FY 2006 Monitoring Report

Umpqua National Forest

Umpqua Mariposa Lily – photo courtesy of North Umpqua RD.

May 2007

Dear Friends of the Umpqua National Forest:

Enclosed are the results of the fiscal years (FY) 2006 Umpqua National Forest monitoring activities. This report summarizes the monitoring that was completed, and what was learned as a result. Resource specialists have also formulated recommendations for changes in the monitoring program.

Please direct comments or questions on this report to: Planning and Products Staff, Umpqua National Forest, 2900 NW Stewart Parkway, Roseburg, OR 97470, 541-672-6601.

Clifford J. Dils

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Forest Supervisor

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Introduction

The Umpqua National Forest annually monitors and evaluates programs and projects to determine whether they comply with management direction in its Land and Resource Management Plan (LRMP), as revised by the Northwest Forest Plan.

Monitoring and evaluation is an ongoing process, specifically designed to insure that LRMP goals and objectives are being achieved; standards and guidelines are being properly implemented; and environmental effects are occurring as predicted. The evaluation of monitoring results allows the Forest Supervisor to initiate action to improve compliance with management direction where needed, improve cost effectiveness, and determine if any amendments to the LRMP are needed to improve resource management.

Monitoring is conducted by field reviews of projects and by inventory and survey work conducted by Forest Service resource specialists and other cooperators.

This monitoring report for Fiscal Years (FY) 2006 is divided by resource areas with general overviews of the monitoring conducted in the Executive Summary, followed by detailed resource reports, which detail the results of the monitoring along with recommendations for future years.

Executive Summary

Fire and Fuels

Fire Suppression/Pre-suppression: For FY06, the Forest was directed to staff at 82.5% of the Most Efficient Level (MEL). With this type of financing, the Forest expected to see 2,064 acres burned for a cost-plus-loss of $14.5 million.

The fire season on the Umpqua was below normal to normal in activity, although the potential for large fire growth was present during parts of the fire season. Fire season began on June 22 and ended October 17 for a total of a 118 day season for 2006. There were a total of 65 fires for 79.3 acres in 2006.

Inadequate outdated NFMAS runs may lead to a shortage in staffing levels in future years. Costs exceeded projections in FY06 because of the outdated NFMAS information. The budget was spent down to the dollar and no overspending was incurred due to the IA program being supplemented by Severity requests and off Forest assignment savings.

Fuels: For FY06, the Forest accomplished 856 acres of the assigned target in prescribed fire treatment. Hazardous fuels accounted for 361 acres in WUI areas, and another 495 acres in non-WUI. Additional funding came in the form of CWK2 dollars for a target of 159 acres which the Forest accomplished. BDBD accomplishments on the Forest included treatment on 948 acres. The Forest met approximately 98% of the resource objectives on HF burning and the results were evaluated on post monitoring burn forms attached to the District burn plans.

The ability to accomplish more fuels work on the Forest was constrained by budget caps and the inability to compete with eastside forests for funding, which have lower overall costs per acre for fuels treatments.

Fisheries

For FY06, the Forest completed 30.3 miles of Level II stream surveys, operated 2 smolt traps on the Tiller Ranger District, and completed spawning ground surveys and redd counts on numerous streams.

The streams surveys found that many streams within the managed landscape continue to have “at risk” or “not properly functioning” attributes, including high water temperature, lack of floodplain connectivity, scoured out stream channels and reduced large woody material, primarily because of past management practices. Recent instream work and other restoration efforts are improving some attributes and overall conditions in a small number of high priority streams; however, much work remains to be done to move existing conditions toward the desired condition on many more streams.

The smolt trap returns on the South Umpqua River continue to show critically low levels of production for anadromous fish, despite generally favorable ocean conditions and high adult survival rates. Low productivity may be tied to redd scouring, a result of simplified spawning habitat in combination with altered stream flow regimes (higher, more frequent winter peaks). Additionally, structurally simplified rearing habitat in combination with high summer water temperatures are factors in reducing overall anadromous fish production.

Heritage

In FY 2006 monitoring took place at 132 prehistoric or historic sites, and on 16 project areas, totaling 858 acres. Law enforcement, Forest Service Heritage Program staff, and the Cow Creek Band of Umpqua Tribe of Indians continued to monitor archaeological sites considered a risk for looting. Archaeological looting has decreased on the forests. Only four incidents of

archaeological looting were documented and an appropriate investigation was conducted for each incident. Public outreach and stewardship activities have been increased in an effort to decrease looting.

Minerals

The overwhelming majority of the mining claims on the Forest are located within the Bohemia mining district which straddles the topographic divide separating the Cottage Grove and North Umpqua Ranger Districts. All the 'active' mining claims during Fiscal Year 2006 were on the Cottage Grove Ranger District. The Cottage Grove Ranger District processed a total of 65 Notices of Intent and 6 Plans of Operations.

Seven Forest designated material sources were entered for in-service projects during Fiscal Year 2006. Only two of the seven material sources entered involved large-volume removals requiring preparation of a Pit Development Excavation Plan. Several dozen material sources were also utilized by the general public to develop and remove various rock resources, primarily decorative-landscape [building] stone under mineral material [sale] permits. A total of 57 small-volume mineral material sale permits and another 7 free-use permits were issued as reported by District field units. There was a production of 13,618 tons [equivalent to about 7,565 loose cubic yards] of common variety mineral materials during Fiscal Year 2006.

Range

The 2006 grazing season was the first since the issuance of the Range FEIS/ROD on March 13, 2006. The ROD essentially continued the livestock grazing program that was in place at the time it was signed, and added the 4,160-acre Joe Hall Pasture in the Summit Allotment. Approximately 47,790 acres are under allotment, with 1,020 head months of use during 2006. Seventeen permanent monitoring sites were maintained. Overall, compliance with the Annual Operating Instructions is good.

Recreation

An analysis of management direction, existing conditions and user preferences for winter recreation on the Diamond Lake Ranger District was incorporated into a Winter Recreation Assessment and Use Guide for the Diamond Lake Ranger District. Priorities, as recommended in the Winter Use Guide, resulting from the survey are: (1) improve safety related to snow parks and signing, and (2) improve public information materials.

Project priorities for winter recreation facilities to support improving safety based on available resources were identified as: (1) Three Lakes Snow Park (Nordic skiing and motorized winter recreation), (2) Windigo Junction Snow Park (Nordic skiing and motorized winter recreation), (3) North Diamond Snow Park (relocate), (4) Cinnamon Snow Park, (5) South Diamond Snow Park, (6) Winter Ski Cabin (new), and (7) Hut-to-Hut Cross-country.

The Diamond Lake Restoration Project FEIS, completed in 2004, continued to be implemented into 2006. Restoration project effects on recreation and visual quality continued to be monitored for compliance with mitigations for the Diamond Lake area identified in the environmental document. Chemical applications to the lake were successfully applied. The recreating public was continually informed of the implementation progress, emphasizing safety and health, and providing options for recreation activities.

The Forest completed the Recreation Sites Facility Master Planning (RSFMP) process in 2006.

The Recreation Resource Management Plan, completed in 2004 by PacifiCorp for the North Umpqua Hydroelectric Project, FERC Project No. 1927 as per the Settlement Agreement, defines several activity areas to address Project-related recreation facility capital improvement and

development, facility operations and maintenance (O&M), funding Forest Plan compliance, monitoring, public information, law enforcement, and reporting. In 2006, the Rolling Action Plan was drafted, reviewed, and projects initiated.

Across the Forest, dispersed unroaded recreation areas and Special Interest Areas received little or no impacts from use. Summer off-road vehicle use remained low, but is increasing slowly over time. The North Umpqua Ranger District was 15% up in overnight camping in both 2004 and 2005, back to similar levels as reported in 2003. Brice Creek Old Growth Grove remains in fair to moderate conditions and receives increasing dispersed recreation use. The Oregon Cascades Recreation Area showed no overall increase in use for FY 2006.

Soil and Water

Best Management Practices (BMP) checklists were written for 28 out of 30 ground-disturbing activities in FY06, or 93 percent. Those BMP checklists are being implemented. In FY06, 30 streams were monitored for temperature at Forest Plan monitoring sites and on other streams. Monitoring showed that temperature has not changed on most streams, but that natural stream temperatures in 2006 were about 2 degrees Fahrenheit warmer than the year before. Water temperature in 2006 was one of the warmest years on record. Four streams were monitored for turbidity; the monitoring results showed that turbidity levels have not changed (Attached Graphs). One soil productivity report was completed on the Forest.

Timber and Vegetation Management

The timber volume offered for sale from the Umpqua National Forest in FY 06 totaled 54 million board feet, primarily from commercial thinnings. The Forest continues to move toward intermediate entries in those older managed plantations that present an opportunity for commercial thinning.

Reforestation efforts continued in areas affected by the 2002 fires (Apple and Tiller Complex Fires) and by the 2003 fires (Kelsay Fire).

Transportation

Traffic counts on the Umpqua National Forest have been collected for 2005 and 2006 but have not been complied and a report has not been written. 1.9 miles of new permanent roads were built on the Forest. Approximately 2.1 miles of road were decommissioned across the Forest in 2006, including 1.3 miles in the Steamboat Watershed.). 0.8 miles of existing road was reconstructed, and 25.0 miles had deferred maintenance work completed during FY 2006.

Visuals

The 2002 wildfires continues to visually modify portions of the viewsheds on both the Tiller RD and the North Umpqua RD into 2006 because of fire damage and effects of salvage logging some of the fire-damaged areas.

Scenic quality continues to be assessed during project planning efforts across the Forest. Emphasis on thinning strategies in forest vegetation has reduced some of the obvious visual quality conflicts typically associated with clear-cutting practices. Implementation of fuel reduction projects in the under-story of coniferous forests in wildland-urban interface areas, such as along the Myrtle Creek-Canyonville Tour Route, has had beneficial effects on scenic quality and enhanced the tour route experience.

The Aesthetics Management Plan, completed in 2004 by PacifiCorp on the North Umpqua Hydroelectric Project, FERC Project No. 1927, as per the Settlement Agreement, continued to be implemented. The 5-Year Rolling Action Plan was drafted, reviewed and initiated among cooperating partners.

Wild and Scenic Rivers

In 2006, monitoring continued on the North Umpqua Wild and Scenic River through an MOU between the BLM and the Forest Service. In 2006, 61% of all boating use was non-commercial with adjusted non-commercial use counted at 3,766 user days. Commercial use, as reported by 11 permitted rafting guides was 39% of all use (2,344 user days). The rafting put-in facilities at Boulder Flat were improved during FY 2006.

Wilderness

Boulder Creek and Mt. Thielsen Wildernesses: No monitoring was reported in FY 2006 in either Wilderness. Use was expected to be similar to previous years.

Rogue Umpqua Divide Wilderness: Five wilderness patrols were performed in the Rogue Umpqua Divide Wilderness during 2006, down from twenty-two patrols the previous year. These were performed by a Fire Protection Officer during June through October. Six Incident Reports were filed for failure to remove garbage, unauthorized trail construction, theft of trail sign and OHV use on an access trail.

Wildlife and Threatened/Endangered Species

In 2006, the second of a five-year monitoring study of the northern spotted owl (*Strix occidentalis caurina*) was conducted. The U.S. Fish and Wildlife Service proposed surveying for northern spotted owls before and after a thinning and hazardous fuels removal project was implemented in order to determine effects of these activities on the northern spotted owl.

In 2006, the Forest coordinated with the Oregon Department of Fish and Wildlife (ODFW), as they continued to monitor deer and elk populations. In general, Forest-wide observations show that elk trends appear to be declining.

Townsend's bats are monitored at one site on the Forest. The population appears to be stable at the North Umpqua site.

Two areas were monitored for western pond turtles on the Cottage Grove Ranger District, helping the Forest understand patterns of use by pond turtles.

Bald eagles were monitored at all four known sites on the Forest. All known sites continued to be occupied. Reproductive success in 2006 was reversed from that in 2004-2005.

Peregrine falcon sites were also monitored. Thirteen of fourteen known sites were monitored. Three new sites have also been discovered, bringing the total to fourteen known sites on the forest. Eight of the sites successfully fledged young.

Finally, primary cavity nesters and landbirds were monitored on two project areas on the forest. A Breeding Bird Survey (BBS) route was monitored again within the boundary of the Apple Fire. The Forest is beginning to use monitoring data from nearby BBS routes adjacent to the Forest.

Detailed Resource Area Reports

Fire and Fuels

What monitoring did we do in 2004 and 2005?

The Umpqua National Forest LRMP requires monitoring as a periodic comparison between the end results that are realized and those projected in the LRMP. In Chapter V of the LRMP (Table V-1) there are specific items that require monitoring by the Fire Management Staff area. These are:

1. ET112/NFTM 51, stand destruction caused by wildland fires. The objective of this monitoring item is to determine if plan output assumptions are not valid because of catastrophic losses from wildland fires. The unit of measure used to determine this is acres and percent of area damaged.
2. PF2 BDBD FFFP 54, fuels treatment. The objective is to determine if fuels treatments are meeting expected resource management and protection objectives. The unit of measurement is the percent of fuel treatment acres meeting resource management and protection objectives, and acres of prescribed burning.
3. PF11 FFFP 55, Fire Management. The objective is to determine if protection from wildland fire for forest users, improvements, and forest resources are being met through a fire management program that is cost efficient and responsive to land and resource management goals and objectives. The unit of measure is acres and cost.
4. FA121/NFSW 56, Total Suspended Particulates (TSP)[1]. The objective is to attain compliance with State and Federal laws, the Clean Air Act, and State Implementation Plan. Unit of measure is tons of TSP.

Suppression/Presuppression – Under this category the Forest was financed at 82.5% of the Most Efficient (MEL) based on FY99 NFMAS (National Fire Management Analysis System) planning inflated to FY06dollars. With this type of financing, we can expect 2,064 acres burned for a cost-plus-loss of $14.5 million.

The fire season on the Umpqua was normal in fire activity and below normal in acres burned, although the potential for large fire growth occurred during the season. Snow pack levels for the 2006 were considered near normal. Fire season began on June 22 and ended October17 for a total of a 118 day season. There were a total of 65 fires for 79.3 acres.

Based on the acres burned there was an actual cost plus loss of approximately $13.7 million dollars. The actual savings based on this formula was $.8 million, within monitoring item 1 and 3 above. According to Page 39 of Chapter V or the LRMP no changes in suppression strategies are needed as we did not exceed 20% acreage burned over our NFMAS level.

Fuels – The Forest accomplished 856 acres of the assigned target in prescribed fire treatment. Hazardous fuels accounted for 361 acres in WUI areas, and another 495 acres in Non - WUI. Additional funding came in the form of CWK2 dollars for a target of 159 acres which the Forest accomplished. BDBD accomplishments on the Forest included treatment on 948 acres. The Forest met approximately 98% of the resource objectives on HF burning and the results were evaluated on post monitoring burn forms attached to the District burn plans.

TSP – According to the TSP production chart attached, the Umpqua NF is well below the TSP goal. In 2006 TSP amounts increased very slightly, but still well below the TSP goal.

[1] TSP is defined as any finely divided material (solid or liquid) that is airborne with an aerodynamic diameter smaller than a few hundred micrometers.

According to the guidelines that we adhere to for smoke management, the Forest is allotted 6,550 tons for the year; we were well below 1,000 tons. With this data, we meet the objective set in monitoring item 4 as stated above.

What did we learn in 2004-2005?

Suppression/Presuppression – That our NFMAS run parameters for a below normal to normal year are adequate for protection. For monitoring purposes we are well within our thresholds. One item that the Forest had to deal with in 2006 was that the NFMAS costs did not keep up with actual costs on the ground. Due to changes in policy and direction, we increased our leadership and non-producer costs related to oversight of a safe and effective program.

From our NFMAS run, fire season was identified as being 130 days; the Forest was below this at 118 days. In 2006 we relied on severity dollars and resources associated with severity starting in late July ending October. We must continue to monitor costs over those shown in our NFMAS run and relate them to true costs.

We learned that our NFMAS run is outdated and that a more accurate budget analysis tool needs to be used. In 2006 we finished phase One or the FPA (Fire Program Analysis) analysis, but it was found that there were some fatal flaws in the program and that is was put on hold until further notice. For 2007 an interim budget study is expected in the Region to determine a budget for the Forest. Until then we need to keep the Region informed that our costs for 2006 and beyond are not adequate and do not represent the actual dollars needed on the ground to meet our MEL staffing levels.

Fuels – The Forest has been constrained by the budget that is allocated to the Forest in fuels management. In the Annual Fire Report, the Forest reports that over 5,000(+) acres of fuels treatments could be accomplished if regional allocations would allow this. Currently we are constrained by our process of how the budget in WFHF was allocated and our high cost per acre for treatments compared to the eastern portion of the Region. The BOD needs to develop a strategy for adjusting the BFES cap and for helping the Region to understand we have reduced our cost per acre substantially, but we don't compete with low costs on the eastside of the Region well. The Umpqua is moving towards become competitive for dollars based on a plan to look at leveraged acres for 2007.

TSP – The Forest continues to maintain excellent air quality standards as defined by our direction. No smoke intrusions occurred in any designated areas from the Forest burns. Prescribed fire smoke monitoring continues with audits being accomplished as outlined in our direction. Total tons and total suspended particulates are much lower than historic figures (Figure 1). This reduction has been accomplished by spring broadcast burning and leaving sufficient large woody material for long term site productivity.

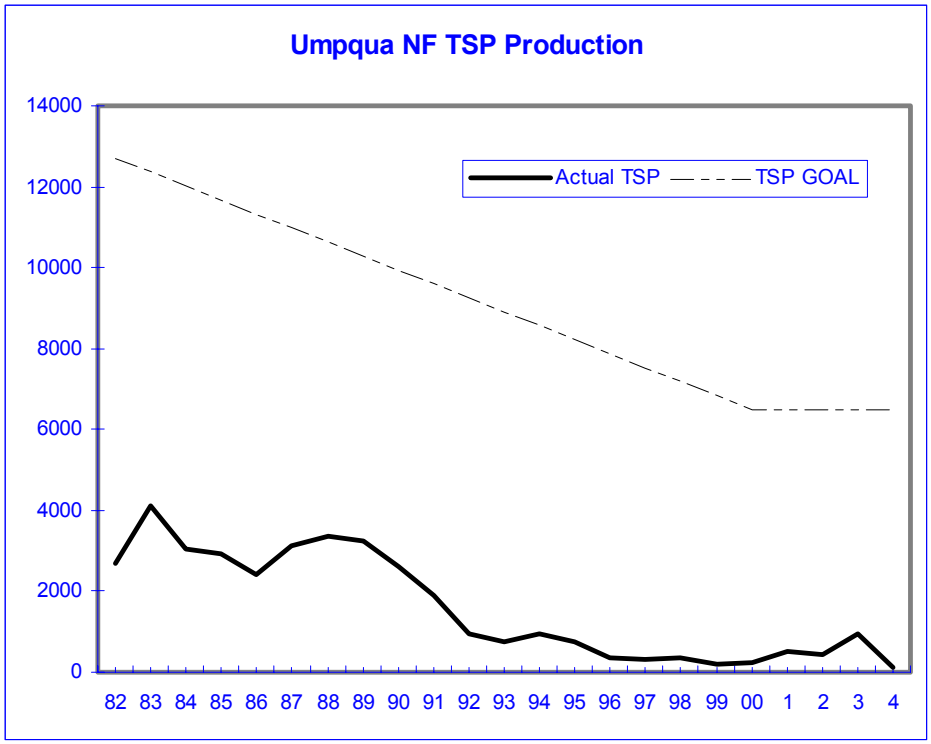


Figure 1. Total Suspended Particulate (TSP) Production Graph 2006.

