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Lookout Loop OHV Management Area, Mammoth Ranger District

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Introduction

The Regional Forester approved the Inyo National Forest Land and Resource Management Plan (LRMP or Plan) and Environmental Impact Statement (EIS) on August 12, 1988 (USDA 1988). Chapter V of the Forest Plan includes a monitoring program. As stated in the Forest Plan (pg. V-1) “the purpose of monitoring is to assess the success of Plan implementation and determine whether the Plan needs to be amended or whether management activities need to be revised.”

In addition to monitoring, the LRMP requires evaluation of results. Evaluation is the analysis and interpretation of monitoring data to determine whether changes in the LRMP or in project implementation are necessary. Together, monitoring and evaluation ensure that the Plan remains a dynamic and responsible tool for managing the Forest’s land and resources in a changing social and economic climate.

This report, prepared by an Interdisciplinary Team (see List of Preparers) for the Forest Supervisor, documents the results of monitoring and evaluation activities accomplished on the Inyo National Forest during federal fiscal year 2007 (October 1, 2006 to September 30, 2007).

Land Management Plan Monitoring Activities

The LRMP, as amended, includes monitoring of 20 broad resource categories ranging from air quality to wilderness (Table 1). As shown, many of the resource categories identified in the 1988 LRMP are also identified as part of the monitoring strategy for the Sierra Nevada Forest Plan Amendment (SNFPA), which amended the 1988 LRMP in 2004. The Monitoring Strategy for the 2004 SNFPA is described in Appendix E of the 2001 SNFPA FEIS (USDA 2004; USDA 2001).

There is considerable overlap in monitoring direction. In some cases, the monitoring objectives for the 2004 SNFPA are very similar to those of the 1988 LRMP. In others, however, monitoring is focused on answering different questions about different resources.

Table 1. Summary of monitoring direction by resource category, 1988 Inyo National Forest LRMP, as amended

| Resource Category | Source of Monitoring Direction |
|---|--------------------------------|
| Air Quality | 1988 LRMP/2004 SNFPA |
| All Resource Elements | 1988 LRMP |
| Diversity (of Vegetation) | 1988 LRMP |
| Fish/Aquatic, Riparian, and Meadow Ecosystems | 1988 LRMP/2004 SNFPA |
| Heritage/Cultural and Fire and Fuels | 1988 LRMP/2004 SNFPA |
| Noxious Weeds | 2004 SNFPA |
| Pest Management | 1988 LRMP |
| Protection (Fire Suppression)/Fire and Fuels | 1988 LRMP/2004 SNFPA |
| Range | 1988 LRMP |
| Rare Plants/ Aquatic, Riparian, and Meadow Ecosystems | 1988 LRMP/2004 SNFPA |
| Recreation | 1988 LRMP |
| Riparian/Aquatic, Riparian, and Meadow Ecosystems | 1988 LRMP/2004 SNFPA |
| Socioeconomic Effects | 2004 SNFPA |
| Soils/Soil Productivity and Fire and Fuels | 1988 LRMP/2004 SNFPA |

| Resource Category | Source of Monitoring Direction |
|---|---|
| Timber/Fire and Fuels and Old Forests and Associated Species | 1988 LRMP/2004 SNFPA |
| Visuals | 1988 LRMP |
| Water/Aquatic, Riparian, and Meadow Ecosystems | 1988 LRMP/2004 SNFPA |
| Wild and Scenic Rivers | 1994 North and South Forks of the Kern Wild and Scenic River Plan (Amendment #4) |
| Wildlife/Old Forests and Associated Species; Aquatic, Riparian, and Meadow Ecosystems | 1988 LRMP, Deer Herd Management Direction Amendment #5/2004 SNFPA |
| Wilderness/Old Forests and Associated Species | 1988 LRMP, 2001 Wilderness Plan (Amendment #7), and 2005 Trail and Commercial Pack Stock Management (Amend. #10)/2004 SNFPA |

Note: Soils and water are presented as one resource category in the 1988 LRMP Monitoring Plan

This report presents a subset of the fiscal year 2007 monitoring and evaluation efforts related to six of the resource categories: wildfire reforestation, recreation, sensitive plant species, water quality, wilderness, and wildlife. This report is not intended to document all monitoring activities conducted on the Forest during 2007. Additional monitoring for various resource categories may have been completed and documented as part of reporting requirements for specific program areas.

Each monitoring overview begins with a summary of relevant goals, objectives, and monitoring established in the 1988 LRMP and 2004 SNFPA for that resource category. Some of the monitoring actions completed in 2007 are discussed, including a summary of results and a brief evaluation. Evaluation is the analysis and interpretation of monitoring data to determine whether changes in the LRMP or project implementation are needed.

Fire and Fuels - Reforestation

Goals and Objectives

Although it calls for monitoring of reforestation, the 1988 LRMP does not include any goals related specifically to post-wildfire reforestation on the forest. The goal for wildfire protection is:

The forest has a cost-effective fire management program that minimizes resource losses and serious or long-lasting adverse effects from wildfire. The Forest Service mission in fire management is to use fire as a resource management tool.

Monitoring Actions

As shown in the table below, the 1988 LRMP calls for continued monitoring of reforestation activities. The 2004 Sierra Nevada Forest Plan Amendment does not include specific monitoring direction related to reforestation activities.

Table 2. Summary of monitoring direction for fire protection and reforestation

| Activity to be Measured (LRMP) | Summary of LRMP Objective | LRMP Monitoring Technique | Related 2001/2004 Framework Monitoring |
|--------------------------------|--|--|--|
| Reforestation | Determination of success of regeneration practices | Described in FSH 2470. Includes sampling of species, survival, planting stock density. | Not Applicable |

Monitoring Action 1: Crater Fire Reforestation

From 2002 through 2004, Jeffrey pine seedlings were planted on approximately 450 acres within the area burned by the 2001 Crater Fire (T1S, R27E, Sec. 2 MDB&M; Crater Fire Tree Planting Decision Memo, 2/22/02). During 2007, monitoring was completed in Stand 0030023 (28 acres) within the Railroad Timber Compartment. The objective of the monitoring was to assess the percentage of area stocked with planted and natural trees and determine the number of trees per acre within the planted area. Monitoring was conducted on a sample (one percent) using 1/50 acre-sized plots.

Results

The desired (pre-European settlement) Jeffrey pine forest condition would average 15-25 large trees (> 24 inch dbh) per acre, occurring in patches or groups. Of the 236 trees planted per acre, 64 trees per acre survived (1.27 trees per plot). This represents 80 percent stocking (12/15 plots) and 27 percent survival (64 trees per acre survived out of 236 originally planted trees).

Evaluation

Although actual survival numbers are below average, they are currently within an acceptable range. These survivors are expected to provide a future seed source to help restore this burned area to a forested condition. No additional activities are planned at this time.

Reforestation efforts were initiated post-wildfire and were not related to timber harvest activities. Because the planting was not subject to reforestation requirements, any number of successfully regenerated trees would be considered acceptable in that it will enhance natural regeneration by reducing the amount of time trees would reoccupy the site through natural recovery.

Recreation

Goals and Objectives

The 1988 LRMP includes the following goal for recreation on the forest:

A broad range of developed and dispersed recreation opportunities in balance with identified existing and future needs is provided.

Related annual objectives are:

- 1,914,000 recreation visitor days of developed private use
- 1,578,000 recreation visitor days of developed public use
- 1,191,000 recreation visitor days of dispersed use
- 644,000 recreation visitor days of designated Wilderness use

A recreation visitor day (RVD) is defined as 12 hours of recreation use in any combination of persons and hours, such as one person for 12 hours or three persons for four hours.

Monitoring Actions

As shown in the table below, the 1988 LRMP calls for continued monitoring of recreation use levels and the effects of OHV use on land and other resources. Overlapping monitoring direction from the 2004 Sierra Nevada Forest Plan Amendment is also displayed.

Table 3. Summary of monitoring direction for recreation

| Activity to be Measured (LRMP) | Summary of LRMP Objective | LRMP Monitoring Technique | Related 2001/2004 Framework Monitoring |
|-------------------------------------|---|--|---|
| Recreation use | Determine total recreation use | RIM system and other sampling techniques | NA |
| OHV use on land and other resources | Determine if adverse effects are occurring or likely to occur | Photograph and/or field measurements | Key Old Forest Information Gaps (p. E-70 and 71): What are the effects of OHV use on the abundance and distribution of fishers? What are the effects of OHV use on the abundance and distribution of martens? |

Monitoring Action 1: National Visitor Use Monitoring (NVUM)

The National Visitor Use Monitoring (NVUM) program provides information about recreation visitors to national forest system managed lands at the national, regional, and forest level. Information about the quantity and quality of recreation visits is required for national forest plans, Executive Order 12862 (Setting Customer Service Standards), and implementation of the National Recreation Agenda. The Inyo National Forest participated in the National Visitor Use Monitoring (NVUM) project during fiscal year 2007. Results are still undergoing review and will be reported in the FY 2008 Monitoring and Evaluation Report.

