



**Klamath National Forest
Fiscal Year 2012
Monitoring and Evaluation
Report**



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http://www.fs.usda.gov/detail/klamath/landmanagement/planning/?cid=fsm8_049843

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Introduction

The 1995 Klamath National Forest Land and Resource Management Plan (Forest Plan), as amended, contains a list of monitoring projects that are intended to be conducted on a regular basis (<http://www.fs.usda.gov/main/klamath/landmanagement/planning>). The Fiscal Year 2012 Monitoring and Evaluation Report documents the evaluation of monitoring information related to the Forest Plan from October 1, 2011 through September 30, 2012. The objective of monitoring and evaluating Forest Plans is to determine whether programs and projects are meeting plan direction. Monitoring is the collection of information, on a sample basis, from sources identified in the Forest Plan. Evaluation of monitoring results is used to determine the effectiveness of the Forest Plan and the need either to change the plan through amendment or revision or to continue with the plan as written. Data are compared to data from past years, when appropriate. Monitoring results are emphasized rather than monitoring data. Evaluations are based on professional judgment when monitoring data are incomplete or lacking.

This report closely follows the format of the Monitoring and Evaluation Requirements outlined in Chapter 5 of the Forest Plan (pages 5-11 through 5-14). Specific monitoring objectives are presented, followed by the monitoring activities that were accomplished.

In some cases, monitoring was not conducted as specified in the plan. While most monitoring activities are accomplished on the prescribed schedule, some have been delayed due to funding shortfalls, lack of priority compared with other program needs, or lack of activity in that management program. Monitoring activities, if they occurred in addition to those identified in Chapter 5, are listed at the end of each resource area.

Although the Forest emphasizes integrated resource management, the Monitoring and Evaluation Report is organized by resource areas, following the organization of the Forest Plan, as follows: [Geology](#), [Soils](#), [Water Quality](#), [Air Quality](#), [Biological Diversity](#), [Sensitive Plants](#), [Wildlife](#), [Fisheries Management](#), [Visual Resource Management](#), [Wilderness](#), [Lands Program Management](#), [Timber Management](#), [Fire Management](#), [Range Management](#), [Noxious Weeds](#), [Cultural Resource Management](#), [Planning](#). Each section identifies monitoring objectives, methodology, analysis results, and if further action is required (or will be taken). An [Abbreviations and Acronyms](#) section concludes the report.

Geology

Landslides

Objectives: Test assumptions for landslide sediment production rates in Forest Plan. Determine effectiveness of standards and guidelines in reducing landslide rates.

Methodology: Forest-wide landslide production rates can only be effectively monitored after landslide-producing storms. There were no landslides reported by watershed or District personnel in 2012. Consequently, no monitoring was warranted for this aspect of the objective. This element was monitored in depth following the flood of 1997, and adjustments made to sediment production rates and management practices accordingly.

Application of geologic standards and guidelines was monitored by field reviewing the McBaldy Project, Caribou Reforestation Project and the Oak Flat Project during and after implementation.

Results: The standards and guidelines and resultant project design features were implemented on the projects reviewed. The standards and guidelines were found to be effective at avoiding disturbance to unstable lands and impacting landslide rates.

Further Action Required: None.

Geologic Hazards

Objectives: Determine levels of hazardous materials (asbestos, radon, etc.) and if the Forest is meeting required standards. Evaluate effectiveness of standards and guidelines for reducing environmental threats from geologic hazards.

Methodology: Naturally occurring hazardous materials would be investigated if new facilities were being proposed or new rock pits developed in ultramafic rock. Investigations include GIS analysis, review of previous investigations and field review to determine the potential for the presents of hazardous materials. Laboratory testing for the presence or absence of hazardous materials may occur depending on the outcome of initial evaluation. Upon request by Forest staff, a geologic hazards risk evaluation would be completed using GIS analysis, review of previous investigations, and field review. The focus of the analysis would be to determine the threat to visitors and/or personnel from geologic events at a particular area or site on the Forest.

Results: No asbestos or radon monitoring was conducted, since no rock aggregate from quarries in ultramafic rock was used as road surfacing, and no new radon threats were identified. No monitoring was done on hazards from abandoned mines, landfills, or seismic, volcanic or avalanche sources because no new hazards relative to these threats came to light in 2012.

Further Action Required: None.

Unique Geologic Areas

Objectives: Assess the condition of unique geologic areas and effectiveness of Forest Plan standards and guidelines and resource management programs in preserving and protecting these resources.

Methodology: Monitoring visits were conducted to Geologic Special Interest Areas (SIA) at: Four-mile Hill Tree Molds, Pumice Crater Glass Flow, Elk Lick Pond, and Little Glass Mountain. Five noteworthy caves, including two gated caves, were monitored for disturbance.

Results: Geologic SIAs were all in good condition with little to no new disturbances. There was no new graffiti in Pluto's Cave, but some evidence of fire use in the cave. The two gates, Barnum Cave and

Sand Cave, were not vandalized this year. The John Bell cave was within active vegetation management projects and was protected with 50 foot buffers. The cave did not show signs of disturbance due to the activities, therefore it seems the buffers were an effective means of protection. There was evidence of fuelwood harvesting adjacent to Shoe Cave but the cave was undisturbed.

Further Action Required: None.

Geologic Mapping

Objectives: Assess the accuracy of mapping units in the Forest Plan geologic database (rock type, geomorphic terrains, unstable and potentially unstable lands, etc.) (Implementation, Effectiveness). Evaluate the unstable lands component of Riparian Reserves for accuracy (Implementation, Effectiveness).

Methodology: The Forest has been working toward updating geomorphic mapping as part of project level work on McCollins, Eastend and Jess projects and several projects early in the planning stages. The resulting field mapping is used to refine the Forest Geomorphic and Bedrock layers.

Results: Generally, the inner gorges are over mapped, especially in steep terrain. Some polygons identified as active slides in our GIS data have been found to be incorrect, and some new active slides have been located. The bedrock mapping was found to be fairly accurate in the project areas. These data have been updated based on these results.

Further Action Required: Updates to the databases will be continued as needed.

Soils

Objective: To assess the implementation and effectiveness of soil standards, guidelines and thresholds to maintain soil productivity. Forest Plan standards and guidelines (S&Gs): The overarching Forest Plan S&Gs for soils require that land management activities are planned and implemented to maintain or enhance soil productivity and stability; specific requirements for soil cover and soil organic matter are set. The Forest Plan calls for soil quality standards to be met on at least 85% of lands dedicated to producing vegetation. For soil compaction, a 10% or more reduction in total soil porosity of the surface soil over natural conditions on 15% or more of the area is a variation from standards that requires further action. Forest Service Manual: The Region 5 supplement to Forest Service Manual 2550 replaces the now obsolete Soil Management Handbook (FSH 2509.18). The supplement provides indicators including soil stability, soil organic matter, and soil structure to measure soil condition. Soil condition classes are defined as Good (meets desired condition), Fair (partially meets desired condition), and Poor (does not meet desired condition). To assess the effects of management actions on soil functions, desired condition of each indicator is evaluated and determined to either meet desired conditions or not meet desired conditions.

Methodology: The National Forest Soil Disturbance Monitoring Protocol (NFSDMP) was used to collect soil disturbance data. NFSDMP data was gathered using a random transect approach that consists of between 2-5 passes through a unit with between 30-60 data points collected. The NFSDMP categorizes disturbance into four classes. Soil disturbance class 0 is undisturbed or natural condition. Soil disturbance class 1 can include faint ruts or wheel tracks <5 cm deep, slight compaction in the surface 10 cm, light intensity burn, and slight erosion. Soil disturbance class 2 can include ruts or wheel tracks 5-10 cm deep, moderate compaction up to 30 cm deep, moderate intensity burn, and moderate erosion. Soil disturbance class 3 can include ruts or wheel tracks >10cm deep, severe compaction more than 30cm deep, high burn intensity, and severe erosion that has produced rills or gullies

Activity units were evaluated to determine if desired condition for soil indicators (soil stability, soil organic matter, and soil structure) were met. A summary of the percentage of units that meet desired condition for soil indicators is displayed in the table under “Results”. Soil stability desired condition is met if an adequate level of soil cover is present and signs of erosion are not visible or very limited in degree and extent. Forest Plan S&G 3-2 provides guidance on adequate levels of soil cover levels by soil texture class, slope steepness, and management activity. Soil organic matter desired condition is met when the thickness and color of the upper soil layer is within the normal range of characteristics for the site and is distributed normally across the area. Localized areas of displacement may have occurred but it does not affect the productivity for the desired plant species. Soil structure desired condition is met when soil structure and macroporosity are relatively unchanged from natural condition and soil strength is conducive to a favorable rooting environment for the desired species.

Units were monitored on a randomly selected subset of management areas. Randomly selected units are the same ones selected for Best Management Practice Evaluation Program (BMPEP) monitoring and include: ground-based yarding, cable yarding, helicopter yarding, and mastication.

Results:

Mastication: One mastication unit from the Humbug-Greenhorn Project was evaluated (Figure 1). The soils in this unit were sandy loams derived from granitic parent material and had slopes averaging 22% across the unit. As expected, soil cover levels were high, averaging 95%. Because of the sandy nature of the soil, and since the mastication equipment travelled across a bed of masticated material, soil compaction was not detected in this unit. Desired conditions for soil stability and soil organic matter were met on 95% of the unit. Areas in the unit not meeting desired condition for soil stability and soil organic matter occurred on the masticator ruts where soil cover was absent and soil organic matter was displaced. No changes to the planning and implementation of mastication activities are recommended.



Figure 1 - Humbug-Greenhorn Project - after mastication treatment

Cable yarding: Two cable yarding units were evaluated from the Horse Heli and Jack Conventional Timber Sales. Soils in the Horse Heli unit were loams derived from schist parent material and gravelly

fine sandy loams derived from granitic parent material in the Jack Conventional unit. Soil cover levels were very high, averaging 96% in the two units. An average of 7% of the units were impacted by soil displacement; some of this displacement was found on cable corridors but most was due to legacy impacts from old skid trails. Rutting and compaction were not detected at either unit. Desired conditions for soil stability and soil organic matter were met on 97% of the unit. Areas in the unit not meeting desired conditions occurred on cable corridors where soil cover was absent and soil organic matter was displaced. No changes to the planning and implementation of cable yarding activities are recommended.



Figure 2 - Jack Conventional Timber Sale - a view of cable yarding from a landing

Cable yarding- fire salvage: One cable yarding unit was evaluated from the Panther Fire Salvage Project. Soils in the unit were very gravelly loams derived from granitic parent material. Soil cover levels were lower than non-salvage cable yarding units; averaging 59% across the unit. However, even with low soil cover levels, no signs of soil erosion were detected. Disturbance from yarding activity was light, with only 2% of the unit impacted by topsoil displacement along the cable corridors. Rutting and compaction were not detected. Desired conditions for soil stability and soil organic matter were met on 98% of the unit. Areas in the unit not meeting desired conditions occurred on cable corridors where soil cover was absent and soil organic matter was displaced. However, placement of waterbars on cable corridors prevented water from concentrating. No changes to the planning and implementation of cable yarding- salvage activities are recommended.



Figure 3 - Panther Fire Salvage Timber Sale, cable yarding corridors in a fire salvage unit

Tractor yarding: One tractor yarding unit from the Jack Conventional Timber Sale was evaluated. The soils in this unit were gravelly fine sandy loams derived from granitic parent material and have slopes averaging 21%. Average soil cover across the unit was high at 89%. Topsoil displacement, rutting, and compaction were all detected at low to moderate levels. Low levels of rutting and compaction were mostly detected in secondary skid trails where skidding equipment made 1-3 passes. Moderate levels of rutting, compaction, and topsoil displacement were noted on primary skid trails. The secondary skid trails occupied 15% of the unit and the primary skid trails occupied 8% of the unit. Desired conditions for soil stability, soil organic matter, and soil structure were met on 95, 90, and 95 percent of the unit, respectively. The majority of areas that did not meet desired conditions were located on primary skid trails and landings. No changes to the planning and implementation of tractor yarding activities are recommended.

Tractor yarding- fire salvage: One tractor yarding unit from the Panther Fire Salvage Timber Sale was evaluated. The soils in this unit are very gravelly loams derived from metasedimentary parent material and have slopes averaging 32%. Average soil cover across the unit was low at 53%, but no signs of erosion were detected. This level of soil cover is below minimum soil cover guidelines in S&G 3-2 in the Forest Plan, but was mostly due to the existing condition of the stand, not harvest activities. Compaction was detected at low to severe levels; low to moderate on secondary skid trails and moderate to severe on primary skid trails and the landing. Rutting ranged from low to severe depending on the slope steepness of the skid trail. Topsoil displacement was high compared to non-salvage tractor units at 28% of the unit. Topsoil displacement was noted on secondary skid trails, primary skid trails, and the landing. The secondary skid trails and primary skid trails each occupied 11% of the unit and the landing occupied 4% of the unit.