Recommendations

For the upcoming fiscal year, recommendations to the Forest Leadership Team (FLT) would be:

- **Suppression/Presuppression** – Stay in tune with the new budget processes that will replace outdated NFMAS runs and recognize that in the future we will be challenged to show that our current organization is run in a 70/30 fashion with 70% of our budget being in the discretionary category (discretionary costs include items such as; temporary employees, contracts, annual agreements, optional travel and training, lookouts, and district dispatching). The other 30% of the budget would fall into the base cost category. Currently our organization has a mix of discretionary to base that varies by each subunit. The organization need to be looked at to make sure they can weather a 2% decrease in dollars within the 30% side. The Regional Office understands our plight with leadership and inflation costs not being adequate and can only assist us in limited ways. We need to understand that the Regional Office is not okay with deficit spending as they have been in the past.
- The Forest also has the leeway to change the mix of resources within the NFMAS run, but we must be diligent in making sure the resources still meet the FPCC (firefighter production capability) levels identified in NFMAS that determine our MEL staffing levels. Move ahead as needed using the PIG book numbers for 2007 planning and workchunks. Be prepared to meet critical timelines and provide input into a well thought out organization to meet future needs of the Forest program. The Forest had finished developing block cards and can better meld the District lines to accomplish resource protection at a lesser C+NVC cost for protection. .
- **Fuels** – The Forest needs to continue increasing the implementation of fuels treatments to reduce the risk of wildland fires in wildland Urban Interface and high value resource

areas. Treatments and costs need to remain competitive. While the Regional Office is accepting our fuels treatment costs in line with the rest of Southwest Oregon, we need to continue to demonstrate efficiency and make our case for funding that is equitable to the rest of SW Oregon. The Forest needs to work with the County and communities in any further community protection plans so they are competitive for Regional dollars. Recommend that the Forest continue utilizing leveraged acres in conjunction with integrating with other resource areas to increase the fuels program in implementation and planning. Caution needs to be used in developing increase program options to make sure the right acres are being treated in line with Forest Protection strategies and resource benefit. The Forest should also be cautious in getting stuck in the cycle of molding the program around budgeting processes and develop real processes for determining the program by utilizing FRCC mapping, watershed needs, high risk areas needing treatment related to WUI protection, decreasing per acre suppression costs, community protection and safety, as well as integrating with existing resource treatments that fall within these identified areas.

- **TSP** – The Forest will continue to monitor TSP levels. It is anticipated that if the budget allows increased treatment acres, we will remain within acceptable levels of compliance
- **Overall recommendation for the entire program** – The Forest should do a Forest Plan amendment to move RAWS station sites into administrative sites and a CE needs to be completed to maintain these permanent sites to standards set within RAWS station maintenance plans.

Fisheries

Forest Plan Monitoring Elements:

ME-06, Channel Cumulative Effects (Level II Stream Inventory), Table V-1, Page 14; ME-11, Smolt Trapping, Table V-1, Page 16; ME-12, Pool Quality, Table V-1, Page 16; ME-13, Aquatic Macroinvertebrates, Table V-1, Page 16; ME-24, Large Woody Material, Table V-1, Page 22.

Other Monitoring Elements:

Adult Salmon & Steelhead Spawning Surveys/Redd Counts

What monitoring did we do in 2006?

ME-06: Two of the four Ranger Districts (Tiller-23.7 miles, North Umpqua-6.6 miles) conducted Level II Stream Surveys in 2006, totaling 30.3 miles. This represents 17% of the Forest Plan level of 176 miles annually.

ME-11: Two smolt traps (South Umpqua River & Jackson Creek) were operated in 2006, both at the Tiller Ranger District. This represents 20% of the Forest Plan level of 10 sites each year.

ME-12: No Pool Quality transects were inventoried in 2006. This represents 0% of the Forest Plan level of 8 transects for each of the two years.

ME-13: No macroinvertebrate sites were sampled or analyzed in 2006. This represents 0% of the Forest Plan (35 sites) level.

ME-24: No Large Woody Material transects were inventoried in either 2006. This represents 0% of the Forest Plan level of 8 transects.

Other: Spawning Survey/Redd Counts were conducted on numerous streams on three of the four Ranger Districts for three different species.

1. Tiller completed multiple surveys for coho salmon on transects in Dumont, Boulder, Joe Hall and Beaver Creeks in 2006.
2. Tiller also completed several mid-summer spring Chinook holding counts in established index pools in the South Umpqua River.
3. Diamond Lake completed multiple surveys for coho salmon on two stream transects in Boulder and Copeland Creeks. Additionally, Diamond Lake completed multiple surveys for steelhead in Copeland Creek.
4. North Umpqua completed multiple surveys for steelhead on several transects in the Steamboat Creek watershed and an adult spring Chinook spawning survey on the mainstem North Umpqua River in 2006.

What did we learn in 2006?

The Stream Survey work was conducted primarily to establish baseline conditions. Results further supports previous findings that many stream segments on the Forest in "managed" landscapes currently have numerous "At Risk" or "Not Properly Functioning" attributes, including: high summer water temperatures, loss of floodplain connectivity, altered (coarsened) streambed substrate composition, simplified and widened stream channel morphology, and reduced LWD loading. These watersheds are in need of substantial protection and/or restoration in order to achieve Forest Plan Desired Conditions and contribute to the recovery of desired native TES fish and other aquatic organisms. Restoration will be based on FY-2000 Restoration Business Plan (as amended) priorities, e.g., Steamboat, Middle South Umpqua, Jackson and Middle North Umpqua watersheds.

Results from the Smolt Trapping conducted in both years shows a continuing trend of critically low levels of production of several native anadromous South Umpqua River fish stocks, including: spring Chinook, coho, and searun cutthroat trout; despite recent favorable ocean conditions and resultant higher adult survival rates. This suggests that spawning and juvenile rearing habitat in many parts of the South Umpqua sub-basin remains impaired and is in need of restoration. The capture of large numbers of age 0 young-of-the-year coho, but very few mature age 1+ smolts, suggests that redd scouring, a result of simplified spawning habitat in combination with altered flow regimes (higher, more frequent peaks), is likely a serious factor limiting production. Additionally, structurally simplified rearing habitat in combination with high summer water temperatures is also likely a significant factor that reduces overall anadromous fish production. For further information, see Forest Monitoring Plan elements NFSW-9 (Stream Temperatures) and NFSW-10 (Sediment, Turbidity, and Streamflow).

Spawning Surveys continue to provide important information on differences and similarities in annual abundance and distribution of many of the Forest's native salmon and steelhead stocks. Changes in native-stock adult abundance, which for some stocks is substantially determined by off-forest conditions (ocean productivity) and/or activities (harvest, brood collection) was mixed. Healthier stocks, such as North Umpqua spring Chinook and winter-run steelhead, saw generally constant numbers over the past 10-year average; while most of the more sensitive stocks, such as: searun cutthroat (Forestwide), coho (Forestwide), and South Umpqua spring Chinook, had small or no apparent increases in abundance. It is likely that natural production of the healthier stocks (both of which utilize the high quality rearing habitat afforded by the North Umpqua main-stem) was large enough to be able to take advantage of the excellent ocean conditions and reduced harvest levels over the past two years, as has been hypothesized as the reason for generally larger salmon returns (wild and hatchery) throughout the region for the period 2002-2006. Conversely,

low natural productivity of the depressed stocks may have precluded a noticeable increase. No trends in abundance are evident at this time.

Amendments

No amendments are recommended at this time.

Recommendations

- At a minimum, increase present aquatic monitoring efforts to include at least 15 macroinvertebrate sites.
- Continue to make water quality and fish habitat/population monitoring the highest priority for limited NFIM funds.
- Continue to emphasize implementation of the Restoration Business plan. Update the RBP to incorporate Hydropower Mitigation Fund opportunities.
- Initiate a more comprehensive effectiveness evaluation of recent large-scale habitat restoration work in the Steamboat and Middle South Umpqua watersheds.

Heritage Resources

What monitoring did we do in 2006?

In addition to Forest Plan monitoring requirements, the Forest meets its monitoring obligations under the Programmatic Agreement between the United States Department of Agriculture Forest Service Pacific Northwest Region (Region 6), the Advisory Council on Historic Preservation, and the Oregon State Historic Preservation Officer Regarding Cultural Resources Management in the State of Oregon by the USDA Forest Service. Monitoring is an added protection measure to prevent looting as required under the Archaeological Resource Protection Act of 1979. Law enforcement, Forest Service Heritage Program staff, and the Cow Creek Band of Umpqua Tribe of Indians continued to monitor archaeological sites considered a risk for looting. Monitoring took place at 132 prehistoric or historic sites, and on 16 project areas, totaling 858 acres.

What did we learn in 2006?

Archaeological looting has decreased on the forests. Only four incidents of archaeological looting were documented and an appropriate investigation was conducted for each incident. Public outreach and stewardship activities have been increased in an effort to decrease looting. Public outreach and archaeological site monitoring appear to have helped decrease the number of incidents of archaeological looting. The archaeological resources were found in high probability areas as defined by the Forest Inventory Plan.

Amendments

No amendments are recommended at this time.

Recommendations

- Archaeologists will continue to survey in high probability areas during emergency activities. Consultation with the State Historic Preservation Office and Tribes will continue. A strategy will be developed with fire to ensure protection of archaeological and historic resources. In an effort to prevent looting, public outreach will continue. Support of active law enforcement, the Site Stewardship Program, and public awareness needs to continue. The Forest is committed to work with law enforcement and other federal agencies to complete a heritage resource protection strategy.

Locatable and Salable Minerals

Element #57 – Administration of Locatable Minerals
Element #58 – Management of Rock Resources
Element #59 – Availability of Rock Material

What monitoring did we do in 2006?

Element #57:

Information regarding locatable minerals for this report was derived from Bureau of Land Management (BLM) National Mining Claim interactive database (LR-2000) and from Ranger District responses to request for mining-related information. District field units indicate that field verifications and inspections of mining Plans of Operations are being conducted.

Element #58 and #59:

Seven Forest designated material sources [including one government-owned stockpile] were entered for in-service projects during fiscal year 2006. Only two of the seven material sources entered involved large-volume removals requiring preparation of a Pit Development Excavation Plan. Several dozen material sources were also utilized by the general public to develop and remove various rock resources, primarily decorative-landscape [building] stone under mineral material [sale] permits. A total of 57 small-volume [personal use] mineral material sale permits and another 7 free-use permits were issued as reported by District field units. The majority of 'rock permits' issued during fiscal year 2006 were from the North Umpqua Ranger District. Jerry Harryman, Resource Assistant actively promoted the District's building stone program since the North Umpqua corridor is located near Roseburg and adjacent population centers.

The production of 13,618 tons [equivalent to about 7,565 loose cubic yards] of common variety mineral materials during fiscal year 2006 (Table 1) equates to roughly 3 percent of the 257,000 cubic yards of projected annual rock needs as cited in the 1990 Forest LRMP. Rock resource projections made in the Forest LRMP for the decade of the 1990's were based upon a timber sale program that averaged between 300 and 350 MMBF harvest per year. Some 257,000 cubic yards of rock materials were estimated to be needed annually to construct and maintain an extensive road network. Figure 1 displays reported rock production from fiscal years 1993 through 2006.

Table 1. Reported production of salable mineral materials during fiscal year 2006.

Type Mineral Material *(Commodity)*	Ranger District	Issued Sale Permits *(number)*	Rock Materials Sales *(tons)*	Free-Use Permits *(number)*	Rock Materials Free-Use *(tons)*	Forest In-service Use *(tons)*	Production Totals *(tons)*
crushed stone	Cottage Grove					7,525	7,525
riprap	Cottage Grove					213	213
landscape rock	Cottage Grove	6	60				60
crushed stone	Tiller					720	720
riprap	Tiller					1,260	1,260
landscape rock	Tiller	14	1,150	7	1.75		1,152
crushed stone	North Umpqua					288	288
riprap	North Umpqua					1,187	1,187
landscape rock	North Umpqua	31	61				61
crushed stone	Diamond Lake						
riprap	Diamond Lake	1	60				60
landscape rock	Diamond Lake	5	192				192
sand & gravel	Diamond Lake					900	900
TOTALS		**57**	**1,523**	**7**	**2**	**12,093**	**13,618**

The annual review of the Forest Resource Management Plan did not take place during fiscal year 2006. There is a growing need to update the Forest Rock Resource Management Plan so it conforms more closely to current trends in rock resource consumption and the capabilities of those District personnel who administer the program.

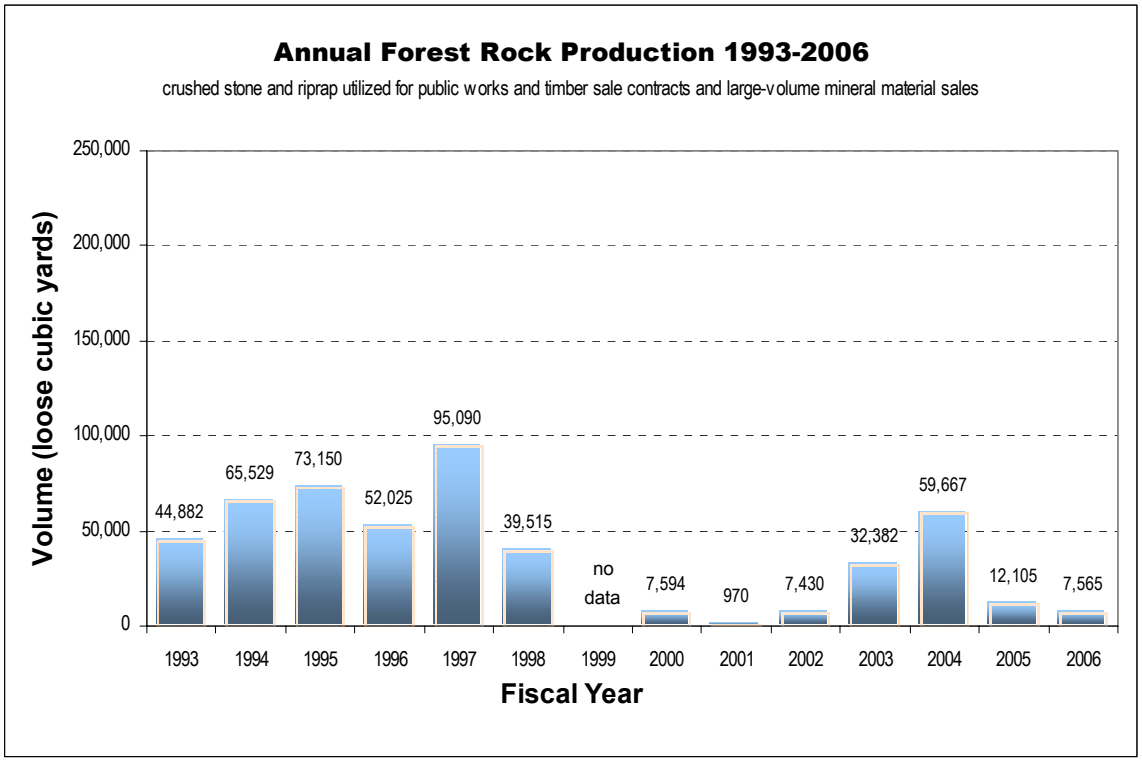


Figure 1. Annual production of rock materials for fiscal years 1993 through 2006.

What did we learn in 2006?

Locatable Minerals (#57)

There are approximately three hundred forty individual mining claims listed within the boundaries of the Umpqua National Forest, as indicated on the BLM LR-2000 database. The majority of these mining claims are not 'active' meaning on-the-ground activities are not being conducted that would require mining claimants/operators to file Notices of Intent (NOI's) for proposed operations or submit more comprehensive Plans of Operation (POO's) for on-going operations. The overwhelming majority of the 340 mining claims on the Forest are located within the Bohemia mining district which straddles the topographic divide separating the Cottage Grove and North Umpqua Ranger Districts. All the 'active' mining claims during fiscal year 2006 are located on the Cottage Grove Ranger District. The Cottage Grove Ranger District processed a total of 65 NOI's and 6 POO's. The complexity and time required for processing and approving each Plan of Operation (case file) continues to increase, as does the complexity and workload in managing the locatable minerals program. No "surface use determinations" were conducted on the Forest by the Area Minerals Examiner during fiscal year 2006.

The locatable minerals program on the North Umpqua and Tiller Ranger Districts remains static in fiscal year 2006 with no new Plans of Operation being submitted or existing ones processed. The North Umpqua Ranger District is no longer sampling water outflows from two mines under

existing approved Plans of Operation. The Diamond Lake Ranger District essentially has no locatable minerals program due to the youthful geologic environment.

Salable and Common-variety Minerals (#58 and #59)

District field units are no longer staffed with engineering personnel to conduct Total Station site surveys or prepare Pit Development Excavation Plans. The Forest Engineering Survey Crew conducts site surveys as needed. The Forest Rock Resource Manager prepares Pit Development Excavation [Single Entry] Plans according to the standards and guidelines specified in the Forest Rock Resource Management Plan when a planned entry involves removal of 1,000 or more cubic yards of rock resources.

Roles and responsibilities of District Rock Resource Managers as outlined in the 1992 Forest Rock Resource Management Plan have diminished considerably over the past decade. The Forest Rock Resource Manager maintains frequent contact with a dozen or more persons stationed at District field units and the Supervisors Office to keep account of what material sources that are being considered or planned for entry and what rock materials are being developed and utilized [Table 2]. There is no single person on a District field unit that is aware of all the entries made into material sources to obtain rock materials and therefore no direct means for the Forest Rock Resource Manager to obtain data for annual monitoring reports. Large-volume entries are reported with a relative degree of accuracy; however, many of the smaller-volume entries may not be reported or the production figures reported may not be 100% accurate.