Monitoring Action 2: Effects of Off-Highway Vehicle (OHV) Use on Land and Other Resources

The Forest has 10 areas in which OHV patrol, route maintenance, and conservation efforts are concentrated. These areas include the following:

- Monache
- Poleta Open Area
- Bishop/Coyote
- White Mountains and Ancient Bristlecone Pine Forest
- Mazourka and Inyo Mountains
- McGee Creek and Sagehen Meadow area/Taylor Canyon
- Glass Creek/Deadman/Crater Flats
- Lookout Loop
- East Craters
- Mono Basin Scenic Area

These areas represent a cross section of different soil types and conditions found throughout the Forest. For instance, in the Monache and Bishop/Coyote areas system routes traverse through wet and dry meadows. In the McGee Creek, Glass Creek/Deadman/Crater Flats, Lookout Loop, East Craters and Mono Basin Scenic Area routes traverse through ashy/pumiceous soil types.

As part of OHV management on the Forest, approximately 215 miles of system roads and unauthorized routes within the OHV management areas are monitored using the 1991 California Department of Parks and Recreation Soil Conservation Standards and Guidelines. The majority of the monitoring is focused on system roads. Generally, routes are rated annually.

The Soil Conservation Standards and Guidelines are used to rate the condition of route segments as Green, Yellow, or Red (G, Y, R). The green condition class means that the route is in stable condition and is generally functional with minimal resource issues. Yellow condition relates to routes that need minor erosion control and/or tread work that should be prioritized for maintenance. The red rating is used for routes in need of restoration and/or heavy maintenance work.

Results

As of the summer of 2007, 88 percent of the monitored routes were found to be stable and functional (green-rated) with continued maintenance. The remaining 12 percent of routes were rated yellow, with minor drainage problems, multi-trailing, and/or off-trail headcutting. The G,Y,R monitoring results are used to identify and prioritize routes for corrective action, including heavy maintenance, repair of drainage/erosion control features or damaged tread surfaces, and, in some cases, re-routing to avoid the sensitive area. Restoration and maintenance activities implemented since 2003, for instance, have increased the percentage of green-rated routes from 82% to 88%, and decreased yellow-rated routes from approximately 18% to 12% in 2007. A project started in 2007 is intended to address the drainage problems on the remaining yellow-rated routes.

Evaluation

Based on this data, OHV routes through meadows and steep areas (over 15% slopes) on ashy/pumiceous soils generally have the most potential for soil concerns (e.g., surface erosion and loss of soil productivity on adjacent sites) from public motor vehicle use. These data were used in the development of the Proposed Action and alternatives for the Motorized Travel Management Environmental Impact Statement (USDA 2009). They served to identify potential problem areas (e.g., routes on steep slopes or through meadows) associated with unauthorized routes and possible mitigation measures to address those concerns. In addition, the data furthered the understanding of how routes through different soil environments respond to motor vehicle traffic.

Status of Sensitive Plants

Goals and Objectives

The 1988 LRMP includes the following goal:

Sensitive plant species are protected to ensure that they will not become threatened or endangered.

There are no objectives related to sensitive plants.

Monitoring Actions

The LRMP includes the following sensitive plant monitoring actions. The table includes related monitoring to be conducted under the 2004 Sierra Nevada Forest Plan Amendment (from Appendix E of the 2001 SNFPA).

Table 4. Summary of monitoring direction for Forest Service sensitive species

| Activity to be Measured (LRMP) | Summary of LRMP Objective | LRMP Monitoring Technique | Related 2001/2004 Framework Monitoring |
|---------------------------------|---|---|---|
| Sensitive Plant Species Habitat | Detect changes in key populations of each species and assess impacts on selected populations of occupied habitats | Population trend censuses; baseline and past-project surveys for input into EAs. Use applicable techniques identified in Interim or Species Management Guides | Aquatic, Riparian, and Meadow ecosystem Status and Change Monitoring (p. E-104): Populations of nonvascular plant and fungi species at risk? |

Monitoring Action 1: White Mountains Moonwort Survey

In July 2007, surveys were conducted in potential habitat to confirm the existence of and gather additional population and habitat data for several different moonwort (*Botrychium*) species in the White Mountains. When located, individual moonwort plants were marked with pin flags to assist with counting and mapping populations.

There are several species of rare moonworts that may be found in meadows, seeps, fens, or marshes in upper or lower montane forests, or subalpine forests. Meadows with non-granitic soils, especially limestone-based, are considered to be more likely habitat for these rare species. Surveys were conducted for upswept moonwort (*Botrychium ascendens*), common moonwort (*Botrychium lunaria*), and scalloped moonwort (*Botrychium crenulatum*). Prior to the surveys conducted in 2007, there were ten known occurrences of these three species on the Inyo National Forest. Several occurrences are awaiting identification, as the species are very difficult to separate from one another without genetic analysis.

Results

Individual plants were counted and populations were mapped. Approximately 15 acres were surveyed, and one new *Botrychium* population was identified, mapped, and censused

Evaluation

Census and population data gathered during this survey will be used in the development of management strategies for the range allotments in the White Mountains. Analysis of grazing use in the allotments has begun and is anticipated to be completed by September 2009. The results of the moonwort surveys will be used to inform grazing management strategies where moonworts occur. Grazing scenarios that maintain the hydrologic stability of moonwort habitats will be recommended.

Monitoring Action 2: Ramshaw Abronia Habitat and Genetic Analysis

Abronia alpina (Ramshaw abronia), a Forest Service sensitive species, is known only from Ramshaw and Templeton Meadows in the Golden Trout Wilderness of the Inyo National Forest. One population of the species (previously considered two populations) is spread along the sandy margins of those meadows. Thirty-four subpopulations have been mapped within that population.



Figure 1. Ramshaw abronia, a Forest Service sensitive species (James Andre, 2004)

In 2007, research action items identified in the draft Conservation Agreement for *Abronia alpina* were implemented as part of the initial phases of a Master's thesis project. Data were gathered on soils and vegetation, and plant material was collected for genetic analysis. Transects to measure vegetation and soil components were established and read in selected areas of occupied and unoccupied *A. alpina* habitat. Seeds were collected from selected subpopulations, and propagated under greenhouse conditions as well as planted in containers along established transects in areas on the Kern Plateau with suitable, but unoccupied, habitat. In addition, leaf material was collected from selected subpopulations to be used in an analysis of genetic variability within and between subpopulations.

In addition to the field studies, data collected during the 2006 field season were analyzed and incorporated into the draft Conservation Agreement between the US Fish and Wildlife Service (USFWS) and the Inyo National Forest. Standard statistical methods were used to analyze the population monitoring data collected during the summer of 2006. In 2006, Forest botanists and volunteers conducted population monitoring on all 34 subpopulations, re-read long term permanent plots, and repeated photographs of selected subpopulations to assess lodgepole pine encroachment. Surveyors recorded plant density and age class in multiple 5 meter x 6 decimeter plots within each subpopulation, as well as 5 meter x 5 meter permanent plots in three selected subpopulations.

Results

Results of data gathered during the 2007 season are not available at this time as analysis is ongoing. However, based on analysis of the 2006 monitoring data, adjustments were made to the monitoring protocol to more closely and accurately assess the species. Monitoring will be continued during the 2008 season, using the new protocol.

Evaluation

Evaluation of the data collected as part of the research action items included in the draft Conservation Agreement will add to existing knowledge of the species' requirements and vulnerabilities. More specifically, germination studies will aid in identification of dispersal and/or germination limitations. Analysis of genetic material is expected to identify the degree of gene flow between subpopulations and provide valuable information if the need should arise to actively restore the species.

Conservation measures outlined in the draft Agreement will guide management for this highly localized endemic species and are expected to provide for its long-term viability. Long term monitoring will help determine if the goals for the species are being met.

Monitoring Action 3: Subalpine fireweed conservation assessment

Epilobium howellii (subalpine fireweed) is known from moist mossy openings near meadow or montane forest edges at elevations from 6,000-8850 ft. (2000-2700 m.). This diminutive fireweed may be easily overlooked, and is often found growing sympatrically with other similar fireweed species. Subalpine fireweed is currently listed as a Forest Service sensitive species.

In 2007, Forest botanists surveyed suitable habitat on the Inyo and Plumas National Forests. Aerial photos were examined to identify likely habitat areas prior to field surveys.

Results

Approximately 580 acres were surveyed across the known range of the species, approximately 380 acres of this on the Inyo NF. No new populations of subalpine fireweed were located. (Surveys conducted in 2006 confirmed its occurrence on the eastern slope of the Sierra.) Habitat parameters were narrowed with information obtained through the surveys.