Figure 4 - Jack Conventional Timber Sale -a primary skid trail in a tractor yarding unit



Figure 5 - Panther Fire Salvage Timber Sale -skid trail patterns in a tractor unit, showing a primary skid trail along the ridgeline with secondary skid trails extending downslope on slopes up to 35%

Desired conditions for soil stability, soil organic matter, and soil structure were met on 92, 83, and 89 percent of the unit, respectively. The majority of areas that did not meet desired conditions were located on primary skid trails and landings. Due to a lack of a protective duff mat on the soil surface, an increased amount of disturbance was noted on secondary skid trails compared to green timber sales.

Recommended changes to planning tractor yarding for salvage timber sales is to reduce the extent of soil displacement and compaction by limiting slope steepness where skidding can occur or limiting the total area in the unit in primary and secondary skid trails. Alternatively, planners can reduce soil disturbance in fire salvage units by changing logging systems from tractor yarding to cable or helicopter yarding.

Mechanical fall/ helicopter yarding: One mechanical fall/helicopter yarding unit from the Horse Heli timber sale was evaluated. The soils in this unit were loams derived from schist parent material. The average slope in this unit was 31%. This unit had very high levels of soil cover at 92%. Low levels of compaction were recorded throughout the unit because the equipment typically made a single pass. However, increased levels of displacement were noted along tracks, especially where the equipment turned on the hillslope. The feller-buncher travelled over an intact forest floor making water bars unnecessary. Desired conditions for soil stability and soil organic matter were met on 94% of the unit. Areas in the unit not meeting desired conditions occurred as a result of the feller-buncher turning on a hillslope which removed soil cover and displaced topsoil. Recommended changes to implementation of mechanical fall/helicopter yarding units is to reduce the amount of soil displacement by having the operator travel perpendicular to the hillslope as much as possible where slopes exceed 35%.



Figure 6 - Horse Heli Timber Sale - an example of soil displacement in a mechanical fall/ helicopter yarding unit

Summary: Forest Plan S&Gs were met for all management activities in 2012. See summary of results in Table 1 below. For all management activities evaluated, soil productivity and stability were not impaired on a stand basis and soil functions are expected to improve from natural recovery. Monitored units were protected from soil erosion by having adequate soil cover levels and effective erosion control structures. Soil productivity was maintained in all units by retaining organic material in the soil profile and protecting soil porosity. No changes to the planning and implementation of mastication, cable yarding, or tractor yarding in green tree timber sales are recommended.

Table 1 - Soil Indicator Condition Assessment by Disturbance Type

Soils Results: Soil Indicator Condition Assessment by Disturbance Type			
Disturbance Type	Percent of Unit Meeting Desired Condition		
	Soil Stability	Soil Organic Matter	Soil Structure
Mastication	95%	95%	100%
Cable yarding	97%	96%	100%
Cable- fire salvage	98%	98%	100%
Tractor	95%	90%	95%
Tractor-fire salvage	92%	83%	89%
Mechanical fall helicopter yard	94%	94%	100%

Recommended Changes: Impacts on soil indicators from tractor yarding in fire salvage units showed an increase in displacement and compaction compared to green tree timber harvest due to a lack of protective duff material on the soil surface. A recommended change to tractor yarding units in fire salvage projects in the future is to reduce the extent of soil disturbance on certain soil types by limiting slope steepness where skidding can occur or limiting the total area in the unit in primary and secondary skid trails. Impacts on soil organic matter occurred in a mechanical fall/helicopter yarding unit as a result of the feller-buncher turning on a hillslope which removed soil cover and displaced topsoil. A recommended change to the implementation of mechanical fall/helicopter yarding units is to reduce the amount of soil displacement by having the operator travel perpendicular to the hillslope as much as possible where slopes exceed 35%. These recommended changes will increase the percentage of activity units meeting desired conditions and will improve the maintenance of soil productivity and stability on National Forest lands.

Further Action Required: None.

The full 2012 Soil Monitoring Report, including photographs, is available from the Forest upon request.

Water Quality

Best Management Practices (BMPs) Implementation and Effectiveness

Objective: Monitor implementation and effectiveness of Best Management Practices (BMPs) to evaluate their effectiveness at meeting state and federal water quality regulations.

Methodology: Implementation monitoring of BMPs is conducted using checklists completed by project staff to ensure that BMPs are implemented as prescribed. Effectiveness monitoring uses on-site evaluations to determine if BMPs were effective at protecting water quality at the site-scale.

Results: In 2012 BMPs were fully implemented at 92% of the sites evaluated and fully effective at 87% of the sites evaluated. Five percent of the implementation evaluations fell into the “minor departure” category and three percent failed implementation. Eight percent of the effectiveness ratings fell into the “at-risk” category and five percent failed effectiveness. Sites were located on all ranger districts and represented a variety of land management activities, including timber harvest, road and engineering, recreation, grazing, mining, and in-channel construction.

Most of the activities evaluated in 2012 met BMP compliance and were effective at controlling nonpoint pollution. These included most timber sale activities; minerals management activities, fire and fuels activities, and recreation sites. For activities where BMPs were fully implemented and effective, no modifications are recommend for future projects.

Follow-up monitoring of BMP sites that were not fully effective when reviewed during the 2011 BMP effectiveness monitoring has shown that the Forest was responsive and successful in applying corrective actions to address water quality protection. All of the sites that were re-visited in 2012 showed 100% effectiveness in their BMP evaluations.

Storm proofing projects, erosion control on skid trails, and range management can be improved through adaptive management or after the appropriate level of NEPA analysis, when applicable. In all cases where sites were rated as less than fully effective, corrective actions were taken if necessary, and follow-up monitoring will occur in 2013.

A full report containing the data and analysis submitted to the Water Board is posted on the Forest website under water quality:

<http://www.fs.usda.gov/detail/klamath/landmanagement/resourcemanagement/?cid=stelprdb5312713>

Further Action Required: Corrective action and follow-up site visits will occur in 2013 to address the BMP sites that were not fully successful during the 2012 BMP effectiveness monitoring review. Adaptive management recommendations for timber, engineering, and range practices will be implemented and monitored in 2013.

Cumulative Watershed Effects

Objective: Determine whether BMPs and watershed restoration are collectively effective at preventing cumulative effects to water quality at the watershed scale.

Methodology: Cumulative effects at the watershed scale are assessed by measuring streambed sediment deposition and water temperature near the mouth of tributary streams. Effects are evaluated by comparing sediment and temperature in managed streams with those in reference streams.

Results: Between 2009 and 2012 streambed sediment was measured in low gradient stream channels located near the mouth of 59 managed and 20 reference watersheds. When compared to reference streams, 29 managed streams had sediment greater than the reference condition for at least one indicator. Of these, two streams exceeded the reference condition due to high-severity wildfire. High sediment in the other streams appears to exceed reference conditions due to the cumulative effect of human-caused sediment sources. Some of these sources are from legacy sites that predate modern BMPs.

Stream temperature data was collected in 2012 but has not yet been analyzed.

Further Action Required: Further work is needed to develop methods for defining reference conditions. Active restoration of legacy sites is required as a condition of the Water Board Waiver to reduce cumulative effects and bring streams into compliance with State water quality regulations.

Forest Cumulative Watershed Effects (cwe) Modeling

Objective: Test the validity of the techniques used for determining the threshold of concern used to assess cumulative watershed effects in the Forest Plan.

Methodology: The validity of the Forest cumulative watershed effects (cwe) models are tested by comparing equivalent roaded area and modeled sediment supply with in-stream sediment.

Results: Results are pending analysis.

Further Action Required: None identified prior to results analysis.

Air Quality

Objective: Monitor the effects of forest management activities on air quality related values (biologic resources and visual quality) of the Class I area in Marble Mountain Wilderness using methods identified in GTR-RM-168 and to comply with the Clean Air Act.

Methodology: Data on the impacts of ozone and sulfur/nitrogen deposition data were compiled for sub-watersheds (6th field HUC) on the Forest during the Watershed Condition Classification analysis in 2010 and are still valid. Several opportunistic observations on the visibility in the Marble Mountain Wilderness (Class I Wilderness) were made following the procedure in GTR-RM-168. These observations were made on July 18, 2012 and August 8, 2012 (Marble Valley) and July 11, 2012 (Campbell Lake). Air quality related lichen plots, installed and photographed in 1992, were re-photographed in the Marble Mountain Wilderness throughout the summer. The photos were optically compared to determine if there was a loss of air pollution sensitive species indicating a worsening of air quality in the Marble Mountain Wilderness.

Results: The sub-watersheds in the Marble Mountain Wilderness (Upper Elk Creek, Upper Wooley Creek, Middle Wooley Creek, Lower Wooley Creek, North Fork Wooley Creek, Hancock Creek, Grant/NF Salmon River, Right Hand Fork Salmon River, Yellow Dog Creek, Shackelford Creek, Canyon Creek, and Kelsey Creek) all have sulfur/nitrogen deposition that is at least 10% below the critical terrestrial threshold. The sub-watersheds in the Marble Mountain Wilderness were all determined to have ozone levels that do not impact forest health. The visibility was within the screening level for the Wilderness for all observations completed. Preliminary analysis of the lichen plot photographs showed no perceivable changes in the relative percent of sensitive lichen species between the 1992 photos and the 2012 plot photos. There is no evidence that Forest management activities impacted the air quality values (biological resources and visual quality) for the Marble Mountain Wilderness in fiscal year 2012.

Further Action Required: The Forest Service would like to analyze the lichen plots in more detail with GIS data to determine if there is a statistically significant change in the relative percent of sensitive lichen species.

Biological Diversity

Ecosystem Diversity

Objectives: Track changes in vegetative composition.

Ecosystem Diversity-Aspen

Methodology: The Goosenest Ranger District set up permanent transects and photo points and collected baseline data in the Black Rock Aspen Restoration Project. Plots were designed based on Jones et al. 2005¹ and USDA Forest Service 2004². There are 37 plots and 74 permanent photo points. Additionally, twelve areas were fenced and will be monitored for aspen regeneration. The Goosenest Ranger District will continue to monitor aspen response to treatments in 2013. The plots and photo points will be part of this annual monitoring effort.

Results: Will be reported in FY13 report.

Further Action Required: None.

Ecosystem Diversity – Old Growth

Objective: Relocate and resample Terrestrial Ecological Unit Inventory (TEUI) plots on the Forest to assess the condition of old-growth stands that have experienced one or more fires since the initial survey.

Monitoring: Humboldt State University was contracted to resample a subset of the TEUI plots initially surveyed in the 1980s. These data document changes that have occurred in old-growth stands and relate those changes to environmental and ecological conditions. Re-sampling efforts were focused on stands in the western Klamath Mountains that span the Klamath and Six Rivers National Forests. The study was completed in 2010.

Results: The Final Project Summary (*Old-growth forest dynamics in northern California: Pattern, pace, and mechanisms of change*) was finalized August 31, 2011, but the Forest did not get a copy until just after publication of the FY11 MER on September 30th.

Further Action Required: None.

Size and Shapes of Openings

Objective: Ensure [timber harvest] openings are consistent with ecosystem composition, structure and function.

Methodology: The use of remote sensing for this monitoring is identified in the Forest Plan in anticipation of extensive use of Green-Tree-Retention silviculture treatments. However, understory removal is the current management practice to reduce fuel loading and achieve historic conifer condition class. This practice has reduced the size of openings created during harvesting operations. (Understory removal allows sufficient light into the stand post-treatment to encourage growth of early seral stage shrubs, forbs and perennial grasses. This creates healthier stands and reduces fire risk.) Since vegetative

¹ Jones, Bobette E., David Burton, and Kenneth W. Tate. 2005. Effectiveness monitoring of aspen regeneration on managed rangelands: a monitoring method for determining if management objectives are being met in aspen communities. U.S. Department of Agriculture, Forest Service, Pacific Southwest Region. September 2005.

² USDA Forest Service. 2004. Browsed plant method for young quaking aspen: an annual monitoring method for determining the incidence of use on sprouts and young plants during the growing season. Pacific Southwest Region, December 2004.

treatments have not created openings large enough to trigger remote sensing analysis, no remote sensing monitoring has been conducted.

Results: None.

Further Action Required: None.

Other Monitoring - Sugar Creek Research Natural Area (RNA)

Objective: Assess the fuel levels and fire threat to populations of rare conifers in the RNA.

Methodology: Two field trips to the Sugar Creek RNA were undertaken by Forest personnel and adjacent landowners to assess the area and discuss partnership opportunities following an initial series of field trips undertaken to document fuels levels and fire danger through photographs and notes.

Results: Current fuel levels, departure from historic fire return interval, and high occurrences of lightning in the area threaten the highly diverse RNA. Without mitigation, a wildfire in the RNA could destroy stands of endemic and extant conifer species. Progress for collaborative planning to reduce this risk in the future was made by including adjacent landowners on field trips.

