

USDA FOREST SERVICE

# Fiscal Year 2015 Monitoring and Evaluation Report

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Klamath National Forest

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This report is located on the Forest Service website at:

[http://www.fs.usda.gov/detail/klamath/landmanagement/planning/?cid=fsm8\\_049843](http://www.fs.usda.gov/detail/klamath/landmanagement/planning/?cid=fsm8_049843)

# Klamath National Forest FY 2015 Monitoring and Evaluation Report

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# Introduction

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The 1995 Klamath National Forest Land and Resource Management Plan<sup>1</sup> (Forest Plan), as amended, provides a list of monitoring projects that are intended to be conducted on a regular basis. This Fiscal Year 2015 (FY 2015) Monitoring and Evaluation Report documents the evaluation of monitoring information related to the Forest Plan from October 1, 2014 through September 30, 2015. 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 and the resources discussed within it closely follow the format of the Monitoring and Evaluation Requirements outlined in Chapter 5 of the Forest Plan (p. 5-11 through 5-14). Each resource section identifies monitoring objectives, methodology, analysis results, and further action required, as applicable.

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.

## Geology

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### A. Landslides

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

**Methodology:**

#### **Testing assumptions for landslide rates**

The landslide-producing storms in July 2015<sup>2</sup> provided an opportunity to test assumptions about the landslide processes in fire-affected areas. The Music Creek, Walker Creek, Grider Creek, Beaver Creek and McGuffy Creek drainages experienced high intensity storm events on areas with high and moderate fire severity from the 2014 wildfires. There was also some reported mass wasting in the Little Deer fire area (Little Deer Mountain). Field review was completed after the storms by Forest watershed staff. The findings regarding mass wasting processes are documented in the *Preliminary Observations of Storm*

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<sup>1</sup> The Forest Plan, as amended, is located at: <http://www.fs.usda.gov/main/klamath/landmanagement/planning>.

<sup>2</sup> USFS. 2015. *July 2015 Storm Report*. Prepared by Jim Somerville and Greg Laurie for the Klamath National Forest.

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*Effects Music, Walker, Grider, Beaver, McGuffy Creeks and Little Deer Mountain* (de la Fuente, 2015)<sup>3</sup>. The report's findings will be compared to the US Geological Survey post-fire debris flow modeling that was used in the Burned Area Emergency Response (BAER) geology report for the Whites, Beaver and Happy Camp Fires (the model was not run for the Little Deer fire area). The comparison is intended to test if the model results and its assumptions are consistent with landslide rates seen during the July 2015 storm events.

The post-fire debris flow probability was estimated using the model developed by Cannon et al (2012)<sup>4</sup>. The model predicts the probability of a debris flow within a basin and the volume of debris/sediment that will be delivered to the mouth of the basin. The model uses the area burned with moderate and high soil burn severity, area with slopes greater than 30 percent, soil characteristics and storm intensity to predict the probability and volume of debris flows in defined basins. It was developed for use in the intermountain west. The assessment assumed a 10-year storm (10 percent probability of occurrence each year); this is typical of landslide-producing storm events under pre-fire conditions.

### **Effectiveness of Standards and Guidelines**

The Forest monitored the application of geologic standards and guidelines by conducting field reviews of the Goff Fire Fuels Reduction Project, Eddy Late Successional Reserve Habitat Improvement project, Horse Creek Road Improvement project and the Seiad Creek Road Stormproofing Phase I.

### **Results:**

#### **Testing assumptions for landslide rates:**

##### Model Results

The Whites Fire BAER geology report highlights two drainages that were predicted to have a very likely (greater than 90 percent) probability of a post-fire debris flow. There were eight watersheds that were predicted to be likely (between 50 and 90 percent probability) to experience post-fire debris flows. The two drainages with a very likely probability were Robinson Gulch and the headwaters of North Russian Creek. The eight drainages that had a likely probability were the north branch of Sawmill Gulch, Little China Creek, Cow Creek, Highland Creek, the two unnamed drainages to the west of Robinson Gulch and face drainages off of Snoozer Ridge, and a small face drainage between China Creek and Cow Creek.

The Happy Camp Complex BAER geology report highlights two drainages that were predicted to have a very likely (greater than 90 percent) probability of post-fire debris flows. There were five drainages that were predicted to be likely (between 50 and 90 percent probability) to experience post-fire debris flows. The two drainages with a very likely probability were East Walker Creek and the west facing slope of the main stem of Walker Creek. The five drainages that have likely probabilities are No Name Creek, Salt Creek, Louise Creek, O'Neil Creek and the Lower portion of Rancheria Creek.

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<sup>3</sup> de la Fuente, J. 2015. Preliminary Observations of Storm Effects Music, Walker, Grider, Beaver, McGuffy Creeks and Little Deer Mountain. USFS, Klamath National Forest report.

<sup>4</sup> Cannon, S., Gartner, J., Rupert, M., Micheal, J., Rea, A., and Parrett, C. 2012. *Predicting the Probability and Volume of Post-wildfire Debris Flows in the Intermountain Western United States*. Geological Society of America Bulletin.

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The Beaver Fire BAER geology report highlights two drainages with a likely probability of post-fire debris flow. These are the western fork of Kohl Creek and Polly Gulch. There were several watersheds where post-fire debris flows were probable (between 10 and 49 percent probability) including Fish Gulch and Marble Creek. The model did not result in any of the drainages in the Beaver Fire area having a very likely post-fire debris flow probability.

All of the BAER geology reports found that the prescribed road improvements would reduce the risk to infrastructure from landsliding by making the roads more resilient to debris flow and landslide processes. In other words, the roads were less likely to have crossings washed away with debris flows or to lose roadbeds down the hillslope due to landsliding.

### **Documented Storm Effects**

The *Preliminary Observations of Storm Effects Music, Walker, Grider, Beaver, McGuffy Creeks and Little Deer Mountain* (de la Fuente, 2015) found that there were post-fire debris flows in the Highland Creek drainage and the headwaters of Music Creek. There were also debris flows in East Walker Creek and in the face drainages along the west side of the main stem of Walker Creek. No Name Creek experienced a post-fire debris flow that blocked Grider Creek at the confluence. There was also a debris flow earlier in the winter in the Louise Creek drainage reported by district staff. Both Marble Creek and Fish Gulch had post-fire debris flows during the July 2015 storms.

It was unclear if Salt Creek experienced any channel scouring events or debris flows because there has been no field review of that area. McGuffy Creek was field reviewed because of reports of turbid water at the confluence with Scott River but no evidence of post-fire debris flow was present. Discussions with the staff at the Happy Camp Oak/Knoll Ranger District indicated that there were no debris flow events in the Elk Creek drainages, Horse Creek or China Creek drainages. Reconnaissance level review in August 2015 of the Thompkins Creek drainages showed no evidence of post-fire debris flow or channel scouring events.

The *Preliminary Observations of Storm Effects Music, Walker, Grider, Beaver, McGuffy Creeks and Little Deer Mountain* (de la Fuente, 2015) found that the BAER road treatments, where they were completed, did reduce the effects of the debris flows on the infrastructure. The rolling dips kept the water and debris in the stream channel, instead of being re-routed down the road. The armoring on the outside of the dips prevented the roadbed from being eroded away and dissipated the energy of the water on the hillslope as it left the roadbed.

### **Comparison of Model Results and Storm Effects**

The post-fire debris flow modeling predicted a very likely (greater than 90 percent) or a likely (between 50 and 90 percent) probability of debris flow events (assuming a ten year storm event) for 17 drainages in the 2014 wildfire perimeters (Table 1). There were five drainages that had a very likely or likely probability of debris flow that have confirmed post-fire debris flows. Ten of the watersheds with a very likely or likely probability did not experience debris flows. The remaining two drainages have not been field reviewed to determine if they had debris flows (undetermined). The ten watersheds that had an estimated high probability but did not have debris flows received relatively low intensity precipitation compared to what was assumed in the modelling.

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There were also three watersheds with between ten and 49 percent probability of debris flow that experienced a debris flow during the July storms. These watersheds experienced relatively higher intensity precipitation than was assumed in the modelling.

**Table 1: Comparison of modeled debris flow probability and field observations regarding debris flow events.**

Drainage	Probability	Debris Flow	Discussion
Robinson Gulch (Whites Fire)	Very Likely	No	The radar image indicates that the storm had relatively low intensity (inches per hour) precipitation. The storm intensity likely did not meet the criteria used in the model.
Headwaters North Russian Creek (Whites Fire)	Very Likely	No	The radar image indicates that the storm had relatively low intensity (inches per hour) precipitation. The storm intensity likely did not meet the criteria used in the model.
Sawmill Gulch (Whites Fire)	Likely	No	The radar image indicates that the storm had relatively low intensity (inches per hour) precipitation. The storm intensity likely did not meet the criteria used in the model.
Little China Creek (Whites Fire)	Likely	No	The radar image indicates that the storm had relatively low intensity (inches per hour) precipitation. The storm intensity likely did not meet the criteria used in the model.
Cow Creek (Whites Fire)	Likely	No	The radar image indicates that the storm had relatively low intensity (inches per hour) precipitation. The storm intensity likely did not meet the criteria used in the model.
Highland Creek (Whites Fire)	Likely	Yes	The radar images indicate that the most intense portion of the July 5, 2015 storm was over the Highland and Music Creek drainage.
2 drainages west of Robinson Gulch (Whites Fire)	Likely	No	The radar image indicates that the storm had relatively low intensity (inches per hour) precipitation. The storm intensity likely did not meet the criteria used in the model.
Music Creek (Whites Fire)	Probable	Yes	The radar images indicate that the most intense portion of the July 5, 2015 storm was over the Highland Creek Music drainage.
Drainage between Cow and China (Whites Fire)	Likely	No	The radar image indicates that the storm had relatively low intensity (inches per hour) precipitation. The storm intensity likely did not meet the criteria used in the model.
East Walker (Happy Camp Complex)	Very Likely	Yes	The radar images indicate that the July 7, 2015 storm had a high intensity (inches/hour) over this drainage.
W. face drainage of Walker (Happy Camp Complex)	Very Likely	Yes	The radar images indicate that the July 7, 2015 storm had a moderate to high intensity (inches/hour) over this drainage.

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Drainage	Probability	Debris Flow	Discussion
No Name Creek (Happy Camp Complex)	Likely	Yes	The radar images indicate that the July 7, 2015 storm had a high intensity (inches/hour) over this drainage.
Salt Creek (Happy Camp Complex)	Likely	Undetermined	The radar images indicate that the July 7, 2015 storm had a high intensity (inches/hour) over this drainage. So it is likely that there was a high flow event in the drainage.
Louise Gulch (Happy Camp Complex)	Likely	Yes	This drainage experienced a debris flow during a storm event in February, but did not experience a debris flow during the July storms. This is likely a combination of low rain falls in the drainage and the previous debris flow removing material from the channel.
O'Neil Creek (Happy Camp Complex)	Likely	No	The radar image indicates that the storm had relatively low intensity (inches per hour) precipitation. The storm intensity likely did not meet the criteria used in the model.
Lower Rancheria Creek (Happy Camp Complex)	Likely	Undetermined	The radar images show low storm intensity for the July 7, 2015 storm in the drainage.
Kohl Creek (Beaver Fire)	Likely	No	The radar image indicates that the storm had relatively low intensity (inches per hour) precipitation. The storm intensity likely did not meet the criteria used in the model.
Polly Gulch (Beaver Fire)	Likely	No	The radar image indicates that the storm had relatively low intensity (inches per hour) precipitation. The storm intensity likely did not meet the criteria used in the model.
Fish Gulch (Beaver Fire)	Probable	Yes	The radar images indicate that the July 7, 2015 storm had a moderate to high intensity (inches/hour) over this drainage.
Marble Creek (Beaver Fire)	Probable	Yes	The radar images indicate that the July 7, 2015 storm had a moderate to high intensity (inches/hour) over this drainage.

Where the precipitation intensity was equal to or exceeded the modeled intensity the drainage experienced a post-fire debris flow event. Where the intensity was below the model precipitation intensity no evidence of debris flows were observed/reported – even in drainages with relatively high probability of having a debris flow event. This indicates that the assumptions in the post-fire debris flow modeling used for the Burned Area Emergency Response assessment are reasonable and valid for the Klamath Mountains.

Also, the assumption in the Burned Area Emergency Response assessment that the proposed road treatments would reduce the risk to infrastructure from landsliding by making the roads more resilient to debris flow was validated by field observations during the July 2015 storms.

## Effectiveness of Standards and Guidelines

The standards and guidelines and resultant project design features were found to have been fully implemented for the Goff Fire Fuels Reduction and Eddy Late Successional Reserve Habitat Improvement projects. The standards and guidelines were found to have been effective at avoiding disturbance to unstable lands and impacts to landslides. Last year's monitoring (2014) found that there was some sidecasting of material onto unstable lands along the 46N50 road (Horse Creek Road Improvement Project). It was determined that it would cause more disturbance to the unstable lands to attempt to remove the material than leaving it in place so no mitigation was recommended. The area was monitored again this year to determine if that conclusion was still valid. The area looked identical to the previous year and there was no evidence of the unstable land reactivating due to the small amount of sidecast. In fact the sidecast is in the same location and condition as it was during the 2014 field visit. The monitoring of the Seiad Creek Road Stormproofing Phase I project was on Forest Service Road 48N20. There was a small amount of debris sidecast around milepost 4.77. The material is mainly dead vegetation and contained very little sediment. The sidecast was not onto any unstable landforms so the effect to landslide rate is negligible, standards and guidelines were met for unstable lands and they have been effective at mitigating landslide rates in the project area.

**Further Action Required:** The Forest will continue to test and calibrate the post-fire debris flow modeling using the findings of the above analysis.

## B. Geologic Hazards

**Objectives:** Determine the level 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 the Forest was not aware of any new hazards relative to these threats for FY 2015.

**Further Action Required:** No further action is required.

## C. 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 at: Hole in the Ground, Pumice Crater and Glass Flow, Kangaroo Lake, and Condrey Mountain Blue Schist. Five photo points were established in Plutos Cave to monitor graffiti and vandalism trends in the well-used cave.

**Results:** Geologic Special Interest Areas were all in good condition with little to no new disturbances. The Butte Mountain Late Successional Reserve Habitat Restoration project includes fuels treatments around and within the Hole in the Ground Special Interest Area. Field review was completed to check on the status of the treatment and compliance with project design features. The treatments had not been implemented as of the field visit on May 29, 2015.

