

Summary

The Supplemental Environmental Impact Statement (SEIS) for the Sierra Nevada Forest Plan Amendment (SNFPA) addresses three problem areas that were analyzed in the Final Environmental Impact Statement (FEIS) for the Sierra Nevada Forest Plan Amendment (January 2001). Specifically, the SEIS focuses on specific components of the following problem areas: (1) old forest ecosystems and associated species, (2) aquatic, riparian and meadow ecosystems and associated species, and (3) fire and fuels management.

The SEIS presents a range of alternatives for amending the land and resource management plans for the Modoc, Lassen, Plumas, Tahoe, Eldorado, Stanislaus, Sequoia, Sierra, Inyo, and Humboldt-Toiyabe National Forests and the Lake Tahoe Basin Management Unit. One of the alternatives considered in detail, S1, is the “no action” alternative, which would continue management direction in the January 2001 Record of Decision (ROD) for the Sierra Nevada Forest Plan Amendment. The SEIS includes a discussion of new understanding and new information that has become available since the SNFPA FEIS was completed. The projected environmental consequences of the alternatives are evaluated in detail.

Background

Completed in January 2001, the SNFPA FEIS and ROD was the product of more than 10 years of regional planning efforts for management of the species and ecosystems of the Sierra Nevada bioregion. The Forest Service received more than 200 appeals of this decision. The Chief of the Forest Service (Chief) affirmed the decision but directed the Regional Forester of the Pacific Southwest Region (Regional Forester) to review certain elements of the decision.

In December 2001, the Undersecretary of Agriculture for Natural Resources and Environment (Undersecretary) returned the SNFPA decision to the Forest Service, electing not to conduct a discretionary review. The Undersecretary expressed confidence that the Regional Forester would develop an aggressive plan to respond to the Chief’s appeal decision with an open, public review of SNFPA.

The Regional Forester chartered the SNFPA Review Team (Team) to evaluate the SNFPA ROD and recommend any needed changes in six specific areas. The Regional Forester directed the Team to use an open public process to identify opportunities to

- pursue more aggressive fuels treatments while still protecting old-forest conditions and species at risk,
- improve compatibility with the National Fire Plan to ensure that goals of community protection and forest health are accomplished,
- implement the Herger-Feinstein Quincy Library Group Pilot Project to the fullest extent possible,
- reduce unintended and adverse impacts on grazing permit holders,
- reduce unintended and adverse impacts on recreation users and permit holders, and
- reduce unintended and adverse impacts on local communities.

The Team reviewed the SNFPA ROD and FEIS and supporting documents and gathered information concerning each of the above areas. The Team gathered input from national forests currently implementing SNFPA and former members of the SNFPA interdisciplinary team, held meetings with interest groups, sponsored field trips, and reviewed work products generated by the Regional Office SNFPA Implementation Team. The Team also reviewed the appeals record and the Chief’s appeal decision.

The Team investigated a number of concerns related to the areas identified by the Chief and Regional Forester. During the review, new analytical techniques were developed to provide insight into how management direction was implemented on the ground. Some additional information was collected and compiled concerning species of concern from new research, conservation assessments, and field surveys. While the review was underway, the U.S. Fish and Wildlife Service (FWS) released listing decisions for the California spotted owl and Yosemite toad. The findings of the year-long review are acknowledged in this SEIS. The review is documented in Sierra Nevada Forest Plan Amendment, Management Review and Recommendations (USDA Forest Service Pacific Southwest Region 2003g), which is hereby incorporated by reference.

Purpose and Need for Action

The purpose of the proposed action is to adjust existing management direction to better achieve the goals of SNFPA. The SNFPA Review described above, as well as insight gained from almost three years of implementing SNFPA, highlighted the need for refinements of management direction in the following three broad problem areas originally identified in SNFPA: old forest ecosystems and associated species; aquatic, riparian, and meadow ecosystems; and fire and fuels. It also highlighted the need to refine management direction so as to implement the *Herger-Feinstein Quincy Library Group Forest Recovery Act* to the fullest extent that is compatible with other legal mandates.

Old Forest Ecosystems and Associated Species

The Sierra Nevada Ecosystem Project (SNEP) report (chartered by Congress and completed in 1996) found that old forest ecosystems were one of the most altered ecosystems in the Sierra Nevada Region and that the habitat and/or population of some animals associated with old forests was in decline. Accordingly, SNFPA was intended to provide regionally consistent direction for old forest conservation. Specific goals included in the FEIS (volume 1, chapter 1, pages 5-6) were to:

- protect, increase, and perpetuate desired conditions of old forest ecosystems, and conserve their associated species, while meeting people's needs for commodities and outdoor recreation;
- increase the density of large trees, increase structural diversity of vegetation, and improve the continuity and distribution of old forests across the landscape; and
- reverse declining trends in the abundance of old forest ecosystems and habitats for species that use old forests.

The above needs are still valid and must be addressed when making changes to existing management direction. However, the new information concerning species dependent on old forest ecosystems requires consideration. For example, recent analysis of California spotted owl populations in four study areas within the Sierra Nevada can better inform judgments about the current population status and risks of actions to reduce hazardous fuels. Owl reproductive data for the spring 2002 breeding period shows a pulse in reproduction that was not considered in the FEIS.

After reviewing the best available scientific and commercial information available, in February 2003 FWS announced that listing of the California spotted owl as an endangered species was not warranted. In that finding, the use and availability of owl habitat on private lands was documented (see chapter 3 for a summary of that info). The finding also assumed that management of the national forests in the Sierra Nevada was based on the SNFPA.

California continues to have significant problems with wildland fire and forest health. Decades of fire exclusion have produced overcrowded vegetation in many forests, which has weakened trees and made

them more fire prone and more susceptible to pests, diseases, and displacement by invasive species. The number and severity of wildfires continues to increase. Using historic fire data and recent trends, habitat losses are expected to increase on the average. More importantly these losses are likely to result from significant fire events that cause significant impacts to habitat in a concentrated location. There is a need to reduce expected habitat losses to a rate at least equal to replacement by treating enough acres with enough intensity to significantly modify fire behavior. The SNFPA Review indicated that adjustments to management direction would improve the Forest Service's ability to accomplish this goal.

Aquatic, Riparian, and Meadow Ecosystems

SNEP found that aquatic, riparian, and meadow ecosystems are the most degraded of all habitats in the Sierra Nevada, although much of this problem was seen to be related to lower elevation dams and diversions. In addition, many aquatic and riparian-dependent species, such as willow flycatcher and Yosemite toad, were found to be at risk of extirpation. SNFPA was intended to provide regionally consistent direction to address these problems. Specific goals were to

- protect and restore desired conditions of aquatic, riparian, and meadow ecosystems in Sierra Nevada national forests; and
- provide for the viability of species associated with those ecosystems.

The above needs are still valid and must be addressed when making changes to existing management direction. However, new information must be considered concerning the population status and distribution of Yosemite toad and willow flycatcher, which was gained from two years of field surveys conducted according to established protocol. The recently completed conservation assessment for the willow flycatcher includes updated information about the status of the species and possible refinements to management and restoration of suitable habitat. This information reinforces the importance of considering local data and conditions when planning projects in flycatcher habitat.

