United States
Department of
Agriculture

Forest Service

Northern Region

FOREST PLAN
MONITORING AND EVALUATION REPORT
Fiscal Year 2006
Bitterroot National Forest

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INTRODUCTION

Introduction

The Bitterroot National Forest continued its well-established monitoring program and research collaboration in 2006.

The effects of the fires of 2000, 2003, and 2006 continue to influence and change the Bitterroot landscape. A bark beetle epidemic, re-energized by the drought and fire weakened trees, began to decline in severity in 2006, but still caused mortality well beyond the original burn perimeter. Streams and vegetation continue to adjust to the post-fire conditions with corresponding changes in fish and wildlife use, abundance, and distribution. Similarly, people's use and perceptions of the forest are influenced by these events, which in turn are affecting both local and national policies.

Forest Land and Resource Management Plans (Forest Plans) are intended to provide long-range management direction for each National Forest. Forest Plans provide guidance for balancing the physical, biological, and social components of forest management in the form of goals, objectives, standards, and guidelines. The Bitterroot Forest Plan was approved by the Regional Forester in September 1987.

In 2003, the Bitterroot National Forest, in conjunction with the Lolo and Flathead National Forests, initiated the process to revise its Forest Plan. Monitoring results from previous years are being evaluated through the revision process to determine how our Forest Plan direction should change. In 2005, a new planning rule was published which provided direction for a more streamlined, strategic, land management plan. The new planning rule instituted an important paradigm shift in the way plans are developed. A proposed Land Management Plan was released for 120 days of public comment in May 2006. The final plan is expected to be completed in 2008. In the meantime, we continue to operate under the 1987 plan.

As required by the Forest Plan, monitoring and evaluation provide a control system for Forest management. The results provide Forest line officers and employees, Regional and Washington offices, Congress, and the public information on the progress and results of implementing the Bitterroot Forest Plan. Forest Plan monitoring involves gathering information and observing management activities to document their effects on people and the environment. There are three types of Forest Plan monitoring:

- **Implementation monitoring** is used to determine if goals, objectives, standards, and management practices are implemented as detailed in the Forest Plan. In other words, did we do what the Forest Plan said we were going to do?
- **Effectiveness monitoring** is used to determine if management practices, as designed and executed, are effective in meeting Forest Plan standards, goals, and objectives. Did the management practice do what we wanted it to do?
- **Validation monitoring** is used to determine whether the data, assumptions, and coefficients used in the development of the Forest Plan are correct. Are the goals and objectives set by the Forest Plan valid?

Two other types of monitoring are presented for some resources. **Base line monitoring** establishes a basis for assessing change from current conditions, making comparison to future conditions possible. **Tracking** is useful as a way to report on the additional activities we are engaged in, such as numbers of wildfire ignitions and law enforcement incidents.

The Forest Plan monitoring requirements still provide the basic framework for the monitoring today. However, the actual monitoring techniques have evolved and improved over time to provide a more realistic, accurate, and efficient monitoring package to evaluate the effects of management. Some of the newer techniques do not fit the original framework as well as older techniques, but the format has remained unchanged to provide some continuity until the upcoming Forest Plan revision. There will be changes in monitoring at that time and it will likely be more consistent and comprehensive throughout the Northern Region.

For each resource discussed in this report we present the objective of the monitoring, the data source, frequency, acceptable level of variability, evaluation, and the results for the fiscal year (i.e., FY2006). The item number following most resource titles refers back to the Forest Plan monitoring item, found in Table IV-1 of the Plan (pages IV-6 through IV-9). The sections without item numbers are additional information we provide, but are not required Forest Plan monitoring.

The following is a partial glossary of acronyms found throughout this Monitoring Report:

- *BAR* Bitterroot Burned Area Recovery Project
- *BMP* Best Management Practices
- *BNF* Bitterroot National Forest
- *DEIS* Draft Environmental Impact Statement
- *EA* Environmental Assessment
- *EAWS* Ecosystem Analysis at the Watershed Scale
- *EIS* Environmental Impact Statement
- *ESA* Endangered Species Act
- *FP* Bitterroot National Forest's Forest Plan
- *FSM* Forest Service Manual
- *FWP* Montana Dept. of Fish, Wildlife and Parks
- *FWS* United States, Dept. of Interior, Fish and Wildlife Service
- *FY* Fiscal Year
- *GIS* Geographic Information System
- *HD* Hunting District
- *IRA* Integrated Resource Analysis
- *MA* Management Area
- *MBF* Thousand Board Feet
- *MMBF* Million Board Feet
- *NEPA* National Environmental Policy Act
- *NF* National Forest
- *NFMA* National Forest Management Act
- *RD* Ranger District
- *TMDL* Total Maximum Daily Load
- *TS* Timber Sale
- *USFWS* United States Department of Interior, Fish and Wildlife Service

Table 1 – List of Preparers

Resource	**Name and Position**
Administrative Appeals	Pete Zimmerman, Assistant Planner.
Fire Management	Rick Floch, Forest Fire Management Officer.
Fisheries	Rob Brassfield and Mike Jakober, Fisheries Biologists.
Insect and Disease Status	Sue Macmeeken, Silviculturist.
Law Enforcement	Jackie Clark, Law Enforcement Investigative Assistant.
Invasive Plants	Diane Bessler Hackett, Rangeland Management Specialist; Gil Gale, Range Management Program Manager.
Recreation	Sue Heald, Planning & Recreation Staff Officer
Research Needs	Sherry Ritter, Bitterroot Ecosystem Management Research Project
Riparian Condition	Rob Brassfield, Mike Jakober, Fisheries Biologists.
Roadless Areas	Sue MacMeeken, Silviculturist.
Road Construction and Mitigation	Jacob Pintok, Transportation Engineer.
Soils	Cole Mayn, Soil Scientist and Terry Carlson, Hydrologist.
Watershed	Ed Snook, Marilyn Wildey, Hydrologists.
Wildlife	Dave Lockman, Dave Romero, Wildlife Biologists.

Coordination: Pete Zimmerman, Forester/Assistant Planner / Ken Hotchkiss, Planner

Review: Sue Heald, Planning & Recreation Staff Officer

Approval: David T. Bull, Forest Supervisor

TERRESTRIAL ECOSYSTEMS

Management Effects on Soils
Item 31

OBJECTIVE: Determine the effects of timber sale activities on soil productivity. The effects monitored include: soil compaction, displacement, and puddling; and severe burns.

DATA SOURCE: Soil inventory and site inspection prior to and after treatments on activity units.

FREQUENCY: Annually, 25 percent of completed projects per year.

REPORTING PERIOD: 2006

VARIABILITY: More than 15 percent of the activity area detrimentally affected (total accumulation of detrimental compaction, displacement, puddling, and severely burned soil).

INTRODUCTION:

The soil quality evaluations were conducted to determine the effects of management activities on soil productivity as required by the BNF Forest Plan and Region 1 Soil Quality Standards (SQS). To accomplish this task, soils were evaluated against definitions and guidelines provided in the BNF Forest Plan as well as the Forest Service Manual (2550, Amendment No 2500-90-2 and Region 1 Supplement 2500-99-1) and Handbook (2509.18 WO Amendment 2509.18-91-1 and Region 1 Supplement 2509.18-2005-1). Part of the objective was to determine if the unit being monitored exceeds the Region 1 SQS of 15% aerial extent of Detrimental Soil Disturbance (DSD). It is important to consider the 15% as a trigger point at which more in-depth soil quality evaluations would be conducted and soil amelioration is considered to move toward a net improvement in soil quality.

There are 2 sets of factors to review when evaluating soil quality. The first set is a determination of DSD. By definition, DSD includes (1) compaction in which the bulk density has increased by 15%, non-ash and ash soil respectively, above natural conditions; (2) rutting where wheel ruts are at least 2 inches deep in wet soils; (3) displacement with the removal of 1 inch or more of any surface horizon in a continuous area greater than 100 square feet; (4) severely burned soil; (5) surface erosion; and (6) any mass movement. The presence of these factors may indicate site impairment or soil productivity issues.

The second set of factors evaluated includes the site productivity indicators of: soil type, soil horizon thickness, the depth and type of duff and litter, the percent and type of ground-cover, native or non-native vegetation, root density and extension into the soil, soil-water interactions (infiltration rate, hydrophobicity), and stream channel conditions.

Soil quality evaluations were conducted for this report (2006) on harvest units using ‘Howes’ methodology (2002). The original 6 rating categories were modified by grouping them into 4 with one detrimental category. This method consists of ocular observations of the ground surface and vegetation combined with shovel probes and small soil pits to examine soil structure and root abundance and penetration. Each ocular observation is recorded on a field data sheet along with notes related to the point. The units were traversed in a random fashion to obtain a representative sampling of soil conditions. The shovel probe estimate was calibrated by digging and probing in a nearby reference area that showed no sign of previous entry.

EVALUATION:

The following table is a summary of the 2006 post-activity soil quality surveys conducted on the BNF using the 'Howes' method. Note That the results indicate the amount of new or additional DSD created following an activity. These figures are independent of the existing soil quallity conditions on the site.

Table 2 – Percent New DSD By Harvest Activity

Harvest Activity	# Sites Monitored	Avg. % New DSD	Data Range %
Summer Tractor	3	1%	0-2%
Winter Tractor	1	0%	<1%
Summer Skyline	2	0%	<1%
Helicopter	3	0%	<1%
Cut to Length with Forwarder - Summer	1	4%	0-4%

The 2006 BNF monitoring has shown that:

- **summer tractor** if administered properly during dry soil conditions can result in limited detrimental soil disturbance, less than 2% for the units monitored;
- **winter tractor** is very effective at minimizing detrimental soil disturbance, with no new DSD noted in the unit monitored;
- **summer skyline** results in no measurable increase in DSD;
- **helicopter** results in no measurable increase in DSD; and
- **cut to length with forwarder** is effective at preventing DSD as long as a consistent slash mat is available to operate the forwarder on; 4% new DSD was created in areas where the slash mat was inadequate.

Careful administration of these sales minimized the potential disturbances to soil resources.

MONITORING TO DETERMINE THE EFFECTS OF TIMBER SALE ACTIVITIES ON SOILS

Pre-Activity Soil Monitoring Surveys

Pre-activity soil monitoring was conducted to determine baseline soil conditions. The data are used to assess existing condition and affected environments during the planning process.

Table 3- Existing Soil Condition Surveys

Project	Results
Gash Fire Salvage CE	Existing soil conditions meet Region 1 SQS. Units are proposed for summer ground-based and skyline harvest. Mitigations will be implemented to rehabilitate ground-based units (Units 1 & 8) where mineral soils are exposed. All units will be well within Region 1 SQS (< 15%) following activities.
Lost Trail Salvage CE	Existing soil conditions meet Region 1 SQS. Units are proposed for helicopter and skyline harvest. Minimal disturbance is expected in the units. The majority of soil disturbances are anticipated to occur at helicopter landings, which are part of the FS road system. All units will be well within Region 1 SQS (< 15%) following activities.
West Tolan CE	Existing soil conditions meet Region 1 SQS. Units are proposed for helicopter harvest. Minimal disturbance is expected in units. The majority of soil disturbances are anticipated to occur at helicopter landings. All units will be well within Region 1 SQS (< 15%) following activities.
Springer II EA	Existing soil conditions meet Region 1 SQS on summer ground-based and skyline salvage units. These units will be well within Region 1 SQS (< 15%) following activities. Two prescribed burn units have DSD > 15%. DSD in these units will not be increased by the burning.
Lil Lyman CE	Existing soil conditions meet Region 1 SQS. Units are proposed for winter ground-based and skyline harvest. All units will be well within Region 1 SQS (< 15%) following activities.
Trapper Bunkhouse Fuels Reduction Project.	Existing soil conditions meet Region 1 SQS. Surveys indicate that some portions of proposed treatment units 5, 9, 11, 13, 19, 22, 24, 26, 27, 38, 42, 72, 79, 80 and 81 contain existing DSD (< 15%) and are proposed for summer ground-based harvest. Mitigations will be implemented and/or restrictions on harvest method will be prescribed to trend site conditions in these units towards a net improvement in soil productivity. All units will be well within Region 1 SQS (< 15%) following activities.

