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Healthy Forest Restoration
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Environmental Assessment

Stanislaus National Forest
Groveland Ranger District
Tuolumne and Mariposa Counties, California

T1S R19E Sections 27-35
T2S R19E Sections 4-6, 9-10
T2S R18E Section 1

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PURPOSE AND NEED FOR ACTION

The USDA Forest Service has prepared this Environmental Assessment in compliance with the National Environmental Policy Act and other relevant laws and regulations. It discloses the direct, indirect, and cumulative impacts that would result from the proposed action and two alternatives. The action alternatives respond to goals and objectives outlined in the Stanislaus National Forest Plan Direction (USDA 2005) as well as comments received during public scoping. Additional documentation including specialist reports, field data, and detailed analyses of project area resources is located at the Groveland Ranger District Office.

BACKGROUND

The Stanislaus National Forest, Groveland Ranger District, is proposing to conduct vegetation treatments including mechanical and hand thinning, mastication, machine piling, prescribed fire, and road improvement activities for fuels reduction and forest health improvements and willow planting for watershed improvement in the general area of Soldier Creek.

The project is located within the Groveland Ranger District, Stanislaus National Forest, in Sections 27-35 T1S R19E, Sections 4-6 and 9-10, T2S R19E, and Section 1, T2S R18E in Tuolumne County and Mariposa County, California. The 5,400-acre analysis area is defined to the north by the South Fork of the Tuolumne River, to the east by Yosemite National Park, to the south by Hazel Green Ranch, and to the west by Hardin Flat and Crocker Ridge. A project location map is provided in **Appendix A**.

HEALTHY FORESTS RESTORATION ACT

The Healthy Forests Restoration Act (HFRA) of 2003 was authorized by Congress to expedite fuels reduction activities on federal lands. The overall goals of the act include reducing wildfire risk to communities, municipal water supplies, and other at-risk Federal land and to protect, restore, and enhance forest ecosystem components.

PURPOSE AND NEED FOR ACTION

Approximately two-thirds of the Groveland Ranger District has experienced unnaturally high severity stand replacing wildfire over the last 30 years. The Soldier Creek Healthy Forest Restoration project area is within a zone that has been threatened by stand replacing wildfire. Fuel accumulations make this area extremely susceptible to such a wildfire. The National Fire Plan and Cohesive Strategy (USDI et al. 2001), developed after the severe wildfire season of 2000, provides direction for the reduction of fuel loading in fire-prone forests to protect people and sustain resources. The Stanislaus National Forest Land and Resource Management Plan (LRMP) sets goals and objectives for fuels management activities that will enhance natural ecosystem processes while minimizing fire threats to life, property, and resources. The Stanislaus National Forest LRMP also provides for the management of forest pests and forest health to provide for durable, ecologically healthy forest stands. In addition, the Stanislaus National Forest LRMP sets goals and objectives for watershed maintenance and improvements to provide stewardship of water and soil resources.

The primary purpose and need of this project is to:

1. reduce future wildfire intensity, severity, and risk to federal land and adjacent private land/structures; design treatments to remove or modify fuels to reduce expected fire behavior by lowering flame length, reducing rate of spread, and reducing the potential for crown fire.

2. maintain and enhance important wildlife habitat and general ecosystem values such as meadows, streams, mature forest characteristics, and connectivity;

3. enhance the general health of forested stands by reducing susceptibility to insect, disease, and drought-related mortality by managing for increased soil water availability by creating an open durable forest condition with an active fire stand structure;

4. reduce sedimentation to streams from degraded, damaged roadways;

5. increase the value of roads as fuel breaks by removing adjacent surface and ladder fuels and improving access for potential future fire suppression activities;

6. design economically efficient treatments to meet the first five objectives.

PROPOSED ACTION

The Groveland Ranger District proposes to treat approximately 2,600 acres of the 5,400-acre analysis area as described under Alternative 1. Proposed treatments are detailed in Tables 1, 2, and 3. A map of treatment units for the proposed action is provided in Appendix B.

PUBLIC INVOLVEMENT

The Soldier Creek Healthy Forests Restoration Project is listed in the Schedule of Proposed Actions (SOPA), as of December 1st, 2007. The Stanislaus National Forest distributes the SOPA to about 160 individuals and organizations. The current SOPA can be viewed on the internet at: http://www.fs.fed.us/sopa/components/reports/sopa-110516-2009-01.html

In addition, the Proposed Action was sent to 45 individuals and interested groups and agencies during a scoping period that started November 6th, 2008. Four respondents commented on the Proposed Action as described in the scoping letter and an additional alternative was developed to address concerns received during scoping.

A public meeting was held on December 3rd, 2008 at the Groveland Ranger Office that was advertised via local newspaper advertisement and posting of flyers in public locations along the Highway 120 corridor and in the local communities of Groveland and Big Oak Flat. Local newspaper advertisement of the public meeting occurred on November 25th and December 1st, 2008. Twelve members of the public were present at the public meeting representing adjacent landowners, several businesses, and non-profit groups. Meeting summaries and notes are available in the project file.

The line officer has also consulted with the Tuolumne Band of Me-Wuk Indians on April 27th, 2007 and April 23rd, 2008, discussed issues, and developed possibilities for the involvement of tribal members in the Soldier Creek HFR project.

Responses to comments received during scoping can be found in **Appendix D** and **Appendix E**.

ISSUES

The Forest Service separated issues into two groups: significant issues and non-significant issues. Significant issues were defined as those directly or indirectly caused by implementing the proposed action. Non-significant issues were identified as those: 1) outside the scope of the proposed actions; 2) already decided by law, regulation, Forest Plan, or other higher level decision; 3) irrelevant to the decision to be made; *or* 4) conjectural and not supported by scientific or factual evidence. The Council on Environmental Quality NEPA regulation requires this delineation in Section 1501.7, "…identify and eliminate from detailed study the issues which are not significant or which have been covered by prior environmental review (Section 1506.3)." Refer to responses to public comments found in **Appendix D** and **Appendix E**.

As for significant issues, the Forest Service identified one topic raised during project planning and scoping was mechanical tree thinning in late seral habitat that is important for species such as great grey owl, California spotted owl, northern goshawk, American marten, and Pacific fisher.

DECISION FRAMEWORK

After reviewing this environmental assessment (EA) and supporting documents and considering all public input on the project, the Forest Supervisor will decide whether to select the proposed action, select the modified action, or take no action. The decision will be in accordance with Forest Plan goals, objectives, and desired future conditions. If an action alternative is selected, the decision will specify:

1) The timeline of the proposed activities that would take place.

2) The mitigation and monitoring requirements that would occur.

The purpose of the EA is to disclose environmental effects of the Proposed Action and alternatives. As the Responsible Official, the Forest Supervisor will make a decision based on a review of the EA. The Forest Supervisor will decide: 1) whether to proceed with one of two action alternatives, or the "no action" alternative, and 2) whether the decision that is selected will have a significant impact on the quality of the human environment or not. If a determination is made that the impact is not significant, then a "Finding of No Significant Impact" (FONSI) will be prepared, and the decision of the Forest Supervisor would be documented in a Decision Notice (FSH, 1909.15, 43.2). Significant impacts on the quality of the human environment would require the preparation of an Environmental Impact Statement [NEPA, 1501.4 I and (e)].

ALTERNATIVES

This section describes and compares the alternatives considered for the Soldier Creek HFR project. It includes a description of each alternative considered. This section also presents the alternatives in comparative form, sharply defining the difference between each alternative and providing a clear basis for choice among options by the decision maker and the public. Some of the information used to compare the alternatives is based upon the design of the alternatives and some of the information is based upon the environment, social, and economic effects of implementing each alternative. Please refer to Table 6 and Table 7 for a comparison of the alternatives.

ALTERNATIVE 1 (PROPOSED ACTION)

The Groveland Ranger District proposes the following treatment activities to achieve desired conditions for the project area and meet the defined purpose and need. This alternative proposes to treat approximately 2,600 acres of the 5,400-acre analysis area. Proposed treatments are detailed in Tables 1, 2, and 3. A map of treatment units for the proposed action is provided in **Appendix B**. The units are designed to reduce ladder fuels that can carry fire into the forest canopy by reducing accumulations of surface and ladder fuels. In the event of wildfire the proposed actions would reduce flame lengths, reduce rate of spread, increase fireline production levels, and increase protection of national forest, national park, and private lands from a high severity wildfire. Fuel break treatment units are designed to be more resistant to wildfire events and provide strategic areas for potential fire suppression activities. Treatment methods proposed are mechanical thinning, mastication, machine pile and burn, hand thin and hand pile and burn, and underburning. Tables 1 and 2 detail the list of proposed treatments. The treatments overlap in several areas; this causes a situation where treatments acres are greater than total acres. The overlap is approximately 140 acres.

Mechanical Thinning

Mechanical thinning would remove trees greater than 4" and less than 30" diameter at breast height (DBH); primarily suppressed and smaller trees. The emphasis is on retaining large, healthy, and vigorous trees. Large trees would be favored for retention to maintain stand diversity, structure, and health. Mechanical thinning would enhance forest health and vigor, by increasing available water, limiting damage caused by insect and disease, and by reducing competition. Removing suppressed and small trees would also reduce the fire threat by increasing the distance from surface fuels to the crown of the trees and the distance between tree crowns. Biomass removal is proposed to remove heavy ladder fuels. Small trees would be spaced approximately 25' apart to ensure adequate stocking. Black oak trees and other hardwood species would be favored for retention. Mechanical thinning would be conducted for fuels reduction and would adhere to requirements and guidelines stated in the Stanislaus National Forest: Forest Plan Direction, 2005 and the Sierra Nevada Forest Plan Amendment, 2004. Trees over 30" diameter would only be removed where necessary for operational safety. Mechanical thinning would be conducted on approximately 500 acres. Seven treatment units would be thinned using ground based tractor methods. Four units are on slopes that consistently exceed 35% in which skyline based methods are proposed. Mechanical thinning would remove trees as sawlogs, biomass chips, and other products.

Mastication

In forested stands, brush and small trees up to 10" diameter would be masticated and left on site as mulch. The smaller trees would be thinned, leaving the larger trees in a spacing that promotes tree growth and allows for the re-introduction of fire. The spacing specifications would consist of an uneven spacing varying from approximately 15 to 30 feet depending on tree size, location, and environmental variables. In most instances, mastication would be conducted after mechanical thinning operations in order to improve mastication efficiency. Mastication is proposed on approximately 1,110 acres.

Table 1 - Proposed Mechanical Thinning/Mastication Units

UNIT	ACRES	MECHANICAL THINNING[1]	MASTICATION[2]	GROUND BASED	SKYLINE
24011	28	Yes		•	
24018	81	Yes	Yes	•	

UNIT	ACRES	MECHANICAL THINNING[1]	MASTICATION[2]	GROUND BASED	SKYLINE
24021	23	Yes			•
24023	8	Yes			•
24026	133	Yes		•	
24035	25	Yes			•
30021	21	Yes		•	
30048	46	Yes	Yes	•	
30058	10	Yes		•	
30131	6	Yes			•
30134	116	Yes	Yes	•	
Total Acres	497	497	243	435	62

Table Notes:

[1] Mechanical Thinning involves the cutting and removal of selected trees from 4.0 inches to 29.9 inches diameter at breast height; trees will be removed as multiple products.

[2] Mastication involves the mechanical shredding of small trees and brush up to 10.0 inches in diameter at breast height, shredded material is left in the project unit at piece sizes determined by contract specifications.

Machine Pile and Pile Burn

Slash from past timber harvest operations and past fire suppression activities, as well as pockets of dead small trees and heavy fuel concentrations would be piled using mechanical equipment and then burned. This would be conducted after other activities have been completed and only where necessary. Machine piling and pile burning is proposed on up to approximately 160 acres and would be accomplished by the Forest Service or by a service contract.

Hand Thin, Hand Pile, and Pile Burn

In rocky and steep terrain inaccessible to tracked machines and other sensitive resource areas, small trees, brush, and dead vegetation would be cut with chainsaws, piled, and subsequently burned. Burn piles would be placed to minimize tree scorch and resource concerns. This treatment would occur on small portions of most units. Tree spacing would be the same as mastication. This treatment would be accomplished by the Forest Service or a service contract.

Prescribed Fire

Prescribed fire would be used to reduce residual fuels and to re-introduce fire into these fire-dependent ecosystems. Post mechanical treatment evaluations of site-specific fuels conditions would be completed to determine the need for follow-up prescribed burning. In preparation for prescribed fire, perimeter fireline may be constructed where roads, trails, or natural barriers are absent. Burn prescription parameters would be designed to achieve a fire with an average flame length no greater than 4 feet. Burn objectives also include protection of sensitive features such as archaeological sites, sensitive plant populations, nest trees, riparian areas, and minimizing air quality issues as well as avoiding the spread of noxious weeds and use of fire-lines as motorized trails. Underburning is proposed on approximately 2,124 acres.

Table 2 - Proposed Mastication/Pile/Prescribed Fire Units

Unit	Total Unit Acres	Treatment						
		MASTICATION	*ACRES*	MACHINE PILING	*ACRES*	HAND THINNING AND HAND PILING	PRESCRIBED FIRE	
							UNDERBURNING	PILE BURNING
F01	105	●	85	●	10	●		●
F02	183	●	100	●	30	●	●	●
FB03[A]	359	●	200	●	50	●	●	●
F04	18					●	●	●
FB05[A]	60	●	60			●		●
F06	37	●	37					
F07	57					●	●	●
F08	21	●	21					
F09[B]	71	●	35	●	10	●	●	●
F10	75					●	●	●
F11	33					●	●	●
F12	54					●	●	●
F13[C]	88					●	●	●
F14[C]	76					●	●	●
F15	114	●	50	●	60	●	●	●
F16	6					●		●
F17	4					●		●
F18	31					●	●	●
F19	111					●	●	●
F20	178					●	●	●
F21	17					●	●	●
F22	103					●	●	●
F23	204	●	204			●	●	●
F24	158					●	●	●
FB25[A]	42					●	●	●
FB26[A]	22					●		●
FB27[A]	31					●	●	●
FB28[A]	34					●		●
30047	75	●	75			●	●	●
30048[D]	46					●	●	●
Total Acres	2,413		385		160	Small Portions of Units	2,124	Same as Hand Piling

Table Notes:
[A] FB designates a fuel break unit, fuel break treatments are designed to be more resistant to wildfire events and provide strategic areas for potential wildfire suppression activities.
[B] Unit F09 – Adjacent to the small segment of private land, some trees may be cut and removed offsite in order to minimize fuel loading and achieve visual goals around the private land.
[C] Unit F14 is within thinning unit 24026. Unit F13 is within thinning units 24021 and 24018.
[D] This mechanical thinning unit will be treated with prescribed fire after the completion of the mechanical thinning treatments.

Roadside Fuels Reduction

Roadside fuels treatments are proposed along the following selected roads: Highway 120, Harden Flat Road, Golden Arrow Road, 1S11, 1S11A, 1S11C, 1S12, 1S13Y, 1S16Y, 1S20, 1S69, 1S70, 1S71, 1S75, 2S30, and 2S30C. Treatments include hand thinning, hand piling, and pile burning of brush and small trees for distances of approximately 20 feet on each side listed roads (except Highway 120) within the

project area. Trees hazardous to public safety will also be cut and removed or cut and left in place along these road corridors. Highway 120 clearing involves a clearing distance of approximately 200 feet on each side of the highway using a combination of mechanical mastication and hand thinning/hand piling, and pile burning.

Transportation Activities

The proposed action would include improvement of existing National Forest System Roads as needed to safely and efficiently carry out the proposed mechanical thinning and fuels reduction activities. Most of the activities proposed would create or restore drainage features on existing roads, making the road system less prone to erosion damage, and to improve access for management as well as recreation and potential fire suppression activities. Approximately 15 miles of National Forest System Roads would be improved.

The improvements are categorized as follows:

Reconstruction and maintenance of approximately 12.4 miles of roads is required to provide equipment and vehicle access for mechanical thinning and fuels reduction. Reconstruction and maintenance actions include reconditioning the roadway, repairing and improving drainage features, placing crushed rock and/or soil on road surfaces, cleaning culverts, constructing or restoring dips and lead-off ditches, removing encroaching vegetation, allowing for safe travel way for chip van passage and repairing other drainage problems that are leading to road surface erosion. Reconstruction would return the roads to their intended condition and would reduce future erosion and traffic safety risks.

Restoration would occur on approximately 1.5 miles of roads with watershed or erosion concerns not related to project access. Restoration activities would include repairing gullies, minor realignments to reduce stream sedimentation, and repair or replacement of culverts, dips, leadoff ditches, and/or similar drainage features.

Roadside brush removal clearing limits would be approximately five feet from the edge of the roadway. Trees that are hazardous to public safety along the road and dangerous to powerline corridors would be cut and removed or cut and left in place. Small trees (less than 12" DBH) within treatment areas that are a threat to the powerlines will be cut, masticated, and/or removed. Trees over 30" DBH would be removed only when necessary for public safety or protection of powerlines. Road improvement activities would be conducted in a manner that reduces the risk of noxious weed spread. Roads to be improved are listed in Table 3 below and detailed in **Appendix B**.

Table 3 - Alternative 1 - Proposed Road Treatments

Road #	Maintain Miles	Reconstruction Miles	Restoration Miles	Temp Road Miles
01S01Y		0.7		
01S01YB		0.5		
01S11		1.0		
01S13Y		0.3	0.1	
01S16Y		1.9		
01S31Y	0.2			
01S56Y		0.6	0.4	
01S57Y			0.1	
01S59		0.9		

Road #	MAINTAIN MILES	RECONSTRUCTION MILES	RESTORATION MILES	TEMP ROAD MILES
01S59Y			0.2	
01S61Y		0.3		
01S65Y			0.2	
01S70		0.1	0.1	
01S71	0.2	1.6	0.1	
02S30		3.1		
02S40		0.5		
02S87		0.6		
1S1933C			0.1	
F6041			0.1	
F6046				0.7
F6207	0.1			
FR9381			0.1	
Total	0.5	11.9	1.5	0.7

Watershed Restoration

A small gully was identified below a spring east of Rush Creek in unit F12. Sediment produced by this gully travels down road 1S1933C and is deposited into Rush Creek. This gully would be stabilized in place by planting riparian vegetation collected locally. Three other meadows within the project area have minor headcuts. These meadows are Crocker Meadow, a meadow next to private land in unit F09, and a meadow in the southern portion of unit F20. Willow planting is proposed for these three locations to prevent headcuts from expanding in these meadows. The total area proposed for treatment of all four meadows would be approximately 1 acre. Approximately 300 willow stakes would be planted using hand tools. Follow up planting may occur in future years to replace willow stakes that did not establish.

CHANGES TO ALTERNATIVE 1 FROM SCOPING

Due to several public comments received during the scoping period and additional environmental analysis, five changes were made to the proposed action presented in the scoping letter:

1) Timber unit 30011 was dropped from proposed treatments. Mechanical thinning by any method would have reduced canopy cover below standard and guidelines presented in the Forest Plan.
2) Timber unit 30042 was dropped from proposed treatments. The stand contains a past spotted owl nest site. In addition, mechanical thinning would not significantly increase the effectiveness of fuels reduction or be economically efficient due to small timber volume, small unit size, and logistical difficulties involved with mechanically thinning the unit. This unit would not meet purpose and need #6.
3) A clerical error resulted in the lack of addition of 204 acres of mastication in unit - F23. The action was shown in the scoping document and treatment maps but the acres were not added to the total acres of mastication. Mastication acres is corrected to approximately 1,110.
4) Powerline corridors that are located in existing treatment units will have trees that are a danger to the powerline (trees that may damage the line if they fall and trees that are a fire hazard by providing a medium for electrical arcing either while standing or during sway) fallen and left in place, removed, and/or masticated.
5) The planting of willows has been expanded to included three additional meadow areas, increasing the planting area from 0.25 acres to a total of approximately 1 acre.

ALTERNATIVE 2 (MODIFIED ACTION)

In response to public comments, regarding the protection of late seral habitat and a concern over thinning trees larger than 20" DBH, an additional action alternative was developed. Alternative 2 eliminates the mechanical thinning treatments with the exception of thinning trees less than 12" DBH in unit 30134. See the Alternatives Considered but Eliminated from Detailed Study section for an explanation of various diameter limits considered.

The treatments in Table 2, road restoration, and watershed restoration treatments are unchanged between Alternative 1 and Alternative 2. Alternative 2 proposes to treat approximately 2,350 acres of the 5,400-acre analysis area. The treatments overlap in several areas; this causes a situation where treatments acres are greater than total acres. The overlap is approximately 65 acres.

Modification occurs with the Mechanical Thinning Units and related Transportation Activities. Mastication would occur in the units as shown in Tables 2 and 4 with the same specifications as detailed in Alternative 1. Unit 30134 would involve mechanical thinning for the removal of biomass only. No tree over 12" DBH would be removed under this alternative except for danger or hazard trees. Because of the extremely high density of small trees in unit 30134, it is not possible to use mastication or burning alone. The only road reconstruction and maintenance occurring would be to roads 2S30, 2S87, and 1S11 in order to provide chip van access to Unit 30134. Treatments are described in Table 4 and Table 5 and a map of the Alternative 2 treatment units is provided in **Appendix C**.

Table 4 - Alterative 2 - Proposed Units (Treatments in addition to Table 2)

Unit	Acres	Treatment			
		MECHANICAL THINNING[1]	MASTICATION[2]	GROUND BASED	SKYLINE
24018	81		Yes	•	
30048	46		Yes	•	
30134	116	Biomass Removal		•	
Total Acres	243	116	127		

Table Notes:
[1] Mechanical Thinning for biomass removal involves the cutting and removal of selected trees from 4.0 inches to 12.0 inches diameter at breast height; trees will be removed as multiple products.
[2] Mastication involves the mechanical shredding of small trees and brush up to 10.0 inches in diameter at breast height, shredded material is left in the project unit at piece sizes determined by contract specifications.

Table 5 - Alternative 2 - Proposed Road Treatments

Road #	MAINTAIN MILES	RECONSTRUCTION MILES	RESTORATION MILES	TEMP ROAD MILES
01S11		1.0		
01S13Y			0.1	
01S31Y	0.2			
01S56Y			0.4	
01S57Y			0.1	
01S59Y			0.2	
01S65Y			0.2	
01S70			0.1	
01S71	0.2		0.1	
02S30		2.7		
02S87		0.6		

Road #	MAINTAIN MILES	RECONSTRUCTION MILES	RESTORATION MILES	TEMP ROAD MILES
1S1933C			0.1	
F6041			0.1	
F6046				0.7
F6207	0.1			
FR9381			0.1	
Total	0.5	4.3	1.5	0.7

ALTERNATIVE 3 (NO ACTION)

Proposed management activities would not be implemented under this alternative. Under the no action alternative, no specific treatment activities would occur to accomplish the project goals or address the purpose and need for the project. No mechanical thinning, fuels reduction, transportation system, or watershed restoration work would occur. This alternative also provides a baseline of conditions used to compare the environmental effects of the varying action alternatives. It is important to state that environmental conditions, vegetation, and ecosystems continue to be dynamic and change under the no action alternative.

ALTERNATIVES CONSIDERED BUT ELIMINATED FROM DETAILED STUDY

Federal agencies are required by NEPA to rigorously explore and objectively evaluate all reasonable alternatives and to briefly discuss the reasons for eliminating any alternatives that were not developed in detail (40 CFR 1502.14). This section details alternatives that were considered, discussed, and reviewed by the Interdisciplinary Team but eliminated from the planning process during the design, review, and environmental analysis of the Soldier Creek HFR project. Some alternatives eliminated from detailed study are the result of public comments and are noted as such below:

a) An alternative that consisted of 4 additional skyline timber harvest units was considered and eliminated from detailed study. The skyline timber harvest units did not contain the necessary timber volume to make the treatment economically efficient (Purpose and Need - #6). Resource concerns also eliminated this alternative from detailed study (Purpose and Need - #2).

b) An alternative that consisted of 29 timber harvest units (Alternative 1 includes 11 timber harvest units) was considered and eliminated from detailed study. Many of these units contained low canopy cover stands which if thinned would not meet requirements of the Stanislaus Forest Plan. Several units were found to contain active spotted owl and/or goshawk nests, which were not previously known prior to timber stand exams and follow-up wildlife surveys. Subsequently, protected activity centers were created which prevent mechanical thinning (Purpose and Need #2). Several units also did not contain the necessary timber volume to the make the treatment economically efficient (Purpose and Need - #6).

c) An alternative that consisted of mechanical thinning of trees with a diameter limit at DBH of 20 inches was considered and eliminated from detailed study. Due to the nature of the stands in this project and the combination of mechanical thinning units in this project, this alternative would not have been viable as a timber sale with the removal of trees considered as ladder fuels. The removal to meet our purpose and needs would require a service contract. Appropriated funds are very limited especially for expensive treatments such as biomass (recent contracts for such work exceed $800 per acre) and would not be available for that level of treatment necessary to meet the purpose and need in the Soldier Creek HFR project (Purpose and Need #2 and #6). A modification of this alternative resulted in Alternative 2, which is analyzed in detail. Sierra Forest Legacy requested an analysis of

diameter limits at each 2" diameter groups above 12". Diameter limits between 12" and 20" have the same concerns as for a 20" diameter limit.

d) An alternative that consisted of additional mechanical thinning of Wildland-Urban Interface (WUI) - Defense areas adjacent to Berkeley-Tuolumne Camp and to the Sunset Inn was considered and eliminated from detailed study. In the area adjacent to Berkeley-Tuolumne camp, surveys found a predominate slope too steep for mechanical thinning (>45%) by ground based machines. Thinning could only be logistically done by skyline or helicopter. The area consists of a protected activity center for spotted owls, which limits the intensity of mechanical thinning. This limitation makes it very expensive to treat such an area, which does not meet our Purpose and Need - #6. The area adjacent to the Sunset Inn was considered for mechanical thinning but was not considered viable due to the presence of springs and cultural sites that limit the intensity of mechanical thinning.

e) An alternative that consisted of additional fuels reduction treatments across the project area as well as in areas adjacent to Yosemite National Park was considered and eliminated from detailed study. To meet fuels objectives some of these areas would require extensive amounts of biomass removal and hand thinning. These treatments are expensive per area treated and prescribing these treatments across wide areas would not meet our Purpose and Need - #6. Additionally, some areas would require such extensive fuels treatment that this alternative would not meet Purpose and Need - #2.

COMPARISON OF ALTERNATIVES

This section provides a summary, in table form, of the effects of implementing each alternative. Information in this table is focused on activities and effects where different levels can be distinguished among alternatives.

Table 6 - Comparison of Alternatives - Treatments

PROJECT ACTIVITY	ALTERNATIVE 1 PROPOSED ACTION	ALTERNATIVE 2 MODIFIED ACTION	ALTERNATIVE 3 NO ACTION
Total Acres for Treatment	2,600	2,350	0
Mechanical Thinning with product removal. (acres)	497	116 (trees < 12"DBH)	
Total Acres for Mastication	1,110	994	0
Prescribed Fire (acres)	2,124	2,124	0
Machine Piling (acres)	160	160	0
Total Road Treatments (miles)	14.6	7.0	0.0
Road Reconstruction/Maintenance/ Temporary (miles)	13.1	5.5	0.0
Road Restoration Treatments (miles)	1.5	1.5	0.0
Watershed Restoration (acres)	1.0	1.0	0.0

Table 7 - Comparison of Alternatives - Project Goals

PROJECT GOALS	ALTERNATIVE 1 PROPOSED ACTION	ALTERNATIVE 2 MODIFIED ACTION	ALTERNATIVE 3 NO ACTION
Air Quality Burning in accordance with Title 17, Smoke Management Guideline	Approximately 2,100 tons of PM_{10} emissions produced under controlled conditions. Smoke managed, minimal impact to human health.	Approximately 2,100 tons of PM_{10} emissions produced under controlled conditions. Smoke managed, minimal impact to human health.	Approximately 2,800 tons of PM_{10} emissions produced during wildfire conditions. No smoke management with greater impacts to human health and susceptible individuals.
Aquatic Wildlife Protect aquatic and riparian resource values.	No effect on California red-legged frog. May affect individuals, but is not likely to result in a trend toward federal listing or loss of viability of western pond turtle or foothill yellow-legged frog.	No effect on California red-legged frog. May affect individuals, but is not likely to result in a trend toward federal listing or loss of viability of western pond turtle or foothill yellow-legged frog.	Wildfire would reduce canopy cover and increase sediment delivery to the South Fork of the Tuolumne River and its tributaries. This would likely result in an adverse modification to the existing habitat.
Botany *Botanical Interest Species* Enhance and protect characters. *Noxious Weeds:* Prevent spread and restrict current population levels. *Sensitive Plants:* Protect sensitive plant occurrences.	No significant effects, hand treatments protect species from high severity wildfire.	No significant effects, hand treatments protect species from high severity wildfire.	Significant risk to loss of species by a high severity wildfire.
	Potential increases in weed populations, possible introduction of new weed species.	Potential increases in weed populations, possible introduction of new weed species.	Significant risk for large increases in populations of noxious weeds due to ecosystem changes from a high severity wildfire.
	Possible impact to sensitive plant individuals but no trend in decline of populations, possible beneficial release of some sensitive plants from reduced canopy cover and the introduction of disturbance.	Possible impact to sensitive plant individuals but no trend in decline of populations, possible beneficial release of some sensitive plants from reduced canopy cover and the introduction of disturbance.	*Cypripedium montanum* and *Hydrothyria venosa* have a high potential to be eliminated in a high severity wildfire, other sensitive plant species might be lost if seed bank is impacted.
Climate Change and Carbon Resources Increase ecosystem resiliency to climate change and protect carbon resources in the long-term	Provides the best opportunity to provide a durable, more resilient open stand structure that will resist high severity wildfire events and protect soil and tree-based carbon stocks.	Provides an opportunity to reduce the probability of a high-severity wildfire to protect soil and tree-based carbon stocks by reducing surface fuels, ladder fuels, and providing strategic areas for fire suppression.	Does not protect carbon stocks from a high-severity wildfire and doesn't increase tree, stand, or landscape resiliency in response to climate change.
Economics Benefits to local community and cost efficiency to government	**Revenue** $55,000 from tree removal KV Collections will be made and put into other treatments. **Cost** Mastication – 1,110 acres - $555,000 Mechanical piling and burning – 160 acres - $59,000	**Revenue** $0 **Cost** Mechanical thinning (biomass removal) – 116 acres - $95,000 Mastication – 994 acres - $497,000 Mechanical piling and burning – 160 acres - $59,000	Costs associated with suppression of a moderate to large wildfire could occur with any alternative. No action has higher risk. For example - Fire suppression on the Groveland District in the Summer of 2008: North Mountain: $2180 per acre with 2,100 acres on FS land

PROJECT GOALS	ALTERNATIVE 1 PROPOSED ACTION	ALTERNATIVE 2 MODIFIED ACTION	ALTERNATIVE 3 NO ACTION
	Prescribed burning – 1,936 acres - $260,000 Road reconstruction and maintenance costs – $115,000 **Treatment Cost** **$934,000** Costs are expected to be spread over 2-7 years. Some opportunities for direct employment from timber harvest and service contracts would occur. Use of support services by contractors would benefit local economies. Reduced fire risk with unknown reduction in suppression cost.	Prescribed burning – 1,936 acres - $260,000 Road reconstruction and maintenance costs – $55,000 **Treatment Cost** **$966,000** The costs are expected to be spread over 2-7 years. Some opportunities for direct employment from service contracts would occur. Use of support services by contractors would benefit local economies. Reduced fire risk with unknown reduction in suppression cost.	**Total = $4.6 million** Telegraph: $1100 per acre with 5,000 acres on FS land **Total = $5.5 million** Costs would be incurred in a period of weeks to months. Suppression actions using local contractors would benefit economies.
<u>Fire and Fuels</u> Create defensible space near communities. Reduction of fire severity, potential for crown fire, and create conditions that are favorable to suppression of unwanted wildfires.	Reduced risk of wildfire to communities, modification of fire behavior at the site, stand, and landscape scales. Avg. Flame Length = 3 ft Fireline Intensity = 155 Btu/ft/s Rate of Spread = 8 chains per hour Resistance to Control: Persons with hand tools can generally attack fire at head or flanks	Reduced risk of wildfire to communities, modification of fire behavior at the site, stand, and landscape scales, Approximately 9% less treatment area, broad effects similar to Alternative 1. Avg. Flame Length = 3 ft Fireline Intensity = 155 Btu/ft/s Rate of Spread = 8-11 chains per hour Resistance to Control: Persons with hand tools can generally attack fire at head or flanks	Defensible space is not created. Conditions and areas are unfavorable to suppression of wildfire, firefighter safety is not improved. Potential for future high severity wildfire persists. Avg. Flame Length = 11 ft Fireline Intensity = 655 Btu/ft/s Rate of Spread = 14 chains per hour Resistance to Control: Limited to indirect attack with mechanical equipment, problems with crowning, spotting, and major fire runs.
<u>Cultural Resources</u> Protect cultural resources.	Possibility of wildfire damage is reduced.	Possibility of wildfire damage is reduced.	Increased potential for damage to cultural resources from wildfire.
<u>Hydrology</u> Maintain/improve water quality and watershed conditions.	Detrimental watershed impacts unlikely. Reduced potential for high severity wildfire.	Detrimental watershed impacts unlikely. Reduced potential for high severity wildfire.	Increasing potential for high severity wildfire with subsequent detrimental watershed impacts.
<u>Recreation</u> Protect improved campsites from wildfire. Protect recreating campers from undue negative effects of treatment activities.	Fire resistance in camp sites is increased; Limited Operating Periods are used where needed to protect campers from treatment activities.	Fire resistance in camp sites is increased; Limited Operating Periods are used where needed to protect campers from treatment activities.	No change from current conditions.

PROJECT GOALS	ALTERNATIVE 1 PROPOSED ACTION	ALTERNATIVE 2 MODIFIED ACTION	ALTERNATIVE 3 NO ACTION
Silviculture Reduction of tree mortality due to insects, disease, fire, and drought. Increase growth rates of trees, to enhance and accelerate late seral characters.	Tree vigor increased. Growth rates increased. Detrimental outbreaks of insects and disease decreased. Likelihood of stand replacing wildfire decreased.	Tree vigor slightly increased. Growth rates slightly increased. Detrimental outbreaks of insects and disease slightly decreased. Likelihood of stand replacing wildfire decreased.	Tree vigor decreased. Growth rates decreased. Detrimental outbreaks of insects of and disease increased. Likelihood of stand replacing wildfire increased.
Soils Protect productivity and ecological function.	Reduced potential for detrimental soil impacts caused by high severity wildfire. Short -term erosion increase during project activities, with recovery to natural erosion patterns after project completion.	Reduced potential for detrimental soil impacts caused by high severity wildfire. Short -term erosion increase during project activities, with recovery to natural erosion patterns after project completion.	Increasing potential for high severity wildfire with detrimental soil impacts. Unnatural soil erosion patterns expand and resulting sediment is delivered to watercourses.
Terrestrial Wildlife Protect threatened, endangered, & sensitive species and related habitat. Reduce/minimize loss of habitat from disease, wildfire, treatment actions, and other management activities.	No effects to threatened or endangered species. Mechanical thinning in PACs limited to trees 12" DBH or less. Mechanical thinning up to 30" DBH in HRCA and other suitable mature forest habitat. Short-term adverse human disturbance and reduction in mature forest habitat values. Long-term beneficial effects to mature forest habitat for spotted owl, goshawk, great grey owl, forest carnivores. Improves meadow foraging habitat for great grey owl. Protects roosting trees, prey habitat, snags, and foraging habitat for Townsend's big-eared bat, pallid bat, and western red bat.	No effects to threatened or endangered species. Reduced mechanical thinning in HRCA and other suitable mature forest habitat and reduced associated human disturbance. Similar to Alternative 1 but to a lesser degree, short-term adverse human disturbance and long-term beneficial effect on mature forest, meadow, and oak habitat retention and connectivity. Reduction in shrub and dense small tree habitats.	No direct effects to threatened, endangered, or sensitive species. Potential for loss of dense forest habitat values from conifer die-off due to competition or stand-replacing wildfire. Ongoing decline in meadow and riparian habitat values.
Visual Quality Retain natural appearance in Scenic Corridor.	Treatments along roadways meet LRMP standards. Forest will appear more open along Highway 120.	Treatments along roadways meet LRMP standards. Forest will appear more open along Highway 120.	No change from current conditions.

MANAGEMENT REQUIREMENTS COMMON TO ALL ACTION ALTERNATIVES

The Soldier Creek Interdisciplinary Team identified the following management requirements to protect sensitive resources and mitigate the potential environmental impacts of the action alternatives. Management requirements listed here are from the Resource Specialists' reports completed during the NEPA process and are on file at the Groveland Ranger District.

Air Quality

Attain lowest achievable emission rates by conducting prescribed fire under an approved burn plan, including a smoke management plan, which is required for prescribed burning on the Stanislaus National Forest. All prescribed burning will be done in accordance with Title 17, Smoke Management Guidelines for Agricultural and Prescribed Burning, as required by the California Air Resources Board and Stanislaus National Forest Fire Management Plans. The effects of prescribed burning on air quality would be minimized by monitoring, mitigation, and contingency measures identified in the Smoke Management Plan. Desirable meteorological conditions such as favorable mixing layer and transport winds would be part of the Smoke Management Plan, to facilitate venting and dispersion of smoke. Best Available Control Measures would be implemented to mitigate smoke in order to:

- Allow dilution and facilitate dispersion,
- Reduce the amount of pollutants per unit area, and
- Spread the concentrations of smoke emissions over time.

Aquatic Wildlife

1) In units F01, F02, and F04 do not hand cut or pile fuels within approximately 50 feet of the South Fork Tuolumne River to maintain the near-stream integrity of the upland environment and to discourage dispersed recreation (camping) from occurring near the stream.
2) In unit F04, conduct pile burning in spring to minimize the impact to over-wintering turtles.

Botany

BOTANICAL INTEREST SPECIES

There is a small grove of giant sequoia trees (*Sequoiadendron giganteum*) which appears to be naturally occurring in unit F07. The following management requirements would reduce the risk of adverse effects to this grove and enhance the ability of the trees to grow and thrive.

