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Forest Plan Monitoring Report

Fiscal Years (FY) 2006-2010

Plumas National Forest
Plumas, Lassen, Yuba, Butte, and Sierra Counties; California

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INTRODUCTION

The Regional Forester (Region 5) signed the Record of Decision and approved the Plumas National Forest Land and Resource Management Plan (Forest Plan) and Environmental Impact Statement (EIS) on August 26, 1988. In that decision, he also made a commitment to conduct a monitoring and evaluation program. Since that time, the Forest Plan has been modified by major Forest plan amendments, including the 1999 Herger Feinstein Quincy Library Group Forest Recovery Act (HFQLG) Record of Decision (ROD) and the 2004 Sierra Nevada Forest Plan Amendment (SNFPA) ROD. These decisions changed forest management direction and monitoring needs. For some activities and resources, the implementation teams for the HFQLG and SNFPA began monitoring efforts at multi-Forest scales, effectively replacing some of the monitoring efforts envisioned by the 1988 Forest Plan. Reports on HFQLG monitoring are posted at http://www.fs.fed.us/r5/hfqlg/monitoring/. Reports on SNFPA monitoring are posted at http://www.fs.usda.gov/detail/r5/landmanagement/planning/?cid=STELPRDB5349922.

While monitoring of major Forest programs has been ongoing throughout these past decades, formal Forest Plan monitoring reports have been limited. An accomplishment report was published in 1991. In 1997, monitoring and evaluation information was compiled for 1989 through 1996, but a report was not completed. A brief Forest Plan Monitoring Report for Fiscal Year 2005 was completed in September 2006.

MONITORING ACTIVITIES

Wildlife

Aquatic Habitat

Stream Condition Inventories:

4th Water Creek – Data from 2006 through 2010. This stream was monitored over the course of five years as a long term post treatment reach for the Meadow Valley HFQLG Project. Pre-project sampling occurred in 2006 and post-project sampling has been continued during 2007-2010. Data was collected on four key attributes: pool tail fines (%), percent of particles less than 2mm, residual pool depth and percent shade. Data collected between 2007 and 2010 shows that project activities conducted in 2006 have continued to have no negative impacts on stream channel conditions (changes were not statistically significant).

Moonlight Creek – Data from 2005 (pre fire) and 2008 through 2010. This stream was monitored initially for pre-treatment data in 2005 for the Diamond HFQLG Project. However, since the 2007 Moonlight Fire, a stream reach within Moonlight Creek has been used to monitor changes as both a post fire and post salvage stream reach. Post fire data was collected in 2008 and 2009, with post salvage data collected in 2009 and 2010. Again, four key attributes were measured: pool tail fines (%), percent of particles less than 2mm, residual pool depth and percent shade. No significant differences were observed between pre-fire and 2010 data that measured the key attributes of pool tail fines, particles less than 2mm and residual pool depth. Percent shade is still significantly reduced from pre-fire conditions, with some decrease during post fire years which is attributed to falling dead trees post fire. However, observations do show an increase in large woody debris (LWD) into stream channels, again a result of falling dead trees. No adverse effects were observed from tractor salvage operations conducted in 2009-2010.

Springs, Seeps and Other Small Aquatic Habitats:

As part of HFQLG monitoring, these habitats were monitored to see whether they were identified during project planning and whether they were protected during project implementation. Reports from 2006 and 2007 showed that habitats were properly identified and protected in all areas surveyed.

Bird Monitoring

California Spotted Owl Monitoring:

The Forest Plan (1988) directs spotted owl monitoring on page 5-7 to 5-8.

Loss of Spotted Owl Habitat (PACs) - During the period of 2006 to 2010, the Plumas National Forest (Forest) has experienced the loss of 21 PACs as the result of wildfires (20

Moonlight, 1 Rich). Loss of this habitat will not likely be replaced on the landscape for another 80 to 100 years.

Pacific Southwest Research (PSW) Plumas-Lassen Administrative Study – Spotted owl monitoring activities are summarized below for 2006 through 2010.

2006: A total of three Survey Areas (SAs) within the Forest were monitored for spotted owls; SA-2, SA-3, SA-4 (SAs 5 and 7 were not monitored in 2006).

2007: A total of three Survey Areas (SA) within the Forest were monitored for spotted owls; SA-2, SA-3, SA-4 (SAs 5 and 7 were not monitored in 2007). In addition, eight adult owls were radio-tagged within SA-4 (Meadow Valley Project) to estimate home range size and configuration. Approximately 30 locations were recorded for each individual.

2008: A total of three Survey Areas (SAs) within the Forest were monitored for spotted owls; SA-2, SA-3, SA-4 (SAs 5 and 7 were not monitored in 2008). In addition, eight radio-tagged adult owls were monitored between April and September within SA-4 in the Meadow Valley project area to assess habitat selection relative to the recently implemented treatments. The Forest Service also initiated a survey of spotted owl distribution, abundance and habitat associations within the 2007 Moonlight and Antelope Complex wildfire burn areas to examine post fire responses.

2009: A total of three Survey Areas (SAs) within the Forest were monitored for spotted owls; SA-2, SA-3, SA-4 (SAs 5 and 7 were not monitored in 2009). In addition, two owl pairs were monitored in the Empire Project area, and the second and last year of post-fire surveys within and surrounding the Moonlight and Antelope Complex wildfire burn areas were conducted.

2010: A total of three Survey Areas (SAs) within the Forest were monitored for spotted owls; SA-2, SA-3, SA-4 (SAs 5 and 7 were not monitored in 2010). The Empire Project area also was surveyed for a second year.

Northern Goshawk Habitat (PACS)

The Forest Plan (1988) directs goshawk monitoring on page 5-7.

Changes in habitat were noted from 2007 to 2010 as follows.

2007: The Moonlight Fire resulted in the loss of two goshawk Protected Activity Centers (PACs) on the Forest, reducing the total number of PACs on the Forest to 149.

2008: The Rich Fire resulted in the loss of one goshawk Protected Activity Center (PAC) on the Forest, reducing the total number of PACs on the Forest to 148.

2009: Despite the loss of recent goshawk PACs, the trend on the Forest for goshawk is still upward. Since 2004, the Forest has experienced a net gain of 16 PACs (148 PACs on the Forest as of 2009).

Bald Eagle Monitoring

The Forest Plan (1988) directs bald eagle monitoring on page 5-7.

