United States
Department of Agriculture

MOving TOwards Resiliency
Within the Mokelumne River to Kings River Landscape
(MOTOR M2K)

Stanislaus National Forest – Sierra National Forest

May 2019

Forest
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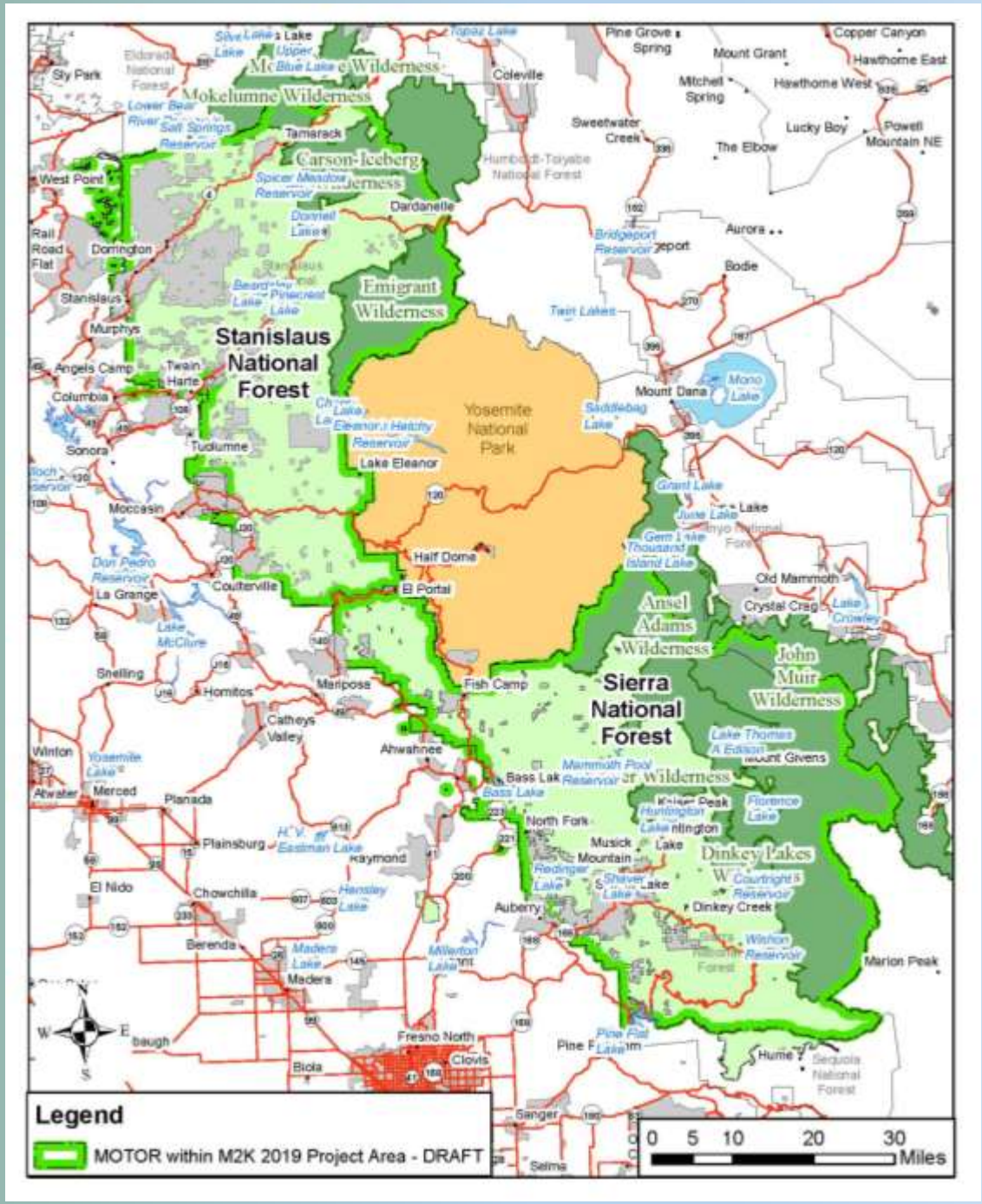
MOTOR within M2K Project Area

- Stanislaus and Sierra National Forests
- Stretches from the Mokelumne River to the Kings River
- Planning area encompasses over 2 million acres



Where are we in the process?