1) Emphasize retention of giant sequoias when thinning and burning for fuels reduction. Manage the stand to provide healthy tree spacing for the giant sequoias.
2) To the extent possible, provide for optimal sunlight exposure for the giant sequoias by opening the surrounding conifer stand. Enhance the reproductive opportunities of the giant sequoias by introducing periodic underburning to create mineral soil areas needed for seed germination.

NOXIOUS WEEDS

The following management requirements would reduce the likelihood of introducing new noxious weed infestations and reduce the risk of spreading existing noxious weeds in the project area.

Table 9 - Weed Prioritization in the Soldier Creek HFR Project

Weed Name[1]	Status[2]	Project Priority	Comments
Bull Thistle (*Cirsium vulgare*)	CDFA C-Rated	High	High for dense infestations in or near meadows, wetlands, landings, and skid trails; Low for scattered plants.
Yellow Star-thistle (*Centaurea solstitialis*)	CDFA C-Rated	High	
Woolly Mullein (*Verbascum thapsus*)	Invasive, Non-native Pest Plant	Moderate	Moderate for dense infestations, Low for scattered plants.
Klamathweed (*Hypericum perforatum*)	CDFA C-Rated	Low	Common weed. Biocontrol insects keeping it in check.

[1] The weeds were prioritized with respect to how much consideration for weed spread they should be given for the proposed project activities. The invasiveness, state rating, prevalence across the Ranger District, and control factors of the weeds were used in assigning these priorities.
[2] CDFA is the California Department of Food and Agriculture. CDFA pest ratings are defined at: http://www.cdfa.ca.gov/phpps/ipc/encycloweedia/encycloweedia_hp.htm.
Invasive, non-native pest plants have no CDFA pest rating.

1) For all logging contract operations, implement the equipment cleaning requirements in the standard contract provision.
2) For all non-logging contract operations: all mastication equipment, road grading, or construction equipment, clothing (particularly footwear), and other equipment, including the transport vehicle should be free of soil, mud (wet or dried), seeds, vegetative matter, or other debris which could contain seeds in order to prevent new infestations of noxious weeds in the project area. Dust or very light dirt, which would not contain weed seed, is not a concern.
3) Where possible while meeting the purpose and need of the project, flag, and avoid high and moderate priority noxious weeds in mechanical project activities. Manual methods such as hand thinning may take place within noxious weed sites if timed for before seed set.
4) To the extent possible, if flowers or seeds are present on the plants, manually treat dense infestations of bull thistle and woolly mullein in landings and skid trails prior to using these facilities to prevent spread. In the years following use of landings and skid trails, monitor for noxious weeds and manually treat infestations of yellow star-thistle and any new high priority noxious weeds found, and dense infestations of bull thistle and woolly mullein. Manual treatment would entail hand pulling, digging, cutting and bagging of flower heads, or solarization with black plastic (solarization would most likely be used in years following use).
5) Where it is not possible to keep off-road equipment out of sites infested with high priority noxious weeds, clean heavy equipment so that it is free of soil, seeds, vegetative matter, or other debris prior to being moved from infested sites to uninfested sites and prior to being transported out of the project area.
6) When needed for soil stabilization, use certified weed-free mulches where available, mulches with low risk of weed introduction where certified weed-free is not available, and certified weed-free seed mixes. When project-generated logging slash or chipped biomass is used for soil stabilization, it should be obtained from sites free of noxious weeds. Seed mixes must conform to the Region 5 Policy on the Use of Native Plant Material in Restoration or Revegetation Projects.
7) Crushed rock, drain rock, riprap, and soil fill for road restoration, reconstruction, and maintenance shall be obtained from weed-free sources. Do not stockpile or stage these or other construction materials in sites with noxious weeds.

8) Monitor the project area through time for noxious weeds to determine if existing seeds are being spread, or if weeds were accidentally introduced by project activities. Hand pull any small, newly discovered infestations. Assess the need for a long-term eradication strategy, if needed.

SENSITIVE PLANTS

The sensitive plants *Clarkia australis* (Small's southern clarkia), *Cypripedium montanum* (mountain ladyslipper orchid), *Hydrothyria venosa* (veiny aquatic lichen or waterfan), and *Mimulus filicaulis* (slenderstem or Hetch Hetchy monkeyflower) are known to occur within or adjacent to proposed project units. In order to reduce, minimize or alleviate possible adverse effects to sensitive plants, the following management requirements will be implemented with the activities of the Soldier Creek Healthy Forest Restoration project:

1) In units, where sensitive plant surveys are incomplete, the presence of sensitive plant species will be assumed and the non-surveyed specifically identified suitable habitat will be excluded from treatment.
2) Flag and avoid occurrences of sensitive plants except as allowed below.
3) Hand thinning and manual brush cutting may take place within *Clarkia australis*, *Clarkia biloba* ssp. *australis, Mimulus filicaulis*, or *Mimulus pulchellus* occurrences only during the dry non-growing period. Refer to the table below, for the dry non-growing periods for these species. Material generated during hand thinning or brush cutting may not be piled, lopped and scattered or otherwise placed within sensitive plant occurrences.
4) Underburning may be conducted within occurrences of *Clarkia australis*, *Clarkia biloba* ssp. *australis, Mimulus filicaulis,* or *Mimulus pulchellus* only during the dry, non-growing period. Refer to the table below for the dry non-growing periods for these species.
5) Mastication may be conducted within *Clarkia australis* occurrences only during the dry non-growing period. Refer to the table below for the dry non-growing period for this species.
6) Any new occurrences of sensitive plants discovered in the project area will be evaluated for possible effects from project activities and protective measures will be implemented to prevent loss of these new occurrences.
7) Avoid to the extent possible foot traffic by contractors and forest workers within or through occurrences of sensitive plants, except as allowed in #3 or #4, above.

Table 8 - Growing Seasons and Appropriate Identification Periods for the Sensitive Plants

Species[1]	Common Name[2]	Growing Season	I.D. Period	Dry, Non-Growing Period[3]
Clarkia australis	Small's southern clarkia	Dec 1 - Aug. 15	June 15 - Aug. 15	Aug 15 - Nov 30
Clarkia biloba ssp. *australis*	Mariposa clarkia	Dec 1 - July 31	May 15 - July 15	Aug 1 – Nov 30
Cypripedium montanum	mountain ladyslipper orchid	Apr. 15 - June 30	May 1 - June 30	none
Hydrothyria venosa	veiny aquatic lichen	all year	all year	none
Mimulus filicaulis	slenderstem monkeyflower	Mar. 15 - July 15	Apr. 15 - June 30	July 15 – Nov 30
Mimulus pulchellus	yellowlip pansy monkeyflower	Mar. 1 - June 15	Apr. 1 - June 1	June 15 – Nov 30

[1]The dry, non-growing period is the time when these species are most resistant to disturbance activities. All dates are approximate, varying with elevation, weather and site conditions.
[2]Common name as referenced by the USDA Plants Database – www.plants.usda.gov
[3]The actual dry, non-growing period will be determined by field observations year to year by a botanist.

Monitoring

The objective of monitoring sensitive plant occurrences is to ensure that the project designs, including the sensitive plant protective measures, are sufficient to protect these resources.

1) Monitoring should take place during project activities and directly after project activities are completed near sensitive plants, to ensure that protective measures are sufficient. This monitoring can be conducted by the Forest Service project inspector concurrently with project inspections. Any occurrences or suitable habitat areas, which are impacted other than as allowed in the management requirements, shall be reported immediately to the district botanist or her representative.
2) Monitoring of sensitive plant occurrences impacted during the non-growing period should take place every two years for six years to determine whether impacts will have lasting adverse effects.
3) Monitoring of occurrences impacted during the growing period should take place yearly for five years to determine whether or not the occurrences are still extant (have not been extirpated) and to determine whether impacts will have lasting adverse effects.

Cultural Resources

Project implementation under the proposed alternatives shall comply with the stipulations of the Programmatic Agreement (PA) among the USDA Forest Service, (Pacific Southwest Region), California State Historic Preservation Officer and the Advisory Council on Historic Preservation regarding the identification, evaluation, and treatment of historic properties managed by the National Forests of the Sierra Nevada, California (PA), dated October 1996. Additional protocol for hazardous fuels and vegetation reduction projects can be found in the Annex to Stipulation XIV of the PA titled Interim Protocol for Non-Intensive Inventory Strategies for Hazardous Fuels and Vegetation Reduction Project, June 2004.

1) Cultural resource specialists shall work closely with all specialists to ensure project treatments have 'No Effect' to cultural resources identified as eligible for inclusion in the National Register of Historic Places (NRHP). Eligible cultural resources include all resources determined to be NRHP eligible and all unevaluated resources. Undertakings shall be considered to have 'No Effect' to those cultural resources determined to be NRHP ineligible pursuant to Stipulation VI.A. of the PA.
2) All project undertakings shall meet Stipulation VII.A. of the PA 'Undertakings That Would Not Affect Historic Properties'. All eligible cultural resources shall be protected from project

activities through the application of Standard Protection Measures, as delineated in Attachment 7 of the PA.

3) Cultural resources shall be protected from all ground-disturbing activities associated with mechanical treatment during all phases of the project.
4) Proposed facilities or improvements shall avoid cultural resources and disturbance activities shall not pedestal or isolate a site from its surroundings.
5) Cultural resources with flammable features shall be protected from prescribed burning operations.
6) All known Native American cultural sites, including gathering sites, shall be avoided during project implementation, except when consultation proves there is Native American support for a treatment that is beneficial to the cultural resource.
7) In the event that new cultural resources are discovered during project implementation, the district archaeologist must be notified and all activities in the vicinity (approximately 50 meters/165 feet) of the resource shall cease until consultations are completed; in accordance with Stipulations VII.E.1 of the PA.
8) Any work outside of the scope of the existing project proposal must comply with the regulations of Section 106 of the National Historic Preservation Act of 1966, as amended.
9) All eligible cultural resources shall be flagged for exclusion from any undertaking activity, unless the activity has been approved under the provisions of the PA, in which case the resource shall be flagged for protection. Allowed treatments within cultural resource boundaries and associated mitigation measures are outlined below:

Transportation and Access

1) The continued use of an existing facility that traverses a historic resource (*e.g.* an existing access road across a historic road, ditch, or site), shall be considered to have no effect on the historic resource, so as long as it was created within the last 50 years, its use is consistent with its original function, and its use does not further affect the resource. The cultural resource specialist shall be consulted prior to use of roads across site boundaries in order to ensure no cultural resources will be affected.
2) If the travel-way is found to contain an archaeological deposit, two foot thick padding may be placed on the travel-way to protect the resource if the placement of the padding is determined sufficient for resource protection by the forest engineer. Padding must also conform to width of the vehicle. In addition, the pads should be easily distinguished from the underlying deposit.

Mechanical Thinning and Mastication

1) Mastication equipment may be used to chip woody material from within a cultural site boundary, as long as its use and staging location does not affect the site. The cultural resource specialist shall be consulted prior to chipping within a site in order to ensure the activity and staging area do not affect the resource.
2) Hand thinning of small trees and brush may take place on historic railroad grade segments and historic ditches. However, larger trees may be removed from a grade or ditch only after approval and the on-site presence of the cultural resource specialist, and only when they are accessible from the outside boundary of the site.
3) Accumulated woody material may be manually removed from within a cultural site boundary. Consultation with and approval from the cultural resource specialist is required prior to the use of off-site or rubber-tired equipment for this purpose.

Sawlog and Biomass Mechanical Thinning

Any impacts to any cultural resources need to be evaluated by the cultural resource specialist and recommendations made prior to the start of specific operations that may damage that cultural resource.

1) Any tree inadvertently felled to intrude into a cultural site boundary is to be left in place until the incident is evaluated by the cultural resource specialist and recommendations made.
2) Logs shall not be skidded, nor roads constructed, in ways that may obliterate the observation of a historic ditch's course (*i.e.* lengthwise or near a ditch).
3) Logs may be end-lined across a historic ditch at a right angle if the ditch is less than three feet deep and five feet wide. The log may also be transferred across the ditch using the grapple of a skidder, as long as the wheels or tracks of the skidder do not impact the ditch in any form.
4) Cable corridors shall be planned to minimize the number of crossings, and full suspension may be appropriate in some cases.
5) Historic earthen ditches may be temporarily breached or filled and traversed under certain conditions outlined below. Any breach requires consultation with and approval by the Cultural Resource specialist.
6) Breaches may only take place when the project manager determines avoidance or evaluation is not economically feasible.
7) Any ditch to be breached must be recorded by the cultural resource specialist.
8) Breaches are not allowed at points of origin, end-points, juncture points, or rock wall feature points.
9) The width of the breach must be approximately 20 feet or less.
10) The breach must be reconstructed to match the width, depth, and contour of the pre-undertaking ditch within two years or less of the breach.
11) The feller-buncher may reach into cultural resource sites from outside their boundary to remove trees, as long as no part of the harvested tree intrudes into the site boundary and the action does not offset the visual integrity of the cultural site.

Prescribed Burning

1) Vegetation may be removed and fire-lines constructed within cultural resource site boundaries using hand tools, as long as ground disturbance is minimized. Cultural features are to be avoided. Consultation with and approval from the cultural resource specialist is required prior to implementation.
2) Non-flammable cultural resource sites may be burned through only after having been hand thinned.
3) Protective materials (*e.g.* fire retardant foam, wetting agents, fire shelter fabric) may be used to protect surface fuels (*e.g.* stumps or partially buried logs) and at risk cultural features of a cultural resource site. Consultation with and approval from the cultural resource specialist is required prior to implementation.
4) Trees believed to cause a hazard to cultural features should they burn and fall, shall be directionally felled away from the resource prior to ignition.

Machine and Hand Piling

1) Vegetation to be burned shall not be piled within a cultural resource site boundary, unless a previously disturbed location is found and approved by the cultural resource specialist.

Hydrology

Management requirements designed to protect water quality and watershed condition are derived from Water Quality Management for Forest System Lands in California, Best Management Practices (BMPs) (USDA Forest Service, 2000) and Riparian Conservation Objectives (RCOs) (USDA Forest Service, 2004). Riparian resources within Riparian Conservation Areas (RCAs) will be protected through compliance with the Riparian Conservation Objectives in the LRMP.

Beneficial uses of water are protected by BMPs, which prevent or minimize the threat of discharge of pollutants of concern. BMPs applicable to this project are listed with site-specific requirements and comments. Numerous timber management, road management, vegetation manipulation, and fuels management BMPs are applicable to this project. BMPs relating to project implementation are described below; BMPs relating to planning processes are inferred as a result of preparation of this document. Management requirements and BMPs have been used on similar projects in the past and have been found to be effective in protecting water quality and watershed condition. Respective BMPs that should be followed are detailed after the described treatment.

Project planners and administrators (*i.e.* layout, SA, COR, CI) are responsible for consulting with a hydrologist and/or soil scientist prior to or during project implementation for interpreting application of watershed management requirements.

1) MECHANIZED EQUIPMENT OPERATIONS IN RIPARIAN CONSERVATION AREAS (RCAS)

Operations in Perennial and Intermittent Stream RCAs: The RCA is divided into three zones to provide a wide, graduated buffer so that riparian conservation objectives and management objectives can be achieved. The zone nearest the stream is an exclusion zone that prohibits mechanized equipment. The next zone is a transition zone that allows light use. The third zone is an outer zone that allows additional use as distances increase from the stream. See Figure 1 for a diagram of the three zones. The objective of the exclusion and transition zones is to retain a high percentage of ground cover and prevent detrimental soil compaction and displacement. The intent of the outer zone is to allow activity to increase from light use in the transition zone to standard operations beyond the RCA.

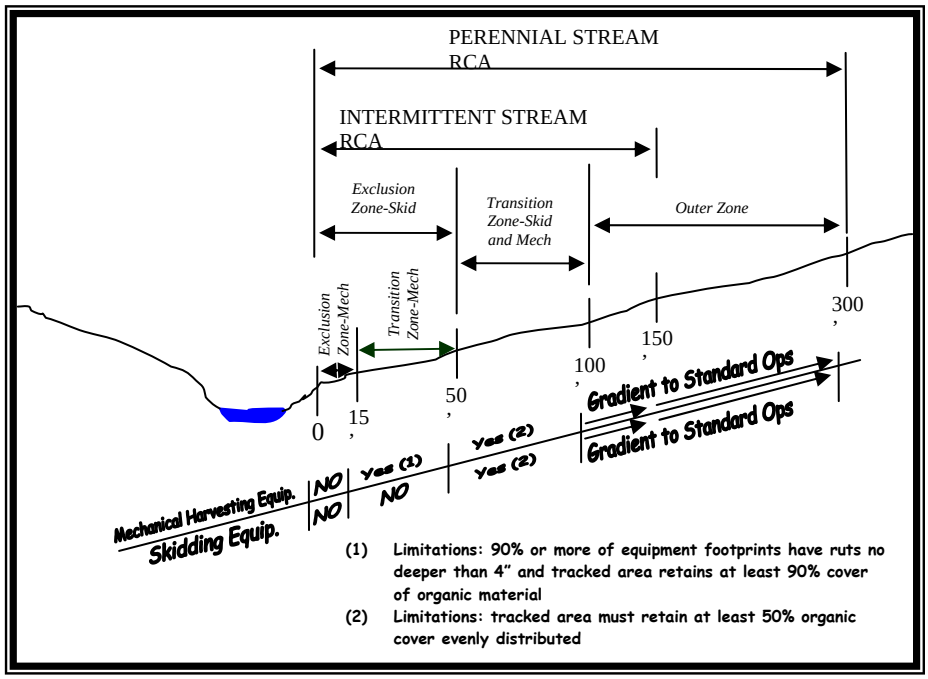

Figure 1 - Equipment Operations in Perennial and Intermittent Stream RCAs

EXCLUSION ZONE: The exclusion zone starts at one of the following features, whichever is furthest from the stream:

a) The edge of the active channel where slopes rise uniformly from the stream, *or*
b) The first slope-break adjacent to the stream (*e.g.* streambank, outer gorge), *or*
c) Flat or nearly flat ground adjacent to the channel (*e.g.* floodplain or terrace), *or*
d) Obligate riparian and/or facultative wetland shrub and/or tree communities associated with any of the above.

For example, if the edge of the active channel is 2 feet from the water's edge, the first slope break is 5 feet from the water's edge, the floodplain is 15 feet from the water's edge, and the obligate and/or facultative wetland riparian vegetation extends 25 feet from the water's edge, then the exclusion zone would start at the edge of the obligate riparian and/or facultative wetland vegetation, since it is furthest from the stream. In Figure 1 above, this start of the exclusion zone is labeled as 0 feet.

Skidding equipment (*e.g.* rubber-tired skidders and track-laying tractors) may not come within approximately 50 feet of the start of the exclusion zone, and mechanical harvesting and shredding equipment (*e.g.* feller-bunchers and masticators) may not come within approximately 15 feet from the start of the exclusion zone. In the example described above, where the obligate and/or facultative wetland riparian vegetation extends 25 feet from the water's edge, mechanical harvesting equipment would remain 40 feet from the water's edge (25 feet to the start of exclusion zone + 15 foot exclusion zone) and skidding equipment would remain 75 feet from the water's edge (25 feet to the start of exclusion zone + 50 foot exclusion zone).

Operation created debris would be removed from stream channels. No damage to streambanks from equipment would be allowed. All vegetation that is maintaining streambank stability would be retained. All obligate riparian and or facultative wetland riparian shrubs and trees would be retained.

TRANSITION ZONE: The transition zone for skidding equipment is approximately 50 feet wide and starts at the end of the exclusion zone (labeled as 50 to 100 feet in Figure 1).

Where skidding equipment is operating, retain a minimum of 50% evenly distributed ground cover in the tracked area. Existing skid trails should be used except where unacceptable impact would result. Do not create new skid trails within approximately 100 feet of a stream. The number of perennial and intermittent stream crossings should not exceed an average of 2 per mile.

The transition zone for mechanized harvesting and shredding equipment is approximately 85 feet wide and starts at the end of the exclusion zone (labeled as 15 to 100 feet in Figure 1). For the first 35 feet of the transition zone for mechanized harvesting equipment (labeled as 15 to 50 feet in Figure 1), operations may only be allowed when continuous ground cover can be retained in 90% of the tracked area, and where 90% of the total tracked area is rutted less than 4" deep. For the last 50 feet of the transition zone for mechanized harvesting equipment (labeled as 50 to 100 feet in Figure 1), retain a minimum of 50% evenly distributed ground cover in the tracked area.

Operations in Ephemeral Stream RCAs: Ephemeral streams have running water only during or shortly after rainfall and/or snowmelt, and show evidence of annual channel scour.

EXCLUSION ZONE: The exclusion zone begins at the edge of the active channel where slopes rise uniformly or at the edge of the streambank, whichever is furthest from the stream.

The exclusion zone for skidding equipment near ephemeral streams is approximately 25 feet from the start of the exclusion zone. The exclusion zone for mechanical harvesters and shredding equipment is 15 feet from the start of the exclusion zone.

TRANSITION ZONE: The transition zone for skidding equipment is approximately 25 feet wide and starts at the end of the exclusion zone. The transition zone for mechanical harvesting equipment is approximately 35 feet wide and starts at the end of the exclusion zone. Within the transition zone for both skidding and mechanical harvesting equipment, retain a minimum of 50% evenly distributed soil cover in project-created tire or tracked vehicle footprints. The number of ephemeral stream crossings should not exceed an average of 3 per mile.

Operations Adjacent to Special Aquatic Features such as lakes, wet meadows, bogs, fens, wetlands, vernal pools, and springs: The exclusion zone and transition zone widths and operating requirements are the same for special features as for perennial and intermittent streams.

EXCLUSION ZONE: The exclusion zone begins at:

a) The outer edge of obligate and/or facultative wetland riparian trees, shrubs, or herbaceous plants in wet meadows and springs
b) The high water line of vernal pools
c) The top of the first slope-break immediately adjacent to the special aquatic feature if further than the obligate vegetation and/or facultative wetland riparian vegetation or high water line.

Special Conditions for Soldier Creek HFR project: Stand 30134 has a population of alders, a facultative wetland riparian species, interspersed with conifers. Removal of conifers around the alders will be allowed to release alders, as only mature alders are present. No alders will be removed.

BMP - 1-8 – Streamside Zone Designation

BMP - 1-10 – Tractor Skidding Design

BMP - 1-18 – Meadow Protection during Timber Harvesting

BMP - 1-19 – Streamcourse and Aquatic Protection

BMP - 5-3 – Tractor Operation Limitation in Wetlands and Meadows

BMP - 5-6 – Soil Moisture Limitations for Mechanical Equipment Operations

BMP - 7-3 – Protection of Wetlands

2) LOG LANDINGS: Re-use log landings to the extent feasible. New landings should not be constructed within approximately 100 feet of perennial or intermittent streams and approximately 50 feet of ephemeral streams. Subsoil all landings when harvest/biomass operations are complete.

BMP - 1-12 – Log Landing Location

BMP - 1-16 – Log Landing Erosion

3) ROADS: Service and refuel equipment outside of RCAs. Road watering for dust abatement and road surface protection should be conducted using existing water source locations. These include the Carlon Day Use Area (section on the eastside of Evergreen Road) and at Highway 120 crossing of the South Fork of the Tuolumne river near road 1S59Y.

Water use should not adversely deplete pool volume. Screens should be installed on water intake lines to prevent entrainment of fish and amphibians. Maintain roads during the life of the project and control road use during wet periods to prevent or minimize entrainment of sediment into stream courses. Road improvements will focus on hydrologically connected segments of forest roads that deliver sediment to streamcourses.

BMP - 2-1 – Guidelines for the Location and Design of Roads

BMP - 2-7 – Control of Road Drainage

BMP - 2-12 – Servicing and Refueling of Equipment

BMP - 2-17 – Bridge and Culvert Installation

BMP - 2-21 – Water Source Development Consistent with Water Quality Protection

BMP - 2-22 – Maintenance of Roads

BMP - 2-23 – Road Surface Treatment to Prevent Loss of Materials

BMP - 2-24 – Traffic Control during Wet Periods

BMP - 7-3 – Protection of Wetlands

4) SLOPE LIMITATIONS: See Soils Management Requirements

5) PRESCRIBED BURNING: Avoid damage to obligate riparian and/or facultative wetland riparian vegetation. Retain 75% ground cover within approximately 100 feet of perennial streams and approximately 50 feet of intermittent streams. Ground cover is defined as a minimum of one inch of organic litter, slash, duff, or loose rock fragments, as well as living vegetation less than five feet tall. Fire is allowed to back into the riparian area as long as ground cover is maintained. Avoid direct ignition within ephemeral channels. New dozer lines should not be constructed within approximately 100 feet of perennial and intermittent streams and approximately 50 feet of ephemeral streams. Constructed firelines should be restored upon completion of prescribed burning and/or prior to each

winter when firelines are exposed to erosion. Restoration should consist of water barring hand and dozer lines, re-contouring of benched trails, and subsoiling of detrimentally compacted dozer lines.

BMP - 6-3 – Protection of Water Quality from Prescribed Burning Effects

6) BURN PILES: Burn piles should be placed a minimum of approximately 50 feet away from perennial and intermittent streams and approximately 25 feet from ephemeral streams unless otherwise approved by hydrologist and/or soil scientist. They should also be located outside of areas that may receive road runoff.

BMP - 6-3 – Protection of Water Quality from Prescribed Burning Effects

Range

1) Provide startup dates, locations, and duration of activities to provide information to permittee for herding of livestock away from project, if necessary.

2) Any fences, gates, water facilities, or cattleguards that are damaged or let-down because of the project must be reported to the forest range specialist and repaired to forest standards in a timely manner.

3) If any gates are entered or exited within the allotment during the project, please leave them as found.

Recreation

1) All skid trails should have barriers constructed at the end points that potentially connect to any road or trail to eliminate potential future OHV use. The road 1S70 around the south side of the Sunset Inn should remain closed. The road has not been passable for many years.

2) By the completion of the timber contract, temporary roads that lead to landings will have barriers constructed at the entrance to reduce the amount of people attempting to disperse camp at those landings.

3) Vegetation to be cut that is located within view not to exceed approximately 100 feet from the paved areas of the Carlon Day Use Area should have a maximum stump height of 4 inches and should not pose a safety hazard to the public.

4) Hand thinning within Carlon Day Use Area and extending approximately 300 feet from the paved areas should either be chipped or piled outside that defined area.

5) Berkeley-Tuolumne Camp and the Sunset Inn should be notified prior to starting of operations within ¼ mile of their respective areas. All operations adjacent (within a ¼ mile) of each respective area will be conducted on weekdays and non-holidays between the hours 7:00am to 7:00pm.

Soils

Higher levels of mitigation are generally required when existing disturbance is high or potential for disturbance is high. References are Region 5 Soil Quality Analysis Standards (USDA, 1995) and Stanislaus National Forest – Forest Plan Direction (2005) unless stated.

Soil Cover

1) Fifty percent (post treatment) well distributed organic soil cover per treatment unit is recommended. Cover is typically grass, forbs, leaf litter, small woody debris (< 3 inch in diameter), and decaying logs but can also include surface rock fragments. Tractor piling treatments must leave at least 60% soil cover. In areas where soil cover is less than 50%, (the natural plant community is not capable of producing 50% soil cover) minimal disturbance to soil cover should occur for the maintenance of soil nutrient levels, forest health, and protection from detrimental soil erosion.
2) If treatment causes soil cover to be reduced to an extent that increases potential for detrimental soil erosion or cause significant losses in soil nutrient status additions of soil cover with certified weed-free straw, logging slash, chipped biomass, or other approved material will be made at the discretion of a watershed specialist or timber sale administrator.

Soil Environmental Health

1) Protect Large Woody Material (LWM). Desired LWM are logs greater than 20 inches in diameter and greater than 10 feet long at desired spacing of at least 5 well spaced LWM per acre with preferences to logs in decay classes 3 to 5. Large downed logs should be protected due to their importance to ecosystem and soil health (Brown et al. 2003).
2) For underburning, when the depth of masticated fuels exceeds 3 inches across greater than 25% of the burn area, adequate soil moisture (greater than 15% by volume soil water) should be present in the upper 6 inches of the soil profile (Busse et al. 2005 and Jimenez, 2007a). A soil scientist should be consulted concerning soil moisture conditions for the prescribed burning of masticated fuels.

Soil Erosion and Loss

1) Ground based equipment have the following slope limitations to prevent soil erosion and loss as well as any detrimental disturbance. Tracked low pressure harvesting equipment should be allowed to work in skyline units as long as the slope requirements are followed.

MACHINE SKIDDING SHOULD BE LIMITED TO SLOPES **LESS THAN 35%**,
ADVERSE (UPHILL) SKIDDING SHOULD BE LIMITED TO SLOPES **LESS THAN 30%**.
TRACKED LOW GROUND PRESSURE HARVESTING AND SHREDDING EQUIPMENT (APPROX. 8 PSI OR LESS) SHOULD BE LIMITED TO SLOPES **LESS THAN 45%**.
TRACTOR PILING SHOULD BE LIMITED TO SLOPES **LESS THAN 25%**.
DOZER LINE SHOULD BE LIMITED TO SLOPES **LESS THAN 35%**.

2) For soils having a very high erosion hazard, ground-based equipment should be limited to 30% slope and tracked low-pressure equipment should be limited to 40% slopes. In areas where soils have a high displacement hazard, the same lower slope limits for mechanical equipment is recommended. Mechanical equipment will be allowed to work short sections of slopes that exceed slope limitations, if that section is 100 feet or less. This will be applied to limited situations.
3) Skyline timber operations are required to provide at least one end suspension of logs.
4) Skid trails and skyline corridors are required to be water barred or hand cross ditched according to specifications in the Forest Service - Timber Sale Administration Handbook.
5) A D-6 (or equivalent) size or smaller dozer equipped with a brush rake will be used for tractor piling operations. The operator should be instructed to avoid pushing the brush rake or blade into the soil (keep the blade a minimum 3 inches above ground level), to minimize soil disturbance, and to achieve soil cover requirements.

Soil Porosity, Soil Bulk Density, and Soil Hydrologic Function

1) Limit areas (or restore areas) where detrimental compaction of soil occurs.

2) Ground based equipment will operate on relatively dry soils of high soil strength or bearing capacity. Most of the soils in the project area have a moderate to high compaction hazard. The soil scientist should advise concerning operational start dates. Monitoring of wet season operations should occur.
3) All landings, temporary roads, and main skid trails (as defined by the contract provision) will be subsoiled using a winged ripper to restore soil hydrologic function and reduce compaction resulting from mechanical thinning operations.
4) Equipment with a ground pressure rating of 8 psi or less and with an articulating boom capable of reaching approximately 15 feet should be used for mechanical felling and bunching, grapple piling, and mastication treatments. Mastication equipment lacking an articulating boom must have a ground pressure rating of 4 psi or less, this type of equipment would generally be used in open, low slope (<25%) areas dominated by a brush vegetation type. This equipment would be used in limited areas to achieve visual and fuel profile goals.

Extent of Subsoiling Required to Maintain SQS Guidelines

Subsoiling ameliorates soil compaction and restores soil hydrologic function (Luce, 1998 and Powers, 2002). The amount of subsoiling is estimated using site specific features (*e.g.* soil texture and rock content), known disturbance for prescribed treatments, and a 70% effectiveness co-efficient for subsoiling (Miller et al. 2004). The extent of subsoiling recommended under the current proposed action alternative is as follows:

Alternative 1	Alternative 2
Temporary Roads – All – Maximum **1.5** acres	Landings – All – Maximum **3** acres
Landings – All – Maximum **15** acres	Main Skid Trails – All – Maximum **5** acres
Main Skid Trails – All – Maximum **25** acres	

General Subsoiling Guidelines: A soil scientist experienced with subsoiling will advise the COR or Timber Sale Administrator on specific soil-site conditions that influence subsoiling effectiveness. A soil scientist or sale administrator should oversee the subsoiling and monitor subsoiling effectiveness.

1) Subsoiling should occur to a depth of at least approximately 24 inches on landings and temporary roads and to a depth of at least approximately 18 inches on main skid trails.
2) Subsoiling of landings should occur on contour to minimize erosion potentials.
3) Subsoiling on temporary roads and main skid trails that creates furrowed trenches greater than approximately 8" in depth will be back-bladed to reduce potential for soil erosion as well as rill erosion and gully formation.
4) Subsoiling will not occur on slopes greater than 18%, on slopes from 12% to 18% back-blading will be occur. On soils with a high or very high Erosion Hazard Rating, subsoiling will to limited to slopes less than 12%. Slope reference is to the slope of the skid trail itself, not the general topography.
5) Subsoiling will not occur when soil rock fragment content is greater than 35%.
6) Subsoiling will occur at proper soil moisture content to allow lateral and vertical shattering, minimize soil disturbance, and increase effectiveness.
7) Technical specifications will be included in the timber harvest/stewardship contract.

Terrestrial Wildlife

The following management requirements would be implemented as part of the project prescription based on the Forest Plan (as amended) and as recommended to retain important wildlife habitat values:

Retain riparian vegetation, such as alder and willow. Where feasible and where it occurs in a stand, retain shrub species such as elderberry, redberry, coffeeberry, dogwood, and Sierra plum. Retain hardwood tree species 12" diameter at breast height (DBH). Retain additional smaller diameter hardwood trees wherever feasible to provide a variety of age classes. Remove fuels from around the base of large hardwoods prior to prescribe burning if necessary.

Retain vegetation as wildlife cover and roadside screening along the Harden Flat Road, and Forest Service Roads 1S12 and 2S30 where it would not compromise the fuels treatment by providing continuous fuels or ladder fuels. Screening will be set back approximately 30-70 feet in discontinuous segments with gaps less than approximately 50 feet in length and staggered so as to limit visibility into the stand and may be supplemented with features such as cut-banks or rock outcrops, which also prevent visibility into a stand.

Retain snags over 15" in diameter (4 per acre) and 10-20 tons per acre of the largest downed woody material over 12" in diameter when available. These standards do not apply in the Crocker Ridge Fuel break (FB03), in areas where needed to address safety hazards such as adjacent to the highway or roads, or if levels are reduced as a result of incidental loss during burning. Nonetheless, during burning, every effort will be made to retain large snags and logs.

Sensitive Species PAC, HRCA, and Canopy Cover Retention

For all mechanical thinning treatments, projects should be designed to retain live conifers 30 inches DBH or larger. Exceptions are allowed to meet needs for equipment operability and safety.

For mechanical thinning treatments in mature forest habitat (CWHR types 4M, 4D, 5M, 5D, and 6) *outside* WUI defense zones:

1) Retain at least 40 percent of the existing basal area. The retained basal area should generally be comprised of the largest trees.
2) Where available, retain 5 percent or more of the total treatment area in lower layers composed of trees 6 to 24 inches DBH within the treatment unit.

Avoid reducing pre-existing canopy cover by more than 30 percent within the treatment unit. Percent is measured in absolute terms (for example, canopy cover at 80 percent should not be reduced below 50 percent.) Within treatment units, at a minimum, the intent is to provide for an effective fuels treatment. Where existing vegetative conditions are at or near 40 percent canopy cover, projects are to be designed to remove the material necessary to meet fire and fuels objectives. Where existing vegetative conditions permit, retain at least 50 percent canopy cover averaged within the treatment unit. Exceptions are allowed in limited situations where additional trees must be removed to adequately reduce ladder fuels, provide sufficient spacing for equipment operations, or minimize re-entry. Where 50 percent canopy cover retention cannot be met for reasons described above, retain at least 40 percent canopy cover averaged within the treatment unit.

In the Crocker spotted owl PAC located outside the WUI, limit stand-altering activities to reducing surface and ladder fuels through prescribed fire treatments. In forested stands with overstory trees 11 inches DBH and greater, design prescribed fire treatments to have an average flame length of 4 feet or less. Hand treatments, including handline construction, tree pruning, and cutting of small trees (less than 6 inches DBH), may be conducted prior to burning as needed to protect important elements of owl habitat.

Mechanical treatments would be conducted to meet fuels objectives in PACs located in WUI defense zones. Within California spotted owl PACs: where treatment is necessary, remove only material needed to meet project fuels objectives. Focus on removal of surface and ladder fuels.

In PAC TL026 located in the WUI Threat zone, mechanical treatments are allowed where prescribed fire is not feasible and where avoiding the PAC would significantly compromise the overall effectiveness of the landscape fire and fuels strategy. Mechanical treatments should be designed to maintain habitat structure and function of the PAC.

While mechanical treatments may be conducted in PACs, they are prohibited within a 500-foot radius buffer around the spotted owl nest stands. These buffers will be flagged prior to operations. Prescribed burning is allowed within the 500-foot radius buffer. Hand treatments, including handline construction, tree pruning, and cutting of small trees (less than 6 inches DBH), may be conducted prior to burning as needed to protect important elements of owl habitat. Treatments in the remainder of the PACs use the forest-wide standards and guidelines for mechanical thinning. This measure would also be applied to any great gray owl nests detected or created artificially.

Avoid placement of log processing landings for timber operations in PACs whenever possible. Where landings are considered necessary in PACs, the use of existing landings or creating small landings is preferred.

No mechanical activities shall occur within the *portions* of units within ¼-mile of known spotted owl, northern goshawk, or great gray owl PAC boundaries during the Limited Operating Periods (LOPs) listed in the table below. Road reconstruction, road maintenance, dust abatement, and hauling of product may occur if approved by the district wildlife biologist. Where necessary, the LOPs may be waived to allow for early season prescribed burning, except in Crocker Meadow, where burning should not occur during the LOP for great gray owls. These LOPs do not apply to laying out units or early season burning operations and may be reduced to a ¼-mile area around a nest site if surveys are conducted, or may be lifted altogether, at the discretion of the district wildlife biologist, if the species is not nesting or is not likely to suffer from disturbance from the activity.