Five eagle territories were monitored on the Forest during the period 2006-2010.

2006 - The Forest had a total of 21 bald eagle territories Forest wide. This number includes all territories that fall within National Forest System lands, although the nest may fall on adjacent private lands, of which there are only 2 such territories (Round Valley and PG&E Poe powerhouse).

Antelope Lake Bald Eagle Monitoring – Mt. Hough Ranger District. The three bald eagle territories at Antelope Lake have been consistently monitored between 2006 and 2010.

Little Grass Valley Reservoir – Feather River Ranger District. The two bald eagle territories at Little Grass Valley Reservoir also were consistently monitored between 2006 and 2010.

2010 – The Forest currently has a total of 24 bald eagle territories Forest wide. The three new territories since 2006 include Ross Meadows, Eagle Point (Lake Davis), and Camp 5 (Lake Davis), all of which occur on the Beckwourth Ranger District.

Peregrine Falcon Monitoring

The Forest Plan (1988) directs peregrine falcon monitoring on page 5-8.

As of 2006, the Forest had a total of 2 known peregrine falcon eyries, located on the Feather River Ranger District and Mt. Hough Ranger District.

In May 2008, a third eyrie was discovered on the Forest. This eyrie is the second on Feather River Ranger District.

No additional peregrine falcon eyries have been found on the Forest since 2008.

Golden Eagle Monitoring

The Forest Plan (1988) directs golden eagle monitoring on page 5-9.

In 2006, the Forest had 9 known golden eagle nesting territories Forest wide.

In 2009, the number of territories grew to 10 with a new discovery on the Mt. Hough Ranger District.

Black-backed Woodpecker Monitoring

The Forest Plan (1988) directs woodpecker monitoring on page 5-9.

Since 2008, black-backed woodpeckers have been monitored under the 2007 Sierra Nevada MIS amendment. Sites are selected at random and are surveyed for presence and absence. On the Plumas NF, the following fire areas have been monitored.

2008 (pilot year) – Moonlight, Boulder Complex and Antelope Complex. Black-backed woodpeckers were observed throughout all three monitoring sites.

2009 – The number of monitoring sites on the Forest increased in 2009. However, unlike the initial 2008 surveys, black-backed woodpeckers were not detected on all sites monitored in 2009. Results for the 2009 include: Horton 2 (present), Antelope Complex (present), Boulder Complex (present), Friend-Darnell (site determined not to be suitable), Moonlight (present), Pigeon (absent), Rich (present), Storrie (present), Stream (absent), Bucks (absent), Lookout (absent), Devil's Gap (absent), and Scotch (present).

2010 – A total of eight sites were monitored on the Plumas in 2010 including: Scotch, Frey, Belden, Rich, Moonlight, Boulder Complex, Antelope Complex, and Stream.

Meso Carnivore Monitoring

Sierra Nevada Red Fox – Carnivore monitoring (track plates, bait stations and hair snares) was undertaken across the Forest during 2006–2010.

Wolverine - Carnivore monitoring (track plates, bait stations and hair snares) was undertaken across the Forest during 2006–2010.

Marten

The Forest Plan (1988) directs marten monitoring on page 5-10.

Carnivore monitoring (track plates, bait stations and hair snares) was undertaken across the Forest from 2006–2010.

Fisher - Carnivore monitoring (track plates, bait stations and hair snares) was undertaken across the Forest during 2006-2010.

Management Indicator Species (MIS)

2006 Forest MIS Report

One of the major efforts related to Forest Plan monitoring during 2006 was the Plumas National Forest Management Indicator Species (MIS) Report, which was completed in June 2006. This document was based on a collaborative effort between Forest and Regional Office (R5) personnel to determine population trends for Plumas National Forest MIS species. The comprehensive document includes all available information on MIS habitat and population.

The following species populations were found to be stable on the Forest: bald eagle, Canada goose, mule deer, prairie falcon, peregrine falcon, Constance's rock cress, Butte County fritillary, Quincy lupine, Stebbins' wild mint, closed throated penstemon, cryptic catchfly, scarlet huckleberry, Cantelow's lewisia, and Feather River stonecrop.

The following species populations were found to be in a downward trend on the Forest: golden eagle and largemouth bass. The downward trend for largemouth bass was specifically due to Northern pike presence in Lake Davis, which were eradicated in September 2007.

The following species were found to be in an upward trend on the Forest: goshawk, California spotted owl, and trout.

2007 Sierra Nevada Forests Management Indicator Species Amendment

Changes to Forest MIS List - The Plumas National Forest Management Indicator Species list was changed when the Sierra Nevada Forests Management Indicator Species Amendment Record of Decision was signed on December 14, 2007.

The purpose of this effort was to improve the effectiveness and efficiency of Forest Plan implementation monitoring by refining current direction to identify MIS species that meet the following criteria:

1. Species are clearly linked to habitats or ecosystem components that are affected by National Forest management activities in the Sierra Nevada.
2. Species are amenable to effective and affordable monitoring of population or habitat status and change.
3. Population changes of the species are linked to the effects of Forest Service management activities in the Sierra Nevada and populations of the species are not actively influenced by management actions from other agencies.
4. Species occur on the ten National Forests or on the Forests where the habitat occurs, where possible.

The Forest MIS list changed substantially with this decision. Many MIS species were dropped, some were added, and only two stayed the same (Table 1). All of the 1988 Forest Plan MIS plant species were dropped. In general, plants were found not to meet the feasibility criteria because population trend and the relation to habitat changes are difficult to determine in a manner that is useful to informing management, due to high annual variation in populations and difficulty to detect on an annual basis. (2007 MIS FEIS p. 85).

Other 1988 Plumas Forest Plan MIS species that were dropped because they did not meet the MIS criteria in the purpose and need are: peregrine falcon (MIS FEIS p. 127), bald eagle (MIS FEIS p. 104), golden eagle (MIS FEIS p. 115), prairie falcon (MIS FEIS p. 129), Canada goose (MIS FEIS p. 112), trout (MIS FEIS pp. 89-93) and largemouth bass (MIS FEIS p. 93). Marten meets the MIS criteria but is not an MIS for the Plumas National Forest because the species has limited distribution on the Forest. Northern goshawk meet the MIS criteria but were dropped because they are a Forest Service Sensitive species and are analyzed and protected under that policy.

