Forest Management Plans

Thanks to Jason Wells, Forester, Sonoma Resource Conservation District for content

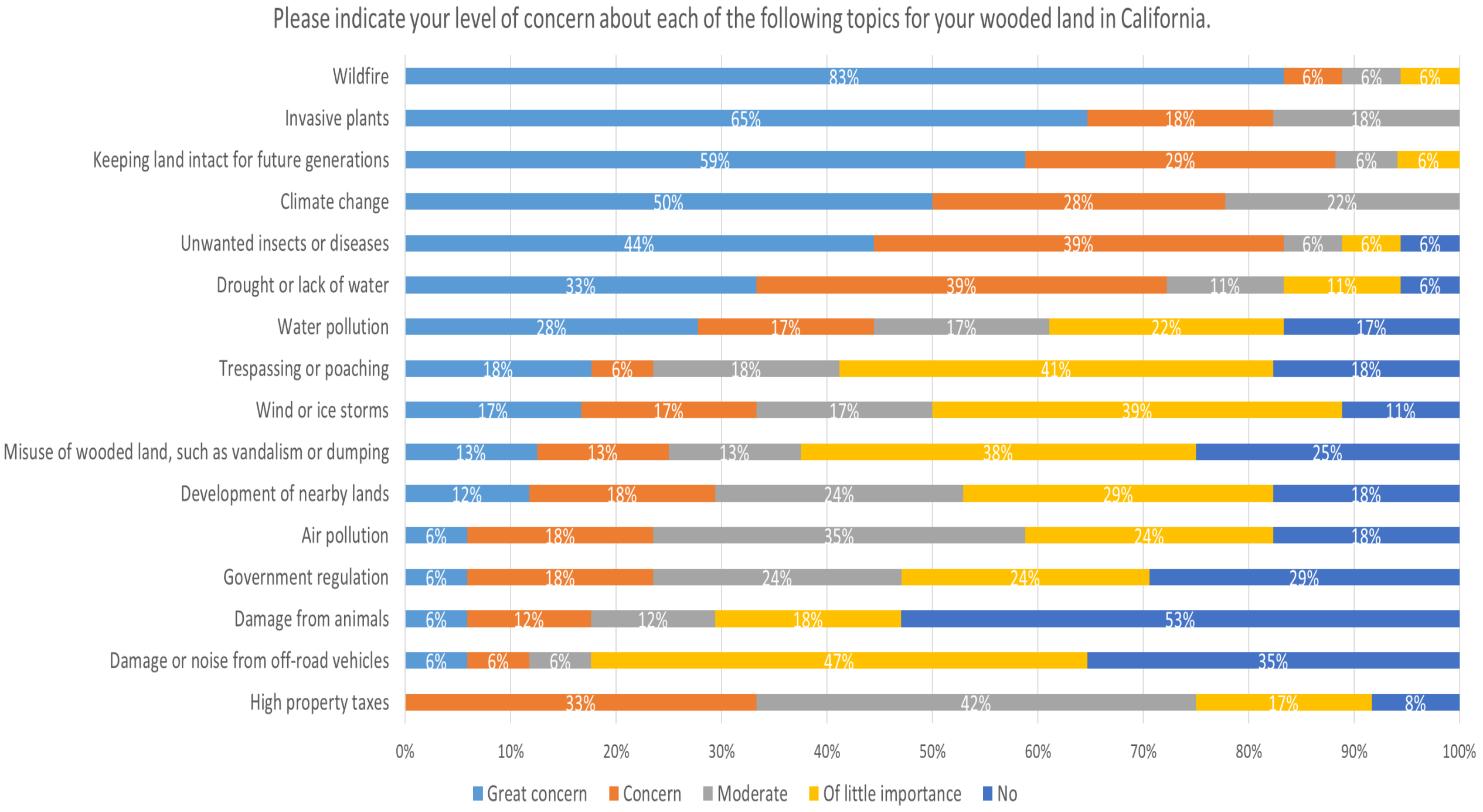
UNIVERSITY OF CALIFORNIA
Agriculture and Natural Resources

Why do I need a forest management plan?

- Solidifies goals on paper
- Identifies current conditions
- Prescribes actions to meet goals
  - how to manage vegetation, streams, and roads
- Identifies treatment priorities
- Identifies constraints on management
- Is required for cost-share or other funding
  - to implement recommendations on the ground
- Guides management for the next 5-10 years
- Communicates your intent to the next generation