Further Action Required: Although no action is required, the Forest is in the planning phase of an RNA management strategy. Once complete, environmental analyses of projects developed from opportunities identified in the management strategy are anticipated; implementation tools are expected to include prescribed fire.

Sensitive Plants

Sensitive Plants – Project Planning

Objective: Assure maintenance of Sensitive plant population and/or species viability.

Methodology: Projects were analyzed for 51 species; of these, surveys were conducted for Sensitive species (37 vascular plants, seven bryophytes, and one lichen) and one federally Endangered plant species. Areas of survey included 10 different types of projects, where threats and protection measures needed to be identified. Surveys were based upon professional knowledge and judgment, and included searching suitable habitats for new populations of Sensitive plant species.

Results: There were about 2,000 acres inventoried. Eleven new populations of Sensitive plants representing three species were located.

Sensitive Plants - Mitigation and Implementation Effectiveness

Objective: Assure maintenance of Sensitive plant population and/or species viability.

Methodology: About 25 acres of field monitoring was conducted on sites where mitigation measures (buffers) have been applied for project implementation. Monitoring measured 1) implementation (if buffers correctly applied) and 2) effectiveness (if buffers protected species as expected). *Ivesia pickeringii*, *Cyripedium fasciculatum* and *Cyripedium montanum*, and *Tauschia howellii* are discussed individually below.

Ivesia pickeringii: All 10 sites have been revisited. A project to remove encroaching conifers from one meadow complex containing *Ivesia* was implemented in 2012. Additionally, native grass plugs of Idaho Fescue were planted in meadows, with the objective to reduce loss of soil due to erosion that may affect the health of the meadow system containing *Ivesia*.

Results: The portion of the Roo project that addressed conifer encroachment into meadows was implemented in 2012. Trees were hand cut and piled on the edge of the meadow. The effect of this action is still undetermined, as the piles have not yet been burned. Monitoring plots were established in 2013 to observe the effect of tree removal and pile burning on *Ivesia*. Presently, meadow habitat containing *Ivesia* appears to be stable. The area of meadow that was planted with *Festuca idahoensis* plugs in the fall of 2011 shows a marked improvement in grass cover as a result of the plantings. The seedling survival rate appears to be approximately 98%, and most grass plugs show substantial growth.

Further Action Required: The signing portion of the project and results of monitoring in 2013 will be completed.

Cypripedium fasciculatum and *Cypripedium montanum*: The Forest has the largest assemblage of *Cypripedium montanum* populations in the State. Population revisits are conducted annually at selected sites within project areas under evaluation, and where projects have already occurred.

Results: Monitoring indicates that where projects are implemented with protection measures well defined and accurately applied, populations of these species are well preserved. Where instances occur of inaccurately applied protection measures, some impacts have occurred, yet have not resulted in affects to the species as a whole. These instances often provide opportunities to monitor effects on the species that would otherwise not occur. Populations in relatively stable habitats often show increases in the juvenile cohort of the population. Some areas below out-sloped roads have shown effects of road run-off in the form of gullies forming within the habitat.

Further Action Required: Engineering will fix road issues to protect populations from further impacts.

Tauschia howellii: An isolated population, located at Bear Peak in the Siskiyou Wilderness, was visited in August 2012. The size of this population, last visited in 1994, was originally estimated at 400 plants. The population was resurveyed and counted. At present, plants occur across a similar extent as was previously measured. The current population size is estimated at 600 plants.

Results: The species is limited to 10 populations in Southern Oregon and Northern California. The Bear Peak population is currently stable with no apparent threats to the current distribution or health of the population. The population is located close to a hiking trail but is in an area unlikely to be used by recreational hikers. Because of the difficulty in counting this plant, it may be useful to develop a monitoring protocol that could be used in the future to obtain a more consistent measure of population size over time.

Further Action Required: Develop a monitoring protocol for this species.

Other Monitoring - Rare and Declining Species - Yreka Phlox

Objective: To determine the condition of special habitat occupied by rare and declining species that may be Federally listed as Threatened or Endangered, or Federal Candidate Species.

Methodology: Yreka Phlox, *Phlox hirsuta*, is Federally listed as Endangered. This species occupies serpentine and peridotite outcrops in and around the town of Yreka, CA. The U.S. Fish and Wildlife Service (USFWS) monitors the population status, while both the USFWS and Forest Service (FS) agencies monitor the conditions of the occupied habitat, considering ongoing impacts from invasive species that surround the habitat.

Results: Monitoring of the habitat in the last five years has indicated small infestations of both yellow starthistle and dyer's woad within occupied habitat and a substantial area of both weed species surrounding its habitat around Yreka (mostly on non-National Forest System lands). A partnership

between the USFWS and the Siskiyou County Department of Agriculture is continuing, which includes participation from the Forest and private landowners. Non-native invasive species on lands with Yreka Phlox are being treated under landowner agreements to reduce potential impacts to the Phlox. In 2012, 258 acres were treated over a 2,786 acre area.

Further Action Required: None

Other Monitoring - Rare and Declining Species - Siskiyou Mariposa Lily

Objective: To determine the condition of special habitat occupied by rare and declining species that may be Federally listed as Threatened or Endangered, or Federal Candidate Species.

Methodology: Siskiyou Mariposa lily, *Calochortus persistens*, is a Candidate for Federal listing as Endangered. This species is geographically limited to three known occurrences west and north of Yreka, CA. The main threats to the species are thought to be an invasive species, *Isatis tinctoria*, locally known as Marlahan mustard or Dyer's woad, and the risk of fire suppression activities.

Results: Monitoring of Mariposa lily's occupied habitat indicates that Dyer's woad is gradually increasing within its habitat. Conifer encroachment is also potentially impacting its habitat. As of 2012, weed treatments have been conducted adjacent to and within occupied habitat, in limited areas, for ten years to reduce seed production and invasive species impact. In 2012 Siskiyou County Department of Agriculture treated 440 acres of private lands; the Forest treated 120 acres on National Forest System lands.

Further Action Required: In the McBaldy project, test plots for under-burning and the manual removal of fuels are being considered as methods to reduce the risk of high intensity fire that would necessitate aggressive fire suppression tactics. A Forest-wide EIS is being considered to address the threat of invasive plant species on Mariposa lily habitat, and other priority areas of the Forest.

Lake Mountain Foxtail Pine Botanical Special Interest Area

Objective: To enhance habitat necessary for the maintenance of Foxtail Pine population at Lake Mountain Lookout. This is one of the only places on the Forest where visitors can drive to see this unique conifer species.

Methodology: An assessment of the health of the existing population, including habitat requirements and associated species at the Foxtail pine population at Lake Mtn. Lookout is being conducted.

Results: The Lake Mountain Foxtail Pine population represents the northernmost stand of this species and includes approximately 250 - 300 trees. Foxtail pine is currently being impacted by white pine blister rust (*Cronartium ribicola*), an invasive fungal pathogen native to Asia. Survey of the trees for blister rust found an increase in the number of trees infected since the last survey in 1994 – approximately 25% of the trees are currently infected. In addition, the assessment found an increased threat from fire due to the encroachment of red fir into the stand and a reduction in seedling germination within the stand.

Further Action Required: The Lake Mountain Foxtail Pine Enhancement project planning currently in progress is considering the removal of red fir less than eight inches in diameter within the stand to reduce competition for resources, and the planting of 50 foxtail pine seedlings from cones gathered on site.

Wildlife

Bald Eagle

Objectives: 1) Determine trend and productivity of breeding population; 2) evaluate trend of habitat delineated to meet Recovery Plan objectives; 3) determine use, condition and trend of identified active and potential roost sites; and 4) assess effectiveness of Forest Plan standards and guidelines.

Methodology:

Gooseneck Ranger District: Fifteen nests and five winter roosts for bald eagles were surveyed and one driving census was conducted.

Happy Camp/Oak Knoll and Scott/Salmon Ranger Districts: Bald eagles are monitored during the mid-winter Bald eagle count and the Breeding Survey. The mid-winter Bald eagle count monitors bald and golden eagle winter use along seven monitoring routes covering the Mid-Klamath, Salmon and Scott Rivers, and Shasta and Scott Valleys (about 200,000 acres). These monitoring results contribute to the winter use trends that take place across the western United States. These surveys were coordinated by the Salmon/Scott Ranger District and conducted by Forest Service personnel, citizen volunteers, and members of the Mt. Shasta Audubon. The Breeding Survey Monitoring includes seven known bald eagle nest locations along the Klamath River and in the Scott Valley.

Results:

Gooseneck Ranger District: Of 15 nest sites monitored, six produced nine young, two presumably failed, four were inactive, two were not surveyed, and one was unknown. Bald eagles were detected in two of the five winter roosts. On the 180 mile driving route census, four adult bald eagles were observed and no immature bald eagles were observed. Sixty-five raptors representing eight species were observed during the driving route census. The trend over the past several years indicates that the bald eagle population is either stable or improving. Successful nesting and winter use indicates that management standards are effective.

Happy Camp/Oak Knoll and Scott/Salmon Ranger Districts: Three of the seven known bald eagle nests were active and two had confirmed successful reproduction. Both golden eagle nests were active with reproduction unknown. A total of 24 visits were made to monitor the nests.

Six survey routes were completed for the Mid-Winter Bald Eagle Count with 13 bald eagles detected. The table shows the results of the Mid-Winter Bald Eagle Counts on the Happy Camp/ Oak Knoll and Salmon/ Scott River Ranger Districts from 2007-2012. The population trend for bald eagles has been relatively stable or improving with low points in the past two years. Future monitoring will provide data for evaluating whether the low count of 11 in 2011 and 13 eagles in 2012 is part of an overall trend.

Table 2 - Mid-Winter Bald Eagle Counts for Happy Camp/Oak Knoll and Salmon/Scott River Ranger Districts: 2007-2012

Year	# of eagles observed
2007	30
2008	30
2009	30
2010	37
2011	11
2012	13

Further Action Required: Future monitoring will provide data for evaluating whether the low count of 11 eagles in in 2011 and 13 eagles in 2012 is part of an overall trend.

Peregrine Falcon

Objectives: 1) Verify nesting and reproductive success during breeding season.
2) Assess effectiveness of Forest Plan standards and guidelines.

Methodology: Field monitoring at five known peregrine falcon eyries (or nests) was conducted to determine nesting status.

Results:

Gooseneck Ranger District: No known peregrine falcon eyries on the District.

Happy Camp/Oak Knoll and Scott/Salmon Ranger Districts: Five historic peregrine falcon eyries were monitored in 2012 (Knownothing, Shadow, Limestone Bluffs, China Point and King Creek). One single falcon was noted occupying Limestone Bluffs eyrie. No young were recorded at Limestone Bluffs eyrie; therefore, reproductive status was not determined. Knownothing, Shadow Creek, China Point and King Creek eyries were not occupied. Peregrine falcons are no longer listed as Endangered or Sensitive due to a long-term improving trend in the population. Forest Plan standards and guidelines designed to maintain habitat and minimize disturbance to sites have been effective. No new eyries were recorded in 2012.

Further Action Required: None.

Northern Spotted Owl (NSO)

Objective: Determine number of pairs within Late Successional Reserves (LSRs).

Methodology: Standardized protocols were used for all inventories. Monitoring was conducted by Forest Service personnel, with assistance from student interns from the Student Conservation Association, USFWS, and private contractors.

Results:

Gooseneck Ranger District: Over 41,500 acres were surveyed for NSOs as part of the planning process for the Butte Mountain LSR Habitat Restoration Project. Eighteen NSO territories were monitored within the project area. Four territories were occupied by NSO pairs and four territories were occupied by at least one NSO. The NSO sites with pairs had four nests. Three successful nest attempts produced three NSO fledglings (one per nest site) and the fourth nest was presumed failed. Barred owls were detected in several regions of the Butte Mountain project area. Surveys were coordinated with Fruit Growers Supply Company in Bull Meadow. On the eastside of the district 41,288 acres were surveyed. This included 24 territories surveyed with various intensities. Nine NSO territories were monitored, of

which one territory had one NSO individual detected; the remaining territories had no detections. Barred owls were detected on two of the survey routes.

Happy Camp/ Oak Knoll Ranger District: Of the 44 historic NSO activity centers monitored, five sites had pairs, 23 had singles, and 17 sites had no detections. Eight barred owl sites were identified during the monitoring.

Salmon Scott Ranger District: Twelve Project Areas were surveyed to protocol. Thirty-one NSO activity centers were monitored including sites within LSRs and Matrix Designated Lands. Five sites had pairs detected with confirmed non-reproduction. Four sites had a single NSO detected. The remaining 22 historic activity centers were surveyed and determined to be unoccupied for the 2012 field season. Three barred owl single activity centers were detected.

Further Action Required: None.

Northern Goshawk

Objective: Determine occupancy of suitable habitat.