Table 1. Plumas Management Indicator Species

Management Indicator Species	Plumas MIS since 2007 Decision	Plumas Forest Plan (1988)	Threatened Endangered	Sensitive	Special Interest	Harvest Species	Special Habitat Needs	Water Quality
aquatic macroinvertebrates	X							X
fox sparrow	X				X			
yellow warbler	X				X			
Pacific tree frog	X				X			
mountain quail	X					X		
blue grouse	X					X		
northern flying squirrel	X				X			
hairy woodpecker	X						X	
black backed woodpecker	X						X	
peregrine falcon		X		X				
bald eagle		X	X					
spotted owl (1988) California spotted owl (2007)	X	X		X	X			
goshawk		X		X				
golden eagle		X						
prairie falcon		X						
Canada goose		X				X		
deer (1988) mule deer (2007)	X	X				X		
marten (1988)		X		X	X			

Table 1. Plumas Management Indicator Species (cont.)

Management Indicator Species	Plumas MIS since 2007 Decision	Plumas Forest Plan (1988)	Threatened Endangered	Sensitive	Special Interest	Harvest Species	Special Habitat Needs	Water Quality
trout		X				X		
largemouth bass		X				X		
Constance's rock cress (*A. constancei*)		X		X				
Butte County fritillary (*F. eastwoodiae*)		X		X				
Quincy lupine (*L. dalesae*)		X		X				
Stebbins' wild mint (*M. stebbinsii*)		X		X				
closed-throated penstemon (*P. personatus*)		X		X				
cryptic catchfly (*S. invisa*)		X			X			
scarlet huckleberry (*V. coccineum*)		X			X			
Cantelow's lewisia (*L. cantelowii*)		X		X				
Feather River stonecrop (*S. albomarginatum*)		X		X				

Several MIS species were added for the Plumas National Forest. These are: aquatic macroinvertebrates (MIS FEIS p. 88), fox sparrow (MIS FEIS pp. 114-115), yellow warbler (MIS FEIS pp. 142-143), Pacific tree frog (MIS FEIS pp. 126-127), mountain quail (MIS FEIS pp. 120-121), blue grouse (MIS FEIS p. 134), northern flying squirrel (MIS FEIS p. 123), hairy woodpecker (MIS FEIS p. 118), and black backed woodpecker (MIS FEIS p. 107).

Only two Forest MIS species remain from the 1988 Forest Plan. These are the California spotted owl (MIS FEIS pp. 135-136) and mule deer (MIS FEIS pp. 121-122).

Changes to Forest Plan Monitoring for MIS – Forest Plan monitoring for MIS populations (Plumas Forest Plan pp. 5-6 to 5-10) has been superseded by Sierra Nevada MIS monitoring. Monitoring activities are specified in the April 2008 Sierra Nevada Forests (SNF) Management Indicator Species (MIS) Monitoring Implementation Guide. Some of the sample locations are part of the ongoing PSW Plumas-Lassen Administrative Study. Other bioregional monitoring sample locations are being used, as well. These include Forest Inventory and Analysis vegetation plots, California Partners in Flight monitoring sites, California Department of Fish and Game surveys, Sierra Nevada Amphibian Monitoring Program, and Monitoring Avian Productivity and Survivorship monitoring sites.

Watershed

Best Management Practices

The Forest Plan (1988) directs best management practice monitoring on page 5-15.

Monitoring of best management practices (BMPs) occurred each year between 2006 and 2010. Forest reports were written for 2007, 2008, and 2009. Overall, the implementation of BMPs has improved. In cases where BMPs were not effective, it was usually due to old roads in poor locations or problems with the original design.

The 2007 monitoring found that of the 76 implementation evaluations conducted on the Forest, 62 (82%) indicated that BMPs associated with forest activities were adequately implemented. Fourteen (18%) indicated a level of departure below the threshold for implementation. Of those fourteen, 7 evaluations indicated that BMPs associated with the activity were not effective; the remaining 7 were found to be effective despite deficiencies in implementation. Therefore, 7 of the 76 evaluations (9%) were classified as “not implemented and not effective.”

For effectiveness, the 2007 monitoring found that of the 76 effectiveness evaluations conducted on the Plumas, 63 (83%) indicated that BMPs associated with forest activities were adequately effective. In addition to the 7 evaluations mentioned in the paragraph above that were determined to be “not implemented and not effective,” 6 evaluations did not meet the threshold for effectiveness despite the fact that implementation scores were satisfactory.

The 2008 monitoring found that of the 101 evaluations conducted on the Forest, 95% (96 evaluations) rated a "pass" for BMP implementation and 78% (79 evaluations) rated a "pass" for BMP effectiveness. Only 2 of the implementation evaluations (less than 2%) rated as "fail," with 3 others rated "at-risk." For BMP effectiveness, 11% of the evaluations rated as "fail" and 11% rated as "at-risk." Most of the evaluations that rated "fail" for effectiveness (7 of 11) were associated with road surfaces, crossings, or slope protection. Two of the 3 evaluations performed for Range management were rated as "fail" for effectiveness. Four of the five evaluations that rated as "fail" or "at-risk" for implementation also rated as "fail" or "at-risk" for effectiveness, suggesting a strong correlation between effectiveness shortcomings at sites in which the BMPs were not adequately implemented. Of the 11 effectiveness evaluations that rated as "fail," 8 of those sites rated a "pass" for BMP implementation. Six of those evaluations were for road surface and stream crossing protection, suggesting that adequate BMP implementation may not prevent adverse water quality impacts at road sites that are impacted by legacy (pre-existing) factors such as poor road design or location.

The 2009 monitoring found that of the 81 evaluations conducted on the Forest, only 3 rated a "fail" for BMP implementation, resulting in a BMP implementation rate of 96.3%. Seven evaluations rated a "fail" for BMP effectiveness, resulting in a BMP effectiveness rate of 91.4%. Most of the evaluations that rated "fail" for effectiveness (5 of 7) were associated with current system roads or recreation sites. These BMP effectiveness deficiencies were generally due to legacy effects associated with the original design or location of the road or recreation site. The other two "fail" evaluations were for one road decommissioning evaluation (however, the other 19 road decommissioning evaluations were rated "pass" for BMP effectiveness) and for one mining operation evaluation.