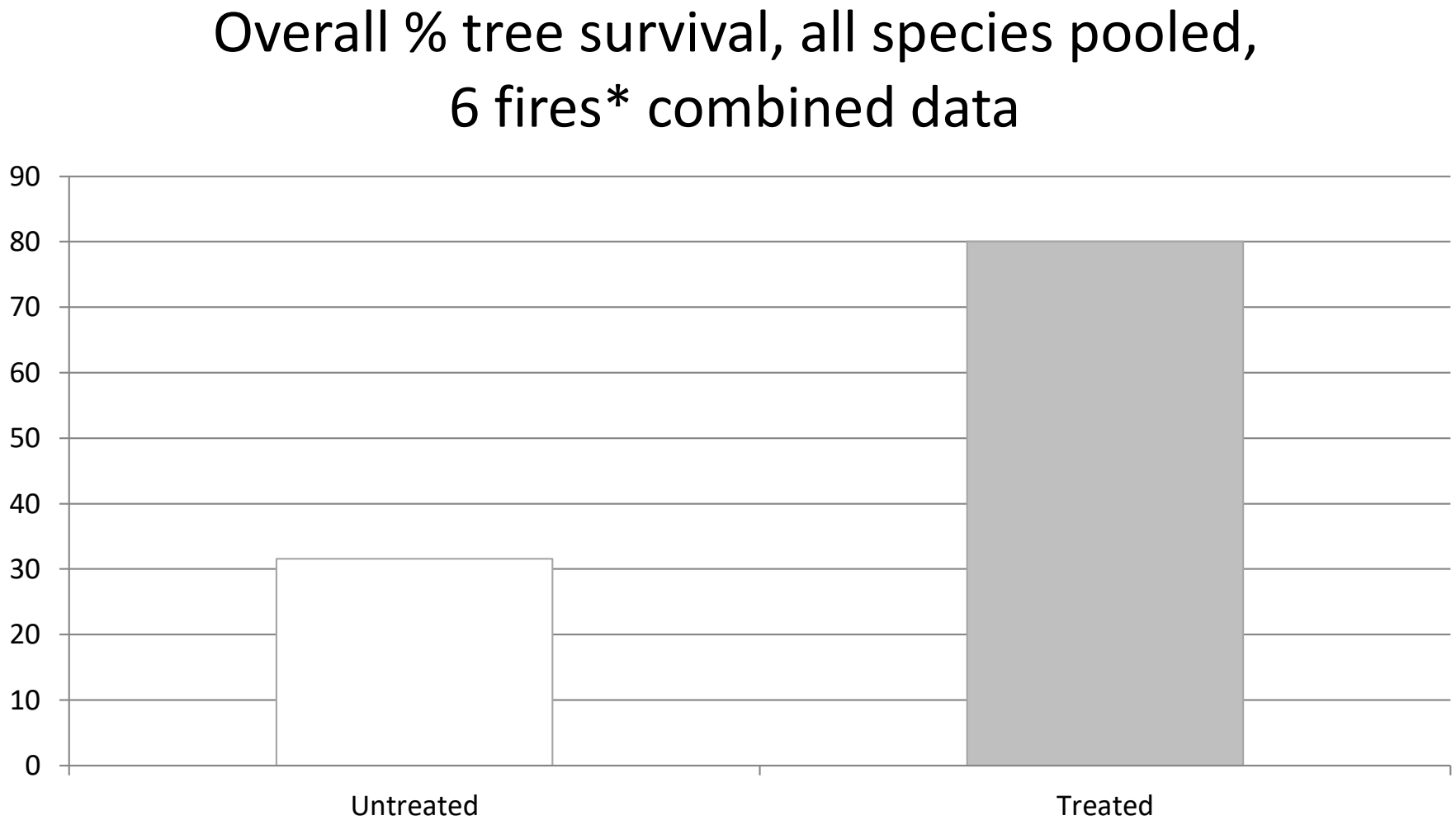
Why should I manage vegetation on my property?

- Management can help make goals happen, avoid risks and bad outcomes
- Reasons will be diverse and depend on goals
- Actions will depend on multiple factors
  - Weight placed on individual goals (often in conflict with one another)
  - Vegetation types
  - Access & feasibility of operations
  - Financial incentives and limitations


Please indicate your level of concern about each of the following topics for your wooded land in California.
Wildfire
83%
6%
6%
6%
Invasive plants
65%
18%
18%
Keeping land intact for future generations
59%
29%
6%
6%
Climate change
50%
28%
22%
Unwanted insects or diseases
44%
39%
6%
6%
6%
Drought or lack of water
33%
39%
11%
11%
6%
Water pollution
28%
17%
17%
22%
17%
Trespassing or poaching
18%
6%
18%
41%
18%
Wind or ice storms
17%
17%
17%
39%
11%
Misuse of wooded land, such as vandalism or dumping
13%
13%
13%
38%
25%
Development of nearby lands
12%
18%
24%
29%
18%
Air pollution
6%
18%
35%
24%
18%
Government regulation
6%
18%
24%
24%
29%
Damage from animals
6%
12%
12%
18%
53%
Damage or noise from off-road vehicles
6%
6%
6%
47%
35%
High property taxes
33%
42%
17%
8%
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%
Great concern
Concern
Moderate
Of little importance
No

Does fuels reduction work reduce fire impacts? YES

Tree survival
we know fuels reduction projects are increasing % of trees that survive wildfire (can be confounded in extreme weather)