Methodology: Standardized protocols were used for all inventories. Monitoring was conducted by Forest Service personnel, with assistance from student interns from the Student Conservation Association, USFWS, and private contractors.

Results:

Goosenest Ranger District: A total of 46 territories across 32,880 acres on the Goosenest Ranger District were surveyed for northern goshawks: 23,080 acres on the east side of the district and 9,800 acres on the west side. On the east side of the district 17 territories were occupied; eight contained breeding pairs that produced six young; three of the occupied territories with nesting attempts failed. On the west side of the District nine territories had breeding pairs and produced 11 young. Surveys were coordinated with Fruit Growers Supply Company in Bull Meadow. The remaining territories were assumed to be inactive.

Happy Camp/Oak Knoll District: Six northern goshawk sites were monitored. One site had a pair, one site had a single detection, and four sites had no detections. None of the monitored sites had reproductive success in 2012.

Salmon Scott Ranger District: Goshawk surveys were conducted in the Singleton and Petersburg Project areas following intensive search protocols. No goshawk presence was recorded.

Further Action Required: None

Willow Flycatcher

Objective: Determine occupancy of suitable habitat.

Monitoring and Results:

Goosenest Ranger District: No willow flycatcher detections or captures at the Antelope MAP station.

Salmon Scott Ranger District: Surveys were conducted for willow flycatchers (and other songbirds) at the Seiad Valley PCT1 Constant Effort Mist Netting Station. Data gathered at the Seiad Valley station contributes to regional and national songbird monitoring data sets and provides information on site productivity and long-term trends. Monitoring was conducted primarily by Forest Service personnel with the assistance of Redwood Sciences Lab, Klamath Bird Observatory, USFWS, Mt. Shasta Audubon, and volunteers from the local community. A total of three willow flycatchers were netted and

banded in 2011. Three were also captured and banded in the 2012 banding season. This is a notable decrease from the 17 willow flycatchers captured during the 2010 banding season.



Figure 7 – Willow flycatcher. (Photo courtesy of Sam Cuenca)

Table 3 - Captures of Willow Flycatcher at PCT 1 Mist Netting Station

Species	FY 10	FY11	FY12
Willow Flycatcher	17	3	3

Further Action Required: Future monitoring will provide data for evaluating whether the low counts in 2011 and 2012 are part of an overall trend.

Great grey owl

Objective: Determine occupancy of suitable habitat.

Monitoring and Results: No monitoring was conducted in 2012 because pre-project surveys are not required. Removal of suitable habitat is not proposed by current projects. Incidental great gray owl detections will be recorded in the NRIS database.

Results:

Goosenest Ranger District: There were no incidental sightings of great gray owls reported in 2012.

Further Action Required: None.

Other Monitoring - Migratory Songbirds

Objective: Gather baseline data on Neotropical migrants.

Monitoring and Results:

Goosenest Ranger District: Antelope Creek MAP Station is run by the Klamath Bird Observatory and the methods follow protocol as described by the Institute of Bird Populations. During the banding season 39 species of migratory birds were captured and numerous other species were observed.

Salmon/Scott Ranger Districts: PCT1 Constant Effort Mist Netting Station: This station is located along the riparian corridor of the mid-Klamath River in Seiad Valley, California, which is used by a diversity of riparian obligate migratory songbirds. This was the 17th year of monitoring for this station, one of the longest running banding stations in the Klamath Basin. The station is run by permitted bander Sam Cuenca through a partnership with Redwood Sciences Lab, Klamath Bird Observatory, USFWS (Yreka Field Office), California Department of Fish and Game, Klamath River Elementary School, and Discovery High School. In 2012 volunteers from the Student Conservation Association, Siskiyou

County Office of Education Workability Crew, and SCEP Native American Job Placement Program contributed many hours with banding operations. Methods follow protocol described by the Redwood Sciences Lab and the Institute of Bird Populations. During the 2012 season, 320 birds were captured including key species such as willow flycatcher, yellow warbler, yellow-breasted chat, bushtit, purple finch, Western flycatcher, song sparrow, Swainson's and hermit thrush. Data is compiled by the Redwood Sciences Lab and contributes to the understanding of the importance of songbird use on the riparian habitats mid-Klamath River Zone, the Klamath Basin, and the Pacific Flyway.

Table 4 - Total Captures of Songbirds at the PCT 1 Mist Netting Station

Species	FY11	FY12
Songbirds	70	320



Figure 8 – Wilson's Warbler. (Photo courtesy of Sam Cuenca)



Figure 9– Yellow-breasted Chat. (Photo courtesy of Sam Cuenca)

Other Monitoring – Swainson's Hawk and Butte Valley National Grassland avian monitoring

Objective: Gather baseline data.

Methodology: Monitoring in Butte Valley National Grassland continues as part of an ongoing program that has provided data on Swainson's hawk survival, reproduction and recruitment for over 20 years. About 124 hawk territories were visited. During these visits, personnel also monitored several other avian species.

Results:

Gooseneck Ranger District: In 2012, 124 Swainson's hawk territories were monitored and 84 nests were located in and around Butte Valley, California; of the 84 nests located four territories were new this year. Fifteen of the 84 nests were on National Forest System land. Apparent nest success was 65% with 29 nests failing over the season. A total of 99 nestlings were banded and average productivity was 1.27 chicks per nest. One breeding female located in Butte Valley was 26 years old and is the oldest known Swainson's hawk on record.

Three experimental GSM transmitters were placed on nestlings. As of October 1st one is in Tulelake, CA; one is in south Texas; and one is south of Veracruz, Mexico. We hope to continue to track these individuals to learn more about their movement patterns over their first winter and subsequent seasons.

Data gathered during Butte Valley surveys are contributing to studies on natal dispersal and manuscripts on mating patterns, stable isotopes, and seasonal interactions are being submitted to peer-reviewed journals.

Partnerships were established with the Golden Gate Raptor Observatory, University of Nevada-Reno and University of California-Davis. Five volunteers contributed over 400 hours to the project.

Further Action Required: None

Other Monitoring - Breeding Bird Survey (BBS)

The BBS is a large-scale survey of North American birds. It is a roadside survey, primarily covering the continental United States and southern Canada, although survey routes have recently been initiated in Alaska and northern Mexico. The BBS was started in 1966 and now contains over 5,000 survey routes which are surveyed in June by experienced birders. The primary objective of the BBS has been the estimation of population change for birds encountered along habitats surveyed from roadsides.

On the Klamath National Forest one BBS route is established on the South Fork of the Salmon River (Cecilville #14429). This data contributes to overall bird trends across North America. There were 249 birds detected at 50 stations on 6/21/12.

Other Monitoring - Other Raptors (ferruginous hawks and golden eagles)

Objective: Gather baseline data for uncommon species.

Monitoring and Results:

Gooseneck Ranger District: There are 15 historic golden eagle nests on Gooseneck Ranger District, most have not been active for several years. In 2012, one nest was surveyed and showed signs of activity but no signs of reproduction. No golden eagles were observed during the Winter Driving Census. All historic golden eagle data were compiled and submitted to USFWS for incorporation into a population demography study. No ferruginous hawk nest sites were monitored.

Happy Camp/Oak Knoll District: In 2012, two golden eagle nests were active but reproductive status was unknown.

Fisheries Management

Sensitive Species

Monitoring Objective: Determine population trends and habitat conditions for steelhead trout and Chinook salmon.

Monitoring: Data is collected to determine number of spawning steelhead trout and Chinook salmon.

Results: *Summer-run steelhead and spring Chinook holding census, Happy Camp/ Oak Knoll Ranger District:* Conduct fisheries census and maintain population trend data for summer steelhead and spring Chinook which are Forest Service designated Sensitive species. The census was done by direct observation snorkel surveys in all five tributaries to the Klamath River. The population trend data has been collected on a continuous or nearly continuous basis since 1987.

In July and August of 2012 a total of seven tributaries to the Klamath River were surveyed. The stream reaches surveyed totaled about 64.8 miles. Summer steelhead were observed in all seven tributaries (Table 5). Spring Chinook salmon were observed in one tributary. The stream reaches surveyed totaled about 4.5 miles. The final count of Spring Chinook salmon is summarized in Table 6 below.

Table 5 - Results of Summer Steelhead Surveys for Happy Camp/Oak Knoll, July-Aug 2012

Stream Name	Adults	Half-Pounders
Beaver Creek	0	3
Clear Creek	9	123
Copper Creek	0	2
Dillon Creek	19	98
Elk Creek	9	28
Indian Creek	5	24
Thompson Creek	0	3
Totals	42	281

Table 6 - Results of Spring Chinook Surveys for Happy Camp/Oak Knoll, July-Aug 2012

Stream Name	Adults	Jacks
Dillon Creek	0	2
Totals	0	2

Salmon River Summer-run steelhead holding census, Salmon/Scott River Ranger District and the Ukonom Ranger District: The purpose of the project is to complete annual survey (monitoring) of the mainstem, North Fork, South Fork, and East Fork Salmon River. This data has been actively collected since the late 1960s and is important for the tracking of spring Chinook and summer steelhead trends over time. The census is conducted by direction observation snorkel dives. All stream reaches (about 91 miles) were completed in one day. Efforts were made possible through the collaboration of about 80

volunteers and other fish biologists (from California Department of Fish and Wildlife, U.S. Fish and Wildlife Service, Resource Conservation Districts (RCDs), local tribes, etc.).

Table 7 - Results of Summer Steelhead Surveys on the Salmon River, July 2012

Stream Name	Adults	Half-Pounders
Salmon River - Mainstem	18	16
North Fork Salmon River	14	48
South Fork Salmon River	74	144
East Fork of South Fork Salmon River	0	0
Wooley Creek	58	22
Totals	164	230

Salmon River Spring-run Chinook holding census, Salmon/ Scott River Ranger District and Ukonom Ranger District: The purpose of this project was to continue long-term monitoring of spring Chinook presence in the Salmon River drainage. Although species of primary interest was spring Chinook, steelhead and other anadromous salmonids were tallied as encountered. The Salmon River drainage was divided into reaches, and the reaches surveyed by teams of snorkelers. In July 2012, a total of 91 miles of the Salmon River were surveyed. Of the 91 miles, approximately 63 miles (including North Fork, South Fork, East Fork, and a portion of the mainstream) occur on the Forest. The final count for all reaches was: 1,291 Chinook (1,104 adults and 187 jacks); 394 steelhead (164 adults and 230 half-pounders). The Six Rivers National Forest completed the mainstem and Wooley Creek (about 28 miles) reaches. Although the primary non-governmental participant was Salmon River Restoration Council, additional crews were present from adjacent National Forests, California Department of Fish and Wildlife, U.S. Fish and Wildlife Service, Karuk Tribe, and local volunteers.

Table 8 - Results of the Spring Chinook Surveys on the Salmon River, July 2012

Stream Name	Adults	Jacks
Salmon River - Mainstem	176	18
North Fork Salmon River	237	54
South Fork Salmon River	559	102
East Fork of South Fork Salmon River	2	1
Wooley Creek	130	12
Totals	1104	187

Salmon River Spring-run Chinook Spawning surveys: No data are available.

Mid-Klamath Fall-run Chinook Spawning Surveys: This monitoring effort begun in 1992 consists of spawning ground surveys from a cooperative effort between the Forest Service, California Department of Fish and Wildlife as lead agency, Yurok Tribe, Karuk Tribe, Quartz Valley Tribe, Salmon River Restoration Council (SRRC), Scott Valley RCD, Middle Klamath Watershed Council, Northern

California Resource Center, and local schools and volunteers. In addition to providing information to land managers on fish spawning locations, these surveys are used to estimate the total in-river spawner escapement of fall Chinook salmon (*Oncorhynchus tshawytscha*) by the Klamath Fisheries Management Council and the Pacific Fisheries Management Council for determination of harvest allocations for the subsequent year. The Salmon River, Scott River, and other mid-Klamath River tributaries are surveyed on an annual basis using both carcass mark-recapture and/or redd count techniques. Redd data is used to make spawner estimations on smaller tributaries, while the mark-recapture technique (and in some cases redd counts) are used for population estimations on the Salmon and Scott Rivers.

The Salmon and Scott Rivers were surveyed twice each week during the spawning run. The Salmon River survey was conducted on every Tuesday and Friday and the Scott River survey was conducted on every Monday and Thursday. Miscellaneous tributary streams were surveyed every Wednesday. Surveys began during the second week of October and continued into mid-December. In addition to the spawning ground survey effort on the Scott River a fish counting video weir was operated at roughly river mile 18. The video weir is operated by the California Department of Fish and Wildlife's Klamath River Project and is the primary method for estimating adult abundance in areas of the Scott River upstream of the weir. This video weir on the Scott River has been in operation since 2007. In addition to the video weir described above, fish counting video camcorders (video weirs) have been set up on the Shasta River and Bogus Creek (one video weir on each stream). The video weirs on the Shasta River and Bogus Creek have been in operation since 2001 and 2003, respectively.