Table 10 - Mechanical Thinning Units with Limited Operating Periods

Species	Unit	Limited Operating Period (No Mechanical Operations)
California Spotted Owl	30047, 30048, 30058, 30134 F1, 2, 2A, 3, 7, 8, 9, 10, 20, 21, 22	March 1 – August 15
Northern Goshawk	30021, 30047, 30048 F2, 2A, 3, 7, 8, 10, 11, 12, 16, 17, 20, 21, 22	February 15 to September 15
Great Gray Owl	24018, 24026 F9, 10, 11, 12, 16, 17, 20	March 1 – August 15

The following road segments to be treated for fuels would require LOPs as well (These may be amended or lifted altogether, at the discretion of the district wildlife biologist, if the species is not nesting.):

Table 11 - Roadside Fuels Reduction with Limited Operating Periods

Species	Unit	Limited Operating Period (No Mechanical Operations)
California Spotted Owl	Harden Flat Road from Berkeley Camp to intersection of Road 1S75; 1st ½-mile of Road 1S75; Road 1S69-southern 1 mile from intersection with Road 2S30	March 1 – August 15

Species	Unit	Limited Operating Period (No Mechanical Operations)
Northern Goshawk	Harden Flat Road and Road 1S71 within 1/4-mile of Soldier Creek	February 15 to September 15
Great Gray Owl	Harden Flat Road within 1/4-mile of Crocker Meadow	March 1 – August 15

If spotted owls, northern goshawks, or great gray owls are discovered in or within ½-mile of the project area outside the designated PACs prior to or during project activities, activities must comply with the appropriate LOPs and the district wildlife biologist will be notified.

Visual Quality

1) Where conditions warrant, avoid straight lines in the skid trails that will create a corridor that could be seen from Highway 120.
2) Painted trees should be marked on the side of the tree least likely to be seen from Highway 120, Harden Flat Road, and Golden Arrow Road.
3) Trees to be cut that are located within view of Highway 120 should be low-cut as required by the timber sale contract specifications; stumps should not exceed 8 inches in height. Stumps should not detrimentally diminish visual values.
4) Logging slash created from harvest activities that is within view distance (not to exceed approximately 200 feet) of Highway 120 shall be piled for burning. Material may also be chipped or removed. Piles should be burned within 1 burn season as conditions allow. Piles should not contain root wads or large diameter material that would (when burned) diminish visual values. Piles should be created and covered as detailed in contract provisions.
5) Retain effective screening vegetation to meet visual objectives at strategic locations. These locations currently prevent views between Highway 120 and manmade structures.
6) Screening should be maintained between Harden Flat Road (1S20) and the Sunset Inn (a 2-acre inholding of private land within unit F09).

Fuels treatment units will be consistent with Forest Plan Direction relating to the Visual Quality Objectives (VQO). Underbrush screening along Highway 120 will be removed from the foreground view. This will reduce fuels buildup along the highway, limiting the chance of a catastrophic wildfire starting from the roadside. These treatments will also increase the effectiveness of the corridor as a fuel break for use in possible future fire suppression activities. These treatments will allow motorists the proper visual corridor in which to see and avoid collisions with wildlife. Vegetation screening will be kept in strategic locations, those locations being around manmade structures.

Table 12 - Visual Quality Objective Class – Mechanical Thin Units

Unit Number	Visual Quality Objective Class	Located Along Highway 120
24011	Retention	Yes
24018	Retention / Partial Retention	Yes
24021	Retention	No
24023	Partial Retention	No
24026	Retention / Partial Retention	Yes
24035	Partial Retention	No
30021	Retention	Yes
30047	Partial Retention	No
30048	Partial Retention	No
30058	Partial Retention	No

Unit Number	Visual Quality Objective Class	Located Along Highway 120
30131	General Forest / Partial Retention	No
30134	General Forest	No

Table 13 - Visual Quality Objective Class - Other Units

Unit Number	Visual Quality Objective Class	Located along Highway 120
F-1	Retention	No
F-2	Retention / Partial Retention	No
FB3	Retention / General Forest / Partial Retention	No
F-4	Retention	No
FB5	Partial Retention	No
F-6	Retention	No
F-7	Retention	No
F-8	Partial Retention	No
F-9	Retention / Partial Retention	No
F-10	Retention	Yes
F-11	Retention / Partial Retention	No
F-12	Retention	Yes
F-13	Retention	Yes
F-14	Retention / Partial Retention	Yes
F-15	Retention	Yes
F-16	Retention	Yes
F-17	Retention	No
F-18	Retention	Yes
F-19	Partial Retention / Retention	Yes
F-20	General Forest / Partial Retention	No
F-21	Partial Retention / Retention	No
F-22	Partial Retention / Retention / General Forest	No
F-23	Retention / General Forest	No

Table 14 - Unit Specific -Visual Resource Mitigation Measures

Unit Number	Mitigation Measures
24011, 24018, 24026	All heavy equipment that will be within 200 feet of Highway 120 should be brought in from the north of the highway.
30021	All heavy equipment that will be within 200 feet of Highway 120 should be brought in from the south of the highway.
F15	All heavy equipment that will be within 200 feet of Highway 120 should be brought in from the north of the highway.

ENVIRONMENTAL CONSEQUENCES

This section summarizes the physical, biological, and social environments of the affected project area, the potential changes to those environments, and the potential effects due to implementation of the alternatives. The specialists' reports include the scientific and analytical basis for comparison of alternatives and may be found in the Groveland District planning file. A summary of these reports follow. The best available science was used throughout the analysis and can be found in the literature-cited section at the end of this document. The supporting analysis documents are in the project record file and are incorporated by reference in this environmental assessment.

The focus of this chapter is on issues, context, and intensity factors which provide a basis for determining if an action would have significant effects to the environment. This chapter provides brief evidence and analysis to determine whether to prepare an environmental impact statement or a finding of no significant impact.

EFFECTS RELATIVE TO SIGNIFICANT ISSUES

Impacts on Late Seral Habitats and Sensitive Species that Require those Habitats

The significant issue identified during scoping was mechanical tree thinning in late seral habitat that is important for species such as great grey owl, California spotted owl, northern goshawk, American marten, and Pacific fisher. Wildlife habitat management is affected by the presence of wildland urban interface (WUI), which requires defensible space near communities and economically efficient fuel reduction treatments. This simultaneous need to protect WUI areas and late seral habitat in the form of PACs and HRCAs, as well as provide for economic efficiencies presents challenges. The second action alternative was developed to allow for reduced thinning treatments in mature forest habitat while carrying out a portion of the fuels treatments.

Table 15 - Special Habitat Areas - Affected by Soldier Creek HFR Project - Alternative 1.

Designated Habitat	Mechanical Thinning	Fuels Treatments	Total Acres
Spotted Owl PAC TUO-0010	--	84	84
Spotted Owl PAC TUO-0026	--	85	85
Spotted Owl HRCA (TUO-0010 and TUO- 0026)	243	565	808
Spotted Owl HRCA (TUO-0078)	9	359	368
Spotted Owl PAC TUO-0078	--	13	13
Rush Creek Goshawk PAC 54-40	--	77	77
Soldier Creek Goshawk PAC 54-43	--	53	53
Crocker Meadow Great Gray Owl PAC	--	63	63

Table 16 - Stand Characteristics and Effects of Mechanical Thinning - Alternative 1

Unit	Acres	QMD >6" DBH Pre/Post	Canopy Cover Pre/Post	CWHR Type Pre/Post
24011	28	16/ 20	61/ 50	6/ 5M
24018	81	20/ 23	56/ 50	4M/ 4M
24021	23	18/ 20	49/ 44	5M/ 5M
24023	8	13/ 14	66/ 60	4M/ 4M
24026	133	16/ 23	58/ 40	6/ 6
24035	25	17/ 20	49/ 45	5M/ 5M
30021	21	16/ 20	61/ 50	6/ 5M
30047	75	22/25	50/40	4M/ 5M
30048	46	21/ 26	59/ 50	5M/ 5M
30058	10	20/ 22	46/ 40	4M/ 4M
30131	6	14/ 18	69/ 61	6/ 6
30134	116	15/ 20	51/ 40	4M/ 4M

Note: CWHR types that provide moderate to high suitability for breeding and foraging habitat for California spotted owls are classified as 6, 5D, 5M, 4D, and 4M (USDA, 2001; CDFG 2002). Highly suitable habitat occurs in 5D and 6 habitats with over 70% canopy cover (Blakesley 2003).

The Soldier Creek HFR project area contains approximately 3,000 acres of late-seral, closed canopy forest, which is the majority of dense, late seral habitat on the Groveland Ranger District. The best

habitat occurs within the three California spotted owl PACs (929 acres) and two goshawk PACs (415 acres) in the project area. These high quality areas are not contiguous, having been affected by the fires in 1944 and 1987, as well as past timber harvest.

Alternative 1 would not mechanically thin in the spotted owl, goshawk, or great gray owl PACs that cover 24 percent of the project area, but would include substantial treatment of understory fuels as shown in Table 15. Fuel treatments within the PACs are in the defense zone adjacent to Harden Flat, Berkeley-Tuolumne Camp, and the Sunset Inn. Treatments in these PACs are primarily underburning and hand thinning. A minor amount of mastication would occur in patches of dense small trees and brush near structures. Mechanical thinning would occur on 252 acres of the 2,872 acres of HRCAs. Canopy cover in the thinned HRCAs would remain above 50 percent, but reduced from current levels as shown in Table 20. Modeling shows that 99 percent of the trees planned to be removed in the 252 acres of HRCA would be less than 20" DBH. Tree growth would be increased in the thinned stands. At the landscape scale, the mechanical thinning units provide continuity to the other fuels treatments.

Alternative 2, would eliminate the mechanical thinning from Table 15. No trees over 12" DBH would be removed in the project, except for danger and hazard trees. The benefit of having ten percent of the project area thinned to maximize individual tree growth would not occur. The fuels treatments remain the same. While the determinations for the late seral species are the same for both action alternatives, adverse effects would be reduced under Alternative 2. See the wildlife biological evaluation for details.

Alternative 3 would not directly affect any threatened, endangered, or sensitive wildlife species or the late-seral habitat on which they depend. This alternative would retain existing stands of small and medium-sized conifers and shrub understory, providing a dense understory that is competing for light, water, and space with more mature trees. Conifer stands would remain at risk of die-off from competition during drought and from a high severity stand-replacing wildfire. Stand-replacing wildfire reduces important habitat components of sensitive species such as of snags, logs, and canopy cover. Wildfire in the project area could adversely affect the habitat values of the six PACs and surrounding habitat, which is important for year-round home range, dispersal, and foraging. Stand-replacing fire also increases the risk to the habitat in the surrounding landscape, including the designated PACs for spotted owl, northern goshawk, and great gray owl in and adjacent to the Soldier Creek HFR project area. The relatively high road density, limited mature forest, and relatively low elevation of the project area would continue to adversely affect quality habitat connectivity to higher quality habitats for late-seral habitat dependent species.

If the project area matures slowly or suffers high tree mortality from wildfire or disease, it would contribute to the adverse effect of contiguous, mature forest loss because of historic logging practices and large wildfires in the surrounding area and across the Sierra Nevada. This effect would be offset by the other fuels reduction and reforestation activities occurring in the same watershed and in the surrounding area, as well as fuels reduction activities and mature forest habitat maintenance in adjacent Yosemite National Park. Soldier Creek HFR project area contains higher quality habitat than most of the surrounding area on the Stanislaus National Forest because it contains several productive PACs and provides connectivity to high quality habitat in Yosemite National Park. The risk of losing stands to wildfire or stand mortality would likely have adverse cumulative effects on other less productive PACs until those PACs develop more mature forest characteristics.

See the description of wildlife effects below for more details about late seral species and habitats.

EFFECTS RELATIVE TO 10 SIGNIFICANT FACTORS

In 1978, the Council of Environmental Quality (CEQ) promulgated regulations for implementing the National Environmental Policy Act (NEPA). These regulations (40 CFR – 1500-1508) include a definition of "significantly." The elements of this definition have been considered in identifying the significance of impacts resulting from the intensity of the actions considered.

The following elements have been considered in evaluating significance:

(1) Beneficial and Adverse Impacts

Both beneficial and adverse impacts have been considered in the evaluation of the environmental consequences of the proposed action alternatives. Beneficial effects have not been used to offset or compensate for potential adverse effects. Singularly and collectively, the resources affected by the proposed activities in all alternatives are not expected to experience significant impacts. The adverse impacts associated with the project include minor and localized soil disturbance and a short-term increase (5-10 years) in noxious weeds. The beneficial effects of the action alternatives are improved forest health, reduced fuels, development of late-successional habitat, and improved vegetation diversity. Improved forest health and reduced fuels decrease the risk of stand loss due to forest insects, diseases, or wildfires. The beneficial and adverse impacts of the alternatives are discussed in this chapter. See the Effects on Resources section below.

(2) Public Health and Safety

Both action alternatives would avoid adverse impacts to public safety through project design efforts. Implementation of either action alternative would be governed by standard public health and safety contract clauses. Standard precautionary measures such as dust abatement, signing of roads during log hauling, safely securing truckloads, and maintaining the haul route, would be used.

The Soldier Creek HFR Fuels Report lists the Berkeley-Tuolumne Camp, Hodgdon Meadow, Big Oak Flat Entrance Station to Yosemite National Park, Carlon Day Use Area, and private residences along Harden Flat Road as values at risk of being affected by fires that originate within or adjacent to the analysis area. The project also includes Crocker Meadow with its culturally rich meadow, stream, and forests.

The effects of Alternative 1 and Alternative 2 would be a reduction in surface and ladder fuel loading as well as increases in tree spacing. This would greatly improve the fuel profile. Fires would be expected to burn at lower intensity and be easier to control.

With Alternative 3, the situation would worsen over time as tree mortality increases due to overcrowding. The fuel profile would degrade as the dead material falls to the ground. Expected flame lengths would exceed 4 feet and resistance to control would continue to increase as additional down woody debris accumulates and intermixes with natural brush and conifer regeneration. Fireline production rates would remain low. The project area would remain vulnerable to large, high severity fires. The potential for damage to private property and natural resources from wildfires is high. When wildfires occur, torching, crowning, and spotting could make control efforts at the fire head ineffective. Fire suppression would be difficult, control options would be limited to indirect attack, and the potential for an increase in acres burned would be high.

Impacts to air quality would be extremely high if the entire project area burned at the height of fire season when meteorological conditions are not favorable for smoke dispersal. There is a potential for

this area to produce 2,800 tons of PM_{10} emissions (Airborne particulate matter less than 10 micrometers in diameter. These particles pose the greatest health concern because they can pass through the nose and throat and get into the lungs) in a very short period, resulting in potential human health issues. With the reduction in fuel by burning under prescribed conditions proposed in Alternative 1 and Alternative 2, the affect to air quality would be a reduction in potential PM_{10} emissions. Burning would be spread over approximately 7 years, producing an estimated 300 tons of PM_{10} emissions annually, at a time when meteorological conditions are favorable for smoke dispersal. Future potential wildfire smoke emissions would be reduced. Wildfires typically burn at a time of year when smoke dispersion is not favorable. Short-term adverse effects on public health related to air quality from broadcast burning and pile burning are a small possibility and management requirements have been developed to reduce these effects. These potential short-term effects are of limited scope and duration and have been minimized to the extent possible through timing of pile burning and use of mechanized fuels reduction methods (mastication and/or biomass removal) in some cases. Regional air quality standards would be met in a manner consistent with the Clean Air Act, 1970. Treatment of fuels would reduce potential fuels available for consumption and resulting particulate emissions during future wildfire. See management requirements common to all action alternatives and Soldier Creek HFR Fire and Fuels report for more information.

(3) Unique Characteristics of the Geographical Area

The Soldier Creek HFR project area is part of a historically rich area and cultural sites have been thoroughly surveyed. Known and newly located cultural sites have been documented. For protection, cultural sites will be excluded from mechanical activities. Any hand treatments that will disturb the ground surface will be overseen by the cultural resource specialist.

Ecologically critical areas including mature forest habitat important for sensitive species such as spotted owls, great gray owls, and northern goshawks, as well as areas inhabited by sensitive plant and animal species are contained within the project boundary and the analysis area for the Soldier Creek HFR. Management requirements have been developed to protect these critical habitats from disturbance related to the action alternatives.

(4) Degree of Controversy over Environmental Effects

There is no indication that the effects of the proposed action or action alternatives on the quality of the human environment are likely to be highly controversial. Proposed silvicultural treatments, harvest methods, and road management actions are routine activities that are consistent with the Forest Plan.

(5) Uncertain, Unique, or Unknown Risks

The action alternatives are designed to achieve desired conditions identified in the Forest Plan and minimize the potential for adverse resource effects. Using local expertise and management requirements during project implementation minimizes the chances of highly uncertain effects or effects, which involve unique or unknown risks. Proposed activities are routine in nature, employ standard practices and protection measures, and their effects are known.

(6) Setting a Precedent for Future Actions

The proposed action and action alternatives consist of routine activities that are consistent with management direction in the Forest Plan. Implementation of the actions would not establish a precedent for future actions.

(7) Cumulative Impacts

According to the Council on Environmental Quality regulations "cumulative impact" is the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such actions (40 CFR 1508.7).

In order to understand the contribution of past actions to the cumulative effects of the proposed action and alternatives, this analysis relies on current environmental conditions as a proxy for the impacts of past actions. This is because existing conditions reflect the aggregate impact of all prior human actions and natural events that have affected the environment and might contribute to cumulative effects.

This cumulative effects analysis does not attempt to quantify the effects of past human actions by adding up all prior actions on an action-by-action basis. There are several reasons for not taking this approach. First, a catalog and analysis of all past actions would be impractical to compile and unduly costly to obtain. Current conditions have been impacted by innumerable actions over the last century (and beyond), and trying to isolate the individual actions that continue to have residual impacts would be nearly impossible. Second, providing the details of past actions on an individual basis would not be useful to predict the cumulative effects of the proposed action or alternatives. In fact, focusing on individual actions would be less accurate than looking at existing conditions, because there is limited information on the environmental impacts of individual past actions, and one cannot reasonably identify each action over the last century that has contributed to current conditions. Additionally, focusing on the impacts of past human actions risks ignores the important residual effects of past natural events, which may contribute to cumulative effects just as much as current human actions. By looking at current conditions, we are sure to capture all the residual effects of past human actions and natural events, regardless of which particular action or event contributed those effects. Third, public scoping for this project did not identify any public interest or need for detailed information on individual past actions. Finally, the Council on Environmental Quality issued an interpretive memorandum on June 24, 2005 regarding analysis of past actions, which states, "agencies can conduct an adequate cumulative effects analysis by focusing on the current aggregate effects of past actions without delving into the historical details of each individual past action."

The cumulative effects analysis in this environmental assessment is also consistent with Forest Service National Environmental Policy Act Regulations (36 CFR 220.4(f)) (July 24, 2008).

This project does not represent potential cumulative adverse impacts when considered in combination with other past or reasonably foreseeable actions. There are no apparent adverse, cumulative or secondary effects from Alternative 1 or Alternative 2, the action alternatives, as discussed in the Cumulative Watershed Effects (CWE) Analysis, Terrestrial Wildlife BE, Aquatics BE, Sensitive Plant BE, Noxious Weed Risk Assessment, Soil Report, Silviculture/Vegetation Report, and Fire/Fuels Report. The no action alternative has a higher risk of a high severity wildfire and the detrimental environmental effects associated with such an event. Homes, businesses, and historic structures located in the Wildland-Urban Interface within and adjacent to the project area are not protected by Alternative 3.

The process for analyzing CWE is documented in the Hydrology report. The risk of cumulative effects was evaluated using Forest Service Equivalent roaded acreage (ERA) methodology (USDA Forest Service, 1988). ERA values were calculated using a computer model developed by the Stanislaus National Forest (USDA Forest Service 2003). The ERA model is intended to predict risk of off-site impacts in terms of cumulative effects, not actual effects. The CWE methodology assumes

that the more densely a watershed is roaded, the greater the effects to water quality downstream. It considers past activities going back 10 years and reasonably foreseeable future activities within the next five years.

Watersheds and associated stream systems can tolerate given levels of land disturbance, until a point when the disturbances begin to substantially affect downstream channel stability and water quality. The upper limit estimate of watershed tolerance to land use, measured in percentage ERA, is called the threshold of concern (TOC). ERA values above the TOC may indicate that water quality no longer meets the criteria for the designated beneficial use of the water.

The hydrology report displays the ERA changes by implementing Alternative 1 or Alternative 2. The ERA for the existing condition of the 4 watersheds analyzed range from 0.61% - 3.12%. The ERA range for implementing Alternative 1 is increased to 1.38% - 4.27% at the maximum and would decline after implementation. The ERA range for implementing Alterative 2 is increased from 1.38-3.80% at the maximum and would decline after implementation. Both the existing condition and the effects of implementing either action alternative fall well below the 12-14% TOC. The results of the ERA modeling show that the threshold of concern is not reached in any of the watersheds analyzed under Alternative 1 or Alternative 2.

The relevant boundaries and projects assessed for cumulative effects vary by resource. Each resource cumulative effect area can be different. Relevant cumulative effects are discussed for each resource in this chapter. Each cumulative effects analysis for each environmental component or resource area is guided by and consistent with the Council on Environmental Quality letter "Guidance on the Consideration of Past Actions in Cumulative Effects Analysis" of June 24, 2005.

(8) Cultural Resources

A Cultural resources analysis has been completed. The assessment area has been surveyed for cultural and historical resources. Treatment units have been designed to avoid sites containing these resources. Site locations would be provided to Forest Service project implementation and contract administration staffs to ensure sites are protected. Project activities would not be permitted within site boundaries except as allowed by the district or forest archaeologist in consultation with the State Historic Preservation Officer (SHPO).

The timber sale contracts or service contracts will include standard provisions protecting cultural resources.

(9) Threatened and Endangered Species

Alternative 1 or Alternative 2 would not affect the threatened valley elderberry longhorn beetle because there would be no effect to potential suitable habitat. See next section.

Alternative 1 or Alternative 2 would have no significant effect on California red-legged frog because it would have no significant effect on the habitats needed by these species. See next section

(10) Consistency with Federal, State, or Local Laws and Requirements

The proposed actions are consistent with all Federal, State and local laws or requirements imposed for protection of the environment. The proposed action and modified action alternatives are consistent with the Stanislaus National Forest – Forest Plan Direction. The proposed action and alternatives were specifically developed to comply with the following laws and regulations:

1) Clean Water Act 1977
2) Clean Air Act 1970 and as amended 1977 (including Tuolumne County Air Pollution Control District Regulations)
3) Endangered Species Act 1973
4) National Historic Preservation Act 1966 (including the Region 5 Cultural Programmatic Agreement)
5) National Environmental Policy Act 1969
6) National Forest Management Act 1976

Other Required Disclosures

A No Effect Recommendation has been made for the Proposed Action and Action Alternative 2, in accordance with the provisions set forth in the Programmatic Agreement among the USDA Forest Service (Pacific Southwest Region), California State Historic Preservation Officer and Advisory Council on Historic Preservation regarding identification, evaluation and treatment of historic properties managed by the national forests of the Sierra Nevada, California (October 1996)." Protection of cultural sites during and after project activities will comply with this agreement.

Alternative 1 and Alternative 2 would result in beneficial impacts. Significant adverse impacts are unlikely. Negligible adverse impacts are not significant, even when each impact is considered as a whole. Beneficial effects have not been used to offset or compensate for the limited potential adverse effects in making this determination of no significant impact.

EFFECTS ON RESOURCES

Each section below summarizes a resource that was analyzed and effects determined by an appropriate technical specialist. All specialist reports, analyses, field data, modeling, and related material are incorporated here by reference and detailed in **Appendix F**.

Air Quality

Prescribed burning must be conducted in accordance with Title 17, Smoke Management Guidelines for Agricultural and Prescribed Burning as required by the California Air Resources Board. Prescribed burning would mange these emissions utilizing Best Available Control Measures (BACMs) and coordinate burn timing with the Tuolumne County Air Pollution Control District, the California Air Resources Board, Yosemite National Park, and other federal and local fire agencies.

Alternative 1 (Proposed Action)

The direct and indirect effects from using the Proposed Action are that enough biomass would be removed to significantly reduce emissions if wildfires occur. There would be a cumulative increase in emissions from prescribed fire associated with this project and others on the Stanislaus National Forest, Yosemite National Park, and private lands within the area. This would be mitigated by utilizing the previously listed BACMs.

Alternative 2 (Modified Action)

Alternative 2 treatments would not differ from the Proposed Action. As in the Proposed Action, the short-term effects on air quality in the air basin are reduced during wildfires and future prescribed fires.

Alternative 3 (No Action)

There would be a decrease in cumulative emissions associated with prescribed fire on the Stanislaus National Forest, Yosemite, and adjacent private lands by not burning the proposed acres in the Soldier Creek HFR project. There is a potential for degradation of air quality within the air basin from smoke produced by unplanned wildfire with pollutants from other sources.

Aquatic Wildlife

The primary aquatic features in the Soldier Creek HFR project area include the South Fork Tuolumne River, Rush Creek, and Soldier Creek. There are approximately six miles of the South Fork, 2.5 miles of Rush Creek, and 1.5 miles of Soldier Creek in the project area. Additionally there are approximately three miles of unnamed perennial stream channel and four miles of unnamed intermittent stream channels in the analysis area. Two ponds are located in the Soldier Creek HFR project area and two (2) ponds are located on private property lying within ¼ mile of the project boundary in the vicinity of Harden Flat.

The California red-legged frog (*Rana aurora draytonii*) is the only federally listed Threatened or Endangered (T&E) Aquatic species analyzed for this project. No other aquatic T&E species are found within 10 miles of the Soldier Creek HFR project planning area. Sensitive aquatic species that are analyzed include the foothill yellow-legged frog (*Rana boylii*) and the western pond turtle (*Actinemys marmorata*). Potential effects to these three species are addressed in this document.

All treatment units more than 200 feet from any perennial stream were eliminated from detailed aquatic analysis under both action alternatives because the 200 feet would act as a buffer to intercept and assimilate soil lost through erosion and prevent indirect soil delivery to perennial channels. A buffer of 200 feet would also maximize stream shading so there would be no expected changes in stream temperature. The remaining treatment units were categorized into units of limited concern and units of greatest concern in order to focus on meaningful disclosure.

Alternative 1 (Proposed Action)

There is very little difference in the potential for adverse or beneficial effects if either action alternative were implemented. The Proposed Action appears to be the action alternative with the greatest level of ground disturbing activity due to more timber units. The fuels treatments are identical between the two action alternatives. In general, the effects of implementing the proposed Soldier Creek HFR project would benefit aquatic systems by reducing the potential for stand-replacing wildfire. The two primary effects to aquatic species by initiating either action are 1) reduced risk and extent of high severity wildfire and 2) physical disturbance of individuals during project implementation.

The following threatened and sensitive aquatic species were analyzed for cumulative effects:

California red-legged frog: The project area lacks breeding and dispersal habitat for the California red-legged frog; therefore, the project area does not contain the four required habitat elements. There is suitable habitat adjacent to the project area, but the action alternatives would have no impact to this habitat. There would be no direct or indirect effects expected to occur to individual California red-legged frogs or their habitats, and implementation of the Soldier Creek HFR project would not contribute to cumulative effects to the frog or its habitats.

Foothill yellow-legged frog: Implementation of the Soldier Creek HFR project would not affect the foothill yellow-legged frog or its habitats. This determination is based on the lack of recent detections despite surveys of suitable habitat, limited ground disturbing activity in proximity to suitable habitat, and because the project area approaches the local elevation limit of the species. The anticipated intensity and duration of sedimentation of habitat is expected to be negligible. Cumulative effects to individuals or habitats would not occur.

Western Pond Turtle: The Soldier Creek HFR project may affect individual western pond turtles but would not lead to a trend in federal listing or result in a loss of viability within the planning area. This determination is primarily based on the limited duration and intensity of physical disturbance within the riparian area along the South Fork Tuolumne River. There is a very low potential for injury or mortality to individuals resulting from pile and burn operations if turtles occupy the piles during ignition. Fuels reduction activities near the South Fork have the potential to modify upland habitat for 2 to 3 years after treatment by making it less suitable for over-wintering. Road treatments and fuels reduction activities have the potential to improve pool and turtle nesting habitat by reducing fine sediment sources and removing encroaching conifers from open areas, respectively. The primary cumulative effects stressors occurred in the past and appear to be having negligible or minor impacts to western pond turtle habitat. Direct and indirect effects would have negligible cumulative effect to the turtle or its habitats at the watershed scale.

Alternative 2 (Modified Action)

The direct, indirect, and cumulative effects are the same as described in Alternative 1.

Alternative 3 (No Action)

Implementing the No Action Alternative except for a stand replacing fire would have no appreciable direct, indirect, or cumulative effect on the California red-legged frog, foothill yellow-legged frog, or the western pond turtle. This alternative would have negligible detrimental impacts to habitat in the South Fork Tuolumne River, Rush Creek, and Soldier Creek since road maintenance would not be completed and road-related sedimentation would continue.

Botany

BOTANICAL INTEREST SPECIES

In the Soldier Creek HFR project, a naturally occurring grove of young giant sequoia trees (*Sequoiadendron giganteum*) was found in unit F07. The grove of five sapling trees does not appear to have been planted. The nearest naturally occurring grove is the Tuolumne Grove in Yosemite National Park, approximately 6.5 miles to the east. Although speculative, it is possible that there could be one or more mature trees on private property near the project where the seed could have originated. The grove is unique enough to warrant applying management considerations, which would enhance the grove and provide some protection from a stand-replacing wildfire.

Alternative 1 (Proposed Action)

Direct Effects: Adverse direct effects to the giant sequoia grove are unlikely under these alternatives. The activities proposed for unit F07 are hand thinning and hand piling, underburning and pile burning. The management requirements call for treatments in the grove that would enhance the conditions for the giant sequoia trees. Underburning might singe the bark or scorch the lower branches of the trees. However, since this tree species is well adapted to the frequent fire regime and tends to be very fire resistant under prescribed fire conditions, the trees should do very well with the underburning proposed for this project.

Indirect Effects: Reducing tree density and removing dense brush around the giant sequoia trees would create favorable growing conditions for the giant sequoia trees. This species grows best in forest openings. Providing the tree spacing allows good sun exposure to the giant sequoias, dense brush does not encroach and the trees are reproductive, it is possible that this colony might expand, increasing the size of the existing grove. Giant sequoia trees are noted to reproduce best with bare mineral soil conditions and not reproduce well with thick needle duff on the forest floor. The duration of this effect would be as long as the canopy remained open and competition from brush and conifer regeneration remained low.

Cumulative Effects: The combined effects of the proposed Soldier Creek HFR project and past, present and foreseeable future projects, activities, and incidents in the analysis area and vicinity are not expected to cause long-ranging adverse cumulative effects to the giant sequoia grove. While there has been management activity in the vicinity, the grove itself does not appear to be very old. No evidence or reports of a historic grove in the area were found. The grove occurs in an area, which has not burned since before 1908. No influences from past management activities or wildfires are expected to have adverse effects or contribute to cumulative effects to the grove of giant sequoias.

Alternative 2 (Modified Action)

The direct, indirect, and cumulative effects are the same as described in Alternative 1.

Direct and Indirect Effects: There would be no direct or indirect effects to the giant sequoia grove by this alternative.

Cumulative Effects: The combined effects of selecting the "no action" alternative and past, present and foreseeable future projects and activities in the Soldier Creek HFR project area are not expected to have long-ranging cumulative adverse effects. However, the "no action" alternative on its own could lead to long-ranging adverse cumulative effects. The trees are saplings approximately 25 feet tall. A stand-replacing wildfire would likely kill most or all of the trees. The duration of this effect, if all of the trees were killed, would likely be permanent, unless a seed source exists nearby and reseeds into the site.

NOXIOUS WEEDS

Inventories for noxious weeds are complete in the Soldier Creek HFR project. Three CDFA noxious weeds have been discovered in the analysis area: bull thistle (*Cirsium vulgare*), klamathweed (*Hypericum perforatum*), and yellow star-thistle (*Centaurea solstitialis*). An invasive, non-native pest plant, woolly mullein (*Verbascum thapsus*) also occurs in the analysis area. A Noxious Weed Risk Assessment has been prepared.

Bull thistle: Bull thistle occurs as scattered individual plants across the analysis area. It is ubiquitous on the Groveland Ranger District. Dense concentrations of bull thistle were found in nine mechanical thinning units, 18 fuels reduction units, and in 10 roadside clearing units during the inventory for this proposed project. It is a CDFA C-Rated noxious weed.

Klamathweed: There are small infestations of klamathweed in one mechanical thinning unit, three fuels reduction units and in five roadside fuels clearing units. Klamathweed occurs scattered throughout the analysis area as a few scattered plants. It rarely occurs in large dense patches. It is likely that the biological control agent, *Chrysolina quadrigemina* (klamathweed beetle) is present and keeping the plants in check. These biocontrol agents have been observed at the Jordan Creek/Bower Cave Special Interest Area, about seven and one-half miles southwest of the analysis area. Klamathweed is everywhere on the Groveland Ranger District. It is a CDFA C-Rated noxious weed.

Yellow star-thistle: All of the known infestations of yellow star-thistle in the analysis area occur along Highway 120. There is an infestation of yellow star-thistle near two mechanical thinning units. There are two other infestations within one fuels reduction unit and within one roadside clearing unit. Yellow star-thistle is a CDFA C-Rated noxious weed.

Woolly mullein: Woolly mullein occurs as scattered individual plants within the analysis area. Only one concentration of concern was reported from weed inventories. It is located on an old landing in a fuels reduction unit. Woolly mullein is not a CDFA noxious weed but is considered a non-native, invasive pest plant species. This species poses a moderate risk to areas, which have ground disturbance and little or no tree canopy.

Alternative 1 (Proposed Action)

Direct and Indirect Effects: The management requirements for the activities conducted or contracted outside the timber sale contract, such as the service contract portions of the project, would provide a low to moderate risk of spreading existing infestations of noxious weeds as the result of the non-timber sale contracted activities. The standard contract provision for equipment cleaning, which is the required wording for timber sale contracts, would result in a moderate to high risk of introducing new infestations of noxious weeds.

The contract provisions only apply to off-road equipment, defined as "all logging and construction machinery, except for log trucks, chip vans, service vehicles, water trucks, pickup trucks, cars, and similar vehicles." Often when noxious weeds are present in a project area, they occur at log landings or along road shoulders. On-road equipment and passenger vehicles can easily pick up and vector noxious weeds if driven through or parked in infested sites outside the project area or inside. Log trucks and other vehicles primarily are exposed to disturbed sites within the project, where weeds are most easily spread. Timber sales generally have a higher number of highway vehicles coming and going from long distances than other contract types.

Timber sale contract equipment cleaning provisions require the purchaser to take "reasonable measures" to ensure that each piece of off-road equipment is "free of soil, seeds, vegetative matter, or other debris that could contain or hold seeds" if that equipment last operated in an area infested with one or more invasive species of concern. In practice, in the Stanislaus National Forest, the contractors have been arriving at timber sale projects with clean off-road equipment regardless of where the equipment had previously worked. This greatly reduces the risk of vectoring weeds into the new projects by off-road equipment.

The project would open the tree and shrub canopy resulting in more sunlight to the forest floor and improved conditions for weed spread. If new infestations of noxious weeds are introduced into the project because of the timber sale activities, the opening of the tree and shrub canopy would encourage the spread of those introduced weeds. Those new infestations might include weed species not currently known to the analysis area or the National Forest.

Cumulative Effects: The trend in forest management is to manage the National Forests in such a way that resource and property losses from wildfire are minimized. This means that, in the best case scenario, the proposed project units and surrounding areas would be managed in an open, reduced fuels condition, maintained by periodic prescribed underburning. By opening up the tree stands and reducing or removing the dense brush and conifer regeneration understory, the noxious weeds would persist through time and likely continue to spread from current locations where adequate sunlight reaches the ground. This effect might be reduced if weed control measures at areas of weed concentrations could be continued through time. There is a low likelihood that weed treatments would continue for more than a year or two after the completion of project activities due to the general lack of adequate funding available to treat weeds.

Noxious weeds are often plants, which are able to take advantage of disturbance and quickly dominate sites, pushing out the native and desirable non-native plants previously occupying the sites. Noxious weeds are often able to out-compete native and desirable non-native plants, even in the absence of disturbance. The result could be that over time, the plant species diversity of the project area could be reduced from competition with noxious weeds.

Alternative 2 (Modified Action)

The direct, indirect, and cumulative effects are the same as described in Alternative 1.

Alternative 3 (No Action)

Direct Effects: Areas that currently have noxious weeds and invasive, non-native pest plants would continue to support these species, providing seed sources for spreading into adjacent areas. There would be no direct effects to noxious weeds, invasive non-native pest plants, or weed spread from this alternative. No new weed infestations would be introduced to the analysis area as the result of mechanical thinning activities.

Indirect Effects: The current vegetation types would be maintained without a disturbance phase caused by management activities under this project, eliminating the risk of weed spread as the result of tree thinning or fuels reduction activities.

Cumulative Effects: With the current level of management and activities in the Soldier Creek HFR project area, exclusive of another wildfire event, noxious weeds would continue to spread at the current rate within the analysis area. The likelihood of a future stand-replacing wildfire event increases the risk of weed spread in the future. The next stand-replacing wildfire event would create optimum growing conditions for the currently known noxious weeds. On the Groveland Ranger District, stand-replacing wildfires have started mostly during the summer months of late July to late August. By this time of year, yellow star-thistle, bull thistle, and woolly mullein have produced about half of the viable seed for that growing season. Therefore, in the Soldier Creek HFR project area, a stand-replacing wildfire would cause existing infestations to increase within one to two years after the wildfire. The weeds would spread rapidly from infested areas into nearby uninfested areas, taking advantage of the fire-disturbed condition and increasing the infested acres in the project area.

SENSITIVE PLANTS

Surveys for Sensitive Plants were conducted in the proposed project units for the Soldier Creek HFR project. Surveys in the analysis area have revealed occurrences of *Clarkia australis* (Small's southern clarkia), *Cypripedium montanum* (mountain ladyslipper orchid), *Hydrothyria venosa* (veiny aquatic lichen or waterfan), and *Mimulus filicaulis* (Hetch-Hetchy, or slender stemmed monkeyflower). *Clarkia* species plant remnants, which could be Clarkia australis or Clarkia biloba ssp. australis were found during surveys outside of the species', appropriate identification periods.

1. *Clarkia australis*: There are known occurrences of *Clarkia australis* within two mechanical thinning units, eight fuels reduction units, three fuels break units and two roadside clearing units in the proposed Soldier Creek HFR project. There is one additional mechanical thinning unit, one additional fuels reduction unit and a roadside clearing unit with *Clarkia* species remnants, which could be *Clarkia australis*.