Table 2. Forest and District personnel involved with the Forest Rock Resource Program during fiscal year 2006.

Personnel	Unit	Title	Function
Pat Williams	Cottage Grove RD	Supv. Engineering Tech.	District Rock Resource Mgr.
Megan Perkins	Cottage Grove RD	Support Services Specialist	Mineral material [sale] permits
Wes Yamamoto	Tiller RD	Resource Asst.	District Rock Resource Mgr.
Linda Spencer	Tiller RD	Roads Mgr.	
Barbara Whetzel	Tiller RD	Information Specialist	Mineral material [sale] permits
Mike Kinney	Diamond Lake RD	Transportation Mgr.	Rock Resource Mgr. Diamond Lake and North Umpqua RD's
Mike Karr	Diamond Lake RD	Road Maintenance Work Ldr.	Road Maintenance
Fran Brewington	Diamond Lake RD	Information Receptionist	Mineral material [sale] permits
Pat Cook	North Umpqua RD	North River Project Team Ldr.	
Miles Barkhurst	North Umpqua RD	Civil Engineer	
Nancy Andrich	North Umpqua RD	Engineering Tech.	
Roger Bailey	North Umpqua RD	Engineering Tech.	
Dennis Scott	North Umpqua RD	Information Specialist	Mineral material [sale] permits
Julie Merrit	Supervisors Office	Central Project Team Ldr.	
Gordon Hanek	Supervisors Office	Geotechnical Engineer	
Leonard Herzstein	Supervisors Office	Land Surveyor	Total Station surveys
Robin Duarte	Supervisors Office	Special Uses Specialist	INFRA Mineral Materials
Jake O'Dowd	Supervisors Office	Asst. Lands & Minerals Staff	Rock Resource Program Mgr.
Larry Broeker	Supervisors Office	Geologist	Forest Rock Resource Mgr.

On June 6, 2005, the Forest updated the royalty fees charged to the public for the disposal of common variety mineral-materials via issuance of a mineral-material (sale) permit. These new rates supplant the fees listed is in a 'Letter of Direction' dated 6 April 1995 signed by [then] Forest Supervisor, Don Otsby. The updated royalty rates were placed in R6/PNW Supplement No. 2800-2006-1 [FSM Chapter 2850] on June 26, 2006.

Infra Mineral Materials Training was provided to District front desk personnel by Robin Duarte, Forest Special Uses Specialist for the issuance of issue small-volume [personal use] mineral material sales to the general public. Beginning in fiscal year 2007 all mineral material sales must be issued through Infra Mineral Materials. In-service rock production and use on the Forest will also be recorded via Infra Mineral Materials. A total of 50 mineral material sites were entered into the Infra Mineral Materials Site Data Module by the Forest Rock Resource Manager.

Recent transfers and retirements and shifting roles and responsibilities of Forest and District personnel have created inefficiency in the management of the Forest Rock Resource Program. A more effective process needs to be developed for how District Rock Resource Managers, Engineering Project Team Leaders, the Forest Road Maintenance Leader, and other District engineering personnel who are involved with the various aspects of the Forest rock resource program coordinate with the Forest Rock Resource Manager for planned entry into Forest designated material sources for in-service projects or issuance of large-volume mineral material [sale] permits.

Some of the more frequently entered and strategically located rock sources on the Forest are approaching depletion of available rock resources within the limits of existing development – the limits oftentimes being the boundary with mature or old growth timber stands. Expansion of an existing material source to develop additional reserves of quality rock materials requires NEPA which District field units are hesitant in doing. No new material sources have been developed and no existing material sources have been expanded beyond established limits of development.

Many government-owned stockpiles of crushed rock aggregate have dwindled considerably over the last two decades as a result of annual road maintenance operations and periodic ERFO projects. Two Payco contracts located on the Diamond Lake Ranger District during fiscal years 2004 and 2005 have replenished crushed rock aggregate stockpiles at a two key material sources to meet future project needs. Payco contracts are planned on the Tiller Ranger District for fiscal year 2007 to develop crushed rock aggregate at two material sources and large class riprap for fish structures at another material source.

Management of the Forest Rock Resource Program has deteriorated over the past several fiscal years due to transfers and retirements, and constantly shifting roles and responsibilities amongst Forest and District personnel. The Forest Rock Resource Manager maintains frequent contact with District field units and the Forest Timber Sale Planning IDT regarding the need to maintain an adequate supply of rock resources for planned projects.

The Region-6 Invasive Plant Program Record of Decision signed on October 11, 2005. Standard # 7 involves the removal and use of rock materials within Forest designated materials sources as well as government-owned or privately-owned aggregate stockpiles. Standard # 7 requires that a Forest or District weed specialist "Inspect active gravel, fill, sand stockpiles, and borrow material for invasive plant species before use and transport" . . . "Treat or require treatment of infested sources before any use of pit material". . . "Use only gravel, fill, sand, and rock that are judged to be weed free by District or Forest weed specialists". All material sources planned for entry are being examined by Forest or District weed specialists. Standard # 7 is listed in "Development Notes" for Pit Development Excavation Plans. The next revision of the Forest Rock Resource Management Plan needs to discuss Forest management of invasive weeds.

Amendments

No amendments are recommended at this time.

Recommendations

- There is a growing need to update the Forest Rock Resource Management Plan so it conforms more closely to trends in rock resource consumption since implementation of the Northwest Forest Plan ROD and the capabilities of those District personnel who administer the Forest Rock Resource Program. The best opportunity to amend and update the Forest Rock Resource Management Plan may be during the next revision of the Forest Plan when a new set of monitoring elements are formulated.
- As an interim measure, clarify the roles and responsibilities of those Forest and District engineering personnel who are involved in all aspects of rock resource management.
- The Forest Rock Resource Manager will be responsible for issuing all large-volume mineral material [sale] permits to Forest Service contractors and entering in-service rock production data into Infra Mineral Material Database.

Range, Livestock and Grazing

Resource Element

Umpqua National Forest Land and Resource Management Plan Chapter V: NFRG/DN12 (page V-20); NFRG/DN1 (V-46); NFRG/DN1 (V-48); NFRG-RBRB/DN221-DN222 (V-48).

What monitoring did we do in 2006?

The 2006 grazing season was the first since the issuance of the Range FEIS/ROD on March 13, 2006. The ROD essentially continued the livestock grazing program that was in place at the time it was signed, and added the 4,160-acre Joe Hall Pasture in the Summit Allotment. The allotments and pastures comprising the permitted grazing area total 51,950 acres.

The Forest livestock program is implemented primarily on the Tiller Ranger District. Approximately 47,790 acres of allotments, including the Drew Creek, Diamond Rock and Divide Allotments, as well as the Pickett Butte pasture of the Summit Allotment and the Collins Ridge pasture of the Acker Divide Allotment, were monitored during the 2006 grazing season. The Forest did not authorize use of the Joe Hall Pasture in 2006 because of operational considerations. The yearly monitoring effort is conducted to assess how well permitted livestock grazing complies with the Forest Plan, as amended, and Biological Opinions. The field notes and allotment monitoring reports are located at the Tiller Ranger District.

The 2006 range administration program, including the monitoring component, was fully funded.

What did we learn in 2006?

The Forest authorized 1,020 head months of livestock use, or about 54 percent of the use permitted by the ROD. The authorized use reflects the livestock numbers for which permittees applied for the 2006 season.

According to the Term Grazing Permit, the scheduled turnout date is May 1; however, it was delayed this year. Range readiness, which determines turnout on the basis of soil moisture conditions and plant phenology, showed high soil moistures and slower than usual forage growth during early May. Turnout for the Pickett Butte and Collins Ridge Pastures was authorized for May 12, while turnout for Drew Creek and Divide Allotments occurred on May 17 and May 25, respectively.

The Forest maintains 17 permanent monitoring sites in the aforementioned allotments. These sites are located along perennial and fish-bearing streams, as well as in wetlands, meadows and

conifer plantations. Monitored use includes forage utilization, as well as impacts to vegetation structure, riparian areas and streambank morphology.

Monitoring is conducted to assess compliance with the Forest Plan Standards and Guidelines and to gather information for adaptive management applications. The Forest Plan contains a number of management prescriptions for regulating livestock use so that it is compatible with other resource values. The ROD provides utilization standards for implementing these prescriptions, which in turn become terms and conditions of the grazing permits. These use standards, as well as adaptive practices, are issued under the Annual Operating Instructions (AOI).

The monitoring results indicate that permittees were able to comply with the provisions of the AOI. As shown in the following tables all of the use standards were met. For the Drew Creek, Diamond Rock and Divide Allotments, the 2006 data, displayed in Table 3 was consistent with findings from prior years. This year marks the seventh full season of use for these allotments after the Forest reconfigured its historic range program on the Tiller Ranger District in order to continue to provide grazing opportunities, but within an environmental framework of moderate to low risks for resource impacts from livestock activities. This level of consistency demonstrates that the permittees for Drew Creek, Diamond Rock and Divide Allotments have developed a pattern of use that allows cattle to be successfully grazed. The level of success involved five years of adaptive management, including cooperation, good monitoring and skillful application of practices.

Table 3. Summary of Grazing Use at Monitoring Sites on the Drew Creek, Diamond Rock and Divide Allotments.

Monitoring Sites	Site	Type	Threshold (%)	2006 Actual Use (%)
Threehorn	Riparian	Forage Use [1/]	10	Not measurable
	Riparian	Vegetation Structure [2/]	10	<1
	Riparian	Streambank Stability [3/]	20	Not detected
RD 1615	Riparian	Forage Use	10	Not measurable
Crossover Meadows	Upland	Forage Use	25	Not measurable
	Riparian	Vegetation Structure	10	<10
Peavine Camp	Riparian	Forage Use	10	<5
B.Bates Meadow	Upland	Forage Use	25	<10
	Riparian	Vegetation Structure	10	<10
East Fork Cow Creek	Riparian	Forage Use	10	Not measurable
	Riparian	Streambank Stability	20	<1
RD 3201 MP 0.8	Riparian	Forage Use	10	<10
Lower Camp Creek	Riparian	Forage Use	10	Not measurable
Upper Camp Creek	Riparian	Streambank Stability	20	Not measurable

[1/] Forage use measures utilization by weight as compared to control plots.
[2/] Vegetation structure measures reduction in canopy cover of ground vegetation as compared to control plots.
[3/] Streambank stability measures the amount of bank instability, attributable to all causes, in key reaches.

The 2004 and 2005 monitoring reports noted increased cattle use at the Peavine Camp monitoring site based primarily on sightings and signs. These observations were verified by actual measurable use during 2006, supporting a trend of dispersal and use of high elevation areas within the Diamond Rock Allotment. Dispersing cattle in this manner distributes use among plantations; and also moves livestock use away from sensitive lower elevation wetlands and meadows within the allotment. One such area, a sedge wetland monitored at RD 3201 MP 0.8, also represents other wetlands in the Drew Lake area. There also has been acceptable use at the East Fork of Cow Creek monitoring site, which is situated below Peavine Camp. Cattle use in the

Peavine Camp area will continue to be a focus of management as an indicator of livestock dispersal to the outlying areas of this allotment.

The Range FEIS identified two sites for Survey and Manage species within the Diamond Rock Allotment. For *Cypripedium montanum*, it prohibited cattle use within a one-quarter mile buffer area surrounding the site to protect the species from grazing. Based on monitoring, there were no signs of cattle use within or near the buffer. The other species, the fungus, *Sparassis crispa*, had no required protection measures other than monitoring. No cattle use was detected at the site.

A third Survey and Manage species of concern with respect to livestock use, *P. arcticum crateris*, is not found on the Tiller Ranger District; but the FEIS required monitoring selected potential habitat because of its sensitivity to grazing and the localized nature of its habitat. A second monitoring site at RD 1615, established in 2002, within the Divide Allotment that encompassed a well-shaded seep and sedge community is being monitored for this purpose. There was no measurable use at this site in 2006.

The Forest first authorized livestock grazing at Pickett Butte and Collins Ridge in 2003, based on adaptive management. As noted in the Range FEIS, these pastures, along with Joe Hall, were delineated within existing allotments to reduce resource impacts by selecting for prime transitory range and minimal potential riparian conflicts. The adaptive management process is being applied to develop a pattern of use that conforms to the Forest Plan, as well as one that contains cattle to the pastures. As shown in the Table 4, the permittee was able to comply with the utilization standards during 2006.

Table 4. Summary of Grazing Use at Monitoring Sites on the Pickett Butte and Collins Ridge Pastures.

Monitoring Sites	Site	Type	Threshold (%)	2006 Actual Use (%)
RD 3113-110	Upland – TR [1/]	Forage Use [2/]	50	15-20
Branch Fence	Upland – TR	Forage Use	50	15
Branch Riparian	Riparian	Streambank Stability [3/]	20	<5
RD 3113-200	Riparian	Forage Use	10	<10
	Riparian	Vegetation Structure [4/]	10	<10
RD 2929 PP Meadow	Upland – Meadow	Forage Use	25	<15
Bullock	Riparian	Forage Use	10	<10
	Riparian	Vegetation Structure	10	<5
RD 2980-625	Riparian	Forage Use	10	<10
	Riparian	Streambank Stability	10	<10
Cedar Shelter	Riparian	Vegetation Structure	10	<10

[1/] Transitory Range
[2/] Forage use measures utilization by weight as compared to control plots.
[3/] Streambank stability measures the amount of bank instability, attributable to all causes, in key reaches.
[4/] Vegetation structure measures reduction in canopy cover of ground vegetation as compared to control plots.

The modified turnout pattern that was initiated last year at Collins Ridge was again implemented in 2006. This approach was devised to minimize cattle use of the lower elevation pine and oak meadows below the junction of RD 2929/2929-300 at MP 3.3; and to reduce cattle encroachment of a private tract in the lower part of the pasture. Turnout took place at MP 4.0 compared to MP 6.0 last year. This change in turnout location reflects another iteration of adaptive practices intended to find a reasonable pattern of grazing that balances protection of meadows with better utilization of transitory range within plantations along RD 2929, beginning immediately above MP 4.

Monitoring of the RD 2929 PP Meadow site, which represents livestock use of the meadow complexes showed utilization to be under 15 percent in 2006. This measurement compares to 10 percent in 2005; and 20 percent in 2004, when cattle were turned out below the junction and allowed to travel upslope along RD 2929. All use levels are within the 25 percent threshold allowed for upland meadows. While it was speculative following last year's use, it's becoming clearer that turning out cattle above the junction reduces the level of grazing in the meadows. This year's 15 percent use probably reflects a higher amount of drifting due to the lesser distance cattle need to travel between the turnout point and the monitoring site.

As mentioned above, the turnout pattern was also modified to minimize straying into a private holding accessed by RD 2929-249 at MP 3.0. Although Oregon State law and Douglas County ordinances regulate livestock grazing on private lands, the Forest attempts to reasonably adjust grazing practices to reduce conflicts, to the extent possible. This property has been annexed into the Douglas County Livestock District; and is presently classified as closed range. The landowner had experienced several instances of cattle encroachment during 2004, when cattle were turned out below the access road. This year's turnout took place about one mile above the RD 2929-249 junction, compared to three miles in 2005, but the results were quite similar. This approach eliminated early season straying and minimized those occurring later in the year. Based on conversations with the landowner, this year's encroachment occurred during the September 22 time period. Modifying turnout in this manner is intended to find a reasonable pattern of use that provides grazing opportunities while reducing resource and social conflicts.

Good forage utilization continues to take place within the commercial thinning units represented by the RD 3113-110 monitoring site, where 15-20 percent use occurred. At Branch Fence, use averaged approximately 15 percent. On Collins Ridge, Unit 9-6 near MP 4.0 experienced 40-50 percent use, while the ponderosa pine plantations near MP 8.0 showed 30 percent, as did grazing along RD 2929-500 at MP 5.0. Turnout is directed at these areas to utilize the abundant forage and to hold cattle in areas with little potential for resource conflicts.

For the fourth consecutive year, grazing use at the RD 3113-200 monitoring site fell within the thresholds for riparian forage use and vegetation structure. The extent of cattle impacts here is an indicator of the degree of grazing success for the Pickett Butte Pasture. The wetlands were significantly impacted under the historic program, but the permittee is currently minimizing cattle use through good herd management. Stubble heights were measured at 6-8 inches; and there was no grazing of grass regrowth in the fall. Region 10 EPA staff was satisfied with cattle use in this area during its 2005 visit. It will continue to receive management focus over the next several years to ascertain a reliable pattern of use.

In addition to the straying described above, there were several instances of cattle encroachment to a private residence along Jackson Creek Road. This property is adjacent to the Collins Ridge Pasture. There also was a straying incident involving a private residence on Devils Knob Road near the Pickett Butte Pasture. The Forest recommended to the affected landowners that they protect their interests by working with the permittees and Douglas County officials. The Forest is also engaging these parties to alleviate this problem.

To address the straying problems, the District and permittee will be discussing possible solutions when developing the Allotment Management Plan next year. Solutions involve increased herding effort, new water developments, additional supplement use, and selectively fencing along the pasture boundary.

Amendments

No amendments were identified for 2006.

Recommendations

- Continue to engage permittees to develop a common understanding of resource problems and common solutions to reduce risks.
- Continue to work with the permittee to develop adaptive solutions to resolve the straying problem in the Pickett Butte and Collins Ridge pastures.

Recreation

Element #25- Developed Recreation; Element #26-Dispersed Unroaded Recreation; Element #32- Oregon Cascades Recreation Area; Element #33- ORV Use; Element #35- Special Interest Area Condition; Element #36-Recreation Use in Dispersed Roaded and Unroaded Environments.

What monitoring did we do in 2006?

#25 Developed Recreation: Overall summer recreation use remained constant.

For the Tiller Ranger District, effectiveness monitoring was conducted. The demand for developed sites exceeds capacity on holiday weekends, summer weekends, and at some sites during hunting season. Use in Industrial Camps is primarily recreation use. Boulder Creek Annex Campground remained closed due to tree hazards associated with the 2002 wildfires, and a decision was made to relocate all the facilities to Three C Rock area.

For the Cottage Grove Ranger District, validation monitoring was conducted. The developed overnight campsites at Cedar Creek, Hobo, and Mineral continue to exceed capacity on summer holidays and most mid-late summer weekends. Capacity at Rujada was increased from 80 to 100 Persons at One Time (PAOT's) this fiscal year and use still exceeded capacity during holidays and some weekends. Public rentals continue to be popular and a highly desired recreation opportunity with seasonal reservations continuing to increase. Fairview Peak Lookout Rental was rented 100% of the 2006 available season and Musick Guard Station was rented approximately 38% of the season (48 days/125 day season).