Carcass Surveys: Detailed methods for carcass surveys and red counts are from the 2011 Fall Chinook Spawning Survey Report (USDA Forest Service 2012). Carcass surveys were conducted on the Scott River, North Fork Salmon River, South Fork Salmon River, and Mainstem Salmon River from Forks to Nordheimer using the mark and recapture methodology. This methodology is utilized by the California Department of Fish and Wildlife to estimate run size for the mid-Klamath River and its tributaries. Therefore carcass counts are not listed in the tables below for these rivers. In the portion of the lower Mainstem Salmon River, Wooley Creek and the mid-Klamath River tributaries where the mark and recapture methodology was not conducted, carcass counts are listed for those streams in the tables below.

Redd Surveys: In 2011, redd surveys were conducted on the Salmon River from mile marker 12 on the North Fork to the confluence with the South Fork, and from Matthews Creek campground on the South Fork to the confluence with the North Fork. The mainstem Salmon River from Forks to Nordheimer Creek (Reach 4; R4) was surveyed twice weekly; the other three mainstem Salmon reaches (R1, R2, and R3), from Nordheimer to the Klamath River, were surveyed for redds by snorkel diving approximately one time per week. Redd surveys on the Scott River were conducted from the confluence of the East Fork Scott River to the confluence of the Klamath River. However, high water conditions on the Salmon and Scott rivers from late October until mid-November and access to private land excluded some reaches from being surveyed and known poor spawning reaches were not surveyed. Other mid-Klamath tributaries surveyed included: Beaver Creek, Clear Creek, Dillon Creek, Elk Creek, Grider Creek, Horse Creek, Independence Creek, Indian Creek, Irving Creek, Nordheimer Creek, Rock Creek, Rogers Creek, Thompson Creek, Ti Creek, and Wooley Creek. The mapping occurred the first week of November on both the Scott and Salmon Rivers. Based on surveys from past years, this is typically the approximate peak of the fall Chinook spawning season.

Table 9 - Results of the Mainstem Salmon Fall Chinook Salmon Redd Surveys

Reach	Redds	Carcasses	Lives
4A Otter Bar - Nordheimer	76	*	213
4B Forks – Otter Bar	111	*	434
Reach 1 Brannon to Mouth	43	28	179
Reach 2 Butler to Brannon	44	30	203
Reach 3 Tripp to Butler	53	48	233
Reach 4 Nordheimer to Tripp	61	55	282
Totals	388	161	1544

Table 10 - Results of the North Fork Salmon River Fall Chinook Salmon Redd Surveys

Reach	Redds	Lives
Mile 2 to Forks	108	444
Mile 4 to Mile 2	82	304
Mile 6 to Mile 4	50	230
Mile 8 to Mile 6	65	48
Mile 10 to Mile 8	54	47
Mile 12 to Mile 10	32	24
Mile 12 to Mile 14	3	4
Totals	394	1101

Table 11 - Results of the South Fork Salmon River Fall Chinook Salmon Redd Surveys

Reach	Redds	Lives
Henry Bell to Forks	549	917
O'Farrell Gulch to Henry Bell	126	355
Indian Creek to O'Farrell Gulch	102	327
Matthews Creek to Indian Creek	69	79
Totals	846	1678

Table 12 - Results of the Scott River Fall Chinook Salmon Redd Surveys

Reach	Redds	Lives
R1 – Midpoint to Confluence	49	930
R2 – Pat Ford to Midpoint	31	409
R3 – George Allen to Alreds	20	132
R4 – Townsend Gulch to George Allen	25	335
R5 – Bridge Flat to Townsend Gulch	24	232
R6 – CDFW Weir to Bridge Flat	40	425
R7 – USGS Gauge to CDFW Weir	41	455
R8 - Sniktaw Creek to USGS Gauge	246	2412
R12 - Sweezy to Eller Lane	57	239
R13 - Horn Lane to Sweezy	186	616
R14 - Youngs Dam to Horn Lane	748	951
R15 - Fay Lane to Youngs Dam	691	1033
Totals	2158	8169

Table 13 - Results of the Mid-Klamath River Tributaries Fall Chinook Salmon Redd Surveys

Stream	Reach	Redds	Carcasses	Lives
Beaver Creek	R1- Polly Gulch to Mouth	27	19	45
	R2 – West Fork Confluence to Polly Gulch	22	10	37
	R3 – West Fork Confluence to Bear Creek	1	0	0
Clear Creek	R1 – Above Slippery to Mouth	85	91	897
	R2 – South Fork Clear to Mouth	5	0	11
Dillon Creek	R1 – Mill Creek to Mouth	22	13	228
Elk Creek	R1 – 5 mile Bridge to Mouth	27	5	165
	R2 – Twins to 5 mile Bridge	15	8	75
	R3 –Doolittle to Twins	23	5	144
	R4 – Bear to Doolittle	13	2	53
Grider Creek	R1 – No Name to Mouth	39	5	64
	R2 – Bark Shanty to No Name	26	2	40
	R3 – Rancheria to Bark Shanty	0	0	0
Horse Creek	R1 – 46N66 Bridge to Mouth	8	1	8
	R2 – 47N77 Bridge to 46N66t Bridge	2	1	3
	R3 – 47N87 Bridge to 47N77 Bridge	0	0	0
Independence Creek	R1 – Mine to Mouth	4	0	0
Indian Creek	R1 – Buchanan Falls to Mouth	62	27	375
	R2 – Southfork Bridge to Buchanan Falls	6	4	80
	R3 - Westbranch to South Fork Bridge	0	0	15
	R4 – Above Gauging Station	13	9	69
Irving Creek	R1 – 1 Mile to Mouth	0	0	0
Nordheimer Creek	R1 - Mouth to Fish Ladder	25	2	12
Rock Creek	R1 – Slide to Mouth	10	0	10
Rogers Creek	R1 – 1 mile to Mouth	5	0	0
Thompson Creek	R1 – 2 miles to the Mouth	25	4	131
Ti Creek	R1 - .5 Mile to Mouth	0	0	0
Wooley Creek	R1 - Gates to Mouth	22	10	13
	R2 – Bridge to Gates	84	20	22
	R3 – Hancock to Bridge	11	5	10
	R4 – N. Fork to Hancock	3	2	6
Totals		585	245	2513



Figure 10 - Data collection for Fall Chinook spawning surveys

The number of Klamath River fall Chinook salmon returning to the Klamath River Basin (Basin) in 2012 was estimated in tabular form:

Table 14 - Estimations of the Fall Chinook Salmon Returning to the Klamath River Basin

Age	Count	Percent of Total Run
2	21,473	6.6%
3	248,532	76.8%
4	51,352	15.9%
5	2,225	0.7%
Totals	323,582	100%

The following paragraphs are a subset of Appendix D of the primary report (*Klamath River Fall Chinook Salmon Age-Specific Escapement, River Harvest, and Run Size Estimates, 2012 Run* by the Klamath River Technical Team dated 27 February 2013). See the report for results for Iron Gate Hatchery, Shasta River, Lower Klamath River Creel, Upper Klamath River Recreational Fishery, Yurok fisheries, and Blue Creek.

Scott River: Total escapement was obtained using expansion of redd counts (twice the redds counted) for reaches below a resistance board weir installed near Jones Beach. Videography was used to estimate the population above the weir. Bio-samples were obtained from all non-deteriorated carcasses encountered above and below the weir. Scale-age proportions were used to assign all ages.

Salmon River: As in past years, carcass mark-recapture was used to estimate total fall Chinook spawners in Salmon River. The total run estimate was generated by carcass mark-recapture. Bio-samples

were obtained from all non-deteriorated carcasses encountered. Scale-age proportions were used to assign all ages.

Klamath River Tributaries (above Weitchpec): The adult run estimate was obtained by multiplying total redd counts by two and adding the total of live fish observed during the final survey in each tributary. Due to insufficient collection of scales in 2011 and 2012, Chinook from these tributaries were apportioned by age using a surrogate of un-weighted average proportions estimated for the Salmon and Scott Rivers combined.

Klamath River Mainstem: For the upper reach (Iron Gate Hatchery (IGH) to Shasta River section), the total population was estimated by tag recovery using an unstratified Peterson estimator. Scale-age proportions were used to assign all ages. For the lower reach (Shasta River to Indian Creek) redds were multiplied by two to estimate the adult run.

The scale-age proportions from the upper reach were used as surrogate to assign all ages.



Figure 11 - Coded wire tag in Chinook Salmon

Further Action Required: Continue coordination with California Department of Fish and Wildlife for the annual Fall Chinook Salmon Spawning Ground Surveys. Continue coordination with Salmon River Restoration Council for the annual Salmon River Spring-run Chinook holding census. Continue conducting the Summer-run steelhead and spring Chinook holding census on Happy Camp/ Oak Knoll Ranger District.

Management Indicator Species

Objective: Determine population trends and relationship to habitat changes for steelhead trout and rainbow trout.

Methodology: Monitoring for steelhead trout is covered under Sensitive Species monitoring (above). California Department of Fish and Wildlife is conducting a field study of fish, amphibians, and reptiles in the High Mountain Lake surveys of the Klamath, Cascade, and Sierra Nevada mountains. The multiyear project, begun in 1995, has collected data on three fourths of the Sierra Nevada's 10,000 high mountain lakes, and on nearly all high mountain lakes in the Klamath and Cascade mountains of California³. Habitat changes are measured through the Aquatic and Riparian Effectiveness Monitoring

³ (Chapter 4 in <http://www.dfg.ca.gov/news/pubnotice/hatchery/>)

Plan (AREMP) program and the Klamath National Forest has an intensive watershed condition monitoring program for ‘managed’ and ‘reference’ streams organized through the Klamath National Forest hydrology department in coordination with Total Maximum Daily Load (TMDL) compliance.

Results: The AREMP program has found an overall positive trend in watershed conditions over the last 16 years (final report is pending).

As provided in the *FY2011 Monitoring and Evaluation Report*: Monitoring populations of the resident form of rainbow trout is confounded by potential impacts from 1) fish stocking operations conducted by private interests and the California Department of Fish and Wildlife and 2) the targeting of rainbow trout common in recreational fishing. The California Department of Fish and Wildlife has reduced their stocking of high mountain lakes since 2008; no hatchery (resident rainbow) trout are stocked within the currently managed range of the Southern Oregon/Northern California coho salmon (Figures 4-36 and 4-34 respectively in the January 2010 Environmental Impact Report (EIR)), and one location for the Klamath Mountains Province (KMP) steelhead⁴. Salmon and steelhead are stocked at five locations within the KMP steelhead distinct population segment (DPS) in the Klamath and Trinity River basins (Figure 4-36 of the same January 2010 EIR). Naturally produced steelhead juveniles may be preyed on by hatchery steelhead that may be residualizing in the Klamath and Trinity Rivers below Iron Gate and Trinity River Hatcheries. Residualization of hatchery steelhead and predation on naturally produced salmon and steelhead fry has been demonstrated in the Trinity River, representing a potential threat to natural salmon and steelhead populations. Based on the time and size at release, hatchery coho salmon yearlings may also prey on naturally produced steelhead fry. The hatchery programs have the potential to cause significant impact to the survival of wild juvenile salmon and steelhead. Rainbow trout have been observed preying upon juvenile steelhead; additionally, their diets and habitat preferences overlap. Therefore, hatchery rainbow trout may prey upon native steelhead or compete with them for rearing and spawning habitat. According to the January 2010 EIR prepared by California Department of Fish and Wildlife, the “implications of competitive interactions between hatchery and wild fish may be particularly serious for steelhead because the freshwater environment probably limits production.” There is also a potential for hatchery trout to compete for spawning sites with native steelhead, due to overlapping spawn times and spawning habitat preferences. These influences on the population make habitat monitoring a more reliable system of tracking trends for fish Management Indicator Species.

Further Action Required: Coordinate with California Department of Fish and Wildlife on their ongoing monitoring, continue coordination with AREMP.

Fisheries Management

Objective: Determine effectiveness of Forest Plan standards and guidelines in meeting objectives.

Methodology: The Northwest Forest Plan, a management strategy applied to 24 million acres of federal land in the Pacific Northwest, was approved in 1994 and incorporated into the Forest’s 1995 Forest Plan. The Northwest Forest Plan’s Aquatic Conservation Strategy that requires the protection, restoration, and

⁴ California Department of Fish and Wildlife, U.S. Fish and Wildlife Service Biological Resources, Final Hatchery and Stocking Program, Environmental Impact Report/Environmental Impact Statement 4-73 January 2010

monitoring of aquatic ecosystems under the Plan’s jurisdiction was incorporated. The AREMP program⁵ was developed to fulfill the monitoring component of the strategy. Monitoring is conducted at the sub-watershed scale (US Geologic Survey 6th-field hydrologic unit). These sub-watersheds are approximately 10,000-40,000 acres in size. In 2012 invasive aquatic species were also monitored.