2. *Clarkia biloba* ssp. *australis:* There are no confirmed occurrences of *Clarkia biloba* ssp. *australis* in Soldier Creek HFR project. There is one mechanical thinning unit, two fuels reduction units, one fuel break unit, and one roadside clearing unit with *Clarkia* species remnants that could be *Clarkia biloba* ssp. *australis*.

3. *Cypripedium montanum:* There are known occurrences of *Cypripedium montanum* within five mechanical thinning units and four fuels reduction units. There are occurrences of *Cypripedium montanum* within two roadside clearing units.

4. *Hydrothyria venosa:* There is one known occurrence of *Hydrothyria venosa* in one fuels reduction unit of the Soldier Creek HFR project.

5. *Mimulus filicaulis*: There are known occurrences of *Mimulus filicaulis* within one mechanical thinning unit, five fuels reduction units and four roadside clearing units. There is suitable habitat that has not been surveyed during the appropriate identification period within one mechanical thinning unit, eight fuels reduction units, and four roadside clearing units. Therefore, it is possible that there are as-yet undiscovered occurrences in the project area.

6. *Mimulus pulchellus*: There are no known occurrences of *Mimulus pulchellus* within the analysis area. However, there is suitable habitat that has not been surveyed during the appropriate identification period within one mechanical thinning unit, eight fuels reduction units, and four roadside clearing units. Therefore, it is possible that there are as-yet undiscovered occurrences in the project area.

There are no federally listed Threatened or Endangered plant species within the boundaries of the Stanislaus National Forest. Therefore, there would be no impacts from any of the alternatives in this project to such species. None of the alternatives in this project is expected to have an adverse effect on the viability of any Sensitive Plant species. All of the alternatives might have both beneficial and adverse effects to individuals or occurrences of Sensitive Plants. None of the alternatives in this project are expected to result in loss of species viability or create significant trends toward Federal listing for any of the Sensitive Plant species.

Alternative 1 (Proposed Action)

The management requirements for this project were developed to minimize, reduce or alleviate adverse effects to Sensitive Plants. Nevertheless, there may be some adverse effects to occurrences of *Clarkia australis, Clarkia biloba* ssp. *australis, Mimulus filicaulis,* and *Mimulus pulchellus* because the management requirements might only reduce or minimize the adverse effects to known occurrences of these Sensitive Plants, not completely alleviate the effects. The project design allows for specific, limited, and appropriately timed project activities to be conducted in or through known occurrences of these Sensitive Plant species. At no time are any adverse effects expected to be so great that an occurrence would be impacted to the point that it would be eliminated. These adverse effects are not expected to result in a downward trend in terms of species viability. For this section, the term "impact" refers to any disturbance that might adversely affect Sensitive Plants or occupied Sensitive Plant habitat. Occurrences of *Cypripedium montanum* or *Hydrothyria venosa* would be protected from all project activities under the Sensitive Plant management requirements.

<u>Direct Effects</u>: If the management requirements are fully implemented, there would be no direct effects to *Cypripedium montanum* or *Hydrothyria venosa* from the proposed project. Since occurrences of *Clarkia australis, Clarkia biloba* ssp. *australis, Mimulus filicaulis, and Mimulus pulchellus* would not be protected from all impacts, direct effects to these Sensitive Plants are possible from the project activities.

Some limited ground disturbing activities such as masticating and subsoiling skid trails or landings would be allowed within *Clarkia australis* occurrences during the dry, non-growing period when the species is most resilient to these types of disturbances. Activities such as masticating brush and trees or subsoiling skid trails within occurrences of *Clarkia australis* during the non-growing period might damage, move, or bury seed banked in the soil. There is a chance that some of the seed banked in the soil might be killed by the passage of the heavy equipment through an occurrence. It is expected that most of the seed would survive these activities and the occurrences would benefit by being provided with less competition and better soil moisture. Some seed of *Clarkia australis, Clarkia biloba* ssp.

australis, Mimulus filicaulis, or *Mimulus pulchellus* might be affected by underburning where ground fuels might have built up enough to generate more heat than the seeds could tolerate. These species seem to be well adapted to the frequent fire regime, often responding the year after a fire with larger numbers of plants, plants that are larger than normal, and more flowers on the plants. However, where ground fuels might generate too much heat, some seed could be lost. It is doubtful that entire occurrences would be eliminated by underburning during the dry, non-growing period.

Indirect Effects: Operating heavy equipment for logging activities, subsoiling for compaction, road reconstruction, or temporary road construction near Sensitive Plant occurrences might change the way moisture is translocated through the substrates into the occurrences. More moisture might be channeled to occurrences by heavy equipment as it operates in an area conducting log skidding, roadbed reconditioning or road construction. One possible result could be an erosive force cutting through an occurrence. This would be an adverse impact. Moisture might be diverted by compaction caused by heavy equipment or by drainage improvement in roadwork. The loss of moisture would probably have an unfavorable impact on Sensitive Plants.

The intensity of these indirect effects would be dependent on the location of the activities in relation to the occurrence. An activity that occurred several hundred yards uphill from an occurrence would be expected to cause little change in the occurrence's soil moisture. That same activity directly adjacent to an occurrence could cause much change in the soil moisture pattern. The intensity of the effects of activities within an occurrence or directly above an occurrence could be great, potentially reducing a high quality habitat to a low quality habitat. This would be especially true for *Mimulus filicaulis* and *Mimulus pulchellus* that are very dependent on an abundant amount of available soil moisture. The duration of these effects would vary with the site and species. An occurrence of *Clarkia australis*, *Clarkia biloba* ssp. *australis*, *Cypripedium montanum*, *Mimulus filicaulis*, or *Mimulus pulchellus* might not recover if the soil moisture is permanently reduced. The result could be a reduction or elimination of the occurrence, the duration being beyond the foreseeable future.

Suitable habitat for *Hydrothyria venosa* is perennial streams fed by cold spring water. It is unlikely, due to soil and water quality best management practices that any project activities would cause a loss of soil moisture or a redirection of water flow that could result in degradation to the suitable habitat of this species.

Reducing tree density and removing dense brush could open up more suitable habitat for *Clarkia australis, Clarkia biloba* ssp. *australis, Mimulus filicaulis,* and *Mimulus pulchellus* which tend to grow in forest openings or under light shade. Providing the canopy allows full sun exposure to ground level, slash is removed, dense brush does not encroach, and a seed source exists after the project activities, these species might colonize some of the newly opened areas, increasing the size of an existing occurrence. Increasing the size of an occurrence would be beneficial and is desirable in the recovery and viability of any species. The duration of this effect would be as long as the canopy remained open and competition from annual plants and brush remained low.

Cypripedium montanum grows under deep shade on the Groveland Ranger District. A buffer of adequate tree canopy would be retained around each occurrence to maintain the microclimate and tree associations needed by the species. Reducing tree density and removing dense brush adjacent to *Cypripedium montanum* occurrence sites would decrease the risk of a stand-replacing wildfire. Reducing the current risk would be beneficial to retaining the occurrences through the foreseeable future. The intensity of this effect could be great since the project area is at a moderate to high risk of a stand-replacing wildfire due to the current tree and brush density. The duration of this effect would be for as long as forest fuels and tree density remained at an acceptable level for modifying fire behavior.

Hydrothyria venosa tends to grow under shade on the Groveland Ranger District. Reducing tree density and removing dense brush adjacent to any *Hydrothyria venosa* occurrence sites would decrease the risk of a stand-replacing wildfire. Reducing this risk would be beneficial to retaining this species within the project area through the foreseeable future. The intensity of this effect could be great since the forest surrounding the known occurrence is at a high risk of a stand-replacing wildfire due to the accumulation of forest fuels. The duration of this effect would be for as long as forest fuels and tree density remained in an acceptable range for reduced wildfire burn severity.

Low severity underburning during the dry non-growing season would probably be advantageous to *Clarkia australis, Clarkia biloba* ssp. *australis, Mimulus filicaulis,* and *Mimulus pulchellus* since burning would temporarily reduce or eliminate many of the species that are in competition. These species tend to respond favorably to reductions in competing vegetation, especially after wildfire or dry season burning. Burning might also reduce the accumulated thatch or duff that impedes the germination and growth of these Sensitive Plant species that favor bare mineral soil. The intensity of any benefit to these Sensitive Plant species would depend on how completely the low severity underburning consumed the competing vegetation, thatch, or duff. The greater the level of vegetation and organic material consumed by fire, the greater the benefit to these four Sensitive Plant species. The duration of the effect would be only for as long as the competition or organic matter remained low. Once the competing vegetation, thatch, or duff becomes dense again, the benefit would be lost. The time frame for returning vegetation could be quite short since most of the species on these sites are adapted to a frequent fire regime. Hand thinning during the dry non-growing period within occurrences of *Clarkia australis, Clarkia biloba* ssp. *australis, Mimulus filicaulis* or *Mimulus pulchellus* would have similar benefits for these species as does underburning in terms of reducing competition.

Competition from existing occurrences of noxious weeds, non-native invasive plants and grass species would likely increase with the introduction of disturbance and the thinning of trees and brush. When noxious weeds or invasive pest plants are already on a site, ground disturbance can create favorable growing conditions for some of those species. Increasing competition from these species as well as other non-native species would be considered an adverse impact to Sensitive Plants. The duration of this effect would be for as long as the sites remained open to sunlight, allowing the non-native species to thrive.

Cumulative Effects: The combined effects of the proposed Soldier Creek HFR project and past, present and foreseeable future projects, activities, and incidents in the analysis area and vicinity are not expected to cause long-ranging adverse cumulative effects to Sensitive Plants. Individuals of some Sensitive Plant occurrences may be adversely affected by proposed project activities. However, these impacts are not expected to be so great in intensity or duration that any of these occurrences would be eliminated, even when combined with other Forest activities. The combination of effects from all of the Soldier Creek HFR project activities and past, present and foreseeable future projects, activities, and incidents are not expected to cause long-ranging adverse cumulative effects to occurrences of Sensitive Plants in the analysis area. Any possible adverse effects from the Soldier Creek HFR project to occurrences are expected to be temporary, limited to portions of occurrences, or limited in intensity.

Six wildfires occurred within the proposed Soldier Creek HFR project analysis area between 1908 and 1996. An unnamed fire in 1944 and the 1987 Larson fire were large acreage fires that burned large areas of the analysis area. The remaining four fires burned small areas within the analysis area and all overlapped with either the 1944 or 1987 fire. The fires would have provided favorable growing conditions during the growing period following the fires for *Clarkia australis*, *Clarkia biloba* ssp. *australis, Mimulus filicaulis,* and *Mimulus pulchellus*, which are well adapted to in-season burning.

Cypripedium montanum does not respond well to fire and some occurrences might have been lost as the result of one or more of these past fires. A comparison of the currently known locations of *Cypripedium montanum* and the boundaries of the past wildfires, combined with a study of the 1944 aerial photos of the post-fire area indicates there might be a correlation between fire occurrence or intensity and the retention of populations of this species. *Cypripedium montanum* remains in the analysis area where there have been no wildfires since before 1908, or where burn intensities were very low as viewed on the aerial photos.

Hydrothyria venosa is not adversely affected by wildfire as long as the overstory and habitat remains intact, sedimentation remains low and scouring does not occur as a result of increased water flows. *Hydrothyria venosa* has not been found in any of the streams within the burn areas. It is not possible to know if *Hydrothyria venosa* was present prior to any of the fires. Therefore, it cannot be determined if the past wildfires had adverse effects on this species in the analysis area.

The management requirements for the Soldier Creek HFR project incorporate measures, which would reduce, minimize, or alleviate adverse effects to occurrences of Sensitive Plants in the currently proposed units that overlap with these past wildfires. Therefore, there would be no adverse cumulative effects from the combination of the proposed project and the past wildfires.

The Larson Fire was followed by timber salvage sales to recover the timber value of the trees. It is likely that the same was true of the 1944 fire. The other 4 fires were small acreage fires and in general, there was little or no timber value to recover. No organized inventories were done prior to implementing the fire salvage after the 1987 Larson Fire. Occurrences of Sensitive Plants were not protected from impacts by the logging activities in these past fire salvage timber sales. The management requirements for the Soldier Creek HFR project incorporate measures, which would reduce, minimize, or alleviate adverse effects to occurrences of Sensitive Plants in the currently proposed units, which overlap with these past fire salvage timber sale units. Therefore, there would be no adverse cumulative effects from the combination of the proposed project and the past fire salvage timber sales.

Timber harvesting has taken place in the analysis area going back to the railroad logging era of the 1920s. "Green" timber sales, which were implemented prior to 1991, were not surveyed for Sensitive Plants and no mitigation was incorporated into the projects. It is unknown how many occurrences of Sensitive Plants might have been impacted by logging activities because of those prior harvests. Six current Sensitive Plant species would have been most likely affected by green timber sales prior to 1991 if they were present in harvest units: *Clarkia australis, Clarkia biloba* ssp. *australis, Cypripedium montanum, Hydrothyria venosa, Mimulus filicaulis*, and *Mimulus pulchellus*. While it isn't known how many occurrences of Sensitive Plants were impacted by past green timber harvests, what is known is the number of occurrences found since inventories began in the analysis area in 1991, which is a current (albeit imprecise) reflection of the long-term effects of those past activities.

The Regional Forester's Sensitive Plant list has been updated twice (1998 and 2006) since surveys for Sensitive Plants began in the analysis area. Each time, several new species were added to the list. Since the past botany surveys were not floristic in nature, that is, a complete identification and listing of all plant species encountered was not made, the newer additions to the list would have been overlooked in past surveys. Surveys each time were conducted for the current list at the time.

One of most recent green timber sales in the Soldier Creek HFR project analysis area were the Crush and Orange Crush timber sales, which were adjacent to each other and covered in the same environmental analysis. The Sensitive Plant surveys for those projects were conducted in 1992 and 1993. Occurrences of *Cypripedium montanum* and *Mimulus pulchellus* would have been overlooked or not

reported when encountered. *Hydrothyria venosa* was a complete unknown to Stanislaus National Forest at that time and would not have been recognized. Occurrences of these species received no species-specific protection from logging activities in the Crush and Orange Crush Timber Sales. However, the best management practices for protecting water quality would have provided protection for *Hydrothyria venosa*. Known occurrences of *Clarkia australis* and *Mimulus filicaulis* were protected by flagging and avoidance in the Crush and Orange Crush Timber Sales. The management requirements for the Soldier Creek HFR project incorporate measures, which would reduce, minimize, or alleviate adverse effects to occurrences of Sensitive Plants in the currently proposed units, which overlap with these past timber sales. Therefore, there would be no adverse cumulative effects from the combination of the proposed project and the past green timber sales.

The analysis area is within active cattle grazing allotments. The Sensitive Plant surveys revealed that most of the units showed no signs of cattle use. Where cattle use was observed, it appeared to be concentrated in the damper, more open areas, such as meadows. The meadow areas are suitable habitat for *Mimulus filicaulis* and *Mimulus pulchellus*. Trampling during the growing season can prevent the plants from setting seed. The management requirements for the Soldier Creek HFR project require flagging and avoidance of occurrences of *Mimulus filicaulis* and *Mimulus pulchellus* or activities timed for when the species are best able to tolerate the activities. Therefore, the proposed project would not contribute adverse cumulative effects to *Mimulus filicaulis* and *Mimulus pulchellus* when taken in consideration with grazing.

As trees are thinned and brush is removed in the project units, cattle would tend to move into those areas to take advantage of the newly available forage. This would take some of the pressure off the areas where they are currently concentrating. Over the course of the project's seven to ten year implementation schedule, some Sensitive Plant occurrences not currently exhibiting impacts from cattle might begin to incur impacts from cattle. This increased activity around Sensitive Plant occurrences would be expected to continue through time, beyond the ten-year life of the project, as long as these areas remain open, providing forage. However, the impacts would be dispersed over a large area, improving the odds that none of the occurrences would be impacted to the point of elimination.

The road corridors in the Soldier Creek HFR project analysis area have had a typical amount of disturbance in the form of road construction and maintenance through time. Most of the roads are "native surface" roads which have been graded and cleared of brush periodically in the past. The proposed road maintenance, reconstruction or restoration activities for this project are not expected to cause adverse cumulative effects to *Clarkia australis*, *Clarkia biloba* ssp. *australis*, *Cypripedium montanum*, *Hydrothyria venosa*, *Mimulus filicaulis,* or *Mimulus pulchellus*, even when considered with past road construction and maintenance activities.

Alternative 2 (Modified Action)

The direct, indirect, and cumulative effects are the same as described in Alternative 1.

Alternative 3 (No Action)

<u>Direct Effects</u>: There would be no direct effects to Sensitive Plants from this alternative.

<u>Indirect Effects</u>: There would be indirect effects to Sensitive Plants by this alternative. The indirect effects would come from continued encroachment by dense tree regeneration and brush, and the increasing threat of stand-replacing wildfires.

Native brush species, such as mariposa manzanita (*Arctostaphylos viscida* ssp. *mariposa*) and deer brush (*Ceanothus integerrimus*) can dominate sites within several years of ground disturbing activities such as timber harvest, mastication, or underburning. The same is true of regenerating conifers, especially ponderosa pine, which also readily occupy disturbed sites. As these species become dense, they can crowd out some Sensitive Plant species. In the Soldier Creek HFR project analysis area, *Clarkia australis, Clarkia biloba* ssp. *australis, Mimulus filicaulis,* and *Mimulus pulchellus* are being crowded by manzanita and regenerating trees as they overtake the forest openings and understory. Some stands are now so dense that if present in the past, *Clarkia australis* or *Clarkia biloba* ssp. *australis* cannot grow now and may only be present as seed in the soil seed bank in some areas.

A high intensity, stand-replacing wildfire would likely eliminate any *Cypripedium montanum* or *Hydrothyria venosa* occurrences, which might be present. These species depend on cool, shaded habitats. A stand-replacing wildfire would likely eliminate the microhabitat on which these species depend, thereby setting up occurrences for extirpation (permanent loss) in the proposed project area.

Cumulative Effects: The combined effects of selecting the "no action" alternative and past, present and foreseeable future projects and activities in the Soldier Creek HFR project area are not expected to have long-ranging cumulative adverse effects. However, the "no action" alternative on its own could lead to long-ranging adverse cumulative effects for at least two Sensitive Plant species in the analysis area.

Because of the cyclic nature of disturbance, both natural and man-caused, it is expected that any indirect effects from this alternative would not last indefinitely for all of the Sensitive Plant species in the analysis area except possibly *Cypripedium montanum* and *Hydrothyria venosa*. The Sensitive Plants *Clarkia australis, Clarkia biloba* ssp. *australis, Mimulus filicaulis,* and *Mimulus pulchellus* bank seed in the soil and would probably are able to maintain populations in small isolated pockets until the next disturbance. Therefore, with the cyclic nature of disturbance, increased competition from brush and non-native species as the result of implementing this alternative would be expected to have no lasting contribution to the accumulation of adverse effects to these four Sensitive Plants.

A future stand-replacing wildfire event could cause the elimination of *Cypripedium montanum* or *Hydrothyria venosa* in the analysis area. *Cypripedium montanum* does not bank seed. *Hydrothyria venosa* does not produce seed. Neither of these species can rely on a seed bank to sustain an occurrence. They are intolerant of the high temperatures and dry conditions, which would occur when the tree canopy is removed following a high intensity fire. Elimination of *Cypripedium montanum* or *Hydrothyria venosa* occurrences would likely be a permanent adverse cumulative effect of not reducing fuel loading near occurrences.

Carbon Resources and Climate Change

Terrestrial ecosystems strongly influence the global carbon cycle and, combined with oceans, are estimated to absorb about half of the carbon dioxide (CO_2) currently being released by human activities (Dilling et al. 2003). Simulated global patterns of carbon flux suggest that western U.S. forests are a carbon sink (Potter and Klooster 1999). Temperate forest ecosystems contain a significant amount of soil carbon (Rasmussen 2006) and tree-based carbon (Hurteau et al. 2008). These carbon stocks are important resources that reduce carbon inputs into the global carbon cycle and provide a mechanism for carbon storage of emissions from natural and anthropogenic sources.

Climate Change in the Sierra Nevada: Increasing temperatures and a greater annual variation in precipitation in the Sierra Nevada are predicted from expected increases in anthropogenic CO_2. The variation in precipitation will have effects on water release timing, length of the growing season, and

soil moisture conditions. Predicted increases in early season snowmelt/late season precipitation (Miller et al. 2003) (which will increase fuel loading due to greater understory growth) and hotter, drier summers have the high potential to increase wildfire activity and carbon emissions from forested areas (Miller and Urban 1999; Kim, 2005). In the Sierra Nevada, mean and maximum fire sizes as well as total area burned annually have all risen substantially since the 1980's (Miller et al. 2008). Research shows increases in understory biomass with amplified pollution and climate change, suggesting future increases in fire severity and fire size in the Sierra Nevada (Hurteau and North 2008). Climate change modelers agree that climate will have greater variation and maximuns as oscillations between wet and drought conditions become more common. It is suggested that land managers not recreate a fixed pre-settlement condition but strive for forest conditions that are more resilient and resistant to disturbance impacts (North et al. in press; Millar et al. 2007).

Carbon Resources in the Sierra Nevada: Forests are viewed as a potential sink for carbon that might otherwise contribute to climate change (Lal 2005; Beedlow et al. 2004). Intact forest ecosystems of the Sierra Nevada can contain from 160 Mg/ha (*mega-grams per hectare*) of carbon (Johnson et al. 2007 and 2005) to over 400 Mg/ha of carbon (Hurteau and North 2009). It is important that these carbon resources are protected in the short-term and that these forested ecosystems are managed to increase carbon sequestration in mid to long-term timeframes. Re-introducing fire back into fire adapted ecosystems as well as related restoration thinning can have significant, positive impacts on protecting carbon stocks as well as sequestering additional carbon, potentially buffering historically high carbon concentrations in the atmosphere.

Alternative 1 (Proposed Action)

Mechanical thinning and fuels reduction treatments would initially reduce tree-based carbon stocks in the short-term but tree-based carbon stocks would recover in the mid to long-term as well as being protected from catastrophic loss from a stand replacing wildfire. Untreated forests have the largest total carbon emission and largest reduction in live-tree-based carbon stocks due to wildfire (Hurteau and North 2009). Treatments proposed have been shown not to affect total soil carbon stocks (Moghaddas and Stephens 2007; Kobziar and Stephens, 2006). Prescribed burn treatments could potentially add relatively significant amounts of highly resistant, long-term carbon stocks in the form of charcoal in soil horizons (DeLuca and Aplet 2008). Meadow soils contain vast stores of mid to long-term carbon stocks (Buol et al. 2003), gully erosion and conifer encroachment would potentially remove carbon mineralization (conversion to CO_2) from lowered water tables. Properly functioning meadows in the Sierra Nevada store more carbon than degraded ones (Jungst 2008). The potential release of carbon from mechanical equipment completing the work is exponentially lower than the amount of carbon protected.

This alternative provides the best opportunity to provide a durable, more resilient open forest stand structure that will resist high severity wildfire events and protect soil and tree-based carbon stocks. Additionally, improved soil moisture conditions would sequester additional carbon through greater productivity in large, fire resistant trees. This alternative further protects soil and tree-based carbon stocks by reducing surface fuels, ladder fuels, and providing strategic areas for fire suppression as well as through meadow enhancement.

Alternative 2 (Modified Action)

The effects of this alternative on climate change and carbon resources would be similar to that of Alternative 1, the extent of treatments is less thus the benefits to carbon sequestration and protection of carbon stocks would be less. Alternative 1 treats an additional 183 acres and creates an open stand structure that is more resilient and resistant to disturbance on an additional 183 acres. (North et al. in

press) These acres consist of mechanical thinning units that include removal of biomass, *i.e.* ladder fuels. The effects to climate change and carbon resources would be the same as Alternative 1 related to the fuels reduction and meadow enhancement treatments.

This alternative provides an opportunity to reduce the probability of a high-severity wildfire to protect soil and tree-based carbon stocks by reducing surface fuels, ladder fuels, and providing strategic areas for fire suppression. This alternative also provides for, in limited acres and size classes, tree release by means of mechanical thinning as well as meadow enhancement which further protects existing carbon stocks and potentially increases current carbon stocks in the long-term.

Alternative 3 (No Action)

A review of literature (Ritchie et al. 2005; Smith et al. 1996; Kimmins 1987) finds that thinning produces a release effect, suggesting that the leave trees are sequestering carbon at a higher rate than when growing in dense stand conditions. There is also evidence that pre-fire suppression forests stored more carbon and had the lower CO_2 emissions than the current dense growth, small diameter tree stand structure (Hurteau and North 2009; Fellows and Goulden 2008). The consequence of no action would be a decreased storage of carbon in tree-based and soil-based carbon stocks as well as increased emissions of CO_2 from carbon mineralization.

In a high-severity wildfire there is a dramatic loss of tree-based carbon stocks from the initial burning of tree boles as well as loss of fine and coarse roots through decomposition and mineralization over the following years. Losses of tree-based carbon can exceed 40 Mg/ha in mixed conifer forests of the Sierra Nevada (Johnson et al. 2005; Johnson et al. 2007). In addition to the significant loss of tree-based carbon in a high-severity wildfire event, there is a dramatic loss of soil-based carbon greater than 20 Mg/ha as well as loss of significant amounts of nitrogen, which in nitrogen limiting forests (like those of the Sierra Nevada) reduces future capacity to sequester carbon in forest stands (Bormann et al. 2008). Research has shown that ponderosa pine forests convert from being a net sink of carbon to a net source of carbon for many decades after high-severity fire (Dore et al. 2008), this expands and elongates the negative effects of stand replacing wildfire on carbon stocks. The net carbon source effect is reduced primary productivity and decreases in total ecosystem respiration. The increased decomposition of woody debris played a smaller, secondary role in this effect. Research in other forested ecosystems shows similar findings (Fredeen et al. 2007; Thornton et al. 2002).

Summary

In fire dependent forests that are susceptible to wildfire, tree-based carbon stocks are best protected by silvicultural and fuels treatments that produce a low-density stand structure dominated by large, fire resistant pines (Hurteau and North 2009). Soil-based carbon stocks will also be enhanced in the mid to long-term by the same fuel treatments that reduce ladder and surface fuels and prevent a high-severity wildfire (Neary et al. 2005). From recent synthesis of the scientific literature (North et al. in press) and recent study findings (Bormann et al. 2008; Dore et al. 2008; Fellows and Goulden, 2008; Hurteau and North 2009):

- Alternative 1 provides the best opportunity to provide a durable, more resilient open stand structure that will resist high severity wildfire events and protect soil and tree-based carbon stocks. This alternative will also improve soil moisture conditions for additional carbon sequestration through greater ecosystem productivity in the fire resistant, large tree component.

- Alternative 2 provides an opportunity to reduce the probability of a high-severity wildfire, which will protect soil and tree-based carbon stocks by reducing surface fuels, ladder fuels, and providing strategic areas for fire suppression.

- Alternative 3 does not protect carbon stocks from a high-severity wildfire and does not increase tree, stand, or landscape resiliency in response to climate change.

Maximizing carbon stock retention and conservation of existing carbon stocks while restoring forest stands to durable, natural stand structures should be goals of forest management, in order to increase and retain long-term carbon stocks (Beedlow et al. 2004).

Environmental Justice

Low-income populations comprise 12% of the total population within Tuolumne County and 11% within Mariposa County according to the US Census taken in 2004. The United States Environmental Protection Agency - Office of Environmental Justice defines environmental justice as follows:

"Environmental Justice is the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. It will be achieved when everyone enjoys the same degree of protection from environmental and health hazards and equal access to the decision-making process to have a healthy environment in which to live, learn, and work."

Executive Order 12898 signed February 11, 1994 by President Clinton requires an assessment of whether minority or low-income populations would be disproportionately affected by the proposed action alternatives. An environmental justice concern arises when actions may involve a potentially disproportionate, high, and/or adverse environmental or human health effect on identifiable low-income or minority communities.

Scoping was conducted to elicit comments on the proposed action from all potentially interested and affected individuals and groups without regard to income or minority status. Scoping and public meeting notices were placed in a local newspaper as well as posted adjacent to the project area and in public areas (*i.e.* local post offices and community bulletin boards). Comments were able to be received through phone, e-mail, or written mail as well as in person. The Groveland District received no specific comments concerning any potential disproportionate affects to low-income and/or minority populations.

Alternatives 1 (Proposed Action)

There is little potential for minority and low-income populations to be disproportionately affected by the proposed activities. The project would likely produce a short-term economic benefit to the local community. The benefits would come in the form of increased employment in local timber and mastication companies. The project would also benefit companies and businesses that support those operations including local fuel businesses, mechanics, and other businesses that provide support services.

Alternatives 1 should not significantly restrict or inhibit the gathering of fuelwood or hunting of game animals. Several of the treatments prescribed will enhance fuelwood and hunting opportunities.

Alternative 2 (Modified Action)

The direct, indirect, and cumulative effects are the same as described in Alternative 1.

Alternative 3 (No Action)

The implementation of this alternative would have no negative affects on minority or low-income populations. However, this alternative would not produce any short-term economic benefits for the local communities. Thus, Alternative 3 would have negative cumulative affects to the local community.

Summary

Based on the composition of the effected communities, along with cultural and economic factors, the activities that are proposed would have no disproportionately adverse effects to human health and safety, or environmental effects to minorities, those of low income, or any other segments of the population. There are no significant negative direct, indirect, or cumulative effects relative to issues of environmental justice through the implementation of the action alternatives.

Fire and Fuels

The northern aspect dominates the Soldier Creek HFR project landscape. Several ridgelines create defining land features, which influence fuels and fire character. Crocker Ridge is the southern boundary of the project. Crocker Ridge north is the eastern boundary of the project. The next ridge south from Crocker Ridge is Pilot Ridge, a prominent east to west and northwest trending ridge that shelters the area to the north from predominate alignment with southwest prevailing winds. It is not within the project boundary but closely related.

The summer weather pattern for the analysis area is hot and dry, with little or no precipitation in the months of June through August. The winters are relatively mild, with typical snow loads of less than 2 feet. Average annual precipitation is 35 to 40 inches, in a mixture of rain and snow primarily between October and April. The mountainous terrain causes periodic cumulus cloud development during spring, summer, and fall, which often produce lightning. Summer rain can occasionally occur, usually in the form of brief scattered showers with associated thunderstorms, and occasionally accompanied by lightening. This pattern typically builds at the crest of the Sierra due to thermal influences and generally moves east to west. Lighting is the greatest cause of fire in the project area.

Alternative 1 (Proposed Action)

Direct Effects: Thinning from below can alter fire behavior by reducing crown bulk density, increasing crown base height and changing species composition to more fire-resistant species (Agee 1996b; Graham et al. 1999; Fulé et al. 2001; Fiedler at al. 2002, Keyes and O'hara 2002; Graham et al. 2004). The most effective modification of fire behavior using thinning is when thinning is applied in conjunction with prescribed fire (Graham et al. 1999; Graham et al. 2004). Post-thinning and underburning treatments will reduce surface fuels and ladder fuels.

In this analysis, the trees greater than 4" and less than 12" in diameter were removed in FMA+ models for stands that are to have biomass trees removed (<12" DBH). Also removed are sawlogs as a percentage of trees greater than 10" and less than 29.9" DBH. To determine the treatment effects on canopy base height and crown bulk density, modeling was based on the stand prescriptions designed to reduce the canopy cover to 40% and 50%.

Crown bulk density (CBD) is the mass of available canopy fuel per canopy volume in lbs/ft^3. CBD quantifies the amount of fuels available for combustion in the flaming front of a crown fire (Scott and Reinhardt 2001). Thinning to 50% canopy cover reduces canopy bulk density by an average of 12%.

Thinning to 40% canopy cover reduces CBD by an average of 71%. An empirical test of CBD threshold suggests that when bulk density is less than 0.006 lbs/ft^3 crown fire spread cannot be maintained (Agee 1996a). All stands with the exception of 30048 are below this criteria level. The average CBD prior to treatment in all stands is 0.0014 lbs/ft^3. The average post treatment would be 0.0009 lbs/ft^3. There is a probability of passive crown fire, where individual or groups of trees will torch but not carry fire continuously through the crown where ladder and surface fuels remain and canopy base height is low.

Canopy Base Height (CBH) is the lowest height above the ground at which there is sufficient canopy fuel to propagate fire vertically through the canopy (Scott 2001). The existing average canopy base height in the stands analyzed for trees 10" DBH and greater is 31 feet. Post mechanical thinning CBH averages 46 feet for a 33% increase in CBH. This greatly reduces the ladder for surface fire to spread into the canopy. In all but stand 30013 the potential for passive crown fire is reduced.

Mastication is used to reduce potential fire behavior by reducing fuels bed depth and thereby increasing packing ratio (Sugihara et al. 2006). Mastication reduces the vertical fuels to small pieces, reducing the ladder fuels to a compacted surface fuels bed, and increasing the separation of surface and crown fuels. The dead and down fuels accumulations are rearranged, reducing the fuels bed depth.

A bed of masticated fuels is unusual in its composition, structure, and physical properties. It is not similar to natural fuels beds that have been previously studied for prescribed burning and wildfire effects, (Keane et al. 2002). Current research has found that tree mortality from prescribed burns is primarily the result of crown scorch. Significant soil and duff moisture at the time of the burning limits heat penetration into the soil suggesting that prescribed burning can be successfully used to reduce masticated fuels without killing residual trees if fire-line intensity is kept low using conservative firing techniques. Greater use of backing fire, narrowing of distance between strips with strip headfirst or burning when air temperature is low would be options to protect residual trees from damage. Burning when soil moisture is high may also help reduce damage to trees, (Busse et al. 2005).

Mastication followed by prescribed underburning will occur on 711 acres where post mastication conditions are conducive to use prescribed fire resulting in minimal tree mortality. In these units, average existing flame length is 12 feet and post treatment average flame length is 4 feet; overall flame length is reduced by an average of 66%. The rate of spread post treatment is reduced from an average 19 chains/hour to 6 chains/hour, a 68% reduction.

Underburning is proposed on 2,124 acres. Where mechanical thinning is the primary treatment, prescribed fire will occur on 259 acres. Where mechanically thinned units overlap with prescribed fire treatments the average existing flame length is 12 feet pre-treatment and 7 feet post-treatment, a 42% reduction. In unit 24023, flame length would be reduced by half where thinning but no biomass removal occurred. Overall, in the mechanically thinned units rate of spread would be reduced to 9 chains/hour, a 60% reduction.

Fire behavior is strongly influenced by stand structure as it relates to live and dead fuel loading as well as ladder fuels. The type and abundance of surface fuels also influence fire behavior by that they allow falling embers to ignite and spread. Reducing both ladder fuels and surface fuels is essential to be effective changing fire behavior (Graham et al. 2004). One way to mitigate adverse fire severity is to implement fuels treatment across the landscape so that when unplanned fires occur they will tend to be less severe. This is especially true in short fire return interval forests that have historically burned with frequent, low-severity fires (Reinhardt et al. 2008). Prescribed fire as the primary treatment will occur on 2,056 acres. Surface fuels including dead and down woody debris are estimated from 2 to 65

tons per acre. The average fuel loading in tons per acre for the 0" to 3" size ranges from 0.7 to 18 tons per acre. The average fuel loading in tons per acre for the 3.1" to 20.1" size class ranges from 0.4 to 53 tons per acre, in all size classes average total tons per acre is 17.

Prescribed fire in thinned and masticated stands will reduce existing and activity created surface fuels. Prescribed fire in stands that are not thinned and masticated will reduce surface fuels, standing vegetation, and raise canopy base height. Treatments of surface fuels result in higher fireline construction rates (chains/per hour fireline construction rate), so that the control potential can increase after fuels treatment. The resistance to control is generally viewed as an estimate of the suppression force required to control a unit of fire perimeter. Average rate of spread prior to treatment is 17 chains per hour and post treatment would be 7 chains per hour, resulting in 59% reduction in rate of spread.

Average flame length pre treatment in all proposed units is 11 feet while post-treatment flame length in all units would average 3 feet. In all but one fuels unit flame length would be reduced to flame lengths of 4 feet or less. Overall, fireline intensity prior to treatment average 655 Btu/ft/s; post treatment averages would be 155 Btu/ft/s, resulting in a 76% decrease in fireline intensity. Average flame length in timber stands pre-treatment would be 12 feet and post treatment flame length decreased to an average of 6 feet. Overall flame length would be reduced by 50% and fireline intensity reduced by 57%. Flame length under 4 feet and fireline intensity under 100 Btu/ft/s would allow for a fire crew using hand tools to attack fires at the head and flanks, holding the fire with handline. This would create an environment with decreased rates of fire spread, higher rates of fireline production, more effective control, increased firefighter safety, and fires contained at smaller acreages.

Indirect Effects: In the event of future wildfires, the fuels treatments will reduce the potential for crown fire (Graham et al. 2004; Omi and Martinson 2002). In the event of future wildfires and prescribed fires, tree mortality and scorch height would decrease. The threat of escape during prescribed fire would be reduced with the reduction of ladder and surface fuels. Aerially delivered retardant effectiveness would increase as reduction of canopy cover would facilitate penetration onto surface fires. These factors combined would result in smaller final fire size and a reduction in loss. This would meet the standards and guidelines for the Defense Zone as well as the site-specific objectives of the Forest Fire Management Plan.

In the post-treatment environment, thinned stands will have increases in solar radiation to the forest floor increasing surface temperatures and decreasing relative humidity and fine fuel moisture, conditions that can increase surface intensity (Pollet and Omi 2002). Thinning and prescribed fire can modify understudy microclimate that was previously buffered by overstory vegetation (Agee 1996b; Scott and Reinhardt 2001; Pollet and Omi 2002). The effects of this can be mitigated by treating and maintaining surface fuels at levels where potential flame lengths are less than 4 feet in height and resistance to control is low.

Because of thinning and burning, decadent stand growth and resiliency would be enhanced moving the stand toward restoring the fire adapted ecosystem (large trees resistant to fire, insect, and disease) that existed under an active fire regime when frequent, low intensity fires were more common. The threat of loss to wildlife habitat (northern goshawk, great gray owl, and California spotted owl) may be reduced as a result of breaking up the continuous high fire hazard fuels.

