Chapter 11: Dinkey North and South Project

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Introduction

Summary of Findings

1. This project, the first to implement GTR 220 concepts, began with discussing and **agreeing upon a desired future condition for the project area**, which helped build consensus amongst diverse stakeholders.
2. At first, **prescription development and marking guidelines were difficult to write up, but became easier to communicate** after they were condensed into a series of decision steps.
3. **Field visits to test marks with the stakeholders allowed grounded discussion** of how GTR 220 concepts were being translated into practice and how and why marking decisions were made.

Designing and implementing vegetation treatments that can move a forest landscape toward a desired future condition is often challenging. Faced with diverse stakeholder interests and the unknown effects of changing climate conditions, managers need to engage and build collaborative projects. One such effort is the Dinkey project designed to help restore a healthy, diverse, fire-resilient forest structure while maintaining and enhancing habitat for fisher (*Martes pennanti*) and California spotted owls (*Strix occidentalis occidentalis*). The project retained tree species and size classes that are the most drought tolerant; more resistant to insects, diseases, and air pollution; and have higher rates of postwildfire survival. Surface and ladder fuels were decreased to reduce the probabilities of crown fire ignition and fire severity. Large woody debris and higher canopy closure were retained in some areas that may provide suitable habitat for sensitive species. Some torching and tree mortality were considered acceptable to support cavity nesting and denning structures, and a range of ecosystem functions over time. In areas where a reduction in potential fire intensity was essential, treatment included separating tree crowns to reduce the potential for crown-fire spread. Forest health and resilience were promoted by increasing the forest's capacity to withstand short-term impacts (e.g., drought) without causing long-term changes in the system's overall function. Mechanical, hand, and prescribed fire tools were used to meet these goals. The project was also designed to be conducted in an economically efficient manner with minimal outside funding.

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Context

The Dinkey North and South project (hereafter the Dinkey project) occurred on 3,000 ac (1214 ha) of Forest Service land ranging from 5,400 to 6,800 ft (1646 to 2073 m) in elevation about 30 mi (48 km) northeast of Fresno. Mixed-conifer constitutes most of the forest type (90 percent) with the remainder in ponderosa pine.

The project area supports known populations of fisher and California spotted owls. Monitoring and demographic studies have identified fisher rest sites and California spotted owls foraging areas within the project area (North et al. 2000, Purcell et al. 2009). Studies in the project area (Spencer et al. 2008) indicated that fisher habitat and populations are particularly vulnerable to severe fire. Habitat emphasis treatments recognize the importance of late-seral forest structures, home range conditions, large trees, and forest heterogeneity.

The project area has a history of fire exclusion that has led to a homogeneous landscape of dense conifer forest stands, with prolific establishment of 25- to 100-year-old, shade-tolerant white fir (*Abies concolor* (Gordon & Glend.) Lindley) and incense cedar (*Calocedrus decurrens* (Torrey) Florin). Ponderosa (*Pinus ponderosa* Laws.) and sugar (*Pinus lambertiana* Douglas) pine, and black oak (*Quercus kelloggii* Newberry) were notably underrepresented in the forest's current species composition. A fire history completed in the adjacent Teakettle Experimental Forest found an average fire-return interval of 12 to 17 years for 1700 to 1865, after which all fires stopped (North et al. 2005). In addition to fire suppression, past fires and mechanical harvest have created large areas dominated by shrubs and dense pockets of white fir and incense cedar. High tree density/biomass creates conditions that predispose about 50 percent of the landscape to high-severity fire, insect attack, and drought-induced mortality.

Information Used

Studies that had reconstructed forest conditions under an active fire regime were used to inform general objectives for posttreatment desired conditions. The area has lower annual precipitation (about 45 in/yr) (114 cm/yr) than more mesic west-side forests, so particular emphasis was given to studies that had been conducted in drier mixed-conifer areas such as the eastern side of the Lake Tahoe Basin (Taylor 2004) and the nearby Teakettle Experimental Forest (North et al. 2007). The stand density, basal area, and species compositions in these studies was used to set lower limits, which posttreatment conditions should not fall below. Upper bounds for posttreatment stand conditions were inferred from site capability, landscape zone, and stand density index values at which bark beetle mortality may increase (Oliver 1995).

The Dinkey project focused on implementing concepts found in U.S. Forest Service General Technical Report PSW-GTR-220, "An Ecosystem Management Strategy for Sierran Mixed-Conifer Forests" (hereafter GTR 220) (North et al. 2009). The project's collaborative group (see chapter 7) developed different prescriptions based on topographic design criteria including a slope position matrix (similar to table 10-1). In general, prescriptions were designed to promote heterogeneity by avoiding even spacing of residual trees (fig. 11-1) and protecting unique structures including wildlife trees, snags, large logs, clumps of large trees, understory vegetation (including shrubs), and hardwoods (especially black oaks).