These surveys provide the baseline data which help guide project design. Soil resource protections including Soil and Water Conservation Practices (SWCPs), Montana BMPs, and in some cases mitigations are prescribed to ensure soil resources are protected and maintained within the Region 1 SQS. Rehabilitation projects are also often derived from these pre-activity surveys.

Bitterroot National Forest Post-Activity Soil Quality Monitoring Surveys (2006)

Post-activity soil quality monitoring was conducted to determine the effects of harvest activities on the soil resource. A total of 8 harvest units were monitored from 4 different projects. Individual soil monitoring reports are available from the Bitterroot National Forest, Hamilton, MT. In summary, all units monitored meet the Region 1 SQS.

FRAZIER DRAW STEWARDSHIP FUELS REDUCTION

Unit 64W - Harvest Method: Cut to Length with Forwarder – Summer Ground-Based

Background: The unit covers approximately 70 acres. The pre-activity soil assessment completed in 2003 found approximately 3% DSD. Mitigations recommended by the soil scientist in the Environmental Assessment (EA) included ground based harvest in the winter or during dry soil conditions in the summer to minimize soil impacts. Operations were to occur on designated skid trails over a slash mat with ground-based equipment rated at less than 12 PSI to minimize compaction. These mitigations along with other standard soil BMPs were written into the contract specifications.

Observations: Harvest in the unit followed the soil scientist's recommended mitigations for summer operations. Soil displacement was noted along main skid trails where the slash mat was of minimal thickness (less than 2 inches) or not present. Due to the limited slash available and the cut length operation, a slash mat 6 to 8 inches was not consistently attained on the main skid trails. Limited slash mat led to detrimental soil conditions on approximately 1/3 of the main skid trails. Skid trails with slopes greater than 20% and minimal slash mat typically had detrimental soil displacement. Detrimental soil disturbance and compaction on main skid trails accounts for approximately 3 acres across the unit. This amount of detrimental soil disturbance is at the low end of the range predicted in the EA by the soil scientist. The detrimentally disturbed areas were rehabilitated by placing slash on disturbed portions of the skid trails, water barring, and seeding prior to closing the sale. Minor areas of displaced soils (less than 10 square feet) were noted; however, no other detrimental soil conditions were noted off of the main skid trail areas.

Conclusion: Cut to length harvest using a forwarder created approximately 4% DSD in the unit. Cumulative DSD in the unit was increased to 7% by the harvest activities. The unit is within Region 1 SQS.

Figure 1 - Soil displacement and compaction are present where slash was not available to create a 6 to 8 inch slash mat. The slash that is present will prevent erosion. Organic and topsoil horizons are intact or slightly mixed in many locations which will maintain the native seed bank and speed natural revegetation.

Figure 2 - Adequate slash was present here to prevent soil impacts. This harvest technique should only be prescribed if adequate slash is available and equipment can accommodate the placement of slash.

The soil mitigation involving slash placement of 6 to 8 inches thick on main skid trails is good in theory for soil protection; however, the method was not always feasible in this location due to the limited available slash and the harvesting equipment utilized. The attempt to place t slash on the skid trails did help to minimize soil disturbances in various locations. A proposed change in yarding system may have been possible in portions of the unit. The use of a trackline machine may have minimized skid trail disturbances on slopes. However, the limited use of a trackline machine may not have been economically or logistically feasible in this case.

BEAR BEETLE SALVAGE SALE

Unit 1 - Harvest Method: Winter Tractor Ground-Based

Background: Unit 1 covers approximately 13 acres. No DSD was noted during pre-activity surveys. Winter ground-based operations were completed during the winter of 2006.

Observations: Soil monitoring of Unit 1 indicated that winter ground-based operations were successful at preventing soil compaction and displacement. Several minor areas of displaced soils (less than 10 ft^2) were noted; however, no DSD was present in the unit. Overall, it was difficult during monitoring to identify where equipment was operated across the unit. Activities and cumulative effects in Unit 1 are well within the Region 1 Soil Quality Standards.

Conclusion: Winter ground-based harvest did not create new DSD in the unit. Cumulative DSD in the unit was not increased by harvest activities. The unit is within Region 1 SQS.

Unit 3 - Harvest Method: Summer Tractor Ground-based

Background: Unit 3 covers approximately 31 acres. No DSD was noted during pre-activity surveys. Summer ground-based operations on dry soils were completed in Unit 3 with the exception of brief operation on moist soils following a rain event. The rain event increased soil moisture beyond desirable levels during operations in the upper portion of the unit. Disturbances are described below.

Observations: Operations were ceased soon after the rain event by the Timber Sale Administrator to minimize soil impacts; however, brief operations on moist soils in the upper portion of the unit created some detrimental soil disturbance. During this time, rutting, soil displacement, and compaction occurred on the main skid trails near the top of the unit. Approximately ½ acre was detrimentally disturbed by the ground-based operations, causing a total of approximately 2% detrimental soil condition in the unit. Additional displacement and compaction disturbances occurred on the main skid trail during dry soil conditions. In order to rehabilitate the disturbance, the large ruts were smoothed, and the entire skid trail was slashed, water barred, and seeded prior to closing the sale. Minor equipment disturbances (less than 10 square feet) of soil displacement were noted across the unit; however, no other detrimental soil conditions were noted off the main skid trails. Proposed changes to the yarding system in the upper portion of the unit involving skyline harvest may have prevented the soil impacts created on the main skid trails. Overall, activities and cumulative effects in Unit 3 are well within the Region 1 Soil Quality Standards.

Conclusion: Summer ground-based harvest created approximately 2% DSD in the unit. Cumulative DSD in the unit was increased 2% by harvest activities. The unit is within Region 1 SQS.

GOLD 1 SALVAGE

Units 3 and 4 - Harvest Method: Summer Ground-based & Skyline

Background: Units 3 and 4 were reviewed in the Gold 1 Salvage Sale on July 21, 2006. Salvage in these units utilized skyline and ground-based operations to remove salvage trees. Soil scientist mitigations in the CE included rehabilitating temporary roads and landings, retaining 5 to 10 tons/acre of coarse woody debris for soil development, and operating only on dry or frozen soils. These mitigations along with standard soil BMPs were included in the contract specifications for the sale. Records of past timber sale activity indicated that these units were not logged prior to the fire in 2003.

Observations: Monitoring of the ground-based operations in units 3 and 4 indicated that less than 1% of the units had detrimental soil disturbance. The disturbances were due to elevated compaction on several short skid trail segments. No detrimental soil displacement was observed in these units. No detrimental disturbances were noted in the skyline yarded areas within the units. These activities and cumulative effects are well within the Region 1 SQS.

Conclusion: Summer ground-based & skyline harvest created less than 1% DSD in the units. Cumulative DSD in the unit was increased to less than 1% by the harvest activities. The units are within Region 1 SQS.

Figure 3 - Examples of ground-based skidding areas within units 3 and 4. Elevated compaction was noted only in select areas on main skid trails such as the one shown below right. Minimal detrimental soil disturbance was incurred by the operations in these units (less than 1%).

ALTA CAMP HELI SALE

Units 53, 56 and 70- Harvest Method: Helicopter

Background: Units 53, 56, and 70 were reviewed in the Alta Camp Heli Sale on July 19, 2006. Fuel hazard reduction in these units utilized a helicopter to remove trees. Soil scientist mitigations in the CE included rehabilitating disturbances at the helicopter landing sites. These mitigations were included in the contract specifications. Soil disturbance from past harvest entry was not noted during the field review on July 19, 2006.

Observations: Helicopter operations in these units provided excellent protection for soil resources. No soil disturbances were noted across these units from the operations. Adequate woody debris was maintained for future soil development. The activities and cumulative effects in these units are well within the Region 1 SQS.

Conclusion: Helicopter harvest did not create new DSD in the unit. Cumulative DSD in the unit was not increased by harvest activities. The unit is within Region 1 SQS.

Figure 4 - Example of helicopter yarding in the Alta Camp Sale. No signs of soil disturbance were noted from the helicopter yarding.

Helicopter Landings

Background: Helicopter landings utilized wide pullouts on the existing road system. Disturbances associated with FS system roads are not considered detrimental.

Observations: Additional ground disturbances were not created outside the landing boundaries. Minimal seeding was completed for landing rehabilitation. However, vegetation was established and provided adequate ground cover on the landing sites.

Conclusion: Overall, operations on the landing sites were not noticeable during monitoring.

Figure 5 - View of helicopter landing. No signs of soil disturbance were noted outside of the landing boundaries. Vegetation is establishing on the landing site.

Lodgepole and Ponderosa Pine Volume
Item 12

OBJECTIVE: Track volume of ponderosa pine and lodgepole pine that is harvested.

DATA SOURCE: Annual Cut and Sold Report.

FREQUENCY: Annually.

REPORTING PERIOD: 2000 through 2006.

VARIABILITY: +/- 25 percent from predictions used in the Forest Plan over a five-year period.

EVALUATION:

One of the objectives in the Forest Plan is to achieve a species mix of offered volume that is nearly proportional to the mix currently growing on the Forest. This objective and supporting monitoring item were established because of a past concern for the possible over-cutting of ponderosa pine and the avoidance of lodgepole pine harvest.

Table 4 shows the desired species mix proposed for harvest in the Forest Plan, the species mix harvested in 2006, and the species mix harvested since the plan was approved. More Douglas-fir has been harvested than any other species. In recent years, the removal of dead beetle-killed Douglas-fir has been a priority across the Forest along with the removal of understory Douglas-fir (ladder fuels) from stands in the wildland urban interface. This trend is expected to continue into the future although salvage efforts in the bug-killed Douglas-fir are not expected to last much longer. It is anticipated that lodgepole pine stands will not be a priority for treatment in the near future since these stands are typically not high priority for fuel reduction.

A growing percentage of harvested timber has been recorded as firewood or dead timber with no species noted. This was true for several of the sales sold after the 2000 wildfires. The species data indicate that the percentage of ponderosa pine being harvested is slightly above Forest Plan estimates with all other species lower than what was projected. Both ponderosa pine and lodgepole pine harvest volumes are within the 25% variability for this monitoring item.