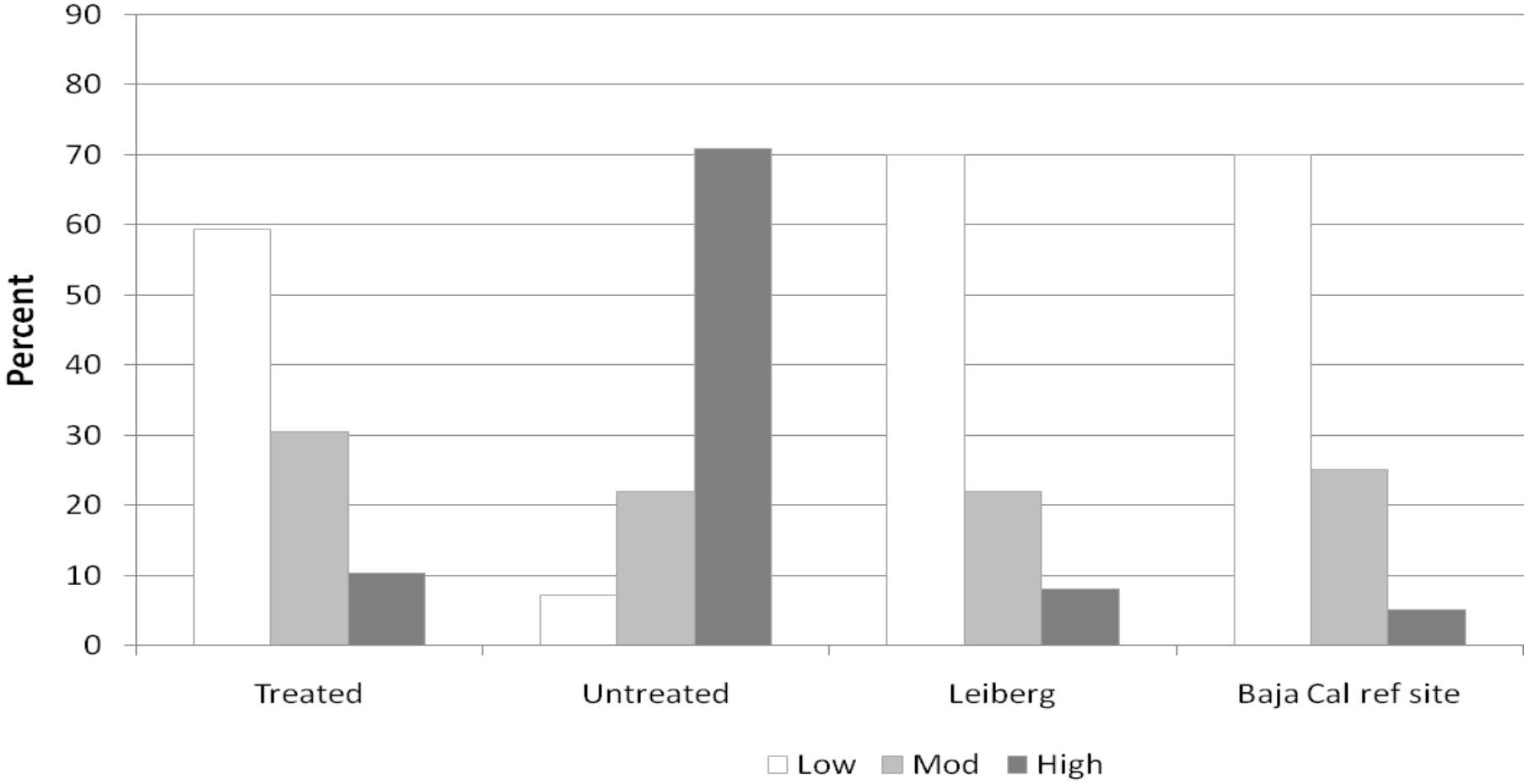


From Hugh Safford 2010
* Angora, Peterson, Rich, Antelope, Milford, American River fires

Is it working? YES

Fire severity

the % of area burned at high severity more closely approximates "natural" conditions

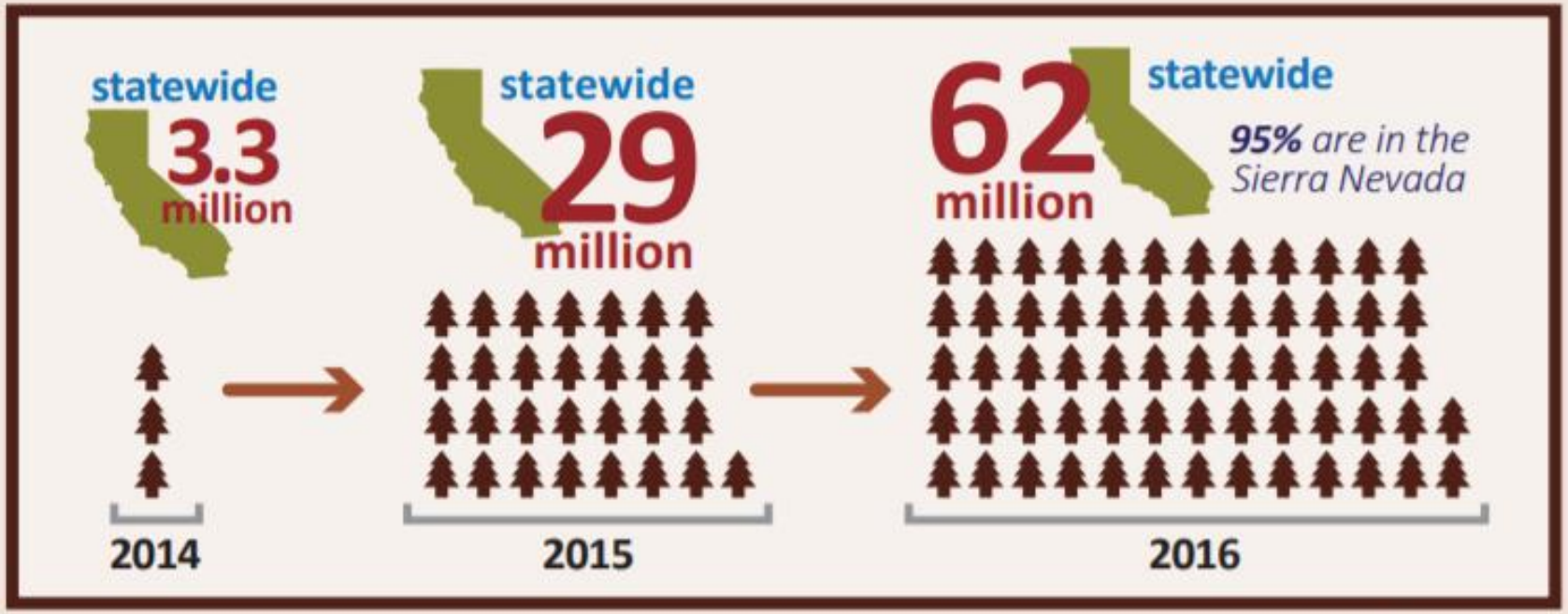


– 6 fires combined data
From Hugh Safford 2010

Estimate of 19th century fires in Sierra Nevada: Leiberg 1902

Living reference system for eastside SN pine forests: Stephens et al. 2008

Location in Madera County before and after tree mortality began spreading. Photos: Margarita Gordus, CA Department of Fish and Wildlife



Since 2010, 102 million trees have been killed in California by bark beetles and drought. Most of these trees died in 2015–2016 and are concentrated in the Sierra Nevada Region.