Cumulative Effects: This alternative supports the Forest Plan Amendment and Fire Management Plan direction to adopt an integrated strategy for vegetation management that reduces the risk of wildland fire to communities and modifies fire behavior over the broader landscape. The Bear Mountain Fuels Reduction project, the proposed Middle Fork Fuels Reduction project, and the Peach Growers Fuels

Reduction project are in close proximity to the Soldier Creek HFR. Bear Mountain and Peach Grower projects are currently in the implementation process. In addition, Yosemite National Park has completed fuels treatments adjoining this project in the Highway 120 road corridor. These projects are in close proximity to the Soldier Creek HFR. As these projects are completed, they will create a mosaic of fuels treatments that will change fire behavior across the broader landscape including the watershed encompassing the Middle and South Fork of the Tuolumne River.

Alternative 2 (Modified Action)

Direct Effects: The primary difference between Alternative 1 and Alternative 2 is that Alternative 2 has a reduction in the acres of canopy and ladder fuels treatments (thinning and biomass). Treatments in units 24011, 24018, 24021, 24023, 24026, 24035, 30021, 30048, 30058, 30131 would be dropped. The total mechanical thinning acres for Alternative 2 is 318. All mechanical thinning is dropped with the exception of unit 30134, 116 acres of biomass removal only. All other treatments remain the same. Treatment acres for Alternative 1 total 2,595 acres. This amounts to approximately 10% less area being treated under Alternative 2.

The 318 acres of treated stands will have an effect in the continuity of untreated fuels surrounding Protected Activity Centers (PACs) and old growth Forest. These treatments provide additional connectivity with other fuels treatments. A mosaic fuels treatment pattern further enhances overall fuels treatment objectives. Existing flame length in the mechanical thinning units is approximately 12 feet, in Alternative 1 average flame length would be 7 feet and for Alternative 2 average flame length would be 11 feet for an increase in flame length of 57% from Alternative 1. Average existing rate of spread (ROS) is 14 chains per hour. The average ROS in Alternative 1 is 8 chains per hour and for Alternative 2 average ROS is 14 for an increase from Alternative 1 of 75%.

Average existing canopy base height is 31 feet, for Alternative 1 average canopy base height would be 46 feet, for Alternative 2 average canopy base height would be 37 feet, for a 20% decrease from Alternative 1. Average existing Crown Bulk Density is 0.0014, average Crown Bulk Density for Alternative 1 would be 0.0008, and average Canopy Bulk Density for Alternative 2 would be 0.0012 for an increase of 50% from Alternative 1. Existing average fireline intensity average is 687 Btu/ft/s, for Alternative 1 average fireline intensity would be 283 Btu/ft/s, and for Alternative 2 average fireline intensity would be 344 Btu/ft/s for an increase of 22% from Alternative 1.

Other Effects: Mastication, prescribed fire, fuel break construction, road side fuels reduction, machine piling and burning, and hand thinning and burning treatments will produce the same direct, indirect, and cumulative effects as Alterative 1.

Alternative 3 (No Action)

Direct Effects: The proposed fuels reduction would not occur. There would be no change in the existing condition. Existing surface fuels would remain at their current levels of approximately 17 tons per acre and would continue to accumulate over time. Flame lengths would average 12 feet and rate of spread would average 17 chains per hour. Canopy base heights would remain at 22 to 31 feet, and the potential for passive crown fire would remain. The natural stands would experience high mortality in all size classes in the event of a wildfire. Existing surface fuels would remain at their current levels and continue to accumulate over time. Resistance to control would remain high and would continue to increase as additional down woody debris, brush, and conifer regeneration accumulates. Fireline production rates would remain low.

Indirect Effects: The project area would remain vulnerable to large, high intensity fires. The potential for damage to private property and natural resources from unwanted wildfires is high. When wildfires occur, torching, passive crowning, and spotting will make control efforts at the fire head ineffective. Fire suppression would be difficult, control options would be limited to indirect attack, and the potential for an increase in acres burned will be high. Firefighter safety could be compromised during wildfire suppression efforts. Surface fire intensity may not increase but fire residence time would increase along with the potential for detrimental fire effects to soils, vegetation, and watershed values.

Cumulative Effects: Stands in the area would not be fire resilient and the ecological characteristics of high frequency: low to moderate severity fire regimes would not be restored. This area of the Stanislaus National Forest has a history of large, stand replacing wildfires that have occurred including the 147,000 acre Stanislaus Complex in 1987, the 18,500 acre Arch Rock fire in 1991, and the 59,000 acre Ackerson fire in 1996. The effects of these fires include loss of structures, critical habitat for the threatened and endangered species, old growth timber, plantations, and damage to soils, watershed, and recreational values. The costs of suppression, emergency rehabilitation, and restoration of these fires have been high. There is a cumulative impact from the loss and damage to property, natural resources, and the associated economic cost from potential high severity wildfire.

Hydrology

The proposed action is concentrated in the Lower South Fork Tuolumne River East, Carlon Picnic Area – Upper South Fork Tuolumne River West, Hazel Green Creek, and Hazel Green Ranch – Upper Bull Creek watersheds. Therefore, the watershed management analysis for this project focuses on these four watersheds. An inventory was conducted in Soldier Creek, Rush Creek, Big Creek, and the South Fork Tuolumne River in summer 2007 by forest staff following the Streamscape Inventory Protocol (Frazier et al. 2006). A road inventory was conducted throughout the project area to determine hydrologically connected segments (HCS) of forest roads that deliver sediment to streamcourses (Frazier and Grant 2006). The inventory was used to determine the moderate, high, and very high severity sites, based on the combination of amount and frequency of sediment delivery. The inventory was only conducted within the project area, not entire watersheds.

LOWER SOUTH FORK TUOLUMNE RIVER EAST WATERSHED

Stream and Riparian Condition - The channel form in Soldier Creek, Rush Creek, Big Creek, and the South Fork Tuolumne River was classified as normal (no active downcutting or evidence of accelerated erosion). Dominant substrate varied from cobbles and gravels in Soldier Creek and Rush Creek to bedrock and boulders in Big Creek and the South Fork Tuolumne River. Stream gradient was predominantly high in Soldier Creek, Rush Creek, and Big Creek, and predominately low in the South Fork Tuolumne River. Vegetation, rocks, and large woody debris provided for predominately moderate to high streambank stability in all drainages. Stream shading was high in Soldier Creek, Rush Creek, and Big Creek, providing for cool water temperatures, but was lower in the South Fork Tuolumne, as would be expected with a larger, wider river. However, water temperatures remained cool throughout the surveyed area. Five riparian disturbances were identified, none of which appeared to be major sources of sediment. Elevated levels of sediment were not seen downstream of disturbance sites.

Meadows - A small gully was identified below a spring east of Rush Creek in unit F12. Sediment produced by this gully travels down road 1S1933C and is deposited into Rush Creek. Three other meadows within the project area have minor headcuts. These meadows are Crocker Meadow, a meadow next to private land in unit F09, and a meadow in the southern portion of unit F20. All four

meadows are located within the Curtin allotment. Field review in November 2008 did not identify any substantial erosion concerns as a result of grazing.

Road Condition - HCS inventories identified eight moderate and one high severity sites. These problem sites are proposed for treatment as part of the Soldier Creek HFR project through road restoration and/or reconstruction.

Hillslope Condition - Slopes adjacent to streams in this watershed have a long history of vegetation management during the 20th century. Fire records show a history of fire in the watershed dating back to the first recorded fire in 1908. The largest fire in the watershed, however, was the Stanislaus Complex, which burned over 6,600 acres of the watershed. Currently, the dense stands with vertically and horizontally continuous fuels represent a very high fire hazard.

CARLON PICNIC AREA - UPPER SOUTH FORK TUOLUMNE RIVER WEST

Stream and Riparian Condition - The channel form of the South Fork Tuolumne River in this watershed was classified as normal (no active downcutting or evidence of accelerated past incision) and had substrate comprised primarily of gravel and cobble. The gradient was low (<2%) and valley form was narrow. Vegetation, rocks, and large woody debris provided for moderate to high streambank stability. A suitable amount of pool habitat was found, as well as moderate accumulations of fine sediment in pool tails and pool beds. Stream shading was relatively high, providing for cool water temperatures (12-17ºC). One riparian disturbance was identified at a dispersed campsite. This disturbance does not appear to be a major source of sediment.

Road Condition - HCS inventories identified one moderate severity site. Road restoration is proposed to fix this issue.

Hillslope Condition - Hillslopes within the project area in the Carlon Picnic Area – Upper South Fork Tuolumne River West watershed have had previous timber entries throughout the 20th century. Currently the high amount of ground cover poses a very high fire hazard.

HAZEL GREEN CREEK

Stream and Riparian Condition - The main stem of Hazel Green Creek is located primarily in Yosemite National Park. Stream surveys were not conducted on National Park land, so the condition of the main stem of Hazel Green Creek is unknown. However, it is assumed that Hazel Green Creek is relatively undisturbed, as there are no trails, only 4 stream crossings of the main stem and its tributaries, and no vegetation management other than prescribed fire. Approximately 0.4 miles of intermittent tributary to Hazel Green Creek is located on Forest Service land. Field review of the intermittent tributary was conducted in March 2008. The channel form was normal (no active downcutting or evidence of accelerated past incision). The stream gradient varied from high (4-10%) to very high (>10%). As is typical of high-gradient streams, the substrate was large, comprised primarily of boulders and cobbles. Streambank stability was high (>75%). Although water temperatures were not taken in March, stream shading was generally high, which would provide for cool water temperatures.

Road Condition - HCS inventories identified no moderate, high, or very high severity sites. Therefore, stream sedimentation from forest roads is minimal.

Hillslope Condition - Hillslopes within the project area of the Hazel Green Creek watershed have had previous timber entries throughout the 20th century. The hillslopes have also been affected by wildfire. Currently the high amount of ground cover poses a very high fire hazard.

HAZEL GREEN RANCH – UPPER BULL CREEK

Stream and Riparian Condition - USGS quad maps indicate an intermittent channel in the headwaters of Bull Creek north of Hazel Green Ranch. However, field review of the headwaters of Bull Creek found no intermittent channels within unit F23. No riparian vegetation was observed within this treatment area. Just south of the area proposed for treatment is a large meadow, which is managed under private ownership. As described in the 2004 Larson EIS, the perennial streams in the watershed have narrow strips of riparian vegetation. The main stem of Bull Creek and its tributaries are primarily high gradient channels with large substrate.

Road Condition - HCS inventories identified no moderate, high, or very high severity sites. Therefore, stream sedimentation from forest roads is minimal.

Hillslope Condition - Hillslopes within the project area of the Hazel Green Ranch watershed have been largely affected by wildfire. Approximately half of the watershed burned in 1934. More recently, the entire watershed burned in 1987 during the Stanislaus Complex. Approximately 362 acres of shredding followed the wildfire, but salvage logging and reforestation was not completed.

Alternatives 1 (Proposed Action)

Direct Effects: The current high fuel loading would be reduced and the current threat of large and damaging wildfire would be reduced. Fire severity would be minimized to the extent that maintenance of water quality and watershed condition could be achieved. Beneficial Uses would continue to be met by implementation of Region 5 Water Quality Best Management Practices and Soil Quality Standards during the life of the project.

There would be a potential for sediment discharge to streams for 1-2 yrs after project implementation begins because of ground disturbance by equipment during vegetation treatments. Alternative 1 is anticipated to have a higher sediment discharge that Alternative 2 because more acreage is treated. However, BMPs would minimize any actual effect to a minor or negligible amount under either action alternative. Research on prescribed fire has shown that riparian vegetation traps sediment from side slopes that would otherwise enter the channel if riparian vegetation is not present (Brooks et al. 1997). Since riparian vegetation is not targeted in the proposed project, any increased erosion from the prescribed fire has the potential to be filtered out before reaching surface water. Therefore, the BMPs described above would minimize any actual effects to a minor or negligible amount. Soil compaction and displacement would occur as a result of heavy equipment use for mechanical vegetation treatments. However, it would be mitigated by water and soil management requirements.

Indirect Effects: Reduction of the fire hazard in the project area may also moderate wildfire severity in adjacent areas. Vegetation treatments here may serve as a break in fuels continuity which could lessen severe fire behavior over a larger area. Reductions in fuel loading through mechanical and hand treatments would allow fire to be safely reintroduced into a landscape dominated by a recent history of fire suppression. Fire would be allowed to creep into riparian areas along stream channels and in meadows. Fire suppression in forested riparian areas has resulted in increased fuel loads and changes in vegetation composition and structure (Dwire and Kauffman 2003). By safely introducing prescribed fire into riparian areas, the function and condition of riparian areas would more closely resemble conditions, which occurred prior to fire suppression.

Road condition would be improved by activities designed to restore drainage function, including reconstruction of road surfaces and design features and maintenance of roads during the life of the project. Under either action alternative, the hydrologically connected road segments would be treated. These activities would reduce the threat of sedimentation to streams in and downstream of the project area.

A small gully is located below a spring in unit F12. The sediment produced by this gully travels down road 1S1933C and is deposited into Rush Creek. Stabilizing this gully by planting riparian vegetation would reduce future sediment production and deposition into Rush Creek. In addition, willow planting would be conducted in three other meadows to help prevent minor headcuts from expanding in these meadows. A moderate increase in the amount and duration of late summer streamflow is expected in intermittent streams in the project area as a result of reduced plant transpiration following vegetation removal.

Cumulative Effects: Results of the ERA modeling show that the threshold of concern is not reached in any of the watersheds analyzed. Although several adjacent fuels reduction projects are scheduled within the next five years (USDA 2005b), the planned vegetation treatments are well distributed over time and space. Results of the field evaluation validate the ERA model prediction that the action alternatives and other reasonably foreseeable future activities in the project watersheds are not expected to result in adverse cumulative watershed effects.

Positive cumulative effects would result from this project - a lower risk of high severity wildfire. The fuels reduction treatments would substantially reduce the risk of a severe wildfire. In the event of such a fire under present or worsening future fuels conditions (if left untreated), water quality and watershed condition would likely be significantly degraded in at least some portion of the area. Such effects have been observed in other severe fires on the Stanislaus National Forest over the past 30 years, a period of unprecedented fire occurrence on the forest. The positive effects of fuels reduction (lower risk of fire, especially high severity fire) are much greater in the long-term than any of the minor short-term negative watershed effects of this project.

In summary, both action alternatives would achieve all project watershed goals and objectives. The goals of maintaining water quality and watershed condition and maintaining integrity of waters and habitat would be met. The action alternatives would protect the beneficial uses of water, utilize BMPs to protect water quality, and reduce the current high fire hazard.

Alternative 2 (Modified Action)

The direct, indirect, and cumulative effects are the same as described in Alternative 1.

Alternatives 3 (No Action)

Direct Effects: The current fuel loading would continue, posing a substantial threat of wildfire. A high severity fire would substantially degrade watershed condition and water quality in the short-term until watershed recovery is achieved. Beneficial uses would continue to be met at present. However, if a severe fire occurred under the current high fire hazard condition, beneficial uses would likely be adversely affected.

Indirect Effects: The current fuel loading would increase over time, as would the watershed consequences of severe fire. A high severity fire would substantially degrade water quality, watershed condition in the short-term until the watershed recovers from the effects of the fire, and the possible subsequent management activities related to reforestation. Fire suppression in forested riparian areas

has resulted in increased fuel loads and changes in vegetation composition and structure (Dwire and Kauffman 2003). This has increased the risk of uncharacteristically large and severe wildfire (Bêche et al. 2005). The no-action alternative would not allow for the reintroduction of fire into the landscape. Therefore, changes in riparian vegetation composition and structure and the risk of large and severe wildfire would continue.

Road condition may degrade over time. A lack of water bars and rolling dips causes concentration of flow on the road surface. Sediment would continue to reach surface waters.

Late summer base flows would remain suppressed since high vegetative density increases plant transpiration. This effect would be most prevalent in small streams. Stream shading may increase over time, maintaining cool water temperatures.

Cumulative Effects: Watershed management goals for this project (maintenance of water quality and watershed condition) would be met until a wildfire occurs, but the no action alternative perpetuates the current high fire hazard. This represents a much higher risk of degradation to water quality and watershed condition than management activities that can be implemented to prevent or minimize large and damaging fires. For example, if a 3,500 acre high burn severity wildfire occurred in the Lower South Fork Tuolumne River East watershed in 2009, ERAs would reach the threshold of concern under the no action alternative (ERA =12.82). Watershed management objectives would be partially met. Compliance with CVRWQCB Water Quality Plan objectives and protection of beneficial uses of water would continue to be met until a severe fire occurs. Minimizing the risk of water quality degradation by reducing the fire hazard would not be met if the no action alternative is selected.

Recreation

The recreation opportunities sought after by users within the Soldier Creek HFR project area are driving for pleasure, dispersed camping, off highway vehicle (OHV) riding, picnicking, fishing, and hunting during appropriate seasons. Management actions within the alternatives of this analysis are consistent with the ROS of the area. The Carlon Day Use Area is within unit F19. This is a commonly used day use area with a Sweet Smelling Toilet and picnic tables. The Carlon Day Use Area will have to be closed during implementation of the proposed underburning. This action should not displace many users; and the users that will be displaced will be able to go to the Middle Fork Day Use Area located several miles north on Evergreen Road. The Middle Fork Day Use Area has the same amenities and scenery offered at the Carlon Day Use Area. The Carlon Day Use Area could be re-opened following implementation of the underburning, and the character of the day use area is not expected to change due the fuels reduction treatments.

Alternative 1 (Proposed Action)

Under this alternative the purpose and need of the project would be accomplished. The project area will be restored to a more open stand structure, thus having a positive effect on the recreational opportunities.

During the implementation of this project, there will be some dispersed camping users that will be displaced. Campers will be displaced only during active operations. Campers will most likely be displaced to other non-impacted areas of the Forest. The treatments prescribed for the locations near dispersed camping will increase the appeal of some camping spots. The treatments will appear unnatural to some users for several years. This effect is temporary. Fuel reduction will create less of a fire hazard around those camping locations, decreasing the possibility of a catastrophic wildfire caused by campers. In addition, a more open forest stand will appear after treatments and for several years.

By following the mitigation measures, Alternative 1 will not affect the recreation opportunities within the project area. The alternative will modify the use of the area by some publics.

Alternative 2 (Modified Action)

The purpose and need of the project would still be accomplished under this alternative, thus having a positive effect on recreational opportunities.

Under Alternative 2 the impacts to recreation and recreation users would be very similar to Alternative 1. Even though there would be fewer on the ground operations within Alternative 2 the consequences and impacts to recreation would be the same. Therefore, by following the mitigation measures Alternative 2 will not affect the recreation opportunities within the project area.

Alternative 3 (No Action)

This alternative would consist of no Forest Service action within the project area with the exception of normal course of business. Such business would include normal cleaning and maintenance of the Carlon Day Use Area and OHV patrol.

This alternative would not affect the current recreation opportunities within the project area. However, this alternative would not help reduce the fire danger within the project area, and therefore would not fulfill the purpose and need of the project.

Conclusion

The Soldier Creek HFR project will have a generally positive effect on the recreation opportunities within the project area. By using the mitigation measures, Alternatives 1 and 2 would accomplish the purpose and need of the project without significantly affecting the recreation opportunities within the project area. Alternative 3 would not accomplish the purpose and need of the project, but would not have any impacts to the recreation opportunities within the project area.

Silviculture

There are three predominant vegetation types found within the Soldier Creek project area: mixed conifer forest with small amounts of black oak (*Quercus kelloggii*), montane chaparral dominated by manzanita (*Arctostaphylos spp.*) and deer brush (*Ceanothus integerrimus*), and riparian vegetation predominately in the major drainages. Most of the mixed conifer component consists of overstocked pockets of small diameter trees with < 30% crown ratio. These clumps of small trees are stagnating beyond their ability to release and will likely succumb to drought, insects, or disease. Even in clumps of larger diameter trees (>20") there is reduced tree vigor due to inter-tree competition. There are frequent openings in the canopy from pre-existing landings and skid trails where seedlings and brush are regenerating.

There are no known large pockets of disease within the project area however, some infections were observed. Evidence of white pine blister rust (caused by *Cronartium ribicola*) in sugar pine (*Pinus lambertiana*) was commonly observed. The presence of the alternate host (*Ribes spp.*) of white pine blister rust was also noted throughout the project area. Testing has shown that only about 7% of the sugar pines on the Stanislaus National Forest are resistant to white pine blister rust (Kinloch 1991). There is also the presence of red ring rot (caused by *Phellinus pini*), velvet top fungus (*Phaeolus schweinitzii*), Indian paint fungus (*Echinodontium tinctorium*), and pecky-cedar rot (caused by *Oligoporus amarus*).

Species composition is important in evaluating the health and resiliency of a stand. As the natural species composition and forest structure is altered from human impacts, the more prone the stand is to unnatural disturbances. Examples of such human interference in forest growth include grazing, harvesting, and fire suppression. There is now less of a pine (*Pinus ponderosa* and *P. lambertiana*) component in the Sierra mixed conifer forest than was present prior to European settlement (Sierra Nevada Ecosystem Project 1996). This is due to fire suppression and selective logging of pines during the early 20th century (McKelvey et al. 1996). These activities have resulted in an increased percentage of the shade tolerant, less fire resistant species incense cedar (*Calocedrus decurrens*) and white fir (*Abies concolor*).

Much of Soldier Creek's existing forest consists of former understory trees released after the past logging of large, mature overstory trees, predominately between 1910 and 1980. This has resulted in an increase in the numbers of small and medium trees, as well as brush, creating multi-storied stands with few large trees. All analyses of plot data taken within the Soldier Creek project was done using Forest Vegetation Simulator (FVS) and data represents conifer tree species, 1" DBH and greater. According to this analysis the average trees per acre (TPA) in the stands is 422. Large numbers of small trees lowered the average quadratic mean diameter (QMD) to 12". Denser portions of the stands exceed 1000 trees per acre.

The composition of these second growth stands consist of an overstory of ponderosa pine (*Pinus ponderosa*), sugar pine (*P. lambertiana*), Douglas-fir (*Pseudotsuga menziesii*), incense cedar (*Calocedrus decurrens*) and white fir (*Abies concolor*) with thickets of shade tolerant incense cedar and white fir common in the understory. Black oak (*Quercus kelloggii*) is present throughout the stands but is in decline due to overtopping by the conifers. The average canopy closure for the stands in Soldier Creek is 63%.

Conifer stand density affects stand development through inter-tree competition, limiting diameter growth, and weakening trees, at times to the point of mortality (Barrett 1983). One of the major strategies of the Forest Plan is to take "a proactive approach for improving forest health with management objectives to reduce susceptibility of forest stands to insect and drought-related tree mortality by managing stand density levels" (USDA 2005). Insects and disease agents are more damaging in stands where densities are high due to the tree's weakened state and reduced vigor (SNEP 1996). Stand Density Index (SDI) is a measure of how dense a forest is. The desired SDI, for mixed conifer on the Stanislaus National Forest is 300-333, with the average SDI in the Soldier Creek stands being 460. In the wildlife PACs, areas of steep slopes and riparian zones, tree densities are higher than in the proposed treatment stands. The PACs have a variety of conditions. The PAC along the eastern edge of the project has an existing SDI of 700 due to the dense understory. The California Wildlife Habitat Relationship (CWHR) System also considers tree density. The mechanical thinning stands in Soldier Creek are all density M (40% to 60% canopy cover) and D (60% to 100% canopy cover).

Alternative 1 (Proposed Action)

One of the objectives of this project is to enhance forest health. The proposed action focuses on removing small intermediate and suppressed trees while leaving large trees. This will increase the availability of water, nutrients, and sunlight to the residual trees, improving their health and vigor, thus making them less susceptible to drought, insects, and disease (SNEP 1996). Their growth rate will also increase, thus creating larger diameter trees more rapidly which accelerates the stands towards sizes typical of late-seral stands preferred by wildlife such as spotted owls and northern goshawks, a goal of the Stanislaus National Forest (Cochran and Barrett 1995, Oliver 1997, USDA 2005). Favored retention of sugar pine and oaks would increase their diameters and heights as well as increasing the percentage of their occurrence within the stands. Favored removal of white fir and incense cedar

would shift species compositions more towards a mix appropriate for the site under drought conditions and natural fire regimes (Zald et al. 2008, North et al. 2007). Some mortality is still expected and desirable for generating snags for wildlife habitat. Commercial logging would thin less than 10% of the analysis area. Approximately 32% of the analysis area has been thinned in the last 20 years with another 24% of the area designated as wildlife protected activity centers (PACs). These PACs are not included in any mechanical thinning units.

In the thinning units, there will be a short-term decrease in stand complexity and structure due to most of the understory being removed. Thinning would be heaviest in the denser clumps of trees with very little or none occurring in the open areas. Some areas will remain untreated due to sensitive resources and operational constraints. While the thinning may reduce complexity and structure within a stand, at the landscape scale it will modify a portion of the area to have faster growing, larger trees compared to the area as a whole.

Without the reintroduction of fire into these stands, mechanical thinning would be required to maintain forest health. Seedlings will establish, while oaks and residual conifers will respond and grow quickly due to the increased light, water, and nutrients; thus filling in the understory to create a two canopied structure.

The preferential removal of suppressed and intermediate trees will focus on eliminating most of the smaller trees that are less vigorous and more likely to experience mortality due to competition. The average number of TPA in the Soldier Creek stands would be greatly decreased from 422 to 115 while the QMD would increase from 12" to 18" at DBH. The proposed action would also decrease the average canopy cover of the stands from 63% to 49% allowing more sunlight to reach the residual trees. In addition, stand densities will decrease thus decreasing inter-tree competition for water, nutrients, and sunlight. The average SDI in the stands is projected to drop from 460 to 269 after treatment. By 2012, the average SDI is modeled to have grown back to the recommended upper desired level of 330 for mixed conifer stands in the Sierra Nevada. This does not meet the regional direction to minimize thinning re-entries (Blackwell 2004) but is necessary at this time to maintain canopy cover. This lowered SDI will also allow for higher tree vigor and considerably less mortality from drought, disease, and insects (SNEP 1996). The percentage of trees harvested per size class as a total of trees harvested are estimated to be:

DBH	Percent of Harvested Trees
4" to 9"	89%
9" to 20"	11%
20" to 29.9"	1%

Individual tree growth is inversely related to the density of trees (Dunning and Reineke 1933; Oliver 1972; Barrett 1983). In order to reach average tree sizes of 30" in diameter, well-stocked mixed conifer stands in the Sierra Nevada on sites similar to this project have stocking levels of approximately 50 to 70 trees per acre (Dunning and Reineke 1933). Trees of this size are desirable for sensitive wildlife species and resistance to low and moderate intensity fire. The Soldier Creek HFR silvicultural prescriptions for mechanical thinning will leave higher densities to allow for natural mortality, structural diversity, and to maintain canopy covers at the levels in the standards of the Stanislaus National Forest – Land and Resource Management Plan. Recent research has shown that removing small trees around large, older trees causes a growth response in the large, older trees (Kolb et al. 2007).

Alternative 2 (Modified Action)

Alternative 2 proposes to treat only the small trees less than 12" DBH in the densest, ground based, silviculture units. These units account for about 55 percent of the treatment area in Alternative 1's silviculture units. The remaining vegetation left untreated will remain in its existing state as described in Alternative 3 - no action.

By removing only the small trees in these stands, we can expect to see some of the results mentioned in Alternative 1 above, but to a lesser extent. The large majority of suppressed and some intermediate trees will be either removed or masticated leaving codominant and dominant trees. This will still increase the availability of water and nutrients to the residual trees but will not increase their sunlight due to only the understory being removed. Therefore, there will be less of an effect on the residual trees vigor and growth rate than in Alternative 1. There will still be a shift of the tree species composition in these stands to a mix more appropriate for drought conditions and natural fire regimes due to the removal of the understory consisting of predominately white fir and incense cedar (North et al. in press). SDI will still decrease but not to the extent of Alternative 1, which was projected to be 269. Therefore, the stand may need to be re-entered and thinned again within the next 20 years to keep the densities low, trees vigorous, and growth rates high. In addition, canopy cover will only decrease slightly due to a large portion of the trees being masticated or removed already being located under a larger tree's canopy.

The decrease in the stand complexity and structure will be less dramatic due to medium sized trees being retained. Thinning out clumps will only be accomplished if they are composed of small trees. Seedlings in these stands will still regenerate after 20 years but predominately only where there are already natural openings since the canopy of the overstory will be left intact.

Alternative 3 (No Action)

This alternative will leave stands in their existing state permitting them to carry on with their current course of growth. Vegetation within the project area will remain at a high risk of stand replacing wildfire due to the lack of treatments designed to reduce wildfire size and intensity. SDIs will continue to increase causing more inter-tree competition, slowing growth, and increasing the probability of mortality due to drought, insects, and disease (SNEP 1996). Allowing the stands to remain in this overstocked state risks high mortality from stress related factors due to less available light, water, and nutrients caused by the inter-tree competition. The overstocked state of these stands will also considerably slow or halt their movement towards the large tree sizes characteristic of late-seral stands favored by wildlife such as spotted owls and goshawks (Cochran and Barrett 1995, Oliver 1997, USDA 2005).

Without regular fire intervals, large amounts of dead fuels will continue to accumulate as tree mortality persists due to density related factors. Any increase in surface fuels further increases wildfire intensity. The trees within the stands will continue moving towards the more shade tolerant, less fire resistant species as the overstory continues to shade out the understory. Oaks will continue to be overtopped by the conifers, allowing them to lose vigor and eventually die out. New oak seedlings will not be released without openings in the canopy. Furthermore, these existing mixed conifer stands will not be thinned, further risking their chances of experiencing stand replacing fire, stagnation, or mortality.

Soils

Mapped within the project boundary are eight different soil series. The soils are generally derived from granitic or medi-sedimentary parent materials from weathered either bedrock or colluvial deposits. The soils are a repeating mix of shallow and moderately deep soils across the landscape, varying due to geomorphic and erosional surface. Soil depths range from 10 inches to exceeding 60

inches with Lithic Haploxerepts, Typic Dystroxerepts, and Fiddletown soils constituting the shallow soils. Relatively coarse textured (sandy loams and loamy sands) surface horizons and moderate rock fragment contents (15 to 45% by volume) are common in the soils of the project area. Vast majorities of the soils are well drained and typically have moderate available water holding capacities.

Alternative 1 (Proposed Action)

Direct Effects:

SOIL COVER: In areas of mastication treatment, soil cover would be dramatically increased. Treatment would result in lower soil temperatures and increased soil moisture later in the growing season (Kobziar and Stephens 2006), both positive effects for soil processes and tree productivity. In mechanical thinning and prescribed fire treatments, reductions of soil cover would be limited with management, and soil cover would be required to conform to Soil Quality Standard Guidelines.

SOIL ENVIRONMENTAL HEALTH: No significant direct effects would occur to soil environmental health due to mastication and mechanical thinning treatments (Shestak and Busse 2005). Hazard and danger tree operations have a low potential for detrimental effects to soil environmental health due to the scale and type of operations. For prescribed fire treatments, soil nutrient status would be increased in the short-term and soil acidity decreased both positive effects. Approximately 10% of soil nitrogen would be lost through prescribed fire; research has shown no significant impact to forest productivity with these nutrient losses from prescribed fire (Johnson et al. 2005). Prescribed fire has minimal effects on soils or water quality (Murphy et al. 2006). There would be some loss of large woody debris to prescribed fire.

SOIL EROSION AND LOSS: There is no anticipated significant increase in soil erosion and loss with mastication treatments. Mechanical thinning and prescribed fire treatments would increase soil erosion and loss over the short-term (< 2 years). Soil erosion would return to background levels within 5 years (Elliot 2005).

SOIL POROSITY AND BULK DENSITY: No significant direct effect would occur during mastication with management requirements. With mechanical thinning treatments, detrimental soil compaction would increase over the short-term 1% to 5% (Johannson 2005, Janicki 2006, Jimenez 2007b) but remain within Soil Quality Analysis Standards. A significant portion of that compaction would be mitigated through subsoiling. No significant increase is expected with a majority of the treatments. Sawlog and biomass timber harvest would increase soil compaction (Alexander and Poff 1985), but management requirements would limit increases. Areas where legacy compaction exists would see an overall reduction of soil compaction and a restoration of soil hydrologic function. Such decreases in soil porosity should not negatively affect tree productivity (Powers et al. 2005). Hazard and danger tree operations have low potentials for detrimental increases to soil porosity and bulk density, due to the scale and type of operations. No significant direct effect to soil porosity or bulk density would occur with prescribed fire treatments.

SOIL ORGANIC MATTER: With mastication and mechanical thinning treatments prescribed, there would be no significant loss in soil organic carbon and soil organic matter (Johnson and Curtis 2001; Powers et al. 2005). There would be a short-term reduction of soil organic matter with prescribed fire treatment - approximately 5% (Johnson and Curtis 2001). This short-term reduction is within Soil Quality Analysis Standards and would have no significant effect on long-term soil productivity and soil quality.

OTHER SOILSCAPE CONCERNS: Fuels reduction and protection of the soil resource from a high severity wildfire would be realized. Goals of long-term protection of soil resources would be achieved.

Indirect Effects:

SOIL COVER: A majority of the treatment area would have decreases in soil cover, with recovery of soil cover to approximate pre-treatment levels within approximately 2 years and full recovery within approximately 5 years. Reductions of soil cover would not exceed to Soil Quality Analysis Standards.

SOIL ENVIRONMENTAL HEALTH: There is no significant indirect effect of treatments on soil environmental health.

SOIL EROSION AND LOSS: Soil erosion would be decreased over the long-term. Problem areas of unnatural erosion patterns would not continue to expand.

SOIL POROSITY AND BULK DENSITY: There is no significant indirect effect of treatments on soil porosity and bulk density.

SOIL ORGANIC MATTER: Over the long-term, mastication treatments will increase soil organic matter through leaching of soluble organic compounds and eventual decomposition and incorporation of masticated materials into the soil profile. Research studies show significant increases in soil organic carbon (Resh et al 2005). With management requirements stated, mechanical thinning treatments would increase decomposition and facilitate increased inputs of soil organic matter into the soil profile through slash and root decomposition. Over the long-term, prescribed fire will increase soil organic matter and nutrient cycling over pre-fire levels (White, 1986, Johnson and Curtis 2001, Certini 2005).

Fuels reductions and protection of the soil resource from a damaging high severity wildfire would be realized. Goals of long-term protection of soil resources would be achieved.

Cumulative Effects: The amount of soil disturbance in the Soldier Creek HFR project area would meet Stanislaus National Forest Land and Resource Management Plan and Soil Quality Analysis Standards when combined with past, present, and reasonably foreseeable future activities. Soils disturbed by management activities when combined with existing conditions and future foreseeable actions would not pose significant impairment to soil management goals or to the soil resource.

Alternative 2 (Modified Action)

The direct and indirect effects would be similar as described in Alternative 1. There would be less disturbance due to less acres being treated. Any substantial changes in soil bulk density or porosity would not occur.

Alternative 3 (No Action)

Direct Effects: No significant direct effects would occur with the selection of Alternative 3.

Indirect Effects:

SOIL COVER: The natural accumulation rates would continue with no improvement beyond.

SOIL ENVIRONMENTAL HEALTH: The natural rates of soil microbial processes and nutrient cycling would continue with no detrimental impairment. The lack of fire in fire dependent ecosystems

(typical ecosystems in the Soldier Creek HFR project area) and those effects on natural soil processes is unknown.

SOIL EROSION AND LOSS: Unnatural soil erosional patterns (gullies and damaged system roads) and potentials for soil loss (due to high severity fire) would continue to expand and increase potential rates of soil loss.

SOIL POROSITY AND BULK DENSITY: A slow rate of natural recovery (> 30 to 50 years) would continue (Rab 2003, Miller et al. 2004, Wilpert and Schäffer 2006). There would be no decreases in soil porosity or increases in bulk density due to additional mechanical subsoiling treatments.

SOIL ORGANIC MATTER: The natural accumulation rates would continue with no improvement beyond.

OTHER SOILSCAPE CONCERNS: The risk of a highly damaging, high severity stand replacing wildfire would continue to remain very high. Historically unnatural accumulations of fuels would not be reduced. The fire regime will remain outside the natural range of low severity, high frequency fire with a return interval ranging from 7 to 25 years (Kilgore and Taylor 1979, Caprio and Swetnam 1993). The potential for detrimental soil impacts across a large continuous area would remain high. Detrimental impacts to soil cover, soil environmental health, soil porosity (hydrophobic soil conditions), and soil organic matter content are well documented as impacts from high severity wildfires (Biswell 1989, DeBano et al. 1998, Neary et al. 2005, Bormann et al. 2008).

Cumulative Effects: Fuel loading would continue to occur with increasing potential for a high severity wildfire to cause detrimental impacts to the soil resource. The effects can be much more severe than properly managed fuels reduction. Soil productivity and soil quality at the landscape scale will not be maintained by options that keep the fire regime and potential vegetation outside this natural historic variation.

Terrestrial Wildlife

The proposed project area is not within the geographic and elevation range of the valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*), which is federally-listed as threatened. No other federally-listed terrestrial wildlife species occur in the project area. The project is in the geographic and elevation range of the following Forest Service Sensitive Species: great gray owl, California wolverine, California spotted owl, Sierra Nevada red fox, northern Goshawk, pallid bat, Pacific fisher, Townsend's big-eared bat, American marten, and western red bat. Habitat types are detailed in the table below.

Table 17 - Habitat types in the Soldier Creek HFR Project Area

Stand Type	Acres
Sierra Mixed Conifer	4,171
Ponderosa Pine	727
Montane Hardwood	231
Mixed Chaparral	156
Grassland	15
Barren	3
Approximate Total	5,300

Dead trees (snags) and logs are important habitat components for many wildlife species; they provide structural diversity, cover, prey habitat, and soil nutrients. Recent stand exams in the project areas

reflect the overall lack of snags: while the areas proposed for treatment contain an average of 2 snags per acre greater than 12" DBH, the distribution among different units varies. Spotted owl and goshawk PACs were surveyed as well, and they contained less than one per acre. The combination of treatment units and PACs resulted in 1.3 snags per acre. Both treatment units and PACs contained a large amount of smaller snags between 6 and 12" DBH. While small snags provide some wildlife value, they also greatly increase the risk of stand-replacing wildfire by acting as ladder fuels for fire to reach the upper canopy. Although we typically retain more snags in spotted owl and goshawk PACs by limiting treatments and timber harvest, most of these areas are already deficit in large trees and snags due to past vegetation management. Snags are regularly felled in PACs as part of maintaining the road system to protect powerlines, campgrounds, and private boundaries, and may be lost to prescribed fire. This subwatershed contains over 3 miles of roads per square mile on National Forest land (USDA Forest Service 2003). Felled hazard trees are usually not removed, but may be taken by the public as firewood.