Condition surveys were conducted on 100% of the Cottage Grove Ranger District recreation facilities. Solicited and received FY 2007 Payco funds to install traffic controls and mitigate resource impacts at four popular riparian dispersed sites along Brice Creek.

#26 Dispersed Unroaded Recreation: No area was surveyed on the Diamond Lake District. The North Umpqua RD reported little impacts from use in 2006 in dispersed unroaded recreation areas. Two condition surveys were conducted on the Tiller RD: (1) South Fork Cow Creek, and (2) Skimmerhorn. No change was reported. A MA1 Condition Survey was completed on the Cottage Grove RD in the Hardesty Area in 2006. Hardesty Way #1402 trailhead was relocated and constructed this fiscal year. A portion of the trail was abandoned which followed a steep fire line location, and a new route was constructed along the formerly closed 161 spur road. This lengthened the mileage and improved the trail experience. There were two small lightning fires located west of the trail near the viewpoint, but they had relatively no impact to the trail.

#32 Oregon Cascades Recreation Area: No specific surveys completed.

#33 ORV's: Summer ORV use was not formally monitored on the Diamond Lake District. On the Tiller RD the use and demand is low across the District, except during fall hunting season. Use is increasing. This element is being monitored through updates of the Forest Access and Travel Management Plan.

On the Cottage Grove Ranger District, trail use and condition is being monitored through annual trail condition surveys. Two Jeep Clubs continue to provide volunteer support to the 4 X 4 trails

of Noonday and Sultana Way #1405 including the "Junction City Jeepers" who continue to support the trail through the "Adopt-A-Trail program. The Cottage Grove RD noted that resource impacts are occurring in many areas in the Bohemia Mining District vicinity. Usage is expanding beyond the currently offered routes.

The Umpqua National Forest has started planning and implementing the National OHV Policy change. Finalizing existing condition is near completion. Scoping and NEPA is anticipated in 2007-2008 with implementation in 2009.

#35 Special Interest Area Condition: No use counts were conducted. Fee receipts and an ocular inspection indicate the visitor use was high during the summer. Condition surveys were completed on Fairview Creek OGG, Camp Comfort OGG and Cow Creek Gorge SIA.

#36 Recreation Use in Dispersed Roaded & Unroaded Environments: The Tiller RD reported that "Public contacts are not adequate due to budgets and lack of personnel. Vegetation impacts continue in riparian reserves, especially in the South Umpqua River corridor." No use counts were conducted. Intermittent weekend recreation patrols were funded and conducted on the Cottage Grove Ranger District.

What did we learn in 2006?

#25 Developed Recreation: The PAOT Days offered on the Diamond Lake District are reduced from historic levels, but similar to previous years. Summer recreation use remained constant.

The Fee Program is working on the Cottage Grove District, to the benefit of the management and improvement of federal developed recreation sites, as well as to the general public who benefits from the increased maintenance items at these smaller, less commercial sites.

#26 Dispersed Unroaded Recreation: On the Tiller RD the public contact is inadequate due to reduced budgets and lack of personnel. Vegetative impacts continue in the riparian reserves, especially in the South Umpqua River Corridor.

On the Cottage Grove RD, dispersed recreation use along Brice Creek continues to increase. Use along Sharps Creek is limited by the location of placer mining claims and use here remains fairly constant. Inadequate funding and personnel did not permit consistent O&M patrols or public education/information during 2006. Law enforcement is lacking as well, and therefore, resource impacts and degradation is occurring at most riparian dispersed sites along the Brice Creek corridors. Residency and illegal drug-related activities are common in the more remote dispersed/non-fee sites and therefore patrols by individual recreation personnel is avoided due to concerns for personal safety.

#32 Oregon Cascades Recreation Area: There is no indication of increased use, except during hunting season, and specifically the 1-2 week elk season.

#33 ORV's: Summer off-road use is increasing, especially during hunting season on the southern parts of the Forest. There is increasing demand for access to OHV routes from the Diamond Lake Recreation Area. The Winter Recreation Assessment and Use Guide for the Diamond Lake Ranger District was completed in 2006.

#35 Special Interest Area Condition: Visitor use remains high at the Umpqua Hot Springs. Fee receipts from the Recreation Pass help provide restroom and garbage services and patrols.

Based on method of monitoring and frequency, a condition survey was not completed for either Brice Creek OGG (formerly Lund OGG). A condition survey for Fairview Creek was completed.

Condition surveys on the Tiller RD were completed on the Camp Comfort Old Growth Grove and Cow Creek Gorge SIA.

#36 Recreation Use in Dispersed Roaded and Unroaded Environments: Due to reduced budgets and lack of personnel, public contact was inadequate in the South Umpqua River Corridor to enforce regulation of vehicle access management, vegetation impacts, human waste, and garbage violations.

Intermittent weekend recreation patrols were funded and conducted on the Cottage Grove Ranger District. A few sites (Gleason's Cabin and Cascade Bend) are more remote and therefore these two sites typically have more abuse the sites. Due to personal safety concerns, these two sites were not patrolled. Resource impacts to these sites are occurring as the result of no public sanitation or enforcement of wood cutting and off-road driving/parking.

Amendments

No amendments are recommended at this time.

Recommendations

- Generally continue with present management direction and monitoring efforts for all recreation elements.

Element #25:

- Monitor results on recreation use of the Implement the Diamond Lake Water Quality Final Environmental Impact Statement and Record of Decision.
- On the Tiller Ranger District, convert the Industrial Camps to Forest Camps. Plan for increasing the number of developed sites. Evaluate the resource impacts at the South Umpqua Falls Group Camp. Traffic controls and law enforcement is needed in the South Umpqua Falls Corridor. There is a need to designate day-use areas to reduce the human waste/water quality issues in the riparian areas.
- On the Cottage Grove Ranger District, continue to consider further improvements to Hobo Camp to mitigate resource damage and unplanned expansion. Continue management of the public rental programs

Element #26:

- Begin implementation of the Diamond Lake winter recreation use assessment.

Element #33:

- Continue with planning for the implementation of the new Forest Service policy on ORV use.

Element #36:

- Seek partnership funding and volunteer assistance for the Cottage Grove RD to improve trail/improvements and provide an appropriate interpretive plan.
- Consider an increase frequency of inspections to enforce "Pack-it-Out" policy.
- Seek opportunities for partnership to develop interpretive plans for these Special areas on the Tiller RD, interpretive plans are needed.

Soil and Water

Forest Plan Monitoring Elements:

Element FW121/NFSW 1 – Soil Productivity; Element FW121/NFSW 3 – Soil and Water Best Management Practices; Element FW121/NFSW 9 – Stream Temperature; Element FW121/NFSW 10 – Stream Sediment, Turbidity and Streamflow.

What monitoring did we do in 2006?

The Umpqua National Forest LRMP requires monitoring the use of Best Management Practices (BMP's) to protect Water Quality, stream temperature, turbidity and streamflow, and soil productivity. The data for stream temperature and turbidity are attached to this summary.

Best Management Practices checklists were written for 28 activities out of 30 ground-disturbing activities (93%) in 2006.

The Forest Plan identifies 29 streams to have temperature measured each summer on the Forest. Thirty streams with long-term records are reported in 2006.

Four (4) streams were monitored to show if turbidity is changing for winter flows of the same size. Turbidity and flow was measured on Layng, Steamboat, Canton and Boulder Creeks, and the North Umpqua Wild and Scenic River in 2006. The Forest Plan requires four monitoring sites. Streamflow data from the Oregon Water Resources Department is necessary for the analysis but is not yet available for the North Umpqua River for 2006. The North Umpqua turbidity analysis for 2006 will be included in next year's Forest Plan Monitoring Report. Layng Creek turbidity analysis for 2005 was not available for last year's report. Turbidity analyses for Layng Creek in 2005 and 2006 are presented in this monitoring report.

The Forest Plan requires Soil Productivity reports. One soil productivity report was completed for the Baked Apple fire salvage timber sales in 2006.

What did we learn in 2006?

BMPs are being implemented, according to checklists written for some timber sales and other activities that operated in 2006. Checklists were written for 93% of the projects we planned in 2006. Checklists were completed for three flood damage sites repaired under the Emergency Relief for Federally Owned Roads (ERFO) program. Checklists were also completed in 2006 for the Apple Crisp, Big Apple, Fried Apple, Last Apple, and Crab Apple timber salvage sales that followed the 2002 Apple Fire.

Completed checklists showed that most practices are implemented on those projects. Project inspectors make comments on completed checklists that help modify practices to make them more effective.

Stream temperature did not change, although 2006 maximum summer water temperatures were naturally warmer than the summer of 2005. The water temperature of Steamboat Creek, monitored since 1969, was 78 degrees Fahrenheit and among the 6 warmest years since then. Fish Creek was 5 degrees cooler in 2006, because under a new hydropower license PacifiCorp stopped diverting flow in summer for the first time since 1952.

No large streams on the attached graphs met the Clean Water Act and Oregon standard of 60.8 degrees Fahrenheit in summer 2006. Fish Creek met the standard of 64.4 degrees in effect upstream of Soda Springs dam. Cedar Creek, a 78-degree stream where shading riparian trees were all removed in the 1970's, is 10 degrees cooler today. High stream temperatures are a mixture of natural causes (some streams never were cooler than 60 degrees), and management causes (removal of trees shading the streams and salvage of down logs in the stream bed). Most

streams are naturally warmer than 60 degrees but are also warmer because of logging and channel disturbance.

Turbidity is not changing on the streams monitored, when compared to previous years during comparable winter flows. Long term monitoring of Steamboat, Canton, and Layng Creeks show that high turbidity in the 1970's has decreased in these streams. In some years, turbidity increased, and then returned to relatively constant levels. Turbidity monitoring of the North Umpqua Wild and Scenic River was measured by the US Geological Survey in 2006, but streamflow data for the North Umpqua River below Steamboat is not available yet. The analysis for the North Umpqua will be included in next year's report. On Boulder Creek (a designated Wilderness), turbidity and streamflow have been measured since 1993. The only bridge access to Boulder Creek stream gage and turbidity sampler was destroyed by a falling tree in 2003. The bridge has been replaced, and the turbidity analysis for 2006 is included in this report. Results show similar turbidity to 1993-2003. Turbidity of Layng Creek, the municipal water supply for the city of Cottage Grove, was higher in 2005 and 2006 than 2003-2004, and similar to the high turbidities measured in 9 of the 27 years since 1980. Turbidity in 2006 was within the range of variability since 1980, and lower than turbidity in 1977-1979 when concern over very turbid winter flows caused the annual monitoring program to begin.

Soil productivity monitoring shows how timber harvest practices maintain soil characteristics and organic matter, or recommend ways to improve them. The Baked Apple FEIS Soil Monitoring Report was completed in 2006.

In July and August 2001-2006, Diamond Lake experienced a five-fold increase in density of algae in Diamond Lake, and a dominance of *Anabaena flos-aquae* species. This alga can, and did, produce a neurotoxin that required closing Diamond Lake to water activities. Hydrologists have monitored Diamond Lake since 1992 (this is not an element in the Forest Monitoring Plan) but samples were only taken monthly during summer. This monitoring needs to be a part of the Forest Monitoring Plan. The Umpqua National Forest did weekly May-September early warning measurement of algae and public health risks at Diamond Lake from 2002 through 2006. In 2005 the Forest joined the Oregon Department of Human Services to carry out statewide guidelines for issuing joint public health advisories. Also, monitoring of the 2006 Water Quality Restoration of Diamond Lake began in November 2005, including (1) the flow of Lake Creek and drawdown of Diamond Lake, (2) water quality of Diamond Lake, groundwater around the lake, Lake Creek, and the North Umpqua River, and (3) aquatic life in Diamond Lake, Lake Creek and downstream. PacifiCorp, Oregon DEQ, and the Oregon Department of Fish and Wildlife are cooperating to document the lake restoration. Monitoring continued in 2006.

See Attachment A for graphs of stream temperature and turbidity.

Amendments

Soil and Water elements should be amended in the Umpqua LRMP Monitoring Plan. Districts cannot always write Best Management Plan Checklists on every ground-disturbing activity. One solution is to amend the plan to require that a sample of activities have BMP monitoring. The monitoring could be randomly assigned by the Forest Supervisor, and done on a standardized form for that activity (timber sale, grazing allotment, road construction). A draft BMP monitoring amendment was completed in 2006.

Forest Plan monitoring elements for landslides, public water supplies, cumulative effects analysis, and riparian shade measurements are no longer necessary and should be removed by amending the Plan. The Northwest Forest Plan limited harvest and other activities so that the thresholds in these elements are never reached.

Monitoring Elements FW121/NFSW 2, 5, 7, and 8 addressing the Forest Sediment Yield Model, Public Water Supplies, Cumulative Watershed Effects, and Riparian Vegetation effects should be eliminated from the Forest LRMP Monitoring Plan.

A Monitoring Plan Element should be added to monitor algae blooms and risks to public health on Diamond Lake, where potentially harmful blooms have occurred since 2001, and to keep a watch on Lake Creek, the North Umpqua River, and Lemolo, Toketee, and Hemlock Reservoirs where people swim or use lake water while camping. At a minimum, information should be posted at these and other recreation lakes to warn the public of potential risks from algae toxins.

Recommendations

- The Forest Plan should be amended to monitor BMPs on selected activities, remove monitoring elements that no longer apply, and add monitoring elements for blue-green algae in some lakes. Until then, the Monitoring Plan requires Best Management Practice Checklists on every ground-disturbing activity. Ranger Districts should continue monitoring in order to be in compliance with the Clean Water Act and our Memorandum of Understanding with Oregon DEQ.
- Almost all named streams on the Umpqua National Forest are warmer than the Oregon water temperature standard. These "water quality limited streams" need water quality management plans, and the Forest is working with Oregon DEQ to show that the Northwest Forest Plan protects water quality on federal lands. The data from water temperature monitoring provide baseline information so streams can be compared to water quality standards. Water temperature monitoring is part of Water Quality Management Plans under the Clean Water Act and should be continued.
- Turbidity and flow monitoring provides a long-term assurance that land management activities are not reducing the visibility in the clear waters of the North Umpqua Wild and Scenic River, that drinking water from Layng Creek is not more turbid for the City of Cottage Grove, and that Steamboat, Canton and Boulder Creeks provide suitable fish habitat. Turbidity monitoring in cooperation with the City of Cottage Grove has been important to answer questions about logging in the municipal watershed. When the City of Cottage Grove stops using Layng Creek at a water source, monitoring should stop. Until then, the monitoring should continue.
- Soil Productivity monitoring reports help soil scientists evaluate projects and share those results with the staff that plan ground-disturbing activities. The monitoring should continue and more soil science services are needed. The Umpqua has one soil scientist on the Timber Planning Team for planned harvest activities, and one soil scientist at Diamond Lake Ranger District to prevent, correct, and assess soil damage from all other activities (vegetation and fuel treatments, active timber sales, soil restoration, and past activities).
- Finally, aquatic monitoring of water quality and fish has the best record of Forest conditions, dating from adoption of the Umpqua and Northwest Forest Plans in 1990 and 1994. Some of this monitoring has been done for 30 years, and all is important to meet NEPA, the Clean Water Act, NFMA, and monitoring commitments to our partners. The Forest should give water quality and fish habitat and population monitoring the highest priority for funding with NFIM (Inventory and Monitoring) and other funds.

Timber and Vegetation Management

What monitoring did we do in 2006?

The Umpqua National Forest Land and Resource Management Plan requires monitoring of annual volume offered, stocking of plantations, accomplishment of reforestation, growth of managed stands, and other silvicultural activities.

What did we learn in 2006?

Reforestation during the 2006 period was concentrated in the acres burned during the 2002-2003 fire seasons, specifically the Apple, Tiller Complex, and Kelsay fires. Douglas-fir is the primary species planted although ponderosa pine, sugar pine and western white pine were also planted.

First-year seedling survival (Douglas-fir) is down to 57% from the 71% reported for 2005 (Table 5). Third-year seedling survival and success increased for the 2006 growing season.

Reforestation needs are being met from a number of funding sources including Title II dollars for animal damage control. Identified reforestation needs in the burned areas are anticipated to be completed in 2008 based on the level of funding from the Region. Currently there are 3,930 acres of reforestation needs identified.

The Forest continues to have a substantial backload of plantations in need of thinning, pruning, or other stand improvements. Current timber stand improvement needs identified are 24,447 acres. Timber stand improvement activities of release and precommercial thinning occurred on approximately 868 acres during fiscal year 2006 representing a decrease from 2005.

In 2006, the Forest sold 54.5 million board feet and had a very successful green timber sale program. Much of the volume sold in 2006 was again primarily a result of selling commercial thinnings on older plantations. As in the previous years, the Forest continues to move toward intermediate entries in those older managed plantations that present the opportunity for commercial thinning.

Table 5. Silvicultural activities in FY 2006.

Activity	FY 06
Acres planted during fiscal year	2,394 ac
Seedling survival after first growing season (previous year)	57%
Seedling survival after third growing season (planted 3 years prior to survey year shown)	86%

Amendments

No amendments are recommended at this time.

Recommendations

- Continue to closely monitor stock quality, production and handling practices to improve tree survival rates for Douglas-fir.
- Increase the internal leveraging of HF funds for mechanical fuels treatments in young stands needing stand density treatments.
- Prioritize pre-commercial thinning higher in KV Plans when opportunities are identified within sale areas to deal with a 20,000 acre backlog of PCT needs.

Transportation System

Elements #27- Transportation System Management; Element #28 – Road Construction; Element #29 – Road Closures

What monitoring did we do in 2006?

Element # 27 - Traffic volume on ten high-use sites was collected. Traffic data was collected for 2006. However, this data has yet to be reduced and analyzed for comparison with previous years. Road system mileage by maintenance level (ML) and use category was reviewed.

Elements # 28 and 29 - Road construction, decommissioning and reconstruction records were also checked, including whether there was new road construction in key watersheds.

What did we learn in 2006?

Element #27:

Table 6 is a summary of the miles of road by maintenance level in 2006 on the Forest.

Table 6. Road Miles by Maintenance Level.

	ML 1	ML 2	ML 3	ML 4	ML 5	Total Miles
Total	1,605.3	2,664.4	329.0	161.6	45.0	4,803.5
Subject to Highway Safety Act						535.6 (11.1%)
Not Subject to Highway Safety Act						4,267.9 (88.9%)

Amendments

Amend Forest Plan standards and guidelines for traffic management and Appendix F to reflect the current budget trends, NW Forest Plan Revision, and Forest scale Roads Analysis results.