An assessment of the reduction in grazing activity that would result from implementing FEIS standards and guidelines for meadows and meadow-associated areas was completed during the SNFPA Review. Accordingly, the SEIS considers changes to management direction that would require the development of site-specific grazing strategies, to allow more economic benefits to be retained while continuing to minimize risks to sensitive species.

Fire and Fuels

The SNFPA FEIS recognized that wildland fire poses a major threat to life, property, financial resources, and natural resources in the Sierra Nevada. In addition, the continued and rapid growth of the region's human population continues to increase the risk of loss of life and property from wildfires, unless hazards are mitigated. The SNFPA was intended to provide a coordinated strategy for addressing the risk of catastrophic wildfire that resulted from decades of fire suppression and the resulting build-up of hazardous fuels. Specific goals were to

- reduce the wildfire threat to human communities and ecosystems and natural resources,
- maintain ecosystem functions, and
- decrease the cost of fire suppression.

These goals remain valid and must be addressed when making changes to existing management direction. However, since the ROD was signed, changed circumstances must be considered in framing management direction to attain these objectives.

The National Fire Plan represents a collaborative approach to wildland fire management that has broad support from the Administration, Congress, the Western Governors, and many other local and regional groups. In May of 2002, the Secretaries of Agriculture and Interior and the Western Governors developed an implementation plan for this collaborative effort. It encourages local Forest Service units to work collaboratively with state and local agencies to accomplish the desired outcomes of this plan. The Regional Forester is committed to achieving the goals of the National Fire Plan and wants management direction for the Sierra Nevada forests to contribute to achieving the goals and meeting the performance measures of the implementation plan.

On December 3, 2003, HR 1904, The Healthy Forests Restoration Act of 2003 was signed into law. The legislation provides new tools and additional authorities to treat more acres more quickly. The Act intended to help expedite projects aimed at restoring forest and rangeland health by providing streamlined administrative decisions and provide courts direction when reviewing fuel reduction or forest health projects. Management direction for the Sierra Nevada must be compatible with this legislation to treat more acres.

The SNFPA Review identified aspects of the existing management direction that must be refined to achieve this goal. Stated briefly, fuels treatments must significantly lower wildfire intensity and rate of spread, thus directly contributing to more effective suppression and smaller acreage burned. Hazardous fuels must be treated in a cost-efficient manner to maximize program effectiveness. Fuels management must actively restore fire-adapted ecosystems by making demonstrable progress in reducing the acreage of unnaturally dense forest (i.e. changing a substantial acreage from Fuel Condition Class 2 or 3 to Condition Class 1).

The SNFPA Review also recognized that the by-products of mechanical thinning present an economic opportunity for local communities. The Review identified measures to assess the degree to which fuels reduction programs are creating local economic benefits. Increasing the economic value of fuel treatment byproducts would also improve the Forest Service's ability to treat the desired acreage of hazardous fuels with available appropriated dollars.

The SNFPA Review Team identified a need to more fully consider three critical aspects of the fire and fuels management strategy established in SNFPA. Selected standards and guidelines need to be adjusted to ensure that certain post-treatment conditions can be met. In particular, fuels treatments must

- be strategically placed across the landscape,
- remove enough material to cause wildfires to burn at lower intensities and slower rates of spread in treatment areas compared to untreated areas, and
- be cost-efficient, so program goals can be accomplished with available appropriated dollars.

The Review Team's analysis identified the prescriptive nature of the existing standards and guidelines for vegetation management to be a primary barrier to meeting these three needs. This potential problem was recognized in the FEIS by a statement concluding, "Modified Alternative 8 would have stand level structural requirements that could preclude full implementation of the fuels strategy" (FEIS volume 1, "Summary," page 29).

The SNFPA Review identified the need to adjust the existing fuels management direction to make it less complicated and costly to implement. To meet that need, standards and guidelines must allow a wider array of tools and techniques for meeting fuels reduction objectives and better respond to local resource conditions in a cost-effective manner. In addition, the FEIS's emphasis on prescribed burning for initial treatments needs to be reduced because of public concerns about smoke and because of the limited number of permissible burn days under state air quality management rules.

Implementation of the Herger-Feinstein Quincy Library Group (HFQLG) Forest Recovery Act Pilot Project

Within the Sierra Nevada bioregion, a number of special plans and projects are underway to test alternative management strategies. Some of these were explicitly recognized in the ROD and were allowed to continue unimpeded by new direction in SNFPA. However, the ROD did not make provisions for the HFQLG Pilot Project to continue in its original form. Instead, the ROD imposed new land allocations, new standards and guidelines for sensitive species, and a new fire and fuels strategy, and it eliminated the project's program of group selection (except as part of an administrative study). Under the SNFPA ROD, the rate of implementation of DFPZs was approximately 40% per year of what was envisioned by the Act and approximately 12% per year for group selections.

The pilot project was intended to produce information needed to reduce scientific uncertainty concerning environmental effects of certain forest management activities. However, the SNFPA Review found that, collectively, the standards and guidelines in the ROD limited this learning from occurring and, therefore, compromised the adaptive management strategy. In addition, the Review Team found that HFQLG's goal of commodity production was also affected by the ROD, by making no provision for regeneration harvest to continue within or outside of the HFQLG pilot project area. In light of these findings, the current management direction needs to be adjusted to better reconcile the goals of the HFQLG Pilot Project with those of the SNFPA and its adaptive management component.

Proposed Action

The proposed action responds to changed circumstances and information identified in a year-long review of SNFPA. The following is a general overview of the proposed action. It is described in more detail as *Alternative S2* in chapter 2.

The proposed action replaces the standards and guidelines of the existing SNFPA strategy for fire and fuels with direction that provides flexibility needed at the local level to effectively modify wildland fire behavior. Opportunities are also provided to allow for generation of by-products. By-product production would offset the cost of fuels treatment and allow the desired program level acreage of hazardous fuels to be treated. In addition, the basic fire and fuels strategy provides for other important objectives, such as reducing tree stand density to improve forest health, restoring and maintaining ecosystem structure and composition, and restoring ecosystems after severe wildfires and other large catastrophic events. The resulting integrated strategy is designed to be aggressive enough to minimize risks to communities from wildfire in the urban-wildland interface and to adequately address the threats to wildlife of catastrophic wildfires across broader landscapes. This strategy must be balanced with the need to ensure that wildlife and other resource values are protected today and in the future.

The proposed action also provides for implementation of the HFQLG Forest Recovery Act Pilot Project.

The proposed action includes new standards and guidelines for willow flycatcher habitat, Yosemite toad habitat, great gray owl protected activity centers, as well as grazing utilization standards to better reflect the wide array of site-specific conditions and the management opportunities they may provide.

The proposed action clarifies management intent for off-highway vehicles; applies the requirement for limited operating periods only to vegetation management activities; and clarifies applicability of several riparian standards and guidelines to recreation activities, uses, and projects. These changes are proposed to more closely align management direction with management goals established in SNFPA.

Responsible Officials and Decision to be Made

The Regional Foresters for the Pacific Southwest Region and the Intermountain Region are the responsible officials for amendment of the SNFPA. The Chief has delegated signing authority for the Intermountain Regional Forester to the Regional Forester for the Pacific Southwest Region.