MONITORING RESULTS:

Table 4 – Species Mix Harvested in FY 2006 and Cumulatively from FY 1988 to 2006, Compared to the Forest Plan Desired Harvest Species Mix

Species	Forest Plan ASQ per year		Harvested 2006		Harvested 1988 to 2006	
	Volume (MMBF)	Percent	Volume (MMBF)	Percent	Volume (MMBF)	Percent
Ponderosa Pine	3.34	10%	0.61	11%	31.27	16%
Lodgepole pine	8.67	26%	0.31	6%	35.45	18%
Douglas-fir	16.02	48%	2.67	50%	74.56	39%
Engelmann spruce	1.67	5%	0.08	1%	9.37	5%
Subalpine fir /Grand fir	3.34	10%	0.04	1%	7.94	4%
Larch	0.33	1%	0	0%	0.76	0%
Fuelwood/Dead/Pulp	0	0%	1.66	31%	32.87	17%
Total	33.37	100%	5.37	100%	192.22	100%

Silvicultural and Fuel Prescriptions
Item 14

OBJECTIVE: To determine if site-specific silviculture and fuel prescriptions are being implemented, and if the silvicultural prescription accomplishes stated objectives.

DATA SOURCE: Interdisciplinary team review pre- and post-activity.

FREQUENCY: One project per District annually.

REPORTING PERIOD: 2006

VARIABILITY: Departure from management practice.

EVALUATION:

Forest Service Manual (FSM) Section 2470 requires that a silvicultural prescription be prepared and signed by a certified silviculturist on all vegetation management projects. The following three projects were evaluated in 2006: 1) Frazier Fuel Reduction Project, units 63, 64E, 64W, 4, and A; 2) Fern Trap Timber Sale units 9 and 3; Sheafman Fuel Reduction Project units 4 and 5. Review of these three projects confirmed that this requirement is being met and that prescriptions are being updated to cover changed conditions or additional information needed for implementation. All of the units reviewed had silvicultural prescriptions in place, completed by a Certified Silviculturist which had also been updated as the project progressed. Out of nine units reviewed, one unit had minor changes in the accomplished treatment which deviated from the prescribed silvicultural prescription and one unit was specifically targeted for review because the treatments failed to meet the silvicultural prescription and desired condition.

MONITORING RESULTS:

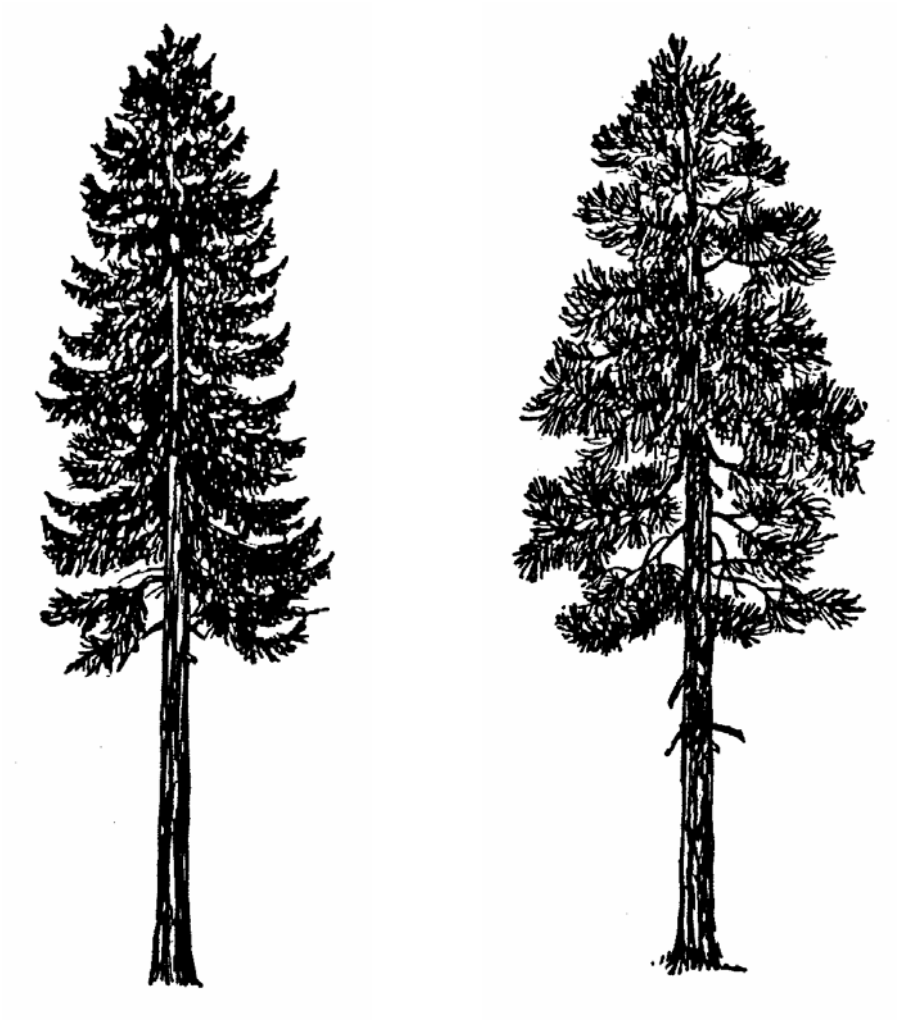
Frazier Fuel Reduction Project. This project includes 13 units where some combination of commercial harvest treatments, manual slashing, and prescribed burning is occurring. To date logging has been accomplished on 6 units; and slashing, piling and some burning have been completed on all or a portion of 4 other units. Site specific silvicultural prescriptions were written for all units in 2004 with updates completed in 2006. Tree marking on units prescribed for commercial harvest was checked in 2004 prior to selling the timber sale portion of this project. All units with completed activities were reviewed again in 2006. Activities are proceeding as planned with some minor changes in slashing treatments. Unit A was slashed, piled and the piles burned. The original prescription required incidental slashing and an underburn. The intent of the original prescription was to let fire creep into the aspen grove within the unit to promote aspen regeneration. Now that the unit has been piled and the piles burned, it may be difficult to generate sufficient heat to regenerate the aspen. This unit has yet to be burned and will be evaluated post-burn.

Fern Trap Timber Sale. Unit 9 was specifically targeted for review because the prescribed burn failed to meet the desired condition specified in the silvicultural prescription. The silvicultural prescription specified a series of steps including commercial thinning, slashing, handpiling & pile burning, followed by an understory burn. The long term desired condition was a stand with large diameter ponderosa pine and scattered groups of younger regeneration. The proposed treatments in Fern 9 were intended to move the stand composition and structure toward this long-term goal. The prescribed burn killed most of the leave trees that were intended to be left.

Requirements for developing silvicultural prescriptions were met, and sale preparation, harvest, and slashing activities were implemented as planned. The original prescription was written in 1997 and was updated in 2002 and again in 2004 to provide more detailed direction for slashing and prescribed burning. The burn plan was reviewed and signed by the Zone Silviculturist which also indicates that both fuels and silviculture personnel coordinated on this last step. Field review of this project identified several items that could be improved to ensure better success in implementing prescribed burns the future. They include: more specific and descriptive

silvicultural prescriptions, specifying acceptable ranges for variables in the prescription, and a greater reliance on monitoring both before and during the prescribed burn.

Sheafman Fuel Reduction Project. The original prescription was written in 2001 and updated in 2005. To date all activities have been in accordance with the silvicultural prescription and NEPA documentation. The desired outcome described in the Decision Notice is a stand that is fairly open with approximately 50 trees per acre (mostly Douglas-fir), where fuel continuity and hazard have been reduced. Not all the prescribed burning has been completed, but visual observation of the work completed to date indicates that there are around 50 trees per acre, mostly Douglas-fir, that the green ladder fuels have been removed, and surface fuel loadings have been significantly reduced. The prescription meets the objective defined in the NEPA document. Discussion on the monitoring fieldtrip focused on the high costs associated with achieving the desired results and the ability to maintain a program with similar high costs. There was some discussion about whether the selected silvicultural prescription was the best choice for this area. Historically this area was an open ponderosa pine stand. Rationale for maintaining the stand in Douglas-fir, and at higher densities, is not clear in the prescription or NEPA documentation.



Lands Adequately Restocked
Item 33

OBJECTIVE: To determine if lands are being adequately restocked and if the intent of the National Forest Management Act (NFMA) is being met.

DATA SOURCE: Forest Activity Tracking System (FACTS) database. FACTS replaces the Timber Stand Management Record System (TSMRS) which was used in previous reports to monitor this item. The Regional Regeneration Indices Report, also used in previous reports, is currently unavailable.

FREQUENCY: Annually.

REPORTING PERIOD: 5 years as required by Forest Plan although this report will cover the period from 2000 to 2006 (7 years)

VARIABILITY: +/- five percent over a five-year period.

EVALUATION:

The National Forest Management Act (NFMA) requires that "*all forested lands in the National Forest System be maintained in appropriate forest cover with species of trees, degree of stocking, rate of growth, and conditions of stand designed to secure the maximum benefits of multiple us sustained yield management in accordance with land management plans*". It also states "*that timber will be harvested from National Forest System lands only where there is assurance that such lands can be adequately restocked within five years after harvest."*

The reforestation program on the Bitterroot National Forest is tied primarily to the wildfires of 2000 and includes an annual tree planting program as well as monitoring burned areas for the presence of natural regeneration. Areas that are planted or monitored for natural regeneration are certified when sufficient numbers of trees are present to meet management objectives as specified in a silvicultural prescription. After the fires of 2000, the Forest estimated that it would take a full decade to reforest the lands burned in the fires. Six years after the fires of 2000, program highlights include:

1. 14,500 acres, and over five and a half million trees, have been planted. Almost all this planting was accomplished on lands burned in the fires of 2000. Ponderosa pine was the primary species planted, mixed with Douglas-fir, lodgepole pine, and some Engelmann spruce.
2. There are approximately 85,500 acres still in need of planting or where surveys are needed to determine whether natural regeneration is sufficient to certify stands as reforested. In six years, approximately half of the planting and monitoring workload identified in 2001 has been completed. Of the original 116,000 acres identified for natural regeneration, approximately 77,000 acres are still being monitored. Many of these sites require multiple surveys before they can be certified as reforested.
3. Reforestation surveys have been completed on almost 89,000 burned acres and since 2000, just over 20,000 acres have been certified as fully reforested. About one third, or 4,930 acres that have been planted since 2000 are now certified and 15,100 acres have been certified as naturally regenerating.
4. Field reviews and reassessment of burned lands using newer aerial photography has resulted in the reforestation need being removed from over 40,000 acres. These lands have sufficient trees to meet management objectives without planting or further monitoring.
5. Harvest after the burn is nearly completed and associated fuels and regeneration activities are progressing well.

MONITORING RESULTS:

In 2001 the burned area reforestation plan estimated that there were over 40,000 acres on the Forest in need of planting and more than 116,000 acres that needed to be monitored for natural regeneration. Fires in subsequent

years (Gold I, 2003; Big Creek, 2003; Gash, 2006) increased the number of acres where natural seeding or planting was needed. Table 5 below shows the Forest's progress on reforesting these burned lands and the current reforestation need. The year 2004 is included as a comparison, since this was the last year this item was documented in the monitoring report.

Table 5 – Reforestation Needs and Accomplishments 2001 to 2006

Year	Acres Planted	Acres Certified as Successfully Reforested	Estimated Acres in Need of Planting	Acres Planned for Natural Regeneration
2001			43,746	116,724
2004	10,419	10,963	16,252	114,110
2006	14,500	20,032	8,400	77,235

Planted areas are monitored after the first, third and fifth growing season and the status of each site recorded in the FACTS database. Of the 14,500 acres planted approximately 93 percent of these stands are either certified or are progressing satisfactorily and we anticipate that they will be certified. Areas where tree survival was less than what the silvicultural prescription required will be evaluated for replanting.