Recommendations

- Element #27 - Produce an annual traffic monitoring report.
- Element # 28 and 29 - Continue monitoring road construction, decommissioning and reconstruction.

Visual Resources

Element # 30 - Visual Resource Condition

What monitoring did we do in 2006?

The Aesthetics Management Plan, completed in 2004 by PacifiCorp on the North Umpqua Hydroelectric Project, FERC Project No. 1927, as per the Settlement Agreement, continued to be implemented. Projects for fisheries enhancement, including rock augmentation into the North Umpqua River, the Clearwater Connect and the Soda Springs Dam Tailrace project were reviewed and monitored during design, contract and implementation. The landscape designs for Pacific Power's Toketee Administrative Site was reviewed and coordinated with the Forest for approval by cooperating parties.

Informal field monitoring was conducted in selected viewsheds across the Forest including the North Umpqua River Canyon, the Rogue-Umpqua National Scenic Byway, the Lemolo Lake and Diamond Lake Recreation Composites and in winter recreation use areas along major travel ways.

What did we learn in 2006?

The Visual Resource Condition across the Forest is largely unchanged from 2005. No major catastrophic events have occurred within the major viewsheds. The conditions of the fire damaged areas which occurred in 2002 and 2003 have changed slightly with limited fire salvage activity and follow-up planting. This will set the stage for long-term rehabilitation of these areas.

The 2002 wildfires continue to visually modify portions of the viewsheds on both the Tiller RD and the North Umpqua RD into 2006.

Scenic quality continues to be assessed during project planning efforts across the Forest. Emphasis on thinning strategies in forest vegetation has reduced some of the obvious visual quality conflicts typically associated with clear-cutting practices. Implementation of fuel reduction projects in the under-story of coniferous forests in wildland-urban interface areas, such as along the Myrtle Creek-Canyonville Tour Route, has had beneficial effects on scenic quality and enhanced the tour route experience.

The commitment of PacifiCorp to be a responsible company and sensitive to the environment was illustrated by their diligent and professional follow-through, in consultation with the Umpqua National Forest, to the Settlement Agreement for the North Umpqua Hydroelectric Project.

Generally the condition of the Umpqua National is in a natural appearing condition within scenic viewsheds, with the exception of forest fire areas that have occurred in the past five years. There are a few locations where human use has impacted scenic resources, such as the Bunker Hill area of the Lemolo Lake Recreation Area. The vegetative conditions of the conifers within the Diamond Lake and Lemolo Lake Recreation Areas are deteriorating due to insects and disease and down woody debris and have the potential to create huge deficits in the scenic conditions of those areas.

Amendments

No amendments are recommended at this time.

Recommendations

- Complete the Vegetative Management Plans for the Lemolo Lake and Diamond Lake Recreation Areas.
- Continue monitoring effects of the Diamond Lake Restoration Project implementation on visual quality for the Diamond Lake Recreation Area.
- Because of the heavily dissected terrain of the Forest and the complexity of viewing, consider completing an electronic "Seen Area" analysis using Geographic Information Systems to more accurately map and validate the visual mapping used in the Forest Plan for all sensitivity level one and two travel ways, use areas and water bodies.

Wild and Scenic Rivers

What monitoring did we do in 2006?

From May to September, river use is monitored 5 days per week through an MOU between the BLM and the Forest Service. Monitoring elements track recreation conflict, perception of crowding, total boating use, and campground use, all of which are recorded yearly.

What did we learn in 2006?

Boating use has stabilized at a near ten-year average use level (Table 7).

Table 7. Annual Comparison of Reported Commercial and Adjusted Use.

Year	Noncommercial Adjusted Use	Commercial Reported Use	Total Adjusted Use
1996	3,998	2,122	6,120
1997	4,702	1,994	6,696
1998	4,647	2,008	6,655
1999	4,502	1,905	6,407
2000	4,236	2,019	6,255
2001	3,378	1,704	5,082
2002	3,354	2,102	5,601
2003	3,614	2,384	5,998
2004	4,511	2,125	6,636
2005	4,229	2,130	6,359
2006	3,766	2,344	6,110

Craft and Boat Launch Use: Data was queried to show the types of watercrafts used to float the river. During the 2006 boating season, inflatable rafts outnumbered other crafts on the river (See Table 8).

Table 8. 2006 Comparison of Watercrafts Observed per Month.

Month	Raft	Hard Kayak	Inflatable Kayak	Canoe
May	42	16	27	0
June	216	80	64	12
July	377	152	239	5
August	243	104	225	8
September	23	12	53	7
Total	901	364	608	32

The data was queried to show a breakdown of the put-in areas and take-out areas. A new boat launch was installed at Boulder Flat and was the most heavily used put-in area (2,646 user days). The most frequent take-out area was Gravel Bin (3,711 user days).

Amendments

No amendments are recommended at this time.

Recommendations

- Continue present direction and monitoring.

Wilderness

Element # 31- Wilderness Condition

What monitoring did we do in 2006?

Boulder Creek and Mt. Thielsen Wildernesses: No patrols were reported for either the Boulder Creek Wilderness or Mt. Thielsen Wilderness.

Rogue Umpqua Divide Wilderness: Voluntary Registration forms are collected at Beaver Swamp, Fish Lake, and Skimmerhorn. In 2006, there were five wilderness patrols.

What did we learn in 2006?

Boulder Creek and Mt. Thielsen Wilderness: Overall use remains low in the Boulder Creek Wilderness and Mt. Thielsen Wilderness. Higher use is associated with the PCT trail and trails 1456 and 1459. No incidents of unauthorized use were discovered or reported.

Rogue-Umpqua Divide Wilderness: Use levels and patterns are stable, with some decline of use on Fish Lake Trail 1570, perhaps due to the effects of the 2002 wildfires.

Over 10 bags of garbage, plastic, rafts, inner tubes, and related items were packed out on pack frames. Six Incident Reports were filed for failure to remove garbage, unauthorized trail construction, theft of trail sign and OHV use on an access trail.

Encounters: The party size was exceeded at least three times by over-sized groups to the Fish, Cliff, and Buckeye Lakes areas.

Group Size: About 95% of lakes campsites exceed the 200 feet from water and trails standard.

Campsite Location: About 95% of campsites near lakes exceed the 200 feet from water and trails standard.

Campsite Density: The Primitive standard is an 80% probability of one or less campsites audible or visible within 500 feet. Patrols in the Lakes areas met this standard.

Livestock: No violations noted.

Waivers: One equipment waiver was issued for Search and Rescue at Fish Lake. Two were issued for fires in the upper Lonewoman drainage.

Coordination Meetings: None.

A total of 104 Voluntary Registration forms were filled out at the following trailheads:

- Fish Lake TH – 20;
- Skimmerhorn TH – 48;
- Beaver Swamp TH – 36.

Other: It is an ongoing challenge to keep people off of the rehabilitated campsite at Fish Lake.

Amendments

No amendments are recommended at this time.

Recommendations

- In the Rogue-Umpqua Divide Wilderness, Forest orders need to be considered for continued problems: lakeshore campsite set-backs, over-sized groups, use of wagons and carts, restoration site closure, and caching of personal property.

Wildlife, Plants and Threatened and Endangered Species

Resource Element - Sensitive Plants

Umpqua National Forest Plan Chapter V – 18, Table V-1; CT1/NFWF16 – Sensitive Plants and Animals

Umpqua kalmiopsis

What monitoring did we do in 2006?

Funding was not available to continue the monitoring of recovery of populations burned in wildfires although greenhouse germination and growth trials have continued at Oregon State University. Umpqua kalmiopsis (*Kalmiopsis fragrans*) occurs only on the Umpqua National Forest. Roughly a third of all known populations burned in wildfires between 1996 and 2002. Through a challenge cost share agreement with the Oregon Department of Agriculture's Native Plant Conservation Program, fire recovery of kalmiopsis was monitored in 2004-2005. Percent cover was evaluated through digital photography analysis using SigmaScan Pro5 software. The Oregon Department of Agriculture maintains raw data in their Corvallis office. The monitoring reports are available at the Umpqua National Forest Supervisor's office.

What did we learn in 2006?

Numerous nutrient and soil amendments were tested on germination of kalmiopsis but kalmiopsis grew in all of them without any stratification. This contradicts previous accounts of this species being difficult to grow from seed. It remains unclear why seedlings do not appear to be occurring naturally in the wild.

Recommendations

- The high fuel loading caused by mortality of knobcone pine at the Dry Creek site should be reduced. Fire recovery monitoring should continue until the rate of recovery can be determined. Potential for outplanting of seedlings into suitable habitat should be investigated.

Umpqua mariposa lily

What monitoring did we do in 2006?

The entire global distribution of Umpqua mariposa lily (*Calochortus umpquaensis*) is confined to serpentine soils in southern Douglas County. A Conservation Strategy for this species was completed and signed in 1995. A Conservation Agreement with US Fish & Wildlife Service, along with Roseburg and Medford Districts of the BLM was signed in 1997. Population trend monitoring was initiated in 1993 in a cooperative effort with the Oregon Natural Heritage Program and has been repeated annually since. Habitat improvement through prescribed burning as recommended in the Conservation Strategy was applied to 25 acres of one population in 2002. Population trend was monitored in both treated and untreated site. Data and analysis is maintained at the Supervisor's Office with copies at the Tiller Ranger District.

What did we learn in 2006?

Populations of Umpqua mariposa lily displayed a sharp downward trend in 2006 (Figure 2). There was a sharp decline noted by flowering plants in particular. A higher than usual amount of apparent seedlings was observed in 2006. Even though numbers are down this year, the overall population trend displays an upward tendency.

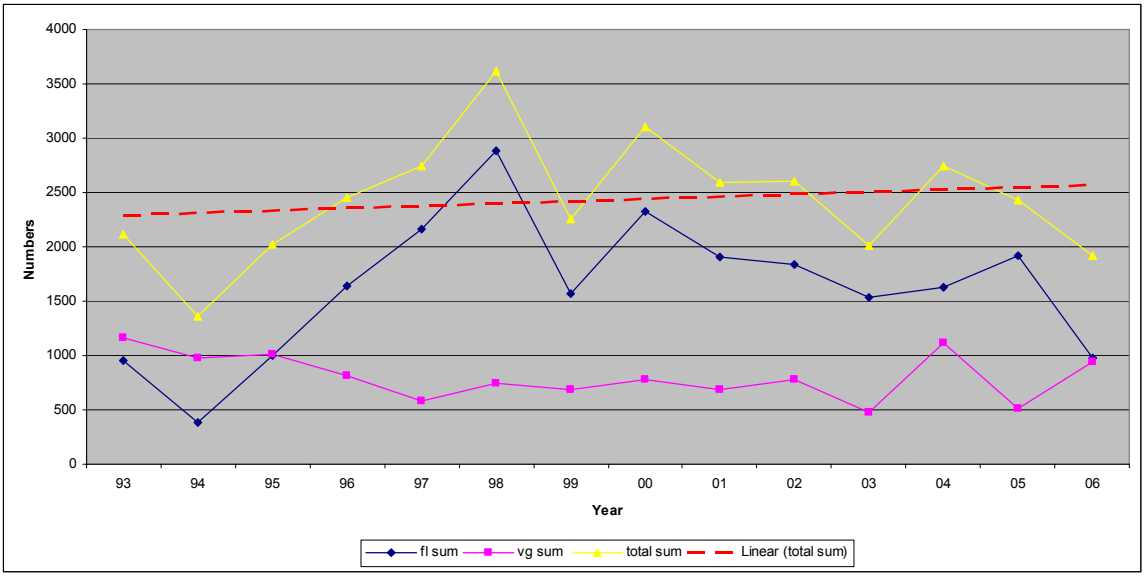


Figure 2. Population trend of Umpqua mariposa lily, 1993-2006.

Umpqua mariposa lily has responded positively to all treatments although the plots that were thinned but not burned have increased less than the controls (Figure 3). Total numbers of plants in the treatment plots are lower than the controls presumably due to competition (which was the target of the thinning and burning).

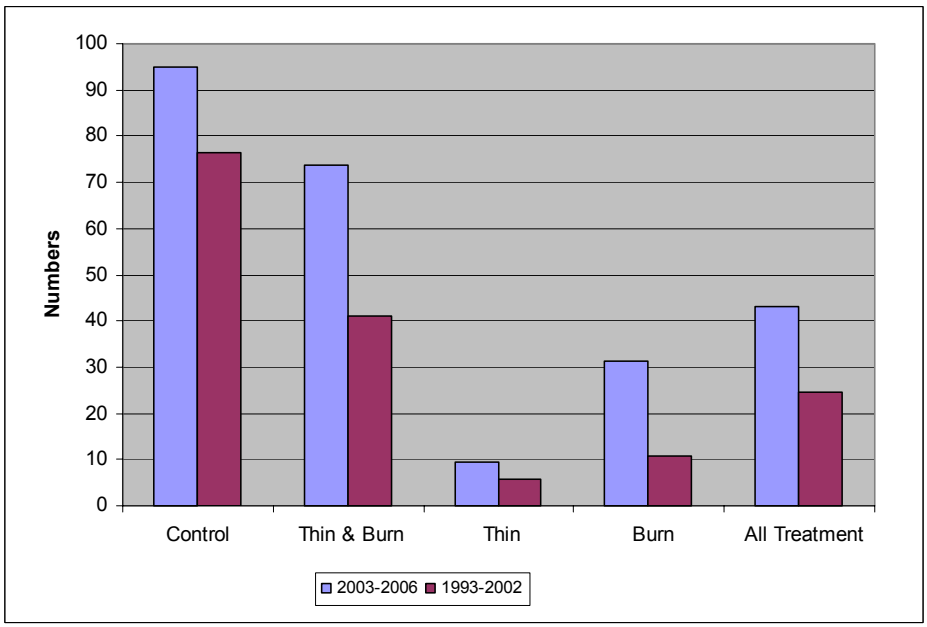


Figure 3. Umpqua mariposa lily, comparison of treatment vs. control plots.

Recommendations

- Current management and monitoring should continue as is. Future management of Umpqua mariposa lily habitat areas should be guided by results of continued monitoring. Treatments should be expanded to additional areas if monitoring continues to indicate a positive response.

Clustered lady-slipper

What monitoring did we do in 2006?

There is only one population of Clustered lady-slipper (*Cypripedium fasciculatum*) on the Umpqua National Forest. This one occurrence is in a campground along the North Umpqua River. Monitoring was initiated in 1993. Data and analysis is maintained at the Supervisor's Office with copies at the North Umpqua Ranger District.

What did we learn in 2006?

This year marked the fewest number of Clustered lady-slipper plants ever recorded (Figure 4). These data also continue to display a dramatic shift from a relatively equal percentage of flowering, non-flowering, and juvenile (small) life forms during the 1993-94 period to a population that is dominated by small, non-reproductive plants during the 2003-2006 time period (Figure 5). Individual plants have emerged from nearly the exact same location over this entire period suggesting that even the small plants that have been called juveniles may actually be quite old plants. The cause of the decline in reproductive effort is likely the result of either recreation damage or competition (or the combination). There has been little obvious damage from recreationists observed since 1998 when the campground was closed for the early spring season, suggesting that competing vegetation may be the primary factor. This is consistent with observed habitat relationships with this and other species of lady-slipper.

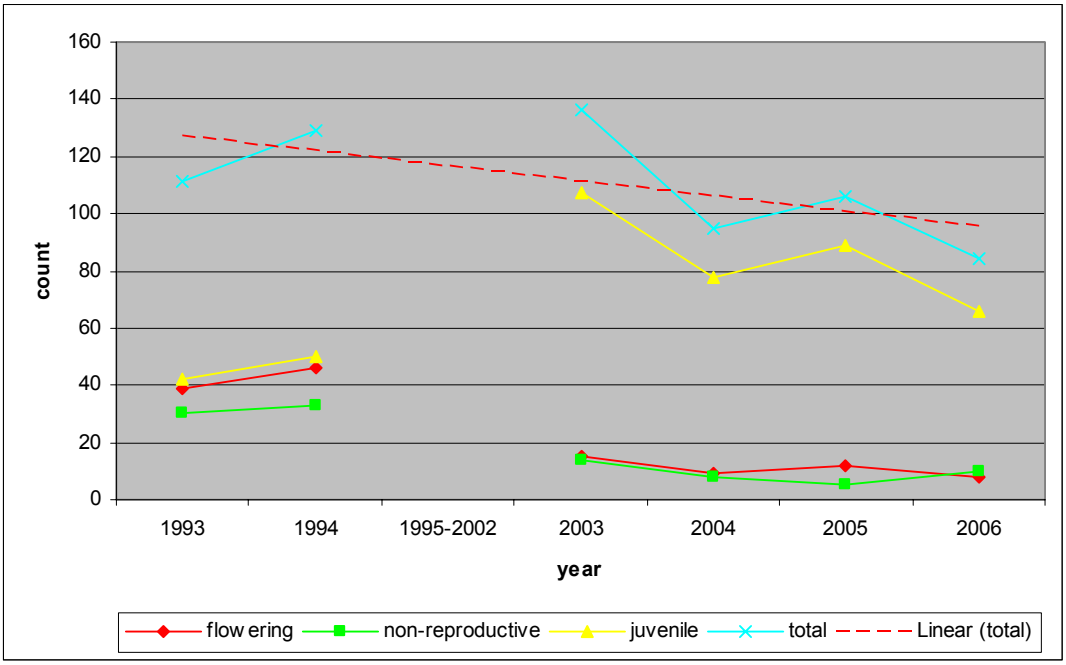


Figure 4. Population trend of clustered lady-slipper.

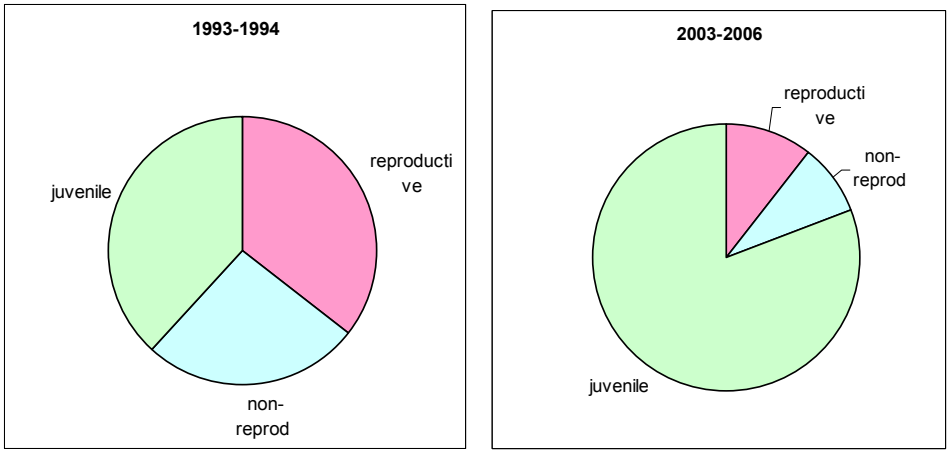


Figure 5. Demographic shift in the clustered ladyslipper population between 1993-94 and 2003-06 period.