A comparison of photos taken in January 2014 to photos taken in January 2015 showed new graffiti at all photo points in Plutos Cave. The new graffiti consisted of new spray paint re-tracing the existing vandalism. There were no new graffiti markings apparent at the photo points. The vandalism was reported to law enforcement.

**Further Action Required:** Follow up monitoring will continue in the Hole in the Ground Special Interest Area during the implementation of the Butte Mountain Late Successional Reserve Habitat Restoration project.

## D. 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 analysis at the project level. 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 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:** No further action is required. Updates to the databases will be continued as needed.

## Soils

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**Objective:** To assess the implementation and effectiveness of soil standards, guidelines, and thresholds to maintain soil productivity. The overarching Forest Plan standards and guidelines 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 percent of lands dedicated to producing vegetation. For soil compaction, a ten percent or more reduction in total soil porosity of the surface soil over natural conditions on 15 percent or more of the area is a variation from standards that requires further action. The Region 5 supplement to Forest Service Manual 2550 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

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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:** Activity units were evaluated to determine if desired condition for soil indicators (soil stability and soil structure) were met. Soil cover and effectiveness of erosion control, rutting and signs of erosion on landings, prescribed fire units, and OHV trails were measured to evaluate soil stability. 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 Standard and Guideline 3-2 provides guidance on adequate levels of soil cover levels by soil texture class, slope steepness, and management activity.

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 monitoring and include: landings, prescribed fire areas, and OHV trails.

### **Results:**

*Landings:* Black Rock unit 1 on the Goosenest District was evaluated for surface erosion. No signs of erosion were found on the landing. This landing met desired conditions for applicable soil indicators.

Beauty Flat unit 94 on the Scott River District was evaluated for surface erosion. No signs of erosion were found on the landing. This landing met desired conditions for applicable soil indicators.

*Prescribed Fire:* Seider Thin units 247, 279, 536, met or exceeded the 75 percent soil cover objective. These units meet desired conditions for soil stability and soil structure.

*OHV Trails:* Trail 55103 on the Oak Knoll District was evaluated for surface erosion. Minor departures from desired soil indicators. Overall this trail met the national and regional BMP guidelines.

Trail 55101 on the Oak Knoll District was evaluated for surface erosion. Minor departures from desired soil indicators. Overall this trail met the national and regional BMP guidelines.

Trail 55109 on the Oak Knoll District was evaluated for surface erosion. Minor departures from desired soil indicators. Overall this trail met the national and regional BMP guidelines.

**Conclusion:** Forest Plan Standards Guidelines for soil stability, soil organic matter, and soil structure were met for all areas monitored.

Management of the soil resource can be improved for future projects if skidder operators are discouraged from turning on sideslopes where possible. The recommendation 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 percent. 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:** No further action is required.

# Water Quality

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## A. Best Management Practices Implementation and Effectiveness

**Objective:** Monitor implementation of Best Management Practices (BMPs) and evaluate their effectiveness at meeting state and federal water quality laws, Forest Plan goals, and Forest Plan standards and guidelines.

**Methodology:** BMP implementation and effectiveness is monitored using the Forest Service Region 5 Best Management Practices Evaluation Program (BMPEP), and the National BMP Monitoring Technical Guide. The BMPEP uses on-site evaluations to determine if BMPs were effective at protecting water quality at the site-scale. Sites are randomly selected from all projects completed on the Forest.

In addition to the Forest Service BMP evaluation program, the Regional Water Quality Control Board requires the following monitoring as a condition of the Waiver of Waste Discharge Requirements (Order No. R1-2010-0029):

- BMP implementation checklists for all projects covered under Category B of the Waiver. Checklists are completed by project staff to ensure that BMPs in the NEPA document are implemented as prescribed.
- Follow-up BMP monitoring using the Forest Service BMPEP protocol at all sites that were not rated as fully effective the previous year to assess the effectiveness of corrective actions.
- Retrospective monitoring of past management activities to evaluate the effectiveness of BMPs after they have been in place for 3 to 5 years. Methods use the Forest Service BMPEP protocol.

**Results:** In 2015 the Forest evaluated 28 randomly selected sites. BMPs were fully implemented at 89 percent of sites and were fully effective at 82 percent of the sites. All of the sites where BMPs were not implemented, or were rated as at risk or not effective, were associated with roads. BMPs at all of the sites for recreation, grazing, timber, and fuels activities were rated as fully implemented and effective. Of the 11 road sites evaluated, three sites failed implementation, three sites fell into the “at-risk<sup>5</sup>” category for effectiveness, and two sites failed effectiveness. Problems ranged from sidecasting material onto road fill, lack of clean-out of culvert inlets, and rutting on the road surface. Four of these sites were part of the follow-up monitoring of sites that were at risk in the 2014 report. More recently, Engineering staff has corrected all but one of the sites rated as at risk or not effective. The one site that could not be corrected is on road 4820 where a rolling dip could not be enlarged and still meet road standards for truck traffic.

Retrospective monitoring of past BMPs was completed at two sites related to timber management. Both sites were rated as fully effective.

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<sup>5</sup> The term “at risk” is being used to be consistent with the Region 5 BMP evaluation protocols and means the site is at risk of failing but is not yet considered to be ineffective.

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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:** No further action is required.

### B. In-stream Sediment and Temperature Monitoring

**Objective:** In-channel sediment monitoring is required as a condition of the North Coast Water Board's Waiver of Waste Discharge Requirements. The purpose of the in-channel monitoring is to help determine whether USFS project management and BMPs collectively are effective in meeting water quality objectives at the watershed scale.

**Methodology:** Fine sediment is monitored on a five-year rotation at sites located near the mouth of 79 tributary streams. Sediment deposition on stream beds is measured using three methods: percent fine sediment in the bed subsurface is measured using a McNeil core sampler (Schuett-Hames et al., 1999)<sup>6</sup>, percent fine sediment on the riffle surface is measured using a sampling frame similar to Cover (2008)<sup>7</sup>, and the portion of pools filled with fine sediment is measured using the V\* method (Hilton and Lisle, 1993)<sup>8</sup>. Effects are evaluated by comparing values in managed streams with those in reference streams.

Stream temperature is measured using recording dataloggers. Sample locations are the same as for sediment plus some additional sites that are suitable only for temperature monitoring.

**Results:** When compared to reference streams, 25 managed streams had sediment values less than the reference condition for all indicators. Fine sediment in these streams is within the natural range of variability in the absence of significant human disturbance or high-severity wildfire. The other 34 managed streams had percent fine sediment greater than the reference condition for at least one indicator. A report of results is posted on the KNF water quality monitoring webpage:

<http://www.fs.usda.gov/resources/klamath/landmanagement/resourcemanagement>

**Further Action Required:** None.

### C. Forest Cumulative Watershed Effects Modeling

**Objective:** Test the validity of the techniques used for determining thresholds of concern in the Forest Plan.

**Methodology:** The validity of the Forest cumulative watershed effects models are tested by comparing equivalent roaded area and modeled sediment supply with the in-stream fine sediment measured in section B above.

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<sup>6</sup> Schuett-Hames, D., R. Conrad, A. Pleus, and M. McHenry. 1999. *TFW Monitoring Program Method Manual for the Salmonid Spawning Gravel Composition Survey*. Prepared for the Washington State Dept. of Natural Resources under the Timber, Fish, and Wildlife Agreement. TFW-AM9-99-001. DNR #101. March.

<sup>7</sup> Cover, M.R., C.L. May, W.E. Dietrich, and V.H. Resh. 2008. *Quantitative linkages among sediment supply, streambed fine sediment, and benthic macroinvertebrates in northern California streams*. J. N. Am. Benthol. Soc. 27(1):135-149.

<sup>8</sup> Hilton, S., and T.E. Lisle. 1993. *Measuring the Fraction of Pool Volume Filled with Fine Sediment*. USFS PSW-RN-414-WEB. July.

**Results:** Potential thresholds were identified for reference conditions for in-stream fine sediment, equivalent roaded area, and road density. The full results are posted on the KNF water quality monitoring webpage.

**Further Action Required:** An interagency review is needed to interpret the potential thresholds identified in the sediment analysis.

## Air Quality

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**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 Hydrologic Unit Code) on the Forest during the Watershed Condition Classification analysis in 2010 and are still valid. 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 16, 2015 (Campbell Lake), July 18, 2015 (Hays Meadow), August 7, 2015 (Big Meadow) and September 24, 2014 (Box Camp).

**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 ten percent 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 on July 16, 2015, July 18, 2015 and September 24, 2015 were within the screening level for the Wilderness for all observations completed. The visibility on August 7, 2015 was less than a half mile, which is below the desired condition. This is due to smoke from the many wildfires that were burning at the time on the Shasta-Trinity and Six Rivers National Forests as well as wildfires in Region 6.

**Further Action Required:** No further action is required.

## Biological Diversity

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### A. Ecosystem Diversity–Seral Stages

See Other Monitoring –Migratory Songbirds within the Wildlife section.

### B. Size and Shapes of Openings

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

**Methodology:** The use of remote sensing data for this monitoring is identified in the Forest Plan. Since vegetative treatments have not created openings large enough to trigger remote sensing analysis, no monitoring has been conducted.

Results: N/A

**Further Action Required:** No further action is required.

### **C. Other Monitoring Efforts – Russian Wilderness forest composition, structure, and health**

**Objective:** Finish resampling 200 vegetation plots in the Russian Wilderness on the Klamath National Forest that were originally established in 1969 to assess changes in tree species composition over the last 45 years. Vegetation plot data was also supplemented by the collection on detailed forest pathology data on Shasta red fir (*Abies magnifica* var. *shastensis*) and an assessment of fuel build-up around large legacy sugar pines (*Pinus lambertiana*) in lower elevation mixed conifer forests within the Russian Wilderness.

**Methodology:** A Masters student and seasonal field crew from Humboldt State University, supervised by the Province Ecologist, collected data on all vascular plants in 207 plots previously established by John Sawyer and Dale Thornburgh in 1969 in the Russian Wilderness, Salmon/Scott River Ranger District, Klamath National Forest. Vegetation data are currently being analyzed to look at the roles of fire, fire exclusion, and the potential impacts of climate change on forest structure and composition over time. The goal of this study is to better understand forest disturbance processes in enriched mixed conifer forests on National Forest lands.

**Results:** The data is currently being analyzed by Humboldt State University and the Province Ecologist. The first publication from this monitoring work was published in the journal *Fremontia* in January 2016. It is titled “Revisiting John Sawyer and Dale Thornburgh’s 1969 vegetation plots in the Russian Wilderness: a legacy continued.” Two additional manuscripts have been submitted for publication in peer-reviewed journals and are currently in review.

**Further Action Required:** This study is part of a series of research projects by several graduate students at Humboldt State University. All field work has been completed and published results are forthcoming. No further action in future years is required.

## **Sensitive Plants**

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

### **A. Project Planning**

**Methodology:** There were about 500 acres inventoried in 2015 for projects in planning stages. Surveys were conducted for sensitive species (36 vascular plants, five bryophytes, and one lichen) and one federally endangered plant species. Different types of projects included: forest restoration (thinning, planting, salvage harvest, green harvest), mining, grazing, and hazardous fuel reduction where threats and protection measures needed to be identified. Surveys were intuitively controlled, searching suitable habitats for new populations of sensitive plant species, and confirming status of known populations.

**Results:** Two new populations of sensitive plant species were found on the Forest: *Cypripedium fasciculatum* (clustered lady slipper) and *Cypripedium montanum* (mountain lady slipper). One new population of a sensitive bryophyte was found on the Forest: *Ptilidium californicum* (Pacific fuzzwort).

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Known populations of *Cypripedium fasciculatum*, *C. montanum*, *Eriogonum hirtellum*, *Erythronium hendersonii*, *Horkelia hendersonii*, and *Ptilidium californicum* were flagged and buffered for protection in FY 2015.

*Erythronium hendersonii* populations showed vigorous regeneration in low-moderate burns areas.

Populations of *Cypripedium fasciculatum* and *C. montanum* were not relocated in areas that burned with high vegetation mortality. Monitoring data from past fires suggest that these species will re-sprout in moderately burned areas where some canopy cover and duff layers remain.

Most populations of *Eriogonum hirtellum* were entirely unaffected by the fire or suppression activities, likely because these plants occur in rocky outcroppings with little vegetation.

Populations of *Horkelia hendersonii* were unaffected by fire or suppression activities, likely because these plants occur in gravelly slopes and ridges where other fuels are not present.

Populations of *Ptilidium californicum* were lost in all burn severities due to the fact that they grow on the lower portion of tree trunks and cannot persist once the base of the tree has been charred.

**Further Action Required:** No further action is required. Sensitive plant species inventory is a regular component of the KNF botany program.

### **B. Mitigation and Implementation Effectiveness Monitoring**

Field monitoring was conducted on about 30 acres 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* (silky mousetail):**

**Methodology:** Implementation with mitigation measures within *Ivesia sp.* habitat in the Roo project and the Sugar Creek Watershed project.

**Results:** Implementation in the Roo project area was successful. The trees that were hand-cut and piled on the edge of the meadow were piled in areas designated by the botanist, and some piles were burned during the fall/winter of 2013. Four monitoring plots, including a control, were established in FY 2013 to observe the effect of pile burning on *Ivesia*. The response of *Ivesia* adjacent to piles that have been burned to date, has been favorable. Presently, meadow habitat containing *Ivesia sp.* appears to be thriving. The area of meadow that was planted with *Festuca idahoensis* (Idaho fescue) plugs in the fall of 2011 continues to show improvement in vegetative cover.

Implementation in the Sugar Creek Watershed project area was successfully implemented. A rolling dip was constructed near a seasonally wet drainage that provides habitat for a population of *Ivesia*. One plant was removed during implantation, but the remaining plants in the population are healthy and were undisturbed by project activities.

**Further Action Required:** Plants within burned plots need to be counted in the Roo project area. No further actions are required within the Sugar Creek watershed project area.

#### ***Cypripedium fasciculatum* and *C. montanum* (clustered and mountain lady's slipper):**

**Methodology:** Selected populations are revisited annually within project areas under evaluation and where projects have already been implemented. In 2015, populations within the implemented Salmon

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Salvage Project were visited to assess if buffers were applied correctly and worked effectively. Populations within the Westside Fire Recovery project area were flagged and buffered for protection.