Sierra Nevada forests are too dense, which makes them **highly vulnerable** to tree mortality from bark beetles and drought. These dead trees can become carbon emission sources, but most importantly, they stop removing carbon from the atmosphere.

Does reducing vegetation increase forest health?

- Fuel reduction treatments shown effective for mitigating drought impacts to ponderosa pine, the hardest hit in the drought.
- Maintaining a diversity of tree species can help buffer drought impacts

Restaino et al 2019. Forest structure and climate mediate drought-induced tree mortality in forests of the Sierra Nevada, USA. Ecological Applications 29(4)

Percentages indicate the proportion of trees of each species that died across the study.

Increased Mortality
Reduced Mortality
Mixed Effect Depending on Precipitation

HIGHER DENSITY

TREATMENT

24% White Fir

In both cedar and white fir, treatment reduced mortality in wetter stands but increased it in dry areas. Perhaps these shade-tolerant trees did worse with more sun exposure in more open stands.

21% Incense Cedar

While cedar mortality increased with stand density, there was also a higher likelihood of an individual tree dying where there were more cedars present.

35% Sugar Pine

Sugar pine mortality was greatest in areas where there were more, large sugar pines.

40% Ponderosa Pine

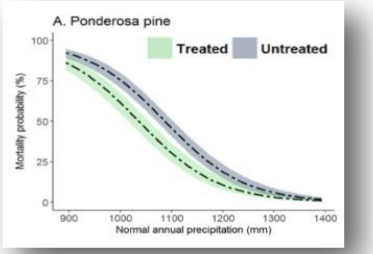
More mortality where there were high densities of large pines (more bark beetle hosts), especially in dry areas.

IN SUMMARY

Treatments are effective at mitigating drought impacts, particularly for ponderosa pines. When drought becomes too extreme, treatment may increase mortality for shade-tolerant species, but those species didn't experience the high die-off rates pines did and are more prevalent on the landscape now than they were historically. To effectively mitigate for future drought, treatment pace and scale needs to be amplified.

In our study, incense cedars and oak species proved to be the most drought tolerant. Forest management that maintains a diversity of tree species will buffer forests against future droughts and other large disturbances.

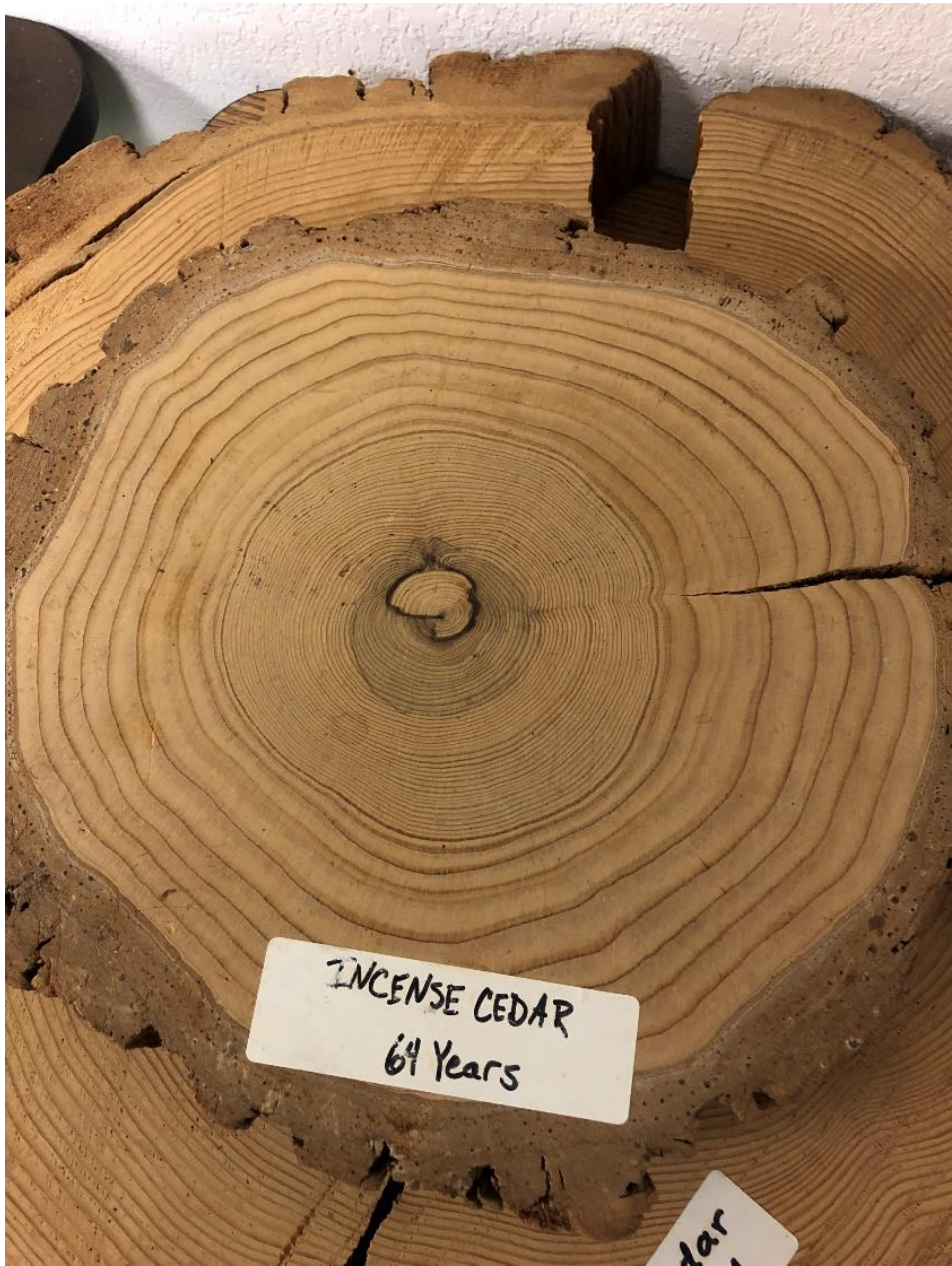
Less precipitation was correlated with higher tree mortality for all species. The graph shows how treatment was related to less ponderosa pine mortality, across the precipitation spectrum.