- Identified planning area, interdisciplinary team members and preliminary need for action and purpose of the project
- Compiling key relevant literature driving project development (Best Available Science)
- Developing specific desired conditions
- Working on identifying existing condition and opportunities for treatment
- Introducing potential collaborators to the project
- Working to set up Collaborative Public Engagement Sessions to inform our proposed action

Need For Action

- Increasing trend of large, high severity catastrophic fires.
- Millions of dead trees throughout the Sierra Nevada, with the Sequoia, Sierra and Stanislaus NFs hit especially hard.
- Projected increases in temperature and decreases in snowpack likely to continue trends

Preliminary Purpose (subject to evolution)

- Protect lives and property from the effects of wildfire and insect, disease and drought related mortality.
- Modify conditions across the landscape to increase resiliency to wildfire and insect and disease outbreaks, ensuring that present and future generations still have a forest that can meet their needs.
- Reintroduce fire into these fire adapted ecosystems to work toward restoring ecosystem structure and function.

Preliminary Scope

- Vegetation management strategy to be implemented over the next 10-15 years
- Focus on fuel reduction and density reduction treatments
- Adaptable to account for changing conditions
- Considering all tools at this stage including mechanical, and hand thinning, prescribed burning, herbicides, etc.
- Open to considering any means necessary, including Forest Plan amendments

Best Available Science

Key pieces of literature informing project development and analysis:

- Long, Jonathan W.; Quinn-Davidson, Lenya; Skinner, Carl N., eds. 2014. ***Science synthesis to support socioecological resilience in the Sierra Nevada and southern Cascade Range***. Gen. Tech. Rep. PSW-GTR-247. Albany, CA: U.S. Department of Agriculture, Forest Service, Pacific Southwest Research Station. 723 p.
- North, M.; Stine, P.; O'Hara, K.; Zielinski, W.; Stephens, S. 2009a. ***An ecosystem management strategy for Sierran mixed-conifer forests.*** 2nd printing, with addendum. Gen. Tech. Rep. PSW-GTR-220. Albany, CA: U.S. Department of Agriculture, Forest Service, Pacific Southwest Research Station. 49 p.
- North, Malcolm, ed. 2012. ***Managing Sierra Nevada forests*****.** Gen. Tech. Rep. PSW-GTR-237. Albany, CA: U.S. Department of Agriculture, Forest Service, Pacific Southwest Research Station. 184 p.
- Safford HD, Stevens JT. 2017. ***Natural range of variation (NRV) for yellow pine and mixed conifer forests in the Sierra Nevada, southern Cascades, and Modoc and Inyo National Forests, California, USA.*** US Department of Agriculture, Forest Service, Pacific Southwest Research Station. General Technical Report no. PSW-GTR-256.
- USDA Forest Service. 2019. ***Conservation Strategy for the California spotted owl (Strix occidentalis occidentalis) in the Sierra Nevada.*** Publication R5-TP-043.

How will MOTOR within M2K work?

- Upfront Collaboration
- Utilize Condition based NEPA
  - If you have this condition, then you apply that treatment.
  - Provides flexibility to respond to rapidly changing conditions.
  - Specific enough to satisfy NEPA requirements – no additional NEPA
- Specify Management Requirements/Design Features.
- Implementation Guide
- Monitoring and Adaptive Management will be key

Preliminary Project Timeline

Dates/Timeframe	Key Stage
March 25, 2019	First Interdisciplinary Team Meeting
May - August 2019	Collaborators/ Public Engagement meetings and workshops
August 2019	Finalize Proposed Action and initiate Scoping
October 2019	Finalize Alternatives and Management Requirements
April 2020	EA or Draft EIS for public review (Comment Period)
April/May 2020	Public Meetings for EA or DEIS
July 2020	Initiate Objection Period on Draft Decision
November 2020	Issue Final Decision and Project Implementation

Other Examples…

Medicine Bow Landscape Vegetation Analysis (LaVA) Project (R4)

https://www.fs.usda.gov/project/?project=51255

Prince of Whales Landscape Level Analysis project (Tongass NF, R10)

https://www.fs.usda.gov/project/?project=50337

Blue Mountain Forest Resiliency project (Ochoco, Umatilla, and Wallowa-Whitman NFs, R6)

https://www.fs.usda.gov/detail/r6/landmanagement/resourcemanagement/?cid=stelprd3852678

