras
Marin
Contra
Costa
San
Joaquin
Tuolumne
Mono
San
Francisco
Alameda
Stanislaus
Mariposa
San
Mateo
Santa
Clara
Merced
Santa
Cruz
Madera
Fresno
San
Benito
Inyo
Kings
Tulare
Monterey
San Luis
Obispo
Kern
San
Bernardino
Santa
Barbara
Ventura


2012 Mortality
Elk Grove
Stockton
Tracy
Modesto
Merced
Los Banos
Fresno
Soledad
Lemoore
Visalia
Coalinga
Avenal
Delano
Bakersfield
Ridgecrest
Tonopah
San Luis Obispo
Santa Maria
Barstow
SIERRA NEVADA MOUNTAINS
SAN JOAQUIN VALLEY
CALIFORNIA
DIABLO RANGE
SANTA LUCIA RANGE
PANAMINT RANGE
DEATH VALLEY
MOJAVE
Mono Lake
Yosemite National Park
Sierra National Forest
Inyo National Forest
Death Valley National Park
Kings Canyon National Park
Sequoia National Park
Giant Sequoia National Monument
Sequoia National Forest
Carrizo Plain National Monument
Los Padres National Forest
5827 ft
2453 ft
11083 ft
14482 ft
8988 ft
8451 ft
4335 ft
2859 ft
4901 ft
8829 ft
1:2,311,162
0 15 30mi


2013 Mortality
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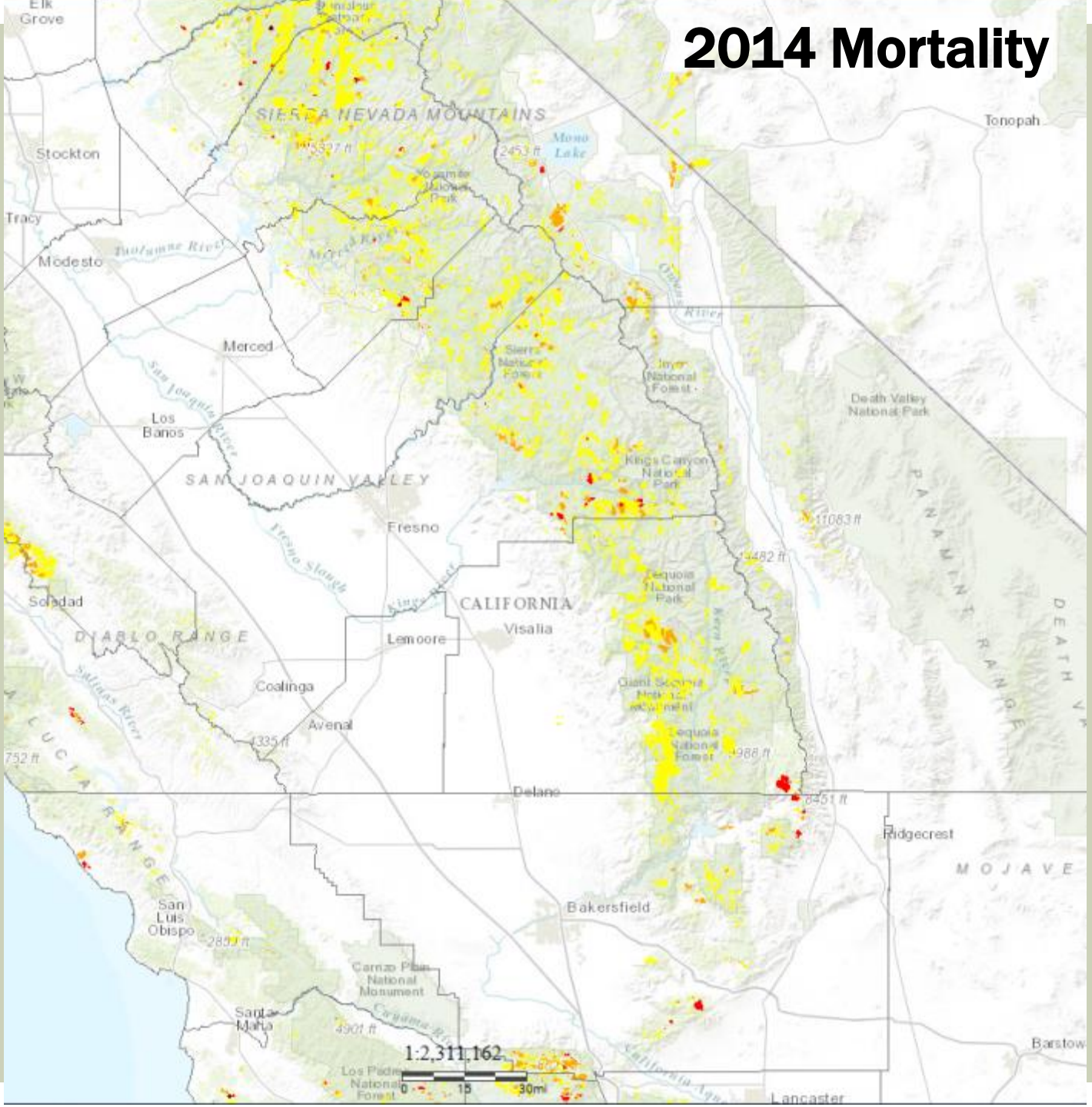
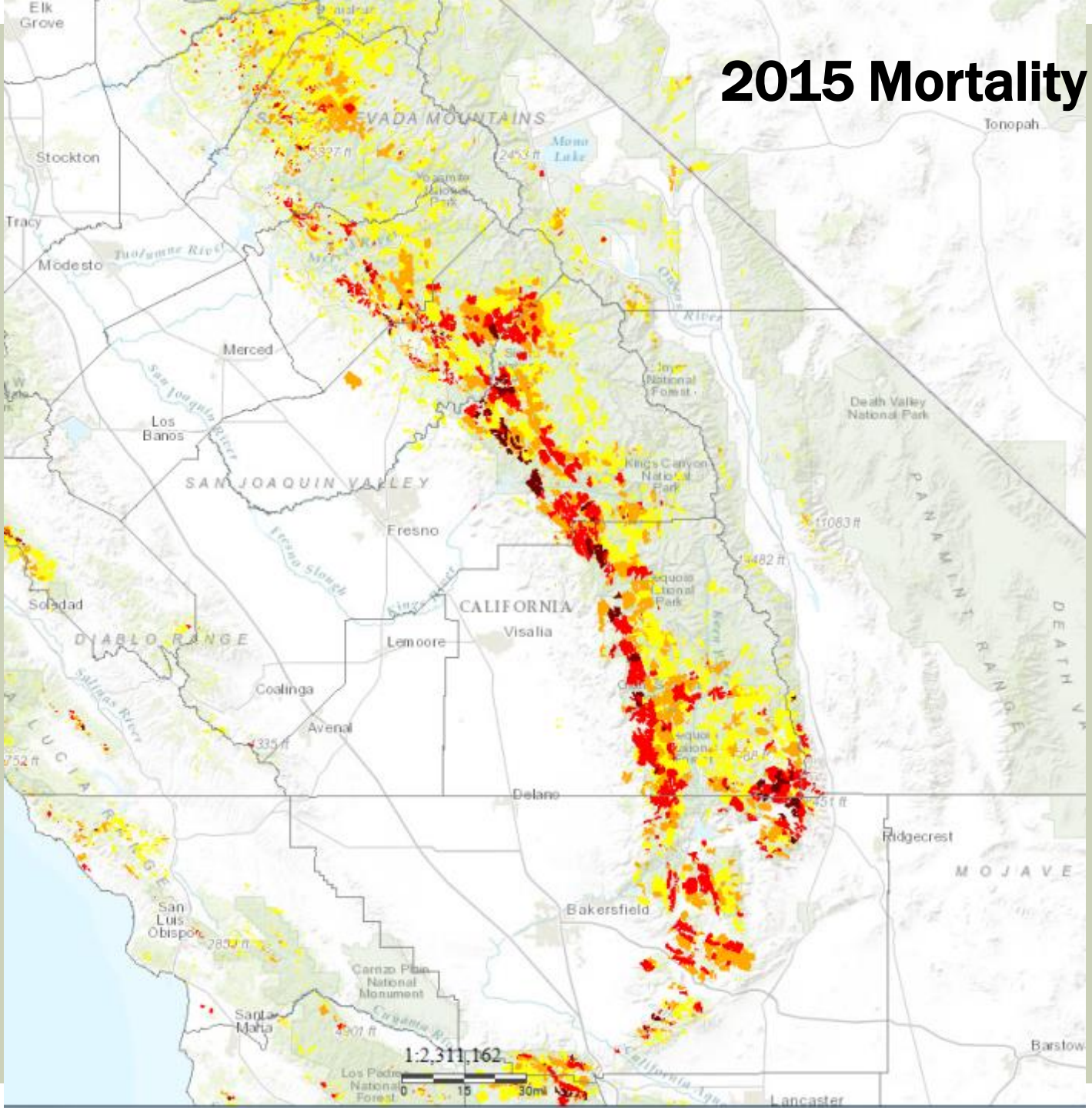
Giant Sequoia National Monument
Sequoia National Forest
Carrizo Plain National Monument
San Luis Obispo
Santa Maria
1:2,311,162
0 15 30mi