Priority for planting has been in areas where salvage logging occurred with the emphasis on ensuring salvage areas are reforested within 5 years. As fire plays an increasing role in managing ecosystems for sustainability, regeneration of adequately stocked forest lands will continue to be an important part of forest management. Planting and natural regeneration will both be important methods of achieving desired conditions. The Forest intends to work with the Regional Office to improve the Forest's management activity data and the functionality of standard reports. This will improve the Forest's ability to monitor this item in the future.

Size Limit for Harvest Areas
Item 35

OBJECTIVE: Evaluate maximum size limits for harvest areas to determine whether such size limits should be continued.

DATA SOURCE: Forest Service Activity Tracking System (FACTS) database, environmental analyses, and timber sale folders.

FREQUENCY: 100 percent annually.

REPORTING PERIOD: 1989 to 2006.

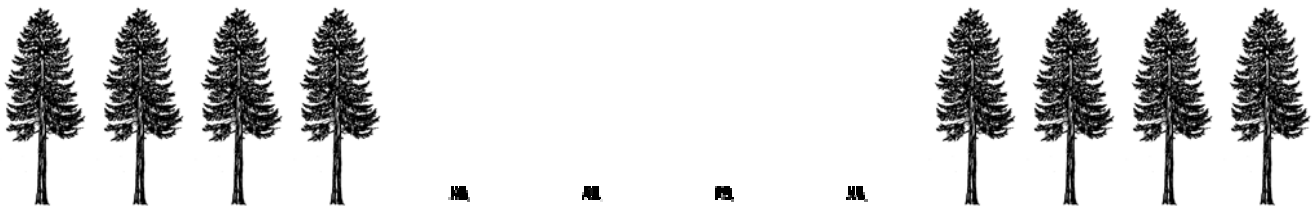
VARIABILITY: Any deviation from regulations.

EVALUATION & MONITORING RESULTS:

The Forest Plan specifies that 40 acres is the maximum size for clearcuts and other harvest methods that create openings. Historical data show patch sizes within some landscapes to be naturally larger than 40 acres and recent fire activity on the Forest supports the concept that patch sizes can vary from an acre or less to over a thousand acres. Application of fire in conjunction with harvest treatments is part of the overall effort to move toward the historical condition of larger patch sizes on the landscape. While clearcuts do not entirely mimic these openings and events, we have proposed some regeneration harvests in the past that were larger than 40 acres, to approximate historical patch sizes.

Since 2000, the majority of timber harvesting on the Forest has been salvage of dead and dying trees from the wildfires of 2000 and the Douglas-fir bark beetle epidemic. The National Forest Management Act (NFMA) contains a specific exception (219.27(d)(2)(iii)) that the established size limits will not apply to areas harvested as a result of natural catastrophic conditions, such as fire, insect and disease attack, or windstorm." Since 2000 no harvest openings in excess of 40 acres have been proposed or created.

Future planning efforts will likely continue to consider openings that approximate the historical, naturally occurring patch size. Where openings greater than 40 acres are proposed, outside of salvage treatments, approval from the Regional Forester will be requested prior to project approval.



Fire Management

OBJECTIVE: Track trends in wildland fire and fire management actions.

DATA SOURCE: Fire management records.

FREQUENCY: Annually.

REPORTING PERIOD: 2006.

VARIABILITY: Deviation from historic ranges of wildland fire and desired conditions.

EVALUATION:

As the Forest incorporates a more comprehensive ecosystem management type model into Forest Plan revision, two useful new concepts are emerging:

> ***Fire Regime*** – a general classification of the role fire would play across a landscape in the absence of modern human mechanical intervention, but including the influence of aboriginal burning. Five such fire regimes have been defined, based on fire frequency and fire intensity.
>
> ***Fire Regime Condition Class*** – a classification of the amount of departure from the natural regime – possibly resulting in alterations of key ecosystem components such as species composition, structural stage, stand age, canopy closure, and fuel loadings. Three condition classes have been identified.

At present, fire regime condition class is being evaluated at the project level to determine the departure from natural regimes so that needed treatments can be identified and implemented as funding and conditions allow. Based on a forest-wide analysis of fire regime condition classes completed as part of the Forest Plan revision, lower elevation areas of ponderosa pine and Douglas-fir types have the most departure and are in greatest need of treatment, followed by mid-elevation mixed conifer types. Upper elevation lodgepole and subalpine fir types have the least departure from natural regimes.

MONITORING RESULTS:

Fire managers continue to develop and use terminology that describes how fire is applied across landscapes to achieve desired resource conditions. A consistent set of terms are useful when coordinating with cooperators or explaining fire management to the public. Although the following term was defined several years ago, it began to re-emerge in 2006 as a possible approach to reducing fire suppression costs:

> ***Appropriate Management Response (AMR) -*** Any specific action suitable to meet Fire Management Unit (FMU) objectives. Typically, the AMR ranges across a spectrum of tactical options (from monitoring to intensive management actions). The AMR is developed by using Fire Management Unit strategies and objectives identified in the Fire Management Plan.

Wildland Fire Situation

The Bitterroot Valley experienced an average fire season in 2006. A warm spring with interspersed periods of precipitation provided opportunities for prescribed fire activities. At the end of June, wet weather ended abruptly, and was replaced with a warming and drying trend that lasted into September. By the end of July, fuel moisture conditions were conducive to the start of lightning fires and several storms during late July and August provided ignitions for numerous lightning caused fires across the forest.

Two indices that are tracked each year to determine fire severity are 1000-hr fuel moisture content and the energy release component (ERC). The 1000-hr fuel moisture content represents the fuel moisture content in dead fuels in the 3- to 8-inch diameter class and can range from 1 to 40%. As large dead fuels dry, this number decreases and large fuel moistures below 10% signify the potential for high fire severity. In review of the 2006 season, 1000 hr fuel moistures were fairly high during the spring months due to interspersed rainfall during this period. This trend ceased abruptly at the end of June, and by August, 1000 fuel moistures had reached their lowest point at about

10%. These conditions continued into September and then began increasing again with fall rains. A late fall drying trend allowed for a fairly robust fall burning program.

The energy release component (ERC) is used to provide a relative indication of drought conditions. It relates to the potential heat release per unit area in the flaming zone of a fire front, and as live fuels cure and dead fuels dry, the ERC values get higher. As an example, conditions producing an ERC value of 24 represent a potential heat release twice that of conditions resulting in an ERC value of 12. For the Bitterroot Valley on the average for the past 25 years, only about 10% of the days during the summer experience an ERC above 45.

For 2006, estimated ERC's fluctuated from 20-30 all spring and through the end of June. With warmer and drier weather starting in July, ERC's rapidly increased, climbing through 45 by mid-July and setting numerous records during the last part of July and the first part of August. They stayed in the 60s for most of August and into the first part of September when fall rains finally brought them back down.

The season's first fire was human-cause and recorded on May 12th, and the first lightning fire was recorded on June 5th. The last lightning fire occurred on September 9th and the last human-caused fire occurred on November 5th. One wildland fire escaped initial attack and was managed with an incident management team. Twenty-six lightning fires were managed for wildland fire use, burning a total of 7,152 acres. On average, the Forest has about 150 fire starts annually. In 2006 the Forest recorded 102 starts (Table 6).

Table 6 - Number of Fires by Year within Forest Protection Boundary and by Type of Fire

Type of Fire	1989	1990	1991	1992	1993	1994	1995	1996
Lightning	229	125	159	154	37	200	49	203
Human-caused	14	17	20	30	17	15	25	45
Total	243	142	179	184	54	215	74	248

Type of Fire	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	Average
Lightning	71	112	137	249	50	76	96	90	126	74	124
Human-caused	28	9	32	28	23	23	5	17	19	28	22
Total	99	121	169	277	73	99	101	107	145	102	146

Table 7 - Number Of Acres Burned By Year Within Forest Protection Boundary

Type of Fire	1989	1990	1991	1992	1993	1994	1995	1996	1997
Lightning	183	3156	3028	450	454	8680	244	47720	207
Human-caused	549	3166	1889	161	11	777	375	432	33
Total	732	6,322	4,917	611	465	9,457	619	48,152	240

Type of Fire	1998	1999	2000	2001	2002	2003	2004	2005	2006	Average
Lightning	22826	2898	308,576	231	1241	11,595	1,529	44,994	7,174	25,844
Human-caused	3835	316	11,559	5	242	1,374	37	12	8,886	1,870
Total	26,661	3,214	320,135	236	1,483	12,969	1,566	45,006	16,060	27,714

Table 8 - Acres Burned By Management Area (MA)

Year Burned	MA 1, 2, 3a, 3b, 3c, 8b, 9, 10, 11a		MA 5 & 8a	MA 6 & 7
	Roaded	Inventoried Roadless		
Total MA Acres	399,799	99,100	259,097	819,887
1989 Acres	569	2	119	42
Percent of MA	0.14	0.00	0.05	0.01
1990 Acres	2,132	7	534	3,649
Percent of MA	0.53	0.01	0.21	0.45
1991 Acres	266	2,339	121	2,191
Percent of MA	0.07	2.36	0.05	0.27
1992 Acres	169	7	92	343
Percent of MA	0.04	0.01	0.04	0.04
1993 Acres	17	<1	<1	448
Percent of MA	0.00	0.00	0.00	0.05
1994 Acres	1,164	495	3,837	3,961
Percent of MA	0.29	0.50	1.48	0.48
1995 Acres	323	2	6	288
Percent of MA	0.08	0.00	0.00	0.04
1996 Acres	747	217	367	46,821
Percent of MA	0.19	0.22	0.14	5.71
1997 Acres	119	11	2	108
Percent of MA	0.03	0.01	0.00	0.01
1998 Acres	3,875	5	157	22,624
Percent of MA	0.97	0.01	0.06	2.76
1999 Acres	29	1,415	28	1,742
Percent of MA	0.01	1.43	0.01	0.21
2000 Acres	216,998	28,331	20,899	53,907
Percent of MA	54.28	28.59	8.07	6.57
2001 Acres	7	0	11	218
Percent of MA	0.00	0.00	0.00	0.03
2002 Acres	167	63	15	1238
Percent of MA	0.04	0.06	0.01	0.15
2003 Acres	10,155	6	2,350	458
Percent of MA	2.54	0.01	0.91	0.06
2004 Acres	106	2	160	1298
Percent of MA	0.03	<0.01	0.06	0.16
2005 Acres	3,147	2	6,129	35,728
Percent of MA	0.79	0.00	2.37	4.36
2006 Acres	8,834.24	0	69.8	7,155.78
Percent of MA	2.21	0.00	0.03	0.87
1989-2006 Average Annual Acres	13,824	1,828	1,939	10,123
1989-2006 Average Annual Percent of MA	3.46	1.84	0.75	1.23

The Bitterroot NF Fire Management Plan identifies the following four Fire Management Units (FMU): FMU1 includes the wildland urban interface areas; FMU2 includes the active roaded areas; FMU3 includes roadless and unroaded areas outside of wilderness; and FMU4 includes wilderness areas. As the Forest completes the latest Forest Plan revision, these areas will begin to have more significance in monitoring. Table 9 tracks acres burned in each FMU since 2003.