Downed wood 12" DBH and above (logs with high wildlife values) averaged 4.1 logs per acre in the treatment units and 2.15 in the PACs. The overall average was 3.1 logs per acre. Because logs vary in length, it is useful to estimate the weight in tons per acre of downed woody material. Survey transects of the proposed units suggest the treatment areas contain an average of 2.5 tons per acre of logs over 12" diameter; the PACs contained less than one ton per acre. Existing snags are expected to fall periodically and contribute to the numbers of logs.

These numbers do not include smaller snags and downed woody material, of which the project area contains a great deal more, as described in the Soldier Creek HFR Fire and Fuels report (Castro 2009). The Forest Plan, as amended, suggests wildlife habitat goals of at least 4 snags and log densities of 10 to 20 tons per acre (USDA Forest Service 2005); the Soldier Creek HFR project area has some of the higher quality mature forest habitat on the Groveland Ranger District, but it is still deficient in logs and snags.

Recent stand exams conducted in the Soldier Creek HFR project area suggest the existing canopy cover in the treatment units ranges from 45 to 69%. We did not measure canopy cover in the PACs, which is likely at least as dense as in the proposed treatment units. Because canopy cover must be maintained at 40 to 50%, treatment areas do not include open areas such as roads, meadows, and brushfields areas with more open canopies. The quadratic mean diameter (QMD) is a measure of the average DBH which is weighted toward the larger, dominant trees; this number varies somewhat from unit to unit, but the overall average diameter of trees outside the PACs is approximately 17 inches. Because of the overwhelming number of small trees in the area, trees under 6" DBH were not included in this calculation of QMD.

The project area includes portions of three spotted owl PACs, associated HRCAs, two goshawk PACs, and one great gray owl PAC (see table below). The quality and continuity of the stands in the Soldier Creek HFR project area make the habitat and territories very important to surrounding areas. The productive owl and goshawk territories in the project area likely provide a dispersing source of animals to other less suitable habitat in the surrounding landscape, helping to maintain a network of occupied habitat. The Soldier Creek area also provides connectivity to other mature forest habitats in Yosemite. The recent Arch Rock, Ackerson, Kibbie, and 1987 Complex fires have greatly reduced mature forest and habitat connections with Yosemite.

The Soldier Creek HFR project area contains approximately 1315 acres that were identified as Old Forest Emphasis Area (OFEA). Approximately 465 acres (35%) of the OFEA area in the Soldier Creek HFR project area is within portions of spotted owl or goshawk PACs; approximately 64% of the OFEA is outside of PAC boundaries. All but about 60 acres of the OFEA are within portions of

spotted owl PAC, goshawk PAC, or spotted owl Home Range Core Areas. This OFEA includes some of the stands with mature habitat characteristics such as dense canopy cover, large trees, and large downed woody debris, but does not include much of the western most spotted owl PAC and other smaller areas of dense trees. OFEA was also identified to the west, along the South Fork Tuolumne River.

Table 18 - Special Habitat Areas in the Soldier Creek HFR Project Area

Designation	Acres
Spotted Owl PAC	929
Spotted Owl HRCA	2,872
Northern Goshawk PAC	415
Great Gray Owl PAC	63
Old Forest Emphasis Area	1,315

Great Gray Owl: One great gray owl territory occurs in the Soldier Creek HFR project area and has a designated PAC. As part of project development, this PAC was enlarged to meet the minimum size of 50-acres; the actual size of the PAC is 63 acres. In 2007, a great gray owl was found nesting in a white fir snag but the tree fell before any young had fledged. Birds were detected during surveys in 2005, 2006, and 2008, but nesting was only confirmed in 2007. Past studies of birds from Yosemite National Park suggest birds moving to lower elevations in winter regularly visit the Crocker meadow area (van Riper and van Wagtendonk 2006).

The Soldier Creek HFR project area contains several openings on private lands and drainages and associated small "stringer" meadows, providing potential great grey owl foraging habitat. Most of the canopy cover in the surrounding area is relatively dense and contains large trees. The PAC in the project area consists of the area where a bird was documented nesting and the best available habitat adjacent to meadows. The owls in the area appear to use a complex of small meadows rather than any one, although Crocker Meadow is the largest and the site of most detections.

California Spotted Owl: Seven spotted owl PACs are located within 1 mile of the project area. The PACs and survey results are listed in the table below. The first three PACs are located in the project area; the second three are outside the project area but nearby. Surveys for spotted owls were conducted in suitable habitat in the project area according to Forest Service protocol (1992) during 2006 and 2007. Results of these survey efforts are on file at the district office. A pair of spotted owls has been regularly detected in PAC TUO-0010, which is located in the westernmost portion of the project area. No activity has been documented in TUO-0026 in several years. TUO-0078 is a new territory based on recent surveys in the project area.

Table 19 - Spotted Owl PAC Activity in the Soldier Creek HFR Project Area

Year	TUO-0010	TUO-0026	TUO-0078	TUO-0011	TUO-0012/039	TUO-00177
2003	Male	Unknown	Unknown	Unknown	Pair	Unknown
2004	Female	Unknown	Unknown	Unknown	Unknown	Unknown
2005	Pair	None	Unknown	Nest	Male	Unknown
2006	Pair	None	Unknown	Female	Male	Unknown
2007	Nest	None	Male	Male	Male	Female
2008	Nest	None	Male	Male	Unknown	Unknown

Note: Occupancy unknown due to lack of surveys.

The Soldier Creek HFR project area contains approximately 3,000 acres of late-seral, closed canopy forest, which is the majority of dense, late seral habitat on the Groveland Ranger District. The best habitat occurs within the three spotted owl PACs and two goshawk PACs in the project area. Even

these high quality areas, however, are not contiguous, having been affected by the fires in 1944 and 1987, as well as past salvage logging, hazard tree removal, and the recent Crush timber sale. No owl activity has been documented in the adjacent PAC (TUO-026) in recent years.

The stands along the Hardin Flat Road and in Rush and Soldier Creek contain the best habitat for spotted owls on the Groveland Ranger District. The territory on the western end of the project is very productive and is consistently occupied. This PAC is located near Rush Creek and adjacent to the Crush sale. The preferred dense canopy cover of over 70% probably only occurs in portions of the PACs; it does not occur in the proposed treatment stands outside of the PACs. Approximately 259 acres that would be mechanically treated contain highly suitable CWHR 5D and 6 stand types, although none contain over 70% canopy cover. As described previously, while the area contains denser and larger snags and logs than most areas on the district, these important habitat components are still relatively scarce. Approximately 2,872 acres of HRCA associated with spotted owl PACs are within the project boundary. Much of the rest of the project area may provide suitable movement corridors and roosts for dispersing and unpaired owls, but is patchier, with more open canopy cover and smaller diameter trees that would not likely provide suitable nesting habitat.

Northern Goshawk: The project area includes two goshawk PACs and one nearby (PAC #54-07). PAC 54-07 is located south of the project area and is a successful territory that is typically occupied, while 54-28, located in the eastern portion of the project area, is rarely occupied. PAC 54-43 was first discovered in 2007, and was occupied in 2007 and 2008. Approximately 2,100 acres of potentially suitable habitat were surveyed in 2007 and 2008; no additional territories were detected.

Table 20 - Northern Goshawk PAC Activity in the Soldier Creek HFR Project Area

Year	54-07	54-28	54-43
2006	Active Nest	No Detections	No Surveys
2007	Active Nest	No Detections	Territory Active
2008	Active Nest	No Detections	Territory Active

Mature, closed canopy stands in the project area make up approximately 2,800 acres, and provide potentially suitable nesting and foraging habitat; several hundred acres of more open habitat may also provide suitable foraging habitat. Nonetheless; as described above, logs and snags, which provide important habitat for prey species are limited in the project area. In addition, PAC 54-28, which has not been active since 2000, was affected by the Crush Timber Sale, which included units inside the PAC. Adjacent woodlands may contain suitable nesting and foraging habitat for goshawks.

Forest Carnivores: Forest Carnivores include the Pacific fisher, American marten, California wolverine, and Sierra Nevada red fox. Carnivore surveys conducted between 1996 and 2008 did not detect fisher, wolverine, or red fox on the Stanislaus National Forest (Zielinski et al. 2000; CSERC 2008). These surveys did not detect wolverine or red fox in the Sierra Nevada, although recent surveys have detected these species on forests north of the Stanislaus NF. Focused surveys using bait and automatic cameras were conducted in and adjacent to the project area in 2006, 2007, and 2008; these surveys did not detect fisher, marten, red fox, or wolverine. Individual sightings of these species have been documented in the past by employees and members of the public on the Groveland Ranger District, but were not verified during follow-up surveys by biologists.

A recent analysis of habitat characteristics in the Sierra Nevada identified the Soldier Creek HFR project area as having a high-predicted probability of fisher occurrence (Spencer et al. 2008). This model of habitat value was based on latitude-adjusted elevation, average annual precipitation, and total aboveground biomass of trees. Nonetheless, no fishers have been detected in or near the project area

during recent surveys. The nearest detections are south of the Merced River, over 10 miles south. Despite the proximity to occupied areas, Spencer et al. were uncertain if steep canyons, open habitats, the Merced River, or roads might prevent population expansion. The Soldier Creek HFR project area, while it contains denser, larger trees than much of the surrounding area on the Groveland Ranger District, does not contain the density of large trees that occur in Yosemite National Park, including nearby stands at Hodgdon Meadow and the Merced Grove.

The habitat for marten within the project area is relatively low quality for many of the same reasons described for the Pacific fisher; the lack of large logs and snags, and the presence of numerous roads. The project area is also at the lower end of this species' elevation range. Because the project area contains low quality habitat, marten are unlikely to use the area for denning or foraging habitat. Because of the large home range of this species, dispersing and foraging marten may briefly move through the project area.

Based on a GIS-based model using the information from the foxes at Lassen National Park, the project area is unsuitable for Sierra Nevada red fox. The project area is at the lower end of this species' historic elevation range and does not contain the red fir and lodgepole pine habitat they typically inhabit. If they use the project area, it is likely that it would be during the winter months because of the low elevation. Downed woody material levels in the area are relatively low and may not be sufficient and the small meadows in the project area are not likely as suitable as larger nearby complexes, particularly those at higher elevation in Yosemite National Park. Dispersing red fox may briefly move through the project area.

Despite the presence of several small meadows and riparian areas, the Soldier Creek HFR project area is relatively low quality habitat for wolverine due to the high road density and regular human disturbance, as described above. The project area is also situated at or below the lower end of this species' elevation range. Although the project area is connected with higher quality habitat in the park, the project area does not likely provide suitable denning habitat in the form of late snowpack. Nonetheless, this wide-ranging species may briefly move through the project area.

<u>Western red bat, pallid bat, and Townsend's big-eared bat:</u> Relatively little is known about these three uncommon bat species. The Forest Plan does not provide specific management direction for bats; however, it does contain general guidelines to promote the health and vigor of hardwoods and riparian habitats, both of which are important habitats for bats. Several surveys have been conducted on the Groveland Ranger District, including at some bridges within the project boundary. All three species have been documented on the District in small numbers.

Although there are no known natal roosts for Townsend's big-eared bats in the project area, there is likely suitable foraging habitat throughout the project area. Potentially suitable roosting and breeding habitat occurs in cabins in and adjacent to the Soldier Creek HFR project area, in abandoned mines in the surrounding landscape, and in a large cave within 10 miles of the proposed project area. Individual foraging bats likely move through the project area regularly.

As described above, there are cabins and bridges in the project area that are used by pallid bats. Old oak trees with cavities, snags, and houses, bridges, and other structures in the area provide good roosting habitat. Pallid bats likely forage regularly in the area, particularly near openings and roads, but the denser understory does not likely provide good foraging habitat for this large species.

The South Fork Tuolumne River and its tributaries are relatively dense with conifers, but nonetheless contain riparian foraging and roosting habitat for red bat. In addition, areas with dense brush may provide suitable temporary roost sites, particularly during migration.

Alternative 1 (Proposed Action) - All Species

Direct Effects: Project implementation would increase human presence and disturbance in the project area during vegetation thinning activities. Most wildlife species are sensitive to human disturbance, which can disrupt breeding and foraging activity or result in the abandonment of active nests or roosts. Because most mechanical operations would be restricted to limited operating periods within ¼-mile of the known PACs, which contain the most suitable habitat for species dependent on conifer habitat with dense canopy cover, the likelihood of disruption of these species during breeding is relatively low. Some prescribed burning may occur in or near the PACs during the breeding season, which may have the same adverse effects. Disturbance to species outside of these buffer areas during the breeding season is likely. Disturbance outside of the breeding season would also occur, but is expected to result in only limited, temporary displacement effects.

Indirect Effects: The following table is a summary of expected changes in habitat as a result of the proposed action:

Table 21 - Stand Characteristics and Effects of Mechanical Thinning - Alternative 1

Unit	Acres	QMD >6" DBH Pre/Post	Canopy Cover Pre/Post	CWHR Type Pre/Post
24011	28	16/ 20	61/ 50	6/ 5M
24018	81	20/ 23	56/ 50	4M/ 4M
24021	23	18/ 20	49/ 44	5M/ 5M
24023	8	13/ 14	66/ 60	4M/ 4M
24026	133	16/ 23	58/ 40	6/ 6
24035	25	17/ 20	49/ 45	5M/ 5M
30021	21	16/ 20	61/ 50	6/ 5M
30047	75	22/25	50/40	4M/ 5M
30048	46	21/ 26	59/ 50	5M/ 5M
30058	10	20/ 22	46/ 40	4M/ 4M
30131	6	14/ 18	69/ 61	6/ 6
30134	116	15/ 20	51/ 40	4M/ 4M

Note: CWHR types that provide moderate to high suitability for breeding and foraging habitat for California spotted owls are classified as 6, 5D, 5M, 4D, and 4M (USDA, 2001; CDFG 2002). Highly suitable habitat occurs in 5D and 6 habitats with over 70% canopy cover (Blakesley 2003).

The mechanical thinning units all provide potentially suitable foraging habitat for spotted owl, although the canopy cover is generally more open than preferred. These areas would be thinned, reducing their habitat value for nesting and to a lesser extent, for foraging for 10-20 years. Because more suitable habitat in the nearby territorial activity centers (PACs) would not be mechanically thinned of overstory trees, these affected areas are more important as contributing to dispersal and year-round foraging as part of spotted owl home range (HRCA) than as breeding habitat. These thinned areas are expected to recover and fill in the canopy cover over the long-term (several decades).

The level of thinning is not expected to adversely affect populations of gray or Douglas squirrels, thus retaining prey for predators such as the California spotted owl, northern goshawk, American marten, and Pacific fisher. Indeed, thinning is expected to benefit squirrels by favoring hardwoods, encourage larger crown development, and increase acorn production.

Burning and disturbing the soil with mechanical treatments may adversely affect mychorrizal fungi, an important food of squirrels. If there is a reduction in fungi, this could cause a subsequent decline in squirrel populations in the area, adversely affecting predators. The reduced treatment in the PACs, drainages and other areas will provide relatively undisturbed habitat for plants and small mammals. Mechanical treatments and burning will disturb the soil and reduce ground cover and under-story

vegetation, which are important food and hiding cover for small mammals. Removing ground cover also accelerates the drying of soils. Soil moisture provides favorable conditions for fungi. Consequently, there is some risk that project activities would reduce the quantity of prey within treated areas. The risk of reducing prey numbers may be offset over time as the understory recovers and oaks increase in productivity.

The dense understory habitats of shrubs and small trees are over-represented in the project area and in the landscape as a whole due to fire suppression. Recent large, stand-replacing fires have generally reduced the availability of large trees in and around the project area for several decades into the future. The project area as a whole would greatly reduce understory brush and small trees in the treatment area, resulting in a change to a more open condition immediately after project implementation.

Opening up the understory, in conjunction with the proposed fuel breaks along the paved roadsides may increase human use in the area, as access and visibility is improved. This may include recreational use, such as hiking, hunting, and illegal off-road vehicle use, as well as woodcutting and illegal garbage dumping. Increased human use could result in adverse disturbance-related effects and reduced habitat quality. The retention of larger trees, along with screening along smaller roads and the presence of drainages and steep banks is expected to somewhat prevent these anticipated adverse effects.

The loss of snags in the fuel breaks would adversely affect habitat for many wildlife species that utilize cavities, forage on plant and animal species associated with snags, and depend on the resulting logs and associated plant and prey species. Areas subject to timber harvest and human access in general typically contain lower densities of snags (Wisdom and Bate 2008). Snag and log densities are relatively low in much of the project area already, as roads and powerlines are typically cleared of dead and dying trees to reduce hazards to the roads in the area, while woodcutters remove logs near roads. Although some additional snags would be lost during treatment for access and safety, larger snags and logs would be retained.

Oak trees would be retained, while small and moderate sized conifers and shrubs would be thinned. The result of treatment would be to benefit oak tree species, by reducing competition with conifers and shrubs for space, light, and water. Oaks provide important structural values such as long-lasting trees, snags, and downed wood for prey and sensitive species habitat. They also provide important forage for prey species in the form of acorns and leaves for small mammal and insects. Maintaining and enhancing oak habitat is expected to benefit species such as spotted owl, goshawk, fisher, marten, wolverine, fox, and bat species.

Tree thinning is intended to increase the health of the remaining trees in treated stands; this would not only reduce the number of trees available for later snag and log recruitment, but the likelihood of trees dying. Reducing the risk of stand-replacing fire would also reduce the likelihood of trees dying and forming logs and snags. The Groveland Ranger District as a whole has had numerous large wildfires, resulting in a flush of snag availability, followed by heavy salvage harvest, and little to no recruitment for decades as the forest recovers. The resulting habitat of shrubs and small trees contains very few snags or logs and may take over 100 years to recruit new snags of any appreciable size.

A synthesis of the effects of fuels treatments to wildlife and invertebrates found that while location, treatment method, and specific habitat types greatly determine the effects to individual species, some general patterns of effects can be anticipated (Pilliod et al. 2006). Typically, species associated with early successional habitats and fruit/seed eating species benefit from fuels treatment, as the forest floor is opened up and more small vegetation is made available. Species associated with late successional habitats or dense understories are generally adversely affected by the loss of logs, snags, understory, and in many cases, overstory canopy. Replacement of these characteristics can take

decades, making retention of important habitat characteristics such as snags and canopy cover important in reducing adverse effects.

The long-term goal in vegetation management is toward developing mature conifer forest that is less susceptible to stand-replacing fires. The fire risk is considered relatively high in the area due to the low elevation, the fire history in the area, and the proximity to private structures (Castro 2009). Understory thinning is expected to increase the vigor of the remaining trees and reduce the risk of stand-replacing fire. The fuel break areas are generally limited in wildlife value due to historic road and timber management and recreational use, but will have a higher likelihood of surviving and attaining a mature condition with treatment. All the trees over 12" DBH in the spotted owl and goshawk PACs would remain in the project area; these trees make up the majority of the useful canopy cover. Trees over 30" DBH elsewhere in the project area would be retained. In addition, 40% canopy cover would be retained throughout the project area, while 50% canopy cover would be retained in the spotted owl PACs. The following table lists the acres of special habitat types that would be affected under Alternative 1.

Table 22 - Special Habitat Areas Affected by Soldier Creek HFR Project - Alternative 1

Designated Habitat	Thinning	Fuels	Total Acres
Spotted Owl PAC TUO-0010	--	84	84
Spotted Owl PAC TUO-0026	--	85	85
Spotted Owl HRCA (TUO-0010 and TUO- 0026)	243	565	808
Spotted Owl HRCA (TUO-0078)	9	359	368
Spotted Owl PAC TUO-0078	--	13	13
Rush Creek Goshawk PAC 54-40	--	77	77
Soldier Creek Goshawk PAC 54-43	--	53	53
Crocker Meadow Great Gray Owl PAC	--	63	63

Cumulative Effects: Many of the management activities on the Groveland District have been and continue to be related to high-severity wildfires, including reforestation, hazard and salvage tree removal, control of shrubs, fuel breaks, and various habitat enhancement projects. These activities have generally favored habitat for mature conifer-dependent species in the long-term, while short-term disturbance activities near PACs are limited during the breeding season by limiting operating periods (LOPs). While mature conifer stands do not necessarily benefit species dependent on riparian, meadow, or shrub habitats, these other habitats are also considered during project planning, and protected as a mosaic of important habitat types in the landscape. In addition, these habitats generally develop faster and are less limiting than mature forest. Current fire management plans also contribute to habitat values for conifer-dependent species, by conducting prescribed burns and reducing stand densities while maintaining overstory canopy.

Recreational and other activities or developments on the Forest are currently analyzed with respect to the effects on wildlife species and also incorporate measures, as needed, to reduce adverse effects. A forest-wide analysis of off-highway vehicles (travel management) is currently underway to attempt to define and manage appropriate uses and locations.

The Stanislaus National Forest is also implementing a plan known as a Stewardship Fireshed Assessment (SFA) to identify strategic placement, timing, and size of projects to most effectively treat fuels and provide additional sustained timber volume. The Soldier Creek HFR project is a part of this process. These projects would also contribute to habitat values for wildlife, by conducting controlled burns, creating strategic fuel breaks, and reducing the density of forested stands while maintaining overstory canopy and other important habitat components.

The SFA plan will result in widespread human activity and associated disturbance on the Forest. These and other projects include areas of mature forest, riparian habitats, brush, oak woodlands, and PACs. These projects will generally reduce downed wood, canopy cover, and shrub densities in an attempt to reduce fuel levels. These treatments are expected to reduce the risk of stand replacing fires and increase stand health and so would contribute to the effect of the Soldier Creek HFR project. Nearby projects on the District are listed in the following table:

Table 23 - Large Vegetation Management Projects near the Soldier Creek HFR Project

Project Name	Planned/ Ongoing	Project Type	Analysis (acres)	Distance from Project (miles)
Crocker	Planned	Fuels/ Thin	3,490	Adjacent
China Flat	Ongoing	Fuels/ Thin	5,149	Adjacent
Middle Fork	Planned	Fuels/ Thin	2,951	0.5
Bear Mountain	Ongoing	Fuels/ Thin	3,041	0.5
Ascension	Planned	Fuels/ Thin	2,445	2.0
Aqueduct	Planned	Fuels/ Thin	3,502	2.5
Abernathy	Planned	Fuels/ Thin	2,930	3.0
Peach Growers	Ongoing	Fuels/ Thin	753	3.0
Buck Meadow	Planned	Fuels/ Thin	3,262	5.0
Gravel Range	Planned	Fuels/ Thin	5,347	4.0

The general effect of reduced conifer densities would reduce habitat values for conifer-dependent species such as spotted owl, fisher, and olive-sided flycatcher. Meadow, shrub, and oak woodland species may benefit from the anticipated changes in forest structure. Metabolic impacts of warming climates on wildlife, their prey, and the vegetation that they utilize for habitat and forage are likely, but unknown, but may have profound effects as well. Because interactions between various factors that make up a species' niche are complicated and synergistic, it is not possible to make precise predictions of climate change impacts. (Safford 2006) There is a great deal of current concern about climate change. While the exact effects, particularly at localized scales is difficult to anticipate, some general effects may be described for the range and habitat types of many Sierra Nevada habitats. Climate models suggest that hardwood densities will increase in montane forests.

Alternative 1 (Proposed Action) - Great Gray Owl, California Spotted Owl, and Northern Goshawk

Direct Effects: As described above, limited operating periods (LOPs) would be implemented for mechanical activities in areas adjacent to suitable habitat for spotted owls, great gray owls, and goshawks; disturbance to breeding birds from project activities is expected to be limited. Some disturbance would result from early season prescribed burning, as well as human activity associated with vehicle traffic associated with adjacent private land owners and with activities in adjacent units not subject to an LOP. The highway and paved Harden Flat road in the project area receive a large amount of human disturbance, particularly recreational from the adjacent camps, Yosemite National Park, and fall hunting.

While there is some risk of breeding failure due to prescribed fire, options for burning are limited to spring and fall, when suitable conditions are available. If burning were restricted in the spring, it would not likely be possible to implement, with greater long-term adverse effects. While not expected, if these species occur outside the known PAC locations they would also be subject to disturbance; however, upon detection, activities would be halted and be re-assessed, limiting the severity of disturbance.

Indirect Effects: As described above, the project would affect over 2,800 acres within the over 5,000-acre project area. The removal of understory brush and small trees would benefit these large raptors, which prefer relatively open flight corridors for foraging, but may reduce habitat for some prey species, such as woodrats, the preferred prey of spotted owls (Pilliod et al. 2006). All three species would also benefit from the reduction in the likelihood of high-severity, stand replacing wildfires. The temporary clearing of brush may provide additional movement and foraging access for all three species. Over several decades, the effect of treatments would be the creation of higher quality foraging and nesting habitat, with limited adverse effects to the core habitat in the PACs.

The loss of downed wood associated with project implementation (skidding, burning, increased human access) and anticipated long-term increase in human activity and associated disturbance would have a negative effect on goshawks, great grey owls, and spotted owls. While the extent of long-term future disturbance is unknown and increased use is not the intention, it is possible the project would contribute to adverse indirect effects.

All of the Crocker Meadow great gray owl PAC (approximately 63 acres) would receive treatment under Alternative 1; however, treatment would be limited to trees under 12" DBH and would be subject to a limited operating period for mechanical operation within 1/4-mile of the PAC. A separate project is planned to create several artificial nests in this PAC, and may occur prior to implementation of the Soldier Creek HFR project. If a nest site is detected or artificially created prior to operations, an untreated buffer similar to that used in spotted owl stands would be applied.

Based on the habitat needs of great gray owls and past experience thinning in and around territories, fuels treatments are not expected to adversely affect the habitat for this species. Treatments would have the beneficial effect of opening the understory and reducing the risk of stand-replacing fire, as described above. Understory thinning is also expected to reduce conifer encroachment on meadows and increase herbaceous vegetation in and alongside meadows and other open areas, which would improve habitat for prey. While individual birds foraging or roosting outside the known nest site may be disturbed during project implementation, this disturbance would be outside the breeding season and temporary. Treatment within this PAC would retain middle and overstory trees and, by reducing the risk of wildfire, increase the likelihood of developing more suitably large nest trees. Connectivity to other meadows and large trees would be somewhat improved by opening up the understory of dense, less accessible areas. Overall, treatment is expected to have a somewhat beneficial effect on this PAC immediately after treatment and over the long-term.

The Forest Plan directs project design in spotted owl PACs to "locate fuels treatments to minimize impacts to PACs. PACs may be re-mapped during project planning to avoid intersections with treatment areas, provided that the remapped PACs contain habitat of equal quality and include known nest sites and important roost sites. Document PAC adjustments in biological evaluations." Because the entire project area is relatively low elevation, adjacent to private land, and thus includes defense and threat zones in the wildland urban interface, spotted owl PACs were included in the proposed fuels treatments, where necessary. Adjustments were made to the boundary of TUO-0026, which removed a portion of the PAC in Defense zone surrounding a small private in holding, and included some areas to the east, near Rush Creek. Because both areas are proposed for fuels treatment, the difference in acreage treated in the PAC is very slight, but the previous area would be subject to mastication, whereas the new area would not.

Treatments in the spotted owl PACs would be limited to reduction of understory fuels; no trees over 12" DBH would be removed from within the PAC boundaries and thus very little reduction in canopy cover would occur. Very little mastication would occur in the PACs; most activities would consist of hand-thinning and understory burning. While the loss of a multi-canopied condition would adversely

affect habitat quality, the smaller understory trees and shrubs are expected to recover in 20 years or less, albeit at a much lower density. The lower density understory will provide a more open understory for these large birds to fly, while providing some cover and forage for prey species. Thinning in the associated HRCAs would be limited in order to retain a minimum of 50% canopy cover where it exists; a minimum of 40% canopy cover would be retained in other areas outside the PACs and HRCAs, where it occurs. In addition, a 500-foot buffer around nest stands would not be treated. The other spotted owl and goshawk PACs outside of the project area would not be directly or indirectly affected by project activities.

PAC TUO-0010. A total of approximately 84 acres (about 27%) would be treated in this PAC for fuels with hand thinning, burning, and limited mastication. The area treated would be along the western boundary, in association with adjacent Berkeley-Tuolumne Camp and along two roads. All trees over 12" DBH would be retained, as would the majority of the canopy cover and snags and downed woody material. Some snags and downed woody material would be lost during operations and burning. Understory thinning would improve flight access and increase the resiliency of the stand to fire and drought. Although fire would be used under careful prescriptions, there is always some level of risk as a management tool. The benefits of using fire, however, are many, in reducing tree-litter depth and in cycling nutrients into the soil. While this productive PAC may suffer slight adverse effects due to increased human activity, because 73% of the PAC would not be treated, and because the treatment would have a minimal effect on habitat characteristics important for spotted owl, the reduction in fuels risk is expected to have a long-term beneficial effect.

PAC TUO-0026. Approximately 85 acres (28%) of this PAC would be treated for fuels. Like the PAC to the west, fuels treatment would not measurably reduce canopy cover, logs, or snags in suitable habitat, but is expected to increase stand resiliency and open the understory where dense with smaller trees and shrubs. This PAC contains dense understory trees in the treatment areas and is expected to benefit substantially from treatment in stand health and reduced fire risk. While human activity would be increased with treatment, this PAC does not provide the quality of habitat of TUO-0010, and has not been active in recent years. About two thirds of the PAC, particularly areas further from homes and with a more open understory, would not receive treatment.

PAC TUO-0078. Only about 13 acres (4%) along the edge of this PAC are proposed for fuels treatment; the majority of the PAC would not be treated. The treated area is located at the southern end, near the ridgetop, and thus contains some of the more open, less suitable habitat in the PAC. While the suitability and connectivity along the ridgetop would be somewhat compromised by the fuel break, larger trees would be retained. Ridges do not typically provide suitable breeding or foraging habitat for spotted owls. The treatment of these ridges is not expected to reduce the quality or quantity of suitable habitat in this PAC, while greatly protecting much of the PAC from stand-replacing wildfire. The core of the PAC would remain untreated, and large trees, canopy cover, snags and logs would continue to develop; thus adverse effects to habitat from treatment are not expected. Like the other PACs, this PAC is expected to benefit from vegetation management.

HRCAs. The Soldier Creek HFR area contains higher quality HRCAs than most territories in the surrounding landscape. Of the over 2,800 acres of HRCA in the Soldier Creek HFR project area, a total of 808 acres (29%) would be treated. Approximately 243 acres (8%) of HRCA would be mechanically thinned, while 565 acres (20%) would be treated for fuels. Owls in the project area are less commonly detected in the HRCA during the breeding season and these areas are generally composed of less suitable habitat; nonetheless, these areas are considered important for year-round habitat needs, for dispersing juveniles, and for buffering the core activity centers. The commercial thinning would reduce more of the canopy cover and remove larger trees than the fuels treatment and would reduce the value of habitat for spotted owls, but would only affect a small portion of the total

habitat area. The more extensive fuels treatments are not expected to adversely affect the HRCAs. The HRCAs are expected to continue to develop more valuable habitat over the long-term.

GOSHAWK PACS. Units F07, F08 would affect 52 acres (24%) in the Soldier Creek goshawk PAC, while F11, and F12 would affect 76 acres (38%) in the Rush Creek goshawk PAC. Only the dense understory in F08 would be treated with mastication, the rest of the units would receive hand-thinning and burning. None of the overstory trees would be removed in either PAC. The Soldier Creek PAC would receive fuels treatment in the less suitable areas containing dense understory trees. Like the overlapping spotted owl PAC (TUO-0026), the Rush Creek PAC has not supported breeding goshawks since the Crush timber sale was implemented. The anticipated human disturbance and loss of logs would adversely affect the PAC; however the retention of large trees and clearing of understory would maintain or enhance the available habitat. While the project may temporarily reduce habitat values for individual goshawk foraging or nesting in the PAC, because the PAC appears to be currently unoccupied, the proposed treatment is expected to improve habitat quality relatively soon after treatment (within 5 to10 years) and over the long-term.

OTHER TREATMENT AREAS. Approximately 380 acres of potentially suitable spotted owl and goshawk habitat not within designated PACs or HRCA would be mechanically treated. These thinning unit areas were all identified as 4M, 4D, 5M, 5D, or 6 (see appendix A for definitions). Because the canopy cover would be reduced, these areas would be less suitable foraging and nesting habitat for spotted owl and goshawk for 10 years or more, but would remain important for connectivity and dispersal between more suitable areas in PACs and HRCA. Over a longer period of time, the retained trees will grow larger and more suitable and the canopy cover density will recover, providing higher quality habitat for prey and nesting birds.

Cumulative Effects: The recent large, stand-replacing fires have generally reduced the availability of foraging and nesting habitat in many areas of the Groveland District for goshawks and spotted owls for 50-100 years. Great gray owls have also lost large nesting trees and snags to fire, although wildfires do create new snags and improved foraging for this species, until shrubs and young conifers created a dense understory. While much of the Soldier Creek HFR project area did not burn, it remains at risk from past and ongoing management activities, particularly fire suppression, which allowed dense stands and understory to develop.

Much of the management activities on the Forest have been and continue to be related to these fires, including reforestation, hazard and salvage tree removal, control of shrubs, and various habitat enhancement projects. These activities generally retain large trees and are expected to benefit habitat for these species in the long-term, while short-term disturbance activities are limited during the breeding season by limiting operating periods. The SFA projects described above would also contribute to habitat values for these species, by removing understory vegetation and reducing the density of stands while maintaining overstory canopy. The Soldier Creek HFR project would contribute to these cumulative effects by reducing the likelihood of stand-replacing fires from adversely affecting PACs, adjacent habitat, and maintaining forest connectivity between more suitable habitats.

Cattle grazing would continue in the project area. The grazing allotments on the Stanislaus NF are being re-issued, which may lead to changes in management. Grazing tends to adversely affect great gray owl by reducing forage and cover for their prey species and by creating disturbance in foraging habitat during the breeding season. Additional herbaceous forage would likely develop immediately, as the canopy cover is reduced and more sunlight reaches the forest floor. The removal of tree litter and the increased disturbance would also contribute to increasing herbaceous plant cover. In addition, several meadows and openings, including Crocker Meadow, would be hand-thinned of encroaching

conifers, which would also increase understory plants. The net result of treatment would be to increase forage for cattle, which would reduce their impacts overall and would likely have a beneficial effect on foraging and breeding great gray owls.

Human disturbance in the area is relatively high, due it its proximity to camps and neighboring private property. The project area also contains heavily used roads, including Highway 120, and the Harden Flat Road. The area also receives use by recreational Off-Highway Vehicle (OHV) users, woodcutting, hunting, and other uses. Regardless of whether these uses increase with improved roads and cross-country access resulting from project implementation, the already high use is expected to remain high. The Forest continues to monitor use and attempt to mitigate recreational problems as they arise. In addition, a Forest-wide effort to better manage OHV use is currently being developed. Because much of the current Forest management is intended to manage and minimize adverse effects from recreation, because recreational impacts are not anticipated to substantially increase, and because adverse effects of the project in suitable habitat would be minimized, the Soldier Creek HFR project is not expected to contribute toward adverse cumulative effects to these species.

Treatment in and near PACs may effect the continued use of the PACs and use of surrounding areas and PACs. Although spotted owls are territorial, research found that birds tended to occupy territories closer to other occupied sites than expected, suggesting that they occupy sites based on cues from other birds (Seamans and Gutierrez 2006). Because project activities would be timed to reduce disturbance during breeding, and because important habitat characteristics would be retained in the PACs and, largely, in the associated HRCAs, spotted owls, goshawks, and great gray owls are not expected to abandon territories in or near the project area. Because similar standards are applied to adjacent vegetation management projects, these projects are not expected to have an adverse cumulative effect on PACs in the Soldier Creek HFR project area either.

Overall, the Soldier Creek HFR project would thin the understory fuels in the less suitable areas of the PACs, remove larger trees in potential habitat areas outside PACs and HRCAs, develop fuel breaks in less suitable areas along Crocker Ridge and roadsides to reduce wildfire risk, leave much of the PACs untreated, and retain connectivity between PACs by retaining canopy cover, snags, logs, and large trees. The cumulative effect to the PACs in the project area will be to maintain connectivity in mature forest habitat over time and increase the resiliency of these stands. By retaining connectivity, the surrounding population of goshawks, spotted owls, and great gray owls will be able to disperse into and out of the Soldier Creek HFR project area. Because the habitat in the area provides connectivity to mature habitat in Yosemite National Park, to other nearby PACs, and to less suitable stands elsewhere in the surrounding watershed, the project will contribute to beneficial cumulative effects.

Alternative 1 (Proposed Action) - Fisher and Marten

Direct Effects: Because neither species has been detected in or near the Soldier Creek HFR project area, and because the project area is relatively low elevation for the range of marten, neither species is expected to occur in the project area. Nonetheless, both species are wide-ranging and may occur in the project area. Project implementation would increase human presence and disturbance in the project area during vegetation thinning and shredding activities. These species are sensitive to human disturbance, which can disrupt breeding and foraging activity or result in the abandonment of active dens. Because limited operating periods would be implemented in the areas adjacent to PACs, which contain some of the best mature forest habitat, disruption during breeding is reduced, but fisher and marten could occur in suitable habitat outside the PACs as well. While unlikely, if these species occur in actively treated areas, there remains some risk of disturbance or loss of breeding dens and mortality to less mobile juveniles. Disturbance outside of the breeding season is expected to result in only limited, temporary displacement and is less likely to result in mortality.

Indirect Effects: As described above, much of the project area and the PACs contain suitable habitat for spotted owls and northern goshawks. While treatment would reduce the canopy of the 572 acres in treatment units, it would all retain a minimum of 40% canopy cover; some areas would retain 50-60% canopy cover. Project implementation would reduce habitat value immediately after implementation as the canopy is reduced, including portions of HRCAs, but over the long-term, it is expected that the habitat will become more suitable as the remaining trees grow larger. Understory and mid-story thinning is expected to increase the vigor of the remaining trees and quickly return to the existing canopy cover. Most importantly, treatment would greatly increase fire resiliency of the stand.