Managing vegetation is really important!

1. Where there is growing space, things grow.
2. Silviculture is managing what grows in that space.
3. When growing space is full, competition sets in.
4. Silviculture is managing competition.

An example of "release" from competition



Writing a plan can

- Help you develop your goals for the what vegetation conditions you want
- Develop ‘prescription’s for vegetation management to move your forest to your desired conditions
- Start implementing your vision of what your forest should look like

California Cooperative Forest Management Plan

- **Developed by**
  - US Forest Service
  - California Department of Forestry & Fire Protection (Cal Fire)
  - Natural Resource Conservation Service (NRCS)
  - American Tree Farm System
- **You can start writing part of the plan**
  - Property ownership information & history
  - Current conditions
  - Landowner objectives******
  - Management plan implementation

Who does a plan belong to?

- A management plan is a tool for and belongs to the landowner.
- Other signatures are required for implementing plan activities or for requesting funding from agencies

Who signs the plan?

- You should - I have reviewed this plan and approve its content.
- California Registered Professional Forester (RPF) and agency representatives for participation in cost share programs and management practices
  - California Department of Forestry and Fire Protection's (CALFIRE) California Forest Improvement Program (CFIP)
  - American Forest Foundation's American Tree Farm System (ATFS) and
  - The Natural Resources Conservation Service (NRCS) programs.

What's in a Forest Management Plan?

California Cooperative Forest Management Plan - Page #

Landowner Management Objectives Page 10

- **Desired Forest Condition:**
  - Fire protection objectives
  - Forest Health objectives
  - Insects and disease concerns
  - Invasive plant and animal, concerns
  - Trespass concerns
- **Wildlife:**
  - Desired species habitat improvement
  - R and E species habitat concerns:
- **Additional Objectives:**
  - Aesthetics:
  - Income:
  - Family Legacy:
  - Livestock (optional):
  - Other (optional):