2014 Mortality




2015 Mortality
Elk Grove
Stockton
Tracy
Modesto
Merced
Los Banos
Fresno
Soledad
Lemoore
Visalia
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Avenal
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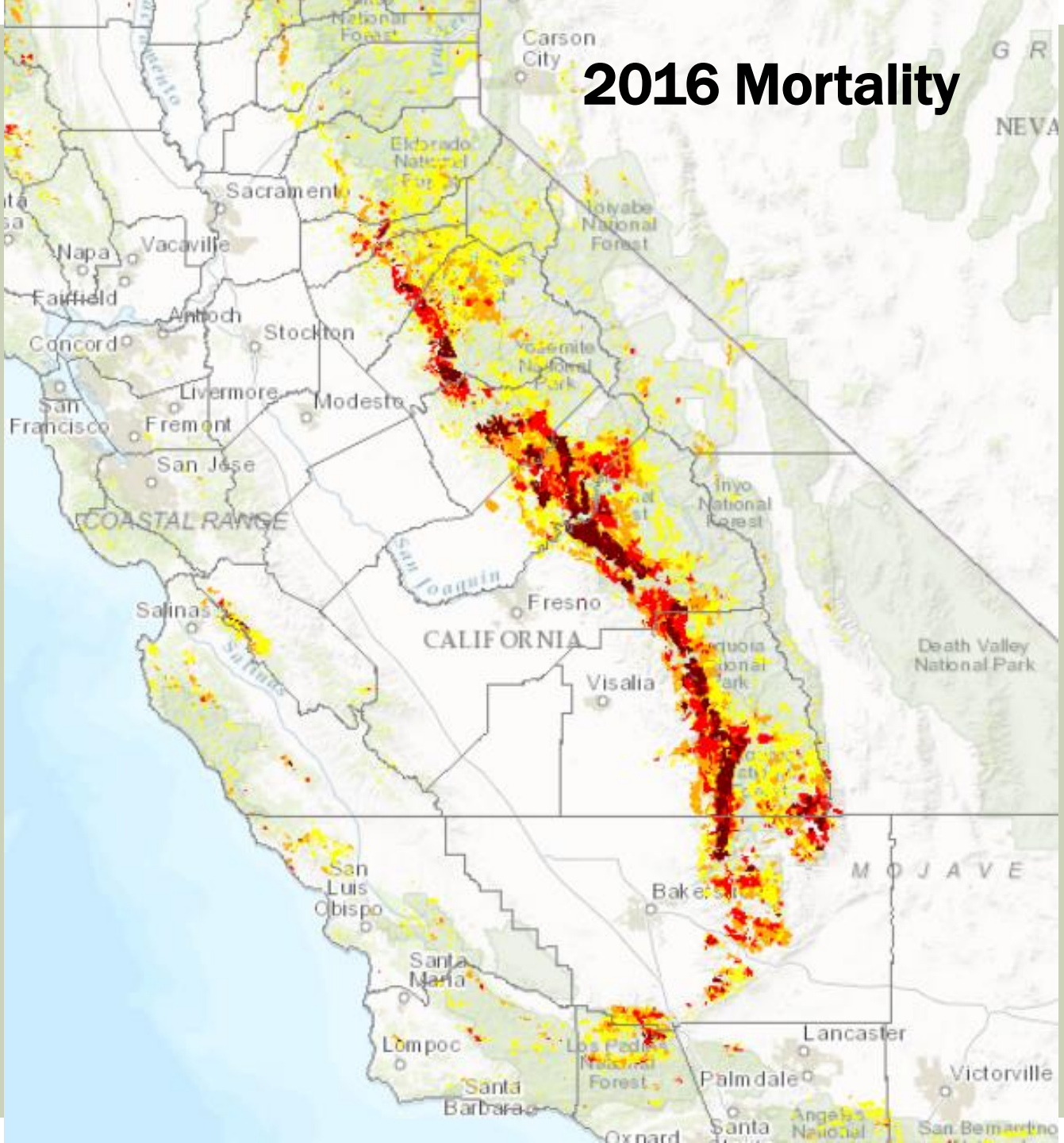
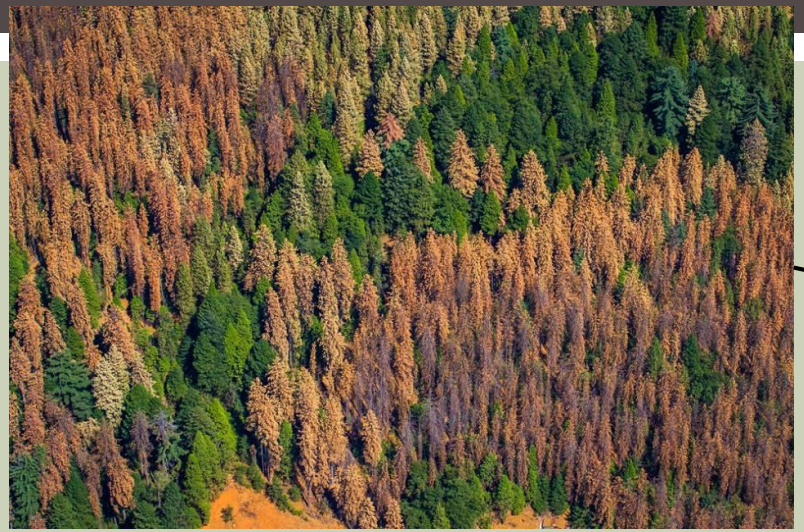
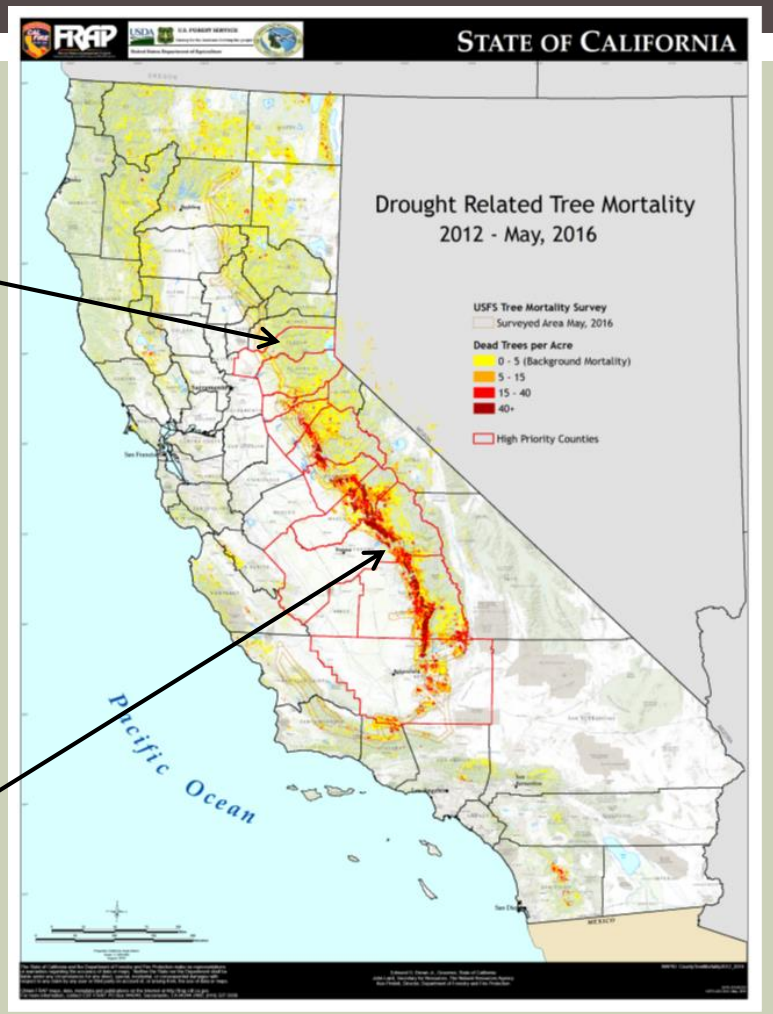
Ridgecrest
Tonopah
Barstow
Lancaster
San Luis Obispo
Santa Maria
SAN JOAQUIN VALLEY
DIABLO RANGE
CALIFORNIA
Death Valley National Park
1:2,311,162
0 15 30mi