Evaluation

Surveys increased available information on the distribution and abundance of this little known species. Additional information on suitable habitat acquired through these surveys will help to focus future survey efforts, and will be incorporated into a conservation assessment, to be completed in FY2008.

Monitoring Action 4: Fen Conservation Assessment

Additional surveys for the Fen Conservation Assessment Project were conducted in 2007. The objective was to conduct surveys for fens on the Inyo National Forest, using the indicator species of *Meesia triquetra* and *M. uliginosa*, to assist in the coordination of a Regional fen conservation assessment. Aerial photographs were used in the initial assessment of fen potential. Potential fen sites were then field-verified using established protocols.

Meesia triquetra and *M. uliginosa* (hump moss) are listed as Forest Service Sensitive Species. Both are fen indicator species with wide distributions outside of California, which grow in "rich" fens characterized by pH values ranging from approximately 5.5 to 7.5. No populations of *M. triquetra* or *M. uliginosa* are known from the Inyo National Forest, but extensive unsurveyed habitat exists.

Results

Approximately 330 acres were surveyed and 36 fens identified as a result of this effort. A fen spatial geodatabase was refined, populated, and shared with other national forests.

Evaluation

Survey data increased the available knowledge base for fen locations, associated species, and potential impacts on the Inyo National Forest. Information from the surveys has been incorporated into a draft fen conservation assessment, which was completed and distributed for review in FY 2007. A conservation strategy will be developed using information compiled in the conservation assessment.

Monitoring Action 5: Tahoe Draba Survey and Conservation Assessment

The Tahoe draba is known primarily from several occurrences around Lake Tahoe; however, one disjunct occurrence has been reported at 11,500 feet on Mt. Gibbs on the Inyo National Forest. This occurrence has not been relocated since it was first discovered in 1916. Based mainly on the Lake Tahoe occurrences, the habitat is characterized by extensive scree slopes of granitic material ranging in size from sand to small boulders. It is normally found in the sandy areas between stones or crevices on north facing slopes at elevations above 8,900 feet.

In 2007, a survey was conducted to relocate the historical population of Tahoe draba reported from Mt. Gibbs. Using the limited information available, Forest botanists surveyed some of the potential habitat on the upper reaches of the mountain.

Results

Approximately 10 acres were surveyed but the historical population was not relocated. Three non-sensitive *Draba* species were located and mapped. Although the survey failed to relocate the historical Tahoe draba population, all historical records and surveys results were provided to researchers from Brigham Young University currently conducting research on the species. In addition, results of the survey were incorporated into the draft Conservation Assessment for the species.

Evaluation

Due to the large amount of potentially suitable habitat remaining unsurveyed on Mt. Gibbs, and the very general location information available for the historical occurrence, the survey conducted in 2007 does not rule out the possibility of this occurrence being extant. Current impacts to the site are negligible or non-existent, with the exception of the possible effects of climate change. Forest botanists recommended that the Brigham Young University researchers evaluate the historical specimen to verify its taxonomic status. If the Mt. Gibbs occurrence is correctly identified as Tahoe draba, and is extant, it represents not only a disjunct and possibly genetically distinct population, but a population that is relatively secure from direct impacts, as opposed to the existing populations in the Tahoe area located within active ski areas.

Water Quality Management

Goals and Objectives

The 1988 LRMP established the following goal related to watershed management:

National Forest management activities are conducted to maintain or improve soil productivity, to maintain favorable conditions of waterflow, and to comply with water quality goals as specified in state and federal clean water legislation for the sustained benefit of consumptive and nonconsumptive users of water.

The LRMP includes the following annual watershed objectives:

- Improvement of 350 acres annually, compared to the base year (1982) output of 100 acres.
- Water Quantity yield at standard of 1,050,000 acre-feet annually, and
- Increased quantity of 7,000 acre-feet annually

Monitoring Actions

The 1988 LRMP includes direction to monitor water quality management and watershed improvement. Objectives of the LRMP program, along with monitoring techniques and a summary of related monitoring elements from the 2004 Sierra Nevada Forest Plan Amendment, are displayed in the table below.

Table 5. Summary of monitoring direction for water quality management

| Activity to be Measured (LRMP) | Summary of LRMP Objective | LRMP Monitoring Technique | Related 2001/2004 Framework Monitoring |
|--------------------------------|---|--|--|
| Water Quality Management | Assess compliance with BMP direction and continue to evaluate the effectiveness of BMPs | Review of prepared EAs, review of contract provisions, field activity reviews, water quality analysis field observations | Status and Change and Cause/Effect Monitoring for Aquatic, Riparian, and Meadow ecosystems (p. E-102): Water quality in streams? (Goal 1) Water quality and community composition in lakes? (Goal 1,3) |
| Watershed Improvement | Evaluate effectiveness of watershed improvement measures | Observations and measurements | Cause and Effect Monitoring, p. E-113: Does implementation of the recommendations in a landscape/watershed analysis result in maintenance and or restoration of watersheds and soil health/productivity? Status and Change and Cause/Effect Monitoring for Aquatic, Riparian, and Meadow ecosystems (p. E-102): Watershed condition? (Goal 7) |

Monitoring Action 1: Best Management Practices

Best Management Practices (BMPs) are an integral component of all management activities conducted on National Forests in Region 5. Monitoring of BMP implementation and effectiveness through the BMP Evaluation Program (BMPEP) is necessary to meet the requirements of a Management Agency Agreement with the State of California. The Inyo National Forest documented

the results of its 2007 BMP monitoring program in a Best Management Practices Evaluation Report dated January 10, 2008.

The regional office has developed BMPEP evaluation protocol, including visual inspections and comparison with established objectives for each site, along with repeat photography. Onsite Evaluations are used to assess both BMP implementation and effectiveness. Implementation evaluations determine the extent to which planned, prescribed and/or required water quality protection measures were actually put in place on project sites. Effectiveness evaluations gauge the extent to which the practices met their water quality protection objectives.

In 2007, the Regional Office assigned the Forest 44 targets for 22 different Evaluation Types (Table 6). However, the Forest did not have a sample pool for three of the targeted Evaluation Types: streamside management zones - T01, meadow protection - T07, and pioneer road construction - E18. Beyond the required targets, evaluations were conducted to determine whether manure removal standards implemented as part of the 2005 Trail and Commercial Pack Stock Management in the Ansel Adams and John Muir Wildernesses FEIS/ROD were effectively preventing manure entry into surface water.

Of the 40 targets with a sample pool, evaluations were completed to protocol on 30 (75%) randomly selected sites throughout the Forest. These include stock holding areas, recreational sites, roads, prescribed burns, fuel treatments, and mining operations. Target Evaluation Types not met in 2007 include snow removal - E17, range management – G24, and vegetation manipulation – V28. Targets were partially met for evaluations of location of stock facilities in wilderness –R23, mining operations – M26, and revegetation of surface disturbed areas – V29.

Table 6. BMP targets assigned and met in fiscal year 2007

| Activity Code | BMP Evaluation Type | Targets Assigned | No. with sample pool | Targets met |
|---------------|--|------------------|----------------------|-------------|
| T01 | Streamside Management Zones | 1 | 0 | 0 |
| T02 | Skid Trails | 1 | 1 | 1 |
| T03 | Suspended Yarding | 0 | 0 | 0 |
| T04 | Landings | 1 | 1 | 1 |
| T05 | Timber Sale Administration | 1 | 1 | 1 |
| T06 | Special Erosion Control & Revegetation | 0 | 0 | 0 |
| T07 | Meadow Protection | 1 | 0 | 0 |
| E08 | Road Surface & Slope Protection | 3 | 3 | 3 |
| E09 | Stream Crossings | 3 | 3 | 3 |
| E10 | Road Decommissioning | 3 | 3 | 3 |
| E11 | Control of Sidecast Material | 0 | 0 | 0 |
| E12 | Servicing and Refueling | 1 | 1 | 1 |
| E13 | In-channel Construction Practices | 1 | 1 | 1 |
| E14 | Temporary Roads | 0 | 0 | 0 |
| E15 | Rip Rap Composition | 0 | 0 | 0 |
| E16 | Water Source Development | 1 | 1 | 1 |
| E17 | Snow Removal | 3 | 2 | 0 |
| E18 | Pioneer Road Construction | 1 | 0 | 0 |
| E19 | Restoration of Borrow Pits and Quarries | 1 | 1 | 1 |
| E20 | Management of Roads during Wet Periods | 0 | 0 | 0 |
| R22 | Developed Recreation Sites | 4 | 4 | 4 |
| R23 | Location of Stock Facilities in Wilderness | 4 | 4 | 3 |

| Activity Code | BMP Evaluation Type | Targets Assigned | No. with sample pool | Targets met |
|---------------|---|------------------|----------------------|-------------|
| R30 | Dispersed Recreation Sites | 2 | 2 | 2 |
| G24 | Range Management | 4 | 4 | 0 |
| F25 | Prescribed Fire | 2 | 2 | 2 |
| M26 | Mining Operations | 2 | 2 | 1 |
| M27 | Common Variety Minerals | 0 | 0 | 0 |
| V28 | Vegetation Manipulation | 1 | 1 | 0 |
| V29 | Revegetation of Surface Disturbed Areas | 3 | 3 | 2 |
| TOTALS | | 44 | 40 | |

Results and Evaluation

The following table summarizes the results of the 25 evaluations to analyze BMP implementation and effectiveness. Below are the results:

- Implemented and effective (IE): 23 sites (77%).
- Not implemented, but effective (NIE): 3 sites (10%).
- Implemented but not effective (INE): 3 sites (10%).
- Not implemented and not effective (NINE): 1 sites (3%).