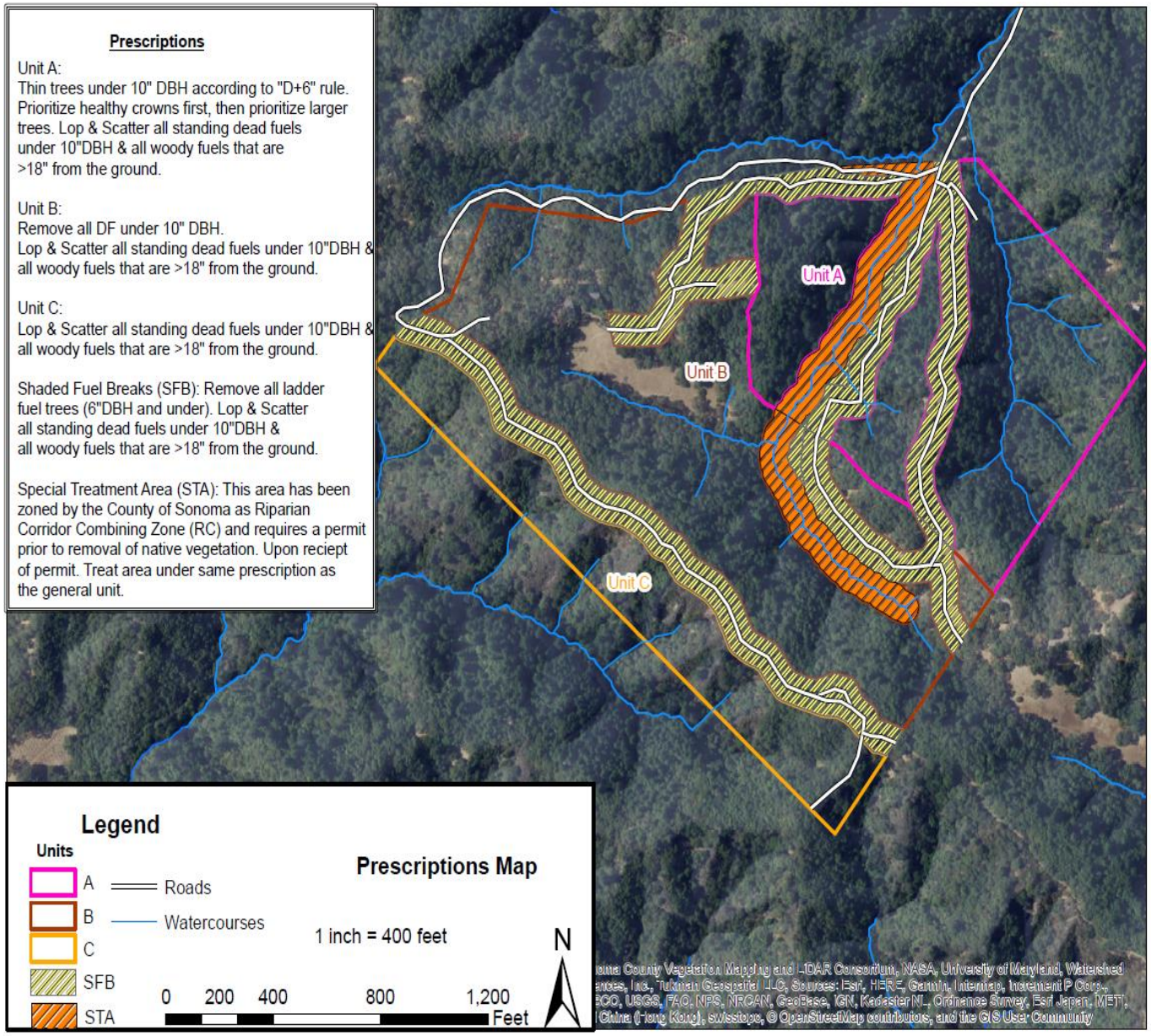
4. MANAGEMENT GOALS & OBJECTIVES

	Production/Business
☒	Timber production
	Quality of Life
☒	Increase and/or maintain aesthetics of the property
	Forest Health
☒	Wildfire protection and fuel load reduction/promote fire resilient forest
☒	Prevent and/or control insects and/or disease (list)
☒	Reduce erosion of streambanks and gullies
☒	Maintain or enhance oak woodland, native grassland, or other plant communities

The landowners purchased the property for the privacy and beauty that a forested parcel provides. They are interested in managing the forest to create healthy and resilient stands of trees that are capable of withstanding drought, insect attack, and fire. The landowners have noticed a decline in the Douglas-fir trees on their property in recent years, likely due to drought stresses, and they are concerned with the fire hazard that the dead trees may present. The landowners are interested in maintaining or enhancing oak woodland on their property, and they generally prefer the mixed hardwood component in their forests which consists of multiple oak species, California bay laurel, madrone, and manzanita species. The landowners are interested in sustainable timber harvesting, mostly as a means to remove declining fir trees and release the surrounding suppressed trees, with the potential side benefit of generating a small income.

The landowner's short term goals are to create defensible space around their property and access routes, and to generally reduce the fuel loading on their property to create more favorable conditions in the event of a wildfire. After the immediate concern of defensible space is addressed, they would like to begin thinning the stand, potentially utilizing commercial harvest exemptions such as the oak woodland restoration exemption, forest fire prevention exemption, and dead & dying tree exemption. In the long term they would like to favor oak recruitment over Douglas-fir, and maintain this hardwood component in their forest.

California Cooperative Forest Management Plan



Management plan objectives - Mountain Meadows Bible Camp, Shingletown

Silvics (growing and tending of forests)

- **a.** Develop and maintain a properly stocked mixed conifer forest stand that is healthy, productive, aesthetically pleasing, and fire safe.
- **b.** Any harvesting done will be uneven-age management to improve the stand health, growth, and fire resistance.

Pest/Fire

- **a.** Reduce stocking level of the timber stand to an average of 100 square feet per acre basal area to provide for a healthy, attractive, growing forest.
- **b.** Do pre-commercial thinning and pruning to reduce the fuel ladder and to protect the crop trees from insect and fire damage.
- **c.** Treat any slash developed from the thinning or harvesting by chipping or burning the slash within six months of the project completion.
- **d.** Salvage harvest annually any insect infested trees, hazard trees, or dead and dying trees on the property to reduce fire hazard and provide for safety.

Management plan objectives

- **e.** Treat any new occurrence of invasive plant species that is identified on the property annually before it is established.
- **f.** Construct a 150 foot wide shaded fuel break along the east property boundary adjacent to Sierra Pacific Industries property. This fuel break will require vegetative maintenance every 3 to 4 years to maintain the effective value of the fuel break to control fire spread.

Wildlife

- **a.** Provide and protect natural habitat for native wildlife species present.
- **b.** Protect native hardwood tree species for wildlife benefits including oaks, aspen, willow, cottonwood, and Pacific Dogwood.
- **c.** Protect Bailey Creek watercourse, ponds, and adjacent wetland and riparian vegetation for wildlife habitat.

Addtl' objectives

- **Additional Objectives For:**
- **a.** Mountain Meadows Bible Camp has several ecosystems within the property boundary. These include a riverine, lacustrine, montane, riparian, wet meadows, aspen, and mixed conifer. It is the objective of Mountain Meadows to retain these ecosystems in a healthy and thrifty condition while at the same time protecting them from catastrophic wildfire.
- **b.** Maintain the property improvements and forest to be fire safe by reducing forest fuel ladder, and constructing the required 100 foot fuels modification zones around all buildings.
- **c.** Provide education to all user groups about fire prevention, ecology, wildlife, and forest management.
- **d.** Maintain an aesthetically pleasing camp area and natural habitat for the enjoyment of the user groups. Keep buildings and improvements rustic and in harmony with there natural habitat. It is the objective that facilities and buildings shall be "rustically comfortable" while blending in with the natural setting in terms of form, line, color, shade, and texture.
- **e.** Treat the developed camp area where slopes are over 10% and surface erosion is occurring by applying wood chips, grass seed, straw, and hand placed water breaks each fall before winter rain can cause surface erosion.
- **f.** Install rolling dips, on the road up the hill to the water tanks to divert water off of the road and reduce erosion.
- **g.** Outdoor recreation, education, and wildlife habitat are the primary objectives of the camp operations and management.