Results: The AREMP monitoring reflects the effectiveness of standards and guidelines related to aquatic systems, including the implementation of the Aquatic Conservation Strategy identified in the Forest Plan, as adopted from the Northwest Forest Plan Record of Decision. The AREMP monitoring effort determines present watershed condition every five years for every 6th-field watershed (with greater than 25% federal ownership along the stream length) based on upslope and riparian data derived from GIS layers and satellite imagery. In-channel attributes are also measured each year in a subset of watersheds to supplement the watershed condition assessments and validate the models used to assess stream condition. AREMP also tracks changes in watershed condition over time; and reports on the Northwest Forest Plan’s effectiveness across the Northwest Forest Plan area. The draft 15 year monitoring report⁶ stated, “An evaluation of upslope and riparian (watershed-wide) conditions for all 1,379 sixth-field watersheds in the Northwest Forest Plan area with significant federal ownership was based on mapped data, e.g., road density, based on Forest Service and Bureau of Land Management geographic information system (GIS) road layers, and vegetation data, e.g., tree canopy cover, derived from satellite imagery. Watershed-wide condition scores were calculated for 1994 and 2008, and the difference in these scores was used to represent trend. Regarding status, the overall condition scores of the 1,379 watersheds mostly fell into the low (21 percent), moderate (27 percent) high (26 percent), and very high (22 percent) categories; relatively few watersheds scored in the very low (4 percent) category. The majority of watersheds (69 percent) had a positive change in condition scores (trend). Of those with larger positive changes, most were driven by both improvements in road (decommissioning) and vegetation (natural growth) scores. The greatest negative score changes were caused by the Biscuit Fire and other fires along the eastern side of the Cascades. Half of the fire affected watersheds were in congressional reserves, 35 percent in late-successional reserves, and 15 percent in “matrix” (lands identified for timber production).”

During the 2012 field season (June through September) AREMP crews surveyed 194 sites in 28 watersheds for invasive species through the Northwest Forest Plan area. No watersheds were sampled on the Forest.⁷

Further Action Required: None.

Other Monitoring – Klamath River Water Temperature

Objective: Monitoring water temperature

⁵ <http://www.reo.gov/monitoring/reports/watershed-reports-publications.shtml>,
http://www.reo.gov/monitoring/reports/watershed/aremp/wshed_loc_map.htm

⁶ The findings and conclusions in this report are in press and subject to change prior to formal dissemination by the agencies and should not be construed to represent agency determination or policy.

⁷<http://www.reo.gov/monitoring/reports/2012%20AREMP%20Tech%20Rpt%201.9%20MB.pdf>

Methodology: In conjunction with information from the water temperature monitoring program, streamflow monitoring can be used to model and better understand thermodynamics in the Klamath River; and can be used to plan fisheries restoration projects such as restoration, enhancement, and creation of cold-water summer thermal refugia that facilitate salmon and steelhead survival in hot periods when water quality in the Klamath River becomes sub-optimum or lethal for salmonids.

Results: Seven sites on the Klamath River and 105 sites on Klamath River tributaries were surveyed in 2012 and the resultant data will be analyzed to establish existing baseline aquatic habitat conditions, to determine fish species distribution, and to estimate fish species abundance. Stream survey information will be used to plan and assess the effects of restoration forestry, will be used to plan and assess effects of upslope watershed restoration, and will be used to plan and assess effects of fisheries restoration projects.

Further Action Required: None.

Visual Resource Management

Trends: Visual Condition & Scenic Character

Objective: Determine the trends of Forest-wide Visual Condition (existing visible disturbances) and Scenic Character (the historic, ecologically established scenic identity) every 10 years.

Methodology: In 2012, informal observation of visual condition and scenic character was performed by Forest landscape architects. These informal observations took place during over 40 field days in 2012, when Forest landscape architects traveled to, and then evaluated numerous Forest projects across the Forest. This informal observation has occurred continuously even before the Forest Plan, primarily on vegetation manipulation project areas as viewed from the Forest Plan's sensitive viewpoints. Field photography of visual condition and scenic character occasionally accompanies these informal observations.

Results: Informal observations confirm two long term, Forest-wide scenery trends: an improvement of Visual Condition (fewer visual disturbances); and a decline in Scenic Character (historic attractiveness and sustainability).

Visual Condition, as a measure of visible disturbances, has been steadily improving with the reduction in large clearcut disturbances typical of the 1980s and 1990s, and the natural revegetation and restoration of these and other scenery disturbances. Forest programs have produced fewer scenery disturbances since that time, through less intensive activities such as forest canopy thinning and understory fuels reduction.

In contrast, Scenic Character (the ecologically established scenic identity) has steadily declined for many decades across the forest as forest canopies have become increasingly dense and uniform due to wildfire suppression within this wildfire adapted ecosystem. This has reduced the historic variety of scenic vegetation patterns and diminished the presence and attractiveness of vegetation scenery attributes. Attractive large trees are increasingly weakened from forest canopy overcrowding while spatial and species variety has also been substantially reduced. Additional adverse impacts to the historic scenic character are becoming more likely, due to the increasing risk of uncharacteristically large and intense vegetation disturbances from wildfires, insect and disease events. Ecosystem restoration projects

in recent years have reversed Scenic Character decline within relatively small but ecologically strategic areas of the Forest.

Further Action Required: Visual Condition and Scenic Character can be improved through forest health projects that increase both the attractiveness and ecological resilience of forest vegetation. Forest projects will continue to be designed to address these opportunities. Formal monitoring of Visual Condition and Scenic Character trends as specified in Chapter 5 of the Forest Plan, Table 5-1, has not been performed, and will not be performed in 2013 because existing Visual Condition and Scenic Character condition trends are stable, and project level information about these conditions is adequate to support Forest Plan desired scenery conditions within upcoming project areas for several years.

Visual Quality Objectives

Objective: Determine compliance with Forest Plan Visual Quality Objectives (VQOs), every three to five years.

Methodology: Forest landscape architects regularly perform informal monitoring of compliance with VQOs as part of project analysis. These observations usually include site visits and field photography.

Results: Based upon informal monitoring described above, the frequency of project compliance of Forest Plan VQOs appears to be very high, about 95%.

Further Action Required: Since informal monitoring indicates a high degree of Forest Plan VQO compliance, formal monitoring of VQO compliance is not necessary and will not be performed. Informal monitoring of Forest Plan VQO compliance will continue in 2013 and beyond.

Wilderness

Forest Plan Consistency

Objective: Use the Limits of Acceptable Change (LAC) concept to refine future wilderness management direction.

Methodology: Informal field observation of compliance with Forest Plan wilderness standards and guidelines was performed by Wilderness Rangers and District Recreation Officers. Monitoring of wilderness campsites was conducted on Forest Wilderness areas in 2009 and 2010, and will continue on a 5 year cycle. Information stations were installed at wilderness trailheads in 2010 and 2011 to better inform wilderness visitors of wilderness values, local resource issues, and methods to reduce wilderness impacts. Solitude (encounter) monitoring was conducted in 2012 within the Marble Mountain and Russian Wilderness areas.

Results: Observations have enabled Forest Wilderness managers to identify needs and develop strategies to protect wilderness character. The LAC and the Recreation Opportunity Spectrum (ROS) management tools identified in the Forest Plan are in need of refinement during Forest Plan revision to better support the achievement of desired wilderness conditions.

Further Action Required: Monitoring of the Forest's Wilderness areas in 2013 is expected to focus on invasive plant species.

Lands Program Management

Objective: Determine if land adjustments have increased administrative efficiency, and whether Forest outputs are adversely affected.

Methodology: Since 2002 the Forest has acquired 840 acres in five parcels. No parcels were acquired in 2012.

Results: About 4-½ miles of Forest boundary has been eliminated since 2002, reducing the total miles of landline that requiring location and posting.

Further Action Required: None.

Timber Management

Growth and Yield Projections

Objective: Determine if growth and yield projections for silvicultural prescriptions are occurring as projected.

Methodology: The Region 5 Remote Sensing Laboratory maps and monitors vegetation throughout the Region. Lab personnel use baseline inventory maps in conjunction with inventory plots to assess the vegetation resources and associated uses such as forest health, timber volume and growth, wildlife habitats, old growth forests, watershed conditions, and surface fuel mapping. The Forest was inventoried in 2004 and updates were done in 2007 using Landsat photos and validated by the Province Ecologist.

Results: Growth projections are in line with Forest Plan expectations.

Further Action Required: None.

Wildland Fire Effects on Plantations

Objective: Determine average rate of loss of plantations to wildland fire.

Methodology: Locations of plantations from FACTS were overlaid with fire boundaries of wildfires that burned in 2012

Results: Approximately 1,044 acres of plantation (mostly 1987 fire salvage) were impacted by the Goff Fire. Severity was mixed, with perhaps 30% of the trees within those areas surviving.

Further Action Required: None will be taken. Plantations are within the Kangaroo Backcountry Semi-Primitive Non-motorized area.

Dispersal of Harvest Openings

Objective: Ensure that spacing of harvest openings conforms to Regional policy and Forest Plan direction.

Methodology: The Forest Plan modeled Green Tree Retention (GTR) harvest as the primary silvicultural system to be implemented on the Forest. This prescription has been used only sparingly on the Forest since the adoption of the Plan. Understory thinning, the primary prescription for timber harvest, does not create openings in the forest canopy. Large openings due to timber harvest are rare and spacing is not an issue. For this reason, no monitoring has been conducted.

Results: N/A

Further Action Required: None.

Timber Stand Improvement

Objective: Determine success of release and stand improvement practices to meet desired future condition.

Methodology: The Forest pre-commercially thinned 3,228 acres of wild stands and plantations combined and released 2,898 acres of plantations in 2012. These stands were inspected to validate that the prescriptions were appropriately applied. Monitoring consisted of placing plots in many of the stands and recording spacing of the trees and the amount of competing vegetation removed. Other stands were inspected by a visual walk-through method to determine if treatments met standards. The stands take a number of years to respond to the treatments after being suppressed for a period of time, so immediate measurement of the plantations would not yield an increase in growth.

Results: 100% of treated stands met the required standards.

Further Action Required: None.

Other Monitoring Efforts – Timber Marking, Reforestation Success, and Sale Implementation

Timber marking is reviewed by Forest check cruiser for conformance with Timber Theft Plan. Reforestation success was monitored through survival surveys and certification of planted stands. Post-sale treatments required under contract were monitored by sale administration personnel and reviewed by an audit team from the Supervisor's Office.

Other Monitoring Efforts – Site Preparation and Reforestation Targets

In 2012 the Klamath planted 2,829 acres. Species planted included ponderosa pine, Douglas fir, sugar pine, incense cedar, and white fir. First year survival averaged 66% and third year survival averaged 47%. In anticipation of the 2013 planting season, 335 acres of forest land were prepared for planting.

Other Monitoring Efforts – Timber Targets

Allowable Sale Quantity (ASQ), reforestation, and timber stand improvement activity accomplishments are derived from data in the Planned Timber Sale Accomplishment Report, the Forest Service Activity Tracking System, and the yearly Plantation Survival Report. The Forest offered about 63,278 hundred cubic feet (CCF) of timber and convertible products in FY 2012. This exceeded the assigned target of 55,000 CCF by about 15%. All five sales offered were sold with an average over-bid value of \$17,407. The volume offered for sale includes sawlogs, biomass, posts, poles and firewood produced through a combination of forest management activities, including thinning, sanitation, salvage, and fuelwood and post and pole cutting.

The annual reforestation program fluctuates, dependent largely on wildfire and post-fire salvage and fuels treatment. Of the recent fires salvage/planting projects, the Caribou is still ongoing. Planting on Panther and Mt Hebron is complete. Planting and subsequent release on burned sites where fire-killed trees are not removed continue to pose a management challenge; The immediate threat of falling trees and the development of substantial fuel loading as the result of fallen fire-killed vegetation render many of these sites impractical to manage. Planting is scheduled for FY13 on approximately 330 acres.

Other Monitoring– Loss of trees to wildfire

Region 5 annually tracks the acreage where trees have been lost to wildfires, concentrating on fires that burn more than 1,000 acres of National Forest forestland. There was one fire in this size category on the Forest in 2012. A summary of past monitoring efforts is located on the web at <http://www.fs.fed.us/r5/rsl/projects/postfirecondition>.

Fire Management

Fire Suppression

Objective: Primary objective is to meet Fire Fighter Line Production Capability (FFPC). Also to assure there is compliance of the initial attack’s 90th percentile objective.

Methodology: Number of fire starts and escapes were analyzed.

Results: The first fire on the Klamath National Forest this season was a human caused fire on January 11th. A lightning storm across Northern California started the first of a series of fires on July 20th thru August 19th. The number of fires increased this year from 39 in 2011 to 45 in 2012. There were 15 lightning and 30 human caused fires. Burned acres this year on the Klamath totaled 21,665. Lightning burned 21,448 acres and Human caused fires accounted for 217 acres.