Table 7. BMP implementation and effectiveness matrix for fiscal year 2007

| Eval. Type | Targets assigned | Targets completed | IE | NIE | INE | NINE |
|--------------|------------------|-------------------|------------|------------|------------|-----------|
| T02 | 1 | 1 | 1 | 0 | 0 | 0 |
| T04 | 1 | 1 | 1 | 0 | 0 | 0 |
| T05 | 1 | 1 | 1 | 0 | 0 | 0 |
| E08 | 3 | 3 | 3 | 0 | 0 | 0 |
| E09 | 3 | 3 | 3 | 0 | 0 | 0 |
| E10 | 3 | 3 | 3 | 0 | 0 | 0 |
| E12 | 1 | 1 | 1 | 0 | 0 | 0 |
| E13 | 1 | 1 | 0 | 0 | 1 | 0 |
| E16 | 1 | 1 | 1 | 0 | 0 | 0 |
| E19 | 1 | 1 | 1 | 0 | 0 | 0 |
| R22 | 4 | 4 | 2 | 1 | 0 | 1 |
| R23 | 4 | 3 | 1 | 0 | 2 | 0 |
| F25 | 2 | 2 | 2 | 0 | 0 | 0 |
| M26 | 2 | 1 | 0 | 1 | 0 | 0 |
| V29 | 3 | 2 | 2 | 0 | 0 | 0 |
| R30 | 2 | 2 | 1 | 1 | 0 | 0 |
| Total | 33 | 30 | 23 | 3 | 3 | 1 |
| | | Percent | 77% | 10% | 10% | 3% |

BMPs Implemented and Effective

In 2007, BMPs were implemented and effective at 77% of the sites evaluated. These sites include timber-related project sites (T02, T04, and T05); road-related project sites (E08, E09, and E10); fuel storage sites (E12); borrow pits and quarries (E19), two out of four developed recreation sites (R22); one of three commercial pack stock sites (R23); prescribed fire project sites (F25); revegetation project sites (V29); and one of two dispersed recreation sites (R30). Because these sites met both implementation and effectiveness criteria, no further action was taken.



Figure 2. Planted vegetation at a revegetation project site with implemented and effective BMPs (V29)

BMPs Not Implemented, but Effective

One developed recreation site (R22), one mining operation (M26), and one dispersed recreation site (R30) did not have BMPs implemented. Corrective actions were not taken because there was little to no evidence of water quality impacts such as sedimentation or runoff at the sites.

French Camp Campground is a developed recreation site in Rock Creek Canyon. Evaluations were conducted after rainfall, and it was found that the main access road (native surface) did not have appropriate runoff control. However, sediment runoff from the road did not have the potential to adversely affect water quality as it did not reach surface water or a riparian area. One or more additional drainage structures could alleviate the road maintenance problem.

BMPs were not initially implemented at one mining operation because the associated Environmental Assessment (EA) did not include provisions for on-site human waste disposal. However, the mine operators have installed an appropriate toilet, and will continue to do so as required by Mono County. The next EA (expected in 2010) will contain a provision for proper human waste disposal. Corrective actions were not taken because there is a toilet on site eliminating any potential water quality or human safety issues.

BMPs were not implemented at one dispersed recreation site (R30) along Coyote Creek. The site includes a vehicle turn around and moderately-used campsite within 20 feet of Coyote Creek. Due in part to dense vegetation and leaf litter between the site and the creek, there was no evidence of sediment or waste reaching the creek from the campsite. The Forest did not propose to obliterate this user-created site at this time because it provides one of the better camping opportunities in the area and is not affecting beneficial uses.

BMPs Implemented but Not Effective

Three (or 10%) of evaluations had BMPs implemented, but they are not effective. They are:

- One in-channel construction practice at Sawmill Creek (E13)
- Two stock facilities in wilderness (R23)

A project implemented at the Sawmill Creek crossing east of Glass Mountain hardened and narrowed the road crossing to reduce erosion and increase the area available for growth of riparian vegetation. Water was not diverted out of the stream during construction. The BMP implemented to reduce sedimentation during construction was not effective because a small amount of sediment was carried more than 20 channel widths below the project, and there was a small amount of sediment deposited below the crossing. However, all construction-related sediment dispersed within 5 days, and the project had a greater positive than negative effect on beneficial uses. Based on these results, water may be diverted from the channel during implementation of similar in-channel construction projects in the future. However, this is not expected to eliminate the potential for some level of sedimentation in all cases. For example, if water had been diverted during implementation of the Sawmill Creek project, some sedimentation would have occurred when the water was put back into the natural channel because of the lightweight, ashy nature of the volcanic soils.



Figure 3. Example of a completed in-channel construction practice on Lower Deadman Creek

Designated stock camps in the Ansel Adams and John Muir Wildernesses have approved stock holding areas where impacts are managed in a manner consistent with BMPs. At two of these camps—Shadow Creek and Lower Davis Lake—BMPs were implemented but were not effective.

- At Shadow Creek designated stock camp, pack stock (e.g., horses and mules) have been held in a part of the camp not approved for such use. Because the area is close to the meadow near the camp, there is the potential for manure to run into the meadow during high flows in spring. Future monitoring by the wilderness rangers and permit administrator will ensure commercial pack stock are not held in the area in the future.

- The stock holding area in the designated camp near Lower Davis Lake in the Rush Creek drainage is in an approved location and is not leading to sedimentation. However, implemented BMPs were not effective because the stock users are piling manure outside of the stock holding area, an access trail to the camp is contributing to erosion at a stream crossing, and access to the camp has not been restricted to one trail as required in the commercial stock outfitter permit.
 - To correct these problems, stock users will be required to contain manure in an appropriate location by spreading it in the approved stock holding area or packing it out. Further, only one access trail will be open and used in the future, and improvements will be made to stabilize the stream bank at the crossing. These actions were proposed for implementation in 2008.

BMPs Not Implemented and Not Effective

At one of the 30 evaluated sites, Coldwater Campground in the Mammoth Lakes Basin, BMPs were not implemented and water quality was not effectively protected. Water quality concerns identified during evaluation include:

- Groundcover ranges from 0-5% between campsites (desired condition is 40% for this area).
- Sediment is entering the adjacent creeks (Mammoth and Coldwater Creeks) due to inadequate drainage at campsites and along roads. However, the amount of sediment actually reaching the creeks appears to be minor, based on the few small rills seen entering the creek.
- Three campsites on the west side of the campground are within 50 feet of water.
- Several dumpsters are not on concrete pads because the pads were located incorrectly and could not be accessed by garbage trucks.

Comprehensive corrective actions are needed in order to effectively protect water quality at the Coldwater Campground. These could include either relocating or improving existing campsites and repairing drainage structures on roads to eliminate runoff to the creek. However, because a comprehensive management plan has not yet been developed, analysis and implementation of corrective actions is not expected to begin in 2008. In the short-term, the potential for adverse effects to downstream beneficial uses is relatively low based on the minor amount of road and campsite runoff currently reaching the creeks.

BMP Evaluations Not Completed

No targets were completed for two Evaluation Types: snow removal (E17) and range management (G24). To remedy this, the Forest Hydrologist has scheduled days to evaluate snow removal in January, 2008, for 2008 evaluations. Range evaluations were not completed in 2007 because the Forest had no range staff during the field season from June 2007 to November 2007. Completion of the range evaluation BMP form requires experience and training in grazing management and generally cannot be completed by personnel without that experience. The Forest has hired a range conservationist and will complete targeted BMP evaluations in 2008.

Monitoring Action 2: Water Quality Evaluation at Commercial Pack Stations

In 2007, water quality evaluations were conducted at all commercial pack stations within 100 feet of surface water. This includes five pack stations: Mammoth Lakes Pack Outfit, McGee Pack Station, Pine Creek Pack Station, Rainbow Pack Outfit, and Rock Creek Pack Station Lower Corral.