Four Forest Restoration Initiative (Kaibab, Coconino, Apache-Sitgreaves & Tonto NF, R3)

https://www.fs.usda.gov/4fri

Black Hills Resilient Landscapes Project (Black Hills NF, R2)

https://www.fs.usda.gov/project/?project=49052

Spruce Beetle Epidemic and Aspen Decline Management Response (Grand Mesa, Uncompahgre and Gunnison National Forests or GMUG NFs, R2)

https://www.fs.usda.gov/project/?project=42387

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Stanislaus and Sierra National Forests

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Threats (From the *Conservation Strategy for the California Spotted Owl in the Sierra Nevada* [2019])

- **Large, High-Severity Wildfire**
  - Today's disrupted fire regimes in the Sierra Nevada include lower amounts of low- and moderate-severity fire and more large, high-severity, stand-replacing fires that destroy large blocks forest. The current average fire size (excluding those immediately put out) is 5 times greater, and high-severity fire is burning 5 to 7 times more area than historically (Safford and Stevens 2017, page 180).
  - Trends in high-severity fire proportion and patch size are likely to continue to increase in the absence of active forest restoration (Stephens et al. 2016a).
- **Tree Mortality (related to drought and insects)**
  - Warming temperatures have triggered population increases in many insect species, which have resulted in widespread outbreaks (Millar and Stephenson 2015).
  - Bark beetle infestations are influenced by factors such as overall stand density, tree diameter, tree vigor, fire exclusion, and host species density…Various measures of stand density, including stand density index or basal area, are positively correlated with levels of tree mortality from bark beetles (Fettig et al. 2012, Hayes et al. 2009).
  - Since 2012, there has been a dramatic increase in loss of large trees due to bark beetles in low- to mid-elevation coniferous forests of the southern Sierra Nevada. The synergistic effect of high tree densities, coupled with drought, insects, pathogens, and air pollution, is increasing tree mortality at landscape levels. Between 2014 and 2017, tree mortality levels increased more than 100 fold in many areas of the southern Sierra (USDA Forest Service 2017a). Prevention strategies for minimizing further tree mortality by reducing water stress and competition will be critical.
- **Climate Change**
  - Modeled estimates for the Sierra Nevada indicate temperatures will increase by 5.4 to 10.8 degrees Fahrenheit (3 to 6 degrees Celsius) during the twenty-first century.
  - Climate change projections indicate many of the low- and mid-elevation forests in the Sierra Nevada are vulnerable to conversion to woodlands, shrublands, and grasslands.
  - Projected increases in temperature and decreases in snowpack for the Sierra Nevada (Safford et al. 2012) are likely to continue the increasing trend in the size of stand-replacing fires and proportion of landscape impacted by high-severity fires (Stephens et al. 2013).

Key changes in fire-prone or dry mixed-conifer forests as compared to historic or NRV conditions

- From the *Conservation Strategy for the California Spotted Owl in the Sierra Nevada* (2019)

McKelvey and Johnston (1992)

(1) loss of old, large-diameter trees and associated large downed logs;

(2) shift in tree species composition towards shade-tolerant species;

(3) increase in fuel associated with mortality of smaller trees; and

(4) presence of ladder fuels that facilitate crown fire.

Franklin and Johnson (2012)

(1) fewer old trees of fire-resistant species,

(2) denser forests with multiple canopy layers,

(3) more densely forested landscapes with continuous high fuel levels, and

(4) more stands and landscapes highly susceptible to stand-replacement wildfire and insect epidemics.

Key drivers of these changes include historic logging and over a century of fire suppression, as well as climate change.

Summary of Probable Deviations

From PSW-GTR-256: NRV for Yellow Pine and Mixed-Conifer Forests in the Sierra Nevada[2017]

"For decades, the major ecological issue in the assessment area was thought to be the loss of dense-canopied, old-growth forest to logging, and threats to wildlife species that depend on such conditions (Duane 1999, Ruth 1996). **Today the major threat is clearly the loss of forest—old growth or not—to severe wildfire and insect and direct drought mortality** (Keeley and Safford 2016, McKenzie et al. 2004). The irony is that a primary cause of this major threat is the historical widespread focus on fire suppression, which was viewed as a necessary means to prevent forest loss. In light of new scientific information, such as the information presented in this report, these management views have been changing, and **we are at a pivotal point in resource management in the assessment area**. Current trends in climate, fire, human land use, economics, and federal budgets are not auspicious, but recent collaborative management efforts at large landscape scales, political developments in California, and more progressive national forest planning suggest that there is a broadening understanding of the necessary ecological role of fire in the Sierra Nevada bioregion. We hope that this assessment of past and current conditions in the broader Sierra Nevada bioregion will add to this growing understanding and support effective management that can conserve California's "Range of Light.""