The decision to be made is whether to amend the Land and Resource Management Plans for the Humboldt-Toiyabe, Modoc, Lassen, Plumas, Tahoe, Eldorado, Stanislaus, Sierra, Sequoia, and Inyo National Forests and the Lake Tahoe Basin Management Unit.

Public Participation

No formal public scoping period was held or required for the Draft SEIS; however, the extensive and open public process used to complete the SNFPA Review informed development of the proposed action. The Review was a transparent and highly collaborative process conducted by local Forest Service employees working with a host of key stakeholders, including elected officials, tribes, interest groups and other government agencies. Insight was obtained from dozens of public meetings, workshops, and field trips held with employees, interest groups, scientists, other government agencies, journalists, and others. An Internet website and biweekly electronic news brief were developed to keep the public informed throughout the Review. The issues identified in the SNFPA FEIS (volume 1, chapter 1, pages 12-16) reflect the broad areas of concern, debate and disagreement that also surfaced during the Review.

From early June through August, 2003, extensive efforts were made by national forest leaders to highlight management proposals and encourage public comment on the Draft SEIS. Each Forest Supervisor strongly attempted to engage the local communities through a variety of programs and comment opportunities during this period. The majority of those contacted were interested in the proposals and clearly some groups expressed high interest in the proposed management actions. Each national forest worked with the general public, elected officials, Resource Advisory Councils (RAC's), Native Americans, special interest groups, the media, and other people in their local area.

Forest Service and Tribal Relations

The relationships of the Forest Service with American Indian tribal governments, communities, and organizations are important in the management and restoration of ecosystems in the Sierra Nevada and Modoc Plateau. Tribal representatives participated in the Sierra Nevada Framework Management Review and Supplemental EIS process through interagency team meetings, workshops, field trips, and presentations. The Forest Service continues to work with tribal governments through forest level government-to-government consultation to seek increased opportunities to implement the nine commitments of the SNFPA that were included in the Record of Decision (pages 52-53). At the regional level, annual Sierra Nevada tribal summits are co-hosted, on a rotating basis, by local tribes and forests. At these tribal summits, relationships and communication networks are strengthened through local examples of SNFPA commitment accomplishments and updates of work-in-progress.

The Alternatives

The Final SEIS considers 9 alternatives in detail: the no action alternative (Alternative S1), the proposed action (Alternative S2), and seven action alternatives from the FEIS (Alternatives F2-F8). The no action

alternative (Alternative S1) continues management in the 11 Sierra Nevada national forests consistent with the Sierra Nevada Forest Plan Amendment (SNFPA) Record of Decision (ROD, January 2001). Alternative S2 proposes specific changes to the SNFPA ROD to respond to direction from the Chief of the Forest Service and the Pacific Southwest Regional Forester described above under “Background.” Alternatives 2 through 8 of the SNFPA FEIS are briefly described in the SEIS as Alternatives F2-F8. Readers can refer to the SNFPA FEIS, Volume 1, Chapter 2, pages 83-164, for more detailed descriptions of these alternatives.

Alternative S1 (No Action)

The no action alternative (Alternative S1) would continue management in the 11 Sierra Nevada national forests consistent with the Sierra Nevada Forest Plan Amendment (SNFPA) Record of Decision (ROD, January 2001). Alternative S1’s approach for conserving old forest ecosystems and associated species and managing fire and fuels responds to concerns that impacts from mechanical fuels treatments may pose greater risks to habitats, particularly in the short-term, than the risks posed by potential wildland fires. As such, Alternative S1 applies a conservative approach for conducting activities in habitats for sensitive species, particularly species associated with old forest ecosystems. Alternative S1 includes standards and guidelines for retaining canopy cover and limiting the sizes of trees that can be removed during fuels treatments and imposing limited operating periods for activities within the vicinity of nest and den sites. Under Alternative S1, vegetation treatments are focused on fire hazard reduction, maintenance activities, and public health and safety.

The No Action Alternative also provides direction for limiting and, in some cases, eliminating grazing from habitat that is or has been occupied by the Yosemite toad and willow flycatcher. This alternative applies limited operating periods to vegetation management activities in the vicinity of California spotted owl and northern goshawk nest sites and forest carnivore den sites. Limited operating periods may apply where analysis of proposed projects or activities determines that such activities are likely to result in nest or den site disturbance.

Alternative S2 (Proposed Action, the Preferred Alternative)

Under the proposed action (Alternative S2), Forest Service managers would use thinning, salvage, and prescribed and natural fires to make forests less susceptible to the effects of uncharacteristically severe wildfires, as well as invasive pests and diseases. Goals established in the SNFPA ROD for conservation of old forest ecosystems and associated species would be retained. However, this alternative also provides for other important elements of old forest ecosystems, including the objectives of reducing stand density and regenerating shade intolerant species.

Alternative S2 would adopt an integrated vegetation management strategy with the primary objective of protecting communities and modifying landscape-scale fire behavior to reduce the size and severity of wildfires. This alternative would provide for the removal of some medium-sized trees to increase the likelihood of accomplishing program goals with limited funding. Alternative S2 acknowledges the role that the Forest Service plays in providing a wood supply for local manufacturers and sustaining a part of the employment base in rural communities. This alternative would address the need to retain industry infrastructure by allowing wood by-products to be generated from fuels treatments and for dead and dying trees to be salvaged after wildfires. This active approach to vegetation and fuels management accepts the risks of temporarily changing some habitat for California spotted owls and other species to reduce the future risk of wildfire to habitat and human communities.

Alternative S2 would include the SNFPA ROD's network of land allocations, with some modification and clarification of the associated desired conditions. Alternative S2 would replace some of the standards and guidelines in the SNFPA ROD pertaining to old forest ecosystems, associated species conservation, and fire and fuels management. Alternative S2's standards and guidelines would give greater flexibility to local managers to design projects to respond to local conditions, while meeting desired future conditions unique to each land allocation.

Pending completion of the forest plan amendments/revisions required by the HFQLG Forest Recovery Act, vegetation management activities on the Plumas and Lassen National Forests and the Sierraville Ranger District of the Tahoe National Forest would be guided by the direction of Alternative S2. Alternative S2 provides for implementation of the HFQLG Forest Recovery Act Pilot Project and employs the land allocations specified in the Act for the life of the pilot project. As in Alternative S1, vegetation management in riparian areas within the HFQLG Pilot Project Area would be handled under the SAT guidelines for the life of the pilot project.

Alternative S2 also includes standards and guidelines for managing grazing within habitat that is or has been occupied by the Yosemite toad and willow flycatcher. This management direction is designed to allow local managers to develop site-specific approaches to meet overall program goals for species conservation. Some flexibility is provided to allow managers to take advantage of unique opportunities that can only be identified at the project-level. This alternative would invoke limited operating periods for vegetation treatments in the vicinity of nest sites for California spotted owl and northern goshawk and near furbearer den sites.

Alternative F2 (FEIS Alternative 2)

Alternative F2 establishes large reserves where human management is very limited, to maintain and perpetuate old forest, aquatic, riparian, meadow, and hardwood ecosystems. Alternative F2 responds to views that ecosystems should be protected from all but minimal human-caused disturbances and conditions that "nature" delivers are desired.