Potential management objectives:

- Address forest health: create resilient forest systems capable of enduring stresses such as drought, fire, insects and pathogens, and provide growing space for trees of all sizes and ages.
- Increase access to the property
- Create defensible space around property and access routes
- Manage for increased carbon storage or standing volume in living trees per acre
- Increase forest habitat for specific wildlife, or for wildlife in general
- Road improvements for access/water quality, reduce erosion
- Increase quality of in-stream aquatic habitat
- Increase recreational potential: trail building, mushroom hunting, etc.
- Increase non-potable water storage
- Reduce/manage invasive weeds
- Reforestation or afforestation
- Maintain or enhance oak woodland, native grassland, or other plant communities
- Favor certain tree species over others (i.e. increase oak recruitment versus Douglas-fir)
- Increase tree species diversity, manage for aesthetics
- Generate income through sustainable timber harvest, or livestock management
- Increase wood quality for future timber harvest
- Fuels reduction/ management of dead wood

Question

A 60 acre landowner in a mixed hardwood-conifer woodland has owned their property for 40 years, and have always let nature take its course. They've noticed many of the meadows on their property have significantly shrunk in size and are now occupied by 40-50 foot tall Douglas-fir that average 16 inches in diameter.

The landowner highly values wildlife on the property, especially the acorn woodpeckers. They love their oak trees, and want to make sure they are healthy. They are also interested in sequestering as much carbon as possible on the property. The property currently shows a mosaic of forest types, ranging from conifer dominant, mixed hardwood-conifer, and oak woodland-savannah. How can the landowner best meet their wildlife and forest health objectives while maximizing carbon sequestration?

Property Ownership/Management Plan History-Page 5

Landowner Information:

- Landowner(s), Mailing, Phone, E-Mail:
- Landowner's Representative (if applicable): RPF# (if applicable): Mailing Address: Phone: E-Mail:

Management Plan History

- Does a Management Plan exist for this property?: Yes No
- If Yes: Type of Plan: (CFIP, EQIP, NTMP, FSP, CAP, Other): Date of Original Plan Completion: Revision Dates:

Property Facts

Legal Property Description:

- Nearest city or Town, County, Assessor's Parcel Number: GPS Coordinates:
- Total ownership acreage: Total forested acreage:
- Does Landowner reside on the property?: Yes No
- Describe the overall topography including slope, aspect and elevation:
- Estimate percent of total acreage that is:
- Simple topography (few ravines and changes of aspect) %
- Percent of Land: Flat (<5% grade) Gentle (< 20% grade) Steep (> 35% grade)
- Transportation System: Vehicle Access (check): Excellent (80% accessible) Good (at least 50%) Fair (at least 25%) Poor (<10%)
- Estimated improved road length (rock surface):
- Estimated unimproved road length:
- Watershed Information: CALWATER 2.2 planning watershed: Acres within watershed:
- Is there a 303d listing on watershed?: what are the factors?:

Property History

- This section is based on personal knowledge from landowner, neighbors and others, property records, and local information sources as well as evidence seen on the ground; stumps, skid trails, etc.
- Discuss past management history including past timber harvests (include THP # after 1970s), conservation practices (include those completed under public incentive agreements) and catastrophic events.

Current Property Conditions Page 8

- **Property Infrastructure**: Discuss existing improvements (including dwellings, roads and access, outbuildings, fencing, water improvements, tanks including stock ponds, wells, power lines, etc).
- ***Forest Infrastructure****: Discuss overall forest structure, percent of productive forest soils, regeneration levels and current silvicultural practices. Note current conservation practices for forest lands, including insect or disease problems*.
- **Roads**: Describe road system including major trails (see Road System in Map Section. Discuss stream crossings and drainage improvements. Are culverts and other crossings are adequately sized for 100 year storm events? Describe current road maintenance for erosion reduction, road surface condition, weed control, and time-of-year (seasonal) use.
- **Access and Security** : Are property boundaries identified including fences, gates, and boundary or corner markers?
- **Discuss trespass problems**: Review how current property management interacts with neighboring properties.
- **Recreation**: Describe current recreational opportunities including supporting resources.
- **Invasive Species**: Discuss invasive species found and current eradication measures.