**Results:** Monitoring indicates that protection measures have been effective at protecting plants and their habitat. Populations that were expected to have survived the fire, did survive, and flagged protection buffers were successfully implemented. Additionally, in areas of the Salmon Salvage Project where the canopy was un-burned, populations of *Cypripedium fasciculatum* that did not re-sprout in FY 2014 were observed to be healthy and flowering in FY 2015.

**Further Action Required:** No further action is required.

### ***Calochortus persistens* (Siskiyou mariposa lily):**

**Methodology:** Implementation with mitigation measures within *Calochortus persistens* habitat in the Mcbaldy project area continue to be monitored. Part of the purpose and need for the Mcbaldy project was to reduce the risk of high intensity wildfire within the project area; a beneficial action for the *Calochortus persistens* population. However, proposed activities did have a high risk of spreading known noxious weed populations, therefore, additional weed reduction efforts have been directed to this area.

**Results:** Monitoring indicates that protection measures have been effective at protecting plants and their habitat, however project activities did result in the spread of known noxious weed infestations. The most substantial growth occurred adjacent to temporary roads and landings, but is contained to project units and has not spread into protected *Calochortus persistens* populations.

**Further Action Required:** No further action is required. The Forest noxious weed crew will continue to treat the known noxious weeds present at this site.

### ***Thermopsis robusta* (robust false lupine):**

**Methodology:** Populations of robust false lupine were surveyed by the Mid Klamath Watershed Council for the WKRP fuel reduction project.

**Results:** Robust false lupine populations tend to benefit from disturbance, especially mastication and ground disturbance. Four new populations were identified in the project area.

**Further Action Required:** No further action is required.

### ***Ptilidium californicum* (Pacific fuzzwort):**

**Methodology:** Implementation with mitigation measures within *Ptilidium californicum* habitat for the Two-bit project area continue to be monitored.

**Results:** Monitoring indicates that protection measures have been effective at protecting plants and their habitat. Populations are dense and thriving in this area.

**Further Action Required:** No further action is required.

## **C. Other Monitoring - Rare and Declining Species**

**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.

***Pinus albicaulis* (whitebark pine):**

**Methodology:** *Pinus albicaulis* is a federally listed candidate species and a Forest sensitive species. It occupies high elevation ridgelines and mountain tops throughout western North America where it helps stabilize slopes, retain snow packs, and provide a valuable food source for many animals and birds. In FY 2013, the Forest in collaboration with the California Native Plant Society conducted field assessments to verify distribution and status of whitebark pine stands. In FY 2015, Forest personnel surveyed about 1,000 acres in order to confirm the presence of potential stands and conduct a rapid assessment on the health and viability of populations.

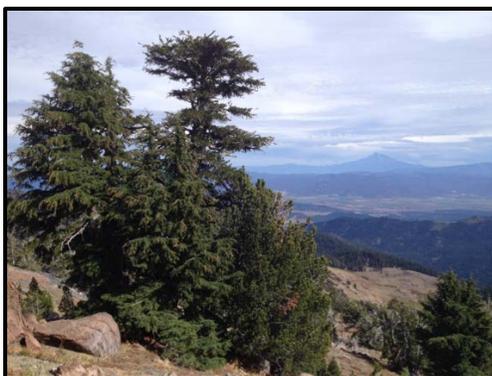
**Results:** Ten whitebark pine populations were surveyed in FY2015 on the Klamath National Forest: five on the Goosenest District and five on the Scott District.

In general, East side populations consist of scattered, individual trees starting at approximately 7,000 feet and transitioning to dense, mostly pure stands near summits. Trees at lower elevations seemed to be most impacted by insects, disease, and shading from Shasta red fir and hemlock. Evidence of reproduction including seedlings, saplings, and first year immature cones were observed. Signs of mountain pine beetle infestation, including pitch tubes and larval galleries, were observed in every stand surveyed. However, very little mortality or reddening of crowns was observed, indicating that infection levels are not reaching epidemic levels. Standing, old, dead, grey whitebark pine and lodgepole were present signifying that mountain pine beetle had caused whitebark pine mortality in the past.

Westside populations consist of scattered, individual trees starting at around 6,500 feet to denser clusters up to about 7,300 feet; on isolated ridge tops whitebark pine becomes more abundant but is rarely the primary and/or dominant tree. Seedlings and saplings were observed in all stands, however no cones were observed during west side surveys. Populations on the west side of the Forest appeared to be more consistently impacted by disease and shading from Shasta red fir and hemlock than higher elevation populations surveyed on the east side. While beetle infestations were less evident in western populations, symptoms of white pine blister rust infection were observed more consistently. No signs of the pathogen itself were observed during surveys; however, symptoms such as flagging branches, cankers, and rodent chewing were observed in all five areas surveyed.



Eastside population on Goosenest Mountain, Goosenest Ranger District. Photo by Erin Lonergan.



Mixed conifer island on Boulder Peak, Scott River Ranger District. Photo by Erin Lonergan.

**Further Action Required:** No further action is required. The Forest plans to continue monitoring populations.

***Phlox hirsuta* (Yreka phlox):**

**Methodology:** *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 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 seven 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, California (mostly on non-NFS 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.

**Further Action Required:** No further action is required. The Forest plans to continue the treatment of infestations which may pose a threat to the habitat.

***Sulcaria badia* (groovy beard lichen) and *Buxbaumia viridis* (bug on a stick):**

**Methodology:** The Forest has a participating agreement with the Mid Klamath Watershed Council (MKWC) to monitor for rare botanical species within the Ukonom and Happy Camp Ranger Districts on the Forest.

**Results:** Two new populations of the sensitive lichen *Sulcaria badia* were located. One new population of the sensitive bryophyte *Buxbaumia viridis* was located.

**Further Action Required:** No further action is required.

***Calochortus persistens* (Siskiyou mariposa lily):**

**Methodology:** 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. In FY 2013 a Conservation Agreement was signed between the Klamath National Forest, the Fish and Wildlife Service, and the Bureau of Land Management. The schedule of conservation actions in the document specifies annual actions, including annual weed treatment.

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Annual weed treatments have been conducted for thirteen years in specific areas that are adjacent to and within occupied habitat, in order to reduce seed production and invasive species impact. In FY 2015, 140 acres were treated for *Isatis tinctoria*.

In FY 2014, a three-way cooperative project between the Klamath National Forest, the Fish and Wildlife Service, and the Bureau of Land Management was initiated to do a greenhouse study of the allelopathic effects of Dyer's woad on germination and survival of Siskiyou mariposa lily seed and bulbs. In FY 2015, Forest staff collected seed from *Calochortus persistens* populations in order to support these research objectives.

**Results:** Due to the effective implementation of the Conservation Agreement and the continued reduction of noxious weed infestations located within suitable habitat, *Calochortus persistens* was removed from the federal candidate list in FY 2015. Continued monitoring of *Calochortus persistens*' occupied habitat indicates that where treatment has been taking place, *Isatis tinctoria* is gradually decreasing. The site pictured below is treated annually by a cooperative inter-agency group of volunteers and paid staff. Photos by Marla Knight.



Before treatment in 2014



Before treatment in 2015

**Further Action Required:** Continued implementation of the Conservation Agreement, including the collection of seed for long-term storage in FY 2016. Other Monitoring - Lake Mountain Foxtail Pine Botanical Special Interest Area:

**Objective:** To enhance habitat necessary for the maintenance of the 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 at the northern end of its range.

**Methodology:** The final phase of the project was implemented in June, with 150 foxtail pine seedlings planted in the Special Interest Area.

**Results:** Planting has been completed and 120 of the planted seedlings have been mapped for survival monitoring.

**Further Action Required:** No further action is required. The Forest plants to monitor the health and survival of planted seedlings.

### D. Other Monitoring - Vegetation Recovery, O'Neil Pond

**Methodology:** Monitoring of vegetation recovery around the salmon rearing pond constructed at O'Neil Creek for the purposes of enhancing riparian habitat in lieu of habitat loss due to culvert replacement by Caltrans, along Hwy 96.

Vegetation recovery will be monitored for five years, or until 65 percent re-vegetation has been reached. Plots will be established using a standard sampling protocol.

**Results:** Forty-four plots were monitored along a 110 meter transect. Mean vegetation cover was 50 percent in 2015, a five percent increase from 2014. Native species represented 75 percent of the mean vegetative cover. The non-native white sweet clover, *Melilotus albus* was removed in the vicinity directly surrounding the pond. Other non-native species recorded at the site include: *Daucus carota*, *Hypericum perforatum*, *Lotus corniculatus*, *Melilotus albus*, *Mentha arvensis*, *Plantago major*, *Rubus armeniacus*, and *Veronica anagalis-aquatica*. These are all low priority weed species on the Forest, and are generally considered naturalized across the county.



Before sweet clover treatment in 2015



After sweet clover treatment in 2015

**Further Action Required:** No further action required. Control of white sweet clover will continue in 2016 to see if it results in an increase of native vegetation. Monitoring will continue until 65 percent vegetation recovery is reached.

## Wildlife

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### A. Bald and Golden Eagles

**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:** The Forest monitors bald and golden eagles annually using two primary methods of monitoring: 1) mid-winter eagle counts and 2) breeding period surveys.

Mid-winter eagle counts monitor bald and golden eagle winter use along seven monitoring routes covering the Mid-Klamath, Salmon and Scott Rivers, and the Shasta and Scott Valleys (about 200,000 acres in total). These monitoring results are combined with a larger dataset of the winter use trends of bald and golden eagles across the western United States. Breeding period surveys target known nest

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locations and river habitat where eagles are expected to occur and document the nesting chronology and reproductive success of each nest by repeated observations over the course of the breeding season (March – August).

Bald and golden eagle monitoring in FY 2015 was conducted by Forest Service personnel, California State Fish and Wildlife, and community volunteers.

### **Results:**

#### **Breeding Period Surveys**

*Goosenest Ranger District:* In FY 2015, 15 of 16 known bald eagle nest sites were monitored across the Goosenest Ranger District. Of these 15 nests, five nests produced seven young, five were not surveyed, four were inactive and the status on the remaining nest was unknown (inconclusive). There are 15 historic golden eagle nests on the Goosenest Ranger District; most have not been active for several years. In FY 2015, one nest was surveyed and determined to be occupied but reproduction was undetermined. All historic golden eagle data were compiled and submitted to USFWS for incorporation into a population demography study.

*Salmon/Scott River Ranger District:* The breeding survey monitoring includes seven known bald eagle nest locations along the Klamath River and Scott Valley. Two of the seven known bald eagle nests were active and three had potential successful reproduction. A total of 20 visits were made to monitor the nests. The bald eagle nest at the mouth of the Scott River and the Caroline Creek nest were disturbed by wildfires that burned from mid-July thru September in 2014. It is unknown if this wildfire and associated suppression activities may have disturbed potential nesting and fledging of these bald eagle nests in FY 2015.

Additionally, one golden eagle nest was monitored in the Scott Valley. This pair was not reproductive.

*Happy Camp/Oak Knoll Ranger District:* Breeding period monitoring for the Happy Camp/Oak Knoll Ranger District in FY 2015 monitored nine known bald eagle nest locations along the Klamath River and Scott Valley. One of these nests was newly discovered in FY 2015 near the Savage Rapids Recreation Site on the Klamath River. Eight out of nine nests were active during the 2015 season; six of the nine nests were reproductively successful and a total of eight young were successfully fledged.

#### **Mid-Winter Eagle Counts**

In total, eight mid-winter bald eagle survey routes were completed in FY 2015 across the Klamath and a total of 24 bald eagles were observed at winter roost locations. On the Goosenest District, bald eagles were detected at two of the five known winter roosts, and seven adult and six immature bald eagles were observed along the 180 mile census route. Six golden eagles were also observed along the Goosenest census route. In addition, 80 raptors representing eight species were observed along the route. On the Salmon/Scott River District, seven winter census routes were surveyed and 11 adult bald eagles were observed.

Table 2 shows the combined results of the mid-winter bald eagle counts on the Happy Camp/ Oak Knoll and Salmon/ Scott River Ranger Districts from 2007-2015. The population trend for bald eagles has been stable or improving.

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**Table 2: Mid-Winter Bald Eagle Counts for Happy Camp/Oak Knoll and Salmon/Scott River Ranger Districts: 2007-2015.**

Year	Number of Eagles Observed
2007	30
2008	30
2009	30
2010	37
2011	11
2012	12
2013	14
2014	11
2015	24

**Further Action Required:** Successful nesting and winter use indicates that management standards are effective. No further action is required.

### **B. Peregrine Falcon**

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

**Methodology:** Field monitoring using spotting scopes and/or binoculars to determine nesting status and reproductive success at known peregrine falcon eyries (or nests).

**Results:**

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

*Salmon/Scott River Ranger District:* One peregrine falcon eyrie was monitored with presence of two adults. Nesting was not confirmed and number of fledged young is unknown. No new nest sites were discovered in FY 2015.

*Happy Camp/Oak Knoll Ranger District:* Two peregrine falcon eyries were monitored both in the Happy Camp Ranger District. Both eyries were occupied and reproductively successful. Both eyries had at least two young per nest.

Peregrine falcons are no longer listed as an endangered species under the Endangered Species Act 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.

**Further Action Required:** No further action is required.

### **C. Northern Spotted Owl**

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

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**Methodology:** Standardized protocols were used for all inventories (USFWS 2012). Monitoring was conducted by Forest Service personnel, with assistance from student interns from the Student Conservation Association, U. S. Fish and Wildlife Service, and private contractors.

**Results:**

*Goosenest Ranger District:* Over 41,500 acres were surveyed for northern spotted owls (NSOs) as part of the planning process for the Butte Mountain LSR Habitat Restoration Project. Eighteen NSO territories were monitored within the project area. Two territories were occupied by NSO pairs but no reproduction was confirmed in these territories. Surveys were coordinated with Fruit Growers Supply Company in Bull Meadow. On the eastside of the district 41,288 acres were surveyed. A total of 30 territories were surveyed with various intensities (Table 3). Nine NSO territories were monitored, without any NSO detections. Barred owls were detected in several regions of the Butte Mountain project area. In FY 2015, barred owls were detected on 12 of the 18 call routes surveyed on the district, compared to nine routes in FY 2014.