Evaluations were conducted to determine whether manure removal standards implemented as part of the 2005 Trail and Commercial Pack Stock Management in the Ansel Adams and John Muir Wildernesses FEIS/ROD were effectively preventing manure entry into surface water.

Water samples were collected upstream and downstream of pack stations during snowmelt, during dry weather, and after rains. The samples were analyzed to detect fecal coliform bacteria levels, which were used as an indicator of the presence of pack stock manure in the water. The fecal coliform standard established by the Lahontan Regional Water Quality Control Board is 20 MPN/ml.

Results

Results of the evaluations are as follows:

- At three of the pack stations (McGee, Pine Creek, and Rainbow), water quality for all collected samples was within acceptable standards.
- Water quality adjacent to the Rock Creek Pack Station Lower Corral was not within the standard for fecal coliform 3 out of the 6 times that water was sampled.
- Water quality adjacent to the Mammoth Lakes Pack Outfit was not within the standard for fecal coliform 3 out of the 8 times that water was sampled.

Evaluation

The results do not suggest that applicable management direction is in need of amendment or revision. Instead, results suggest that applicable management direction would effectively improve water quality if coupled with changes in the location of stock holding areas and maintenance of facilities at Rock Creek and Mammoth Lakes pack stations. This evaluation is confirmed by the following:

- At Rock Creek Pack Station, the corral closest to the stream with high fecal coliform levels was moved and graded in the summer of 2007 to prevent water from flowing directly through the corral and into the creek. In 2008, all 3 water quality samples taken at this site were within fecal coliform standards.
- At Mammoth Lakes Pack Outfit, manure was found to be entering the creek through openings between slats in a bridge used often by stock. In summer 2007, the pack station operator put a rubber mat on the bridge to prevent manure entry into the creek, and assigned an employee to regularly shovel manure off of the bridge. In 2008, all 3 water quality samples taken at this site were within fecal coliform standards.

Wilderness

Goals and Objectives

The 1988 LRMP includes the following goal related to wilderness:

Classified wilderness is managed to protect and perpetuate the wilderness character of the area; to provide opportunities for primitive recreation; to maintain wildlife and fish, scenic, and watershed values; and to maintain or enhance the quality of wilderness experiences.

The wilderness recreation objective established by the LRMP is measured in recreation visitor days (RVD). The LRMP identified a base year (1982) output of 540,000 RVDs, and an annual objective of 644,000 RVDs.

Monitoring Actions

The 1988 LRMP includes direction to compare actual wilderness use to planned use (Table 8). The 2004 SNFPA did not include monitoring elements specific to designated wilderness.

Table 8. Summary of monitoring direction for designated Wilderness

| Activity to be Measured (LRMP) | Summary of LRMP Objective | LRMP Monitoring Technique | Related 2001/2004 Framework Monitoring |
|---|--|---|--|
| Actual use compared to Planned (established) desired conditions | Measure changes and compare with limits of acceptable change and evaluate associated environmental effects | Remeasure campsite condition class; record changes according to FSM 2323.1 R-5 supp. #145 | Not Applicable |

LRMP monitoring direction for wilderness was amended in 2001, with the Management Direction for the John Muir, Ansel Adams, and Dinkey Lakes Wildernesses EIS and Plan, and again in 2005 with the Trail and Commercial Pack Stock Management in the Ansel Adams and John Muir Wildernesses EIS.

The 2001 Plan supplements the wilderness monitoring requirements on page 257 of the LRMP with the Inventory and Monitoring Strategy in Appendix H of the Management Direction for the John Muir, Ansel Adams, and Dinkey Lakes Wildernesses FEIS. This monitoring applies to the portions of the Ansel Adams and John Muir Wildernesses on the Inyo National Forest only. The strategy includes monitoring of variables such as campsite condition and density, visitor experience, user trail density and condition, bighorn sheep disturbance, meadow ecological state and function, and water quality. Monitoring frequency varies from annual to periodic.

The monitoring plan for the 2005 Trail and Commercial Pack Stock Management in the Ansel Adams and John Muir Wildernesses FEIS/ROD includes direction to collect: 1) baseline information for grazing, designated stock camps, use trails, and destinations at various locations across the Wildernesses; 2) conduct annual or biannual monitoring at identified areas to evaluate designated campsites, use trails, range readiness, destinations, fens, wildlife habitat, and impacts to heritage resources; 3a) complete monitoring of locations and/or resources when triggered by certain events or activity; 3b) acquire information in areas of low use, low risk areas, or areas of single resource concerns with a prediction that use levels will not cause further degradation; and 3c) some of the Single Resource Monitoring locations have been identified as representative of other locations in the planning area.

Monitoring Action 1: Comparison of Actual Visitor Use to LRMP Objective

The Forest gathered information about visitor use of designated Wilderness areas during 2007 as part of the National Visitor Use Monitoring project. Results are still undergoing review and will be reported in the FY 2008 Monitoring and Evaluation Report. For more information about NVUM please see the Recreation section of this report.

Monitoring Action 2: Integrated Monitoring Protocol, 2005 Trail and Commercial Pack Stock Management in the Ansel Adams and John Muir Wildernesses EIS/ROD

The 2005 Record of Decision describes a three-tiered approach to monitoring and evaluation of commercial pack stock activities in the Ansel Adams and John Muir Wildernesses: 1) baseline data collection on grazing areas, stock camps, use trails, and destination zones, 2) monitoring of selected destination zones to evaluate the effectiveness of plan implementation (i.e., integrated monitoring),

and 3) single resource monitoring in select locations to evaluate the effectiveness of plan implementation.

In 2007, wilderness managers collected baseline data on 10 grazing areas, 24 stock camps, and 10 use trails. Partial baseline data was collected on 3 destination zones. Preliminary integrated monitoring was completed for one destination zone. Monitoring results for the stock camps, use trails, and preliminary integrated monitoring are summarized in this section.

Monitoring Action 2a: Stock Camp Baseline Data Collection

The 2005 ROD specified that baseline data be collected for 81 stock camps. Of those, baseline information was collected on 41 stock camps in 2006 (FY2006 Monitoring and Evaluation Report), and 24 camps in 2007. Baseline data collection included evaluation of campsite condition class; description of the condition of the stock holding area and access trails; evaluation of firewood availability; and evaluation of BMPs (best management practices).

Results

The results of the condition class rating and BMP evaluation are listed in Table 9 for the camps monitored in 2007. The basis for the BMP rating is listed in Table 10.



Figure 4. Designated stock holding area in the John Muir Wilderness

Six characteristics were evaluated to assess campsite condition. A mean rating of 1 (least impacted site) to 5 (highly impacted site) is used to describe the level of impact within the site. As shown in the table below, approximately 45% of stock camps had a condition class rating of 3 (moderately impacted site) while 17% were in class 2 (low-moderate degree of impact), 33% in class 3 (moderate-high impact), and 4% in class 5 (highly impacted site). BMP evaluation indicated that BMPs were:

- Implemented and effective (IE) at 42% of stock camps.

- To be assigned this rating: 1) Both the entire campsite and the entire stockholding area must be more than 100 feet from water; and 2) No evidence was found that either sediment or animal waste was reaching nearest lake or stream.
- Not implemented but still effective at 29% of stock camps.
 - Stock camps with this rating had a portion of either the campsite or the stock holding area within 100 feet of lakes or streams. Typically, the entire stock camp could not be located more than 100 feet from water due to terrain/topography constraints. No evidence either sediment or animal waste was reaching the nearest lake or stream.
- Implemented but not effective (INE) at 8% of stock camps.
 - Both the entire campsite and stockholding area are more than 100 feet from lakes and perennial streams, but 1) Campsite or stockholding area may be less than 100 feet from ephemeral creek; or 2) Animal waste was transported to within 50 feet of nearest lake or stream, including within 50 feet of ephemeral streams.
- Not implemented and effective at 21% of stock camps.
 - Stock camps with this rating had a portion of either the campsite or stock holding area within 100 feet of water. In addition, staff found evidence that animal waste had been transported to within 50 feet of nearest lake or stream, including ephemeral streams.. In most cases, the entire stock camp could not be located more than 100 feet from water due to terrain/topography constraints.