Current Property Conditions Page 8

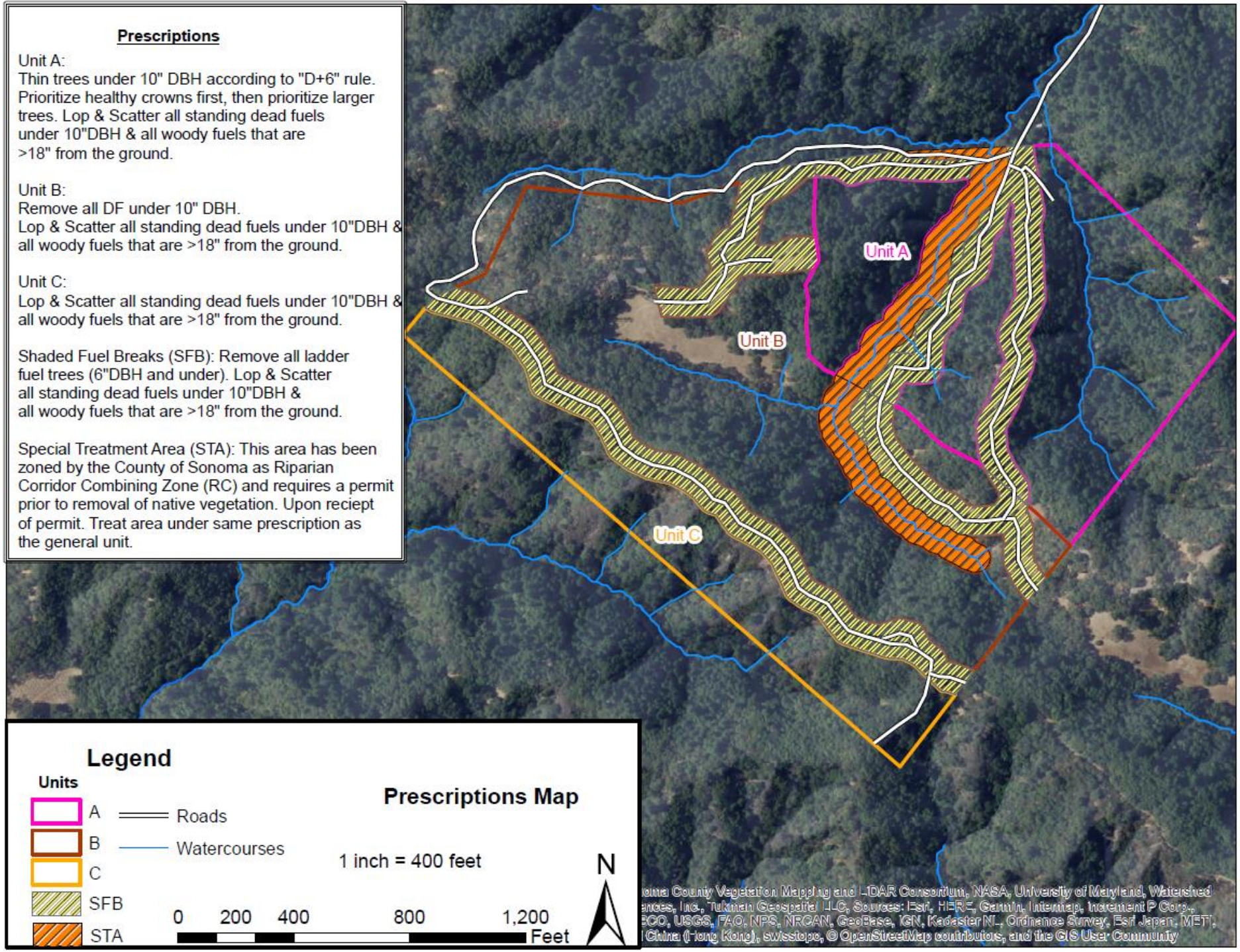
- **Soils**: Describe and map (in map section) soil types, site class, estimated growth/acre/year, erosion hazard ratings, equipment limitations, known geological hazards and landslides. Place supporting soil data and any other available ecological site descriptions (ESDs) in Appendix 4.
- **Streams, Wetlands, and Ponds**: Describe water resources present including streams, wetlands and ponds. Show State and Federal classifications.
- **Air Resources**: Discuss how unwanted vegetation is currently treated or removed from property.
- **Fish & Aquatic Species**: Identify fish streams and note streams with anadromous fish or listed fish species as well as other significant aquatic species using the water resources and riparian area(s), Describe general condition of the fish habitat including large wood, pools, riparian cover, migration barriers and current or desired buffer widths.
- **Upland Wildlife:** Identify bird and animal species observed or known to be present, Describe general condition of habitat and the habitat elements such as den sites, snag retention, downed wood, migration corridors and water sources.
- ***Threatened or Endangered Species - plants or animals:*** *In Appendix #5, discuss T&E species observed or known and provide the results of the California Department of Fish and Game NDDB and BIOS information sites for three miles of the property.*

Forest Management Unit Information pg 14

- For each management unit, write management objectives and a brief description of the management unit and its condition. Further detailed inventory/plot data can be included if desired. Forest modeling outputs may be included with each unit description if available.
- Name or Unit #: _____Acres: _____ Location (describe and map): _____
- Objectives: (Describe type of silvicultural treatment including pre/post harvest activities and slash management if pertinent).
- Forest Description:
  - Stand history, age and desired rotation cycle:
  - Tree species present, forest type and/or ecological site description (ESD):
  - Site index, soil type, elevation, slope:
  - DBH/size class, basal area, trees/acre, stocking, growth/yield potential:
  - Regeneration and stand improvement needs:
- Discussion of Other Resources:
  - Riparian, meadows, aquatic habitat, stream and other watercourses:
  - Understory, downed woody debris, snags, wildlife habitat:
- Unit Management Resource Concerns and Recommendations:
  - Erosion concerns:
  - Domestic uses:
  - Other conservation issues:

What is a management unit?

- A well defined area on your property where management actions will have similar goals and practices because the vegetation or other conditions are similar



MANAGEMENT ACTIVITY DECISIONS, SCHEDULE AND TRACKING

(Copy additional pages if needed)

Management Unit	Acres/ feet	NRCS Practice Code (optional)	Treatment Activity Short Description	Dates		Cost Share Used? Type?	Net Cash Flow	
				Planned	Completed		Cost	Income
3	5	383	Fuel Break	2012				
1	10	666B	thinning	2013				
2	18	666B	thinning	2014				
1 &2	11	660	pruning	2014				
1	10	384	slash disposal	2013				
2	18	384	slash disposal	2014				

Developing Unit Boundaries

- **Definitions**
  - **Unit**: A management block, or area which will receive similar management actions over time
  - **Stand**: A contiguous group of trees sufficiently uniform in species composition, arrangement of age classes, site quality, and condition to be a desirable unit
- **Unit Delineation (boundaries)**
  - Stands, road systems, physical features, parcels, etc.