**Table 3: Northern spotted owl survey totals for Goosenest Ranger District in 2015 field season.**

Goosenest Ranger District	West	East	Totals
Territories	22	9	30
Surveyed	11	9	21
Partial Surveyed	3	1	4
Occupied	5	4	9
Reproducing	0	0	0
Young	0	0	0
Fledged	-	-	Unknown
Failed	-	-	Unknown

*Salmon/Scott River Ranger District:* Of the approximate 30 NSO activity centers monitored, six sites had a single NSO detected; four sites had non-reproductive pairs; and two sites had reproduction confirmed. The remaining 18 historic activity centers were surveyed and determined to be unoccupied for the FY 2015 field season. Two barred owl activity centers were detected (both single barred owl detections).



Northern Spotted Owl

*Happy Camp/Oak Knoll Ranger District:* A total of 76 NSO activity centers in five project areas were monitored in FY 2015. Survey efforts in FY 2015 went up significantly compared to the previous fiscal year because of the importance of monitoring known sites within the Westside Fire Recovery areas. A total of nine pairs were located over the course of the survey season. Two of these pairs were observed attempting to nest; one pair failed and the other pair successfully fledged two young. In addition, nine other single NSOs were detected in the survey areas. At least five barred owl activity centers were identified across multiple project areas with no known reproduction.

**Further Action Required:** No further action is required.

#### **D. 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 52 territories across 43,800 acres on the Goosenest were surveyed for northern goshawks (Table 4) A total of 23,080 acres were surveyed on the east side of the district and a total of 20,800 acres were surveyed on the west side of the district. On the east side of the district, five territories were occupied; five contained breeding pairs that produced five young. On the west side of the district, six territories had breeding pairs and produced five young. The remaining territories were assumed to be inactive.

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**Table 4: Northern Goshawk survey summary totals on the Gooseneast Ranger District for 2015.**

	Westside of District	Eastside of District	Totals
Territories	20	32	52
Surveyed	15	18	33
Presence	4	2	6
Occupied	6	5	11
Young	3	0	3
Fledged	7	5	12

*Happy Camp/Oak Knoll District:* Goshawk surveys were conducted within the Thom Seider, Two Bit, and Happy Camp Phase 2 project areas following intensive search protocols. Three territories were surveyed. Two of the three were active territories contained active nests. One nest contained at least one confirmed young.

*Salmon/Scott River Ranger District:* Goshawk surveys were conducted in the Petersburg and Salmon Salvage Project areas following intensive search protocols. No goshawks were detected.

**Further Action Required:** No further action is required.

### E. Willow Flycatcher

**Objective:** Determine occupancy of suitable habitat.

**Monitoring and Results:**

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

*Happy Camp/Oak Knoll and Salmon/Scott River Ranger Districts:* Surveys were conducted for willow flycatchers (and other songbirds) at the Seiad Valley PCT1 Constant Effort Mist Netting Station (Table 5). 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, U.S. Fish and Wildlife Service, Mt. Shasta Audubon, and volunteers from the local community. A single female (1) willow flycatcher was netted and banded in the FY 2015 banding season. This female had a brood patch which was evidence of a nesting bird. This is a decrease from 2014 when nine willow flycatchers were captured.

**Further Action Required:** No further action is required.

**Table 5: Willow flycatcher captures at Seiad Valley PCT1 Constant Effort Mist Netting Station: 2010-2015.**

Year	Number of captures
2010	17
2011	3
2012	3
2013	10
2014	9
2015	1



**Willow Flycatcher**

### **F. Great grey owl**

**Objective:** Determine occupancy of suitable habitat.

**Monitoring and Results:** No monitoring was conducted in FY 2015 on the Klamath National Forest because pre-project surveys are not required. Removal of suitable habitat is not proposed by current projects.

**Further Action Required:** No further action is required.

### **G. 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 approximately 47 species of migratory birds were captured and numerous other species were observed.

*Happy Camp/ Oak Knoll and 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 18th year of monitoring for this station, one of the longest running banding stations in the Klamath Basin. The station

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is run by banding sub-permittee Sam Cuenca through a partnership with Redwood Sciences Lab, Klamath Bird Observatory, USFWS (Yreka Field Office), Quartz Valley Indian Reservation, and the California Department of Fish and Wildlife Service. In FY 15 volunteers from the California Conservation Corp, and the Student Conservation Association Program contributed time with banding operations. Methods follow protocol described by the Redwood Sciences Lab and the Institute of Bird Populations.



**Female Western Tanager**



**Yellow-breasted Chat**



**Sharp-shinned Hawk**



**Two Wrentits**

During the FY 2015 season, 362 birds were captured including key species such as willow flycatcher, yellow warbler, yellow-breasted chat, song sparrow, Swainson's and hermit thrush. Data is compiled by the Redwood Sciences Lab and the Klamath Bird Observatory. This monitoring data contributes to the understanding of the importance of songbird use in the Klamath Basin and the Pacific Flyway.

## **H. 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. Approximately 120 hawk territories are regularly assessed. During these visits, personnel also monitored several other avian species.

### **Monitoring and Results:**

In FY 2015, 103 Swainson’s hawk territories were monitored and 94 nests were located in and around Butte Valley, California. Fifteen of the 94 nests were on National Forest System land. Fifteen adults were trapped and two transmitters were deployed. Apparent nest success was 74 percent (70 nests were successful) with 24 nests failing over the season. A total of 157 nestlings were banded, exceeding the previous record of 115 banded in a single season. Average productivity was 1.7 young per nest, an increase of 0.5 over 2014. For unknown reasons phenology of nesting was advanced this year. Banding typically extends into August, this year all banding was completed before August.

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 in 2014. Over 1600 hours were spent on the Swainson’s hawk project by researchers and volunteers contributed 150 hours assisting with banding and data collection.



**Swainson’s Hawk**

## I. Other Monitoring – Breeding Bird Survey:

The Breeding Bird Survey 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 Breeding Bird Survey 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 Breeding Bird Survey has been the estimation of population change for bird encountered along habitats surveyed from roadsides.

**Objective:** The mission of the North American Breeding Bird Survey is to provide scientifically credible measures of the status and trends of North American bird populations at continental and regional scales to inform biologically sound conservation and management actions. Determining population trends, relative abundance, and distributions of North American avifauna is critical for identifying conservation priorities, determining appropriate conservation actions, and evaluating those actions.

**Monitoring and Results:** For FY 2015 season the Cecilville Route (#14429) was surveyed on June 19, 2015. The Forest detected approximately 24 species at many locations along the 15-mile route. The total number of species was slightly higher than the 23 species that were detected in 2014. The highest frequency species detected were western tanager and Steller’s jay.

## J. Other Monitoring - Other Raptors (ferruginous hawks)

**Objective:** Gather baseline data for uncommon species.

*Goosenest Ranger District:* For the first time a ferruginous hawk nest site was discovered on the Goosenest, on the Butte Valley National Grassland. This nest is unusual because this species rarely nests in California. It appears to be only the second reported instance of ferruginous hawks successfully nesting in California. The nest produced two young.

**Further Action Required:** No further action is required.

# Fisheries Management

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## A. Sensitive Species

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

**Summer-run steelhead and spring Chinook holding census, Happy Camp/Oak Knoll Ranger District:**

**Methodology:** The Forest conducts fisheries census and maintains population trend data for summer steelhead and spring Chinook, which are Forest Service designated Sensitive species. Direct observation snorkel surveys were used to collect the census data for 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 2015 a total of five tributaries to the Klamath River were surveyed. The stream reaches surveyed totaled about 64 miles.

**Results:** Summer steelhead were observed in all five tributaries. Total counts were 191 adult and 457 half-pounders. Spring Chinook salmon were observed in one tributary. The stream reaches surveyed where Spring Chinook salmon were observed totaled about 6.6 miles. The total count was three adults and zero jacks.

**Salmon River Summer-run steelhead holding census, Salmon/Scott River Ranger District:**

**Methodology:** The Forest, in cooperation with other agencies, completes annual survey (monitoring) of the mainstem, the North Fork, the South Fork, and the East Fork of the 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, local tribes, etc.).

**Results:** The 2015 summer steelhead run totals were 77 adults and 106 half-pounders, which was down from 2014, likely due to drought conditions. Overall, the population trend for the summer steelhead run in the Salmon River has been stable since 2001, declining between 1987 and 2000 due to drought conditions and the 1997 flood.

**Salmon River Spring-run Chinook holding census, Salmon/ Scott River Ranger District:**

**Methodology:** The Forest, in cooperation with the Karuk Tribe and other agencies, continued the 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 2015, 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 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.

**Results:** The final count for all reaches was 286 Chinook (258 adults and 28 jacks) and 183 steelhead (77 adults and 106 half-pounders). The 2015 spring Chinook salmon run was down from 2014. Overall, the population trend for the spring Chinook salmon run in the Salmon River has been stable since 2007, fluctuating between 1987 and 2006 due to drought conditions, ocean survival conditions, and the 1997 flood.

**Salmon River Spring-run Chinook Redd and Carcass Surveys:**

**Methodology:** This monitoring effort began in 2010 and consists of spawning ground surveys from a cooperative effort between the Forest Service, California Department of Fish and Wildlife as lead agency, Salmon River Restoration Council, and the Northern California Resource Center. 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 spring Chinook salmon by the Klamath Fisheries Management Council and the Pacific Fisheries Management Council for determination of harvest allocations for the subsequent year.

The upper reaches of the North Fork Salmon and South Fork Salmon Rivers were surveyed twice each week during the spawning run. The Salmon River survey was conducted on every Monday and Thursday. Surveys began during the first week of September and continue into late- October. It is important to note that these surveys overlap from one fiscal year into the next. Therefore, for FY 15 the totals include those done during the 2014 survey (from 10/2 to 10/30) and the 2015 survey (from 09/17 to 09/28).

**Redd Surveys:** In FY15, redd surveys were conducted on the North Fork Salmon River from mile marker 8 on the North Fork to Mule Bridge Trailhead. Redd surveys were conducted on the South Fork Salmon River from Matthews Creek to Little South Fork Salmon River. Redd surveys were conducted on the East Fork of the South Fork Salmon River from the Shadow Creek confluence to the confluence with the South Fork Salmon River. Redd surveys were conducted on the Little North Fork Salmon River from the Specimen Creek confluence to the confluence with the North Fork Salmon River.

**Carcass Surveys:** Scales, tissue, and otoliths biological samples were collected from carcasses found during the surveys. Since these biological samples are analyzed by the California Department of Fish and Wildlife, detailed methods for biological sample collection and redd counts are found in the 2014 Fall Chinook Spawning Survey Report<sup>9</sup>. Scales, tissue and otolith biological samples were collected from carcasses on the North Fork Salmon River, and the South Fork Salmon River. These biological samples are analyzed by the California Department of Fish and Wildlife to gather information for conducting genetic and disease studies, as well as track the overlap in use location and run timing between fall- and spring-run Chinook.

**Results:**

For the North Fork of the Salmon River Spring Chinook Salmon Redd Surveys, the total counts were 60 redds, 12 carcasses, and 498 lives. For the South Fork of the Salmon River Spring Chinook Salmon Redd Surveys, the total counts were 228 redds, 22 carcasses, and 630 lives. For the East Fork of the South Fork Salmon River, the total counts were three redds, zero carcasses, and four lives. For the Little North Fork Salmon River, the total counts were four redds, zero carcasses, and seven lives.

***Middle Klamath Fall-run Chinook Spawning Surveys: Salmon River (and tributaries), Scott River (and tributaries), and Middle Klamath River tributaries (Happy Camp/Oak Knoll RD)***

**Methodology:** This monitoring effort began in 1992. It consist 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 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

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<sup>9</sup> USDA Forest Service. 2015. 2014 Fall Chinook Spawning Survey Report. Klamath National Forest. Supervisor's Office.

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. The surveys began on October 13 and ended on December 5, 2014. 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.

### **Salmon River Fall Chinook Salmon Surveys**

#### **Methodology:**

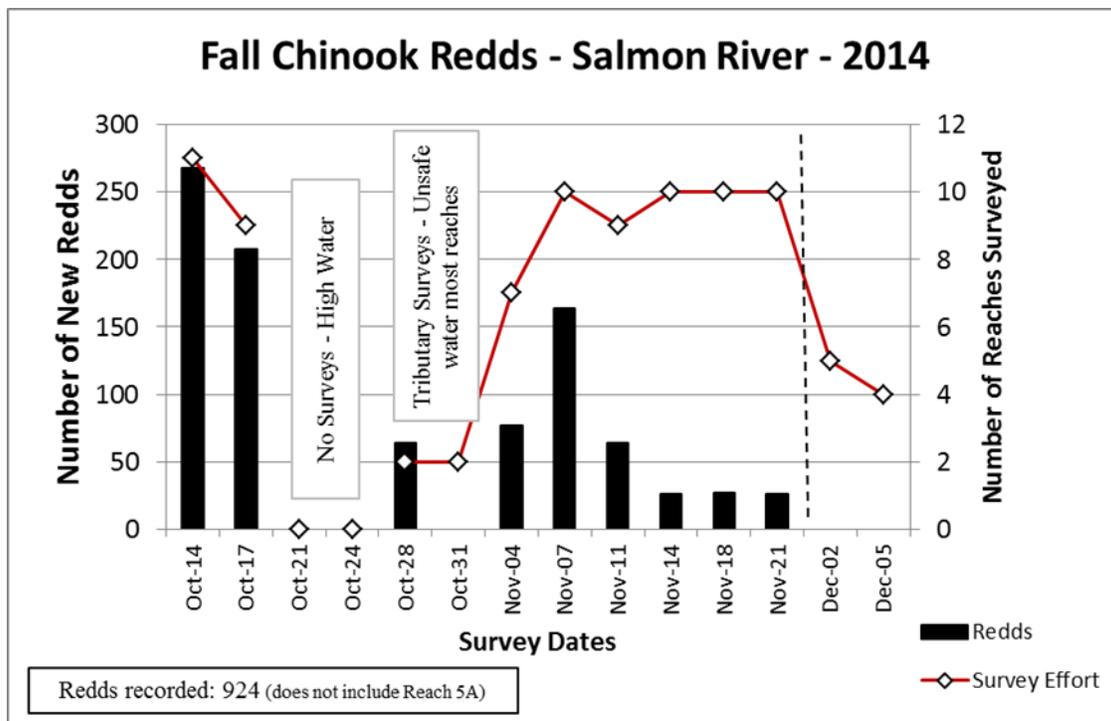
**Carcass Surveys:** Detailed methods for carcass surveys and redd counts are from the 2014 Fall Chinook Spawning Survey Report (USDA Forest Service 2015). Carcass surveys were conducted on the Scott River, North Fork Salmon River, South Fork Salmon River, and Mainstem Salmon River from Forks to Nordheimer 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, Salmon River tributaries, Scott River tributaries, 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 FY 2015 (October 13 to December 5, 2014), 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, access to private land excluded some reaches from being surveyed and known poor spawning reaches were not surveyed. Mid-Klamath tributaries surveyed included: Beaver Creek, China Creek, Clear Creek, Dillon Creek, Elk Creek, Fort Goff Creek, Grider Creek, Horse Creek, Independence Creek, Indian Creek, Rock Creek, Rogers Creek, Swillip Creek, Thompson Creek, Ti Creek, and Ukonom Creek. Salmon River tributaries surveyed included: Blackbear Creek, East Fork Knownothing Creek, Knownothing Creek, Little NF Salmon River, Methodist Creek, Nordheimer Creek, Plummer Creek, St Claire Creek, West Fork Knownothing Creek, Whites Gulch, and Wooley Creek. Scott River tributaries surveyed included: Canyon Creek, East Fork Scott River, French Creek,

Kelsey Creek, Mill Creek, Shackelford Creek, Sugar Creek, and Tompkins 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.