Only 3 of the evaluations were rated "at-risk" for BMP implementation. Seven of the evaluations were rated "at-risk" for BMP effectiveness, with nearly all of those ratings (6 out of 7) again due to legacy effects associated with the original design or location of Forest roads. All three of the evaluations that rated "fail" for implementation also rated "fail" for effectiveness, suggesting a strong correlation between effectiveness shortcomings at sites in which the BMPs were not adequately implemented. Overall, 81% of the 2009 evaluations (66 out of 81 evaluations) rated as "pass" for both implementation and effectiveness.

For the 51 evaluations of BMPs typically associated with timber and fuel management activities (T01, T02, T04, E08, E09, E11, and F25) in 2009, the implementation rate is 98% and the effectiveness rate is 96%. Over the past 3 monitoring seasons, 186 evaluations of BMPs (including E12) were performed for timber and fuel management activities (Table A-4). BMPs were rated as effective for over 88% of those evaluations. Again, most of the evaluations which rated ineffective were due to legacy effects associated with road drainage systems and stream crossings. Without the 67 BMP evaluations performed for roads from 2007-2009, the BMP effectiveness rate was 95%.

Soils

Soil monitoring between 2006 and 2010 was done through the Herger-Feinstein Quincy Library Group (HFQLG) Pilot Project Implementation Monitoring program. It did not use the monitoring activities or standards and guidelines in the Plumas Forest Plan (1988). However, the HFQLG (Forest Plan Amendment) methods and standards are often used in the Forest Service, especially on Forests with Forest Plans that came after the Plumas 1988 Forest Plan.

The Forest Plan (1988) directs soil monitoring on page 5-16. Monitoring activities include checking soil compaction, soil loss and timber site class changes. Monitoring for soil compaction in the Forest Plan uses a threshold of 10% decrease in total soil porosity of the surface soil over natural conditions on a minimum of 80% of an activity area. The standard in the Forest Plan for soil compaction is to dedicate no more than 15% of timber stands to landings and permanent skid trails. This measurement is along the travel way and does not include the width of cut and fill slopes. The HFQLG monitoring uses the definitions, thresholds and indicators in FSH 2509.18 - SOIL MANAGEMENT HANDBOOK, R5 Supplement No. 2509.18-95-1. The threshold for soil compaction is to limit detrimental soil compaction to no more than 15% of an activity area, excluding the transportation system. The threshold for soil cover is at least 50%. Large woody debris is recommended to be 3 to 5 large logs per acre on a project-by-project basis.

Monitoring results discussed below include data collected on the Lassen and Tahoe National Forests (LNF and TNF), as well as the Plumas National Forest (PNF).

2006 HFQLG Soil Monitoring (LNF, PNF, and TNF)

Monitoring showed that legacy (pre-existing) compaction from earlier projects is common. A significant increase in compaction was found in group selection units that did not receive subsoiling mitigation. The significance of compaction, in regard to long term soil productivity, needs further evaluation. All of the units (including group selections) met the recommended thresholds for soil cover (50%). Evidence or observation of increased soil erosion was minimal. Soil displacement was well within acceptable standards. The percent area with soil disturbance increased compared to pre-treatment monitoring, but appears to be acceptable within the normal range of controlled logging activities. Large woody material decreased from levels observed during pre-treatment monitoring, but met standards and guidelines, which recommend 3 to 5 large logs per acre as determined on a project-by-project basis.

2007 HFQLG Soil Monitoring (LNF, PNF, and TNF)

The review of monitoring data indicates that legacy compaction is commonplace. The mean value for all units was 21%, which is statistically above the 15% threshold. Only the group selection treatment showed a statistically significant increase in soil

compaction. Almost all (97.5%) of the thinning units met the recommended thresholds in the soil quality standards for soil cover of at least 50%. Group selection units did not meet soil cover standards in over half of the units. Evidence or observation of increased soil erosion was minimal. Soil displacement was well within acceptable standards. The percent area with soil disturbance increased compared to pre-treatment monitoring especially in the group selection units, but appears to be acceptable within the normal range of controlled logging activities. Large woody material decreased from levels observed during pre-treatment monitoring. Standards and guidelines for retention of large woody material, which recommend at least 3 to 5 large logs per acre as determined on a project-by-project basis, were met in only 62% of the thinning units and 18% of group selection units.

2008 HFQLG Soil Monitoring (LNF, PNF, and TNF)

The comparison of pre-treatment and post-treatment sampling continue to indicate that the overall trend seems to be that harvest operations can add some compaction to the treated area. The amount of compaction added is influenced by the silvicultural prescription, the location of trees to be removed, the soil type, the soil moisture at time of harvest and the kinds of logging equipment used. This year's data also continues to indicate that the incremental increase of one thinning or group selection treatment does not by itself exceed the standards and guides. The highest increase this year was in the Meadow Valley group selection unit 389 which went from 0% compacted pre-treatment to 13% compacted post-treatment. This is still below the 15% threshold. All eight units monitored met R5 Soil Quality Standards for Effective Soil Cover. Only one unit (Meadow Valley unit 389) failed to meet the 50% standard for fine organic matter with 45% measured. Three of the eight units met the standard of at least three large logs per acre. Six of the units showed an increase in large woody material. The other two stayed the same. The level of soil displacement measured post treatment was low. All eight units had less than 10% displacement, with most units showing only a slight increase post-treatment. Meadow Valley unit 17a went from 20% displacement pre-treatment to 4% post-treatment. The reason for this is not clear.

2009 HFQLG Soil Monitoring (LNF, PNF, and TNF)

The soil cover standard of 50% is a general standard intended to indicate a potential hazard of erosion. The standard was satisfied in 90% of the units monitored.

Soil quality standards generally require detrimental compaction to occupy less than 15% of a unit. Overall, 52% of the units meet this standard post-activity, including 45% of thinning units and 67% of group selection units. However, only 58% of units overall met the standard pre-activity (53% of thinning units and 71% of group selection units). Therefore, most of the detrimental compaction existed pre-activity. More pertinent to current activities, there were 9 units (5 thinning, 4 group, 12%) that met the standard pre-

treatment and exceeded it post-treatment; the rest either exceeded the standard pre-treatment or met the standard post-treatment (or both, which is why the percentages above do not appear to reconcile; this is one of the apparent sampling problems already discussed in previous HFQLG soil monitoring reports and addressed).