Table 9 – Acres Burned per FMU per Year

Fire Management Unit	2003	2004	2005	2006	Average
FMU1	1,210	98	1723	8,828	2,965
FMU2	8,310	6	21	74	2,103
FMU3	2,350	165	6129	3	2,162
FMU4	1,099	1,297	37,133	7,155	11,671
Total Acres	12,969	1,566	45,006	16,059	18,900

Prescribed Fire

The Forest's prescribed fire management program plays an important role in sustaining ecosystems by reducing heavy fuel loadings, reducing fire risk to homes along the wildland urban interface of the Forest, and by changing vegetation composition and structure to a condition that allows ecosystems to function within their historical range.

The warm, dry ponderosa pine and Douglas-fir vegetation types characterize much of the interface area. Thickets of Douglas-fir in the understory have become established in many of these previously open stands, which puts them at risk for higher intensity wildfires. Under natural conditions, low intensity wildland fires frequently underburned these drier sites and maintained them in a more open condition. Forest managers will continue to reduce fuels in these priority areas and coordinate their efforts with Ravalli County, homeowners, and research scientists.

As shown in Table 10, acres treated with prescribed fire remained relatively steady from 1992 to 1996, but more than doubled from 1997 to 1999. Acres treated dropped slightly in 2000, in part due to dry fuel moistures and the extreme fire season. During the 2000 fire season, several planned out-year fuels projects were burned as a result of wildland fires, and acres treated in 2001 and 2002 dropped to all time lows. With the warm spring in 2006, the Forest completed 384 acres of broadcast burning, 173 acres of hand piling, 786 acres of slashing, 30 acres of chiping, 163 acres of biomass removal, and 554 acres of pile burning. All but 10 of these acres of treatment were in areas of fire regime condition class 3 (where there is the highest departure from natural conditions), 1915 acres were in the wildland interface area (WUI), and 175 were outside the WUI.

Table 10 - Prescribed Fire Program Acres Accomplished Per Year

	1992	1993	1994	1995	1996	1997	1998
Acres	2,000	2,000	2,100	2,000	2,005	5,234	5,700

	1999	2000	2001	2002	2003	2004	2005	2006	Average
Acres	5,100	2,982	755	349	2,191	5,171	2,100	2,090	2,889

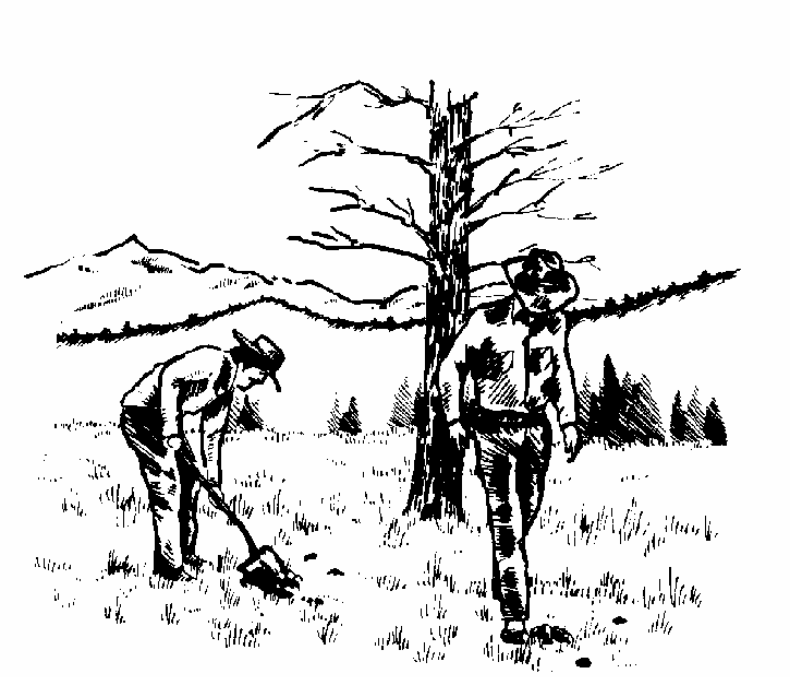
Although fire in the ecosystem is a natural and revitalizing process, it does have other consequences. There may be hazy skies, temporary smoke pooling in the valley, and some visible burn patches on the mountain slopes. However, prescribed burns can be timed to allow control of the prescribed burn length, smoke dispersal, and fire intensity. In contrast, wildland fires often create more long-lasting smoke. The Forest has been monitoring air quality in relation to smoke from wildland fires and prescribed fires for several years. Results have been presented in the Air Resources section of previous years' monitoring reports.

Expanded Cooperative Efforts

As more people continue to build homes in forested settings in the Bitterroot Valley, the complexity of wildland fire suppression in these areas continues to increase. The Bitterroot National Forest's State and Private Forestry program is working cooperatively with the Bitter Root Resource Conservation and Development Area, Inc. (RC&D), State of Montana Department of Natural Resource Conservation, and private landowners in the treatment of hazardous fuels on private lands and National Forest lands immediately adjacent to private lands. Bitterroot National Forest fire management personnel have been providing expertise to the RC&D community forester when working with the private landowners to improve understanding of fire risk in areas that need fuels treatment. We have also been assisting Rural Fire Departments in updating a Community Fire Plan that identifies priority areas for fuels treatment in conjunction with work being planned on adjacent public lands (http://www.bitterrootfireplan.org/).

The State and Private Forestry program provides grant monies and fuels treatment expertise to private landowners to assist them in reducing fire risk on their lands. This increases the chance of successfully suppressing a fire during initial attack and correspondingly reduces risks to lives, homes, and property from a large fire. The Bitter Root RC&D reports the following accomplishments for the 2006 year.

A total of 16 landowners have completed projects on 146 acres during the past year. Approximately 34 landowners are currently signed up under agreements to perform an estimated 320 additional acres of treatment. Due to the active fire seasons in 2005 and 2006, interest in reducing fire risk on private land has increased. The Bitter Root RC&D has funding from a number of grant sources that will be used to assist landowners in the next couple of years.



Insect and Disease Status as a Result of Management Activity, Mountain Pine beetle Infestation Items 36 & 37

OBJECTIVE: To determine insect and disease status as a result of management activities. Monitor trends of mountain pine beetle infestations and respond if needed.

DATA SOURCE: Forest Pest Management aerial observations, Forest Health and Protection site trips & reports, field surveys and project monitoring

FREQUENCY: 100 percent annually

REPORTING PERIOD: 2006

VARIABILITY: Epidemic conditions following management activities or approaching the suitable timber base.

EVALUATION:

Bark Beetle Activity on the Forest is Declining. The 2006 aerial detection flight mapped 36,000 acres of bark beetle caused mortality on the Forest compared to the 114,400 acres mapped in 2005. Populations of bark beetles remain high but are not directly tied to management activities occurring on the Forest. They are the result of prolonged dry weather, decades of fire suppression, recent large fires, and existing vegetation conditions. Since management activities within the planning period are not causing the bark beetle epidemic, we are within the Forest Plan variability threshold.

The aerial detection flight showed a marked decline in the number of acres infested and the number of trees killed by Douglas-fir bark beetle (DFB) throughout all of western Montana. In a few areas, including the Bitterroot NF, Douglas-fir beetle populations and resultant beetle-killed trees remained at higher-than-normal levels and in many areas beetle-killed trees were still noticeable. Areas on the Bitterroot NF affected by recent fires, as well as areas not affected by past fire, showed populations declining dramatically as compared to the previous year. Total number of infested acres dropped by over half compared to 2005.

Tree mortality from mountain pine beetles (MPB) has also dropped in the past year, across Montana and Northern Idaho as well as on the Bitterrroot NF. The Forest Plan requires monitoring of MPB activity since this beetle has historically caused widespread mortality of lodgepole pine throughout the western U.S. Although recent outbreaks of MPB have occurred on adjacent Forests with the potential to move onto the Bitterroot, this has not happened. MPB-caused mortality in whitebark pine continues to be a the greatest concern on the Bitterroot since the distribution of this species is limited across the Forest.

Management Activities Affecting Insect Activity. Project monitoring in 2006 found relatively few insect and disease problems resulting from management activities. Ongoing activities that have the potential to cause insect or disease activities on the Forest include prescribed burning, timber harvest, precommercial thinning, and slashing. Mitigation measures applied to these projects have been effective in preventing any noticeable spread of damaging insects or diseases. Incidental tree mortality was found on some of these projects but was well within the acceptable limits given the project objectives.

An unexpected finding in 2006 was that fertilization treatments intended to induce seed production in ponderosa pine resulted in bark beetle attack and subsequent mortality of many of the fertilized trees. A study completed in Arizona showed that repeated applications of fertilizer (over-fertilization) could be used to induce tree stress and promote a “stress cone crop” in ponderosa pine. The same technique was tried on selected ponderosa pines on the Forest. It appears that fertilization was effective in inducing stress which in turn attracted bark beetles.

MONITORING RESULTS:

Insect and Disease Aerial Survey: The primary data source for monitoring insect and disease conditions on the Forest is the aerial detection flight conducted annually by Forest Health and Protection. These flights provide general estimates, locations, and trends of insect and disease activity on the Forest and are not meant to provide

statistically accurate numbers of affected trees. Aerial flights detect dead and dying trees which are usually the result of the previous year's insect, disease, or fire activity.

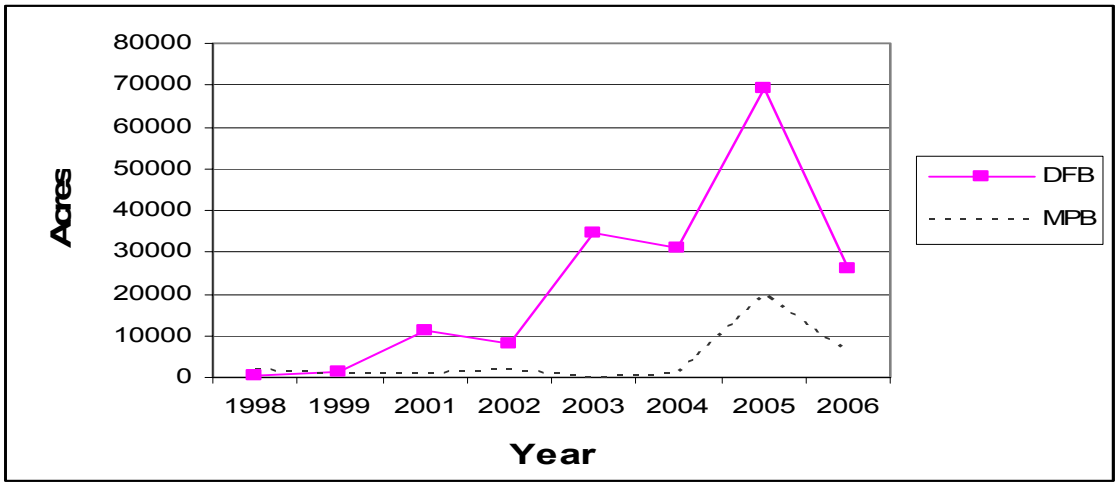
Table 11 summarizes the insect and disease information provided by the aerial detection flights conducted in the summer of 2006. Data are presented for the Bitterroot Reporting Area which includes the Bitterroot National Forest, private, and state-owned lands. Only the portion of the Forest outside of wilderness was flown and mapped.