2016 Mortality



EPIDEMIC PROPORTIONS



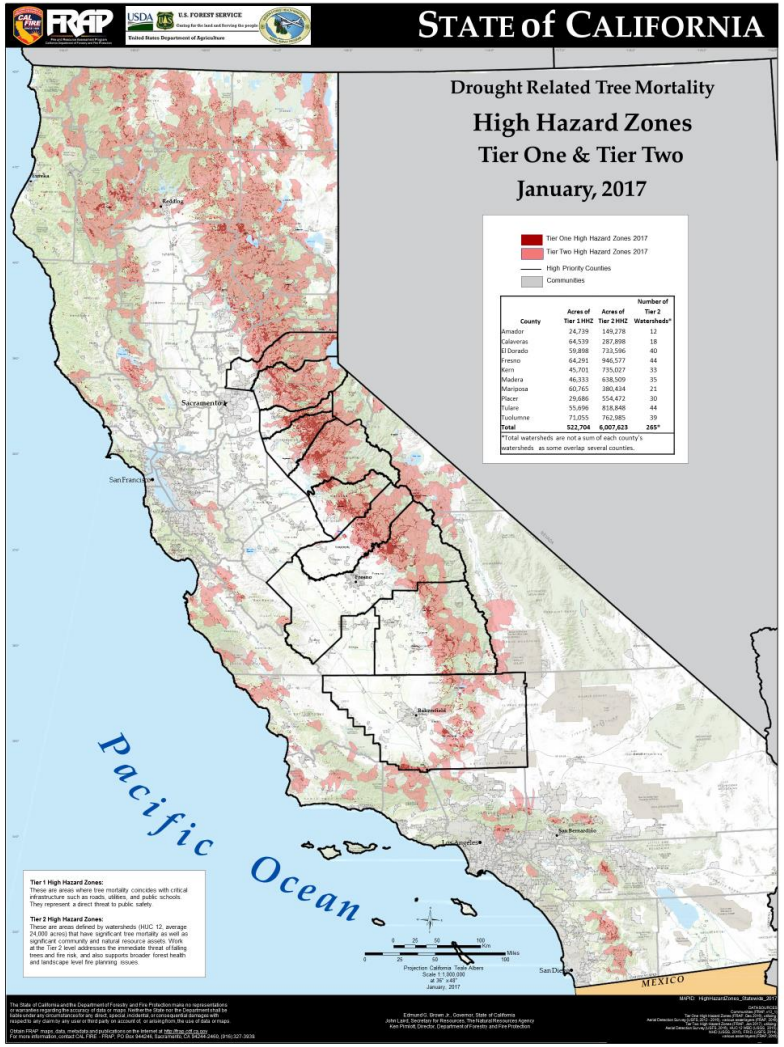


HIGH HAZARD ZONE DESIGNATION

- ***HHZ Direct (Tier 1):*** *These are areas where tree mortality, caused by drought, coincides with critical infrastructure, including but not limited to roads, utilities, and public schools. They represent a direct threat to public safety and identify areas to be prioritized for hazardous tree removal.*
- ***HHZ Indirect (Tier 2):*** *These are areas defined by watersheds (HUC12, average 24,000 acres) that have significant tree mortality combined with community and natural resource assets. Work at the Tier 2 level addresses the immediate threat of falling trees and fire risk, and supports broader forest health and landscape level fire planning issues. They represent areas to be prioritized for hazard mitigation as well as forest health restoration.*

HIGH HAZARD ZONE MAPPING

- HHZ maps are
  - available on the TMTF website,
  - Available for download as GIS data layers,
  - May be viewed through the interactive Tree Mortality Viewer,
  - Are updated as new Aerial Detection Survey data becomes available.