Although Forest Plan soil quality standards and guidelines do not have a minimum area considered significant, or a permissible extent within units, minimizing soil displacement is a management objective. Soil displacement was compared from pre- to post-treatment. Thinning units average about 5% displacement, with only 2 units (4%) barely exceeding 15%. Group selection units average about 10% displacement, with 6 units (25%) exceeding 15% and 2 units just exceeding 20%. In the group selection pre-data, the high variation is driven by 5 Meadow Valley units with displacement reported in the 30 to 60% range; this would be very unusual for 'normal' timber operations, and indicates a high level of displacement in the group selection units, as is also indicated with the soil cover results, or a possible sampling problem with observer interpretation of what constitutes detrimental displacement (minimum area) or both.

Downed woody debris is described as large logs (at least 10 feet long and 20 inches diameter) in decay classes 1-5. Soil quality standards generally require 3 or more logs per acre to be left on the ground post-treatment to help maintain long-term soil productivity, maintain soil moisture as well as for wildlife habitat. Thinning units as a group met the standard with 4 logs per acre post-activity. More specifically, 30 units (59%) have at least 3 logs per acre, 15 units (29%) have 1 or 2 logs per acre, and 6 units (12%) have no large wood. Group selection units as a group did not meet the standard with 1.2 logs per acre post-activity. More specifically, 4 units (17%) had at least 3 logs per acre, 4 units (17%) had 1 or 2 logs per acre, and 16 units (67%) had no large wood. However, half of the group selection units had no large wood prior to treatment, so conditions were worsened by current activities in only 4 units. Of the 2 mastication units, 1 met the standard both pre- and post-treatment and 1 did not.

2010 HFQLG Soil Monitoring (LNF, PNF, and TNF)

A summary of the status and trend of unit data follows:

1. 85-90% of activity units met soil quality standards for soil displacement and cover retention, both pre- and post-activity.
2. 62% of activity units met soil quality standards for compaction; compaction levels were similar pre-activity, representing persistent legacy impacts from pre-HFQLG activities.
3. 43% of activity units met soil quality standards for large wood retention; HFQLG activities affected this parameter in a considerable number of units (particularly group selection units), as reported previously.

Fuels

Defensible Fuel Profile Zone (DFPZ) Effectiveness Monitoring

As part of the HFQLG monitoring program, several wildfire areas were evaluated to determine the effects of prior fuel treatments on fire behavior and fire suppression. Fire behavior was evaluated in terms of changes in flame lengths and other indicators of severe fire behavior such as spotting compared to non-treated areas. Fire suppression was evaluated in terms of changes in suppression strategy resulting from fuel treatments, including: safer areas for firefighters; anchors for fireline construction; areas from which to initiate burnout operations; or, fuel treatments which modified fire behavior to the extent that the need for suppression action was minimal. A report titled "A Summary of Fuel Treatment Effectiveness in the Herger-Feinstein Quincy Library Group Pilot Project Area" was completed in 2010. It is posted at http://www.fs.fed.us/r5/hfqlg/monitoring/resource_reports/fire_and_smoke/dfpz_effectiveness/HFQLG%20treatment%20effectiveness%20report.pdf

The overall conclusion in the Report was that all treatment areas experienced a documented reduction in fire behavior and fire severity.

Treating stands by thinning and reducing surface fuels increased fire suppression options, modified fire behavior, and reduced final fire size and suppression costs. Treated areas also experienced the least vegetation mortality—resulting in improved ecological conditions—and retained green forests after wildfire.

The key findings related to fuel treatment were:

Type of Fuel Treatment

- Thinning and surface fuel treatments reduced fire severity.
- Thinning and prescribed fire treatments, used in combination, modified wildfire behavior more effectively than thinning alone.
- Lopping and scattering—when implemented without any other treatment types—and mastication modified fire behavior. However, due to the resultant high volume of surface fuels and long burn time, tree mortality in these areas was high.
- Trees less than 80 feet from the boundary between treated and untreated areas were likely to suffer high mortality due to radiant heat from high-intensity wildfire in untreated areas.

Fire Behavior and Severity

- Treated areas reduced fire behavior and fire severity.
- Treated areas had the least vegetation mortality and resulted in retaining a green forest after wildfire, maintaining ecological and social benefits of a forest such as wildlife habitat, recreational enjoyment, and numerous other benefits.

- Smoke volume was reduced significantly when fire reached treated areas.
- In severe fire areas, prior fuel treatments increased needle retention in standing trees compared to untreated areas. Residual needle cast later provided ground cover to protect soil.

Fire Suppression

- Treated areas increased fire suppression options by allowing direct suppression by hand crews and dozers.
- Where surface and ladder fuels were sufficiently modified, little suppression action was required and no unacceptable fire effects occurred.
- Areas of fuel treatment enhanced opportunities for safe, low-severity burnout operations and reduced the potential for spotting and torching. Strategically placed fuel treatments slowed fire and allowed suppression forces to focus on high-priority areas located closer to communities and high-value watersheds.
- Strategically placed fuel treatments slowed fire at ridge tops and allowed suppression forces to establish safe anchor points and engage in direct suppression actions.
- When a fire cut off other escape routes, firefighters used a DFPZ for a safe escape route under adverse weather conditions.

Design of Fuel Treatment Areas

- Design of fuel treatment areas is important. To be effective, treatments must be large enough (considering fuel type, stand conditions, expected weather and topography) to modify fire behavior and increase fire suppression capability.
- Width specifications must be sufficient to consider the effects of mid- to long-range spotting outside of treated areas.
- DFPZs have been shown to be adequate to slow low-to-moderate and even high-intensity wildfires, allowing fire suppression resources an opportunity to stop wildfires.
- Large, unbroken blocks of untreated fuels can allow fire to build momentum and increase fire intensity, including long-range spotting over DFPZs. This situation can overwhelm suppression forces. Although the treatment may modify fire behavior, suppression personnel may not be able to take advantage of the treatment.

Table 2 summarizes monitoring findings on the Plumas National Forest wildfire areas.