Table 11 - Insect and Disease Aerial Survey Summary For 2006

	Bitterroot National Forest *		Private Land Bitterroot Area		State Land Bitterroot Area		TOTAL Bitterroot Reporting Area	
Pathogen	**Acres**	**Trees**	**Acres**	**Trees**	**Acres**	**Trees**	**Acres**	**Trees**
Douglas-fir Beetle	26,287	47,942	578	1,072	206	430	27,071	49,444
Mountain Pine Beetle (PP)	204	415	103	206	20	79	327	700
Mountain Pine Beetle (LP)	2591	7677	28	99	85	194	2,704	7,970
Mountain Pine Beetle (WBP)	3005	4077	0	0	0	0	3,005	4,077
West. Balsam Bark Beetle (SAF)	4139	6355	0	0	2	11	4,141	6,366
TOTAL ACRES	36,226	66,466	709	1,377	313	714	37,248	68,557

***** Montana outside of wilderness

Figure 6 – Acres Infested by Douglas-fir Beetle and Mountain Pine Beetle



Project Monitoring:

The Forest Plan requires that silvicultural prescriptions utilize integrated pest management strategies and treatments that reduce long-term losses due to insects and diseases. In most cases, increasing tree vigor and reducing susceptibility to attack by insects and diseases is part of the criteria used to select which trees will stay and which will be removed. Examples of this include the control of mistletoe by selectively removing mistletoe-infected trees or thinning to reduce the susceptibility of forest stands to bark beetles. Mitigation measures are also routinely included in project implementation to prevent the spread of undesirable insects and diseases. In stands where ponderosa pine occurs the primary concern is bark beetles (mainly pine engravers and mountain pine beetle) and annosum root disease. In Douglas-fir stands, Douglas-fir beetle, mistletoe, and root disease are the

primary concerns.

Several projects were monitored in 2006 and are listed below in Table 12. Monitoring of the Hayes Creek Fuel Reduction Project has been ongoing since the project began in 2004 with periodic findings reported in previous monitoring reports.

The direction or mitigation measures provided in the silvicultural prescription are listed along with a synopsis of the monitoring results.

Table 12 – Effectiveness of prescribed treatments and mitigation measures monitored in FY 2006

Direction and/or Mitigation Measure	Insect or Disease of Concern	Applicable Projects [1/]	Purpose of Treatment or Mitigation	Effectiveness
Silvicultural prescription and marking guide	Mistletoe	Sheafman, Fern Trap, Frazier	Remove mistletoe infected trees that are the source for new infections	Very effective to moderately effective
Silvicultural prescription and marking guide	Mountain Pine Beetle (MPB)	Hayes, Frazier, SPA	Reduce density of trees improving tree vigor. Open stand conditions less desirable for MPB.	Very effective to moderately effective
Mitigation Measure: Restricted harvest operating season (July to December)	Pine engravers	Hayes, Frazier, SPA, precommercial thinning (PCT)	Operations scheduled in periods when pine engravers not seeking trees to infest	Very effective in PCT, very effective in timber harvest projects when applied in conjunction with mitigation measures listed below.
Mitigation Measure: Large landing piles	Pine engravers	Hayes, Frazier, SPA	Large piles provide suitable habitat for pine engravers and prevent standing green trees from being attacked	Very effective when applied in conjunction with a limited operating season.
Mitigation Measure: Removal of ponderosa pine > 3 inches in diameter	Pine engravers	Hayes	Removal of material that attracts pine engravers	
Trapping	Pine engravers	Hayes	Trapping and removing pine engraver beetles	
Mitigation Measure: Application of sporax on ponderosa pine stumps (greater than 14” dbh)	Annosum root disease	Frazier, SPA, and a portion of Hayes	Prevents disease spores from inoculating on cut surface of stumps	Studies have shown to be very effective. Project monitoring has not proven otherwise.

[1/] Projects monitored in 2006 include Sheafman Fuel Reduction Project, Fern Trap Timber sale, Frazier Fuel Reduction Project, Hayes Creek Fuel Reduction Project, SPA Timber Sale, and previous years precomercial thinning. .

REFERENCES:

Previous monitoring reports include reference material describing insect and disease conditions on the Forest. In addition, the following websites contain specific information on forest insect and disease problems described above and summarize conditions throughout the Northern Region: http://www.fs.fed.us/r6/nr/fid/wid.shtml

The following Forest Health & Protection Reports were completed on the Bitterroot National Forest in 2006:

Gibson, Ken. Prevention/Suppression/Restoration Review, Bitterroot National Forest, August 22, 2006. Missoula Field Office. R1. MFO-TR-06-14. August 29, 2006.

Old Growth
Item 6

OBJECTIVE: Ensure that old growth is being inventoried through project planning. Determine compliance with old growth standards in the Forest Plan (acres by habitat type, land class, and management area).

DATA SOURCE: Timber Stand Management Record System (TSMRS), aerial photography, FIA data, and inventory.

FREQUENCY: 100 percent every three years.

REPORTING PERIOD: 2006

VARIABILITY: +/- 20 percent over three years.

EVALUATION:

The intent of old growth management in the Forest Plan (1987) is stated in the Forest-wide resource standard on page II-19, "The amount and distribution of old growth will be used to ensure sufficient habitat for the maintenance of viable populations of existing native and desirable vertebrate species, including two indicator species, the pine marten and pileated woodpecker." Each management area (MA) that contains land suitable for timber management has a standard for retention of old growth habitat. Old growth stands should generally be 40 acres or larger and distributed over the management area. MA 1 requires about three percent old growth retention, while MAs 2 and 3 require about eight percent. In MA 3b, the standard is to maintain 50 percent in fisheries areas and 25 percent in non-fisheries areas. The weighted average of Forest Plan Management Area standards was intended to maintain about 10 percent old growth habitat in suitable lands within management areas 1, 2, 3a, 3b, and 3c.

The Plan sets no old growth retention standards for MAs 5 through 11. The Forest Plan allows for very little management that could impact the amount of old growth in those management areas. Natural processes such as growth, succession, and disturbances including wind and wildfire will continue to regulate the amount of old growth habitat in management areas 5 through 11, as is intended by the Forest Plan.

We have been inventorying old growth habitat for each project based on Regional old growth definitions, the Old Growth Forest Types of the Northern Region (Green et al. 1992) and the Forest Plan standard. The Forest Plan expects old growth to be distributed by third-order drainage and management area. During the inventory, we collect data on vegetation habitat type groups for western Montana, minimum age, minimum number of trees per acre above a certain diameter, live basal area per acre, snags per acre larger than nine inches in diameter, dead or broken-topped trees, down woody material, percent decay, and number of canopy layers. This information is compared with criteria in the Forest Plan and regional old growth definitions to determine old growth status.

The Forest's inventory of old growth was completed in 2004 and updated in 2006 for management areas 1, 2, 3a and 3c. About 17 percent of MAs 1, 2, 3a and 3c has old growth habitat characteristics. Total current old growth habitat exceeds Forest Plan Standards by a large margin for each management area. Old growth has apparently increased 2 percent between 2004 and 2006, which is within the Forest Plan variability and requires no further evaluation.

MONITORING RESULTS:

Table 13 shows a summary of the old growth inventory, which is complete for all Forest lands with a numerical old growth standard. In 2006, this information was updated to reflect field inventories for the Trapper Bunkhouse analysis area.

Table 13 - Old Growth Habitat Area and Distribution by Ranger District and Forest Plan Management Area for All Lands Outside Roadless and Wilderness Management Areas.

District	Management Area[1]	Total MA Acres	Old Growth Habitat Area (acres)	Old Growth Habitat Area (percent)	Forest Plan Standard (percent)
Stevensville	1	16508	2962	18	3
Stevensville	2	9644	866	9	8
Stevensville	3a	30868	4861	16	8
Stevensville	3c	3425	1221	36	8
Stevensville Total		60445	9910	16	
Darby	1	64015	8790	14	3
Darby	2	39992	1805	5	8
Darby	3a	34931	3662	10	8
Darby	3c	8154	1247	15	8
Darby Total		147092	15504	11	
Sula	1	54547	8960	16	3
Sula	2	44884	6261	14	8
Sula	3a	26754	3943	15	8
Sula Total		126185	19164	15	
West Fork	1	72679	20357	28	3
West Fork	2	47135	10636	23	8
West Fork	3a	30033	7485	25	8
West Fork	3c	253	12	5	8
West Fork Total		150100	38490	26	
Forest Totals		483822	83068	17	

[1] Management Area 3b is a linear inclusion (riparian) in each of these Management Areas and has not been separated for display here. The Forest Plan intends that 50% of 3b fisheries riparian, and 25% of the 3b non-fisheries riparian be old growth habitat.

[2] No MA 3c occurs on the Sula District.

Table 14 – Old Growth Habitat by Management Area

Forest Plan Management Area[1]	Forest Plan Minimum (%)	2004 Inventoried Old Growth as a % of MA	2006 Inventoried Old Growth as a % of MA	% Change from 2001 to 2004
1	3	19	20	+5
2	8	13	14	+8
3a	8	16	16	0
3c	8	23	21	-8
Total		**16.6**	**17**	**+2**

[1] Management Area 3b is a linear inclusion (riparian) in each of these Management Areas and has not been separated for display here. The Forest Plan intends that 50% of 3b fisheries riparian, and 25% of the 3b non-fisheries riparian be old growth.

FINDINGS:

Total current old growth habitat exceeds Forest Plan standards by a large margin for each management area. Table 14 above implies that old growth increased between 2004 and 2006 in MAs 1 and 2, stayed the same in MA 3a, and declined in MA 3c. Compared to our 2004 estimate, the Forest is within the Forest Plan variability across the combined management areas. No further evaluation is needed.

When the old growth information is compared between 2004 and 2006, it appears there has been some reduction in old growth amounts in Management Area 3c. The largest losses were on the Darby District. The apparent reduction reflects updated data in the Trapper Bunkhouse area. Upon field review, some stands previously classified as old growth were removed from that category due to observed stand conditions. However, as shown in the table, the Darby District still comfortably meets Forest Plan old growth standards in all management areas.

Old growth within Management Area 3c on the West Fork District is below standards, however this is a very small area (253 acres) near the District boundary and is inconsequential at the Forest scale. Even though old growth habitat standards are clearly met in Management Areas Forest-wide, the Forest Plan standards need to be carefully evaluated for each third order drainage where vegetation management projects are planned.

Post-2000 and 2003 fire old growth reviews and inventories indicate limited available drier, ponderosa pine dominated old growth habitats. The Forest has established policy to maintain or enhance these drier habitats until the issue can be reexamined during Plan revision[1] (also see discussions on flammulated owls in the "Sensitive Wildlife Species" section). The policy involves maintaining existing old growth where the dominant old growth species is ponderosa pine, western larch or Douglas-fir, and designing management treatments to increase the longevity of these stands.

Based on our knowledge of old growth habitat distribution on the Forest, we can conclude that old growth associated species are not threatened by current management practices or natural degradation of old growth habitats.

REFERENCE

Green, P., J. Joy, D. Sirucek, W. Hann, A. Zack, and B. Naumann. 1992. Old-Growth types of the Northern Region. Unpublished Report. Northern Region, USDA Forest Service.

[1] Forest Supervisor letter, July 5, 2001, re: Post-Fire Forest Plan Review

Invasive Plants
Item 10

OBJECTIVE: Monitor infestations of leafy spurge, dalmatian toadflax, goatweed and knapweed.

DATA SOURCE: Inventory of infestations.

FREQUENCY: 100% every three years.

VARIABILITY: Increase in area infested.

REPORTING PERIOD: 2006

EVALUATION:

As in previous years, the Forest monitored for all known and suspected invasive plant species, not just the four species identified for monitoring in the Forest Plan.