The project is not intended to reduce other important habitat characteristics such as large downed wood and snags, although some snags and logs would be lost as a result of mechanical activities, controlled burning, and as needed for safe operation. Based on the relatively high likelihood of habitat loss from fire if the area were not treated, project implementation is expected to have a long-term beneficial effect on habitat for fisher and marten and offset the temporary reduction in canopy, log, or snag density. The recent study by Spencer et al. (2008) included the Soldier Creek HFR project area and stated that under the baseline fire regime used in the model "the simulated treatments inside fisher habitat provided a net benefit to fishers, because their effects on reducing fire damage to fisher habitat were greater than the direct negative effects of the treatments themselves on fisher habitat." While the exact prescriptions proposed under Alternative 1 were not used in the simulated treatments, both were derived from standards and guidelines in the Forest Plan and are likely similar or less than those modeled.

Cumulative Effects: As described above, the recent large, stand-replacing fires in the area have generally reduced the availability of habitat for mature forest dependent species such as fisher and marten. While the Soldier Creek HFR project area contains more intact mature forest habitat and relatively good connectivity with habitat in Yosemite National Park, much of the surrounding landscape to the north, west, and south is unsuitable and highly fragmented.

The Soldier Creek HFR project and other proposed projects are designed to prevent further loss of mature forest and attempt to retain or develop those characteristics important to species dependent on mature forest. These projects generally favor habitat for these species in the long-term, do not adversely affect suitable habitat in the short-term, and limit disturbance during the breeding season with limited operating periods when located near habitat occupied by other mature forest sensitive species. Proposed fuels management projects would contribute to retaining habitat values for these species, by conducting controlled burns, creating strategic fuel breaks, and reducing the density of woodlands while maintaining overstory canopy and reducing the likelihood of stand-replacing fires. Implementation of the project is not expected to increase fragmentation of suitable habitat; indeed, the goal of the project is to prevent further fragmentation of suitable habitat; thus increasing the cumulative beneficial effects of the various fuels management projects.

As described above, the project area receives a high level of recreational use and associated disturbance, although the Forest Service tries to manage and limit adverse affects as they arise. Unmanaged OHV use, in particular, was identified as a resource threat, and road use and access management is being developed on the Forest. The current and anticipated recreational uses would contribute to the cumulative effects of disturbance generated by the project, but are not expected to reach a point that would prevent the use of habitat by fisher or marten.

Because existing populations of fisher are located in the Sierra National Forest and Yosemite National Park, management activities, wildfires, and other factors in these areas will greatly affect the health of the southern fisher population and the likelihood of the population reaching or expanding into the

Stanislaus National Forest. Both Yosemite National Park and the neighboring Forests are currently also attempting to manage for wildfire risk, mature forest retention, and species protection.

Alternative 1 (Proposed Action) - Sierra Nevada Red Fox and Wolverine

Direct Effects: The Soldier Creek HFR project area is at the lower end of the elevation range for these species. In addition, recently documented sightings for both species were nowhere near the Stanislaus National Forest, despite ongoing survey efforts. Nonetheless, individuals of these species may occur in the generally unsuitable habitat in the project area while moving between areas of more suitable habitat. Although not expected, if red fox or wolverines occur in the project area during project implementation, they may suffer from disturbance, injury, or mortality. If they occupy areas with limited operating periods or little or no treatment, such as the PACs, the risk of disturbance or injury would be greatly reduced.

Indirect Effects: The removal of dense understory trees and shrubs is not expected to adversely affect habitat quality for wolverine or Sierra Nevada red fox. Understory and mid-story thinning is expected to increase the vigor of the remaining trees and quickly return to the existing canopy cover; while treatment would open up the canopy in stands that qualify as spotted owl habitat, they would remain in the 4M category (at a minimum). Important habitat characteristics such as large downed wood, snags, and meadows and drainages will be retained or enhanced. These beneficial effects, along with the overall improved fire resilience, will have a generally beneficial effect on potential habitat for these species.

Cumulative Effects: As described above, the recent large, stand-replacing fires in the area have generally reduced the availability of mature conifer habitat. At the same time, the loss of trees has reduced meadow encroachment by conifers, and generally increased open habitats and herbaceous vegetation. The Soldier Creek HFR project and other proposed projects are designed to prevent further loss of mature forest and attempt to retain or develop those characteristics important to species dependent on mature forest as well as important habitats such as meadows. Much like the proposed project, these projects generally favor habitat for these species in the long-term, are designed not to result in adverse effects to suitable habitat in the short-term, and limit disturbance during the breeding season with limited operating periods when located near occupied mature forest habitat. Fuels management would also contribute to habitat values for these species, by conducting controlled burns, creating strategic fuel breaks, and reducing the density of woodlands while maintaining overstory canopy. Implementation of the project is not expected to increase fragmentation of suitable habitat.

The management of the high level of recreational use in the project area is expected to improve and manage or lessen the adverse resource and disturbance-related effects. The proposed project would contribute to the cumulative effects of recreational disturbance, but are not expected to substantially contribute to cumulative adverse effects.

Alternative 1 (Proposed Action) - Townsend's Big-Eared Bat, Pallid bat, and Western Red Bat

Direct Effects: Human disturbance can disrupt breeding and foraging activity or result in the abandonment of active roosts. As described above, the project area contains suitable roosting and breeding habitat in privately-owned buildings, along bridges, and in riparian habitat. These habitats provide relatively high quality breeding and roosting habitat despite human presence, due to the presence of mature forest habitat characteristics, snags, and riparian corridors. Existing snags and riparian hardwood trees would be protected during project activities, although adjacent activities could

result in disturbance. In particular, if pallid bats are roosting or breeding in individual snags that are removed for operational safety, they may be disturbed or killed during project implementation.

Indirect Effects: Changes in plant species composition likely affect prey availability for bats. Shrubs are one of a number of preferred foraging habitats for all three sensitive bat species, although it is not considered essential. Sierra mixed conifer habitat provides moderate to low foraging habitat for bats until trees reach moderate size (CDFG 2002; Pilliod 2006). The removal of vegetation would likely temporarily reduce insect numbers, reducing the value of these areas for foraging. Because bats travel long distances to suitable foraging areas, and because herbaceous vegetation would likely increase with more open canopies, particularly near streams and meadows, project implementation is not expected to adversely affect overall foraging habitat for bats. The proposed vegetation management is not expected to significantly reduce availability of small tree or shrub habitat for foraging bats; shrub-dominated chaparral, plantations, and overstocked conifer stands are common in the surrounding area.

Pallid bats will use snags for roosting and breeding; big-eared bats may use snags for roosts as well, but not for breeding. The project may result in the loss of some roosting and breeding habitat in the form of snags. Snag removal would be focused on very decadent snags that pose an immediate risk to roads or operations, and in fuel break units. While not expected to substantially reduce roosting habitat, the loss of snags may adversely affect individual pallid bats. The removal of suppressed trees and shrubs would open up the understory in treatment units, providing more open foraging habitat for bats. Riparian areas are considered important foraging areas for the three Sensitive bat species; these areas would be protected during operations. The proposed riparian restoration component would improve riparian habitat and provide additional forage. The project would have an important, beneficial effect on bats by reducing the risk of a stand-replacing fire, and the subsequent loss of potential roosting trees, prey habitat, snags, and foraging habitat.

Because the project is not expected to greatly affect long-term density of bat prey in the form of arthropods, nor greatly increase the level of human disturbance during foraging or in roosting habitat, nor the availability of foraging and breeding habitat, the project is not expected to result in substantial adverse indirect effects to bat habitat in the project areas.

Cumulative Effects: The large, stand-replacing fires on the Groveland Ranger District have greatly affected foraging habitat for bats in the area; however, it is unknown how the changes in vegetation have affected prey densities. The fires would not have affected breeding or roosting habitat for species using caves and mines, but likely had a large effect on available large snags, vegetation types and densities, and subsequent insect densities. The large forest fires and subsequent salvage sales, hazard tree sales, and reforestation projects have resulted in a loss of trees and a brief pulse of shrub species and subsequent long-term loss of snags, which may have provided roosting and breeding habitat for these species, as well as habitat for prey species.

Much of the vegetation management activities on the District have been associated with post-fire reforestation projects such as the Hamm-Hasloe, A-Rock, Ackerson, Rogge, and Granite projects, whereas the Soldier Creek HFR project and other SFA projects focus on fuels reduction and stand resiliency. Although bat populations and habitat needs remain poorly understood, because these projects are staggered over time and over the landscape, a variety of foraging opportunities would remain within flight distance of roosting/ breeding sites. The removal of shrubs and small trees from the Soldier Creek HFR project is not expected to contribute to the adverse cumulative effect on bat species.

Alternative 2 (Modified Action) – All Species

Alternative 2 would have similar direct, indirect, and cumulative effects to all species described under Alternative 1; however this alternative would mechanically treat 250 fewer acres and would not remove trees over 12" DBH. Fuels treatments and associated effects would be the same as in Alternative 1. No overstory tree removal would occur in spotted owl PACs, HRCAs, or goshawk or great gray owl PACs. Because of the reduced timber component in Alternative 2, the level of disturbance and habitat change would be greatly reduced from Alternative 1.

Alternative 2 would have similar direct, indirect, and cumulative effects to all species described under Alternative 1; however this alternative would affect almost the same amount of acres, although only small trees and hazard trees would be removed from the mid and late seral conifer forest stands. The removal of the timber component would reduce the likelihood of short-term adverse effects to conifer forest dependent species, such as spotted owl, fisher, and northern goshawk, and would likely retain or increase the availability of snags and logs. Adverse affects that are reduced under Alternative 2 include human disturbance, ground disturbance, loss of shrubs and small trees, reduced canopy cover, and loss of logs and snags. As described above, these affects are relatively short-term. By eliminating these affects, the project area and associated mature-forest dependent species may suffer from a higher long-term risk of tree mortality due to overly dense stands, particularly given the high risk posed by current drought conditions and predicted changes in climate for the Sierra Nevada.

While the exact units and treatments in the two alternatives vary, the site-specific issues, the habitat quality, and the number of acres affected, especially when considered cumulatively with similar projects in the surrounding area, would be relatively similar to those in Alternative 1.

Alternative 2 (Modified Action) - Great Gray Owl, California Spotted Owl, Northern Goshawk, Forest Carnivores

Direct Effects: Like Alternative 1, there is some risk of disturbance to individuals, although the risk of disturbance during the breeding season is reduced by limited operating periods within ¼-mile of the PACs.

Indirect Effects: The effects of Alternative 2 to mature forest species would be similar to Alternative 1; however fewer middle and overstory trees would be removed with the reduced mechanical thinning units, only 106 acres in the spotted owl HRCAs would be treated (versus 243 under Alt 1), and no trees over 12" DBH would be removed. The reduced mechanical thinning would thus maintain more important stand characteristics such as snags, logs, overstory trees, and canopy cover in the HRCAs and surrounding areas in the short-term. The stands that would not be commercially thinned would be at somewhat greater risk of decline due to tree density, increasing the risk of stand-replacing fire; however the planned fuels treatments would still reduce understory density and fire risk. Overall, Alternative 2 produces less short-term risk to mature forest species by reducing stand-altering activities, while providing most of the beneficial understory thinning found in Alternative 1.

Cumulative Effects: The cumulative effects of Alternative 2 would be essentially the same as Alternative 1; the project would contribute toward the expected beneficial effects of fuels and stand-thinning treatment proposed in nearby areas.

Alternative 2 (Modified Action)- Townsend's Big-Eared Bat, Pallid Bat, and Western Red Bat

Effects under this alternative would be the same as Alternative 1, albeit to a somewhat lesser extent based on less acres treated. There would remain some risk of disturbance to individual bats or small

colonies in trees and an unknown effect to local foraging due to vegetation changes. The cumulative effect of treatment would be to contribute toward beneficial retention of snags and a diversity of habitats across the landscape, including shrubs would remain within foraging distance to maintain the value of brooding and breeding sites.

Alternative 3 (No Action) - All Species

Direct Effects: There would be no direct effects to any threatened, endangered, or sensitive wildlife species if the No Action alternative is implemented.

Indirect Effects: Indirect effects of Alternative 3 would be that of retaining existing stands of small and medium-sized conifers and shrub understory. This would create a dense understory and conifer stands would be at risk of die-off from insect, disease, and stand-replacing fire. Given current fuel levels and local fire history, there is a high probability for fire in this project area. Without a stand-replacing fire; canopy cover, snag number, and downed woody debris would increase more quickly than in either treatment alternative. If a stand-replacing fire did occur, these components would be lost for decades.

The no action alternative would reduce wildlife habitat values associated with oaks, meadows, and riparian habitat due to competition from dense conifer stands or burned over in a stand-replacing fire. Some areas of dense brush would gradually be overgrown by conifers which may eventually become conifer-dominated habitat, but the risk of stand-replacing fire in these stands would remain high.

Without treatment, the project area would mature slowly or suffer high tree mortality from some combination of fire, disease, and insect damage. This effect would be offset substantially by the other fuels reduction and thinning activities occurring elsewhere in the watershed, and throughout the Stanislaus National Forest, but the Groveland District remains limited in mature forest characteristics due to past logging and numerous large stand-replacing fires. The No Action alternative would contribute to this adverse affect, as the stands continue to decline and fire risk increases.

Determination of Effects

None of the alternatives would affect valley elderberry longhorn beetle because the project is outside of this species' elevation range. None of the alternatives would affect bald eagle, Swainson's hawk, peregrine falcon, or willow flycatcher because the project area is outside of these species' elevation or geographical range or does not contain any suitable habitat.

Alternative 1 may affect individuals and/or habitat but would not result in a loss of viability or a trend toward federal listing for the California spotted owl, great gray owl, northern goshawk, Pacific fisher, American marten, California wolverine, Sierra Nevada Red Fox, pallid bat, Townsend's big-eared bat, or western red bat. This determination is based on the limited treatment in spotted owl, great gray owl, and goshawk PACs that would retain important characteristics such as larger trees and canopy cover coupled with the application of protective limited operating periods during the breeding season. Outside of the PACs, the project areas contain generally high habitat values for these species, and thus there is some risk of encountering or adversely affecting these species. Breeding, roosting, and foraging habitat for the three bat species would be retained and enhanced by more open understory in the treatment units.

Alternative 2 may affect individuals and/or habitat but would not result in a loss of viability or a trend toward federal listing for the California spotted owl, great gray owl, northern goshawk, Pacific fisher, American marten, California wolverine, Sierra Nevada Red Fox, pallid bat, Townsend's big-eared bat,

or western red bat. This determination is based on the limited treatment in spotted owl, great gray owl, and goshawk PACs that would retain important characteristics such as larger trees and canopy cover coupled with the application of protective limited operating periods during the breeding season. Outside of the PACs, the project areas contain generally high habitat values for these species, and thus there is some risk of encountering or adversely affecting these species. Breeding, roosting, and foraging habitat for the three bat species would be retained and enhanced by more open understory in the treatment units.

Alternative 3 may affect individuals, but is not likely to result in a loss of viability or a trend toward federal listing of great gray owl, California spotted owl, northern goshawk, Pacific fisher, American marten, California wolverine, Sierra Nevada Red Fox, pallid bat, Townsend's big-eared bat, or western red bat. While no direct effects to these species would occur without treatment, the project area would still be subject to other ongoing management, continued stand development, and maintain or increase the likelihood of stand-replacing wildfires, which would contribute to the cumulative risk of poor stand health and wildfire to habitat in the project area and the surrounding area.

Management Indicator Species: Direct, Indirect, and Cumulative Effects

A Management Indicator Species report was prepared for the Soldier Creek HFR project. The report described the following habitats that occur in the project area: shrubland, oak-associated hardwoods and hardwood/conifer, riparian, lacustrine/riverine, early seral coniferous, mid-seral coniferous, later seral open canopy coniferous, late seral closed canopy coniferous, and snags in green forest. The difference between the action alternatives would be minimal with regard to most habitat types, while the no action alternative would increase the risk of stand-replacing wildfire and associated effects. If implemented, the Soldier Creek HFR project would affect various components of these habitats but the project would not result in any effect on the distribution or abundance of the habitats or the associated species.

Migratory Landbird Species

The project will not adversely impact migratory landbird species or their associated habitats. Potential impacts to migratory species would be minimized through the adherence of the Forest Plan Standards and Guidelines for snags and down woody debris, riparian reserve buffers, limited ground disturbance, and maintenance of canopy closure. The Soldier Creek HFR project is consistent with the intent of the Memorandum of Understanding between the USDA Forest Service and the US Fish and Wildlife Service to Promote the Conservation of Migratory Birds (USDA Forest Service and USDI Fish and Wildlife Service 2008).

Visual Quality

The Soldier Creek HFR project falls within the *Retention* and *Partial Retention* visual corridor requirements of the Stanislaus National Forest – Forest Plan Direction. The Visual Quality Objectives (VQO) for the project area are:

Retention: Provides for management activities, which are not readily visually evident. Activities may only repeat form, line, color, and texture, which are frequently found in the characteristic landscape. Changes in the quality of size, amount, intensity, direction, and pattern should not be evident. Partial Retention: Management activities remain visually subordinate to the characteristic landscape. Activities may repeat form, line, color, or texture common to the characteristic landscape, and may also introduce form, line, color or texture which are found infrequently or not at all in the characteristic landscape.

Vegetative treatments would be noticeable to the general public; this is acceptable within the context of the Forest Plan Direction 2005. Vegetative treatments and prescribed fire would be apparent only to the trained eye after several years. Within the next five to fifteen years a natural, active fire regime, forest stand structure would be reintroduced into the project area, and vegetation treatments would not be noticeable. By reducing the possibility of a catastrophic wildfire, the Soldier Creek HFR project has beneficial affects for the scenery setting. A catastrophic fire would have a stand replacing effect on the visual setting of the project area. A catastrophic wildfire would eliminate most of the existing vegetation, greatly decreasing the visual appeal of the landscape. The Forest Service would be required to close the area affected by the fire due to public health and safety standards.

Alternative 1 (Proposed Action)

Alternative 1 is the proposed action. Mechanical thinning would remove trees greater than 4" and less than 30" diameter at breast height. Under this alternative the purpose and need would be accomplished. The project area will be restored to a more historic stand structure, thus having a positive affect on the land. This may appear unnatural to some users who are accustomed to a dense, fire suppressed forest. By following the mitigation measures and VQO the Soldier Creek HFR project will not have significant affect on the visual quality of the project area. Vegetation treatments and prescribed fire would be apparent within the project area for several years.

Alternative 2 (Modified Action)

This alternative would only remove trees greater than 4" and less than 12" diameter at breast height. All mechanical thinning units would be dropped with the exception of biomass removal in Unit 30134.

This alternative would still accomplish the purpose and need of the project. The project area will be restored to a more historic stand structure, thus having a positive affect on the land. By following the mitigation measures and VQO the Soldier Creek HFR project will not have significant effect on the visual quality of the project area. This alternative would have fewer visual affects than Alternative 1 due to the smaller scope of the project.

Alternative 3 (No Action)

This alternative would consist of no Forest Service action within the project area with the exception of normal course of business.

This alternative would not affect the current visual structure within the project area. However, this alternative would not help reduce the fire danger within the project area, and therefore would not fulfill the purpose and need of the project.

Summary

The Soldier Creek HFR project will have a positive affect on the forest stand structure within the project area. By using the mitigation measures and following the LRMP, the visual quality of the area will not be significantly affected. Alternative 2 would have fewer visual disturbances than Alternative 1 while still accomplishing the purpose and need of the project. Alternative 3 would not accomplish the purpose and need of the project, but would not have any visual impacts to the project area. However, a catastrophic wildfire would have devastating impacts to the visual quality within project area, far out weighing the visual impacts from Alternative 1 or Alternative 2.

CONSULTATION AND COORDINATION

The USDA Forest Service Interdisciplinary (ID) Team consisted of:

Steve Holdeman	Aquatic Biology
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Priscilla Riefkohl-Guzmán	Cultural Resources
Tom Durston	Engineering/Roads
Kathleen Castro	Fuels and Fire/Air Quality
Tracy Weddle	Hydrology
Susan Forbes	Range
Jim Serra	Sale Administer/Small Sales Forester
Jason Dierberg	Silviculture/GIS
Brian Block	Silviculture Technician
Roy Bridgman	Terrestrial Biology
Spencer Bleardon	Environmental Justice/Recreation/Visual Resources
Scott Brush	Assistant Editor
Jason Jimenez	ID Team Leader/Editor/GIS/Soils/Carbon Resources
Vern Shumway	Recreation Program Leader
Ken Romberger	Resource Management Program Leader
Allen Johnson	District Fire Management Officer
Margaret Dowd	District Ranger
Susan Skalski	Forest Supervisor

The USDA Forest Service consulted with the following individuals, tribes, non-profit groups, non-Forest Service persons, and federal, state, and local agencies:

Agencies

California Department of Fish and Game

US Department of Interior, National Park Service, Yosemite National Park

Yosemite Foothills Fire Safe Council

Tribes

Tuolumne Band of Me-Wuk Indians

Non-Profit Groups

Central Sierra Environmental Resource Center

Sierra Club – Tuolumne Chapter

Sierra Forest Legacy

Tuolumne River Trust

Other

Tim Erickson – Grazing Permittee
Steward Crook – Grazing Permittee
Robert Gundy – Private Citizen
Craig Maxwell– Private Citizen
Virgil McVicker– Private Citizen
Craig Wilson– Private Citizen
Lauren and Bill Nickell– Private Citizens
Berkeley-Tuolumne Camp
Sierra Pacific Industries
Sierra Resource Management
38 Private Residences within ½ Mile of Project Area

LITERATURE CITED

The literature cited is organized by discipline (in alphabetical order) with a section of general references that are often used across disciplines such as forest plan or other regulatory and planning documents. Some sections contain references that were used in the complete specialist report but are not present in the environmental assessment. Those references are still relied on for analysis, decision-making purposes, and are included below. Those references are also included to illustrate the extent of past and current scientific literature used in the creation of this environmental assessment.

GENERAL

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Healthy Forests Restoration Act of 2003; 16 U.S.C. 6501 et seq.

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VISUAL QUALITY

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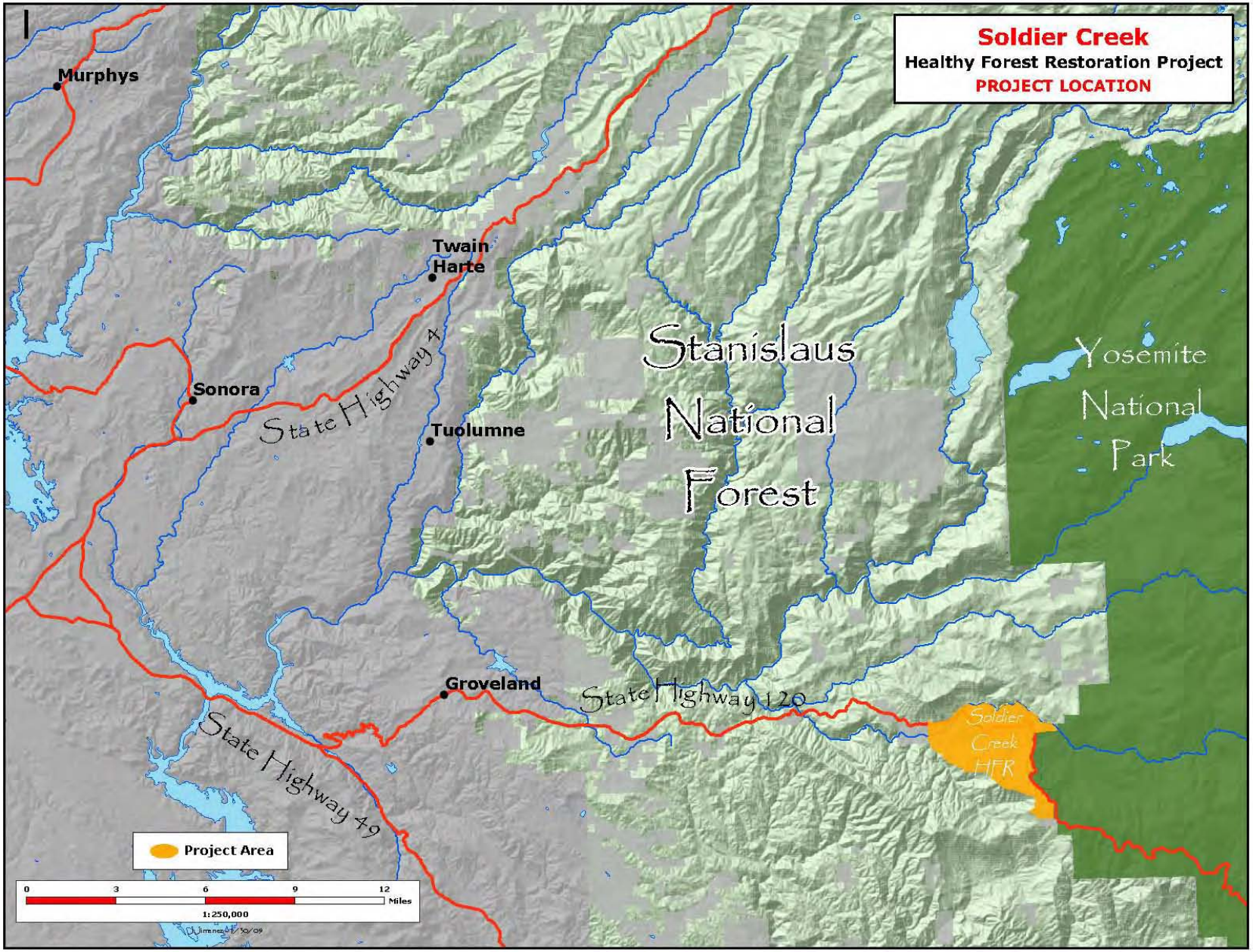
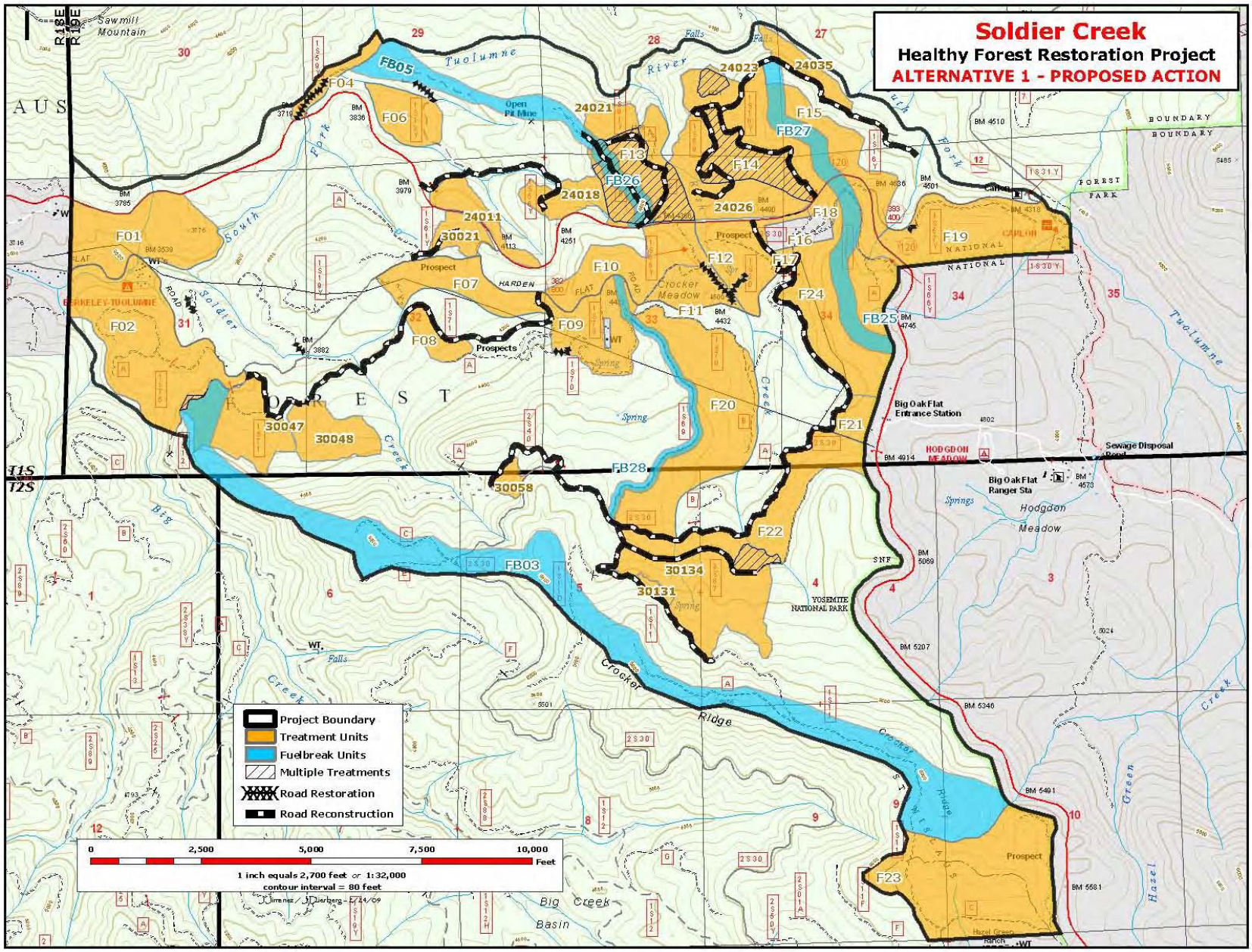
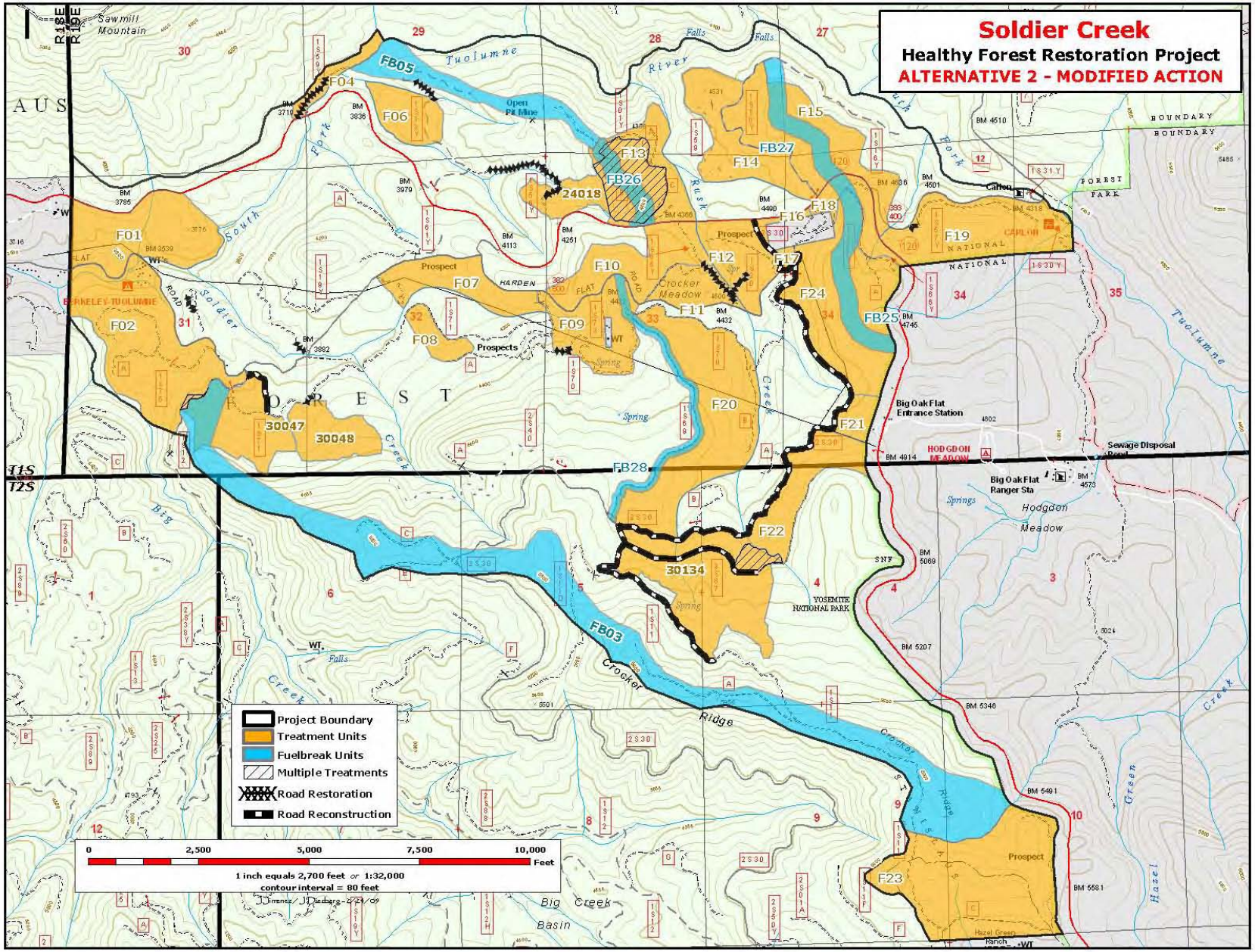
Appendix A - Soldier Creek HFR Project Location Map


Soldier Creek
Healthy Forest Restoration Project
PROJECT LOCATION
Murphys
Twain Harte
Sonora
Tuolumne
Groveland
State Highway 4
State Highway 120
State Highway 49
Stanislaus National Forest
Yosemite National Park
Soldier Creek HFR
Project Area
0 3 6 9 12 Miles
1:250,000

Appendix B - Soldier Creek HFR - Alternative 1 - Proposed Action Map


Soldier Creek
Healthy Forest Restoration Project
ALTERNATIVE 1 - PROPOSED ACTION
Project Boundary
Treatment Units
Fuelbreak Units
Multiple Treatments
Road Restoration
Road Reconstruction
0
2,500
5,000
7,500
10,000
Feet
1 inch equals 2,700 feet or 1:32,000
contour interval = 80 feet
Tuolumne
River
South Fork
Soldier Creek
Big Oak Flat Entrance Station
Big Oak Flat Ranger Sta
Hodgdon Meadow
Crocker Ridge
Crocker Meadow
Big Creek Basin
Green Creek
Hazel Creek
Sawmill Mountain
YOSEMITE NATIONAL PARK
T1S
T2S
R18E
R19E
FB05
FB26
FB27
FB28
FB03
FB25
24021
24023
24035
24018
24011
24026
30021
30047
30048
30058
30134
30131
F01
F02
F04
F06
F07
F08
F09
F10
F11
F12
F13
F14
F15
F16
F17
F18
F19
F20
F21
F22
F23
F24

Appendix C - Soldier Creek HFR - Alternative 2 - Modified Action Map


Soldier Creek
Healthy Forest Restoration Project
ALTERNATIVE 2 - MODIFIED ACTION
Project Boundary
Treatment Units
Fuelbreak Units
Multiple Treatments
Road Restoration
Road Reconstruction
0
2,500
5,000
7,500
10,000
Feet
1 inch equals 2,700 feet or 1:32,000
contour interval = 80 feet
JJimenez/JDieberg 2/24/09
FB05
F04
F06
F01
F02
F07
F08
F09
F10
F11
F12
F13
F14
F15
F16
F17
F18
F19
F20
F21
F22
F23
F24
FB25
FB26
FB27
FB28
FB03
24018
30047
30048
30134
Tuolumne
River
South Fork
Soldier Creek
Rush Creek
Crocker Meadow
Big Oak Flat Entrance Station
Big Oak Flat Ranger Sta
Sewage Disposal Pond
HODGDON MEADOW
Hodgdon Meadow
YOSEMITE NATIONAL PARK
Crocker Ridge
Big Creek Basin
Green Creek
Hazel Creek
Open Pit Mine
Prospects
Prospect
Sawmill Mountain
T1S
T2S
R15E
R16E

Appendix D - Response to Written Public Scoping Comments

A legal notice concerning the Soldier Creek Healthy Forest Restoration Project appeared in the Sonora Union Democrat newspaper on November 6th, 2008. The scoping comment period on the Soldier Creek Healthy Forest Restoration Project was open from November 6th, 2008 to December 5th, 2008. In accordance with the notice, comment, and appeal procedures for National Forest System projects and activities, comments were invited on the Soldier Creek HFR Project from the public; interested or affected persons or organizations; federal, state and local agencies with jurisdiction or special expertise; and Native American tribes. The Responsible Official shall accept all written and oral comments on the scoping letter, and identify all substantive comments. The Responsible Official shall consider all substantive written and oral comments submitted; all comments will be placed in the project file. Comments must meet one or more of the following criteria to be considered substantive comments:

Substantive Comments:
1. Comments that are within the scope of the proposed action,
2. Are specific to the proposed action,
3. Have a direct relationship to the proposed action,
4. And include supporting reasons for the Responsible Official to consider.

In review of the comments, the Forest Service attempted to adhere to a strict interpretation of the criteria. If a comment did not meet one of the criteria, it was determined to be "non-substantive." In the project planning record, all of the non-substantive comments are identified by which of the four criteria were not met. In this appendix, substantive comments follow with detailed Forest Service responses; non-substantive comments are not included. The following pages include the exact text of substantive comment received during the comment period, and the Forest Service response.

Source: Chris Conrad, Sierra Pacific Industries, November 7th, 2008

Comment: If average merchantable tree sizes marked for harvest are small (below 16-18" DBH) for the project and sawlog volumes per acre are low the sale might not be marketable at all if there is much of a biomass component attached. I encourage the district to not be too conservative in marking the size of the trees to be taken out. They are the engine that will drive the rest of the project. The point also needs to be made that given the current higher value of incense cedar and the low values of other species the district would be wise to attempt to market a high percentage of incense cedar in order to help the project to sell.

Response: The purpose and need statement for this project states "design economically efficient treatments to meet" project goals. The timber marking guidelines for this project specifically stress the removal of the understory, shade tolerant species that include cedar and white fir. Marking will be done to meet silvicultural prescriptions. In order to meet Forest Plan objectives and to practice good forest management, we are leaving the largest and healthiest trees. Proposed marking prescriptions retain sugar pine, ponderosa pine, and Douglas fir over incense cedar. Cedars are an integral part of the stand in the project and therefore are an important part of the overall biodiversity and forest resiliency though incense cedar is more abundant today than in pre-fire suppression times.