Table 2. Effects of Fuel Treatments on Plumas National Forest Wildfire Areas

Fire name and size	Wildfire behavior outside treatment area	Type of fuel treatment	Wildfire behavior inside treatment area	Role treatment area played in suppression of wildfire
Stream Fire 3,526 acres 2001	Surface flame lengths 4-12ft., individual and group torching, rapid rates of spread, spotting ¼ to ¾ mile.	Mechanical thin, biomass removal, hand thin/pile, pile burn, underburn.	The treatments reduced flame lengths, fire intensity, and vegetation mortality.	Open stands lowered fire intensity, allowing suppression crews safe access and direct attack. This resulted in smaller final fire size and reduced suppression costs.
Boulder Complex 2,920 acres 2006	Surface flame lengths 4-12ft., individual and group torching, rapid rates of spread, spotting ¼ to ¾ mile.	Mechanical thin, biomass removal, hand thin/pile, pile burn, underburn.	The treatments reduced flame lengths and fire intensity, significantly reduced the rate of spread, and reduced vegetation mortality.	Fuel treatments allowed suppression crews to conduct burnout operations safely and effectively. The reduced rate of spread in previously underburned areas allowed suppression crews to focus on higher priority areas.
Antelope Complex 23,420 acres 2007	Surface flame lengths 4-10ft., individual and group torching, crown fire, rapid rates of spread, spotting up to 1¼ mile.	Mechanical thin, biomass removal, hand thin/pile, pile burn, underburn.	The treatments reduced flame lengths and fire intensity, significantly reduced the rate of spread, and reduced vegetation mortality.	Fuel treatments allowed suppression crews to conduct burnout operations safely and effectively. Spot fires were easily detected and contained. Treated areas reduced fire behavior, providing for safe egress of fire crews during extreme fire behavior. Treatments resulted in smaller final fire size with reduced suppression costs.

Table 2. Effects of Fuel Treatments on Plumas National Forest Wildfire Areas (Cont.)

Fire name and size	Wildfire behavior outside treatment area	Type of fuel treatment	Wildfire behavior inside treatment area	Role treatment area played in suppression of wildfire
Davis Fire 30 acres 2007	Surface flame lengths 2-8ft., individual and group torching, crown fire, rapid rates of spread.	Mechanical thin and mastication.	The treatments reduced flame lengths and rate of spread.	Fuel treatments allowed limited firefighting resources to be effective. Masticated fuels produced low flame lengths and rate of spread. However, due to fuel density, fire intensity and residence time was quite high.

Table 2. Effects of Fuel Treatments on Plumas National Forest Wildfire Areas (Cont.)

Fire name and size	Wildfire behavior outside treatment area	Type of fuel treatment	Wildfire behavior inside treatment area	Role treatment area played in suppression of wildfire
Moonlight Fire 64,997 acres 2007	Surface flame lengths 4-12+ft., individual and group torching, crown fire, rapid rates of spread, long range spotting up to 2 miles.	Mechanical thin, biomass removal, mastication and underburn.	The treatments reduced flame lengths and fire intensity, significantly reduced the rate of spread, and reduced vegetation mortality.	In the earlier stages of the fire, dry conditions, steep topography, large areas of heavy fuel loadings, and frontal winds contributed to intense, plume-dominated fire behavior with long-range spotting. The fire spotted over treatment areas that were being used in suppression efforts. Due to very extreme fire behavior outside of the treatment unit igniting untreated fuels on the other side of treatments, these treated areas became unusable for suppression resources. However, many of the fuel treatments were effective in slowing fire progression. These treatments aided firefighters in controlling fire growth in those sections of the fire. According to firefighters utilizing these treatments in suppression efforts, the fire dropped from an intense fire, with group torching and short crown runs, to a surface fire. This fire transition allowed direct attack using bulldozers in some of these treatment areas.

Table 2. Effects of Fuel Treatments on Plumas National Forest Wildfire Areas (Cont.)

Fire name and size	Wildfire behavior outside treatment area	Type of fuel treatment	Wildfire behavior inside treatment area	Role treatment area played in suppression of wildfire
Franks Fire 2.1 acres 2007	N/A (100% of fire was within treatment area.)	Mechanical thin, biomass removal, mastication.	The treatments resulted in low flame lengths and slow rate of spread.	The reduced flame length and rate of spread allowed initial attack fire fighting resources to work close to the flame front and create a direct line and contain the fire at 2.1 acres.
Irish Fire 1.2 acres 2007	N/A (100% of fire was within treatment area.)	Mechanical thin, biomass removal, mastication.	The treatments resulted in low flame lengths and slow rate of spread.	The reduced flame length and rate of spread allowed initial attack firefighting resources to work close to the flame front and create a direct line and contain the fire at 1.2 acres.
Rich Fire 6,112 acres 2008	Surface flame lengths 4-12ft., individual and group torching, rapid rates of spread.	Mechanical thin, biomass removal, pile, pile burn, underburn.	The treatments reduced flame lengths, fire intensity, rate of spread, vegetation mortality, and smoke production.	Fuel treatments allowed effective application of aerial retardant. Reduced rate of spread allowed suppression crews to focus on higher priority areas that were threatening watersheds and communities. This resulted in smaller final fire size with reduced suppression costs.
Silver Fire 45 acres 2009	Surface flame lengths 4-6ft., individual and group torching, rapid rates of spread.	Hand thin, pile, pile burn.	The treatments reduced flame lengths and fire intensity, significantly reduced the rate of spread, and reduced vegetation mortality.	This treatment caused fire to drop to the ground and allowed firefighters the ability to stop the head of the running fire. Firefighters were also able to use this treatment to stop the progression of the fire to the east toward the community of Meadow Valley.

Table 2. Effects of Fuel Treatments on Plumas National Forest Wildfire Areas (Cont.)

Fire name and size	Wildfire behavior outside treatment area	Type of fuel treatment	Wildfire behavior inside treatment area	Role treatment area played in suppression of wildfire
Milford Grade Fire 226 acres 2009	Surface flame lengths 4-6ft., individual and group torching, rapid rates of spread.	Mechanical thin, pile, pile burn and underburn.	The treatments reduced flame lengths and fire intensity, significantly reduced the rate of spread, and reduced vegetation mortality.	The treatment areas provided a safe anchor point for crews to initiate line construction. The low surface fuel loading allowed for increased line production rates due to low fire line intensities and flame lengths—allowing for direct attack suppression tactics. In addition, the DFPZ demonstrated the ability to reduce overall fire severity.
Friend-Darnell Fire 3,879 acres 2008	Surface flame lengths 4-12ft., individual and group torching.	Hand thin/pile, pile burn, underburn.	Flame lengths less than 2 feet, low fire intensity, direct attack possible.	The treatment area allowed suppression forces to go direct and halt fire spread. The DFPZ was the last line of defense for adjacent communities.
Ponderosa Fire 6 acres 2009	Surface flame lengths were 4-10 ft and moderate rate of spread.	Hand thin/pile, pile burn and underburn.	Flame lengths less than 1 foot, very low fire intensity.	The treated area provided a safe anchor point and allowed for direct attack on both the flank and head of the fire. Full containment was possible in one operational period.