Alternative F3 (FEIS Alternative 3)

Alternative F3 emphasizes restoration of desired ecosystem conditions and ecological processes through active management determined through landscape analysis, monitoring, and local collaboration. Management activities would promote ecosystem conditions and ecological processes expected within natural ranges of variability under prevailing climates.

Alternative F4 (FEIS Alternative 4)

Alternative F4 emphasizes the development of forest ecosystem conditions that anticipate and are resilient to large-scale, severe disturbances, such as drought and high intensity wildfire, common to the Sierra Nevada. The alternative is consistent with the view that ecosystems should be actively managed to meet ecological goals and socioeconomic expectations. Alternative F4 would have the greatest number of acres available for active management including timber harvest.

Alternative F5 (FEIS Alternative 5)

Alternative F5 limits impacts from active management through range-wide management standards and guidelines. Alternative F5 preserves existing undisturbed areas and restores others to achieve ecological goals. Alternative F5 emphasizes reintroducing fire as a natural process and using fire to reduce fires and fuel accumulations.

Unroaded areas larger than 5,000 acres, ecologically significant unroaded areas between 1,000 and 5,000 acres, and inner zones of riparian areas would be persevered and left to develop under natural processes. Other areas, including old forest emphasis areas and general forest, would be restored under a limited active management approach to increase the amount of, and enhance processes associated with old forest conditions. Alternative F5 limits impacts from management activities by specifying range-wide management standards and guidelines.

Alternative F6 (FEIS Alternative 6)

Alternative F6 integrates desired condition for old forest and hardwood conservation with fires and fuels management. This alternative provides direction for implementing a landscape-scale strategic fuels treatment program in high-risk vegetation types across Sierra Nevada landscapes to: (a) reduce the potential for large severe wildfires, and (b) increase and perpetuation old forest and hardwood ecosystems, providing for the viability of species associated with those ecosystems.

Alternative F7 (FEIS Alternative 7)

Alternative F7 aims to establish and maintain a diversity of forest ages and structures over the landscape in a mosaic approximating patterns that would be expected under natural conditions, that is conditions characterized by current and expected future climates, biota and natural processes. Ecosystems and ecological processes would be actively managed to maintain and restore them to desired conditions. Silvicultural treatments could produce timber and other forest products.

Alternative F7 relies on few land allocations, applying what is commonly termed a “whole forest approach.” Most lands are designated in the “general forest” land allocation where active management is used to move landscapes toward desired conditions. Management is linked to desired conditions for California Wildlife Habitat Relationships (CWHR) stages and old forest condition goals, specific to the major Sierra Nevada forest types.

Alternative F8 (FEIS Alternative 8)

Alternative F8 emphasizes a cautious approach to treating fuels in sensitive wildlife habitat. New information from research and administrative studies would be developed to reduce uncertainty about the effects of management on sensitive species. Until further guidelines were developed, treatments in suitable California spotted owl habitat would retain specific levels of large trees, canopy cover, canopy layers, snags, and down woody material.

Environmental Consequences

This section compares the alternatives by summarizing their environmental consequences. Note that environmental consequences for Alternatives F2 through F8 are fully described in the SNFPA FEIS and are only repeated in part in the SEIS.

Old Forest Ecosystems

All of the alternatives would maintain and enhance old forest conditions across Sierra Nevada landscapes. However, they would have different effects on:

- amounts and distribution of old forest conditions,
- potential losses of old forests to wildfire, and
- old forest ecosystem functions and processes.

Amount and Distribution of Old Forest Conditions

The number of large, old trees would increase under all alternatives. With a few exceptions for specific vegetation types or land allocations, all alternatives would have similar effects on the number of large, old trees because the upper diameter limit for tree removal would be 21 inches on the eastside and 30 inches on the westside (table S1). The exceptions to these diameter limits are:

- Alternative S1 - Tree removal also would be limited to 12 inches in old forest emphasis areas and 20 inches in general forest and threat zones.
- Alternatives F3, F5, and F8 - In eastside mixed conifer and subalpine types, the upper diameter limit would be 24 inches.
- Alternative F4 - After 15-20% of national forest lands reach old forest conditions, trees greater than the 30-inch dbh limit could be harvested.

Table S1. Comparison of Large Tree Retention and Old Forest Connectivity among the Alternatives.

Variable	Alternative								
	S1	S2	F2	F3	F4	F5	F6	F7	F8
Upper diameter limit for tree removal	30" west 24" east	30" west 30" east	30" west 21" east	30" west 21" east	30" west na east	30" west 21" east	30" west 21" east	defined by CWHR classes	30" west 21" east
Percent change in numbers of large trees by 2nd decade	+5.5%	+5.5%	+4.7%	+4.5%	+3.3%	+5.2%	+5.1%	+3.7%	+5.7%
Acreage of old forest allocation (millions of acres)	1.636	1.636	4.873	1.337	0.713	1.745	1.605	defined at project level	2.319

Note: west = westside; east = eastside

Alternatives S2 and F4 would include a larger upper diameter limit on the eastside (30 inches). This could result in tree removal in eastside habitats, which would prolong the time to increase old forest conditions. However, Alternative S2 would require that 30% of the pre-treatment basal area be retained in eastside habitats. This standard and guideline would help to maintain a component of older, larger trees.

Alternative F7 would have tree diameter limits that vary by CWHR type.

All alternatives are designed to protect and maintain blocks of old forests (table S1). Alternative F2 would meet this goal by establishing biodiversity reserves. The other alternatives would use the old forest emphasis land allocation for this purpose. Alternative F7 would define these old forest allocations through site-specific project level analyses. Alternatives having the most restrictive measures within old forests (e.g. S1) would probably result in the greatest protection for old forest conditions in the immediate future. However, as table S2 below shows, some alternatives (e.g. S2) would result in large reductions in wildfires, which may provide greater benefit in terms of the amount of old forest conditions available in the long run.

Potential Losses to Severe Wildfires

Over the last 30 years, wildfire in the Sierra Nevada has burned an average of about 43,000 acres per year. In the last ten years, the average has risen to about 63,000 acres per year. Table S2 below shows that reductions in the number of wildfire acreage burned each year are expected under all alternatives except F2 and F5.

Table S2. Comparison of Annual Wildfire Acreage among the Alternatives.

Variable	Alternative								
	S1	S2	F2	F3	F4	F5	F6	F7	F8
Annual acreage of wildfire, first decade	64,000	60,000	68,561	65,804	61,730	69,008	65,705	64,800	67,002
Annual acreage of wildfire, fifth decade	63,000	49,000	76,315	48,381	44,380	71,933	49,579	49,340	62,988
Percent change in annual wildfire acreage from first to fifth decade	-2%	-22%	10%	-36%	-39%	4%	-33%	-31%	-6%

Alternative F4 has the greatest reduction in acres expected to burn annually, followed in order by Alternatives F3, F6, F7 and S2

Old Forest Ecosystem Functions and Processes

Alternatives F5, F6, and F8 would place the greatest emphasis on prescribed burning, and consequently the greatest emphasis on reintroducing fire as a process in old forest ecosystems. Alternatives F5 and F8 would place more restrictions on prescribed burning than Alternative F6. Alternative F6, however, would establish explicit priority on restoring fire as a process in old forests, which would be different than provisions of any other alternative. Alternative F6 would result in the greatest restoration of fire as a process in old forests. Alternatives F4 and F7 would include low to moderate amounts of prescribed burning. However, treatment locations rely more on local discretion, so the extent to which these alternatives would restore fire to old forests is unknown. While Alternative F8 involves higher levels of prescribed burning, provisions in its standards and guidelines would limit the extent of this burning and therefore the amount of fire restoration in old forests. Alternative F2 entails very little prescribed burning and thus minimal restoration of fire to old forests.