Monitoring has shown a substantial increase in invasive plants species and area infested over the past two decades. This is considered an important topic in the current Forest Plan revision. Effectiveness of the Forest inventory, monitoring, and treatment program has improved in recent years. Continued emphasis on inventory and mapping has led to a more accurate picture of the invasive plant situation on the Forest. Apparent changes in the inventory (Table 16) largely reflect updated information rather than actual changes in acreages infested.

The objective for invasive plant control on the Forest is a coordinated and effective Integrated Pest Management (IPM) program. Prevention of new invaders through education and awareness, quick eradication of new invaders, and protection of weed-free areas remain high priorities. The Forest has expanded its invasive plant awareness, education, and prevention efforts. The control components of the IPM approach include chemical, manual, and biological measures which are used singly or in combination.

MONITORING RESULTS:

Implementation of the 2003 Forest Noxious Weed Treatment Record of Decision:

The Bitterroot National Forest invasive plant management program increased ten-fold in scope with the signing of the 2003 Forest Noxious Weed Treatment Project Record of Decision. The document identified new expanded objectives for the Forest and provided a road map for achieving those objectives over the next ten years. It emphasized application of the progressive principles of Integrated Pest Management. Table 15 below summarizes the key invasive plant activities that occurred on the Forest in 2006.

Table 15 - Program highlights in 2006

Project	Description
1) Special Appropriation KV Funds for Invasive Plants	The Forest awarded a 4 year backcountry treatment, mapping, and monitoring project for new invaders and expanding established invaders on trails and remotes areas including the FCRNR Wilderness, westside canyon trails, and at-risk grassland sites.
2) Participating Agreement between Ravalli County and Bitterroot Forest	The Forest renewed a 3 year agreement that implements an integrated invasives strategy including: cooperative treatment of high priority invasive plants across Forest / private land boundaries; biological control release and monitoring program with the Victor and Darby schools science departments; mapping of new invaders; and improving and delivering invasive weed education to groups in the county. The agreement included KV special funding, a Centennial Grant, fire recovery special funding, and regular appropriations.
3) Resource Advisory Committee (RAC)	The Ravalli County RAC recommended, and the Forest Supervisor approved, funding for: a) A two-year program to map and treat blueweed (Echium vulgare) and common bugloss (Anschusofficinalis), two new species of concern. b) The county noxious weed education specialist to develop an invasive weed education "trunk" and power point for use in presentations to middle school-age through adult audiences.
4) Participating Agreement with the Wilderness Institute	Initiated a 3-year agreement with the WI for mapping, monitoring, and handpulling invasive plants in the Selway-Bitterroot and Anaconda-Pintler Wildernesses in conjunction with planned NEPA analysis and inventory needs. The program involves the use of volunteers through the WI and promotes education and training about invasive plants.
5) Participating Agreement with Montana Conservation Corps	Initiated a 3-year agreement with the MCC that meshes with the Wilderness Institute agreement for mapping and treatment work in remote areas and trails on the Bitterroot Forest. The program also promotes education and training for the participants about invasive plants.
6) Participating Agreement with the Western Agricultural Research Center	This project increased funding, through a pre-existing agreement, to the WARC for the rearing and release of biological control insects on spotted knapweed.
7) Cooperative work with Salmon-Challis (S-C) National Forest	The Bitterroot and Salmon-Challis Forests are implementing a long term strategy for the FCRNR Wilderness to control invasive plants. Particular focus is on treatment and mapping of rush skeletonweed, a new invader on the BNF.
8) Rocky Mountain Elk Foundation Grant	This project funded invasive plant treatment (both chemical and biocontrol) and monitoring work on about 250 acres of relatively weed-free critical elk winter range in the upper West Fork watershed. Work focused on mapping and treating pioneering infestations of knapweed and a small infestation of rush skeletonweed, a new invader. The purpose is to maintain the grasslands in the highest and most productive ecological condition possible.

9) General Invasive Plant Education and Training	a) Wilderness Rangers inspect and enforce weed-free feed/hay requirements in the backcountry throughout the field and hunting seasons. In addition, they inform users about best practices to prevent the increase and spread of invasive weeds. b) Invasive plant awareness and prevention was a major theme again in this year's conservation education program. The Forest continued to develop working relationships with groups like the Bitterroot Garden Club, county schools, and Backcountry Horsemen. c) Forest specialists trained permanent and seasonal employees on each ranger district in the identification of new invaders and in the basic weed prevention measures outlined in the Region One supplement to the Forest Service Manual 2080 (R1 2000-2001-1).
10) Aerial Treatment	This ongoing multi-year contract treated about 1,500 acres of knapweed and sulfur cinquefoil in elk winter range and cross-boundary areas on the Sula Ranger District.
11) Roadside and ATV Treatment	This ongoing multi-year contract treated numerous weed-vector roads throughout the Forest and selected low relief grassland terrain compatible with ATV treatment for a wide variety of invasive plant species.
12) Biocontrol Program	This program involves: releasing biological control insects for several target invasive plant species at priority sites; recording the GPS locations of the release sites; and pre / post release measurements of plant community features and insect establishment.
13) Post-treatment Plant Monitoring	Grassland plant trend plots on 2004 aerial treatment sites were reread. A second contractor was hired for a two year monitoring project focusing on post-treatment plant succession trends.
14) BAER Program	a) Treatment and monitoring work for invasive plants continued on the Signal Rock and Como Lake Fires, which burned in 2005. b) Treatment and monitoring work was funded and initiated for the 2006 Gash Fire area.
15) Invasives Prevention	a) Weed prevention protocols for wash stations and general weed prevention best management practices were implemented on the Gash Fire.
16) Selway-Bitterroot Wilderness EIS	The four national forests involved in managing the SBW combined efforts launch the SBW Invasive Plant Management EIS.
17) Revegetation	Contract and force account crews planted native species seed and containerized seedlings on almost 100 acres of grasslands that received aerial herbicide treatment. The objective was to boost the native plant recovery on these sites.
18) TERRA Database Establishment	During the winter of 2006, inventory entry was completed in the new TERRA database. This was an essential piece missing from the Forest program and serves the important purpose of allowing the quick generation of maps by species and location of invasive weeds. With the depletion of post-fire recovery funding, it has become more important to correctly prioritize treatment and inventory work. The improved database allows the program manager to target work objectives and timing for maximum effect and efficiency.

Noxious Weed Inventory and Mapping

Table 16 indicates the most updated estimates of weed acres by species that occur on the Forest. Inventory, monitoring, and mapping of invasive plants in 2006 included 200 miles of trails, 550 additional acres, and 125 miles of road Forest-wide.

Changes in infestations shown in Table 16 largely reflect updated inventory and mapping rather than actual changes in acreages infested. The improved mapping obscures the progress made in the last few years in containing, shrinking, and, in some cases, eradicating infestations of target plant species. Now that the current inventory is in a database, trends may be easier to detect in future years.

The species listed in Table 16 are listed as category 1, 2, and 3 noxious weed species in the State of Montana. Category 1 invasive plants are those that are currently established and generally widespread in many Montana

counties. Category 2 invasive plants are recently introduced and rapidly spreading. Category 3 invasive plants have either not yet been detected in the State, or are found only in small, scattered, localized infestations.

Table 16 - Noxious Weed Infestation Information

Weed Species	Common Name	Category	FY 2001 inventory (estimated acres)	FY 2006 Inventory (estimated acres)
Cardaria draba	white top	1	0	1
Centaurea diffusa	diffuse knapweed	1	1	1
Centaurea bierbersteinii *	spotted knapweed *	1	274,000	274,000*
Centaurea repens	Russian knapweed	1	0	0
Centaurea solstitialis	yellow starthistle	3	0.3	0.3
Chondrilla juncea	rush skeletonweed	3	43	64
Chrysanthemum leucanthemum *	oxeye daisy *	1	Est. 500	2800**
Cirsium arvense	Canada thistle	1	100	604**
Crupina vulgaris	common crupina	3	0	0
Cynoglossum officinale	houndstongue	1	Unknown	1000**
Echium vulgare	blueweed	3	Unknown	2**
Euphorbia esula	leafy spurge	1	70	48
Hypericum perforatum	St. Johnswort	1	1000	1160
Linaria dalmatica	dalmatian toadflax	1	20	20
Potentilla recta *	sulfur cinquefoil *	1	2000	686
Ranunculus acris	tall buttercup	2	12	300**
Tanacetum vulgare	common tansy	1	Unknown	300**

* These species generally occur as a complex with spotted knapweed, sulfur cinquefoil, and oxeye daisy.
** Increase from 2001 reflects better mapping and recording.

Control Efforts

In 2006, the Forest used herbicides to treat approximately 12,400 acres of invasive plants. All treatments complied with the environmental protection measures itemized in Table 14 of the 2003 Noxious Weed Treatment Project Record of Decision.

Approved biological control organisms were released on 345 new acres in 2006. These were all first year releases approved by the 2003 Noxious Weed Treatment Project ROD.

Whitetop: This species occurs in Ravalli County, and has only been identified at one site on the forest.

Diffuse knapweed: This species was located during field surveys being conducted in the burned areas for sensitive plant populations in 2001. It is a small infestation (0.1 acre) in the Whiskey Gulch area, adjacent to private land. It is proposed for treatment in the Forest's Noxious Weed Treatment Project.

Dalmation toadflax: The largest infestation of this species occurs along the Sweeney Creek road. This site is being treated with picloram (Tordon®). Smaller infestations have been found on the West Fork District (along Painted Rocks Lake road).

Spotted knapweed: The majority of acres treated with herbicide in 2006 were for spotted knapweed. Picloram at a rate of one pint of herbicide per acre was used. Good containment results are apparent in areas including Reimel Ridge, Rye Creek Road, Magruder Corridor, and Bass Creek due to the diligent efforts of District spray crews and roadside contractors. Spotted knapweed was treated under contract on 28 trails, and consequently a reduction in occurrence and plant density is resulting from these spray efforts. Transline® is being used to treat spotted knapweed within administrative sites and recreational areas.

In early May of 2006, the Forest aerially treated 1440 acres of spotted knapweed dominated grassland in the Sula Peak area of the Sula Ranger District. The project used two different chemicals in order to tailor the treatment to the target species and avoid collateral damage to non-target species.

Russian knapweed: No known infestations occur on the Forest.

Yellow starthistle: In 2001, a small, localized infestation of yellow starthistle was located in the Salmon River drainage (Idaho), within the boundaries of the Bitterroot National Forest. This infestation was promptly treated and mapped. Another, much smaller infestation was located along the Selway road, between Paradise and the Magruder crossing and was also treated and mapped. One plant was found in the latter location in 2004 and again treated but none has been found since.

Rush skeletonweed: In 2006 two plants were found in the Deer/Chicken Creek area. Fall monitoring found several more plants in the same area which were pulled and treated. The site located at Fawn Ridge has received steady attention with chemical treatment since its discovery. The known site, treated in past years, is contained at 57 acres and appears to be diminishing in size.

Oxeye daisy: This species is found mostly along roadsides and riparian areas. It typically occurs with spotted knapweed and sulfur cinquefoil. Treatments were expanded in 2005 and onging in 2006.

Canada thistle: This species has been associated with timber sales and roadside areas. It is typically treated only when found with other weed species. However, a one-acre patch was treated in Blue Joint Meadows in 2003 and no other invasive plants were in the vicinity. This site was monitored in 2005 and again 2006 and only a few plants were found and treated.