Recommendations

- Habitat improvement potential should be investigated.

Umpqua swertia

What monitoring did we do in 2006?

Umpqua swertia (*Frasera umpquaensis*) occurs at scattered locations throughout Southwest Oregon and Northern California with the largest concentrations of this plant along the Rogue-Umpqua Divide. A multi-agency Conservation Strategy for this species was signed in 1993 and population trend monitoring was initiated in 1995 and has been repeated annually since. Data and analysis is maintained at the Supervisor's Office with copies at the Tiller Ranger District.

What did we learn in 2006?

The population levels for 2006 are above the ten year mean of 202.9 (SD= 61.4) and contributes to an overall slight upward trend (Figure 6). The incomplete data from 2002-2003 is not included within this mean. However, the species is exhibiting a statistically insignificant decline in forested (rather than meadow) areas. The number of flowering plants was higher in 2006 than expected since the species has exhibited a biannual flowering cycle on the odd-numbered years.

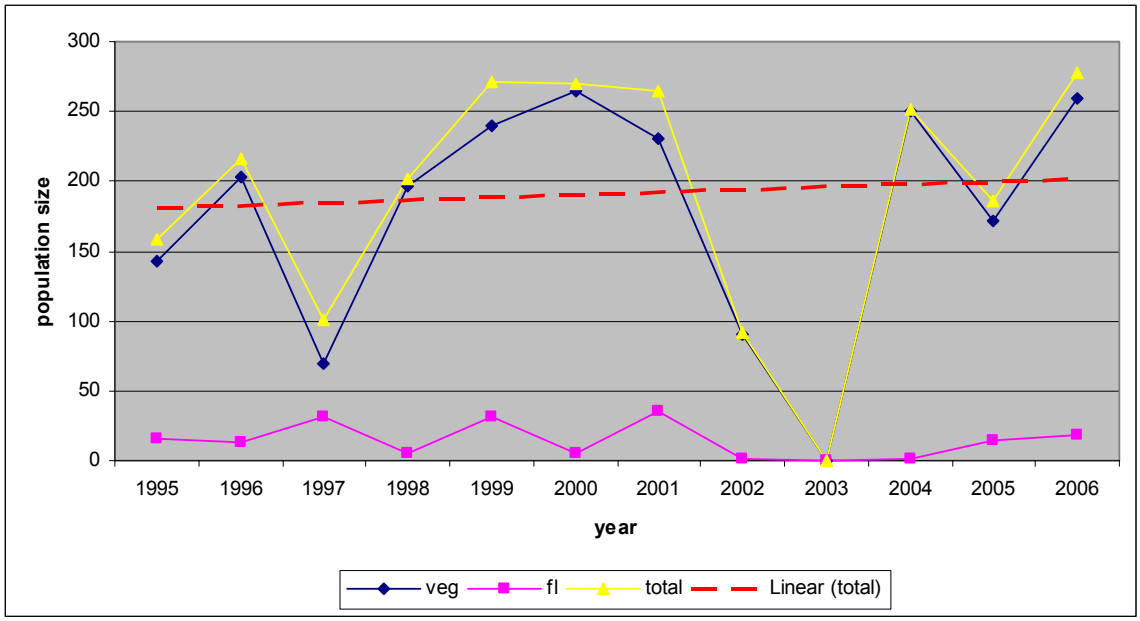


Figure 6. Population trend of Umpqua swertia, 1995-2006. Only half of the plots were sampled in 2002 and no plots were sampled in 2003.

Recommendations

- The multi-agency Conservation Strategy expired in 2002 and is currently in the process of being revised. Monitoring should continue to evaluate population trends although no immediate habitat improvement measures are indicated.

Tall bugbane

What monitoring did we do in 2006?

Tall bugbane (*Cimicifuga elata*) occurs sporadically from British Columbia south to Oregon. A multi-agency Conservation Strategy for this species was signed in 1996. Population trend monitoring plots for this species were established on the Umpqua NF in 1998 and have been repeated annually since. Data and analysis is maintained at the Supervisor's Office with copies at the Tiller Ranger District.

What did we learn in 2006?

Tall bugbane rebounded in 2006 following four years of depressed population totals (Figure 7). The overall population trend continues to exhibit a non-statistically significant decline over the nine-year monitoring period.

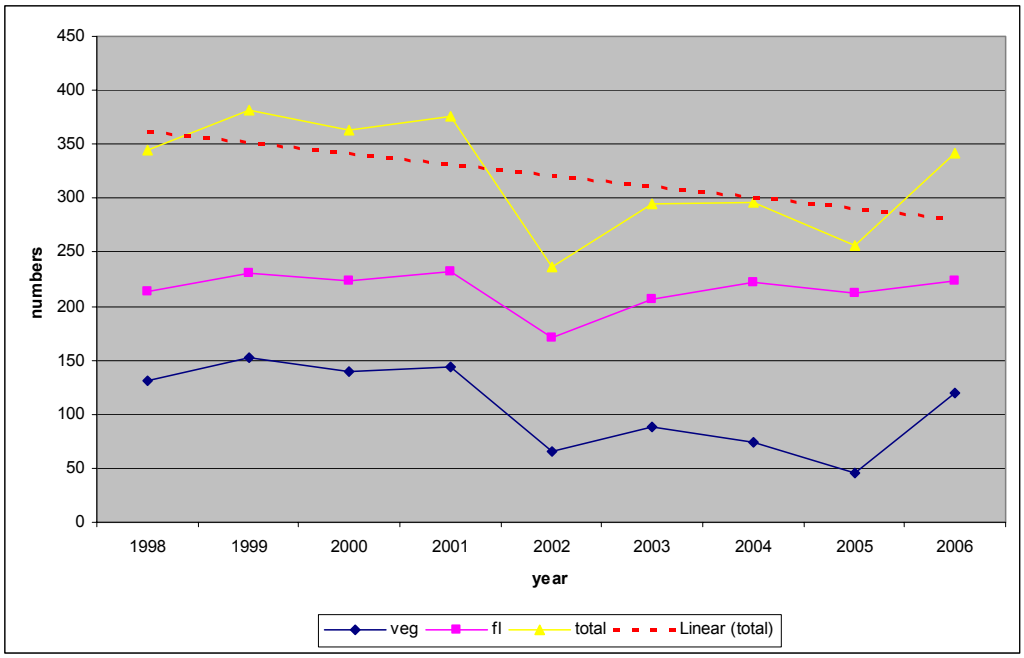


Figure 7. Population Trend of tall bugbane between 1998 and 2006.

Recommendations

- Current management and monitoring should continue as is. If monitoring continues to exhibit a decline in the population, the monitoring objective should be reconsidered to establish the cause of the decline.

Amendments

No Forest Plan amendments/revisions are identified for any sensitive plant species at this time.

Resource Element - Wildlife

Northern Spotted Owl

CT1/NFWF 14 - Northern Spotted Owl; Umpqua National Forest Plan Chapter V -16, Table V-1.

What monitoring did we do in 2006?

The second year of a five-year monitoring study was completed in Late Successional Reserve RO-222 on the Tiller Ranger District. This monitoring was proposed and funded by the USFWS to determine effects forest management activities designed to reduce fuels and thin stands may have on owls. The survey includes areas within the Straight, Dumont, Slick, Boulder, and Zinc Creek drainages as well as part of the South Umpqua River drainage. Surveys follow the protocol set forth in the Northern Spotted Owl Effectiveness Monitoring Plan for the Northwest Forest Plan (Lint et al. 1999).

What did we learn in 2006?

Spotted owl nighttime owl responses were inconsistent early in the survey period. Responses began to increase in June and July. Daytime follow-ups were unsuccessful due to unresponsive birds. Those that did respond appeared to be single birds as they showed little interest in the mice offered, often taking one, eating it, and then caching the next. None of the birds showed any

inclination to return with the mouse to a nest, nor did we hear any young or females in the distance. This seemed to follow the same pattern as last year.

Responses were heard in ten different locations within the study area. A paired response was heard in two locations and single responses were heard in eight locations. No nestlings or juveniles were observed this season. Barred owls (*Strix varia*) were heard at three locations during nighttime surveys. A pair responded in one area and two single owls were heard in two other areas. We did not investigate these locations in daytime follow-ups. Spotted owls are not as responsive to calls when they are not nesting or when barred owls are present.

Although data analysis is not yet complete, overall reproduction for spotted owls on Roseburg BLM lands adjacent to the study area indicates that reproduction was below average/well below average in 2006 (Rob Horn, personal communication). This is consistent with the results in our study area.

Recommendations

- Continue the survey for the remaining three years of the study proposal as defined in the scope of work provided by USFWS.

Blacktail Deer and Roosevelt Elk

CT1/NFWF 15 - Blacktail deer and Roosevelt elk; Umpqua National Forest Plan Chapter V – 18, Table V-1.

What monitoring did we do in 2006?

No NFIM dollars were available in 2006 to conduct monitoring associated with this resource element, NFWF dollars were used to coordinate with ODFW on their annual elk and deer census. This census covers a wider area than the Forest. The Forest utilizes the data from the Indigo and Dixon wildlife management units (Figure 8).

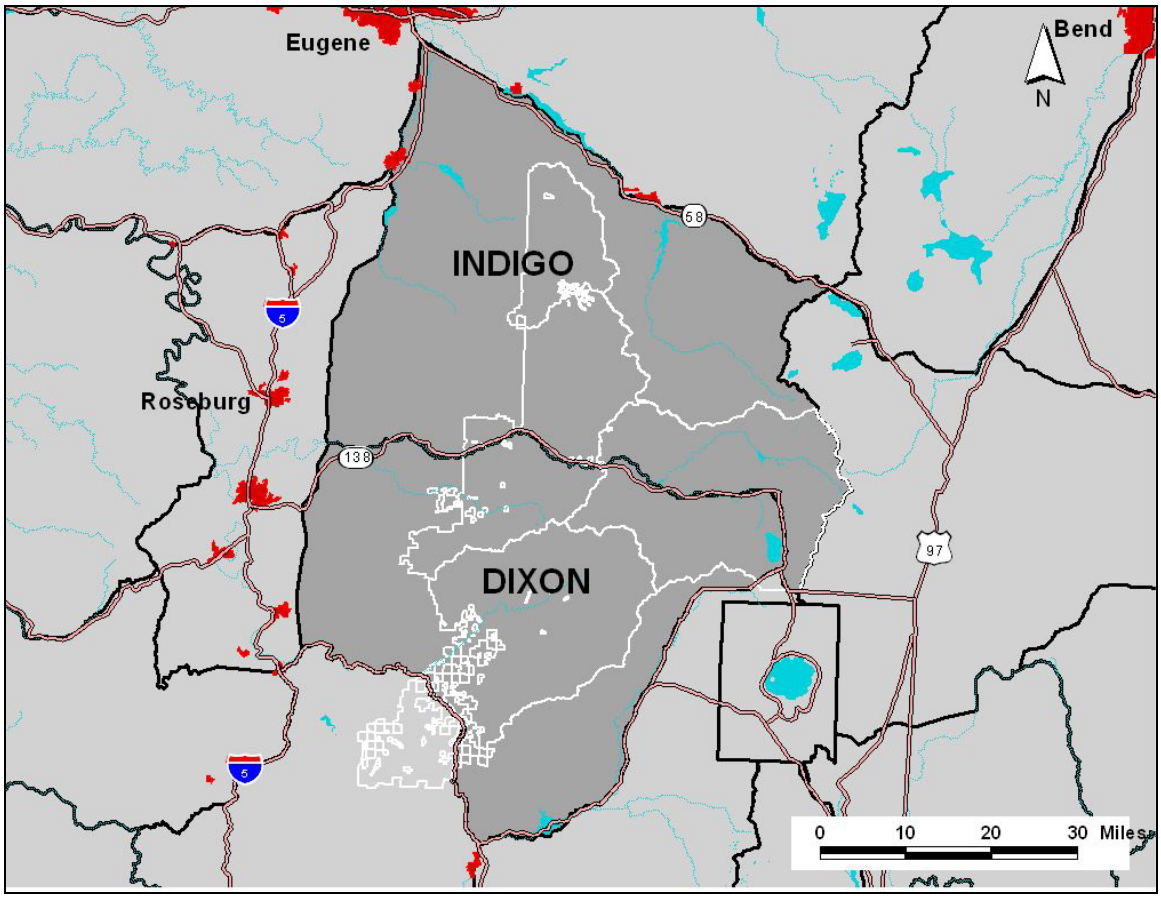


Figure 8. The Dixon and Indigo wildlife management units in relationship to the Umpqua National Forest.

What did we learn in 2006?

Elk trends appear to be declining, annual census data shows a more than 50% decline in the number of elk seen per mile of survey (Figure 9). This trend appears to be statewide, and is thought to be caused by decreasing amounts of forage habitat. Deer trend data provided by ODFW begins in 2002, the trend is also declining.

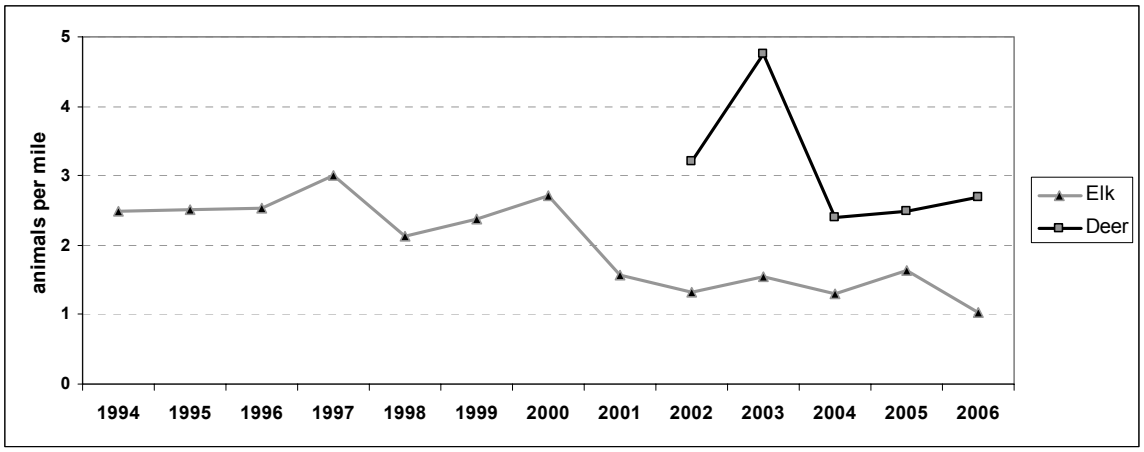


Figure 9. Deer and elk trends recorded from ODFW census data in the Dixon and Indigo wildlife management units. Data was averaged.

Recommendations

- Continue to coordinate with ODFW to monitor trends. Provide forage habitat where possible.

Resource Element - Sensitive Animals - Townsend's Big-Eared Bat

CT1/NFWF 16 - Sensitive Plants and Animals; Townsend's big-eared bat monitoring; Umpqua National Forest Plan Chapter V – 18, Table V-1

What monitoring did we do in 2006?

As no NFIM dollars were available in 2006 to conduct monitoring associated with this resource element, NFWF dollars were used to conduct annual exit counts in a collaborative partnership with ODFW. In previous years Townsend's bats have been monitored at three sites on the Forest. Because of the lack of funding, only one of our sites was monitored in 2006. In addition, micro-climate and bat activity data were collected for a gated cave on Diamond Lake RD. The gate of this cave was also monitored for vandalism.

What did we learn in 2006?

The main maternal colony site located on the North Umpqua RD was monitored through an exit count. This site has been monitored for 10 years (with the exception of 2002 due to wildfires). Results of this monitoring indicate the population is stable and this continues to be an important site for Townsend's bats (Figure 10).

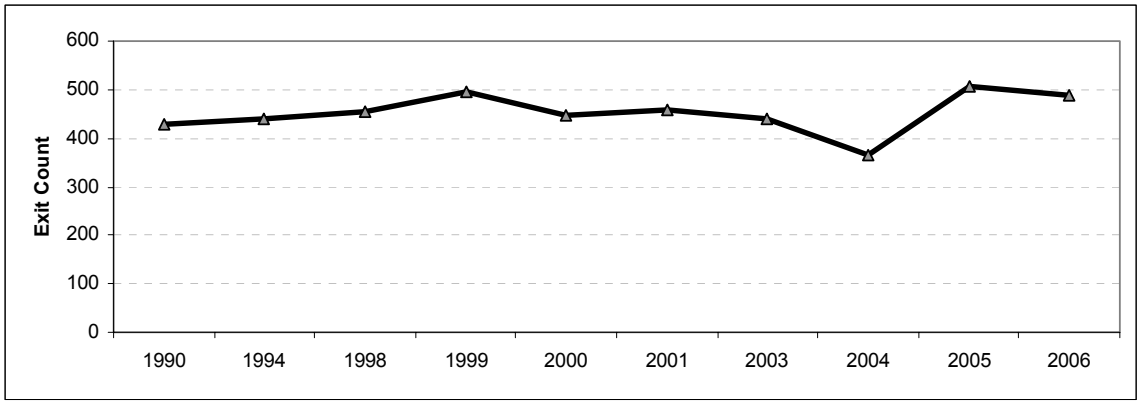


Figure 10. Annual exit counts for maternal colony on North Umpqua RD.

Micro-climate and bat activity data is not yet analyzed. The lock on the cave gate on Diamond Lake RD was cut and the interior of the cave had graffiti spray-painted on the walls.

A Forest-wide cave management plan has been completed that allows these sites to be protected, resulting in continued occupancy at these sites and the potential for successful reproduction.

Recommendations

- Continue to conduct annual exit counts to determine population trends.
- Conduct surveys of caves that have a high potential for occupancy by this species. Replace the lock at Diamond Lake with a sturdier type of lock.

Resource Element - Sensitive Animals - Western Pond Turtle

CT1/NFWF 16 - Sensitive Plants and Animals; Western pond turtle inventory and monitoring; Umpqua National Forest Plan Chapter V – 18, Table V-1.

What monitoring did we do in 2006?

Two areas were monitored. Telemetry tracking of seven western pond turtles was conducted at the city of Cottage Grove, in the East Regional Park for a collaborative project between the City of Cottage Grove and the Cottage Grove Ranger District. The other area monitored was a western pond turtle nest site at a heavily utilized recreation site on the Tiller Ranger District.