**Results:**

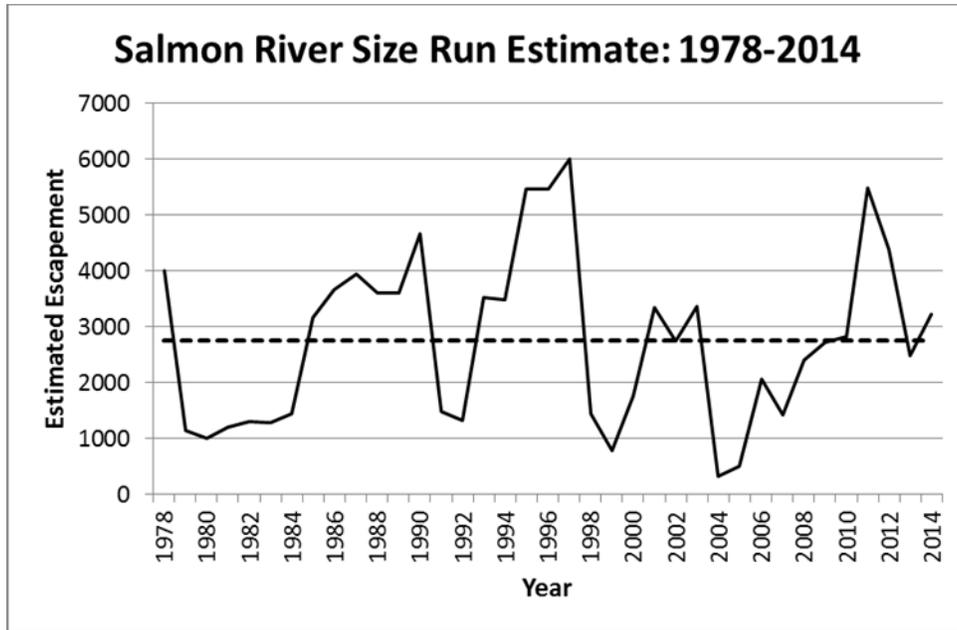
The Salmon River probably reached peak spawning in mid-October, although specific dates cannot be determined because by October 13, 2014 spawning activity had already begun (Figure 1). Overall, the survey effort was affected by the availability of surveyors, weather, and flows. For the Mainstem Salmon River Fall Chinook Salmon Redd Surveys, total counts were 445 redds), 127 carcasses, and 1,565 lives. For the North Fork of the Salmon River Fall Chinook Salmon Redd Surveys, total counts were 342 redds and 402 lives. For the South Fork of the Salmon River Fall Chinook Salmon Redd Surveys, total counts were 941 redds and 857 lives.



**Figure 1.** Fall Chinook redds observed on the Salmon River in 2014. Data is presented by week, not date, since not all survey days counted new redds. Surveys were conducted on the NF Salmon River from Mile 12 to Forks of Salmon; on SF Salmon River from Matthews Creek to Forks of Salmon; and on the mainstem Salmon River from Forks of Salmon to Nordheimer Creek.

Specific areas of the Salmon River display a greater preference for use by spawning fall Chinook. Specifically, GPS and map data indicate the reaches nearest Forks of Salmon show the highest redd density. Reach 4B (mainstem), 5A (SF Salmon), and 9A (NF Salmon) combined had over 40 percent of the total redds in the surveyed area. Amongst all reaches, those with over 100 redds include 4B (mainstem); 5B, and 6A (SF Salmon); and 9A (NF Salmon). Using survey data, the Salmon River is estimated to have had about 3,233 fall run Chinook salmon return in the fall of 2014 (Figure 2). Based

on long-term tracking data from the CDFW, fall of 2014 data was slightly above average, ranking 16th for run size<sup>10</sup>.



**Figure 2. Salmon River run Size Estimates from 1978-2014**

Live Chinook were tallied during surveys (Figure 3). As with redds, survey efforts were impacted by high flow and fish observation was affected by number of surveyors, weather, discharge conditions, and surveyor experience. Peak live Chinook were observed on October 14th, with subsequent numbers declining within the survey area. Similar to redd results, true peak cannot be definitely determined because fish were already very active upon the spawning grounds at the commencement of surveys.

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<sup>10</sup> USDA Forest Service. 2015. 2014 Fall Chinook Spawning Survey Report. Appendix A – California Department Fish and Wildlife “MegaTable”. Klamath National Forest. Supervisor’s Office.

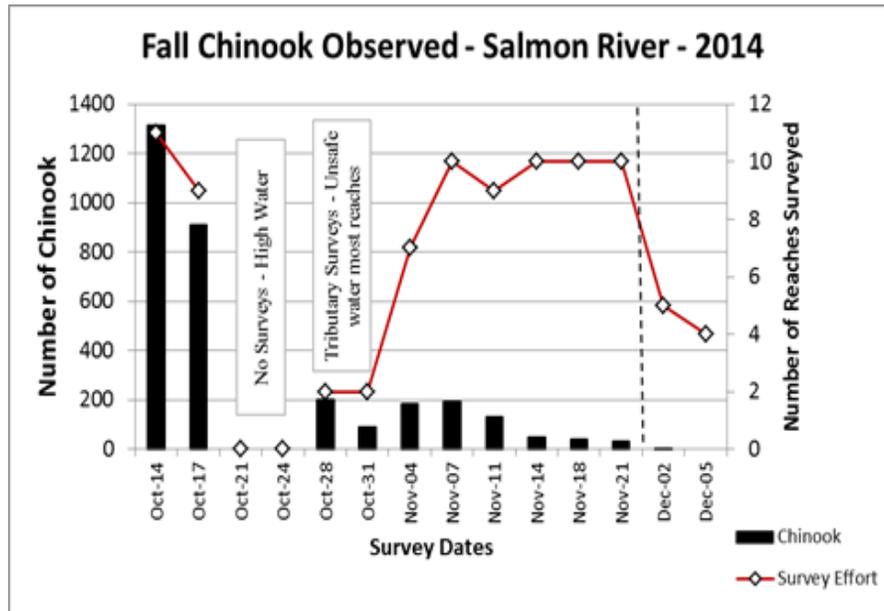


Figure 3. Observation of fall Chinook during the fall of 2014 Salmon River surveys.

Based on the available data, the Scott River reached the peak of spawning on October 30th for Reach 1 through Reach 8 (Figure 4). This date is delayed compared to the last three years, but exhibits similar timing to that observed in 2010. Examining discharge records, both 2010 and 2014 had mid-October storm events which substantially elevated discharge over late summer base flow. In contrast, 2011 through 2013 either had low flows through the spawning season, else significant fall storms did not arrive until late-November. As previous years, spawning lower in the Scott River system commenced and peaked earlier than higher in the system; and of particular note for Reach 8, where the majority of redds are traditionally constructed, spawning did not begin until after the rain events. This observation is likely due the presence of several large beaver dams (Photo 1) difficult or impossible to pass given the severely low fall flows, as well as the inaccessibility of key spawning habitat given the restricted area of wetted channel. Increased discharge following the storms permitted passage over or through dams, plus submerged previously dry substrates, thereby stimulating spawning. Additionally, data shows a small uptick in spawning activity in the lower Scott River reaches. Overall survey effort was affected by number of surveyors available, weather, and flows. The latter was particularly true on October 23rd, when increased turbidity from the storms affected visibility of fish and redds. Overall survey effort was affected by the amount of surveyors available, weather, and flows. Scott River Fall Chinook Salmon Redd Surveys resulted in a total of 1,641 redds and 9,141 lives counted.

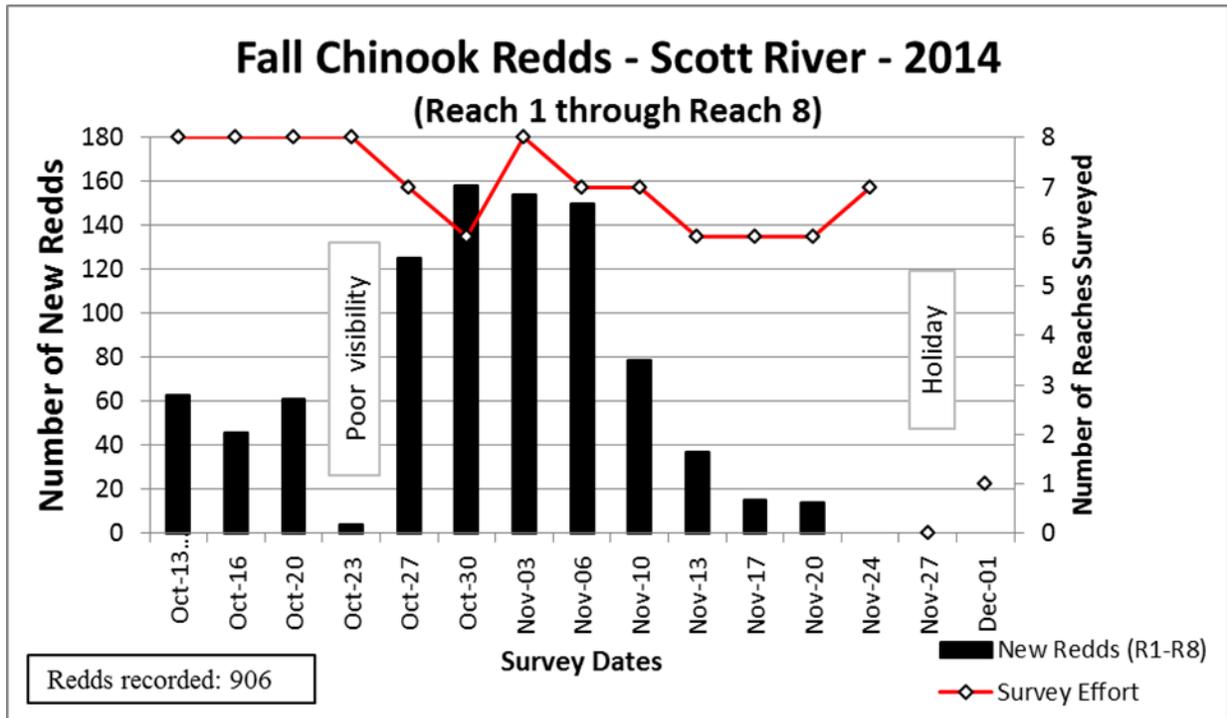


Figure 4. Fall Chinook redds observed and survey effort on the Scott River in 2014. Due to differences in redd tracking between lower and middle reaches, data displayed is for Reach 1 through Reach 8 only.



Photo 1. Beaver dam in Reach 8 following October storm events.

Access to portions of Reach 2 and Reach 3 which traverse private property in the lower Scott River has been an issue most years since 2010. For 2014, permission to cross the Trabucco property in Reach 3 was rescinded following the first survey date. In contrast, the town of Scott Bar was walked this year. All redds (new and old) were to be counted with each pass through town, and flags not hung. Unfortunately, this instruction was not adequately understood by several crews. Flagging was hung on at least two occasions in town early in the season, which in turn confused subsequent crews as to what redds to include when walking this segment. During post-season processing of data, the best maximum unflagged redd count was employed. Unflagged redds for Reach 2 and Reach 3 are reported separately from the rest of the reach due to differences in collection protocol. The maximum number of unflagged redds observed in Reach 3 was 8 (based on a single survey); and for Reach 2 was 67. Redds in the unflagged portions of Reach 2 and Reach 3 are not included in final map outputs.

The final redd count for Reach 8 is underestimated. CDFW curtailed surveys of Reach 8 midway through the season because the target amount of biological samples had been acquired and the downstream video weir abrogated the need to use redds or carcasses to estimate number of fish entering the valley. This decision was a prerogative of CDFW in consideration of their management needs and distribution of crew resources: Reach 8 is wholly private with no Forest Service inclusions. Additionally, no attempt was made to count redds at the end of the survey season when flags were removed. The consequence for this report is that Reach 8 redd counts are underestimated due to lost survey opportunities. Reports of extreme superimposition on Reach 8 while surveys were occurring, while affecting counts, also served to emphasize the large number of fish present in the Scott River system this year.

The Scott Valley Resource Conservation District (RCD) performed redd and carcass surveys upon private property from Reach 12 through Reach 16, as well as several Scott Valley tributaries. Landowner preference was to leave redds unflagged. Therefore, because “new” and “old” redds cannot be reliably differentiated, all are counted during each survey date. Theoretically, total redd number for each reach should increase until a maximum is achieved, and then remain thereabouts until the end of the survey period. In reality, weather and water conditions, scour by high flows, superimposition of redds, surveyor experience, survey schedule, and other factors create conditions whereupon this does not necessarily occur. If maximum number of redds in these survey reaches are tallied, regardless of date, a total of 675 redds is calculated. Compared to the other valley reaches, access to Reach 16 was very limited, with several properties only able to be visited once. Therefore, the reach 16 redd number is a summary of maximum redds encountered for each individual survey segment.

Survey of Scott Valley reaches and tributaries were unable to begin until late October because continuing drought conditions had decreased flows sufficiently for the mainstem to disconnect multiple places in the valley. Following October storm events, surface connectivity was re-established, allowing access for upmigrating fish. Due to low water early in the survey season influencing spawning throughout the Scott River system, timing differences between upstream and downstream reaches is not as clear as it is most years. However, as expected, peak spawning for Scott Valley Reach 12 through Reach 16 appears to have occurred later compared to canyon reaches.