There were two significant incidents this year on Forest:

Dillon fire started August 3rd and was managed by the Forest Type 3 Team (Lindstrand) with mentoring from Nor Cal Type 2 (Whitcomb). Human caused, 136 acres on the Klamath and 182 on the Six Rivers National Forest. No threat to structures.

Fort Complex started August 5th. Lightning caused, starting four fires within the complex. One was on the Forest (California); three were on the Rogue Siskiyou National Forest (Oregon). The Goff Fire within the Fort Complex burned 21,395 acres on Forest and 888 acres on the Rogue Siskiyou National Forest. Type 1, 2, 3, and 4 Incident Management Teams were used. The Goff Fire was a significant threat to structures in the communities of Fort Goff and Seiad. No structures were lost.

Weather conditions this fire season were dry with temperatures exceeding low 100s for six consecutive days and precipitation 79% of normal for Yreka. Although lightning storms were dramatic, almost all were accompanied with precipitation.

Further Action Required: None.

Prescribed Fire Program

Objectives: Determine effectiveness of prescribed burn program in reducing wildfire effects. Monitor conditions of fire severity within a range of vegetation types.

Monitoring and Results: The target assigned to the Forest for hazardous fuels reduction was 14,290 acres for FY12. 15,401 acres were accomplished, the most acres per Forest in the region giving the Forest the “Golden Drip Torch” award. The “Unified” target consists of mechanical and prescribed burning. 4,033 acres of prescribed burning included pile and underburning, about 26% of the accomplishment. 9,277 acres included thinning and piling, about 60% of the accomplishment. 2,092

acres of yarded material was credited to the biomass utilization accomplishment. Although our primary focus is on Wildland Urban Interface (WUI), about 31% was treated this year. Most years the Forest strives for at least 50 to 60% in the WUI.

Further Action Required: None.

Other Monitoring Efforts – Post-Fire Tree Regeneration and Vegetation Recovery

Objective: Assess post-fire tree regeneration and vegetation recovery in five-year-old fires with greater than 50 percent deforested condition. The Forest is coordinated with the Region 5 Ecology Group and Ecosystem Management through this project to monitor natural seedling regeneration from the 2006 fires. This is part of a region wide monitoring effort to determine natural regeneration success rates.

Methodology: A seasonal field crew supervised by the Province Ecologist collected post-fire regeneration data on the 2007 China-Back Complex, Oak Knoll Ranger District, and the 2007 Elk Complex, Happy Camp Ranger District, Klamath National Forest. 70 plots in each fire were installed to assess the natural regeneration of forest tree species and plant community structure. The goal of this study is to better understand forest recovery and regeneration processes following high severity fires in order to help inform management decisions and strategies on National Forest System lands.

Results: The data is currently being analyzed as part of a larger suite of post-fire data from throughout R5. Results are pending. Results will be both provided to the Forests as summary reports and published in peer-reviewed journals.

Further Action Required: Results from the report will be reviewed by the Province Ecologist to determine whether further action in future years is required.

Other Monitoring Efforts - Fire Ecology, misc.

The Forest, in coordination with the Pacific Southwest Research Station, is currently analyzing post fire effects data collected from fires of the 2006 and 2008 fire seasons. Two peer-reviewed papers are expected in 2013 and results will be presented to various groups and at multiple events.

The Fire, Fuels, and Ecology Programs on the Forest have also done treatment effectiveness monitoring on numerous projects, including prescribed burns. We are currently using the Firemon-Feat Integration (FFI) ecological monitoring tool. This program has allowed us to meet some major goals including standardizing the collection, analysis, and results of our data along with creating a cooperate database for our monitoring projects.

SEE: *Biological Diversity* section, *Other Monitoring - Sugar Creek Research Natural Area (RNA)*, for discussion of assessment of fuel levels and fire threat to populations of rare conifers.

Range Management

Range Health

Objective: Determine vegetative ecological condition and trend.

Methodology: Range health and forage availability are monitored through a combination of methods that look at utilization, riparian condition, and vegetative trend. Monitoring methods include landscape analysis, ocular estimates, paired plots, photo points, and stubble height, green line and species frequency. All these methods were used to evaluate conditions on key areas (sites that represent allotment conditions, or are indicators of a specific habitat type, such as riparian reserves). Four Multiple Indicator Monitoring (MIM) plots were read on grazed riparian streams to monitor condition

and trend in selected riparian areas. Best Management Practices Effectiveness Program evaluations were conducted on four allotments.

Results: Range health (ecological condition) on permitted allotments is generally good, with a stable or upward trend on most sites.

Further Action Required: None.

Permitted AUMs

Objective: Compare permitted to Forest Plan projected Animal Unit Months (AUMs).

Methodology: The Forest Plan projected that the Forest would support 34,000 AUMs. Actual use is tracked by billing documents and allotment inspections.

Results: Permitted use was 17,661 AUMs and actual use of 15,313 AUMS.

Further Action Required: None.

Wild Horse Management

Objective: Determine number of wild horses and territory expansion.

Methodology: None conducted. Population numbers are estimates based on observation, with adjustments made using knowledge of history of herd dynamics and removal efforts.

Results: Current estimates are 105 head for McGavin Peak (target of 0 animals) and 20 for Three Sisters (target of 20 animals). No horses were removed in 2012.

Further Action Required: Removal of horses to meet target populations is subject to availability of funding and scheduling with the Bureau of Land Management (BLM).

Riparian Health

Objective: Assure that riparian objectives are in Annual Operating Instructions and that standards and guidelines are met.

Methodology: Allotment Management Plans, Grazing Permits, and Annual Operating Instructions were reviewed to determine whether Aquatic Conservation Strategy and Riparian Health objectives have been included.

Results: All documents reviewed had satisfactorily incorporated guidelines to address Aquatic Conservation Strategy and riparian health objectives.

Further Action Required: None.

Forage Availability

Objective: Determine compliance with Forest Plan standards and guidelines for forage utilization.

Monitoring: The Forest has a total of 47 allotments, of which 37 were active in 2012; of the active allotments, 137 key areas and seven non-key areas were monitored on 32 different allotments.

Results: 138 of 144 monitored areas met resource standards. Resource standards were not on six individual plots on six allotments. Annual Operating Instructions compliance was met on 35 of the 37 active allotments. In each case, a Forest Service range specialist met with the permittee to resolve the situation. Non – use for resource protection was instituted on one allotment. Annual Operating Instructions were adjusted in all cases.

Further Action Required: None.

Implementing Range Project Decisions

Objective: Ensure that Range Project Decisions include standards and guidelines and that the standards are implemented.

Monitoring: The Forest initiated left side analysis (project development) on four allotments during fiscal year 2012; these will be completed in 2013.

Results: When complete, decisions on these allotments will incorporate standards and guidelines from the Forest Plan. To date the Forest has completed NEPA analyses and made decisions on 35 of 45 allotments, all of which have incorporated standard and guidelines from the Forest Plan into the Allotment Management Plans and Annual Operating Instructions for the allotments.

Further Action Required: None.

Noxious Weeds

Noxious weeds are in a separate section, following Range Management.

Table 15 - Forest Range Monitoring Data Summary for 2012

Allotment Name	# of Key Areas	# of Key Areas Monitored	# of Non-Key Areas Monitored	Monitoring Method	Cooperative Monitoring Plan w/ Permittee (Y or N)	Data Source	# Met Resource Standards	# Not Meeting Resource Standards	Results shared w/ Permittees (Y or N)	Permittee cooperation (Y or N)	AOI Compliance (Y or N)	Actions Taken or Remarks
Ball Mountain-Kuck's	7	7	0	LA-7,ST-5	N	FS	6	1	Y	Y	Y	Met w/ permittee change in pasture movement
Bogus	4	4	0	ST-1,LA-3	N	FS	4	0	Y	Y	Y	Copy of report shared w/permittee
Bray	8	8	0	LA-8	Y	FS,P	8	0	Y	Y	Y	Copy of report shared w/permittee
Butte Valley NG	17	17	0	LA-17	N	FS	16	1	Y	Y	Y	Met w/ permittee change in pasture movement, Rest Unit
Deer Mountain	5	5	0	LA-5	N	FS	5	0	Y	Y	Y	Copy of report shared w/permittee
Dry Lake	6	6	0	LA-6	N	FS	6	0	Y	Y	Y	Copy of report shared w/permittee
East Red Rock	11	11	0	LA-11	N	FS	11	0	Y	Y	Y	Copy of report shared w/permittee
Haight Mountain	8	8	0	ST-2,LA-6	N	FS	8	0	Y	Y	Y	Copy of report shared w/permittee
Horsethief	8	8	0	ST-1,LA-7	N	FS	8	0	Y	Y	Y	Copy of report shared w/permittee
McGavin Peak	4	4	0	LA-4	N	FS	4	0	Y	Y	Y	Copy of report shared w/permittee
Mount Hebron	3	3	0	LA-3	N	FS	3	0	Y	Y	Y	Copy of report shared w/permittee
Orr Lake	6	6	0	LA-6	N	FS	6	0	Y	Y	Y	Copy of report shared w/permittee
Panther/Ball Mountain	8	8	0	LA-8	N	FS	7	1	Y	Y	Y	Met w/ permittee change in pasture movement
Red Rock	5	0	0	LA-5	N	FS	0	0				In Non use
Shafter	6	6	0	LA-6	N	FS	6	0	Y	Y	Y	Copy of report shared w/permittee
Three Sisters	8	8	0	LA-7	N	FS	8	0	Y	Y	Y	Copy of report shared w/permittee
Ash Creek	0	0	0		N				Y			NON-USE
Big Flat	4	0	0									VACANT
Big Meadows	2	2	0	LA-2,CY-1,	Y	FS	2	0	Y	Y	Y	Copy of report shared w/permittee
Big Ridge	6	2	0	MIM-1,LA-1, G24-1	Y	FS	2	0	Y	Y	Y	Copy of report shared w/permittee
Boulder Creek	4	3	0	LA-3	N	FS	3	0	Y	Y	Y	Copy of report shared w/permittee
Carter Meadows	4	2	1	LA-3	N	FS	3	0	Y	Y	Y	Copy of report shared w/permittee
Cuddihy	3	0	0								Y	VACANT
Deadwood	0	0	0		N	FS			Y	Y	Y	Copy of report shared w/permittee
Dry Lake (west-side)	3	0	0		N	FS			Y	Y	Y	Copy of report shared w/permittee

Allotment Name	# of Key Areas	# of Key Areas Monitored	# of Non-Key Areas Monitored	Monitoring Method	Cooperative Monitoring Plan w/ Permittee (Y or N)	Data Source	# Met Resource Standards	# Not Meeting Resource Standards	Results shared w/ Permittees (Y or N)	Permittee cooperation (Y or N)	AOI Compliance (Y or N)	Actions Taken or Remarks
Eagle Creek	4	3	0	LA-2,CY-1	N	FS	3	0	Y	Y	Y	Copy of report shared w/permittee
East Beaver	4	2	0	LA-2,CY-1	N	FS	2	0	Y	Y	Y	Partial non-use, Copy of report shared w/permittee
East Fork	2	1	0	LA-1,CY-1	N	FS	1	0	Y	Y	Y	Copy of report shared w/permittee
Etna Creek	3	1	1	CY-1,LA-1	N	FS	2	0	Y	Y	Y	Copy of report shared w/permittee
Granite/Fox	3	0	0									VACANT
Grouse Creek	2	1	0	LA-1,G24-1	N		0	1	Y	Y	N	Permittee called to remove cattle, AOI will be changed for next year.
Horse Creek	3	1	0	G24-1	N	FS	1	0	Y	Y	Y	Copy of report shared w/permittee
Hornbrook	0	0	0		N					Y	Y	Copy of report shared w/permittee
Indian Creek	1	1	0	LA-1	N	FS	1	0	Y	Y	Y	Copy of report shared w/permittee
Kidder Creek	3	0	0									VACANT
Lake Mountain	1	1	1	LA-2,G24-1	N	FS	1	1		Y	Y	Copy of report shared w/permittee
Little North Fork	4	1	0	LA-1	N	FS	1	0	Y	Y	Y	Copy of report shared w/permittee
Marble Valley	2	0	0		N					Y	Y	Copy of report shared w/permittee
Middle Tompkins	4	0	0									VACANT
Mill Creek	4	3	2	LA-5,MIM-1	N	FS	4	1	Y	Y	N	Permittee called to remove cattle, AOI will be changed for next year.
Red Rock Valley	3	0	0		N	FS			Y	Y	Y	Copy of report shared w/permittee
S. Klamath	2	0	0									VACANT
Seiad Johnny	2	0	0									VACANT
Shackleford	4	2	0	LA-2,MIM-1	N	FS	2	0	Y	Y	Y	Copy of report shared w/permittee
Shelly Meadows	3	1	1	LA-2,MIM-1	N	FS	2	0	Y	Y	Y	Copy of report shared w/permittee
South Fork Saloon	4	0	0									VACANT
South Russian	3	1	1	LA-2	N	FS	2	0	Y	Y	Y	Copy of report shared w/permittee
TOTALS	201	137	7		3		138	6	35	Y=37; N=0	Y=35; N=2	

Note that the information presented in this table is summary data (only) from a larger data set. ACRONYMS: # (number), AOI (Annual Operating Instructions), CY (Comparative Yield), FS (Forest Service), G24 (Best Management Practices Effectiveness), LA (Landscape Appearance Herbaceous), MIM (multiple indicators monitoring), No (no), P (permittee), ST (Stubble Height), Y (yes)

Noxious Weeds

Objective: Determine if noxious weeds have increased to damaging levels.