HHZ DATA INPUTS

ASSETS

- Community Infrastructure
- Water Infrastructure
- Water Resources

THREATS

- Tree Mortality
- HHZ Tier 1
- Fire Threat/Fire Return Interval Departure

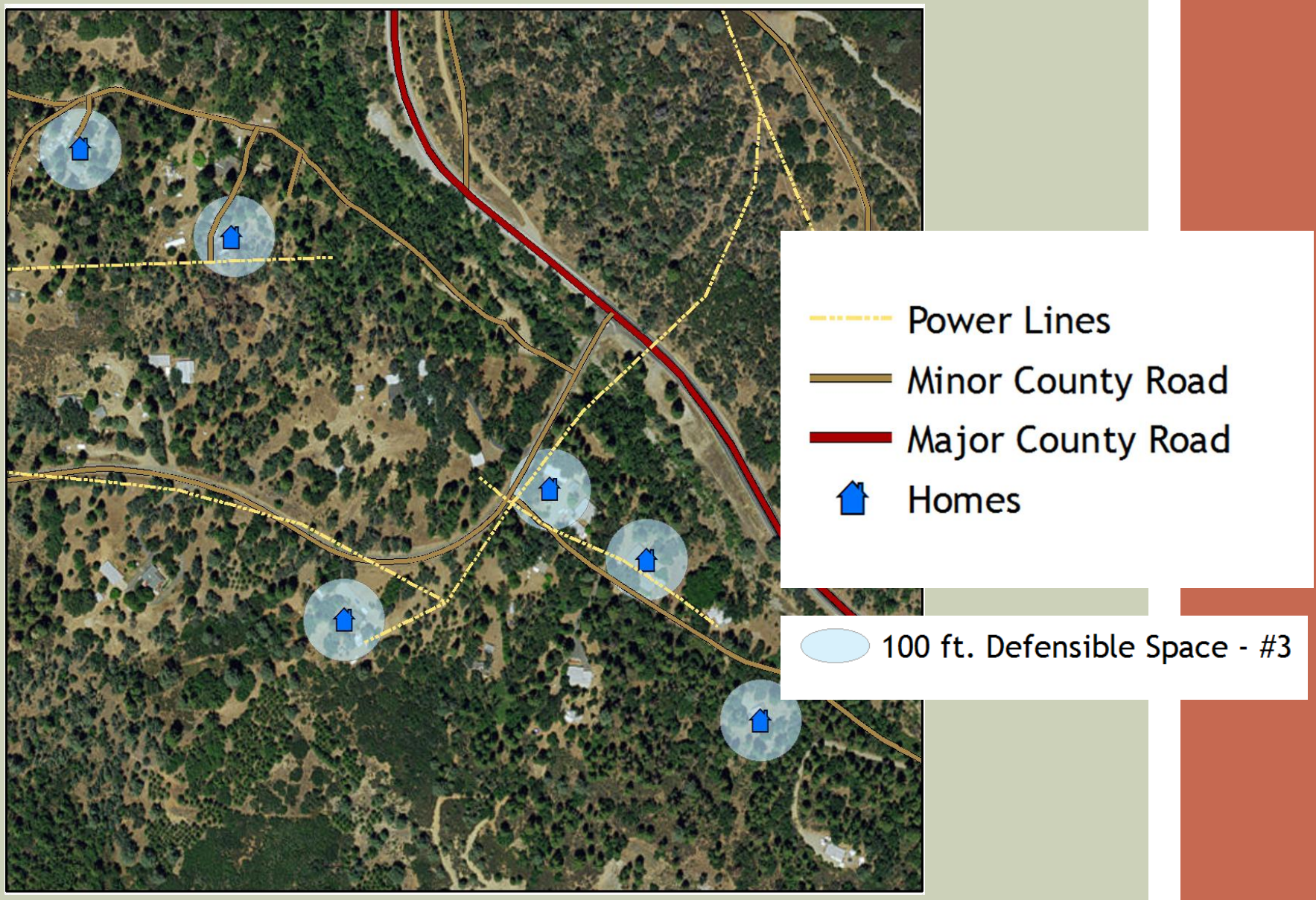
COSTS OF TREE MORTALITY EMERGENCY

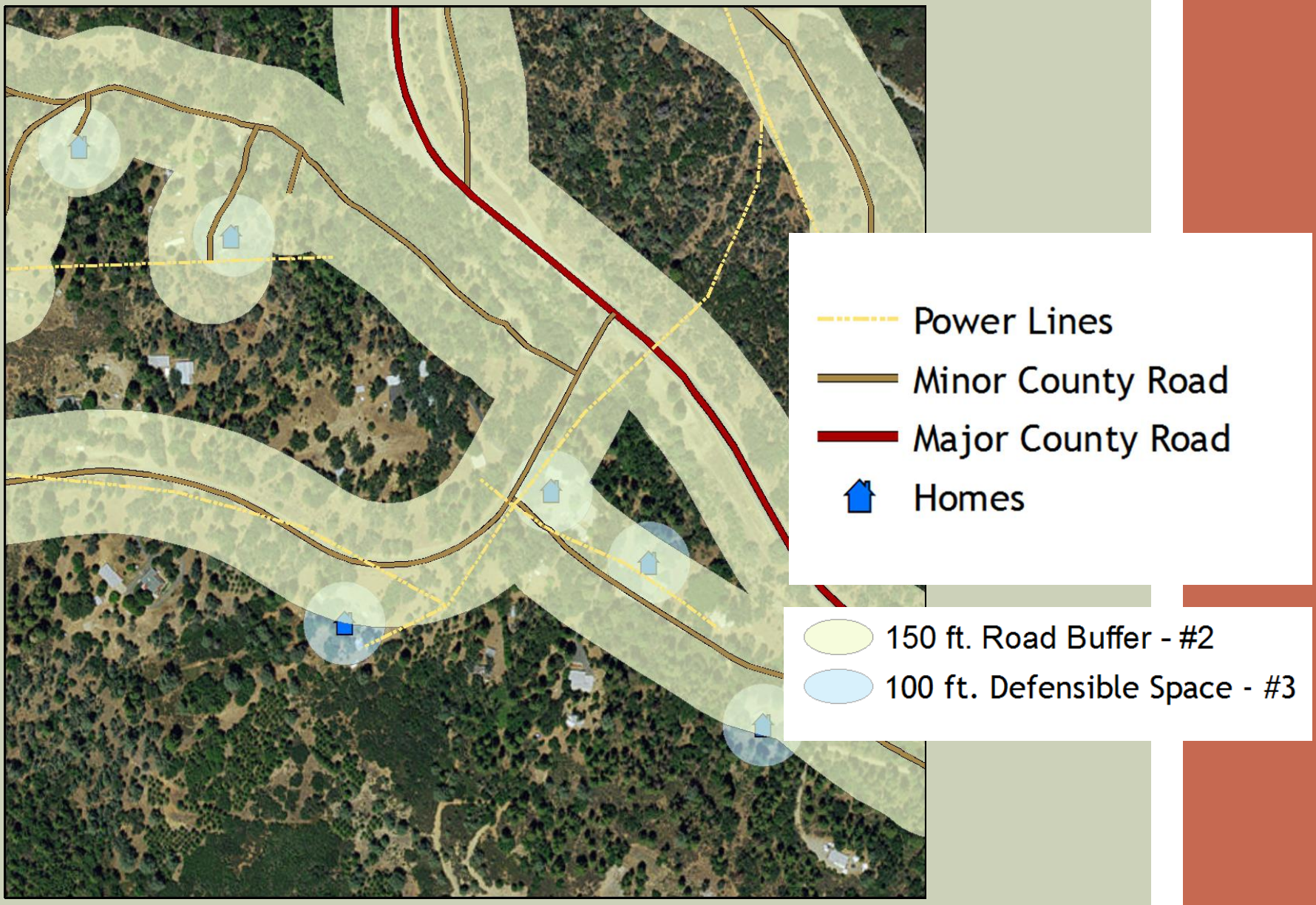
- $2.8 billion estimated cost to remove
- $562 million USFS (approximately $150/tree)
- $2.2 billion non-USFS (average $1,200/tree)