Table 9. Condition class and BMP evaluations for stock camps designated in fiscal year 2007

| Analysis unit | Destination Zone | Stock Camp Location | Condition Class ¹ | BMP IE | BMP NIE | BMP INE | BMP NINE |
|----------------|----------------------------|-------------------------|------------------------------|--------|---------|---------|----------|
| Cascade Valley | Lower Fish Ck. | Island Crossing bridge | 4 | | | | X |
| | Cascade Valley | Minnow Creek | 3 | | | X | |
| | Cascade Valley | Cascade at Purple Creek | 3 | X | | | |
| Convict | Genevieve Lake Edith Lakes | Genevieve Lake | 4 | | X | | |
| Hilton Creek | Hilton | Second Lake | 3 | X | | | |
| King Creek | Anona Lake | Anona Lake | 3 | | | X | |
| | Ashley Lake | Ashley Lake | 4 | | X | | |
| | Fern Lake | Fern Lake | 4 | | | | X |
| | Holcomb Lake | Holcomb Lake | 3 | X | | | |
| | King Creek | King Creek | 3 | | X | | |
| | Superior Lake | Superior Lake | 4 | | X | | |
| McGee | McGee Canyon | Round Lake | 5 | | X | | |
| Minarets | Minaret Creek | Johnston Mdw | 2 | X | | | |
| Parker | Parker | Parker Lake | 3 | | X | | |
| Purple Bench | Purple Lake | Purple Creek | 3 | X | | | |
| | Pika lake | Pika Lake | 2 | X | | | |
| | Duck Creek | Duck Creek | 3 | | | | X |
| | Lake Virginia | NW side of lake | 3 | X | | | |
| | Lake Virginia | NE side of lake | 2 | X | | | |
| Sabrina | Blue Lake | Blue Lake | 2 | X | | | |
| Shadow Ediza | Rosalie/Gladys Lake | Rosalie Lake | 4 | | | | X |
| | Shadow Creek | Gladys Lake | 3 | | X | | |

| Analysis unit | Destination Zone | Stock Camp Location | Condition Class ¹ | BMP IE | BMP NIE | BMP INE | BMP NINE |
|--------------------|---|---------------------|------------------------------|--------|---------|---------|----------|
| | Shadow Creek | Shadow Creek 1 | 4 | | | | X |
| | Shadow Creek | Shadow Creek 2 | 4 | X | | | |
| Total camps | 24 stock camps designated and evaluated for BMP in 2007 | | | 10 | 7 | 2 | 5 |
| Percent | | | | 42% | 29% | 8% | 21% |

¹ Campsite Condition class ratings follow the Parsons/Stolghren method of campsite inventory adapted by David Cole. Six characteristics of campsites are rated. A mean rating of 1 (least impacted site) to 5 (highly impacted site) is used to describe the level of impact.

Table 10. Summary of basis for designated stock camp BMP ratings

| Stock Camp location | BMP rating | Campsite distance from water (feet) | Stockholding area distance from water (feet) | Conditions observed during evaluation |
|------------------------|------------|-------------------------------------|--|--|
| Island Crossing bridge | NINE | 60 | 80 | Manure observed 40 ft from water, runoff from campsite drains towards creek. |
| Minnow Creek | INE | 120 | 350 ft | 80 ft from ephemeral creek, with manure 40 ft from ephemeral creek. |
| Cascade Camp | IE | 140 | NA | Spot and dunnage, no stockholding. No sediment or manure reaching water. |
| Genevieve Lake | NIE | 60 | 80 | No sediment or manure reaching water. |
| Second Lake | IE | 110 | 200 | No sediment or manure reaching water. |
| Anona Lake | INE | 200 | 100 | Ephemeral creek runs through camp. |
| Ashley Lake | NIE | 70 | 80 | No sediment or manure reaching lake |
| Fern Lake | NINE | 84 | 240 | Manure observed within 5 ft. of ephemeral creek. |
| Holcomb Lake | IE | 180 | 180 | No sediment or manure reaching lake |
| King Creek | NIE | 150 | 30 | Site not used recently |
| Superior Lake | NIE | 40 | 100 | No sediment or manure reaching lake |
| Round Lake | NIE | 70 | 150 | No sediment or manure reaching lake |
| Johnston Mdw | IE | 400 | NA | No sediment or manure reaching water |
| Parker Lake | NIE | 75 | 275 | No sediment or manure reaching lake |
| Purple Creek | IE | 180 | 240 | No sediment or manure reaching water |
| Pika Lake | IE | 240 | NA | Spot and dunnage site. No sediment or manure reaching lake |
| Duck Creek | NINE | 75 | 75 | Camp ~5 ft of ephemeral creek; camp is surrounded on three sides by water. Stock facility within ~40 of ephemeral creek. |
| NW Virginia Lk. | IE | 320 | 540 | No sediment or manure reaching lake |
| NE Virginia Lk. | IE | 170 | 250 | No sediment or manure reaching lake |
| Blue Lake | IE | 150 | NA | Spot and dunnage site. No sediment or manure reaching lake |
| Rosalie Lake | NINE | 15 | 135 | Site requires containment to prevent sediment from entering lake. |
| Gladys Lake | NIE | 60 | 160 | No sediment or manure reaching lake |
| Shadow Creek 1 | NINE | 80 | 100 | Site has water on 3 sides. Evidence of sediment reaching water. |
| Shadow Creek 2 | IE | 180 | 280 | No sediment or manure reaching lake |

Evaluation

The eleven spot and dunnage sites or stock camps that have both campsite areas and stockholding areas located more than 100 feet from water generally show no evidence of sediment or manure reaching water at the time of designation. At the Minnow Creek stock camp, however, manure was

observed within 40 feet of an ephemeral creek. No actions are planned or needed to address water quality concerns at these 11 camps.

Twelve of the stock camps designated in 2007 had a portion of the campsite or stock holding area within 100 feet of water channels, including ephemeral stream channels. The proximity to water increases the likelihood that sediment or manure from the camps can enter surface water. Four of the 12 camps showed evidence of sediment or manure reaching water bodies.

A Court Order issued in May 2008 requires all stock camps used by pack stations to be more than 100 feet from water. Accordingly, the 12 stock camps listed in Table 10 above that have campsites or stock holding areas less than 100 feet from water will no longer be used by pack stations.

Monitoring Action 2b: Use Trail Baseline Data Collection

The 2005 ROD specified that baseline data be collected for 23 use trails in the Ansel Adams and John Muir Wildernesses. Eleven use trails were evaluated in 2007 to assess overall resource condition rating from 0 (highly stable trail) to 5 (severe resource degradation). The rating is based on the degree of tread widening, multiple trailing, trail incision, erosion at stream crossings, presence of water diversions, and presence of risk factors such as steep slopes.

Results

As shown in the table below, none of the use trails were found to be causing severe resource degradation. All trails were rated as stable to highly stable. Two trails were not rated as they were either impassable or closed to all use.

Table 11. Use trail baseline data collected in fiscal year 2007

| Analysis Unit | Destination Zone | Trail name | ID number | Overall Resource Condition Rating |
|---------------------|------------------------|--|-----------|--|
| Cottonwood | Cottonwood Lakes Basin | Windy Gap use trail | COT06 | 1.5 |
| | Cottonwood Lakes Basin | Frog Pond Camp (at 3rd lake outlet) | COT08 | 0 |
| Horton | | Sonny Boy Mine | HOR01 | 1 |
| | | Hanging Valley mine (abandoned mining roads) | HOR07 | 1 |
| Kearsarge | Gil/Mat/Bench/Flower | Matlock to Bench Lake | KEA06 | 0 |
| North Fork Big Pine | Black Lake | Black Lake to Coyote Ridge | NFB01 | 0 |
| | North Fork Big Pine | Snow Survey Site | NFB09 | Trail made impassable by debris from recent avalanche |
| | North Fork Big Pine | 4th to 5th Lake | NFB07 | 1 |
| | North Fork Big Pine | Heidi Cabin | NFB05 | 0.5 |
| | North Fork Big Pine | 2nd Lake Snow cabin | NFB06 | 0.5 |
| Taboose | Taboose | Taboose Pass Snow Bypass trail | TAB01 | Trail closed after repair of Taboose Pass system trail |

Evaluation

This baseline information will be used in the future to assess whether pack station operations are adversely affecting resource conditions on these use trails. At that time, changes in management may be considered, including adjusting use levels or restricting use by pack stock.

Monitoring Action 2c: Preliminary Integrated Monitoring Data

Preliminary monitoring in the Hilton Lakes analysis unit was conducted during 2007. The set of features to be monitored in this area include: stock camp compliance with BMPs; recreation category desired conditions; system trail 2942; and campsite access trails. Results of this monitoring are summarized below. The 2001 Wilderness Management Plan lists four criteria to determine whether the desired conditions of Recreation Category 3 areas such as Hilton Lakes are met: campsite density, campsite condition class, impacts to vegetation, and solitude.

Results

Results of monitoring conducted during 2007 are summarized below:

- Eight of 10 stock camps were assessed for compliance with BMPs. All sites still maintained the 100 foot distance from water. Sediment was reaching Davis Lake from an eroding access trail at Davis Lake.
- Trail maintenance work during 2007 on system trail 2942 above Second Lake addressed existing incision, erosion, and multiple trailing.
- There are continued concerns with duplicate access trails to campsites in the area.