Using survey data and video weir observation, the Scott River is estimated to have had 12,470 fall Chinook salmon return in 2014 (Figure 5). Based on long-term tracking data from the CDWF MegaTable, 2014 was well above average, ranking 2nd for run size<sup>11</sup>.

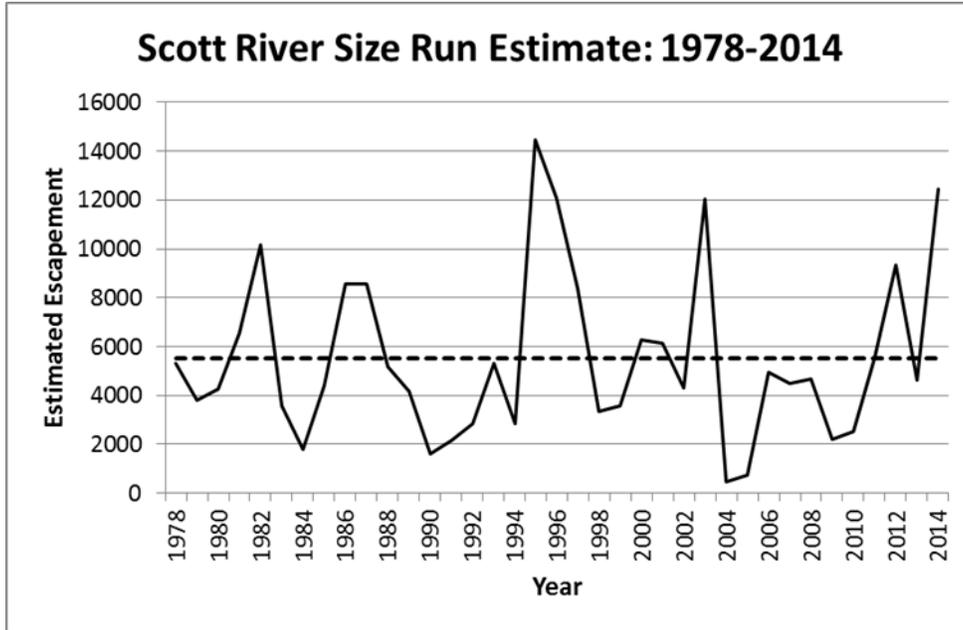


Figure 5. Scott River fall run size estimates for 1978 to 2013. Dashed line is average over long-term survey period.

Live Chinook were tallied during surveys (Figure 6). As with redds, survey effort is impacted by high flow; and fish observation is affected by number of surveyors, weather, discharge conditions, and surveyor experience. Peak live Chinook was observed in mid-October, with subsequent numbers declining throughout the survey area. Storms in October increased turbidity, thereby affecting visibility of fish and redds, especially on October 23rd. Similar to the redd count, number of live Chinook appear to have increased at reaches higher in the Scott River after peaks lower in the system. This observation reflects upmigrating fish movement, particularly in regard to reconnection of the valley reaches.

<sup>11</sup> USDA Forest Service. 2015. 2014 Fall Chinook Spawning Survey Report. Appendix A – California Department Fish and Wildlife “MegaTable”. Klamath National Forest. Supervisor’s Office.

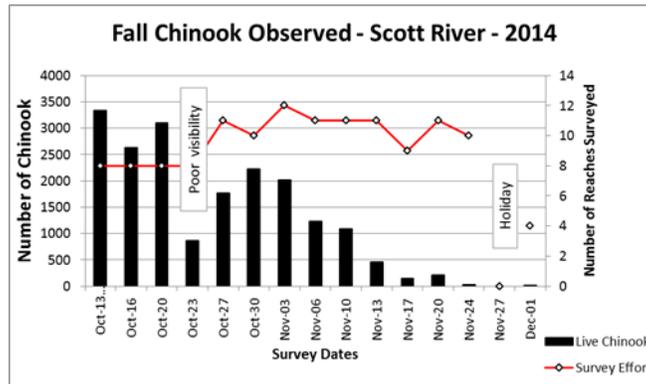


Figure 6. Observation of fall Chinook during the 2014 Scott River surveys.

Scott River Tributaries Fall Chinook Redd Surveys resulted in a total of 87 redds, and 47 lives. Scott River tributaries that recorded greater than nine redds in 2014 were Canyon Creek, French Creek and Kelsey Creek. In Canyon Creek, the furthest upstream redd was observed about 1.1 miles above the mouth and just below what is believed to be upstream limit for Chinook.

Chinook redds were recorded as far upstream as Masterson Bridge above Grouse Creek in the EF Scott River. Elevated discharge due to October storms is the reason for the observation because low fall flows normally prevent Chinook from migrating to or above Callahan.

Salmon River Tributaries Fall Chinook Salmon Redd Surveys resulted in a total of 264 redds, and 386 lives. Salmon River tributaries that recorded greater than nine redds in 2014 were Knownothing Creek, Methodist Creek, Nordheimer Creek, and Wooley Creek.

MKR tributaries (Happy Camp Area) that recorded greater than nine redds in 2014 were Beaver, Clear, Dillon, Elk, Fort Goff, Grider, Horse, Indian, and Thompson Creeks. MKR tributaries (Orleans Area) that recorded greater than nine redds in 2014 were Boise, Camp. Red Cap, Rock, Slate, Ukonom, and Wooley Creeks.

For the most part, weather and high water did not affect surveys to the extent as occurred in 2011. Portions of Indian Creek (1/2 mile) and Elk Creek (1/3 mile) were not surveyed in 2014 due to limited access on private property.

The number of Klamath River fall Chinook salmon returning to the Klamath River Basin in fall 2014 is estimated on Table 6 (includes both total number of natural spawner escapement and number of fish taken by recreational and tribal harvest)<sup>12</sup>.

<sup>12</sup> Klamath River Fall Chinook Salmon Age-Specific Escapement, River Harvest, and Run Size Estimates, 2014 Run by the Klamath River Technical Team dated 2 March 2015

**Table 6. Fall Chinook Salmon returning to the Klamath River Basin**

Age	Count	Percent of Total Run
2	22,348	12.2
3	57,837	31.7
4	98,710	54.0
5	3,897	2.1
Total:	182,792	100

For more information on survey results, see Appendix D of the *Klamath River Fall Chinook Salmon Age-Specific Escapement, River Harvest, and Run Size Estimates, 2014 Run* by the Klamath River Technical Team, dated 2 March 2015.

**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.

## B. 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 California<sup>13</sup>. Habitat changes are measured through the Aquatic and Riparian Effectiveness Monitoring 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 19 years (final report is pending).

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 number of high mountain lakes stocked with hatchery (resident rainbow) trout by the California Department of Fish and Wildlife has been reduced since 2008 and now no hatchery (resident rainbow) trout are stocked within

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<sup>13</sup> (Chapter 4 in <http://www.dfg.ca.gov/news/pubnotice/hatchery/>)

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) steelhead<sup>14</sup>. 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.

### C. 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 monitoring of aquatic ecosystems under the Plan’s jurisdiction was incorporated. The AREMP program<sup>15</sup> was developed to fulfill the monitoring component of the strategy. Monitoring is conducted at the subwatershed scale (US Geologic Survey 6th-field hydrologic unit). These sub-watersheds are approximately 10,000-40,000 acres in size. In 2015 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 percent federal ownership along the stream length) based on upslope and riparian data

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<sup>14</sup> 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

<sup>15</sup> <http://www.reo.gov/monitoring/reports/watershed-reports-publications.shtml>,

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.

AREMP Data for the 2015 field season (June through September) is not available at this time. No reports for the 2015 field season have been posted to the website listed below.

<http://www.reo.gov/monitoring/reports/watershed-reports-publications.shtml>

**Further Action Required:** None.

#### **D. Other Monitoring – Klamath River Water Temperature**

**Objective:** Monitoring water temperature

**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. Eight sites on the Klamath River and 116 sites on Klamath River tributaries were surveyed in 2015.

**Results:** 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.

#### **E. Other Monitoring – Clean Water Act, TMDL**

**Objective:** Collect data to determine stream conditions for reference and managed streams to meet Clean Water Act-TMDL conditions. Monitoring was also done as part of the AREMP watershed condition monitoring for the Northwest Forest Plan area.

**Monitoring:** Techniques used were developed with the California Water Quality Control Board staff to measure sediment, temperature, shade values, and  $V^{*16}$  and included the use of a specialized camera and Hobo-temp data loggers. There are 156 Hobo temp sites monitored in 2015 as part of this project. Stream temperature was monitored in a network of 88 watersheds representing most of the major tributaries on the Forest. Reference conditions were monitored in 14 minimally disturbed watersheds that represent the natural background condition. The Forest monitored sampled areas with well-mixed

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<sup>16</sup> Stream Monitoring Field Guide: Protocols and Methods. USDA Forest Service Pacific Southwest Region. Klamath National Forest. November 2009

stream temperatures in order to better understand the overall watershed condition. Temperatures in thermal refugia at the reach scale were not measured.

**Results:** Data was provided to evaluate listing/delisting of streams under the Clean Water Act. There are 20 watersheds on the Forest that have altered shade due to human-caused disturbance and stream temperatures higher than the Water Quality Control Board threshold for support of beneficial use for salmonids. In these streams the objectives for temperature are not attained. Watersheds with human-caused shade loss of less than 0.1 percent have a negligible effect on stream temperature at the watershed scale. The remaining 68 watersheds appear to meet the temperature objectives of the Basin Plan. All of these streams have either no human-caused alteration of stream shade, or any alteration has not reduced stream temperatures below the threshold required to support beneficial uses. In no instances have stream temperatures increased by more than the 5°F (2.8°C) allowed in the Basin Plan temperature objective. The natural receiving temperature of many streams on the Forest is warmer than the thresholds used by the Water Quality Control Board to assess adverse effects to beneficial uses for salmonids. Nearly half of the reference streams on the Forest exceed the 16°C threshold identified for support of beneficial uses for adult salmonid migration and non-core juvenile rearing. However, salmon are still occupying these streams. Some researchers suggest that salmon in the Klamath River system are adapted to naturally warmer temperatures.

**Further Action Required:** None.

## Visual Resource Management

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### A. Visual Condition and Scenic Character

**Objective:** To determine the trends of Forest-wide visual condition and scenic character every ten years. Visual condition in this report refers to the degree of scenery disturbance perceived by typical forest visitors. Scenic character in this report refers to the degree of ecologically established scenic identity perceived by people who intentionally observe the Forest. “Scenery” and “scenic character” are current best science terms for “visual resource” and “landscape character” as applied in the 1995 Forest Plan.

**Methodology:** In FY 2015, informal observation of visual condition and scenic character occurred during ten field days in 2015, while traveling to and evaluating several 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 designated sensitive roads, rivers, trails and recreation settings. Field photography of visual condition and scenic character occasionally accompanies these informal observations.

This report also quantifies adverse vegetation conditions that have impaired scenic character, using nationally established LANDFIRE “vegetation departure” data that is consistent with established Forest-level wildfire history. Consistent with Standard and Guideline 11-4, Forest projects and recent Forest vegetative treatment accomplishment records have also been evaluated to determine their effectiveness in perpetuating the Forest’s ecologically-established scenic character.

**Results:** Informal observations and the data described above tend to confirm two Forest-wide trends: 1) improving visual condition (fewer obvious scenery disturbances); 2) declining scenic character (loss or impairment of ecologically-established scenic vegetation attributes).

Visual condition, the degree of scenery disturbance perceived by the average person has steadily improved. This is largely due to an overall Forest program shift from block-shaped regeneration harvesting and road-associated visual disturbances (occurring most frequently circa 1970-1990), to silvicultural prescriptions based on thinning and understory fuels reduction. The dynamic process of revegetation has softened the visual contrasts over the past 25 years at the landscape scale.

Scenic character, the ecologically-established scenic identity perceived by people who intentionally observe the Forest, has declined through changes in vegetation. For at least 100 years, wildfire suppression has widely interrupted historic wildfire influences that shaped and maintained forest vegetation structure and diversity. Disruption of natural wildfire cycles has resulted in much of the Forest appearing uncharacteristically dense, with reduced bole diameters and less vegetative structural diversity (Figure 7). As a result, Forest vegetation has departed from ecologically-established conditions (Figure 8).

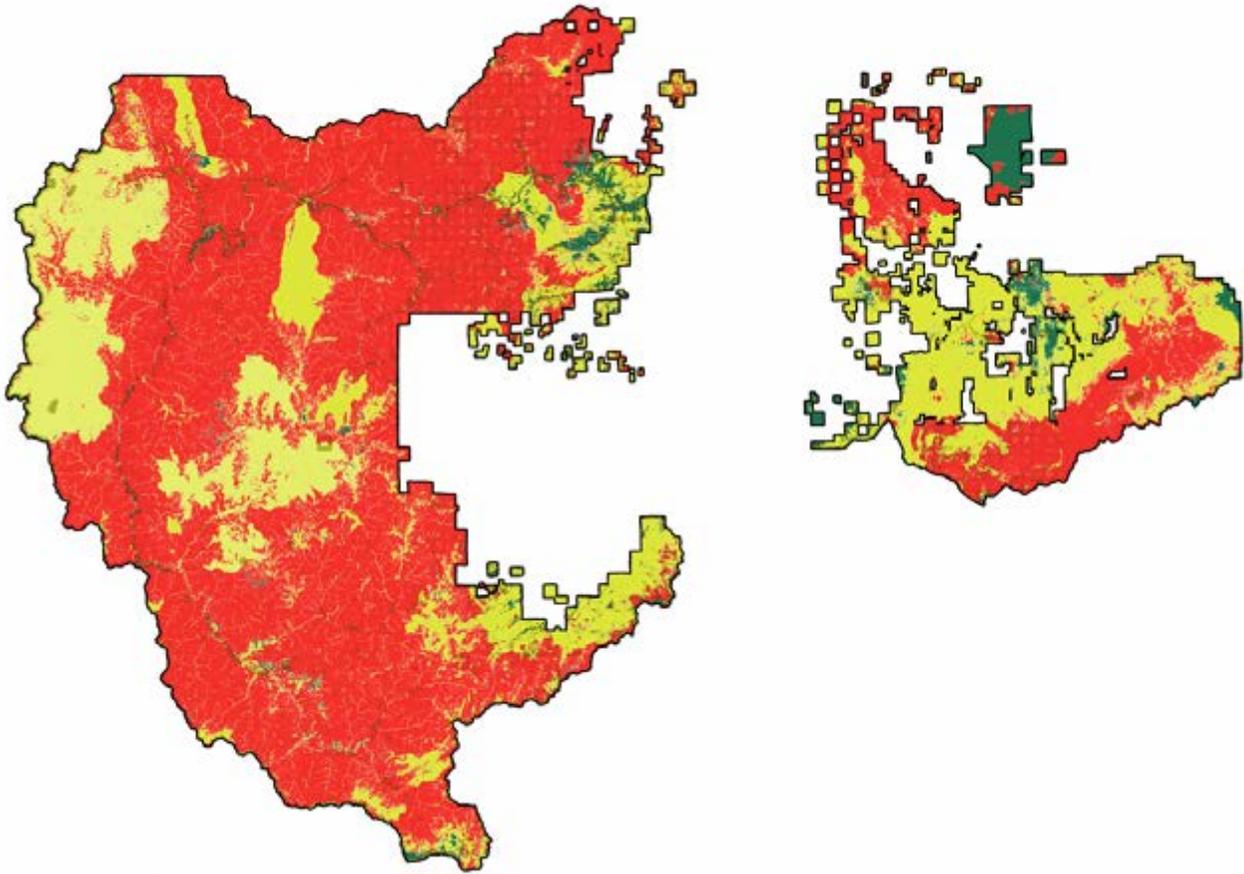


Figure 7. Example of how the disruption of historic wildfire cycles has resulted in much of the Forest appearing uncharacteristically dense with small vegetation and a lack of historic scenic variety. Here, Douglas-fir are crowding Oregon white oak habit (Scott River).