What did we learn in 2006?

The Forest is beginning to understand the use patterns of western pond turtles as they move between the network of ponds within East Regional Park and the Row River. This population provides a source for turtles that extend up the Row River, perhaps as far as the Forest Boundary. The site on the Tiller Ranger District was predated, most likely by raccoons.

Recommendations

- Continue monitoring the patterns of use of the pond turtles in the park so that the City of Cottage Grove will be able to make better management decisions on how to protect, improve habitat and educate the public about pond turtles. Continue monitoring to locate pond turtle nesting sites within the park so they can be protected from disturbance from the public and predators.
- Protect the Tiller site from predation and from habitat disturbance by the public utilizing the recreation site. Improve and restore habitat for the western pond turtle at this site. A proposal for this habitat protection project has been prepared.

Resource Element - Bald Eagles

CT1/NFWF 17 - Bald eagle monitoring; Umpqua National Forest Plan Chapter V – 18, Table V-1.

What monitoring did we do in 2006?

No NFIM dollars were available in 2006 to conduct monitoring associated with this resource element. NFWF dollars were used. All four known bald eagle sites on the forest were monitored. Pairs were observed at each site, three of the four sites were unsuccessful in producing young. One site produced one fledgling.

Artificial feeding platforms were placed in Diamond Lake prior to rotenone application. Forest personnel assisted ODFW and USFWS in this operation.

What did we learn in 2006?

All known sites continue to be occupied by bald eagles. Reproduction in 2006 was completely opposite from that in 2004 and 2005. Sites with successful reproduction in 2004 and 2005 were unsuccessful in 2006, and the site with successful reproduction in 2006 was unsuccessful in 2004 and 2005.

We documented the loss of an adult bald eagle at one of our sites and the assumption is that it was a member of the pair associated with that site. The cause of mortality was not determined. USFWS was notified and collected the carcass. Bald eagles continue to be observed along the North Umpqua River corridor. It is believed that a pair is nesting along the river corridor although this has not yet been confirmed.

Recommendations

- Continue to monitor all known eagle sites for occupancy and reproductive success.
- Conduct surveys along the North Umpqua River to confirm the probable nest location of the bald eagle pair utilizing the river corridor.
- Continue to coordinate with ODFW on supplemental eagle feeding at Diamond Lake.
- Update site management plans.

Peregrine Falcon Monitoring

CT1/NFWF 18 - Peregrine falcon monitoring; Umpqua National Forest Plan Chapter V – 18, Table V-1.

What monitoring did we do in 2006?

No NFIM dollars were available in 2006 to conduct monitoring associated with this resource element. NFWF dollars were used to monitor peregrine falcon sites.

Thirteen of fourteen known falcon sites were monitored in 2006; the exception was a site located in a wilderness area. A potential site where adult falcons have been observed in previous years was also surveyed.

What did we learn in 2006?

At least one peregrine falcon was observed at twelve of the thirteen known sites that were monitored (Table 9). Two sites that have fledged young in previous years were not occupied

although adult falcons were observed flying high over both sites. There was only one known site monitored where no falcons were observed.

There are two areas on the forest where falcons have been observed but occupancy by a pair has not yet been determined. One of these sites was surveyed once in 2006 with an adult falcon observed; the other site was not surveyed.

Table 9. Peregrine Falcon Monitoring for FY 2006.

PEREGRINE FALCON 2006		
Eyrie ID	**Status**	**Young Produced**
OE-002	Adult observed	Unknown
OE-003	Pair occupancy	Yes
OE-006	Pair occupancy	Yes
OE-033	Pair occupancy	Yes
OE-055	None observed	Unknown
OE-056	Pair occupancy	Yes
OE-064	Pair occupancy	Yes
OE-065	Pair occupancy	Inconclusive
OE-069	Adult observed	Unknown
OE-072	Adult heard	Unknown
OE-104	Pair occupancy	Yes
OE-117	Pair occupancy	Yes
OE-121	Pair occupancy	Yes

*Oregon Eyrie (OE) number is assigned by the regional peregrine falcon coordinator

Recommendations

- Continue to monitor all known sites annually to determine occupancy and reproductive status.
- Continue to develop a forest-wide falcon management plan with site-specific recommendations.

Pileated Woodpecker

CW1/NFWF 19 - Pileated woodpecker; Umpqua National Forest Plan Chapter V – 18, Table V-1.

What monitoring did we do in 2006?

Monitoring for this species was incorporated into broader monitoring for primary cavity nesters (see CW1/NFWF 21 below). No NFIM funding was provided for monitoring this Resource Element.

Pine Marten

CW1/NFWF 20 - Pine marten; Umpqua National Forest Plan Chapter V – 20, Table V-1.

What monitoring did we do in 2006?

No NFIM funding was provided for monitoring this Resource Element. However, Forest Service personnel cooperate with ODFW in conducting annual winter track counts in areas where marten occur. NFWF dollars were used. Five areas are monitored annually, as staffing, weather and snow conditions allow. These areas are:

1. Lemolo-Kelsay – located on Diamond Lake RD, east of Lemolo Lake to the Kelsay loop.
2. Mt Bailey – located on Diamond Lake RD, along the south and west slopes of Mt Bailey.

3. Warm Springs – located on Diamond Lake RD, west of Lemolo Lake outflow area up to the Calapooya Divide.
4. Huckleberry – located on the Tiller RD on the Rogue/Umpqua Divide
5. Skookum - located on Diamond Lake RD, near Skookum and Fish Mtn.

What did we learn in 2006?

Pine marten still occur on the Forest, with highest densities on Diamond Lake RD (Figure 11). They usually occur above 5,000 ft elevation.

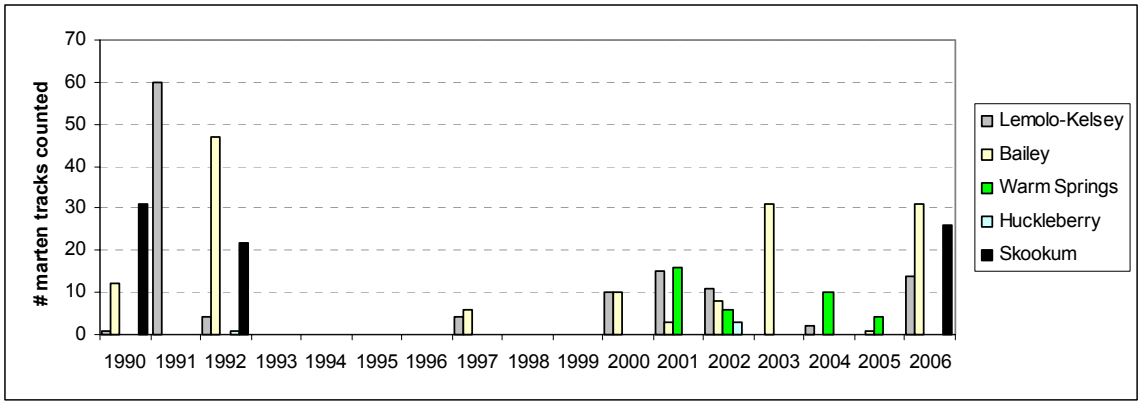


Figure 11. Winter track counts of pine marten on Diamond Lake and Tiller RDs.

Recommendations

- Continue to assist ODFW with winter track counts.

Primary Cavity Nester

CW1/NFWF 21 - Primary Cavity Nester; Umpqua National Forest Plan Chapter V – 20, Table V-1.

What monitoring did we do in 2006?

No NFIM dollars were available in 2006 to conduct monitoring associated with this resource element, NFWF dollars were used. Two areas were monitored for landbirds (including cavity nesters). One area was on the Diamond Lake Ranger District and the other in the Apple Fire (2002) area on the North Umpqua Ranger District. In addition to local monitoring, the Forest is beginning to utilize monitoring data from nearby Breeding Bird Survey Routes (Sauer, J. R., J. E. Hines, and J. Fallon. 2005. The North American Breeding Bird Survey, Results and Analysis 1966 - 2005. Version 6.2.2006. USGS Patuxent Wildlife Research Center, Laurel, MD). This national monitoring provides many years of trend data for this area.

Diamond Lake: Volunteers from the local Audubon Society conducted another year of annual monitoring of 11 routes on the Diamond Lake Ranger District. Six visits were completed for each route, for a total of 66 visits. Presence and abundance of bird species were documented.

North Umpqua: A Breeding Bird Survey (BBS) route was established within the area of the Apple Fire, with surveys conducted along the 21.7 mile route. This BBS route has been surveyed for four consecutive years, both post-fire and pre/post salvage logging (2003-2006).

USGS Breeding Bird Surveys: These surveys are an important source of information regarding population trends for cavity nesters (and landbirds in general) on the forest. These BBS routes are part of a large-scale survey of North American birds, which started in 1966. Each BBS route is surveyed once annually in June by experienced birders.

There are two BBS routes located entirely on the forest (Figure 12), while another four routes within 10 air miles of the forest boundary. Names and locations of these six routes are as follows:

- Clearwater – 25 miles on the Umpqua NF
- Cinderella – 25 miles on the Umpqua NF
- Days Creek – 4 miles west of the Tiller RD
- Sams Valley – directly south of Tiller RD
- Warner Mountain - 3 miles east of the North Umpqua RD
- Winberry – 7 miles north of the Cottage Grove RD

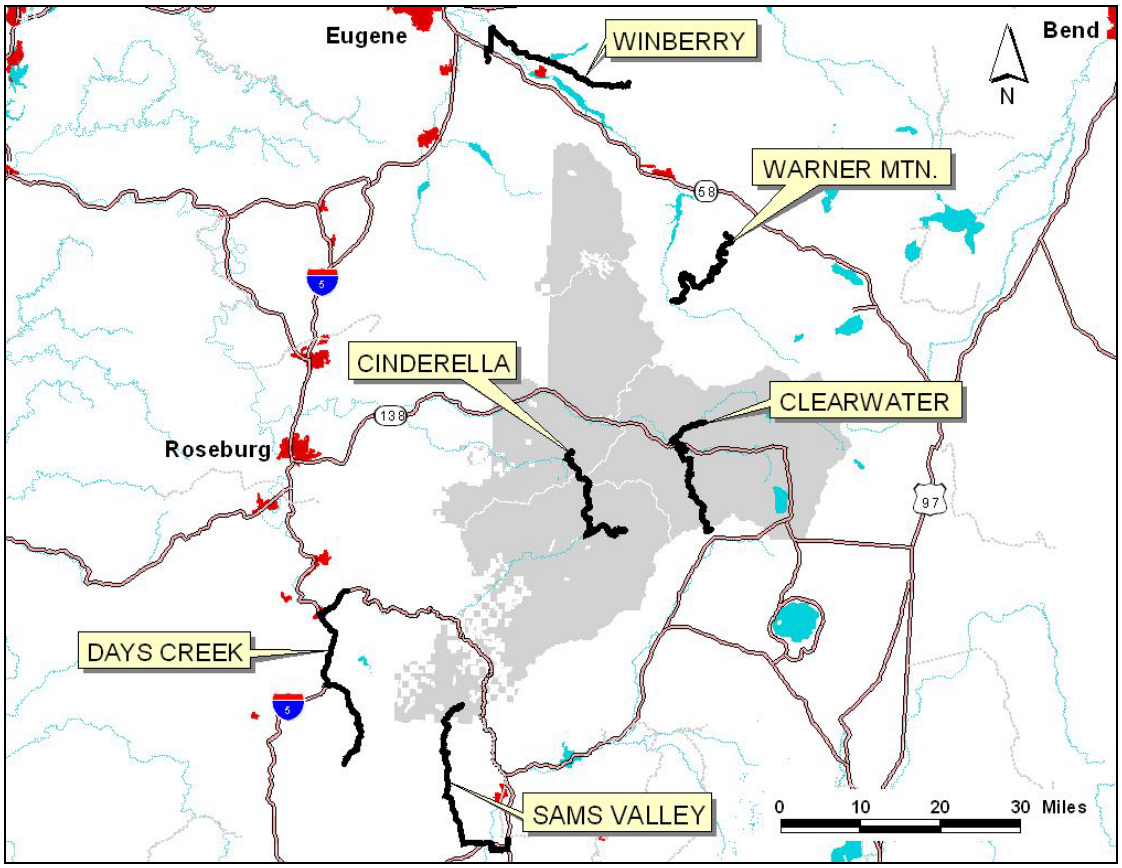


Figure 12. North American breeding bird survey routes on or near the Umpqua NF.

What did we learn in 2006?

The results of the Diamond Lake monitoring are currently being entered into a database and have not yet been analyzed.

To date, a total of 68 different bird species have been detected within the Apple Fire area. Species richness has remained stable. The June BBS annual species totals for the Baked Apple monitoring route have increased from 39 to 44 species. This is similar to the annual species totals from the adjacent Cinderella BBS route, which ranged from 42-49 with an average of 45 species for the 10-year period of 1993-2002. Red-breasted sapsuckers have decreased in the Apple Fire

area and have not been detected during the last two June surveys. Hairy woodpeckers responded positively to the fire and pulse of snags created by it. Flicker levels have remained stable and pileated woodpecker detections have decreased with no detections in last two June surveys (Table 10).

Table 10. Primary cavity nester monitoring data from the Baked Apple Fire monitoring.

Primary Cavity Nesters	1993-2002	2003	2004	2005	2006
Red-breasted Sapsucker	2	3	1	not detected	not detected
Hairy Woodpecker	3	5	7	9	3
Northern Flicker	6	4	5	4	5
Pileated Woodpecker	2	not detected	1	not detected	not detected

Information about cavity nesters has been collected for at least twelve years along the seven BBS routes. The current trends are shown in Table 11.

Table 11. Primary cavity nester monitoring data from local BBS routes.

Primary Cavity Nesters	Population Trends					
	Clearwater (1991-2005)	Cinderella (1993-2005)	Days Creek (1971-2005)	Sams Valley (1993-2005)	Warner Mtn (1992-2005)	Winberry (1968-2005)
Red-breasted Sapsucker	↓	↓	↓	↔	↑	↓
Acorn woodpecker	not detected	not detected	↑	↑*	not detected	not detected
Downy Woodpecker	not detected	not detected	↑	↓	not detected	↑
Hairy Woodpecker	↓*	↑	↔	↑	↓	↑
Northern Flicker	↔	↔	↔	↑	↔	↑
Pileated Woodpecker	↔	↔	↑	↔	↓	↑

↔ This symbol indicates a stable trend (≤2% change per year)
↑ This symbol indicates an increasing trend (>2% positive change per year)
↓ This symbol indicates an decreasing trend (>2% negative change per year)
* Statistically significant ($p<0.05$)

Pileated woodpecker and northern flicker populations appear to be stable at the forest-scale (Figure 13). Hairy woodpeckers are decreasing along the Clearwater route. Red-breasted sapsuckers trends are decreasing, but not statistically significant.

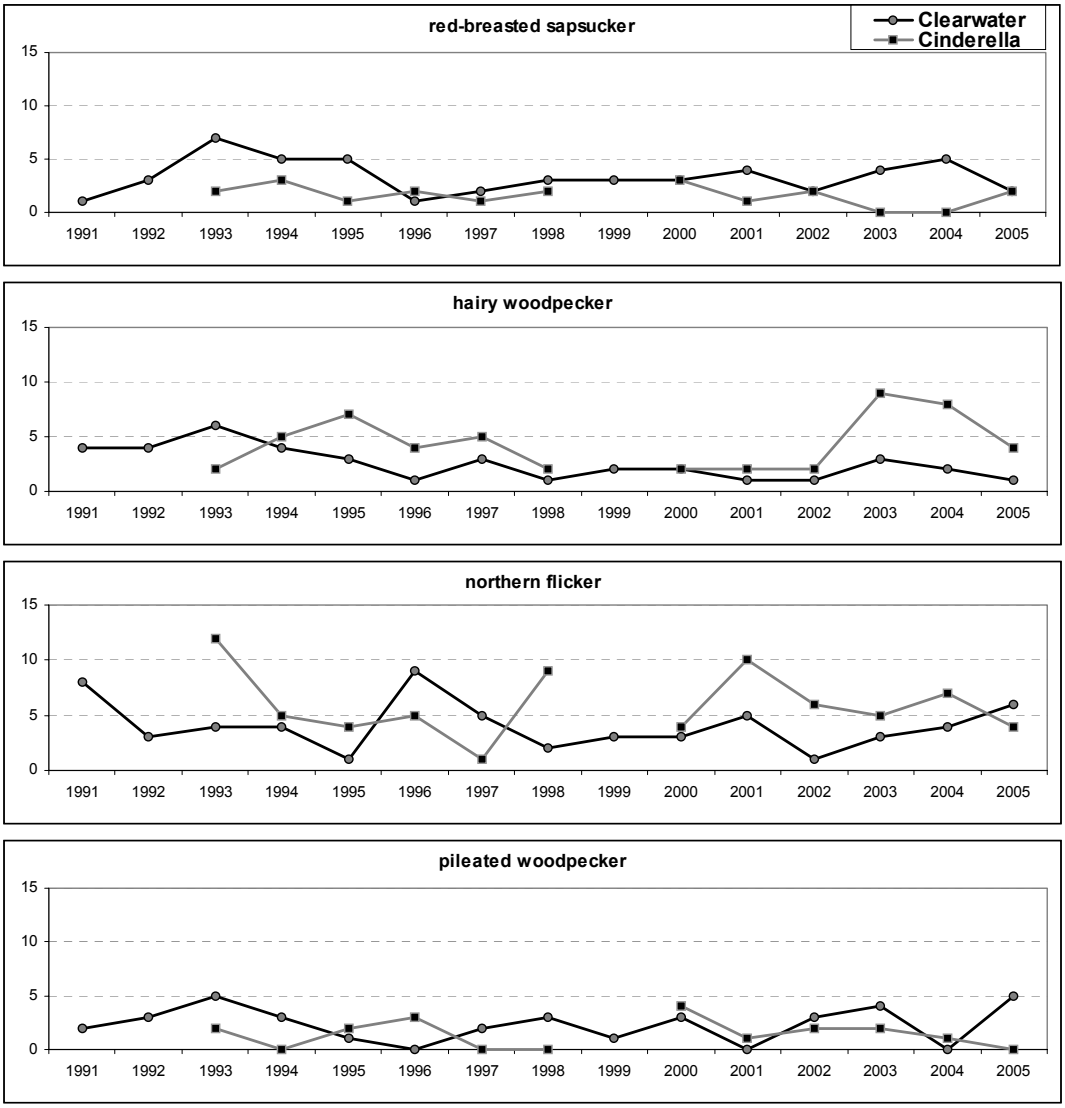


Figure 13. Primary cavity nester trends on the Umpqua NF.