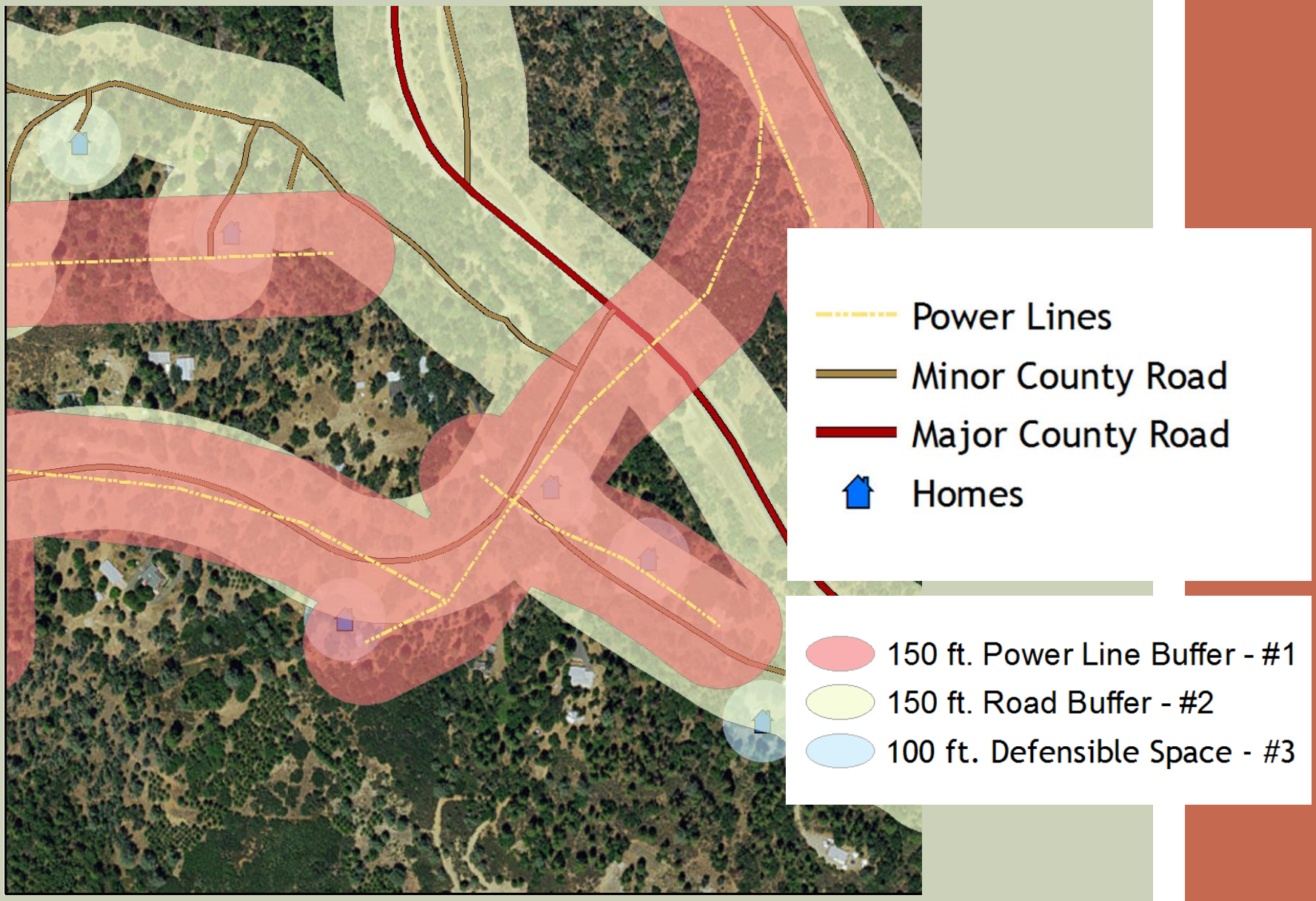
AREAS OF RESPONSIBILITY

- Electric Utilities
  - PRC 4293 requires the removal or trimming of trees, or portions of trees, that are dead, decadent, rotten, decayed or diseased and which may fall into or onto the line and trees leaning towards the line.
- Caltrans
  - Responsible for maintenance of roadways for public safety on state highway system
  - Authority to manipulate vegetation does not extend out of Right Of Way
- Counties
  - Responsible for maintenance of non-highway county maintained roadways
  - ROW general 15-25’
- Homeowners
  - PRC 4291 – 100 feet of defensible space around habitable structures