**Figure 8. Example of the Forest’s historic, ecologically established Scenic Character, displaying open forest conditions, large trees, and a diverse understory (Ball Mountain).**

Impairment to the Forest’s vegetative scenic character attributes is quantified in this report as a “vegetation departure” from historic/reference ecosystem conditions (LANDFIRE Fire Regime Condition Class/FRCC inventory, 2008). This vegetation departure analysis measured each acre of the Forest for its degree of change from an historic, ecologically-established (pre-European contact) “reference condition,” in terms of vegetative species, seral stage/size and stand density. The Klamath National Forest Vegetation Departure Map shows that 62 percent of the Forest displays a “High Departure” from historic, ecologically established vegetation conditions; 33 percent as “Moderate Departure;” and only five percent largely reflects historic vegetation conditions, as “Low Departure” (Figure 9).



**Figure 9. Forest departure from its historic, ecologically established vegetation condition.**

In recent years (FY 2009-2015) Forest ecosystem restoration projects have reversed vegetation and scenic character conditions within relatively small, yet ecologically strategic areas (approximately one percent of the Forest's total acreage each year, per national natural resource data) (Figure 10). During the same time period, a little more than one percent of the Forest has received natural wildfires each year, which consistently helps restore vegetative scenic character attributes towards their historic, ecologically-established reference conditions. Restorative vegetation benefits of such projects and wildfires tend to last for at least ten years. Therefore, it is estimated that each decade approximately 20 percent of the Forest could receive vegetation benefits that at least partially restore scenic character towards historic, ecologically established conditions (two percent of the Forest enhanced each year by projects and wildfires multiplied by ten years). Climate change also impacts vegetative scenic character attributes through local droughts that reduce availability of essential moisture and nutrients, thereby causing wildfires to exceed historic size and severity. Scenic character within untreated and unburned areas of the Forest will continue to display impaired vegetation attributes and evolve subject to other influences such as climate, insects, and disease.



Figure 10. Photo after thinning treatment, resulting in open viewsheds, a more resilient forest ecosystem, and a future visual environment that will support increased vegetative diversity (Butte Creek).

**Further Action Required:** 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 for this report and is not planned for next year's report. This is because visual condition/disturbance trends are improving and remain consistent with Forest Plan goals and direction. The adverse scenic character trend can be effectively monitored through Forest-level analysis similar to vegetation departure described above, using a best-science ecological baseline to measure Forest scenic character condition (apply and adapt FRCC "Vegetation Departure," or similar), in combination with project-level information. Scenery information provided in this report, in addition to known Forest and project-level information, is sufficient to direct Forest programs and projects, meet Forest Plan requirements, and fulfill the Forest's scenery conservation responsibilities. As described above, visual condition and scenic character can be gradually improved through program and project activities designed to increase both scenic quality and ecological resilience.

## B. Visual Quality Objectives

**Objective:** Determine compliance with Forest Plan Visual Quality Objectives every three to five years.

**Methodology:** Informal monitoring of compliance with Visual Quality Objectives is typically performed during travel across the Forest and as part of new project analyses. These informal observations took place over 13 field days in FY 2014 and five field days in FY 2015, focusing on completed vegetation manipulation project effects as viewed from the Forest Plan's designated sensitive roads, rivers, trails and recreation settings. These informal observations often include site visits and field photography.

**Results:** Based upon informal monitoring described above, the frequency of project compliance of Forest Plan Visual Quality Objectives appears to be very high, about 95 percent.

**Further Action Required:** Since informal monitoring indicates a high degree of Forest Plan Visual Quality Objective compliance, formal monitoring of Visual Quality Objective compliance is not necessary and will not be performed. Informal monitoring of Forest Plan Visual Quality Objective compliance will continue in 2016 and beyond.

## Wilderness

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**Objective:** Use the Limits of Acceptable Change 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 in Forest wilderness areas in 2009 and 2010 and is planned to continue on a five-ten year cycle. Information stations were installed at wilderness trailheads in 2010, 2011 and 2014 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 and in 2014 in the Siskiyou Wilderness. In 2015 the Salmon/Scott River Ranger District and Happy Camp/Oak Knoll Ranger District both received funding for a wilderness education intern. The two interns provided youth outreach to approximately 500 students from ages 8 to 18, provided wilderness education at the Siskiyou County Fair and assisted in improving visitor information at wilderness access trailheads.

**Results:** Observations have enabled Forest wilderness managers to identify needs and develop strategies to protect wilderness character. The Limits of Acceptable Change and the Recreation Opportunity Spectrum 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:** None required. Monitoring in FY 2016 will consist of additional wilderness campsite monitoring as planned.

## Lands Program Management

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

**Methodology:** Since FY 2002, the Forest has acquired 840 acres in five parcels. No parcels were acquired in FY 2015.

**Results:** About 4.5 miles of Forest boundary has been eliminated since FY 2002, reducing the total miles of landline that requiring location and posting.

**Further Action Required:** No further action is required.

## Timber Management

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### A. 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 KNF 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.

### B. Wildland Fire Effects on Plantations

**Objective:** No plantations burned in 2015.

**Methodology:** N/A

**Results:** N/A

**Further Action Required:** N/A

### C. 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 KNF. 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.

### D. Timber Stand Improvement

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

**Methodology:** The Forest pre-commercially thinned 3,186 acres of natural stands and plantations combined and released 996 acres of plantations in 2015. 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 height or diameter growth.

**Results:** All treated stands met the required standards.

**Further Action Required:** None.

### **E. Other Monitoring Efforts – Timber Marking, Reforestation Success, and Sale Implementation**

Timber marking is reviewed by Quality Control Group check cruiser for conformance with the 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 program staff from the Supervisor's Office.

### **F. Other Monitoring Efforts – Site Preparation and Reforestation Targets**

In 2015, the Klamath planted 1,383 acres within the Mount Hebron (replant) and Salmon/Butler wildfire areas of 2013. About 216,000 trees were planted, with first year survival rates averaging 78 percent. Species planted in 2015 included ponderosa pine, Douglas-fir, sugar pine, incense cedar, and white fir. In 2013, 339 acres were planted with third year survival rates averaging 81 percent. This was higher than average third year survival rates for the Klamath. This was attributed to a six inch rainfall received in July of 2015. Approximately 348 acres of natural stands were certified as stocked upon completion of monitoring.

The annual reforestation program fluctuates, dependent largely on wildfire, post fire salvage, and fuels treatments. 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. There is a substantial need for site preparation allocations before any significant acreages from the 2014 fires can be planted.

### **G. 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 and awarded about 78,979 hundred cubic feet of timber and convertible products in FY 2015. This was approximately 79 percent of the assigned target of 100,000 hundred cubic feet. The volume offered for sale includes sawlogs, biomass, posts, poles and firewood produced through a combination of forest management activities, including thinning, sanitation, and fuelwood and post and pole cutting.

## H. Other Monitoring Efforts – 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 were no fires/complexes in this size category on the KNF in 2015. A summary of past monitoring efforts is located on the web at <http://www.fs.usda.gov/detailfull/r5/landmanagement/resourcemanagement>.

# Fire Management

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**Objectives:** Primary objective is to meet Fire Fighter Line Production Capability, and to assure there is compliance of the initial attack's 90<sup>th</sup> percentile objective.

**Methodology:** The Forest analyzed the number of fire starts and escapes.

**Results:** In 2015, the Klamath National Forest had a total of 119 wildfires, of which 100 were started by lightning. The total acres burned in 2015 was 232 acres. The largest wildfire was the Five-mile Fire at 80 acres.

**Further Action Required:** No further action is required

## A. Prescribed Fire and Fuels Management 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:** For FY 2015, the assigned Forest target for hazardous fuels reduction was 11,770 acres. The Forest exceeded target, accomplishing 58,918 acres. Of the accomplished target, 39,310 acres was met though claiming low severity wildfire acres as treatment, and 19,608 target acres were accomplished through prescribed burning and other fuels treatments. Of the Forest treatments accomplished, approximately 75 percent were located within areas considered as Wildland Urban Interface.

**Further Action Required:** No further action is required.

## B. Other Monitoring Efforts - Fire Ecology

The Forest, in coordination with the Humboldt State University, is currently developing a visualization model for restoration scenarios across the Forest. The results will be used to visually see restoration type treatments at a landscape scale. In addition, Pennsylvania State University is looking at the interactions between inversions and fire severity. Peer reviewed scientific papers are expected from these projects.

The Forest has also completed treatment effectiveness monitoring on numerous projects, including prescribed burns. We are currently using the Firemon-Feat Integration ecological monitoring tool. The Forest is using this program in order to create a cooperate database for fire monitoring, which will standardize the collection, analysis, and results of Forest monitoring data.

The Forest continues to look into research and monitoring opportunities for the Sugar Creek Research Natural Area, which contains the most diverse coniferous forest in the world.

# Range Management

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## A. 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 Appearance, Best Management Practices, Multiple Indicator Monitoring, Comparative Yield, Photo Points, Stubble Height, and Rooted 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). In FY 2015 fifteen frequency plots were reread; seven on the Scott River Ranger District and eight on the Goosenest Ranger District. Two new Multiple Indicator Monitoring plot were installed; one on the Oak Knoll Ranger District and one on the Scott River Ranger District. 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:** No further action is required.

## B. Permitted Animal Unit Months

**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 20,551 AUMs with an actual use of 20,204 AUMS.

**Further Action Required:** The Forest needs to complete environmental analyses on several vacant allotments prior to permitting additional AUMs in order to bring the permitted or actual use closer to projected Forest Plan levels.

## C. 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 zero animals) and 20 for Three Sisters (target of 20 animals). No horses were removed in FY 2015.

**Further Action Required:** Removal of horses to meet target populations is subject to availability of funding and scheduling with the Department of Interior, Bureau of Land Management.

#### **D. Riparian Health**

**Objective:** Assure Annual Operating Instructions contain riparian objectives and Forest Plan standards and guidelines are being 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:** No further action is required.

#### **E. 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 39 were active in FY 2015. Of the active allotments, 125 key areas and nine non-key areas were monitored on 34 different allotments

**Results:** Of the 134 monitored areas, 130 met resource standards (see Table 7). Resource standards were not met on four individual plots on four allotments. Annual Operating Instructions compliance was met on 36 of the 39 active allotments. In each case, a Forest Service range specialist met with the permittee to resolve the situation. Annual Operating Instructions were adjusted in all cases.

**Further Action Required:** No further action is required.

#### **F. Implementing Range Project Decisions**

**Objective:** Ensure that range project decisions include standards and guidelines and that the standards are implemented.

**Monitoring:** The Forest worked on two range projects consisting of four allotments during this fiscal year. Decisions are anticipated for all four allotments in FY 2016.

**Results:** Decisions will incorporate Forest Plan standards and guidelines. To date, the Forest has completed analyses and made decisions on 35 of 45 allotments, all of which have incorporated Forest Plan standards and guidelines into the Allotment Management Plans and Annual Operating Instructions.

**Further Action Required:** No further action is required.

#### **G. Noxious Weeds**

**See the *Noxious Weeds* section of this report for information.**

**Table 7. Forest Range Monitoring Data Summary for FY 2015<sup>17</sup>**

Allotment Name	# of Key Areas	# of Key Areas Monitored	# of Non-Key Areas Monitored	M. Method	CAMP w/ P. Y / N	Data Source	# Met Resource Standards	# Not Meeting Resource Standards	Results shared w/ P. Y/N	P. Co-operation Y / N	AOI Compliance Y / N	Actions Taken or Remarks
Ball Mountain-Kuck's	7	5	0	LA,SH	N	FS	5	0	Y	N/A	Y	
Bogus	4	5	0	LA,SH	N	FS	5	0	Y	N/A	Y	
Bray	8	8	0	LA	Y	FS,P	8	0	Y	N/A	Y	
Butte Valley NG	17	17	0	LA	N	FS	17	0	Y	N/A	Y	
Deer Mountain	5	5	0	LA	N	FS	5	0	Y	N/A	Y	2015 Drought; only 80% turnout
Dry Lake	6	0	0	N/A	N	FS	N/A	0	Y	N/A	Y	No grazing except for minimal drift in 2015. Cattle grazed on private deeded land. Was Billed
East Red Rock	11	8	0	LA	N	FS	8	0	Y	N/A	Y	The 3 areas not monitored were not grazed in 2015
Haight Mountain	8	8	0	LA,SH	N	FS	8	0	Y	N/A	Y	
Horsethief	8	3	0	LA	N	FS	3	0	Y	N/A	Y	5 points not monitored due to no grazing (Drought & Rested) or fire
McGavin Peak	4	4	0	LA	N	FS	4	0	Y	N/A	Y	
Mount Hebron	3	2	0	LA	N	FS	2	0	Y	N/A	Y	MH-2 overrun by brush

<sup>17</sup> The information presented in Table 7 is summary data (only) from a larger data set. Acronyms and abbreviations are defined as follows: # (number), AOI (Annual Operating Instructions), CAMP (Cooperative Allotment Monitoring Plan), FS (Forest Service), BMP (Best Management Practices Effectiveness), LA (Landscape Appearance - Herbaceous), LAB (Landscape Appearance - Browse), M (Monitoring), MIM (multiple indicator monitoring, all annual indicators monitored), N (no), NG (National Grassland), OC (ocular), P (permittee), PVT (private), S (South), SH (Stubble Height), Y (yes), N (no), and N/A (not applicable).

