Plumas/Lassen Administrative Study
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Introduction

The Pacific Southwest Region and the Pacific Southwest Research Station have agreed to jointly develop and fund an administrative study to fill management information needs concerning the relationship between management-caused changes in vegetation and their effects on spotted owl habitat and population dynamics. The original impetus for this study is in the Record of Decision (ROD), dated January 12, 2001, for the Sierra Nevada Forest Plan Amendment (SNFPA), Final Environmental Impact Statement (FEIS). In this document the Regional Forester presented his decision to amend the Pacific Southwest Regional Guide, the Intermountain Regional Guide and land and resource management plans (LRMPs) for national forests in the Sierra Nevada and Modoc Plateau. Among the elements of this decision was a commitment to develop in collaboration with PSW, a Study that would examine the relationship between management-caused changes in vegetation and their effects on spotted owl habitat and population dynamics. The Regional Forester specifically stated in the ROD:

> "Under the procedures of the adaptive management strategy in this decision, the Forest Service will cooperate with the Pacific Southwest Research Station to design and implement an administrative study to examine the relationship between management-caused changes in vegetation and their effects on spotted owl habitat and population dynamics. I would expect group selection provisions of the HFQLG pilot project as well as other treatments to be used in carrying out this study. The administrative study is intended to investigate the response of the California spotted owl and its habitat, particularly populations of prey species features of their habitats, to various silvicultural treatments."

Purpose of the Study

The fundamental intent of this study is to examine responses of key forest elements to several approaches to fuels management and sustainable silviculture in the Sierra Nevada. The study attempts to investigate these relationships at the landscape scale, over significantly larger spatial scales (aggregations of watersheds averaging about 50,000 acres) and longer time scales (20 + years) than has been done before. It would assess forest responses to the combined effects of both management treatments and natural forest processes. A landscape-scale design provides a comprehensive view of how forest elements, including rare species, cope with a constantly changing environment.

This study is interdisciplinary, examining at least five groups of response variables (spotted owls, small mammals, terrestrial birds, vegetation, and fuels conditions) through collaboration between researchers of the USDA Forest Service Pacific Southwest Research Station (PSW) and cooperators from the University of California, Berkeley and Davis, and the Point Reyes Bird Observatory. The study addresses the most significant uncertainties that confound management decisions in the Sierra Nevada today. How do old-forest-dependent species respond to vegetation management over space and time? Do fuels management approaches effectively address fuels loadings without negatively affecting species viability? These issues are at the heart of the controversy over the Sierra

Nevada Forest Plan Amendment (SNFPA) and are highlighted in the Adaptive Management Strategy that is part of SNFPA.

Objectives of Study

The need for the proposed research project is to resolve persistent questions about the effects of vegetation-management actions upon wildland fire behavior, silvicultural goals, landscape dynamics, and old-forest-dependent species viability. The objectives of the proposed research project is to gather needed scientific data to resolve these key ecological and forest-management questions so as to inform future management decisions.

Accordingly, the proposed research program is designed to address four principal issues:

•***Wildland Fire Behavior and Protection.*** Are specific combinations of defensible fuel profile zones (DFPZs) and subsequent area fuel treatments effective in reducing the extent and severity of wildland fires? (These two types of actions are defined in the subsequent Proposed Action section.) What are practical considerations and costs of constructing, maintaining, and using alternative combinations of fuel treatments? Are hypothesized fire-management gains from these fuel-treatment combinations (in the form of reduced property and resource losses, increased resource benefits from wildland fires, and increased suppression efficiencies) commensurate with the costs and potential adverse ecological impacts of the treatments? Are realized fire management benefits consistent with hypothesized results in reducing fire risk and altering fire behavior?

•***Silvicultural Goals.*** Is small group-selection silviculture effective in promoting regeneration of shade-intolerant tree species; establishing desirable forest age, species, and size distributions at landscape scales; and providing sustainable levels of timber harvest? What are the practical considerations, limitations, and costs of implementing a group-selection silvicultural system over short- and long-term time frames? ("Group selection", an uneven-aged silvicultural system, is described in detail in the Herger-Feinstein Quincy Library Group [HFQLG] Final Environmental Impact Statement [EIS].

•***Landscape Dynamics.*** How do combinations of DFPZs, area fuel treatments, group selection, riparian protection standards, and species-specific protection measures affect landscape dynamics such as forest structure, composition, and succession at multiple scales of space and time?

•***Species Viability.*** How will old-forest-dependent species, particularly the California spotted owl and its prey, respond to changes in vegetation composition, structure, and distribution induced by different forest management regimes? How is change manifested at the individual and population levels of biological organization?

We have developed individual research modules that address the major issues. Results to date are discussed in detail under Response Variable Modules below and the specific

study strategies are described in Appendices D, E, F, G, and H of the overall Study Strategy for this project. These five research modules include:

- Forest structure.
- Fuels, fire behavior, and fire effects.
- Spotted owl responses.
- Small mammal distribution, abundance, and habitat relationships.
- Landbird distribution, abundance, and habitat relationships.