EVALUATION OF MONITORING RESULTS AND CONCLUSIONS AND RECOMMENDATIONS

Wildlife

Aquatic Habitat

Results: Stream condition inventories did not show adverse impacts to streams or other aquatic habitats.

Conclusion: Timber management activities using the standards and guidelines described in the 2004 Sierra Nevada Forest Plan Amendment Decision, standard operating procedures and best management practices adequately protect aquatic habitat.

Recommendation: Continue to include current standard stream protection measures and best management practices for activities. Continue monitoring as budgets allow.

Birds

Results:

California Spotted Owl

2006: Five single males, 22 confirmed pairs, and one unconfirmed pair were monitored. Three pairs successfully reproduced (13.6%), fledging an average of 1.3 offspring per successful nesting attempt.

2007: Two single males, 28 pairs, and one unconfirmed pair were monitored. Twelve pairs successfully reproduced (42.9%), fledging an average of 1.7 offspring per successful nesting attempt. In addition, eight adult owls were radio tagged within SA-4 (Meadow Valley Project) to estimate home range size and configuration. Approximately 30 locations were recorded for each of the eight individuals.

2008: Four single birds (3 males, 1 female), 22 pairs, and four unconfirmed pairs were monitored. Two pairs successfully reproduced (9.1%), fledging an average of 1.5 offspring per successful nesting attempt. One of the two pairs that successfully reproduced in 2008 involved a spotted owl paired with a sparred owl (spotted-barred hybrid) that produced one hybrid fledgling. Post-fire surveys revealed one confirmed pair within the Moonlight and Antelope complex wildlife boundary and 10 detections of single non-territorial birds. Within the 1-mile unburned buffer surrounding the fire area, 5 confirmed pairs, 1 unconfirmed pair, 1 territorial male single, and 6 single birds (4 males, 2 sex unknown) were detected.

2009: Two single males, 23 pairs, and two unconfirmed pairs were monitored. Seven pairs successfully reproduced (30.4%), fledging an average of 1.3 offspring per successful nesting attempt. Neither of the two pairs monitored in the Empire Project area

attempted reproduction in 2009, and post-fire surveys within and surrounding the Moonlight and Antelope Complex wildfire burn areas revealed one pair within the fire area and eight confirmed pairs (three nests), one unconfirmed pair, and a single male within the 1-mile unburned buffer surrounding the fire area.

2010: One single male, two single females, and 25 confirmed pairs were monitored. Thirteen pairs successfully reproduced (52%), fledging an average of 1.8 offspring per successful nesting attempt. Surveys within the Empire Project area detected five confirmed pairs, and at least two of these pairs attempted reproduction producing 3 offspring.

Northern Goshawk

Although the Moonlight wildfire resulted in the loss of two goshawk PACs, the Forest has experienced a net gain of 16 PACs since 2004 (148 PACs on the Forest as of 2009).

Bald Eagle

Two of three bald eagle territories on the Mt. Hough Ranger District were occupied annually during this 5 year period; however, in 2010, the Antelope Bald Eagle Dam nest site was destroyed during wind storms in April. Two chicks from the nest also were destroyed during the storms. This nest produced 1.25 offspring/year during the prior eight years (2002-09). The “Peninsula” eagle territory at Little Grass Valley Reservoir has been the most active and received the most attention of eagle territories on the Feather River Ranger District. Seasonal closures (June thru August) were implemented on this territory during two of the last five years (2008, 2009). The closure was cancelled in 2010 since the eagle pair occupying the territory did not nest. Three new territories have been documented (all of which occur on the Beckwourth Ranger District) since 2006 including: Ross Meadows, Eagle Point (Lake Davis), and Camp 5 (Lake Davis). The Forest currently has a total of 24 bald eagle territories.

Peregrine Falcon

Forest monitoring revealed a third peregrine falcon eyrie on the Forest in 2008. Two eyries, including the most recently discovered, are located on the Feather River Ranger District with the third on the Mt. Hough Ranger District.

Golden Eagle

Forest monitoring during 2009, revealed an additional golden eagle nesting territory on the Mt Hough Ranger District.

Black-backed Woodpecker

Post-fire monitoring of black-backed woodpeckers was conducted at 12 sites on the Forest during 2008-2010. Surveys revealed black-backed woodpecker presence at seven of these sites (58%). Data is not currently available from 2010 surveys.

Conclusions:

California Spotted Owl

California spotted owls displaced by wildfires are likely in search of nearby habitat suitable for establishing new territories. These movements may impact the spatial configuration of preexisting owl territories and/or the number of owl territories adjacent to burned areas.

Northern Goshawk

Despite the recent loss of goshawk PACs through wildfire, the trend on the Forest for goshawk is still upward.

Bald Eagle

Despite the loss of a productive bald eagle nest site on Mt. Hough Ranger District in 2010, survey and monitoring results indicate the number of eagle territories has increased on the Forest during 2006-2010 (24 total).

Peregrine Falcon

Two previously documented peregrine falcon eyries appeared to be consistently used, and one previously unknown eyrie location was discovered in 2008 and monitored through 2010.

Golden Eagle

Discovery of a new golden eagle territory on Mt. Hough Ranger District increased the number of known nesting territories on the Forest from 9 to 10.

Black-backed Woodpecker

Black-backed woodpeckers were present within many (58%, Total=12) recently burned areas of the Forest.

Recommendations:

California Spotted Owl

Continuation of spotted owl reproductive monitoring coupled with surveys in recently burned areas is critical for demographic and population trend monitoring as well as monitoring changes in the spatial distribution of owls across the Forest. The completion of the Meadow Valley Project in 2007-2008 marked the first landscape series of HFQLG treatments to be implemented within the Plumas Lassen Administrative Study area. Additional monitoring in these areas will provide the first opportunity to address treatment effects within a case study framework.