A goal of the decision priorities (described below) was to balance the desire for a fire resilient, healthy forest with the fisher's association with areas of "maximum biomass" based upon habitat modeling work of the Conservation Biology Institute (Spencer et al. 2008). A priority was placed on retaining and promoting areas of large-tree-dominated forest sites with high canopy cover to benefit the fisher (i.e., 63 percent of its home range had > 60 percent canopy cover [Zielinski et al. 2004]) and other rare, old-forest associated species. These individual objectives were intended to provide ecological balance to marking crews as they implemented prescriptions while working within the overarching desire for a healthy, fire-resilient forest.

Figure 11-1—Variable density left in a white-fir-dominated stand after treatment in the Dinkey project.

Implementation

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The mark was difficult to describe with a simplified written prescription; therefore, a series of sequential steps were followed. The first step was to consider the overarching intent of GTR 220 before getting mired in prescription details and marking guidelines. A key aspect of GTR 220 is recognizing forest structure at a fine scale such as groups of trees and favorable regeneration microsites. While field crews have often been trained to recognize individual tree characteristics, they now needed to recognize characteristics of several trees in a group including fisher rest sites; groups of pine regeneration or potential sites for ponderosa pine regeneration; groups of older ponderosa pine; low-quality, even-aged groups of fir; oaks; and groups of younger pine. Markers were trained to recognize each microsite or group prior to implementing the mark.

In the second step, markers first focused on groups with high potential for being used as fisher rest sites. Visits to known fisher sites and conversations with researchers created an emphasis on looking for a particular group structure and not just a canopy cover goal. A dense group of trees did not necessarily mean it was good fisher habitat. The group also needed to have either large structures (live tree, snag, or log) or some “defect” condition. At high-quality fisher rest sites, the prescription was to have little, if any, manipulation. These sites were only about 3 percent of the total area, and therefore did not substantially compromise fuels reduction objectives. In moderate-quality fisher rest sites, ladder fuels were targeted for reduction but were not completely eliminated in the interest of maintaining some understory cover. The lowest quality fisher sites were selected for thinning to increase leave-tree size, so as to create better quality fisher habitat in the future.

Next, markers focused on areas of pine regeneration to obtain a working knowledge of local soil characteristics amenable to regeneration and the appropriate aspect and orientation of openings. The markers were shown examples of successful and unsuccessful shade-intolerant regeneration in small openings. Some collaborative partners were initially uncomfortable with creating holes in the canopy. Therefore the first places identified for regeneration were areas where openings could be expanded rather than created. Attention was paid to “feathering” the gap edge (i.e., reducing foliage density through thinning) and orienting the gap to maximize direct sunlight. It took some time to get markers to recognize what is an appropriate opening rather than just going to rocky or shallow soil locations.

In retrospect, it proved more efficient to identify potential regeneration areas prior to marking trees. This allowed markers to focus on a single task with unique criteria and skills. Depending on forest conditions and the tree markers’ skills, other projects may find it easier to identify tree clumps prior to gaps.

To help markers recognize when to change their mark depending on forest conditions and stand location, they were trained to use a stepwise decision tree:

1. What is the emphasis: habitat/restoration or public safety?
2. What type of microsite or group are you in?
    a. Is it a high- or moderate-quality potential fisher rest site?
    b. If not, does the area provide an opportunity for a regeneration opening?
    c. Is tree structure grouped or better for the matrix of low-density large pine trees?
3. What landscape zone are you in?
4. What is the basal area retention in this microsite and landscape zone?

In step 1, the marker decided whether to emphasize ladder fuel reduction or canopy cover retention. Step 2 proved to be the most important step because the marker needed to identify whether to leave a tree group, create or expand a gap, or create more low-density pine-dominated matrix. Steps 3 and 4 required an awareness of aspect and slope position, and the overall basal area target, respectively.

Marking guidelines identified the choices relative to microsites and landscape zone in any particular stand. For example, there might be two landscape zones and four microsites (priorities) in a stand. Typically a marker would be given a residual basal area for pine groups, individual scattered pine, and fir groups. They were also told the likeliest location of high-quality fisher rest sites. Pine and fir group residual basal area would differ between landscape zones. Residual basal area would remain the same for the fisher rest site and lowered for scattered pines. Thus markers would use the five-step process in any stand to identify the appropriate residual basal area and tree characteristics for retention or removal. Marking guidelines were rarely more complex than this example.