Alternatives having the highest likelihood of connectivity between large blocks dedicated to old forests in order are Alternatives F2, F5, F3, F8, and F6. Alternative F4 would involve moderate-sized blocks

dedicated to old forests, but the blocks would be widely distributed and therefore more limited in providing connectivity. Alternatives F3, F4, F5, F6, F7, and F8 would include provisions for maintaining old forest patches in the general forest, which would contribute to old-forest connectivity.

Alternatives S1 and S2 include the use of prescribed fire as a treatment method. Alternative S1 embodies a strong preference for the use of prescribed fire as the treatment method in several allocations, such as spotted owl and northern goshawk PACs outside of defense zones; however, limitations due to needs of smoke management and due to high existing fuel loadings may hamper some prescribed burn projects. Alternative S2 would allow more use of mechanical treatments as the initial treatment, with prescribed burning as the follow-up treatment, but requires use of prescribed burning as the initial treatment in PACs outside WUIs.

Aquatic, Riparian, and Meadow Ecosystems

The greatest effects on the Aquatic, Riparian and Meadow Ecosystems will generally be from either mechanical fuel treatments or catastrophic wildfires. The other potential effects from activities such as grazing, mining, pesticide use etc. will either affect only specific sections of the landscape such as meadows or their effects are constant across alternatives. When the balance between fuels treatment acres and risk of catastrophic wildfire is assessed, alternatives that lower the risk of fire and have medium levels of treatment pose the least risk to aquatic and riparian systems. This means that Alternatives F3, F6, S1, and S2 are expected to pose the least risk of negatively impacting riparian and aquatic ecosystems, Alternatives F4 and F7 an intermediate level; and Alternatives F2, F5, and F8 the highest.

Another consideration is the size of material removed and the retention requirements for forest stands. Erman and Erman (2000), found that large openings negatively affect the microclimate of the riparian zone. This means that alternatives that remove smaller material and require higher crown closures will have a greater benefit to the aquatic and riparian ecosystem. Using these criteria, Alternatives F2, F5, F8, S1 and S2 would have the least impact. However, the risk of catastrophic wildfire, which would have a profound effect on forest openings, is high in Alternatives F2 and F5. Thus Alternatives F8, S1 and S2 would have the least overall impact on long term forest structure surrounding riparian areas.

Other factors such as the requirement for landscape analysis, peer reviews, and special protection for sensitive species are components of alternatives that will provide increased protection for the aquatic and riparian ecosystems. Alternatives F3, F5, and S1 all require landscape assessment. These analyses will provide important context to management decisions and allow decisions to consider impacts to and needs of species outside of the immediate project area. The Conservation Assessments completed under Alternative S1 and S2 will inform management decisions in all aquatic and riparian habitats. It will provide some of the basic information needed to better manage habitats for these species. The creation of Critical Refuges in Alternative F5 and Critical Aquatic Refuges in Alternative F2, F6, F8, S1 and S2 will also provide special protection for sensitive species. The conservation assessments and refuges are important first steps in the development of conservation management strategies for aquatic and riparian dependent species.

Alternative S2 may pose higher short-term risks to aquatic resources because it prescribes larger amounts of mechanical treatments and greater treatment intensities. However, these are expected to reduce long-term effects associated with wildfire. Short-term risks associated with S2 will be greatly reduced through the application of the same Aquatic Management Strategy with similar standards and guidelines. Specifically, landscape and project-level analysis, attainment of RCOs, implementation of proven BMPs and other standards and guidelines, a modest reduction in overall road miles, and improved road conditions are the most important aspects of reducing risks to aquatic resources.

Based on all of the above factors, Alternative S1 best protects the values associated with aquatic and riparian habitats. Alternatives S2, F3 and F6 follow closely. The other alternatives have pluses and minuses in their ability to protect riparian and aquatic values. While Alternatives F4 and F7 reduce the risk of wildfire, they lack specific guidance that would provide protection to aquatic and riparian species. On the other hand, Alternatives F2, F5, and F8 provide protective management measures; they also pose the highest risk of catastrophic wildfire.

Fire and Fuels

Weather, topography and fuels influence the behavior of fires. All alternatives influence fires in the Sierra Nevada through a fire suppression program and modification of fuels and vegetation. The annual acreages of wildfire projected for each alternative are presented above in table S2. The greatest reduction in the annual acreage of wildfire within the first 5 decades would occur (in decreasing order) under Alternatives F4, F3, F6, F7, S2, F8, and S1. Alternatives F2 and F5 are projected to increase the acreage burned.

Modifying fuel loading across the landscape can effect changes on wildfire behavior by reducing fire intensities and rates of spread. This program also results in safer, more efficient fire suppression efforts. Table S3 below displays the acreage of fuel treatment (mechanical and prescribed burning) projected for each alternative. Alternatives that accomplish more acres of treatment should result in reduced wildfire severity as well as improved fire suppressions. The alternatives that are projected to modify fuel loadings and change fire behavior the most are F4, F7, F6, S2, and S1, in that order. Alternatives F3, F8, F5, and F2 involve treatments, but on smaller acreages. Note that the estimates in table S3 do not show the relative effectiveness of fuel modifications by alternative.

Table S3. Comparison of Extent of Mechanical and Prescribed Fire Fuels Treatments among the Alternatives.

Annual acreage of mechanical fuels treatment	Alternatives								
	S1_1/	S2	F2	F3	F4	F5	F6	F7	F8
	51,345	72,200	7,022	30,081	86,168	9,858	33,381	70,045	13,867
Annual acreage of prescribed burns	49,560	42,020	15,457	53,582	46,760	39,356	82,747	60,113	69,038
Total acreage treated annually	100,905	114,220	22,479	83,663	132,928	49,214	116,128	130,158	82,905

_1/ acres based on gross treatment acres

Focal Species

California Spotted Owl

Under all alternatives the quantity and quality of useable habitat available for the California spotted owl is projected to increase across the species range. The alternatives are distinguished by differences in the amount of habitat and management of individual owl nest locations and home range areas. Alternative F4 is projected to produce slight declines in high quality habitat and would not protect all nest (and primary roost) stands. Among the remaining alternatives, Alternative F7 is projected to provide lower amount of useable habitat. Alternatives F2, F3, F5, F6, F8, S1 and S2 would protect all nest stands and have the highest projected increase in habitat values. These alternatives would provide positive benefits to California spotted owls, Alternative F2, F5 and F8 would limit activities within owl home ranges to a greater extent than would the other alternatives, and they could provide increased short-term protection. Improved understanding of relationships between owl habitat patterns at the home range scale and owl

demographics, and application of this knowledge at smaller scales, would reduce the risks of implementing any of the alternatives. Alternative S2 has fewer restrictions on treatment methods and intensity within PACs and HRCAs than would Alternative S1.