The Hilton Lakes area appears to meet most recreation category desired conditions for the destination zone, including the following:

- A maximum of four campsites per acre due to recent campsite obliteration and containment work.
- The majority of campsites are in condition class 3 or 4 (moderately impacted). Only three of the 48 campsites in the area are rated at condition class 5 (highly impacted).

However, impacts to stream bank vegetation from the use trail at the outlet of Davis Lake were observed. In addition, wilderness managers were not able to obtain sufficient observations to determine whether the solitude criterion (no more than four occupied campsites within sight or sound three times per season) was maintained.

Evaluation

Although current management is guided by the May 2008 District Court Order, this information is being used to assess the preliminary effectiveness of the management direction contained in the 2005 ROD.

Wildlife

Goals and Objectives

The 1988 LRMP established the following goals related to wildlife:

Wildlife habitat is maintained to provide species diversity, to ensure that viable populations of existing native vertebrates and invertebrates are maintained, and that the habitats of management emphasis species are maintained or improved.

The habitats of threatened or endangered animals are protected or improved to assist the recovery of the species in cooperation with State and other Federal agencies.

Monitoring Actions

The 1988 LRMP and Sierra Nevada Forest Plan Amendments (2004 and 2007) identify numerous monitoring activities for many different species of wildlife. Because this report presents monitoring results for just two of those species (willow flycatcher and sage-grouse), the following table presents only the monitoring direction specific to those species rather than attempting to summarize all wildlife monitoring direction in the LRMP and amendments.

To summarize, the 1988 LRMP includes species-specific monitoring direction for goshawk, mule deer, peregrine falcon, bald eagle, and Sierra Nevada and Nelson bighorn sheep (LRMP, pp. 254-255). The LRMP also calls for monitoring related to sensitive species like the willow flycatcher and sage-grouse, and quantity and distribution of snags and downed logs (pp. 256-257).

Recognizing that certain wildlife species are integral components of forest ecosystems and are essential to their function, the 2004 Sierra Nevada Forest Plan Amendment (SNFPA) Adaptive Management Strategy developed detailed monitoring plans for each of the ten species-at-risk for which the SNFPA EIS determined the need for a full viability analysis. Willow flycatcher is one of these ten species-at-risk. Elements of the Adaptive Management monitoring plan for willow flycatcher are summarized in the table below.

Management Indicator Species (MIS) are animal species identified in the 2007 Sierra Nevada Forest MIS Amendment Record of Decision (ROD), which amended the 1988 LRMP. Greater sage-grouse is identified as an MIS for sagebrush habitat/ecosystem components. Guidance regarding MIS directs Forest Service resource managers to (1) at project scale, analyze the effects of proposed projects on the habitat of each MIS affected by such projects, and (2) at the bioregional scale, monitor populations and/or habitat trends of sage-grouse and other MIS.

Table 12 summarizes monitoring direction for the willow flycatcher and sage-grouse. It shows the overlap in direction between the 1988 LRMP as amended and the 2004 SNFPA Adaptive Management Strategy described in Appendix E of the 2001 SNFPA. As shown, the LRMP focuses on monitoring of habitat capability, while the SNFPA emphasizes both population and habitat monitoring.

Table 12. Summary of monitoring direction for willow flycatcher, a Forest Service sensitive species

| Activity to be Measured (LRMP) | Summary of LRMP Objective | LRMP Monitoring Technique | Related SNFPA Monitoring |
|--|--|--|---|
| Other State-listed or sensitive species as affected by specific projects | Ensure protection is provided by S&G and Habitat Capability models | Appropriate survey methods. Application and development of Habitat Capability to delineate habitats on project areas | <u>For willow flycatcher:</u> Population monitoring (distribution and abundance) and habitat trends (p. E-94). Approach uses a combination of status and change, cause and effect, and implementation monitoring. (USDA 2004) No specific monitoring plan developed for sage-grouse. |
| Threatened, endangered, and sensitive species management | Ensure that management activities afford protection of these species as prescribed in the Plan | Sample EAs and conduct field surveys of completed project. | NA |

| Activity to be Measured (LRMP) | Summary of LRMP Objective | LRMP Monitoring Technique | Related SNFPA Monitoring |
|--------------------------------|--|---------------------------|--|
| Management Indicator Species | Not Applicable (amended by 2007 SNF MIS Amendment) | Not Applicable | <u>For sage-grouse:</u> (1) at project scale, analyze the effects of proposed projects on the habitat of each MIS affected by such projects, and (2) at the bioregional scale, monitor populations and/or habitat trends of sage-grouse and other MIS. (USDA 2007) |

Monitoring Action 1: Mono Basin Willow Flycatcher Project

In 2007, Point Reyes Bird Observatory (PRBO) Conservation Science completed the fifth season of the Mono Basin Willow Flycatcher Project (McCreedy 2007). The project is designed as a long term study to investigate the apparent reoccupation of Inyo National Forest (Inyo NF) and Los Angeles Department of Water and Power (LADWP) holdings on lower Rush Creek by a population of Willow Flycatchers (*Empidonax traillii*). Willow Flycatchers are a Forest Service Sensitive Species and California State Endangered species.



Figure 5. Willow flycatcher, a Forest Service Sensitive Species and California State Endangered Species

While the Inyo National Forest contains approximately 850 acres of potentially suitable willow flycatcher habitat, the species has only been found at Rush Creek, a tributary of Mono Lake. Surveys since 2000 have identified a significant population of nesting willow flycatchers that has persisted throughout the study period. The number of territorial individuals increased annually from 2001 to 2004, but has decreased each year since then (McCreedy 2007).

Surveys began on June 7 and ended August 28, 2007 (McCreedy, 2007). Initial surveys consisted of territory spot mapping in accordance with International Bird Conservation Committee recommendations (IBCC 1970) and following Ralph et al. (1993). Lower Rush Creek was divided into four sections of roughly equal size, which were each covered roughly once every four days. All Willow Flycatcher detections were marked with a Garmin GPS V receiver and added to GIS coverage

to maximize spot-mapping accuracy. Sex and age of detected adults were noted when possible, and color-band identifications were recorded whenever possible.

Results

From June through August 2006, PRBO documented five territorial males on lower Rush Creek, and five nesting females (McCreedy 2007). Two males were unmated. A total of twelve nests were located on three territories. Two of these twelve nests fledged young.

Ten out of twelve color-banded adults present in 2006 returned to Rush Creek in 2007 (McCreedy, 2007). However, there were no new, unbanded immigrants to enter the population in 2007, and none of the seven fledglings banded in 2006 returned in 2007. None of the ten adults in the population were born on Rush Creek, unless they were born before nestling banding began in 2003.

To monitor future juvenile recruitment and population dispersal, all five fledged nestlings were color-banded in 2007. The entire Willow Flycatcher population at Rush Creek has been color-banded since 2004, enabling PRBO the rare opportunity to fully assess immigration to Rush Creek and emigration to surrounding riparian areas in 2007 and beyond.

Evaluation

The ten territorial adults detected in 2007 represent a decrease from 12 territorial adults detected in 2006 and 16 territorial adults observed in 2005 (McCreedy 2006 and 2005). Five fledglings were raised by five females, a fecundity of 1.0. This is close to the overall fecundity average from 2001 through 2007 (1.11 fledglings per female). Fecundity decreased from 1.4 in 2006.

As such a high number of adults returned in contrast to a total absence of new entries to the population, it is doubtful that the population is suffering decreases in survivorship due to problems on its wintering grounds. Instead, it is expected that extreme drought conditions in 2007 precluded prospecting birds from attempting to breed on Rush Creek. If Rush Creek had received its usual input of immigrants and second year returns, the population would not have decreased in 2007.

Brown-headed Cowbirds significantly and negatively impacted Willow Flycatcher nest success at Rush Creek in 2007, as in 2006 and 2005. Of the ten nest failures, nine were caused by Brown-headed Cowbird (*Molothrus ater*) activity. Fifty-eight percent of the 2007 nests were parasitized, and cowbirds directly caused the failure of nine out of twelve nests. In comparison, sixty-four percent of the 2005 and 2006 Willow Flycatcher nests were parasitized (McCreedy 2007).

In his guide to research and management action on cowbirds in the western United States, Smith (1999) recommends that managers consider initiating cowbird management programs when the frequency of parasitism consistently exceeds 60% (107). However, only two of 37 Brown-headed Cowbird eggs laid in Willow Flycatcher nests from 2001 to 2007 have survived to fledge, and only one of the seven nests that were parasitized in 2007 fledged cowbird young. Though Willow Flycatchers are frequent cowbird hosts on Rush Creek, and though cowbird parasitism almost always results in host nest failure, Willow Flycatchers very rarely raise cowbird eggs to fledge on Rush Creek.