Source: Chris Conrad, Sierra Pacific Industries, November 7th, 2008

Comment: The scoping letter describes 17 miles of road improvement work needing to be done within the project area. I would encourage the District to keep the road package associated with reconstruction to the minimum level possible. Small trees with biomass attached will not carry much of a road package if any.

Response: Road work associated with this project has been kept to the minimum necessary to facilitate product removal and address sedimentation issues that are affecting water quality. Road work that is unrelated to hauling of products will not be included with or associated with a timber sale contract.

Source: Chris Conrad, Sierra Pacific Industries, November 7th, 2008

Comment: Costs associated with hand thinning and piling are incredibly high when compared to other fuels management methods. Table 2 of your scoping letter lists quite a few units that require this treatment. Attaching large amounts of hand thinning and piling to a timber sale offering is a guarantee that the sale won't sell without large amounts of supplemental funding. I encourage the district to put this kind of work out on contracts separate from a timber sale offering. It should also be noted that while the scoping document states that hand thinning and piling will only "occur on small portions of most fuels units", table 2 shows 150 acres listed for treatment on four units. This in itself is not a small area to be hand thinned and piled, but then in addition almost every other unit in the table is also designated for some hand thinning and piling. This is confusing. What is the total number of acres to be hand thinned and piled? It is not shown.

Response: The Groveland Ranger District understands that timber volumes will not offset the costs of completing all of the fuels reduction goals proposed in this project. Hand thinning and piling prescriptions will be carried out by service contracts or Forest Service crews independent of any timber sale. The total acres of hand thinning and piling are dependent upon many factors, including, but not limited to: proximity to roads, heavy equipment capability, slope, and other topographic features, and will be determined during project implementation in order to meet fuels reduction goals. Hand thinning acres will be less than 5% of the acres treated.

Source: Chris Conrad, Sierra Pacific Industries, November 7th, 2008

Comment: Mastication is a commendable goal but it is extremely expensive. I would encourage the district to put this work out under contracts separate from the harvesting of commercial timber.

Response: Fuels reduction using mastication is proposed under service contracts separate from any timber sale offerings.

Source: Chris Conrad, Sierra Pacific Industries, November 7th, 2008

Comment: I encourage the district to look for ways to "limit the limits" in regards to the LOP restrictions for the project area. The cumulative effects of combined limited operating periods and what that is doing to the district's ability to get fuels reduction projects implemented on the ground needs to be looked at closely. Even the best timber operators cannot keep their crews and their businesses healthy when they are restricted to only being able to work for a few months out of the year. I would encourage the district to get creative in modifying some of these LOPs.

Response: Limited Operating Periods (LOPs) are methods for mitigating the potential negative effects of various activities to resources on National Forests. LOPs related to wildlife are standards from the Stanislaus National Forest – Forest Plan Direction and are not subject to per project changes. The extent and timing of LOPs can be modified dependent upon results from wildlife surveys to determine active spotted owl or goshawk nesting. The priority is the protection of those sensitive populations. We understand the difficulties of completing contracted work under LOP restrictions.

Source: Chris Conrad, Sierra Pacific Industries, November 7th, 2008

Comment: The scoping document states that one of the goals of the project is to "maintain and enhance important wildlife habitat." I would encourage the district to maintain a common sense approach to beginning to mechanically treat areas of the forest that ostensibly have been set aside for wildlife. The truth is that mechanical treatments are part of the solution for protecting wildlife and should be utilized prior to prescribed burning whenever possible in order to protect the very habitat attributes that can potentially be threatened when a prescribed fire burns hot and out of prescription.

Response: Wildlife Protected Activity Centers (PACs) often have higher fuel loadings and are at risk for high severity wildfire, which ultimately eliminates that critical wildlife habitat. The Stanislaus National Forest – Forest Plan Direction prohibits the use of mechanized equipment in PACs except in Wildland Urban Interface – Defense Zones where it is needed for fuels treatment. Mechanical thinning in the PACs contained within the project area was determined not to be economically feasible due to steep ground, limited acres, and difficult access. Much of the PACs are outside of the defense zone. We hope in the future that we can find economical ways to reduce fuel loading in PACs, re-introduce a natural fire regime, and protect that critical wildlife habitat from high severity wildfire.

Source: John Buckley, Central Sierra Environmental Resource Center, October 19th, 2008

Comment: The scoping notice states on page 2 that mastication is proposed on 378 acres, while page 3 states that mastication is proposed on 588 acres.

Response: Total acres of mastication vary from the scoping due to changes in the proposed action (elimination of units) and a clerical error. The scoping document separated treatments based on purpose and need. This totals 1,110 acres of planned mastication. Other treatment acres can be found in the appropriate tables of the environmental assessment

Source: John Buckley, Central Sierra Environmental Resource Center, October 19th, 2008

Comment: CSERC strongly supports the underburning of 1936 acres as identified now in the scoping document. However, stopping burns at the Park boundary makes little sense, because the highway or other reasonable burn perimeters lie within the Park.

Response: The Groveland Ranger District consistently works with Yosemite National Park - Fire Management on fire and fuels management issues along our common boundary and will do so this project.

Source: John Buckley, Central Sierra Environmental Resource Center, October 19th, 2008

Comment: While it appears positive that 2 miles of roads with watershed or erosion concerns will have repair or realignment to reduce environmental impacts, it is puzzling as to how 17 miles of roads within this project all deserve to be maintained, and that none deserved to be closed or gated. CSERC asks that the district look carefully to determine which road segments, if any, truly need to be kept open for essential reasons, and which segments may be appropriate for closing or gating in order to reduce the road maintenance demand on the Forest and to reduce ecological impacts from unnecessary roads.

Response: Stanislaus National Forest - Travel Management DEIS has identified actions on roads within this project area. Until the responsible official chooses an alternative concerning Travel Management, no further proposed actions will be undertaken or considered.

Source: John Buckley, Central Sierra Environmental Resource Center, October 19th, 2008

Comment: Since this project is supposedly aiming to maintain and enhance ecosystem values such as meadows, streams, mature forest characteristics, and connectivity, it would seem as part of this overall project, that seeps, springs, fens, and other key water resources be evaluated, located, mapped, and appropriately protected if they lie within the project boundaries. Since there are relatively few projects that will potentially provide the opportunity for such field surveys and actions to protect such high value water resources, we ask that to the extent feasible, those surveys, and water resources protection measures be considered and planned for this project.

Response: The streams, seeps, springs, and fens were surveyed as part of this project. The few locations where degraded hydrologic or watershed conditions were found are proposed for treatment. Several additional areas were identified for watershed restoration treatment as a response to this comment.

Source: Robert L. Gundy, private citizen, October 16th, 2008

Comment: I am all for the Soldier Creek Healthy Forest Restoration Project. I hope this project expands to other areas in our forest. I love our forest but since it doesn't have the natural burns that in the past cleared vegetation overgrowth, it is now subject to wildfires, man or nature caused. Also, I think after thinning as has been done alongside Highway 120 it makes a firebreak and looks better too. I only wish some private property would be cleared too. Property such as the hill side owned by NACO camp grounds across from the private homes on the north side of Hardin Flat Road. This is a fire waiting to happen.

Response: The Forest Service does not have jurisdiction over private land and cannot include it in our projects.

Source: Susan Britting, Sierra Forest Legacy/Plumas Forest Project/Sierra Club, November 13, 2008

Comment: The Soldier Creek project proposes logging of trees up to 30" diameter in the name of fuels reduction and forest health. However, as described in more detail in these comments, the best available evidence indicates that such intensive logging is unnecessary to achieve legitimate fuels reduction goals and will adversely affect habitat for sensitive and imperiled species such as the California Spotted Owl and American Marten. Therefore, the Forest Legacy urges the Forest Service to consider and adopt an alternative, consistent with the 2001 Framework, that would generally limit logging (outside of defense zones) to trees 20" diameter and smaller and maintain canopy cover at 50 percent.
The Forest Legacy objects to the project to the extent that it deviates from the standards and guidelines contained in the 2001 Record of Decision for the Sierra Nevada Forest Plan Amendment ("2001 ROD") and implement the 2004 Record of Decision for the Sierra Nevada Forest Plan Amendment ("2004 ROD").

The Sierra Forest Legacy/Plumas Forest Project/Sierra Club letter also detail numerous pages of objections, concerns, comments, and requests sometimes unrelated to the project and sometimes referring to projects that are located on other National Forests or Forest Plans from other National Forests. We have determined that a majority of those comments relate to the use of the Sierra Nevada Forest Plan Amendment 2004 as standards and guidelines for the Soldier Creek Healthy Forest Restoration Project.

Response: In response to the above comments, Alternative 2 was developed which addresses Sierra Forest Legacy/Plumas Forest Project/Sierra Club concerns pertaining to sensitive wildlife species, late seral stands, and other planning issues. Please see the environmental consequences sections of the Soldier Creek HFR environmental assessment.

Source: Susan Britting, Sierra Forest Legacy/Plumas Forest Project/Sierra Club, November 13, 2008

Comment: The Forest Legacy strongly opposes the HFRA ~ 218 Objection process that you intend to follow in the Soldier Creek Project. We request you grant the normal regional appeal review of your NEPA documents.

Response: The Healthy Forest Restoration Act (HFRA) of 2003 (H.R. 1904) provides funding for research and use of renewable, green biomass energy, funding for the restoration and protection of watersheds and water quality, and the establishment of a Healthy Forests Reserve Program to promote the recovery of threatened and endangered species, improved biodiversity, and carbon sequestration as well as modifying some aspects of the National Environmental Policy Act Process under special circumstances to facilitate fuels reduction in areas that are at high risk for a devastating wildfire. Using the authority of the HFRA requires the Forest Service to increase its interaction with the public during the planning process of a HFRA project. The Soldier Creek Healthy Forests Restoration project fits all the criteria and regulations to be administered under the above stated act of Congress.

Source: Susan Britting, Sierra Forest Legacy/Plumas Forest Project/Sierra Club, November 13, 2008

Comment: The Forest Service should identify the acreage and type of logging by land allocation, including (where applicable) old forest emphasis area, threat zone of the wildland urban intermix (WUI), defense zone of WUI, defense zone of WUI, protected activity centers (PACs), and owl home range core areas (HRCA) and forest carnivore network.

Response: The requested information is included in the relevant specialist reports.

Source: Susan Britting, Sierra Forest Legacy/Plumas Forest Project/Sierra Club, November 13, 2008

Comment: The Forest Service should disclose the amount of planned road construction and reconstruction and analyze impacts on habitat fragmentation and connectivity, weed invasion, increased predation and poaching. The environmental impacts of temporary road construction and restoration (disturbance) should be fully analyzed.

Response: The requested information and analysis is contained in the environmental assessment and specialist reports.

Source: Susan Britting, Sierra Forest Legacy/Plumas Forest Project/Sierra Club, November 13, 2008

Comment: If the project is adjusting the boundaries of the WUI compared to the boundaries assumed in the 2004 ROD, the Forest Service should explain the basis for the change and analyze the environmental impact.

Response: The Soldier Creek HFR project or planning process does not adjust the WUI boundaries.

Source: Susan Britting, Sierra Forest Legacy/Plumas Forest Project/Sierra Club, November 13, 2008

Comment: The Forest Service should identify and analyze proposed hazard tree removal and the site-specific rationale for such logging. The Forest Service should analyze the impacts of such logging on soils, wildlife, and other environmental values. Hazard trees should be felled and left in place when necessary to meet wildlife needs or forest plan standards.

Response: The above information is contained in the environmental assessment as well as relevant specialist reports. Hazard trees are only removed when they are a threat to public safety and under specific guidance for defining hazard trees (USDA, 2003). Hazard trees will be fallen and left in place to meet wildlife needs or forest plan standards when possible. Fuel loading will also be a factor (decided by the district fuels officer) when determining if hazard trees can be fallen and left in place.

Source: Susan Britting, Sierra Forest Legacy/Plumas Forest Project/Sierra Club, November 13, 2008

Comment: To the extent that the Forest Service believe that logging of medium to large trees is necessary to "improve the cost-effectiveness" of the project as stated in the 2004 ROD (p.9), we request that the agency provide an objective definition of "cost effective" and a detailed analysis comparing the cost-effectiveness of a full range of alternatives, including alternatives with a range of lower diameter limits.

Response: Every project and every stand is different concerning the importance of treatment and the ability of the project to compete for appropriated funds against other projects throughout the Forest Service. Please see the Alternatives Considered but Eliminated from Detailed Study section in the EA. The economics of biomass removal (trees <12" in DBH) may improve in the future, with the development of new industries producing wood pellets, wood shavings (for erosion control and animal bedding), and other products. The Forest Service encourages industries that utilize small diameter trees. The Soldier Creek HFR is planned with that intent, to be able to reduce ladder fuels and use that potential fuel loading as a renewable, green product.

Limiting tree removal at 20" DBH eliminates benefits of mechanical thinning including silvicultural release of leave trees in order to obtain late seral characters, release of wildlife important and culturally important black oaks, and the creation of an active fire stand structure that would allow the re-introduction of fire back into our fire dependent landscapes.

Source: Susan Britting, Sierra Forest Legacy/Plumas Forest Project/Sierra Club, November 13, 2008

Comment: The Forest Service should provide estimates of projected flame length, fir resiliency, mortality of dominant and codominant, and probability of initiation of crown fire for each alternative, and disclose the underlying data and rationale. The Forest Service should provide estimates of existing and projected fire condition class for each alterative, together with underlying data and rationale.

Response: This information is provided in the Soldier Creek HFR project fire and fuels report.

Source: Susan Britting, Sierra Forest Legacy/Plumas Forest Project/Sierra Club, November 13, 2008

Comment: The Forest Service should prepare an analysis of impacts on fire hazard based on thinning from below up to a range of diameter limits, beginning with 12 inches in diameter, and increasing by 2 inch increments to the maximum diameter limit allowed by the 2004 ROD.

Response: The Soldier Creek HFR in either action alternative does not propose mechanical thinning of trees greater than 12" DBH for the reduction of fire hazard, changing the fuel loading, or re-arranging the fuel profile. While there are reductions in fuels and fire behavior with the thinning of trees less than 20" in DBH and the removal of ladder fuels reduces the potential for a high severity wildfire, the mechanical thinning is for silvicultural purposes, to increase tree and stand level resistance to disturbance and increase resiliency. This is important in the face of a changing climate and the currently increasing drought conditions (Millar et al. 2007). The proposed treatment effects are well known from reviews of scientific literature as well as extensive professional experience in managing forested ecosystems in terms of potential fire effects as well as silvicultural results. This type of very specific analysis requested is unnecessary in order to understand, model, and predict treatment effects. Additionally Alterative 2, the modified action does not remove trees greater than 12" in DBH. Please see the alternatives considered but eliminated from detail study section in the environmental assessment.

Source: Susan Britting, Sierra Forest Legacy/Plumas Forest Project/Sierra Club, November 13, 2008

Comment: Based on the above research and additional information from the Cone Fire, Raymond, 2004, Agre and Skinner 2005, Alexander 2006, and others, there is little evidence that logging trees as large as 20" dbh or extensive overstory canopy reductions as proposed in the Soldier Creek project, is needed to achieve fire resiliency and positive fire behavior outcomes. The Forest Service should specifically address and response to scientific information and opinion indicating that achieving fuels objectives (flame length, lowered rate of spread, and increased height to live crown) does not require logging trees greater than 20" dbh.

Response: The purpose and need for the Soldier Creek HFR states that the reduction of ladder and surface fuels is a priority for reducing the potential of a high severity wildfire. Mechanical thinning is purposed for the creation of open stand structure to increase tree, stand, and landscape resistance and resiliency to disturbance in the face of climate change as well as increasing resistance to mortality due to lower soil water conditions. Mechanical thinning would also provide opportunities to enhance tree size for a variety of benefits. With mechanical thinning, we are able to clear small, competing conifers from under the drip-line and surrounding black oaks (an important wildlife and cultural species) and other hardwood species including alder. This will release oaks and improve vigor and growth, potentially producing larger acorn crops and protecting/providing nesting and habitat for important wildlife species. The clearing around oaks is not possible to accomplish by prescribed burning alone.

Our purpose and need for the Soldier Creek HFR project also includes the promoting of a durable, active fire stand structure and accelerating the development of large size in the leave trees. Although large trees are often old, studies have found diameter growth increases significantly when high densities of adjacent small stems are removed (Ritchie et al., 2008, Das et al. 2008, Skov et al., 2004, McDowell et al., 2003, and Latham and Tappeiner, 2002). Mechanical thinning units in the Soldier Creek HFR would release larger trees allowing for quicker development and growth, attaining late seral status sooner, an important habitat type for sensitive wildlife species. Silvicultural prescriptions are designed to maximize the potential of forested stand to reach and maintain late seral characters.

Source: Susan Britting, Sierra Forest Legacy/Plumas Forest Project/Sierra Club, November 13, 2008

Comment: The Forest Service should provide analysis of fire and fuels treatment outcomes in terms of how these treatments have affected stand density by thinning, prior to asserting additional need for increased logging to meet separate stand density objectives.

Response: Approximately 10% of the project area would be mechanically thinned in Alternative 1. Approximately 40% of the project area would receive fuels reduction treatments including prescribed fire. The remaining 50% of the project area would have no treatment. Please see the fire and fuels and silviculture reports for goals and effects. The environmental assessment also summarizes the effects.

Source: Susan Britting, Sierra Forest Legacy/Plumas Forest Project/Sierra Club, November 13, 2008

Comment: The Soldier Creek DEIS should disclose the uncertainty surrounding the fuels model outcomes utilizing in the analysis as discussed in the Empire 2005 SCR; The uncertainty around fuel loading fueling characterizations should be fully disclosed and the confidence levels surrounding fuel model outputs which often drive arguments for increasing treatment intensity should be fully discussed. The DEIS should also fully explain the various focuses and bias within each fuel modeling strategy in plain language the public can understand.

Response: We are unaware of the Empire 2005 SCR. The fire and fuels report discussed fuels modeling parameters and confidence levels. The Soldier Creek HFR environmental assessment or fire and fuels report does suggest or recommend increased treatment intensities due to fuels modeling results.

Source: Susan Britting, Sierra Forest Legacy/Plumas Forest Project/Sierra Club, November 13, 2008

Comment: The Forest Service should prepare a cumulative watershed effects analysis that discloses the threshold of concern for the affected watersheds, the level of disturbance contributed by the proposed action and proposed mitigation measures when project activities would cause the watershed to approach or exceed the threshold for concern.
The Forest Service should assess road conditions for the project area, identify maintenance and restoration needs for stream crossings, and identify maintenance and decommissioning of specific roads.

Response: The above requested information is detailed in the hydrology report and summarized in the environmental assessment. The transportation planner completed road surveys for the entire project area and identified any necessary or potential need for maintenance and restoration. The hydrologist also conducted separate surveys on any road segments that interact with any ephemeral, intermittent, or perennial streams. Both action alternatives identify 1.5 miles of road restoration work to reduce detrimental sediment input into streams. The reduction of sedimentation is identified in our purpose and need for the project. The restoration and enhancement of watershed conditions is a high priority for district resource staff.

Source: Susan Britting, Sierra Forest Legacy/Plumas Forest Project/Sierra Club, November 13, 2008

Comment: The Soldier Creek DEIS should fully consider impacts of logging and other management activities on critical fire-related ecological functions of riparian areas in the project area (see Dwire and Kauffman, 2003).

Response: The Soldier Creek HFR environmental assessment as well as the hydrology report considers the impacts of management activities on riparian areas, including the ecological and hydrological function of these areas. Management requirements and proposed treatments are designed to protect riparian functions while allowing fuels reduction and silvicultural treatments. The Soldier Creek HFR project meets or exceeds relevant standards and guidelines.

Source: Susan Britting, Sierra Forest Legacy/Plumas Forest Project/Sierra Club, November 13, 2008

Comment: First, the environmental impact statement and/or environmental assessment for this Project should analyze in detail a full range of reasonable alternatives, including alternatives involving less intensive logging then currently proposed. See Sierra Nevada Forest Protection Campaign v. Tippin 2006 WL 2583036 (E.D. Cal. 2006). In particular, the Forest Service should analyze an alternative that implements the 2001 ROD. Such an alternative is necessary to allow the public and the decision maker to compare directly the environmental impact of implementing the 2004 ROD and the consequences of implementing the 2001 ROD.

Response: A full range of alternatives was analyzed for this project. The Soldier Creek HFR project includes an alternative, which implements the 2001 ROD, Alternative 2. The environmental assessment details 5 separate alternatives that were considered but eliminated from detailed study.

Source: Susan Britting, Sierra Forest Legacy/Plumas Forest Project/Sierra Club, November 13, 2008

Comment: Second, the Forest Service must also make an independent finding in the biological evaluation with respect to the project's impacts on sensitive species such as the California spotted owl, northern goshawk, Pacific fisher, and American marten. The 2004 ROD and FSEIS did not analyze site-specific impacts and did not fully consider cumulative impacts.

Response: We have made an independent finding concerning sensitive species in the project level biological assessments and evaluations.

Source: Susan Britting, Sierra Forest Legacy/Plumas Forest Project/Sierra Club, November 13, 2008

Comment: Third, because the Forest Service made numerous assumptions in modeling the 2004 ROD in the FSEIS that were not incorporated into the plan's standard and guidelines (SNFPC 2004, pp 110-113), the Forest Service should disclose the extent to which the Project is consistent or inconsistent with the 2004 ROD as modeled in the FSEIS. For example, the environmental assessment should disclose whether any sugar pine will be removed in SPLATS or fuel breaks; whether any trees larger than 24 inches in diameter will be removed from HRCAs, old forest emphasis areas, or the defense zone; and whether 50 percent canopy cover will be retained within old forest emphasis areas. (SNFPC 2004, p. 111-112). To the extent that the project is not consistent with the 2004 ROD as modeled in the FSEIS, the environmental assessment must carefully analyze the differences, including cumulative impacts.

Response: The Soldier Creek HFR is consistent with the 2004 Sierra Nevada Forest Plan Amendment, ROD, FSEIS, and the Stanislaus National Forest – Forest Plan Direction, 2005. There are six fuel break units proposed in the action alternatives. Sugar pines that show no obvious signs of infection by white pine blister rust are the highest priority to be leave trees. Sugar pines are important part of the biodiversity as well as the beauty of our mixed conifer forests. Healthy sugar pines will be maintained to the greatest extent possible. It is likely that some sugar pines will be removed; trees that are suppressed, diseased, or disproportionately increase fire hazards or safety for firefighters will be

removed. There is no proposed mechanical thinning of trees greater than 12" DBH in fuel break units except when necessary for public and/or firefighter safety, hazard trees, and danger trees.

Alternative 1 would removed trees greater than 24 inches from HRCAs and WUI- Defense zones as described in the assessment. Alternative 1 and Alternative 2 maintain 50% canopy cover in all HRCAs and are consistent with all regulatory guidelines. The environmental assessment and specialist's reports analyze all pertinent effects including cumulative impacts of all alternatives.

Source: Susan Britting, Sierra Forest Legacy/Plumas Forest Project/Sierra Club, November 13, 2008

Comment: Fourth, the Forest Service should disclose other important Standards and Guidelines contained in the specific Land and Resource Management Plan that are not identified in the 2004 ROD. An explanation of forest plan consistency should be provided with each site-specific analysis.

Response: The Soldier Creek HFR is consistent with the Stanislaus National Forest - Forest Plan Direction and other relevant Forest Service guidance.

Source: Susan Britting, Sierra Forest Legacy/Plumas Forest Project/Sierra Club, November 13, 2008

Comment: Finally, with respect to all of the foregoing issues, the Forest Service should analyze the cumulative impacts of the project together with "other past, present, and reasonable foreseeable future actions." 40 CFR 1508.7 In addition to considering logging on public lands, it is essential that the analysis also address logging on private timberlands, particularly within checkerboard areas where private lands are intensively intermingled with Forest Service lands (SNFPC et al. 2004 pp.95-98). This analysis should include the environmental impacts of maintaining any proposed SPLATS or fuel breaks which are reasonably foreseeable future actions.

Response: The hydrology report as well as the other specialist reports (summarized in the environmental assessment) are consistent and analyze the cumulative impacts of the project with "other past, present, and reasonable foreseeable future actions." Watersheds within which the Soldier Creek HFR is located contain only small amounts of private timberland. Information concerning past (10 years previous, the extent of the documentation available) and future timber harvests on these lands were requested from Cal Fire for Tuolumne and Mariposa Counties. Less than 100 acres of these watersheds have been harvested (the watershed areas total 17,300 acres). No timber harvesting plans for these watersheds have been submitted for future timber harvest. None of these lands are managed intensively in a "checkerboard" manner. The past, present, and reasonably foreseeable future timber harvest on private lands were incorporated in the cumulative watershed effects analyzed in the hydrology report. Six proposed fuel break units are included in both action alternatives and have been included in the scoping as well as the environmental assessment. These fuel break units have been included in all analysis.

Source: Susan Britting, Sierra Forest Legacy/Plumas Forest Project/Sierra Club, November 13, 2008

Comment: The Forest Service should fully disclose the foundation for their restoration vision in addressing targets for desired conditions in forest management projects (Heald 2006a, 2006b, North, in press (2006)). Historic vegetation condition documentation should be fully disclosed and be based upon on the current best science and should be species-specific and addressed (modeled) after fire treatments. Forest Health concerns should include a spatial analysis of forest wide disease and pest conditions and should be fully consider the ecological role of insect and fungal diseases in terms of

normal and necessary ecological processes in a healthy forest. Any definition of a healthy forest must include a healthy population of representative old growth species and habitats.

Response: The Soldier Creek HFR project does not propose to restore stand conditions to historic, pre-fire suppression conditions. Returning to a pre-European condition, a "back to the future" approach is unlikely to be feasible because of predicted climate change conditions in the Sierra Nevada and Native American ignitions have changed (Millar et al., 2007; Hurteau and North, 2009).

Source: Susan Britting, Sierra Forest Legacy/Plumas Forest Project/Sierra Club, November 13, 2008

Comment: The Region 5 Soil Quality (FSH 2509.18,2[1]), the service-wide soil management handbook (FHS 2905.18-91-1), and the Plumas National Forest LMP provide the regulatory framework that governs soil management in this project. This framework establishes soil properties, conditions, and associated threshold values that are used to avoid detrimental soil disturbance. These soil impacts assessment criteria have a high level of rigor associated with the soil monitoring analysis due to irretrievable nature of forest soil loss.
The Soldier Creek project DEIS should fully disclose forest plan level soil monitoring results. The DEIS should also disclose soil compaction, soil cover, and large woody debris historic levels and whether existing forest plan violations exist in the Soldier Creek project area. Proceeding from the existing conditions analysis the DEIS should explain in detail how the project will exacerbate or alleviate those conditions. Soil impact mitigation success rates should be fully disclosed based on site-specific conditions in the project area. Soil assessment procedures should be fully disclosed and follow proper protocols and professional standards.

Response: The Plumas National Forest LMP is not one of the documents that provides regulatory framework governing soil management on this project. The Stanislaus National Forest Land and Resource Management Plan is an additional document that provides regulatory framework. The requested information is included in the Soldier Creek HFR project soils evaluation. The soil impact mitigation success rate is determined by the scientific literature, the order III soil mapping, and professional experience and is detail in the soils evaluation as well as the detailed soil assessment procedures. The surveys and analysis were performed to professional standards by a certified professional soil scientist, APSS/APSC.

Source: Susan Britting, Sierra Forest Legacy/Plumas Forest Project/Sierra Club, November 13, 2008

Comment: The project should avoid negative impacts to Forest Service sensitive and watch list plant species. The EA should address how disturbance in the project area will be mitigated to prevent the proliferation of the noxious weeds. The opening of canopy cover and prescribed burning have the potential to accelerate the spread of weeds if ignored. Weed abatement should be included as part of the project purpose and need. Surveys and environmental impact analysis for botanical resources should be conducted for the project area.

Response: All of the above requested information is included in the biological evaluation for sensitive plants and the noxious weed risk assessment. Management requirements are included within the project to protect sensitive plant sites as well as reduce the spread of noxious weeds as well as potentially reduce the extent of noxious weed populations within the project area. The project is designed for the reduction of fuels, enhancement of silvicultural resources, maintain, and enhance important wildlife habitat, and improvement of watershed conditions as stated in the purpose and need. The Soldier Creek HFR project is not a weed abatement project and thus weed abatement is not

stated in the purpose and need. Surveys were conducted for botanical resources and weed populations over a period of 1 to 2 years and have been conducted to project and forest plan standards.

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Appendix E - Response to Oral Comments from Public Meeting

Oral comments received during the Public Meeting held on December 3rd, 2008 at 6 pm at the Groveland District Office were documented by several Forest Service employees in attendance. The comments were subsequently compiled, categorized, and are responded to below.

PUBLIC USE RELATED COMMENTS

Comment: Concerned were expressed about existing erosion problems on 1S69 near the intersection of Harden Flat Road.

Response: Forest Service road 1S69 is identified to be used as a fuel break, the treatments are designed to be more resistant to wildfire events and provide strategic areas for potential wildfire suppression activities. We will repair erosion on 1S69 when equipment is in the area to accomplish the fuels reduction treatments.

Comment: We do not want to see 1S70 open to public traffic but would like to see it used as a fuel break.

Response: Forest Service road 1S70 is overgrown. It has not been used for years and will be blocked after fuels reduction treatments to prevent use. These requirements are stated in the environmental assessment (p. 23).

Comment: The timing, season of the year, and hours of the day during which work may be done may negatively affect the Bed and Breakfast business.

Response: As stated in the environmental assessment on page 23, "the Sunset Inn should be notified prior to starting of operations within ¼ mile of their respective area. All operations adjacent (within a ¼ mile) of each respective area will be conducted on weekdays and non-holidays between the hours 7:00am to 7:00pm."

Comment: Prefer to see more hand treatments instead of machine treatment of fuels near the Sunset Inn property.

Response: The Groveland Ranger District will work with the private landowners to accomplish fuels reduction goals and protect areas from a high severity wildfire in a manner that does not diminish visual or recreational values over time.

Comment: Areas that are treated should be kept open for firewood cutting; concerns were expressed about multi-year closure of mechanical thinning areas for firewood cutting.

Response: Alternative 1 proposed the use of mechanical thinning on approximately 500 acres of the 5,500 acres included within the project boundary. During the mechanical thinning operations, firewood cutting would be restricted on 10% of total project area. The mechanical thinning operations would be ongoing for a limited period of weeks to several months. After the cessation of operations, the mechanical thinning units would be re-opened to firewood cutting. The potential for additional firewood opportunities will exist in the form of cull log decks as well as processed top piles left in landings or adjacent to roads for firewood opportunities. Alterative 1 also proposes areas for treatment by hand thinning. Along roadways, larger diameter material would be cut and stacked to allow for public retrieval, providing increased opportunities for firewood gathering.

Alternative 2 does not restrict the cutting of firewood. As in Alternative 1, Alternative 2 proposes areas for treatment by hand thinning. Along roadways, larger diameter material would be cut and stacked to allow for public retrieval, providing increased opportunities for firewood gathering.

Comment: There should be opportunities for volunteers to conduct fuels reduction work as well as other projects beneficial to resources.

Response: The Groveland Ranger District has a robust volunteer program. In 2008, staff on the district coordinated 15 volunteer days including the construction of fence, planting of willows for watershed restoration, and the thinning of conifers from meadows. The District is happy to coordinate with the public to increase public involvement in the stewardship of our national forests.

GENERAL TREATMENT RELATED COMMENTS

Comment: Concern was expressed whether the proposed actions would have funding and the extent that would be accomplished by the District. It was suggested that it would be difficult to fund all or part of treatments with appropriated dollars.

Response: Some appropriated dollars are available for funding the proposed fuels reduction treatments. Mechanical thinning and road actions associated with the mechanical thinning would be accomplished with a timber sale contract. All revenue generated by the timber sale contract would be used to fund road restoration or additional fuels reduction treatments. It is often difficult to predict year to year allocated funding for projects, additional funds are often available at certain times and the Groveland Ranger District would like to be positioned to use additional funds for the accomplishment of fuels reduction and/or watershed restoration goals. Funding could also be available in the form of grants. In the past few years, several projects have been funded through outside grants. This has included funding of the Hells Hollow's Fuel Break, Long John's Gully Restoration, and Granite Meadow Restoration.

Comment: The Forest Service should be applauded for not using herbicides in treatment designs.

Response: Thank you, the use of herbicides is not necessary to meet the project objectives.

Comment: The Forest Service should consider the use of herbicides for the suppression of noxious weeds as well as maintenance of fuel breaks.

Response: The use of herbicides is not proposed as part of the Soldier Creek HFR project.

Comment: Concerns were expressed about noxious weeds (i.*e.* yellow star-thistle) spreading along Highway 120.

Response: The spread of noxious weeds will be minimized to the extent possible. Where feasible, areas of noxious weeds will be avoided and potentially excluded from treatment. Mitigations to prevent the spread of noxious weed are included in the environmental assessment as well as the weed risk assessment and mitigation requirements developed by the district botanist.

Comment: In treatment areas, some dense patches should be left for wildlife values, 0.25 to 0.10 acre patches.

Response: In treatment units, it is typical for some areas to be left untreated due to the presence of sensitive plants, noxious weed, and/or cultural resource areas that exclude the use of mechanical equipment, some of these areas would also be protected from prescribed fire due to the sensitivity of the resource. Units typically contain areas where the terrain or environment prevents efficient mechanical treatment. Patches of untreated areas are usually left across the landscape. The Soldier Creek HFR project is proposing to treat approximately half of the project area creating a mosaic of treatments on the landscape. Large, continuous areas are not proposed for treatment in the Soldier Creek HFR.

Comment: Are there any opportunity for biomass? Why is biomass not cost effective here?

Response: Most of the proposed mechanical thinning units contain a prescribed small diameter tree/biomass component. Biomass alone is not cost effective due to the high cost of removal. This is due to the expense and extent of mechanical equipment required to cut, skid, yard, and chip the small trees as well as the cost of hauling the chipped material to a facility where it is utilized. Biomass treatment alone is typically accomplished through service contracts with costs approaching $800 per acre.

Comment: Favor pine or oak as leave trees in treatments over incense cedar and white fir so that cedar and fir do not take over forest.

Response: In all treatment prescriptions, the retention of large size oaks (>12" DBH) is preferred and when possible oaks will be released from competition with surrounding conifers. Silvicultural prescriptions favor the retention of pines (sugar and ponderosa) over incense cedar and white fir, shade tolerant, less fire resistant species that are more prevalent in the understory due to the last 100 years of fire suppression and historical selective logging of pines.

FUELS TREATMENT RELATED COMMENTS

Comment: Concerns were raised about the past quality of mastication treatments due to a negative visual quality, difficulty of potential fire suppression, and potential insufficient reduction of fire intensity. Concerns were expressed specifically about the height and structure of masticated manzanita staubs and the resultant safety hazard of the splintered staubs to the public, fire crews, and wildlife.

Response: In the past several years, mastication has been changing on the Groveland District. There have been a significant improvements in the technology associated with the machinery involved in mastication. Mastication heads are more durable and produce smaller piece sizes at a greater rate of production then previously. The contract specifications have also become more rigid. Staub height is required to be less than 6 inches and piece size requirements are more specific. Also along private residential boundaries, visual resource considerations are an important part of our treatment objectives.

As a fuels treatment, mastication changes the fuel profile and characteristics of the fire that will burn through a masticated area such as reductions in flame height and rate of fire spread. Mastication itself does not reduce fuel loading because fuels are not removed from the site, only rearranged. Prescribed burning of masticated fuels will reduce fuel loading; prescribed burning is often paired with mastication. Although in certain cases masticated areas pose difficulties in terms of moving and laying hose, fireline production rates are significantly increased (as compared to line construction in tall, thick stands of chaparral) as well as the ability of firefighters to see the landscape, safety zones, escape routes, and the fire they are engaging.

The Groveland District staff has not seen direct injuries to wildlife from masticated manzanita staubs. Masticated areas completed in the last several years, areas around Cherry Lake, Bear Mountain, and adjacent (south) to the District Office do not appear to have characters that would directly injure wildlife.

Comment: Comment that cattle grazing should be part of the treatment plan and incorporated into fuels reduction. Comment attributed success of Granite pine plantations to cattle grazing.

Response: The Curtin Allotment is currently being used for cattle grazing. The Soldier Creek HFR project does not change or address the grazing management of the area. The Soldier Creek HFR does not propose the establishment or maintenance of young pine plantations. The current grazing management is used in the analysis of effects by specialists as well as the being considered in the cumulative effects analysis completed by the district hydrologist. Due to the need for small, site-specific treatments, concentrated grazing for fuels reduction was not considered as an economically efficient treatment due to the specifications needed of specific, significant fuels reduction and the construction of new fencing that would be required.

Comment: The Forest Service should work with private landowners to create continuity with the fuels treatments, connecting Forest Service fuels reduction work with fuels reduction done by private landowners.

Response: The connection of fuels reduction/fuels treatment on private land with fuels reduction on public land is a consideration in our planning process. We hope to continue to work with private landowners to protect our forests and private land from high severity wildfire.

Comment: There is a need for a program and funding of maintenance of fuels treatments, also the use of herbicides should be considered.

Response: Without the re-introduction of fire into fire dependent ecosystems, maintenance of mechanical fuels treatments will require mechanical or hand methods.

Comment: Along Highway 120, wildlife screening should be avoided.

Response: For the protection of public safety and to hopefully reduced wildlife/vehicle encounters at highway speeds, screening will be minimized along Highway 120 to provide motorists with a greater site view and reaction time when encountering wildlife along the Highway 120. Highway 120 is a significant travel way for access to Yosemite National Park.

Appendix F – List of Specialist Reports

List of Specialist Reports

Aquatic Wildlife Biological Assessment

Aquatic Wildlife Biological Evaluation

Carbon Resources and Climate Change Evaluation

Cultural Resources Evaluation

Environmental Justice Analysis

Fire and Fuels Report (including Air Quality Evaluation)

Hydrology Report (including Cumulative Watershed Effects)

Management Indicator Species Report

Migratory Landbird Conservation Report

Noxious Weed Risk Assessment

Recreation Evaluation

Sensitive Plant Biological Evaluation

Silvicultural Evaluation

Soils Evaluation

Terrestrial Wildlife Biological Assessment

Terrestrial Wildlife Biological Evaluation

Transportation Management Report

Visual Resource Evaluation