Northern Goshawk

Alternatives F3, F5, F6, F8, S1 and S2 would provide the greatest contribution to maintaining and enhancing conditions for northern goshawk throughout the Sierra Nevada. These alternatives would protect all goshawk territories, and all are projected to increase amounts of high suitability habitat. Alternatives F4, F7, and S2 would provide less certainty about effects relative to the other alternatives because of the higher rates of mechanical treatments; however, they would provide greater protection from loss due to natural disturbance events.

Willow Flycatcher

The alternatives involve different approaches to managing and conserving willow flycatcher habitat and populations. Alternatives F2 and F8 would result in the greatest improvement in conditions for this species during the breeding season. Given the available data and uncertainties, Alternative F2, which excludes livestock grazing year-round in occupied willow flycatcher habitats, presents the greatest potential benefits to the species. Of all the action alternatives, Alternative F2 is the most likely to support long-term distribution and abundance of this species in Sierra Nevada national forests. Furthermore, Alternative F2 excludes grazing in meadow habitat within 5 miles of occupied sites, allowing for restoration and potential re-colonization of unoccupied sites and the opportunity for willow flycatcher population expansion and recovery.

Alternatives F3, F5, F6, S1 and S2 would provide slightly less improvement of conditions affecting the willow flycatcher than Alternatives F2 and F8. Alternatives F3 and F5 would provide more stringent guidelines than other Alternatives regarding general streambank use but weaker protections than Alternatives F2 and F8 specific to willow flycatcher habitat. Alternatives F3, F4, and F7 would provide an equal to slightly greater level of improved conditions associated with the willow flycatcher.

Alternatives S1 and S2 would apply the AMS and similar standards and guidelines for aquatic, riparian, and meadow ecosystems, to accomplish the same objectives. Alternative S2 involves slight differences relative to S1 where grazing surveys have not been completed, and it allows development of a site-specific management plan to address grazing management where occupied habitat exists. These alternative management strategies are locally determined and are designed to provide sufficient protection of this species.

Forest Carnivores

Four forest carnivores of special concern were identified: marten, fisher, wolverine, and Sierra Nevada red fox. The marten and fisher would more likely be directly affected by all alternatives than would the rarer wolverine and Sierra Nevada red fox, which are associated with higher elevations where relatively little management would take place. Consequences of the alternatives to these species were evaluated in terms of: (1) changes in vegetation structure and composition, (2) recreation and roads, and (3) survey requirements and site protection.

Fisher

Alternatives F5 and F8 would result the greatest improvements to fisher persistence and habitat. Both alternatives would provide fisher habitat through their provisions for retaining and recruiting large trees, snags, and coarse woody debris; retaining dense forest canopy; and promoting hardwoods on conifer sites.

Alternative F2 would provide habitat protections similar to Alternatives F5 and F8; however, because Alternative F2 relies primarily on fire suppression to manage the threat of severe wildfires, the risk of catastrophic fire would be higher under this alternative.

Alternative F3 would result in less benefit to fishers in terms of dead and down wood and hardwoods on conifer sites than either Alternative F5 or F8. Under Alternative F6, canopy closure in denning areas could be reduced to 40% in developed areas within urban WUIs.

All of the action alternatives would protect fisher den sites from human disturbance; however, none of the alternatives would reduce road-related risks to the same extent as Alternative F5. Alternative F5 would reduce potential recreation-related impacts in close proximity to fisher locations and would reduce the impacts of roads and related human disturbance by reducing road density and protecting unroaded areas.

Alternatives F4 and F7 would cause no change or slight increases in fisher habitat and population relative to the other alternatives. Alternative F4 could result in lower fisher abundance and distribution, as it would slightly decrease the availability of habitat elements important to fishers. Alternative F7 would reduce forest canopy from levels required for denning habitat to levels suitable for travel and foraging habitat, but would not change habitat conditions from the current situation.

Alternatives S1 and S2 are similar in projected amounts of fisher habitat over time, with differences primarily due to predicted change in habitat reduction from large wildfires. Under both alternatives a conservation assessment would be completed that could be used to develop a conservation strategy to improve management consistency across the species range. This assessment, coupled with ongoing research, should reduce the level of uncertainty regarding proposed treatments.

Marten

Environmental conditions important to marten and marten population would not be expected to change significantly from the current condition under any of the alternatives. All alternatives would result in retention and development of large trees at levels sufficient to protect and enhance marten habitat.

Under Alternatives F5, F6, F8, S1 and S2 new recreational developments would be evaluated for compatibility with marten needs when they were proposed in suitable marten habitat. In addition, Alternative F5 would reduce the impact of roads and related human disturbance by precluding roading of unroaded areas.

Alternative F2 provides direction for protecting marten habitat; however, this alternative would result in an increased risk of catastrophic fire, which could reduce habitat for this species. Compared to Alternatives F5 and F8, Alternative F3 would provide less dead and down wood and hardwoods on conifer sites.

Alternative F4 would only slightly decrease overall environmental conditions and predicted populations compared to the current condition. Alternative F4, S1 and S2 would reduce forest canopy cover in treated areas because it would establish and maintain both DFPZs and SPLATs. Alternatives F4 and F7 would provide less snag protection, which could lead to lower levels of recruitment of coarse woody debris over time. Alternative F4 has the highest level of fuels treatment and could result in less coarse woody debris recruitment. Alternative F7 emphasizes mechanical treatments over prescribed fire, possibly reducing coarse woody debris recruitment.

Sierra Nevada Red Fox

Although the current distribution of the Sierra Nevada red fox in California is uncertain, the species' range appears to have contracted from the continuous distribution described by Grinnell in the 1930s. Of all the alternatives, Alternative F5 would likely lead towards the greatest improvement in environmental conditions for and population of Sierra Nevada red fox, because it provides the greatest level of meadow protection, emphasizes reducing road densities across landscapes, and encourages new Sierra Nevada red fox surveys. Alternatives F3 and F5 would involve restrictions on recreational activities in unroaded areas. Alternatives F5, F6, and F8, would require detailed evaluation of recreational development on the basis of Sierra Nevada red fox detections and the presence of suitable habitat. Alternatives F6 and F8 would not require surveys, and these alternatives place fewer restrictions on recreation and roads. Alternatives F4 and F7 would provide more of the open forest habitat preferred by the Sierra Nevada red fox than would Alternative F5; however, Alternatives F4 and F7 would place fewer restrictions on recreation and would provide only moderate reductions in roads. Alternative F2 would prohibit off-highway vehicle and over-snow vehicle use in den site buffers. Alternative F2 would not require new surveys for the Sierra Nevada red fox.

Alternatives S1 and S2 have similar effects on Sierra Nevada red fox. Alternative S2 clarifies direction to validate sightings of this species by a forest carnivore specialist and clarifies the implementation of a limited operating period to better ensure that it is applied when warranted to reduce the potential to disturb breeding individuals.

Wolverine

Consequences to wolverines are primarily influenced by: (1) recreation and roads and (2) survey requirements and site protection. Based on the combined categories, Alternatives F5, F8, S1, S2 would likely result in the greatest benefit to wolverine persistence and recovery. Alternatives F5 and F3 would restrict recreational activities in unroaded areas. Alternative F5, F6, and F8 would require evaluation of recreational development on the basis of wolverine detections and the presence of suitable habitat. Alternative F5 would emphasize reducing road densities and would encourage new surveys. Alternative F3, S1 and S2 would not provide the same level of benefits as Alternatives F5 and F8 because it would not require surveys, however it would limit activities around locations of verified wolverine sightings.