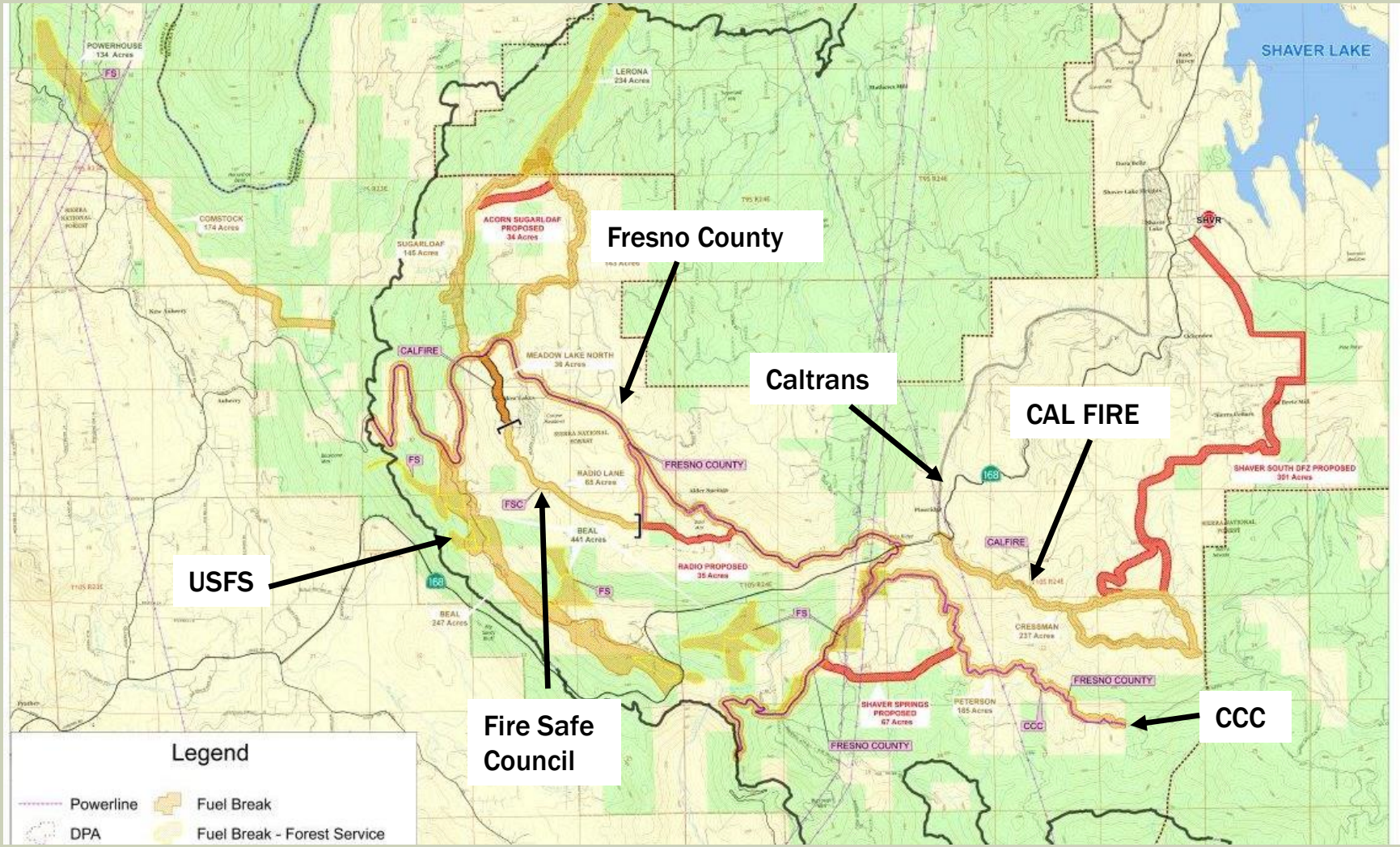

Power Lines
Minor County Road
Major County Road
Homes


Power Lines
Minor County Road
Major County Road
Homes
100 ft. Defensible Space - #3


Power Lines
Minor County Road
Major County Road
Homes
150 ft. Road Buffer - #2
100 ft. Defensible Space - #3


Power Lines
Minor County Road
Major County Road
Homes
150 ft. Power Line Buffer - #1
150 ft. Road Buffer - #2
100 ft. Defensible Space - #3

COOPERATIVE EFFORTS



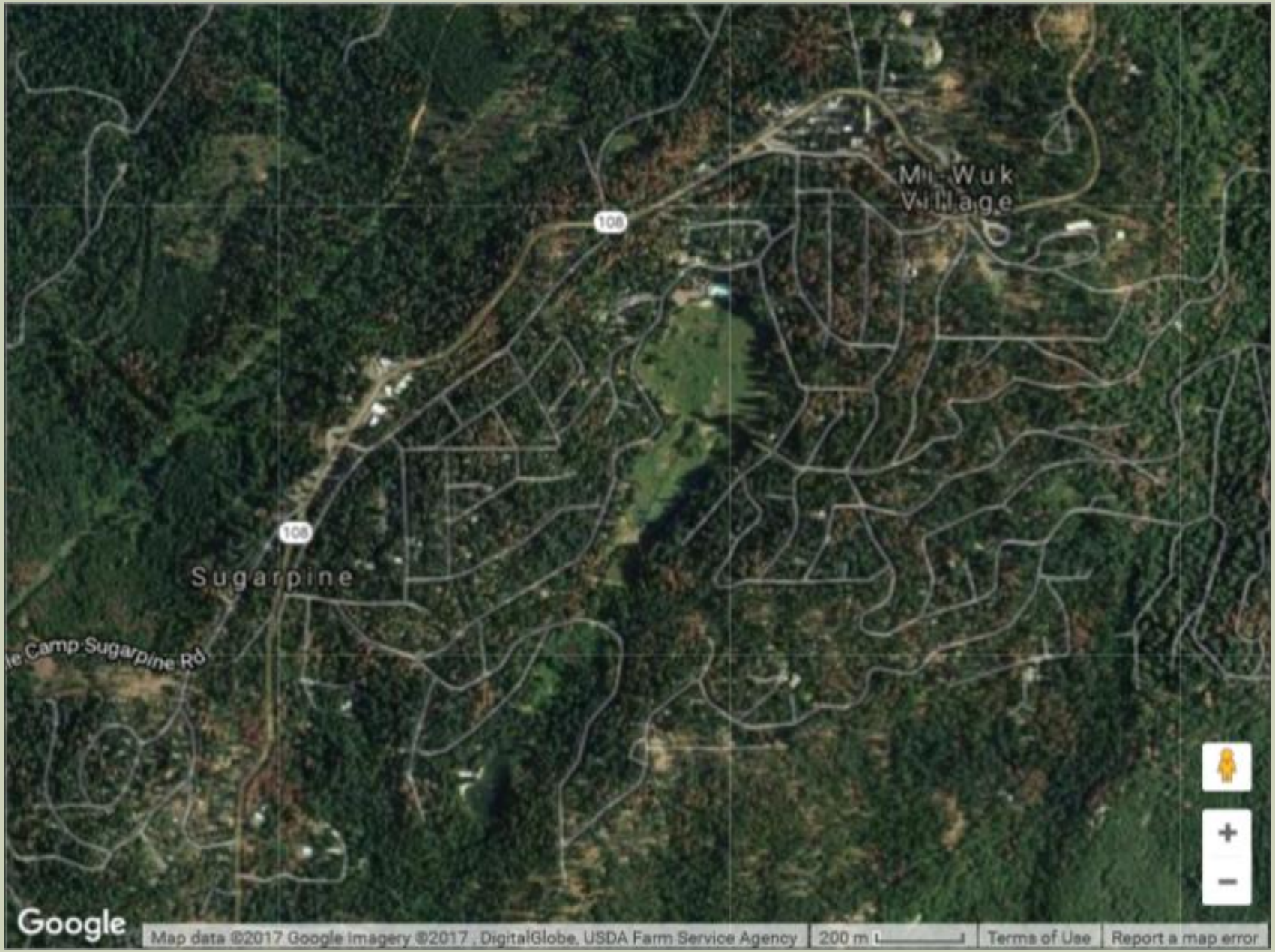
COOPERATIVE EFFORTS

OTHER COOPERATORS

- Office of Emergency Services
  - California Disaster Assistance Act (CDAA) funding
  - Public messaging
- California Conservation Corps (CCC)
  - Crews assisting CAL FIRE, USFS, and Counties in fuel reduction projects
- Resource Conservation Districts (RCD)
  - Grant funding, landowner coordination, technical assistance
- Natural Resources Conservation Service (NRCS)
  - EQIP funding, technical assistance
- Fire Safe Councils
  - Grant projects, homeowner education