Lessons Learned

Three main lessons were learned from the Dinkey project:

1. Move in a stepwise fashion to develop consensus on restoration treatments. The Dinkey project focused on a planning process that included the following steps:
    a. Clarify the overall strategy contained in GTR 220. Forum members needed to agree upon GTR 220 principles of restoration.
    b. Develop desired conditions consistent with GTR 220 and local forest processes. The Dinkey collaborative group sought to develop desired conditions consistent with the role of frequent fire. These desired conditions allowed collaborative members to identify forest structural components for retention or removal.

c. Conduct field visits to identify key microsites and groups. Field visits with collaborative group members allowed retention priorities to be based upon observed rather than assumed stand conditions.

d. Develop vegetation maps that capture within-stand heterogeneity. High-resolution mapping and subsequent modeling provided a context for decisions and end results.

e. Develop decision priorities that are consistent with retaining key structures. Marking guidelines came only after looking at stand structures and discussing small-scale forest heterogeneity.

f. Contract development that carries forward the previous steps. To that end, a stewardship contract was developed to implement the removal of commercial size trees, and precommercial size material as biomass, and treatment of existing and activity-created slash. The contract had to be modified to allow for the protection and identification of fisher rest sites and the small trees contained within them. The Dinkey project used flagging and a map of rest site locations to identify fisher rest sites. This proved tedious, underscoring the need for more efficient methods to differentiate high-quality fisher rest sites from the surrounding forest matrix. More work with contractors needs to be done to use global positioning system or less labor-intensive means of identifying contractually important field areas.

g. Ongoing collaborative monitoring of the implementation and effectiveness of forest restoration treatments provided the opportunity for group learning, trust building, and adaptive management.

2. Use language and treatment descriptions consistent with the restoration objectives.

   a. The scale of restoration treatments required a set of terminology that described forest structural components consistently between forum members and marking crews. Clumps, groups, openings, gaps, aspect zones, rest sites, and microsites were terms used to convey the desired conditions both within stands and across the forest landscape.

   b. Retention of vertical within-stand heterogeneity within the context of tree density management is difficult to convey on paper. Field visits to sample marked areas or key structures proved most helpful. Photos or images of these same structures would be helpful in the future.

c. Focus restoration priorities on retaining forest structures not on eliminating structures. Language in marking guidelines and priorities that focused on tree retention proved most helpful in allowing markers and collaborative members to visualize end results. Leave tree marking proved less practical owing to the great number of trees being retained across the project area. Far fewer trees needed to be marked for removal than for retention. However, leave tree marking was conducted in sample marking areas to aid visualization.

d. Articulate how the removal or retention of any tree or group moves you closer to restoration goals. Collaborative group members were comfortable when removal of intermediate-size trees (20- to 30-in [51 to 76 cm] diameter at breast height) was based on meeting the desired conditions and ecological restoration objectives.

3. Train crews and keep them for more than one or two seasons. An investment in crew training and the ability of crews to apply marking guidelines at a group or gap scale proved essential in applying restoration treatments. The application of the restoration guidelines in the Dinkey area was possible because of the experience level and dedication of the marking crew.

What set the stage in the Dinkey project for building collaboration was first getting agreement on the desired future conditions. While the project began with a focus on fuels reduction, it transitioned to forest restoration, provision of wildlife habitat, and reducing potential wildfire severity. All participants immediately agreed that zones adjacent to homes should be prioritized for fuels reduction. Outside of those areas, however, the effort was to balance all three objectives by increasing forest heterogeneity. Any discussion that started to jump to specific locations in the forest or controversial issues (i.e., if, where, and when a larger tree might be thinned) was reined back until the collaborative group reached agreement on a desired future condition. Sometimes this was difficult, because participants were visualizing particular locations or wanted to discuss economic or revenue-related concerns.

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The project design was based on the classification of topographic categories and establishment of treatment criteria in each category. This often started with suggesting initial prescriptions and working through the details with the collaborative group. After silvicultural and fuels management review, if the treatment did not appear to achieve the desired objective, the collaborative group was asked for further input. Although the forest staff might have ideas about the next logical step, giving the group room to see limitations and propose alternatives allowed for more discovery, creativity, and consensus. For practical purposes, the silviculturist insisted that whatever treatment was decided upon, the group had to identify what target condition and retained basal area was desired.

At this point, there was enough consensus in the group to start working on specifics. We discussed where and when larger trees might be thinned and agreed that increasing structural heterogeneity, improving wildlife habitat or ecosystem restoration were reasonable criteria for selecting larger trees, rather than focusing on project economics. When the group visited stands where some larger trees were preliminarily marked for removal, the group often agreed with the mark. In places where there was disagreement, the silviculturist and marking crew explained the reasoning behind the mark and let the group discuss and revise the mark if desired. At this point, the collaborative group was matching the mark to the collective vision of the forest's desired future condition—a more diverse landscape that maintained or enhanced wildlife habitat, improved fire resiliency, and shifted structure and composition toward a pine-dominated, large-tree condition.

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