All Alternatives would increase the extent of suitable wolverine habitat from the current condition, with increases ranging from 5.4 to 9.1%. Alternatives F4 and F7 would result in only slight increases. However, these increases are not significant because none of the alternatives substantially affect the vegetation associated with wolverine habitat, either as interpreted from the standards and guidelines or from habitat utility values projected by the CWHR model. Alternatives F4 and F7 would not encourage surveys, and they would have greater potential for new road development than the other alternatives.

Alternative F2 would pose more risks related to the effects of roads and survey requirements than Alternative F5, but would generally provide greater benefits to wolverines than Alternatives F4 and F7.

As with the Sierra Nevada red fox, Alternatives S1 and S2 would have similar effects on this species. Alternative S2 applies the same clarification regarding verification of sightings by a forest carnivore specialist and implementation of a limited operating period as described for the Sierra Nevada red fox.

Amphibians

Foothill Yellow-Legged Frog

Alternatives F2 and F5 appear to provide the greatest level of protection to the foothill yellow-legged frog, because they provide the most effective management approaches for this species' persistence and recovery. Alternatives F3, F6, F7, and F8 would provide a slight improvement from the current condition. Alternative F4 would decrease environmental conditions compared with the current condition. Information and research gaps, especially regarding the impacts of livestock utilization standards for grass and shrubs on the foothill yellow-legged frog, add uncertainty to this assessment.

Alternatives S1 and S2 apply the AMS and the same standards and guidelines for aquatic, riparian, and meadow ecosystems. These alternatives protect discovered populations by designating critical aquatic refuges (CARs).

Mountain Yellow-Legged Frog

Alternatives F3, F5, F8, S1 and S2 would likely result in the greatest improvements in populations of mountain yellow-legged frog, because they provide the most effective management approaches for this species' persistence and recovery. Alternatives F4, F6, and F7 would result in less improvement in population numbers.

Alternatives S1 and S2 incorporate the AMS and the same standards and guidelines for aquatic, riparian, and meadow ecosystems. These alternatives protect discovered populations by designating CARs. Some mountain yellow-legged frog populations may exist within habitat for the Yosemite toad, willow flycatcher, or great gray owl. Alternative S2 changes some of the grazing management standards and guidelines related to these species, which could potentially indirectly affect the mountain yellow-legged frog. However, changes in grazing management would require site-specific analyses, including biological evaluations that would address all species occurring within the affected area. Thus, the implications of such changes would likely be minimal.

The U.S. Fish and Wildlife Service has determined that a listing of this species under the federal Endangered Species Act (ESA) as *threatened* is warranted, but action towards listing is currently precluded due to other priorities. If this species is formally listed in the future, changes in management direction may be warranted.

Yosemite Toad

Alternative F8 would result in the greatest improvement of environmental conditions for the Yosemite toad, because it would provide the most effective management approach for this species' persistence and recovery. Alternatives S1 and S2 will most likely have similar results to F8, but have increased risk associated with some potential for late season grazing effects. Alternatives F2, F3, and F5 would result in slightly less improvement, because of lack of specific direction limiting livestock grazing where the species is present. Alternative F2 includes provisions for establishing an amphibian reserve system to protect known occupied and suitable unoccupied amphibian habitats (FEIS Appendix D, standard and guideline AM12). Alternatives F3 and F5 would protect, known, occupied amphibian habitats. These are based on records over the last 25 years (FEIS Appendix D standard and guideline AM13). Alternative F4 would provide for improvement from the current condition.

Alternatives S1 and S2 applies the AMS and the same standards and guidelines for aquatic, riparian, and meadow ecosystems. These alternatives protect discovered populations by designating CARs. Alternative S2 changes some of the grazing management standards and guidelines related to the Yosemite toad. It

allows use of alternative management strategies that are locally determined to provide sufficient protections for this species. Although the intent of these alternative management strategies is to provide for and protect habitat for the species, some difficulties in implementation may increase the risk of success in avoiding impacts to Yosemite toads. Some of these risks would arise with Alternative S1 as well and are due to the difficulty in managing livestock in the forest environment.

The U.S. Fish and Wildlife Service determined that a listing of this species under the ESA as *threatened* is warranted, but action towards listing is currently precluded due to other priorities. If this species is formally listed in the future, changes in management direction may be warranted.

Cascades Frog and Northern Leopard Frog

Alternatives F5, F8, S1 and S2 would likely result in the greatest improvement of conditions for the Cascades frog and northern leopard frog, because they provide the most effective management approaches for this species' persistence and recovery.

Alternatives S1 and S2 apply the AMS and the same standards and guidelines for aquatic, riparian, and meadow ecosystems. Under these alternatives, populations would be protected as they are discovered by designating CARs. Some populations of these species may exist within habitat for the Yosemite toad, willow flycatcher, or great gray owl. Alternative S2 involves changes to some of the grazing management standards and guidelines related to these other species, which could potentially indirectly affect these frog species. However, changes in grazing management would require site-specific analyses including biological evaluations that would address all species occurring within the affected area. Thus, the implications of such change would likely be minimal.

Socio-Economic Concerns

Economy

National forest management directly affects the socioeconomic environment of the Sierra Nevada through employment and income derived from resource extraction, production, and use. Timber harvest from national forest lands provides a flow of products to area industries.

Alternatives F4, F7, and S2 would provide the largest number of jobs annually in the commercial logging sectors. Consequently, these alternatives would also result in the highest estimated annual earnings in these economic sectors. (Table S4)

Table S4. Comparison of Estimated Average Annual Employment and Earnings from Commercial Timber Harvests on National Forests among the Alternatives in the First Decade.

Estimated average annual jobs	Alternative								
	S1	S2	F2	F3	F4	F5	F6	F7	F8
Estimated average annual jobs	957	1,894	145	566	3,467	322	526	2,730	222
Estimated average annual earnings (thousands \$, 1995)	38,344	57,159	7,458	26,099	116,023	14,345	26,136	89,913	12,212

Commercial Forest Products

Table S5 displays the modeled annual yield of green and salvage harvests by alternative for the first two decades. These estimates include the timber volumes produced under the HFQLG pilot project. The

amount of salvage volume projected for each alternative is well less than the amount of annual mortality (700 million board feet [MMBF]) estimated for these forests in the SNFPA FEIS (volume 2, page 380).

Six of the alternatives would produce volumes exceeding 100 MMBF annually. In decreasing order of volume production, these alternatives are F4, F7, S2, F6, F3 and S1. The remaining Alternatives (F5, F8, and F2) would produce less than 100 MMBF annually. For comparison, the average amount of timber offered during the six years following adoption of the California spotted owl guidelines (CASPO guidelines) (1994-1999) was 372 MMBF per year.

The amount of green volume offered in the second decade is less than in the first for each alternative. Maintenance of previously treated areas will be a significant part of the annual program of work, which will result in less volume offered.

Table S5. Comparison of Estimated Annual Timber Harvest Volume (Green and Salvage) Offered for Sale from National Forests among the Alternatives (MMBF/yr).