Amendments

None at this time for any TES Wildlife Species.

Recommendations

- Continue monitoring long term trends from BBS data, where possible, continue project specific monitoring, such as the Baked Apple Fire Salvage monitoring.
- Encourage research community to focus their efforts on local studies that explore land management effects on land birds.
- Amend the Umpqua National Forest Plan to integrate new information and management recommendations outlined in DecAID and the Conservation Strategy for Landbirds in Coniferous Forests of Western Oregon and Washington.

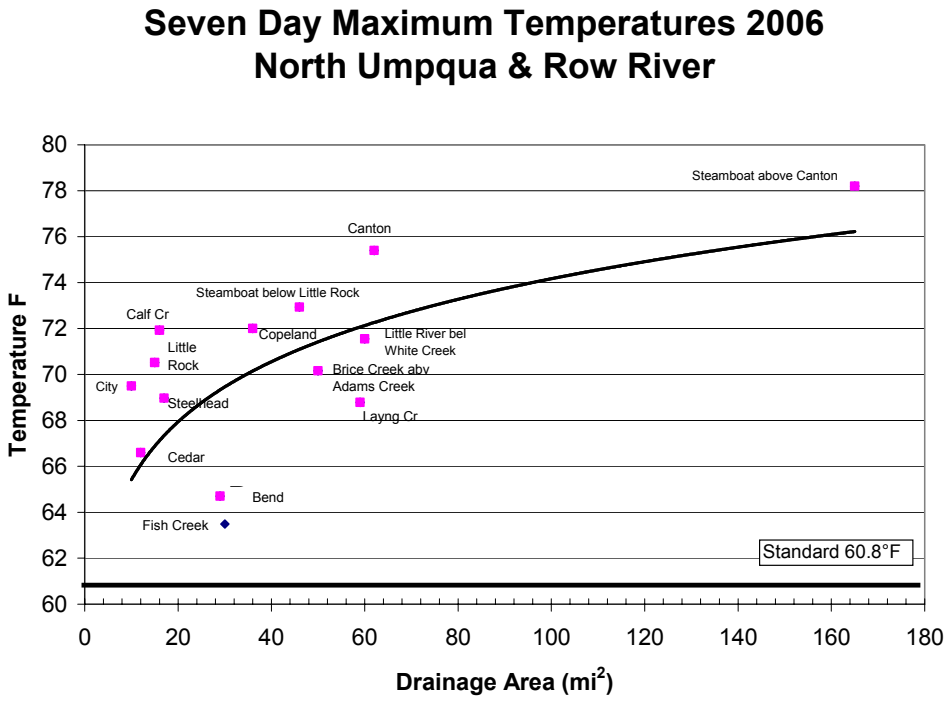
Appendix A - Attachments

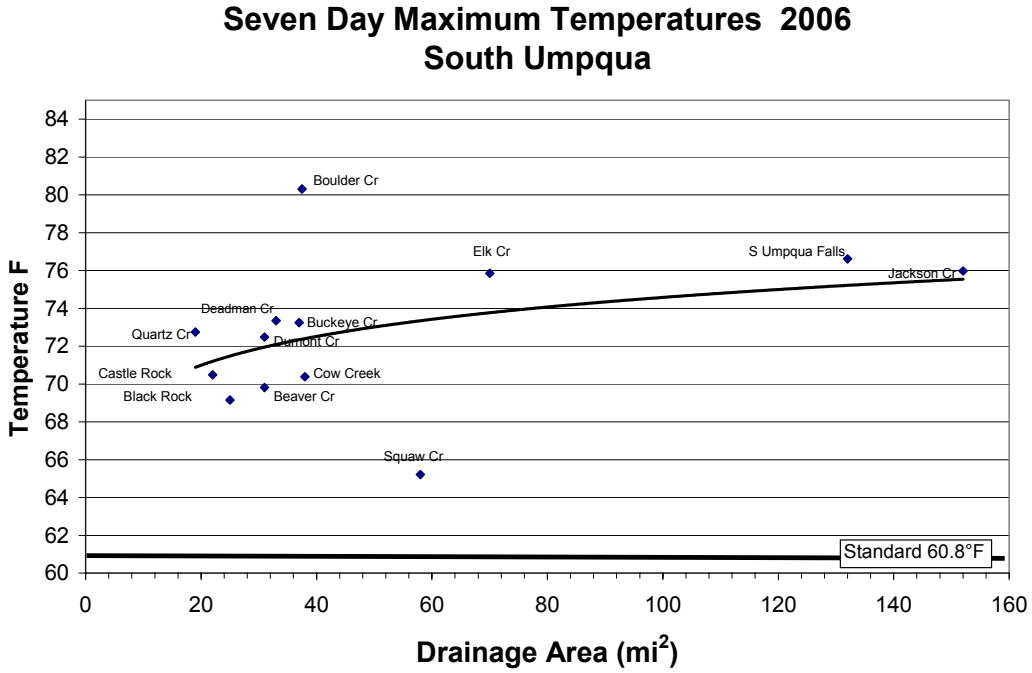
1. **Best Management Practices Table**
2. **Temperature Graphs**
3. **Turbidity Flow Graphs**

Fiscal Year 2006 BMP Checklists

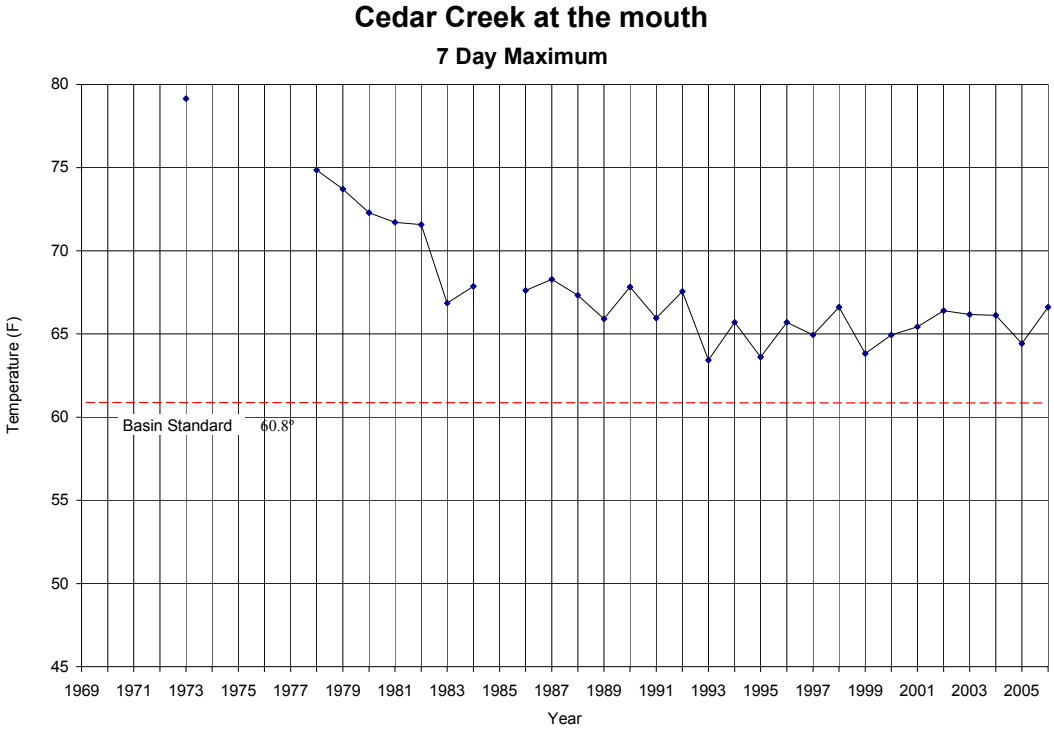
Ranger District	Environmental Documents signed For Ground-Disturbing	B M P C	Percent Wit Ch
Cottage Grove	0	0	-
Tiller	17	15	88%
Diamond Lake	8	8	100%
North Umpqua	3	3	100%
Timber Planning Team	2	2	100%
Forest	**30**	**28**	**93%**

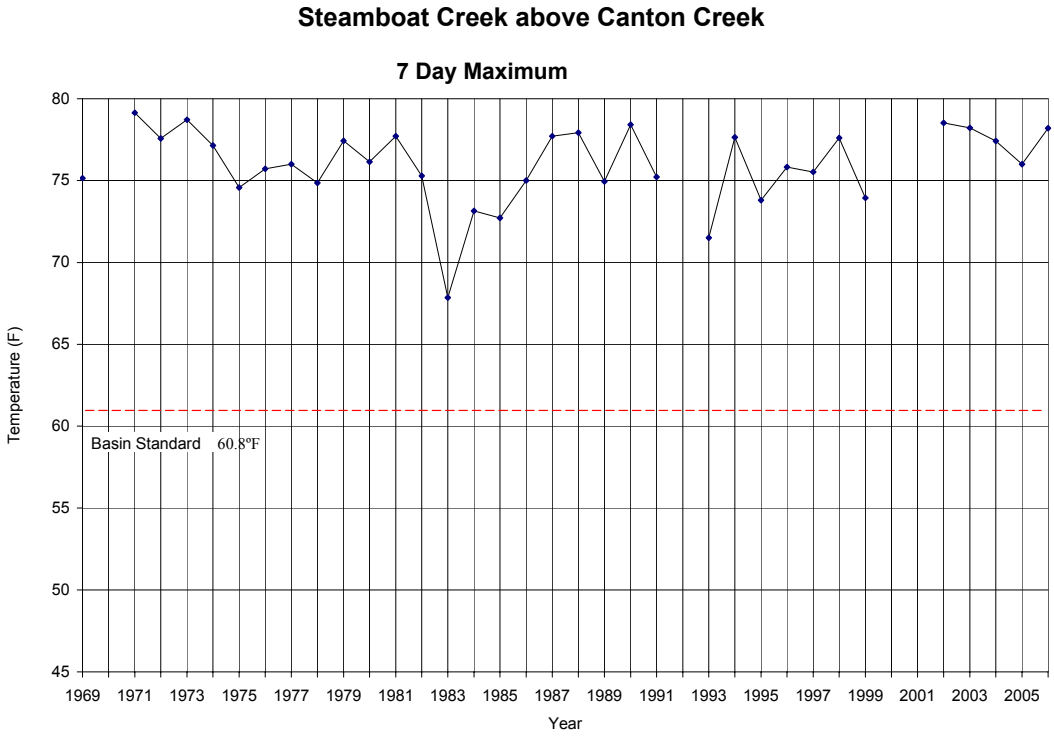
Temperature Graphs for the and North Umpqua, Row, and South Umpqua Rivers



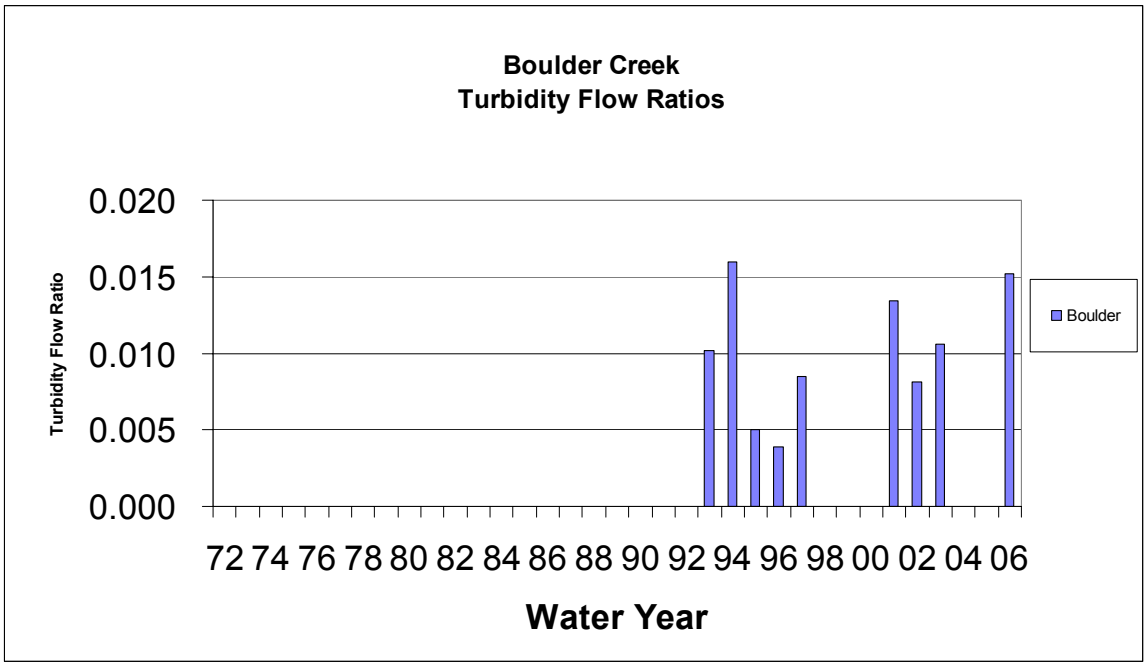


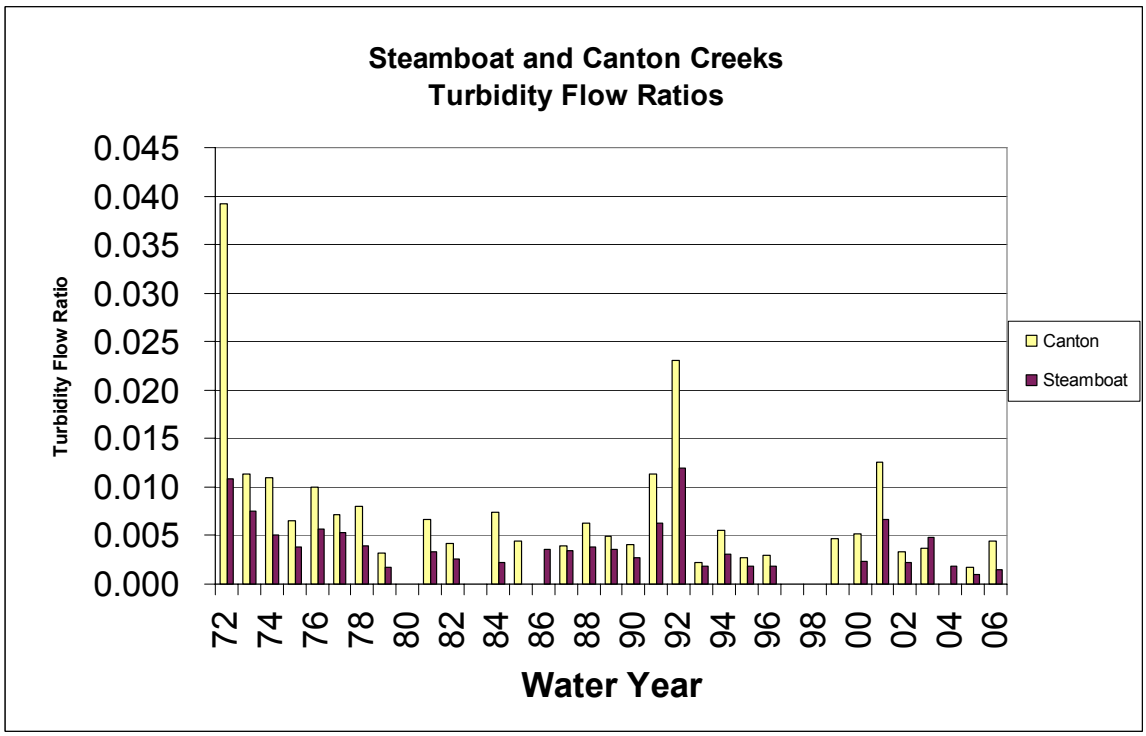
Temperature Graphs for Cedar Creek and Steamboat Creek above Canton Creek.





Turbidity Flow Ratio's for Boulder Creek, Steamboat Creek, Canton Creek, and Layng Creek.





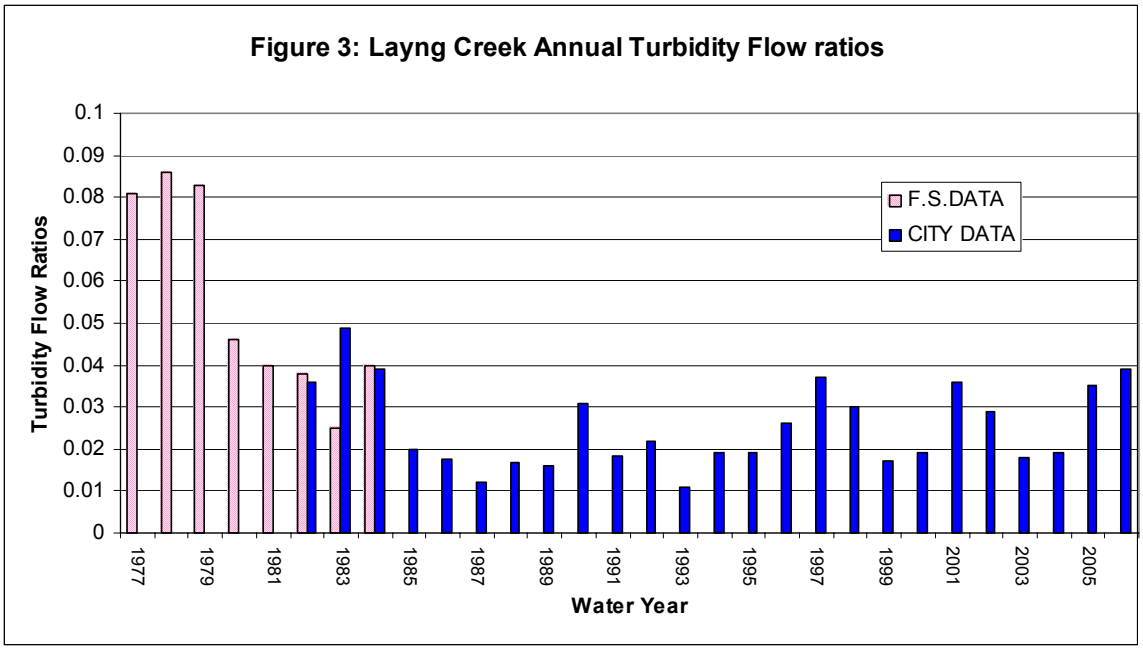


Figure 3: Layng Creek Annual Turbidity Flow ratios
Turbidity Flow Ratios
0.1
0.09
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0
F.S.DATA
CITY DATA
1977
1979
1981
1983
1985
1987
1989
1991
1993
1995
1997
1999
2001
2003
2005
Water Year