Though Brown-headed Cowbirds parasitized the same proportion of Willow Flycatcher nests in 2005, 2006, and 2007, the population held a higher fecundity in 2006 and 2007. This difference resulted from a decrease in nest failure due to other predators besides cowbirds. Less than ten percent of Willow Flycatcher eggs were lost to non-cowbird predation in 2006 and 2007, while roughly one out of three Willow Flycatcher eggs were lost to non-cowbird predation in 2005 (McCreedy 2006).

The lower Rush Creek population has expressed nest site and territory habitat attributes anomalous to other Willow Flycatcher populations in California. These attributes include a predilection for Woods' Rose (*Rosa woodsii*) (through 2007, 88 out of 88 located nests have been built in Woods' Rose), and a lack of territory and nest site correlation to surface water (McCreehy and Heath 2004). Research into the use of these anomalous habitats will identify alternatives to typically surveyed habitats, which will assist the USFS and other agencies in developing conservation efforts. Continued monitoring of the Rush Creek population will add to understanding of the establishment and survival of a small, isolated population of this rare species.

Monitoring Action 2: Sage-Grouse Population Monitoring

The Greater sage-grouse (*Centrocercus urophasianus*) is found in parts of eleven western states, including California. Because the Greater sage-grouse has experienced significant range and population reductions in many areas of the state, it is designated as a sensitive species in the Pacific Southwest Region of the Forest Service and a California Species of Special Concern (third priority) in its nesting and lek (breeding) grounds. Sage-grouse are known to occur in four areas on the Inyo National Forest: Mono Basin, Adobe Valley, Long Valley, and the White Mountains.

Sage-grouse are habitat obligates of western United States sagebrush (*Artemisia tridentata*) shrub steppe plant communities (Connelly et al. 2000). Year-round habitat consists of sagebrush-dominated shrub communities, including associated shrubs such as bitterbrush (*Purshia tridentata*) and rabbitbrush (*Chrysothamnus* spp). Approximately 306,550 acres of potentially suitable habitat occur on lands administered by the Inyo National Forest. Based on new information from Kolada 2007, sage-grouse nesting habitat in this area typically has high shrub canopy cover. Elsewhere in its range, sage-grouse rely more heavily on understory grass cover for suitable nesting habitat than shrub cover.

To better assess sage-grouse population numbers, the Long Valley sage-grouse population was monitored during the 2007 breeding season from early March to late April. Population counts were conducted at breeding grounds (leks) early in the morning by vehicle or on foot, when males are most likely to be present. Both males and females were counted and the maximum number of birds was recorded. Monitoring was conducted by the California Department of Fish and Game with the help of the Inyo National Forest and Bureau of Land Management, Bishop Field Office personnel.

Results

In 2007, a total of 199 males (197 adult males, 2 juvenile males, one unknown) and 46 females were observed. Based on population data gathered from trend leks, (i.e., leks which are surveyed every year to help establish trends in the population over time), the sage grouse counts for 2007 are average for this population.

Evaluation

Combined with new information about suitable habitat components, population data are being used to assess potential effects of livestock grazing on sage-grouse and its habitat. Sage-grouse nesting habitat in this area typically has high shrub canopy cover. Livestock generally avoid foraging on shrub species, reducing the possibility for livestock grazing to affect nesting habitat (and therefore potentially affect population numbers).

Livestock grazing in Long Valley is currently under environmental analysis (Crowley Lake Basin Grazing Project) to determine if grazing will continue and, if so, under what terms and conditions.

The Proposed Action includes changes in allowable use standards based on the condition of key areas within the allotment (Inyo LMP Amendment 6). While not proposed to address concerns related to sage-grouse, implementation of these changes would ensure suitable sage-grouse nesting habitat is maintained. In meadows, establishment of allowable use standards would place limits on livestock grazing to ensure sage-grouse brood-rearing habitat continues throughout the area.

Forest Plan Amendments and Corrections

There were three non-significant amendments to the 1988 LRMP during fiscal year 2007:

- Amendment #11: Commercial Pack Station and Pack Stock Outfitter/Guide Permit Reissuance EIS
 - Amended direction contained in the 1982 Golden Trout Wilderness Plan to allow any permitted commercial pack stock operator to apply for use of allocated case-by-case trips into the Golden Trout Wilderness. Rationale for the amendment is contained on pages 17 – 19 of the Record of Decision for the Commercial Pack Station and Pack Stock Outfitter/Guide Permit Issuance Project (1/24/07).
- Amendment #12: Eagle Lodge Base Development Project
 - Amended the LRMP to apply a Visual Quality Objective (VQO) of Maximum Modification to the site of the Eagle Lodge (approximately 4 acres) within Rx #13. Rationale for the amendment is contained in the Eagle Lodge Base Development Project Decision Notice (2/27/07).
- Amendment #13: Mammoth Community Facilities Land Exchange
 - Amended LRMP management direction for Mammoth Management Area #9 to allow conveyance of a 1.46 acre parcel located north of Highway 203 to the Mammoth Lakes Fire Department. Rationale for the amendment is contained on pages 8 – 10 of the Decision Notice for the Mammoth Communities Facilities Land Exchange (4/20/07)

Update on Research Needs

The following recommendations follow from the results of monitoring conducted in 2007 and summarized in this report. They are focused on improving Forest-wide programs, projects, and activities by increasing our knowledge and understanding of forest ecosystems.

- Divert water from the stream channel during implementation of in-channel construction projects similar to that conducted at Sawmill crossing in order to evaluate whether such a change in implementation can further reduce sedimentation during construction.
- Add to and evaluate baseline information to assess whether pack station operations on use trails and in stock camps are adversely affecting resource conditions. Determine if changes in management should be considered.
- Continue periodic water quality sampling at pack stations to further assess effectiveness of applicable management direction and permit administration.

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Public Participation/Disclosure Plan

The Fiscal Year 2007 Monitoring and Evaluation Report will be posted to the Inyo National Forest website (<http://www.fs.fed.us/r5/inyo/projects/>). Copies will be provided to interested individuals upon request.

References

- CONNELY, J. W., M. A. Schroeder, A. R. Sands, and C. E. Braun. 2000. Guidelines to manage sage grouse populations and their habitats. *Wildlife Society Bulletin* 28:967-985.
- KOLADA, E. J. 2007. Nest site selection and nest success of greater sage-grouse in Mono County, California. A thesis submitted in partial fulfillment of the requirements for the degree of Master of Science. University of Nevada Reno. December 2007.
- INTERNATIONAL BIRD CONSERVATION COMMITTEE. 1970. An international standard for a mapping method in bird census work recommended by the International Bird Census Committee. *Audubon Field Notes* 24:722 - 726.
- MCCREEDY, C. AND HEATH, S.K. 2004. Atypical Willow Flycatcher Nesting Sites in a Recovering Riparian Corridor at Mono Lake, CA. *Western Birds* 35:197 - 209.
- MCCREEDY, C. 2005. Mono Basin Willow Flycatcher Project: 2005 Progress Report. Point Reyes Bird Observatory (Contrib. 1298), 3820 Cypress Drive, No. 11, Petaluma, CA 94954.
- MCCREEDY, C. 2006. Mono Basin Willow Flycatcher Project: 2006 Progress Report. Point Reyes Bird Observatory (Contrib. 1512), 3820 Cypress Drive, No. 11, Petaluma, CA 94954.
- MCCREEDY, C. 2007. Mono Basin Willow Flycatcher Project: 2007 Progress Report. Point Reyes Bird Observatory (Contrib. 1579), 3820 Cypress Drive, No. 11, Petaluma, CA 94954.
- RALPH, C.J., GEUPEL, G. R., PYLE, P., MARTIN, T. E., AND DESANTE, D. F. 1993. Field methods for monitoring landbirds. USDA Forest Service Publication: PSW - GTR 144.
- SMITH, J.N.M. 1999. The basis for cowbird management: host selection, impacts on hosts, and criteria for taking management action. *Studies in Avian Biology* No.18:104 - 108.
- USDA Forest Service. 1988. Inyo National Forest Land and Resource Management Plan. USDA Forest Service, Pacific Southwest Region. Bishop, CA.
- USDA Forest Service. 2001. Sierra Nevada Forest Plan Amendment. Final Environmental Impact Statement. USDA Forest Service, Pacific Southwest Region, January 2001.
- USDA Forest Service. 2004. Sierra Nevada Forest Plan Amendment Final Environmental Impact Statement and Record of Decision. USDA Forest Service, Pacific Southwest Region.
- USDA Forest Service. 2005. Trail and Commercial Pack Stock Management in the Ansel Adams and John Muir Wildernesses, Final Environmental Impact Statement and Record of Decision. Inyo National Forest. December 2005.

USDA Forest Service. 2007. Record of Decision, Sierra Nevada Forests, Management Indicator Species Amendment. Pacific Southwest Region.

USDA Forest Service. 2009. Motorized Travel Management Draft Environmental Impact Statement (R5-MB-182). Inyo National Forest. January 2009.