Study Plan and Treatments

This study comprises is a significant component of the SNFPA Adaptive Management Strategy, and as such, it is intended to address key questions and uncertainties. Adaptive resource management is management by experiment. In this vein, we propose subjecting portions of the Sierra Nevada's westside coniferous forest ecosystem to several alternative management actions and test a set of predictive models that represent competing hypotheses about how the system will respond. This approach acknowledges that the relationship between the chosen management action and the mechanism that affects the system is far from precise. We know there will be sources of variation in the measured response variables that will be unexplained by the models. Nevertheless, we will learn about ecosystem functioning by monitoring responses within each treatment regime and evaluating alternative ecosystem models to determine which ones provide the best fit to the observed responses.

Experimental Design Issues

We believe it is important to establish a research framework that addresses forest management at the scale at which it is normally executed. Two crucial questions are addressed best at the landscape scale; owl population and fire behavior response. The natural landscape is a spatial-temporal mosaic of a variety of ecological characteristics, with each landscape element responding to different stressors over differing spatial and temporal scales. Experimental and analytical approaches at a landscape scale are complicated by the large land areas involved. Working with treatment units of large size (i.e. an average of 50,000 acres) creates difficulties in identifying spatial replicates and controlling potentially extraneous variables. Furthermore, it is difficult to identify homogenous landscape units at the outset of the experiment. Intrinsic landscape variability and land-use histories (over 100 years) confound the identification and delineation of suitable sampling units. Moreover, even in the absence of any treatment it is impossible that existing landscape characteristics would have identical trajectories throughout the duration of the research project.

While some response variables need to be studied at the landscape level, other response variables will need to be examined using smaller geographic domains, which will enable use of more standard experimental designs. The study is therefore designed using nested hierarchical spatial domains for the response variables, addressing different response

variables over the appropriate spatial domain suited to each variable. This will enable simultaneous investigations of a range of important response variables.

Watersheds, which serve as Forest Service management units, have been chosen as useful geographic units for study. Such topographic definition is relevant to daily, seasonal, and annual movements of animals. By identifying a group of adjoining watersheds, a landscape unit is defined that is relevant to larger scale ecosystem processes, including population processes of larger, wide-ranging animals, such as California spotted owls. The following criteria were used to identify logical watershed units within the study area in which various options for vegetation management could be applied. These are called treatment units.

- Each treatment unit includes a group of entire CalWater Planning Watersheds (i.e. watersheds are not split).
- Each treatment unit is large enough to contain 10-20 pairs of California spotted owls. This number is considered the minimum number necessary to assess effects of treatments at the population-treatment unit scale.
- Each treatment unit contains relatively high amounts of land available for forest management.

Based on application of these criteria, 11 treatment units were identified within the study area. These units range in size from 45,000 to 79,000 acres, averaging 55,700 acres. Two of the treatment units are located on the LNF, and 9 are located on the PNF. The total area in the treatment units is 613,000 acres, of which 493,000 (80%) are administered by the National Forests. The qualifying treatment area comprises 54% of the study area.

Three vegetation treatment regimes have been formulated for application to the treatment units. All regimes focus upon reducing wildland fire hazard, but each regime focuses upon different aspects of vegetation management. The regimes are intended to be distinctly different from each other such that monitoring and effects analysis is likely to address the four research questions posed above.

The overall study strategy is captured in a document that describes the overarching framework for the study as well as the objectives for the individual modules. This strategy was originally drafted in April of 2001. The first round of review was informal and led to a second draft in September of 2001 when a scientific peer review was conducted. Six scientists were asked to review the document and their comments were solicited. Simultaneously additional input was sought from interested parties. This led to a third draft in March of 2002 which incorporated comments received to date. With this third draft the Plumas and Lassen National Forest staffs began the development of a purpose and need statement and subsequently a Notice of Intent to pursue an EIS for the proposed treatments. The study strategy is now being revised for a fourth time to reflect the proposed action and additional comments and thoughts regarding the overall study design.

Treatment Definitions and Regimes

Each treatment regime involves 2 or 3 treatments types:

•***DFPZs***

•***Area fuel treatment***s

•***Group selection***

Three regimes, with at least 3 replications, are the most that will fit upon the available land base. The three selected treatment regimes, referred to as Treatment Regime A, B, and C in this document, are summarized in general terms in Table 1 and described in detail below. All treatment regimes would reduce wildland fire hazards. Treatment Regime A would result in the least amount of direct human-induced change and emulates, for the most part, the vegetation-management standards called for in the SNFPA. Treatment Regimes B and C would result in increasingly higher levels of human-induced change but would still allow for persistence of existing forest-stage development, create and maintain a sustainable small patch mosaic forest structure, and contribute forest products.