PRIVATE RESPONSE: SMALL LANDOWNER OPPORTUNITIES

- Forested communities throughout the Sierra are impacted by tree mortality.
- RPFs and LTOs have not traditionally engaged these communities, they are primarily serviced by tree service contractors.
- Landowners are motivated to remove dead trees.
- Biomass plants are hungry for material from HHZ. Removal costs are an issue.
- Home Owners' Associations, Fire Safe Councils and local Governments may provide access to community scale projects.
- The Drought Mortality Exemption, 14 CCR § 1038(k), provides a low regulatory barrier for hazardous tree removal.


Mi-Wuk Village
108
108
Sugarpine
Camp Sugarpine Rd
Google
Map data ©2017 Google Imagery ©2017 , DigitalGlobe, USDA Farm Service Agency
200 m
Terms of Use
Report a map error


108
108
Camp Sugarpine Rd
Google
Map data ©2017 Google Imagery ©2017 , DigitalGlobe, USDA Farm Service Agency
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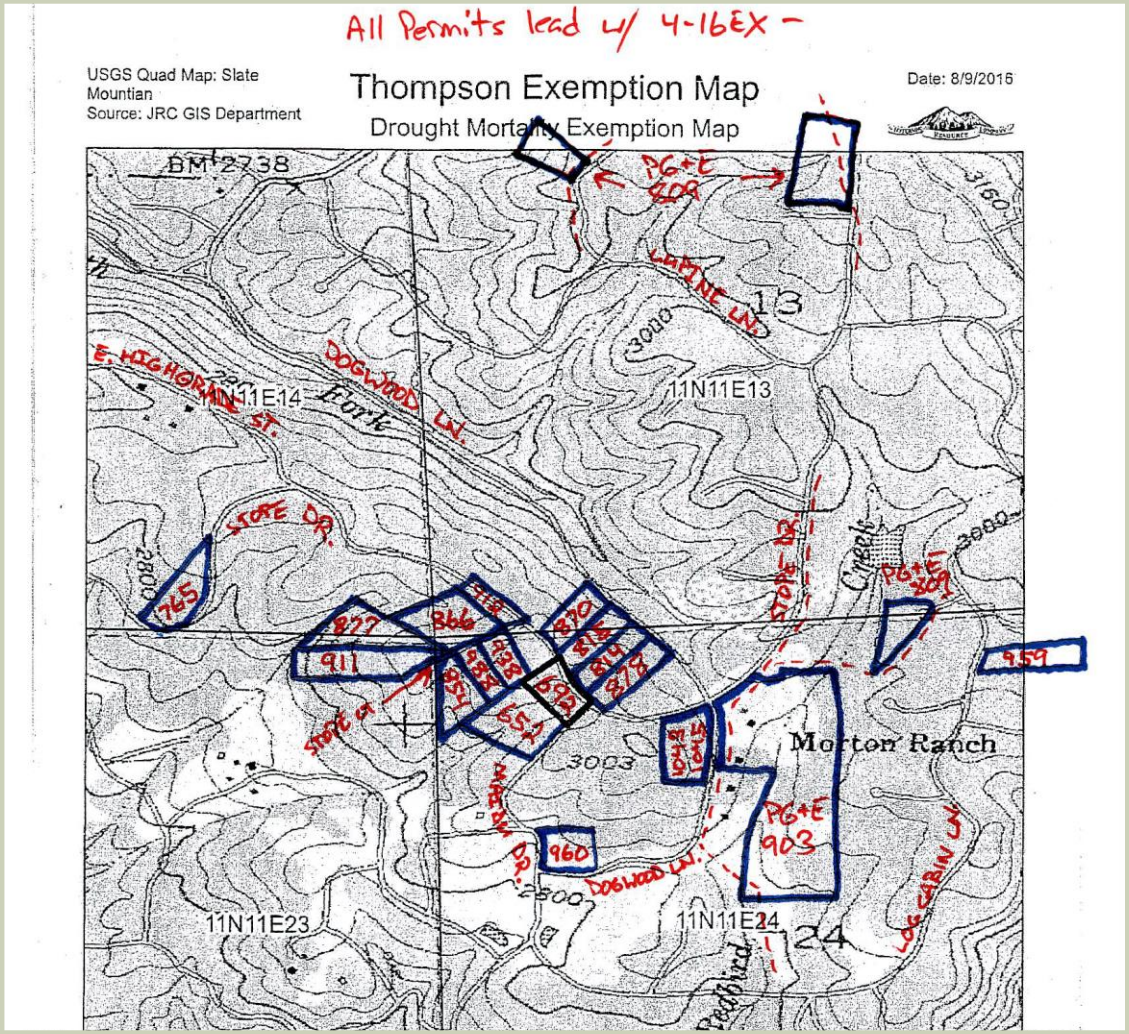
Terms of Use
Report a map error

- Aggregating small landowners to achieve scale.
- Operate across property lines to common landing.
- Avoid infrastructure damage
  - Outbuildings
  - Septic systems
  - Fences
  - Lightly paved driveways



SMALL LANDOWNER CHALLENGES

- Administratively complex.
  - Multiple, contiguous landowners for viable project.
- Relatively high logging costs and low value material.
- Poor road and landing infrastructure.
- LTO is responsible for slash disposal.
- Knowledge of Rules and Regulations.
- Landowner perception of tree value.

LAKE ARROWHEAD IN 2003

LAKE ARROWHEAD- 2016

The tree mortality epidemic will profoundly impact the forests of California and its associated resources including

- water,
- wildlife,
- fire regimes,
- public safety,
- forest products,
- recreation, and
- their associated economics.