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Allotment Name	# of Key Areas	# of Key Areas Monitored	# of Non-Key Areas Monitored	M. Method	CAMP w/ P. Y / N	Data Source	# Met Resource Standards	# Not Meeting Resource Standards	Results shared w/ P. Y/N	P. Co-operation Y / N	AOI Compliance Y / N	Actions Taken or Remarks
Orr Lake	6	6	0	LA	N	FS	6	0	Y	N/A	Y	
Panther/ Ball Mtn	8	6	0	LA	N	FS	5	1	Y	N/A	Y	1 Meadow site did not meet and needs to be fenced out; will be reflected in AOI
Red Rock	5	5	0	LA	N	FS	5	0	Y	N/A	Y	3 sites not grazed due to drought condition. Grazed on PVT
Shafter	6	6	0	LA	N	FS	6	0	Y	N/A	Y	
Three Sisters	8	2	0	LA	N	FS	2	0	Y	N/A	Y	Drought conditions; cows were moved to PVT
Ash Creek	0	0	0	N/A	N	FS	N/A	N/A	Y	Y	Y	
Big Flat	4	0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	VACANT
Big Meadows	2	2	0	LA, MIM, BMP	Y	P, FS	2	0	Y	Y	Y	
Big Ridge	6	6	1	OC, MIM, LA	Y	P, FS	7	0	Y	Y	Y	
Boulder Creek	4	3	0	N/A	N	FS	3	0	Y	Y	Y	
Carter Meadows	4	2	1	LA	N	FS	3	0	Y	Y	Y	
Cuddihy	3	0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	VACANT
Deadwood	0	0	0	N/A	N	FS	N/A	N/A	Y	Y	Y	

Klamath National Forest FY 2015 Monitoring and Evaluation Report

Allotment Name	# of Key Areas	# of Key Areas Monitored	# of Non-Key Areas Monitored	M. Method	CAMP w/ P. Y / N	Data Source	# Met Resource Standards	# Not Meeting Resource Standards	Results shared w/ P. Y/N	P. Co-operation Y / N	AOI Compliance Y / N	Actions Taken or Remarks
Dry Lake (west-side)	3	1	0	MIM	N	FS	1	0	Y	Y	Y	Permitted number adjusted for resource protection. Cattle were removed early from allotment.
Eagle Creek	4	2	0	LA	N	FS	2	0	Y	Y	Y	
East Beaver	4	2	0	LA, BMP, MIM	N	FS	2	0	Y	Y	Y	
East Fork	2	2	0	LA, BMP	N	FS	1	1	Y	Y	N	AOI will be changed for next year.
Etna Creek	3	2	2	LA	N	FS	4	0	Y	Y	Y	
Granite/Fox	3	0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	VACANT
Grouse Creek	2	1	0	LA	N	FS	1	0	Y	Y	Y	Rested this season
Hornbrook	0	0	0	N/A	N	FS	N/A	N/A	Y	Y	Y	
Horse Creek	3	1	0	LA	N	FS	1	0	Y	Y	Y	
Indian Creek	1	1	1	LA	N	FS	1	1	Y	Y	N	AOI will be changed for next year.
Kidder Creek	3	0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	VACANT
Lake Mountain	1	1	1	LA	N	FS	2	0	Y	Y	Y	

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Allotment Name	# of Key Areas	# of Key Areas Monitored	# of Non-Key Areas Monitored	M. Method	CAMP w/ P. Y / N	Data Source	# Met Resource Standards	# Not Meeting Resource Standards	Results shared w/ P. Y/N	P. Co-operation Y / N	AOI Compliance Y / N	Actions Taken or Remarks
Little North Fork	4	0	1	LA, LAB, BMP	N	FS	1	0	Y	Y	Y	
Marble Valley	2	0	0	N/A	N	FS	N/A	N/A	Y	Y	Y	
Middle Tompkins	4	0	0	N/A	N/A	FS	N/A	N/A	N/A	N/A	N/A	VACANT
Mill Creek	4	3	0	LA, MIM	N	FS	3	0	Y	Y	Y	
Red Rock Valley	3	2	1	LA	N	FS	3	0	Y	Y	Y	
S.Klamath	2	0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	VACANT
Seiad Johnny	2	0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	VACANT
Shackleford	4	2	0	LA, MIM	N	FS	1	1	Y	Y	N	AOI will be changed for next year.
Shelly Meadows	3	1	0	LA, MIM, LAB	N	FS	1	0	Y	Y	Y	
S. Fork Salmon	4	0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	VACANT
S.Russian	3	1	1	LA	N	FS	2	0	Y	Y	Y	
TOTALS	201	125	9		3		130	4	39	23	36	

# Noxious Weeds

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

The Klamath National Forest noxious weed and non-native invasive plant program follows national direction with six main emphasis areas.

## A. Early Detection/Rapid Response

**Methodology:** The Forest list contains 45 noxious weed 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 strategy focuses on treating high priority weed species in high priority places before they get to damaging levels as funding allows.

Early detection and rapid response (EDRR) prevention practices are implemented. The Forest continues high priority treatments of the few noxious weed species known to exist within Wilderness on the Forest. The Forest prioritized treatment of infestations outside Wilderness by considering factors such as species, proximity and dispersal ability to Wilderness and trailheads, State ratings of species, and the ability to be successful with available control methods.

In FY 2015, Burned Area Emergency Rehabilitation (BAER) funds provided for EDRR in the areas burned and disturbed by suppression activities in 2014 on the Salmon/Scott River, Happy Camp/Oak Knoll, and Goosenest Ranger Districts.

**Results:** Our Watershed Council partners have been instrumental in locating new infestations in their respective watersheds. New infestations of *Senecio jacobaea* (tansy ragwort), *Linaria dalmatica* (Dalmatian toadflax), and *Euphorbia oblongata* (oblong spurge) were reported along river corridors. Funds from BAER allowed extensive surveys to be conducted in burned areas. New infestations of *Centaurea maculosa* (spotted knapweed), *Centaurea solstitialis* (star thistle), and *Isatis tinctoria* (Dyer's woad) were found as a result of surveys in burned areas. These new infestations are being actively treated by partners and Forest staff.

**Further Action Required:** None required. Current protocols of EDRR will continue.

## B. Inventory/Control/Management

**Methodology:** In FY 2015, The Forest had a two person Forest noxious weed crew stationed out of the Supervisor's Office in Yreka, and a two person BAER weed crew stationed out of the Happy Camp District Office in Happy Camp. The Forest also has a small dedicated force of employees and volunteers that contribute in many substantial ways to the weed treatment program. This cadre includes: district botanists, a small YCC crew at Goosenest and Salmon/Scott River Districts; a very active river ranger and volunteers at Happy Camp that treat river corridors; fire crews, especially Crew 4 Salmon River Hotshots, and range and recreation technicians. The Forest also has community partners: the Salmon River Restoration Council, the Mid-Klamath Watershed Council, Siskiyou County school groups, volunteers from US Fish and Wildlife Service and the Natural Resource Conservation Service, and the Siskiyou Satellite of the California Conservation Corps in Yreka. We also work closely with the Siskiyou County Department of Agriculture for treatment on private lands adjacent to the Forest.

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 national Natural Resource Information Service Invasive Species database.

**Results:** In FY 2015, the Forest and its partners treated 977 acres including 21 different species on over 375 sites. Treatments occurred in high priority sites including: burned areas, trailheads, river accesses, wilderness, roads leading into wilderness, 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. In conjunction with these treatments, a total of 2,504 acres were monitored for the presence of noxious weed infestations and/or to determine treatment needs. Some species, like spotted and diffuse knapweed are still present in moderate to low amounts, but do not appear to be spreading from known sites, and are considered under control on the Forest. Approximately 17 percent (164 acres) of treatments were accomplished using volunteer efforts. *Isatis tinctoria* (Dyer’s woad) continues to spread 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. Scotch broom is prevalent along the Klamath and Lower Scott watersheds. These species are only treated in geographically prioritized areas since they are so common on the Forest.

**Further Action Required:** No further action is required. The Forest plans to continue with current treatment and monitoring efforts.

### C. Project-level monitoring and treatment

**Methodology:** Project level monitoring and treatment, if possible, is conducted within three years of project completion. Some areas, depending on the project, are monitored annually dependent upon risk factors and types of disturbance. All projects have project design features that intend to limit the risk of introduction and spread of invasive species.

**Results:** Some highlights of specific projects:

- Big Ridge Grazing Allotment: Treatment has been occurring at South Fork Kelsey Meadows and Bear Lake for many years. Dyer’s woad has been steadily declining, especially since follow-up visits were instituted in the late-summer in order to capture re-sprouts and seeding. In FY 2015, the infestations at the Kelsey Meadow sites appeared to be declining and were successfully treated in one day. Revisits were made in the late summer to clean up re-sprouts and missed rosettes. The Bear Lake infestation continues to decline and was treated in one day by three people; re-visits to this site were not deemed necessary in FY 2015.
- Mcbaldy: Results of five year monitoring indicate that the combination of substantial dormant seed bank and project related ground disturbance did result in extensive expansion of the Dyer’s woad infestation present in this project area. The second year after implementation, a large germination event occurred from a dormant seed bank, with infestation exceeding 10,000 plants. Continued treatment has contained this infestation to project units and there has been no evidence of expansion into *Calochortus persistens* conservation areas.
- Salmon Salvage: Project design features were effective at limiting the spread of known noxious weed sites in this project area. A dozer inadvertently unloaded in a known star thistle infestation,

but the mistake was recognized and the equipment washed before returning to work. Mitigation measures implemented to allow for the use of a landing infested with spotted knapweed were effective and the infestation was not disturbed or spread.

- Westside Fire Recovery: Surveys indicate that *Isatis tinctoria* has spread throughout the project area. Sale administrators are helping document new infestations and are working with contractors to implement project design features and limit weed spread as much as possible. This area will be a target for the Forest noxious weed crew in FY 16 and 17.

**Further Action Required:** No further action is required. Continuing monitoring and treatment in project areas is planned.

#### **D. Educational Outreach and Prevention**

**Methodology:** As an integral member of the Siskiyou County Weed Management Area group, the Forest has participated in numerous outreach events and has led an educational booth at the Siskiyou County Fair every year since 2001. The 2015 fair booth reached approximately 900 people. Project design features that focus on the prevention of weed introduction and spread are included in every project.

**Results:** Outreach and education events have been successful, measured by the number of new species reported for the County. Prevention measures prescribed for areas where weeds have yet to be introduced have been successful. Preventing the spread of existing weeds has proven to be much more of a challenge.

**Further Action Required:** No further action is required. The Forest plans to continue with current efforts and expanding efforts where possible.

#### **E. Restoration and Rehabilitation**

**Methodology:** Since the Forest does not have extensive weed sites that need human intervention once the target weeds have been removed, most of the time native species return naturally following weed removal. Occasionally, as in the case of fire rehabilitation, native perennial grass seed is used to occupy bare sites. In FY 2015, funds were obligated for the purpose of growing and obtaining native plant materials for future needs.

**Results:** Several beds producing grass seed and propagules were started in FY 2015 at Coeur d'Alene and J. Herbert Stone Forest Service Nurseries.

**Further Action Required:** No further action is required. The Forest will continue eradicating small sites of selected species and holding, controlling, or decreasing the populations of other priority species at known, selected sites.

#### **F. Strategic planning**

**Methodology:** Efforts were conducted at national, state, and local levels.

**Results:** At the national level, the Invasive Species Strategy and Implementation Plan of 2004 has been updated. The Forest Service National Strategic Framework for Invasive Species Management, August

2013, is now the current direction. This document is available here:

<http://www.fs.fed.us/publications/invasive/invasive-framework-2013.pdf>

At the state level, the state-wide weed mapping project implemented cooperatively with the California Invasive Plant Council and partners, funded by USDA State and Private Forestry resulted in prioritized eradication targets for Siskiyou County. The KNF and Weed Management Area Partners are currently writing grant proposals to fund these eradication targets. The North Central Eradication Plan, which includes the KNF and Siskiyou County, is available on-line at <http://calweedmapper.calflora.org/regions/>.

**Further Action Required:** No further action is required. The completion of a forest strategy, and adoption of prevention best management practices are planning goals. We will also continue our efforts to build partnerships and find opportunities for outside funding sources to support the program.

## Cultural Resource Management

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**Monitoring 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. Monitoring also aids in determining whether mitigation measures are working to address adverse effects and stabilize sites.

**Monitoring:** Site monitoring is a necessary component of the process required to comply with Section 106 of the National Historic Preservation Act. As part of the project review process, previously recorded historic properties within the Area of Potential Effect 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 National Historic Preservation Act as part of a proactive 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 50 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 National Register of Historic Places 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

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## A. 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.

## B. 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:** No further action is required.

## C. Other Monitoring – Outputs of 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 seven times (1996, 1997, 2009, 2010, 2011, 2012, 2013, and 2014). The Forest offered and awarded about 78,979 hundred cubic feet of timber and convertible products in FY 2015. This was approximately 79 percent of the assigned target of 100,000 hundred cubic feet.

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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 2015, commercial harvest from unregulated lands was from about 2,128 acres.

See the *Timber Management* section of this report for more information.

The Forest Plan modeled fuels treatments at about 27,000 acres per year, including 9,375 acres of prescribed burning, 3,183 acres of timber-related treatments, and 14,550 acres of other fuels treatments (e.g. mastication). For FY 2015, the assigned Forest target for hazardous fuels reduction was 11,770 acres. The Forest exceeded target, accomplishing 58,918 acres. Of the accomplished target, 39,310 acres was met through claiming low severity wildfire acres as treatment, and 19,608 target acres were accomplished through prescribed burning and other fuels treatments. Of the Forest treatments accomplished, approximately 75 percent were located within areas considered as Wildland Urban Interface. See the *Fire Management—Prescribed Fire Program* section of this report for more information.

**Further Action Required:** Annual comparisons will be continued for FY 2016.