Summary of Probable Deviations

From PSW-GTR-256: NRV for Yellow Pine and Mixed-Conifer Forests in the Sierra Nevada[2017]

General conclusions:

1. With regard to ecosystem composition of assessment-area YPMC forests, although overall plant species diversity across the assessment area has probably not changed much (except for the addition of nonnative species), **there has been a major shift over the past century from dominance by shade-intolerant/fire-tolerant species to dominance by shade-tolerant/fire-intolerant species**. This has happened in both the forest overstory and understory.

Summary of Probable Deviations

From PSW-GTR-256: NRV for Yellow Pine and Mixed-Conifer Forests in the Sierra Nevada[2017]

2. With regard to ecosystem structure, assessment-area YPMC forests are greatly changed from the presettlement period, so much so that people from the 18th or 19th centuries would probably not recognize the modern forest. For example:
   A. Mean adult tree densities are an average of two to four times higher today than during the presettlement period.
   B. Tree seedling densities are similarly much higher in the modern forest, and they are dominated by fire-intolerant/shade-tolerant species.
   C. The average tree in today's forest is 40 to 50 percent smaller (in d.b.h.) than in the presettlement forest.
   D. Even though there are fewer large trees in today's forest, the huge number of small trees has resulted in basal areas that are equal to or higher on average than in presettlement forests.
   E. Tree canopy cover averages about 33 percent more today than in the presettlement period.
   F. Forest structure has been greatly homogenized, with the size and number of forest gaps decreasing almost to zero in many modern forest stands. In presettlement forests, many areas supported more canopy gaps than canopy.
   G. Contrary to what many people think, an objective assessment of the evidence suggests that snag densities and coarse woody debris are not depleted in modern forests, and indeed most of the evidence suggests they are **more** abundant today than in the average presettlement forest stand.
   H. Coarse woody debris is also a component of forest fuels, and modern fuel loadings are much higher today than in the presettlement forest. Our estimate is that fuel loadings in assessment-area YPMC forests have risen by an average of 70 to 100 percent over the past century or so.
   I. Shrub cover in modern YPMC forests is probably not very different from presettlement conditions (maybe slightly lower today), but the distribution of shrub cover certainly is. Modern forests are more likely to support large areas of contiguous shrub fields but relatively low shrub cover within forest stands (owing to higher stand canopy cover today), whereas presettlement forests supported higher cover of shrubs within stands, as light incidence at the soil surface was much higher.

More trees, smaller trees, (fewer big trees), higher canopy cover, more homogenous structure (lack gaps), higher fuel loads

Summary of Probable Deviations

From PSW-GTR-256: NRV for Yellow Pine and Mixed-Conifer Forests in the Sierra Nevada[2017]

3. With regard to ecosystem function, the major change in YPMC forests has been in the role and behavior of fire. Specifically:
   A. Fires have gone from representing a frequently recurring disturbance on the landscape (5 to 10 events per century on average) to an extremely rare event (**75 percent of all YPMC forest has not seen a fire in the past 100+ years**).
   B. The average area of fire in the assessment area between 1984 and 2010 was only about 10 to 15 percent of the presettlement mean (±150,000 ha per year), but the past 6 years have seen much more area burn, with large areas experiencing nearly complete tree mortality.
   C. When fire occurs today, it behaves very differently on average than in the presettlement forest because of differences in forest structure and fuels, and as a result of changing climate. **The proportional area of fires burning at high severity today (severity is a measure of mortality caused by fire or biomass lost to fire) is 5 to 10 times greater than in the average presettlement period fire.**
4. As such, the role of fire has changed from one of forest maintenance (of relatively open-canopy, low-fuel-accumulation conditions with dominance primarily by fire-tolerant species) to one of forest transformation, where dense stands of fire-intolerant species and heavy fuel accumulations are more likely to burn at high severity, resulting in major ecosystem changes.