Methodology: The Forest has a Noxious Weed and Non-native Invasive Plant list of 45 species, 30 of which are high priority species for control. Even small levels of weeds are a concern, as they increase very rapidly, and then become uncontrollable. The Forest has adopted a strategy of treating high priority weed species in high priority places BEFORE they get to damaging levels, where possible.

Our primary focus is to keep our wilderness areas free of noxious weeds by making prevention practices paramount; treat what few noxious weeds exist in wilderness; and continue with inventory to detect new infestations within wilderness. Treatment of infestations outside wilderness then occurs by priority, determined by proximity and dispersal ability to wilderness, and the rating of the species.

In 2012, there was one main crew of two people based out of Yreka who inventoried and treated weed species by hand, non-chemically. The Forest also has a small dedicated force of employees that contribute in many significant ways to the weed treatment program. This cadre includes: District Botanists, a small YCC crew at Goosenest District; a very active river ranger and volunteers at Happy Camp that treat river corridors; fire crews, and range and recreation technicians. We sustained a loss of funding for the YCC crew and crew leader at Happy Camp that had been present the past several years. The Forest also has community partners: the Salmon River Restoration Council, the Mid-Klamath Watershed Council, Siskiyou County School groups, volunteers from USFWS and the Natural Resource Conservation Service, and the Out-of-custody Inmate crew from the Siskiyou County jail.

Effectiveness of treatment methods is measured on the first visit to the site the year following treatment, and then throughout the season on return visits. This evaluation is entered into the FACTS database.

The State-wide mapping project being implemented by the California Invasive Plant Council (Cal-IPC), funded by USDA State and Private Forestry resulted in prioritized eradication targets for Siskiyou County. The Forest and Weed Management Area Partners are currently writing grant proposals to fund these eradication targets. The information is available on-line at <http://calweedmapper.calflora.org/>

To reduce the risk of weed spread as a result of timber harvest activities, Scott River District developed and funded a KV (Knudsen-Vandenberg) Plan to address the risks of weed spread from the McBaldy Project within the Siskiyou mariposa lily Management Area (*Calochortus persistens*), a Candidate species for Federal listing as Endangered. The goal of this project is to both treat noxious weeds and to gather data on the effectiveness of hand-pulling weeds as mitigation for timber harvest and fuel reduction activities.

Results: In 2012, the Forest and partners treated 677 acres of 21 different species, on 261 sites in high priority areas that included fire areas, trailheads, river accesses, wilderness, roads leading to wilderness areas, watersheds with few infestations to date, small satellite sites away from main river corridors, and larger infestations of “A” rated weeds that carry mandatory eradication direction from the State. Some species, like spotted and diffuse knapweed are still present in

moderate to low amounts, but do not appear to be spreading further than known sites. Dyer’s woad, on the other hand, is a species that is prevalent on adjacent private lands, and is rapidly spreading throughout the Forest, along roads, river corridors, and anywhere there is disturbance (e.g. fire, timber harvest, mastication, or any activity that creates large openings in the canopy). Yellow starthistle is also quite prevalent in hotter, drier sites, and scotch broom is prevalent along the Klamath and Lower Scott watersheds.

Our Watershed Council partners have been instrumental in locating first sightings of new invaders in their respective watersheds. Plumeless thistle and oblong spurge are being actively treated as the newest and least prevalent species in the County, due to the vigilance of our partner efforts.

Table 16 - Dyer's Woad Monitoring, McBaldy Timber Sale, Units 48 and 96 following the second year of treatment

Unit 48		
Year	Total Number of Plants	Comments, if any
2010	N/A	No total count was taken for 2010
2011	211	
2012	1057	Mature flowering plants only were counted and treated by CCC crew. Unit 48 was partially logged prior to the 2012 treatment. The areas where more plants were found is also where there was roadwork completed on the temporary road; however, there was no significant increase of the infestation within the unit itself.
Unit 96		
Year	Total Number of Plants	Comments
2010	110	
2011	339	
2012	3966	Mature flowering plants only were counted and treated by CCC crew. Unit 96 has NOT been logged yet. We often see sudden expansion in number of Dyer's Woad plants after a few years of infestation.

The USFWS initiated environmental analysis for the treatment of Leafy spurge on private lands, which included the use of chemicals for treatment. The Forest has been a partner in the analysis process, assisting with information on the effectiveness of non-chemical control for that species.

Further Action Required: Although no action is required, the KNF is considering a Forest-wide EIS for the treatment of non-native invasive species, especially for the protection of *Calochortus persistens*, a Candidate species and other rare plant species and sensitive habitats. The completion of a Forest strategy, and adoption of prevention BMPs are also management goals. We will also continue our efforts to build partnerships and find opportunities for outside funding sources to support this program.

Cultural Resource Management

Heritage Resources - Sites

Objective: The purpose of monitoring is to identify effects to heritage resources and provide appropriate mitigation in the event that effects are adverse. It is extremely important that adverse effects to significant sites are recognized and mitigated before the sites lose the information and integrity that makes them eligible for the National Register of Historic Places (NRHP). Monitoring also aids in determining whether mitigation measures are working to address adverse effects and stabilize sites.

Methodology: Site monitoring is a necessary component of the process required to comply with Section 106 of the National Historic Preservation Act (NHPA). As part of the project review process, previously recorded historic properties within the Area of Potential Effect (APE) are identified and monitored for past effects as well as to identify any potential effects that may occur as a result of project implementation. Site monitoring is also required under Section 110 of the NHPA as part of a pro-active heritage program. Sites are monitored to assess current conditions, identify past or on-going effects, and to determine appropriate mitigation measures. Monitoring information can also be used to update site records and assist in the nomination of the site to the National Register.

Results: Approximately 71 sites were monitored last year to identify effects from project implementation, environmental conditions, OHV use, wildland fire and fire suppression activities, and looting. Monitoring data gathered from these sites aided the Forest in providing information during consultation with the State Historic Preservation Officer and interested Tribal officials. This information was also used to update site records, assess NRHP eligibility and develop mitigation. Monitoring related to project planning and implementation (Section 106) occurs for every project the Forest develops. Monitoring completed in compliance with Section 110 has increased due to a greater focus on non-project related accomplishments and appropriate budget allocations. The Forest continues to meet Heritage program objectives and targets established by the Region.

Further Action Required: Continue updating the heritage database with monitoring information. Monitor more sites for Section 110 compliance.

Planning

Forest Plan Modeling

Objective: Validate assumptions used in the Forest Plan to predict impacts to resource programs including visual, wildlife, and earth sciences.

Monitoring, Results, & Future Action Required: See preceding discussions for each resource area or program, including *Visual Resource Management*, *Wildlife*, *Geology*, *Soils*, *Water Quality*, and *Air Quality*.

Program and Budget

Objective: Determine actual costs associated with implementing planned management prescriptions as compared with costs estimated in the Forest Plan

Methodology: Forest budget and annual budget projections are tracked.

Discussion: The economic analysis for the environmental impact statement for the Forest Plan focused on the impact of each alternative on the Present Net Value (the estimate of the market value of forest resources after all costs have been subtracted). Program budgets have fluctuated according to a variety of Congressional laws and earmarks, and court requirements (Northwest Forest Plan, Herger-Feinstein Act, Lake Tahoe Deliverables, Southern California Forest Plan revisions, Northwest Forest Plan Settlement Agreement, Fire Transfer, etc.). A recap of the Forest budget indicates that, since 1995, most resource program budgets have been stable or declining, with timber management fluctuating between high and low points, fire stabilizing after several years of expansion, and fuels declining, like most other resources.

Further Action Required: None.

Additional Monitoring – Outputs: Timber Harvest and Fuels Treatments

Objective & Monitoring: Compare the acres of timber harvest and fuels treatments, as modeled for the Forest Plan, with actual accomplishments on an annual basis.

Results: In the Forest Plan, timber harvest from regulated lands was modeled at an average of 51 million board feet (7.6 million cubic feet) per year over the first decade (1995-2004). This amount of timber harvest was intended to be accomplished on only 4,040 acres primarily using green tree retention prescriptions to accomplish this goal. However, since 1998, timber harvest has been achieved primarily through thinning instead of green tree retention methods. As a result, the intensity of timber harvest treatments has been reduced, and treatments are required over a larger amount of acres to achieve the same volume of timber removal. Since the Forest Plan was approved, the Forest has achieved or exceeded its annual FY timber target six times (1996, 1997, 2009, 2010, 2011, and 2012). For FY 2012, the Forest offered 63,278 CCF for sale, which exceeded the timber target by 15%.

The Forest Plan modeled timber harvest from unregulated lands (where trees are harvested solely to achieve goals of ecosystem health) at about 6,000 to 12,000 acres per year, while unregulated lands are not programmed and are generally incidental. During FY 2012, commercial harvest from regulated and unregulated lands was from about 2,170 acres.

The Forest Plan modeled fuels treatments at about 27,000 acres per year, including 9,375 acres of prescribed fire, 3,183 acres of timber-related treatments, and 14,550 acres of other fuels treatments (e.g. mastication). In 2012, the Forest treated a total of 11,826 acres, including 975 acres of under-burning. Other fuels treatments included: piling of fuels, hand or machine; rearrangement of fuels; thinning for hazardous fuels reduction; yarding; burning of piled materials; wildlife habitat prescribed fire; and natural fire ignition. Of the total acres of fuels treatments, 7,457 acres were timber-related.

Further Action Required: Annual comparisons will be continued for FY 2013.

Abbreviations and Acronyms

Forest Plan	Klamath National Forest Land and Resource Management Plan, 1995 as amended
Forest	Klamath National Forest
MER	Monitoring and Evaluation Report

Geology

GIS	Geographic Information System
SIA	Special Interest Areas

Soils and Water Quality

BMPs	Best Management Practices
BMPEP	BMP Effectiveness Program
MWMT	Maximum Weekly Maximum Stream Temperature
NEPA	National Environmental Policy Act

Air Quality

GIS	Geographic Information System
GTR	General Technical Report
HUC	Hydrologic Unit Code

Biological Diversity

RNA	Research Natural Area
TEUI	Terrestrial Ecological Inventory

Sensitive Plants

EIS	Environmental Impact Report
FS	Forest Service
USFWS	United States Fish and Wildlife Service

Wildlife

BBS	Breeding Bird Survey
GSM-based	Global System for Mobile Communications
LSR	Late Successional Reserve
MAP	Monitoring Avian Production and Survivorship
NRIS	Natural Resource Information System
NSO	northern spotted owl
USFWS	United States Fish and Wildlife Service

Fisheries Management

AREMP	Aquatic and Riparian Effectiveness Monitoring Plan
CWT	coded wire tag
DPS	distinct population segment
EIR	environmental impact report
GIS	Global Positioning System
IGH	Iron Gate Hatchery

KMP	Klamath Mountain Province
RCDs	Resource Conservation Districts
SRRC	Salmon River Restoration Council
TMDL	Total Maximum Daily Load

Visual Resource Management

VQO	Visual Quality Objective(s)
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Wilderness

LAC	Limits of Acceptable Change
ROS	Recreation Opportunity Spectrum

Timber Management

ASQ	Allowable Sale Quantity
GTR	Green Tree Retention
N/A	not applicable

Fire Management

FFI	Firemon-Feat Integration
FFPC	Fire Fighter Line Production Capability
WUI	Wildland Urban Interface

Range Management

AUMs	Animal Unit Months
BLM	Bureau of Land Management
CY	Comparative Yield
LA	Landscape Appearance Herbaceous
MIM	Multiple Indicator Monitoring
NEPA	National Environmental Policy Act

Noxious Weeds

BMPs	Best Management Practices
Cal-IPC	California Invasive Plant Council
EIS	Environmental Impact Report
FACTS	national natural resource database
USDA	United States Department of Agriculture

Cultural Resource Management

APE	Area of Potential Effect
NHPA	National Historic Preservation Act
NRHP	National Register of Historic Places
OHV	off highway vehicle

Planning

CCF	one hundred cubic feet
GTR	Green Tree Retention