	Alternative								
	S1	S2	F2	F3	F4	F5	F6	F7	F8
First Decade									
Salvage timber	30	90	17	33	238	29	91	142	42
Green timber	70	329	22	84	534	49	80	414	33
Total timber	100	419	39	117	722	78	171	556	75
Second Decade									
Salvage timber	30	90	17	33	238	29	91	142	42
Green timber	20	132	7	21	294	7	57	210	14
Total timber	50	122	24	54	522	36	148	352	56

Table S6 summarizes the estimated commercial biomass output that could be available for sale under each alternative by decade. Alternative S2 is projected to produce the largest amount of commercial biomass, followed by Alternatives F7, F4, and S1. The other alternatives would produce between 9% (Alternative F2) and 41% (Alternative F6) of the amount of biomass produced by Alternative S2.

Table S6. Comparison among the Alternatives of Potential Commercial Biomass Output from National Forests in the First Decade (1,000s of bone dry tons).

Alternative								
S1	S2	F2	F3	F4	F5	F6	F7	F8
4,385	7,021	660	2,440	6,200	1,710	2,910	6,680	1,720

Grazing

All alternatives would reduce the current numbers of livestock permitted to graze on national forest lands because total forage (as measured by animal-unit months) offered by the national forests would decline (table S7). Alternatives F4 and F7 would have more suitable rangeland (acreage available for grazing) than the other seven alternatives.

Table S7. Comparison among the Alternatives of Reduction in Animal-Unit Months Offered by National Forests.

Alt S1	Alt S2	Alt F2	Alt F3	Alt F4	Alt F5	Alt F6	Alt F7	Alt F8
83,000	83,000	140,000	69,000	56,000	172,000	72,000	56,000	110,000

Alternatives F2, F5 and F8 would establish more conservative standards and guidelines related to grazing activities than would the other alternatives. These standards and guidelines would remain in effect on a particular range until a range analysis could be completed to determine the range condition. In many cases, these conservative standards would make it uneconomical for permittees to graze their allotments while waiting for an analysis to be completed. Because many years would be required to complete analyses of several hundred allotments on the Sierra Nevada national forests, many permittees would probably give up their permits.

Alternatives F4 and F7 would cause the least reduction in grazing use. F2, F5, and F8 would cause the greatest reductions in grazing use. The intermediate alternatives in order of least to greatest reduction in grazing are F3, F6, and S2/S1.

Alternatives S1 and S2 were further evaluated by estimating effects on allotment permittees. By employing alternative strategies to protect wildlife species, Alternative S2 is estimated to eliminate the grazing deferral described above for 14 allotment permittees, whereas Alternative S1 would require grazing deferral by these 14 allotment permittees. Seven permittees would be very highly impacted by both Alternatives S1 and S2. (Table S8).

Table S8. Comparison of Effects to Permittees between Alternatives S1 and S2.

	Alt S1	Alt S2
Number of permittees slightly affected	11	7
Numbers of permittees moderately affected	17	10
Number of permittees highly affected	12	9
Number of permittees very highly affected	7	7

Roads

The forest development road arterial system would remain in its current location in Alternatives F2-F8 and S1. No arterial roads would be decommissioned. Improving arterial roads would continue to be a priority for road construction funding.

The forest development road collector system would also remain in its current location in these alternatives. Construction or decommissioning of collector roads would be unlikely. Collector roads would be improved and managed to provide a more stable road surface, primarily using gravel and dust abatement.

The most substantial changes in the forest development road system would be changes in the mileage and conditions of local roads. Some roads would be improved to reduce impacts on adjacent resources, but typically local roads have lowest maintenance priority. Some local roads may become undriveable due to vegetative encroachment. The mileage of local roads would decrease, because some local roads would be decommissioned.

The mileage of unclassified roads would also decrease. Unclassified roads would be evaluated as they were encountered during planning of vegetation treatments. Some unclassified roads (e.g. those

supporting unauthorized uses) would be decommissioned. Others providing needed access would be improved and added to the forest development road system. In some areas the size of the forest development road system would increase as needed roads were added to it. If these roads were supporting authorized uses, adding them to the forest development road system would not affect existing public access.

Alternative S2 would result in different effects on the roads system than the other alternatives. Alternative S2 would allow construction, maintenance, and decommissioning of roads in support of full implementation of the HFQLG pilot project. This will result in an increase in the mileages of the forest development collector system and local road system, along with decommissioning other roads.

Air Quality

Emissions of particulate matter larger than 10 microns (PM₁₀) would be expected to differ by alternative in proportion to the acreages of wildfire and prescribed burning that would occur. Total emissions are expected to increase over time for Alternatives F2 and F5, given the projected increase in wildfire acres. All other alternatives (S1, S2, F3, F4, F6, F7, F8) should result in a reduction in total emissions, simply as a result of wildfire reduction.

Table S9 displays annual emissions of PM₁₀, based on acreages of wildfire and prescribed burning projected for each alternative. Comparison of all alternatives shows 43% difference in annual emissions between the lowest emitting (S2) and highest emitting (F6) alternative. Although Alternatives S2 and S1 would involve larger acreages of prescribed burning than under Alternative F2 (Table S3), Alternative S2 would result in the lowest total PM₁₀ of all of the alternatives. This result is due primarily to the relatively small acreage burned by wildfire under this alternative and because mechanical treatments would be used extensively to reduce fuel loadings prior to prescribed burning. Alternative S1 would result in the next lowest total PM₁₀ emissions.

Mechanical fuels treatments can reduce the amount of particulate from wildfires and from prescribed burns. As shown in Table S3, Alternatives F4, S2, S1, and F7 include the largest amount of annual mechanical fuel treatments. Over time (decades), particulate emissions from wildfires as well as prescribed burning on treated areas should diminish.

Timing of prescribed burns helps reduce particulate emissions during periods of critical air quality. Because all projects are to be designed to keep smoke emissions from causing violations of ambient air quality standards, all alternatives are consistent with provisions of the Clean Air Act.

Table S9. Comparison of Particulate Emissions among the Alternatives in the First Decade (tons of PM₁₀).

	Alternative								
	S1	S2	F2	F3	F4	F5	F6	F7	F8
Annual wildfire emissions	23,700	22,600	25,300	24,300	22,800	25,500	24,200	24,000	24,700
Annual prescribed fire emissions	2,000	2,400	3,500	12,600	11,900	9,200	18,100	13,900	14,500
Total annual emissions	25,700	25,000	28,800	36,900	34,700	34,700	42,300	37,900	39,200

Recreation

In general, all of the alternatives could have localized effects on certain types of recreation activities on national forest lands. Alternatives F2, F3, F5, F6 and F8 would cause a slight reduction in the number of recreation visitor days (RVDs). These alternatives would favor a trend toward more dispersed, non-

motorized recreation, such as hiking and backcountry camping. Alternatives F4 and F7 would maintain the current level of RVDs.

Alternatives S1 and S2 would have similar effects on recreation. Alternative S2 clarifies direction contained in Alternative S1 to explicitly apply limited operating periods for protection of various wildlife species to vegetation treatments and not to recreation related activities. However, new recreation activities still require analysis under NEPA, and recommendations for limited operating periods could be adopted as deemed necessary at the project level. Alternative S1 includes direction that may limit recreational pack stock activities in meadows containing or potentially containing willow flycatchers and/or Yosemite toads.