Northern Goshawk

The 1988 Forest Plan EIS estimated habitat capacity for 100 pairs, while the Forest Plan (pgs. 4-19) called for providing suitable habitat for a Forest-wide network of 60 goshawk

territories. As of 2009, there were 148 PACs on the Forest, a net gain of 16 PACs since 2004. Maintaining these PACs and reevaluating the number of goshawk PACs the Forest should be managing for is recommended for the future Forest Plan Revision.

Bald Eagle

The number of bald eagle nesting territories on the Forest has increased during the past five years. Continued monitoring of existing nest sites is recommended.

Peregrine Falcon

One additional peregrine falcon eyrie was discovered during 2006-2010 inventory and monitoring (3 total on the Forest). Recommend monitoring activity (presence/absence) at falcon eyries annually.

Golden Eagle

Discovery of a new golden eagle territory on Mt. Hough Ranger District increased the number of known nesting territories on the Forest from 9 to 10. Unless additional funding opportunities arise, no additional monitoring is recommended at this time.

Black-backed Woodpecker

Recommend the use of radio-telemetry to track focal birds throughout the breeding season in burned areas to estimate home range size, describe home range characteristics, and study foraging ecology of the species either at the Forest or Regional level.

Meso Carnivores

Results: Mesocarnivore surveys did not detect Sierra Nevada red fox or wolverines on the Plumas during 2006–2010.

Mesocarnivore surveys indicated marten distribution remained relatively stable over this time period with the population locally isolated to the Lakes Basin area of the Beckwourth Ranger District. During 2006-2010, the only new detection on the Forest was made as part of the Big Hill HFQLG Project in the vicinity of Eureka Ridge (Lakes Basin).

Forest Service conducted surveys did not reveal the presence of fisher on Plumas NF. However, a collaborative effort undertaken by North Carolina State University, Sierra Pacific Industries, California Department of Fish & Game, and the U.S. Fish & Wildlife Service on SPI's Stirling Tract in Butte County released 28 fishers on private lands adjacent to the Forest starting in December 2009. Translocated fishers have subsequently been tracked making short duration visits onto the Forest. In a recent meeting with the principal investigator on this project, Aaron Facka (March 28, 2011), tracking data was presented showing male fishers moving onto the Plumas NF shortly after being released, and then returning to SPI lands.

Conclusion: The current distribution of marten on the Forest is consistent with prior descriptions of their range. The introduction of 28 fishers on private lands in Butte County has resulted in reintroduced fishers making forays onto the Forest. Although released fishers have not permanently dispersed onto National Forest System (NFS) lands, additional releases are planned, and fisher use of the Forest may increase.

Recommendation: Continue to survey for mesocarnivores across the Forest. Increase communication/collaboration with researchers and managers releasing fishers on private lands to track and better understand fisher movements onto the Forest.

Management Indicator Species

Results: The Management Indicator Species (MIS) list changed substantially (discussed on pages 5-9 of the 1988 Forest Plan). Monitoring for MIS is now being done at the Sierra Nevada level with sample locations occurring on the Plumas National Forest. Spotted owl monitoring showed reproduction occurring on the Forest. Black-backed woodpeckers were detected in many fire areas.

Conclusion: Conclusions regarding the new MIS list of species are now made at the Regional level.

Recommendation: Continue to review MIS monitoring data, especially data collected on the Forest.

Watershed Best Management Practices

Results: Implementation of best management practices ranged from 82% (2007) to 96.3% (2009). Effectiveness of best management practices ranged from 78% (2008) to 91.4% (2009).

Conclusion: Implementation of best management practices has improved over time. In cases where best management practices were not effective, it was usually due to old roads in poor locations or problems in the original road design.

Recommendation: Continue monitoring of best management practices. Include monitoring of new best management practices listed in the new R5 FSH 2509.22 - Soil and Water Conservation Handbook. Continue to seek outside funding to reconstruct or decommission problem roads. Continue to work with local State Water Quality Control Board employees to address water quality issues related to forest management practices.

Soils

Results: Soil compaction exceeded 15 percent of activity areas in several units, mainly due to existing compaction from management activities decades ago. Soil cover thresholds (50 percent or greater cover) were met in 90 percent or more of treatment units each year. Large woody debris (3 to 5 large logs per acre on a project basis) was met in between 40 and 60 percent of individual units.

Conclusion: The HFQLG monitoring on soil compaction concluded that it is unclear whether not enough mitigation is being done, whether subsoiling treatment is ineffective, or if legacy compaction is causing misleading results. Vegetation management following current standards and guidelines adequately maintains soil cover. Large woody debris are distributed very unevenly across the landscape and 3 to 5 large logs per acre were not available in many units. It is also difficult to maintain "extra" large woody debris in units where it is available because the primary purpose of the vegetation projects is to reduce fuels.

Recommendation: Continue to implement standards and guidelines for soils. Consider land capability when designing mitigation and treatments. Evaluate measures for soil quality that better reflect land capability and consider them for the future Forest Plan Revision.

Fuels - Defensible Fuel Profile Zones

Results: All treatment areas showed a documented reduction in fire behavior and severity as compared to adjacent untreated areas.

Conclusion: Treating stands by thinning and reducing surface fuels increased fire suppression options, modified fire behavior, and reduced final fire size and suppression costs. Treated areas also experienced the least vegetation mortality—resulting in improved ecological conditions—and retained forests after wildfire.

Recommendation: Continue to treat stands by thinning and reducing surface fuels. Continue treatments in the wildland urban interface in coordination with local Firesafe Councils.

STATUS OF PREVIOUS YEAR'S RECOMMENDATIONS

No recommendations were made in the 2005 Monitoring Report.

FOREST PLAN AMENDMENTS AND CORRECTIONS

2007 Sierra Nevada Forests Management Indicator Species Amendment – This amended the Plumas Forest Plan. Changes to the Plumas MIS list and monitoring are discussed on pages 5 to 9.

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PUBLIC PARTICIPATION/DISCLOSURE PLAN

The Fiscal Year 2006-2010 Monitoring and Evaluation Report will be posted to the Plumas National Forest website http://www.fs.usda.gov/land/plumas/landmanagement.

Copies will be provided to interested individuals upon request.

SUPPORTING DOCUMENTATION

Garcia, G. 2006. Plumas National Forest Management Indicator Species Report. 84 p.

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