Common crupina: There are no known infestations occurring on the Forest.

Houndstongue: Found along road sides, trail sides, timber sales, and other disturbed areas. Treatments are included in chemical applications for spotted knapweed. This plant seems to be expanding.

Leafy spurge: Intense monitoring during the spring of 2006 revealed few new sites. In past years there was an increasing number of new infestations, however due to diligent spraying over the last few years, the number of plants at reach site have greatly been reduced. The Little Sleeping Child Drainage supports several small infestations that have been receiving treatments—both chemical and biological. Eradication of this weed species continues to be the goal. Apthona beetles were found on the sites in 2003 and more releases were established in 2004.

St. Johnswort: Infestations occur along the Reimel Creek and Meadow Creek roads, the Magruder Corridor, and along many of the west side canyon trails. The largest infestation is in the Camas Creek area along the road sides. Beetles have been established. Efforts are aimed at keeping this species from becoming widely established in the Selway-Bitterroot Wilderness.

Sulfur cinquefoil: This species occurs in a complex with spotted knapweed, and has been treated with picloram. Accurate acreages are hard to obtain because of intermingling with spotted knapweed populations. It has been found near roads and trails, as well as in areas far removed from roads or trails. It has potential to consume as many acres as are currently infested with spotted knapweed, as it has been found to be commonly associated with knapweed and in some instances has out-competed knapweed. Sulfur cinquefoil responds well to chemical applications, but because it is a prolific seed producer, seedlings rapidly reestablish in subsequent years.

Tall buttercup: All populations of this species were treated again this year with MCPA. These treatments appear to be checking the spread of these populations.

Common tansy: This species has just recently been listed as a category 1 noxious weed within the State of Montana. Many roadsides have been treated along with knapweed.

Cheatgrass: While not listed formally at this time as a noxious weed in Montana, a petition for listing was submitted during the winter of 2004-2005. Cheatgrass is an invasive specie of annual grass that has demonstrated the ability to form replacement monocultures on sites where effective herbicide (and in a few instances biocontrol) treatment has eliminated a former monoculture of spotted knapweed. This species has shown that, under certain conditions, it can derail the objective of reinstalling a vigorous native plant community.

Biological Control: A cooperative working relationship with the Montana State University Agricultural Experiment Station has contributed to the expansion and effectiveness of the biological control program as well as a multi-year participating agreement. The target species for biological agent introduction are leafy spurge, Canada thistle, and spotted knapweed. Table 17 describes the biological control accomplishments for the 2006 season.

Table 17 - Biological Control Agent Releases

Agent (species)	Location	Target weed spp.	Number released
Cyphocleonus achates	Bitterroot NF	Spotted knapweed	14,200

Monitoring of biological control releases is ongoing. Effectiveness and population survival are monitored on an annual basis, with the goal of looking at long-term survival. New releases are typically given 2 years to transition into new environments before monitoring is conducted. In 2006, 69 biological control monitoring transects with photopoints were established. Good results are being seen on knapweed where biocontrols have been established in the valley bottoms for many years. Knapweed is difficult to find on many of these sites.

Invasive Plants in Wilderness

A basic weed-monitoring program (visual observations) has been in place for many years along trails and at campsites in the Selway-Bitterroot and Anaconda-Pintler Wilderness areas. Wilderness rangers have filled out weed location cards and/or have mapped weed locations. Recent observations are summarized below.

Anaconda-Pintler Wilderness: Invasive plants identified in the Anaconda-Pintler Wilderness include knapweed on the East Fork Trail near the trailhead and knapweed, Canada thistle, and tall buttercup in the Kurtz Flat area and beyond Star Falls.

Selway-Bitterroot Wilderness: Invasive plants identified along trails leading directly into the Selway-Bitterroot include:

- Knapweed -present for many years along trail corridors, sometimes in isolated patches. Also present on south facing slopes some distance above the trail especially along the Kootenai, Bass and Big Creek drainages.
- Canada Thistle -found in small patches trailside.
- Tall Buttercup - found scattered in trace amounts on most trails on the west side of the Bitterroot Valley.
- Common Tansy-found in trace amounts along Bass Creek Trail growing in trailside clumps.
- Sulfur Cinquefoil- found in similar habitat to knapweed. It is not limited to the trailside, but tends to run up the hillside.
- Goatweed – found along Sweathouse Trail before the wilderness boundary and in an isolated 1/2 acre patch in the South Fork of Sweeney Creek.
- Oxeye Daisy -Scattered trailside plants.

Monitoring of efforts to spot spray knapweed along trails[2] indicates that the canopy coverage of knapweed has been reduced by over 90%. Non-target species do not appear to have been affected by spot treatments (dead or wilting plants not observed). Still present along trails that have been sprayed are Canada thistle and tall buttercup.

Members of the public have adopted certain wilderness trails for pulling weeds. Weed pulling has been quite successful where weeds occur in limited numbers and in specific areas. For example, at Mill Creek falls in 2001 a wilderness ranger pulled only one knapweed rosette. A few years earlier, it was typical for this wilderness ranger to pull 25 - 30 full-grown plants yearly in the same area. Overall, however, hand pulling has achieved only limited success. For example, three miles further up Mill Creek, beyond the falls, a ¼ acre patch remained which was subsequently treated with herbicide in 2004, 2005, and 2006. Another example of the limited success of weed pulling is on the Bass Creek trail. The extent of knapweed coverage overwhelmed the weed pulling effort. Many knapweed plants were pulled, but more remained. They were subsequently treated with herbicide in 2004, 2005, and 2006.

All wilderness trailhead bulletin boards have a sign informing users of weed free feed regulations. Most Wilderness trailheads have noxious weed education posters.

Frank Church-River of No Return Wilderness: In 2006, over 2000 acres of spotted knapweed and rush skeletonweed were monitored and treated in the Frank Church Wilderness. Treatment areas included the Upper Selway Trail, Fawn Ridge and the Prospect to Dywer Trail.

[2] Monitoring consisted of visual observations by a wilderness ranger.

Elk Habitat Effectiveness
Item 7

OBJECTIVES: Monitor and ensure compliance with Forest Plan standard for Elk Habitat Effectiveness.

DATA SOURCE: Travel plan, Timber Stand Management Record System (TSMRS), and inventory.

FREQUENCY: Annually.

REPORTING PERIOD: 2006.

VARIABILITY: Any deviation from Forest-wide objectives.

EVALUATION:

The Forest's monitoring reports through FY1992 contained data on Elk Habitat Effectiveness (EHE). Since then, we have collected data on each of the Integrated Resource Analysis areas as they are considered for project work. The evaluations have shown that EHE objectives can be met by closing roads to motorized vehicles during the season elk use the area.

When developed as a Forest Plan standard, EHE was a surrogate for hunting season security. In implementing the Forest Plan, we found the technique to be more valid for evaluating the capability of land to support elk in the absence of hunting. The 2003 and 2004 monitoring reports (Elk Security Sections) explained that the Hillis method (1991) is more appropriate for analyzing hunting season security.

The fires of 2000 probably decreased EHE in some drainages by removing vegetation that had made some roads impassable, thus increasing open road densities. These roads were evaluated during the Post-Fire Assessment and many have been scheduled for decommissioning (permanently removed from the Forest road network) or storage (physically closed to all motorized travel). As the Forest Plan initiates travel management planning, the transportation system will be analyzed for its impact on elk habitat.

The Forest Plan Five Year Review (1994) contains an evaluation of the current approaches for assessing the condition of elk populations on the Bitterroot NF. We are using the information from the review as we revise the Forest Plan.

A site-specific Forest Plan amendment in the Middle East Fork Hazardous Fuel Reduction Project Record of Decision for Winter Range Thermal Cover reads as follows: “Existing thermal cover will be maintained within Middle East Fork treatment units to the extent it does not conflict with meeting the project’s objectives.” This site-specific amendment recognizes and addresses the conflicting nature of the Forest Plan’s fuels/fire protection goals, objectives and standards for the wildland urban interface and the overlapping winter range thermal cover standard defined on page 8 of the Forest Plan Record of Decision (1987).

Elk Population in Relation to Habitat Changes
Item 38

OBJECTIVE: Monitor population trends and determine relation to habitat changes.

DATA SOURCE: Montana Department of Fish, Wildlife, and Parks (FWP).

FREQUENCY: 100 percent annually.

REPORTING PERIOD: 1997-2007

VARIABILITY: +/- five percent of most recent three-year average.

EVALUATION:

The change in elk population has exceeded an increase of five percent twice in the last ten years. Further evaluation indicated the increases are occurring in the proper areas according to the Montana Elk Management Plan. The 2005 Montana Elk Management Plan established population objectives by Hunting District as follows:

Table 18 – Elk Population Objectives by Hunting District

Hunting District	Elk Population Objectives
HD 240	750
HD 204 - 261	1320
HD 270	3000
HD 250	2000

The total objective for the Bitterroot elk herd is therefore 7070 elk. FWP trend counts indicate population objectives have been exceeded in all Hunting Districts except 240 and 250. The trend counts indicate a healthy, increasing elk herd that exceeds FWP and Forest Plan population objectives Forest-wide.

The most recent three-year increase (+2%) is within Forest Plan variability and does not warrant further evaluation. Forest personnel continue to work with Montana Fish, Wildlife and Parks to achieve population objectives in all hunting districts across the Forest.

MONITORING RESULTS:

FWP personnel conduct annual aerial elk counts. The results of the flights, done as consistently as possible from year to year, indicate a reliable trend in elk populations on early spring ranges in the Bitterroot Valley. The annual trend surveys began in the early 1950s and show a steady growth in the Bitterroot elk herd since that time. The number of elk detected has doubled since the early 1980s. Table 19 displays three-year averages as required by the Forest Plan when monitoring elk populations to detect possible effects of habitat changes.

Nearly 7,200 elk were seen in the Bitterroot in 2007, making this the fourth highest total observed in the nearly 50-year history of the trend counts. Over the past five years, population trends have continued upward.

Table 19 - Elk Populations, Three-Year Running Average
(Number of elk and percent change)

3-Year Period	1997-99	1998-00	1999-01*	2000-02*	2001-03*	2002-04	2003-05	2004-06	2005-07
Average Elk Population	6090	6112	6143	6394	6795	6954	7555	7620	7760
Percent Change	0	0	0	+4	+6	+2	+8	+1	+2

* Assuming level trends in elk population for Hunting Districts 240 and 250, which were not surveyed in 2001.

Pine Marten Population in Relation to Habitat Changes
Item 39

OBJECTIVE: Monitor population trends and determine relation to habitat changes (36 CFR 219.19(a)(6)).

DATA SOURCE: Track surveys.

FREQUENCY: Three transects annually after the five-year average is established.

REPORTING PERIOD: 2006

VARIABILITY: +/- five percent of most recent five-year average.

EVALUATION:

The Bitterroot NF has been monitoring marten populations by searching transects for marten tracks since 1988. We surveyed nearly 750 miles of transects between 1988 and 1996. In that period, we saw an average of one marten track every 6.7 miles (6.7 miles per track). Variation among transects was high, ranging from four miles per track to 11 miles per track. It would appear that our population is much less dense than a Canadian population, where Thompson et al. (1989) found nearly three tracks per mile of transect surveyed. The 1988-1996 data established a base line population index with which to compare future information. This information is used for comparison instead of a strict "most recent five-year average" because it contains more robust data.

When compared to the base line data, more recent surveys have shown a dramatic decrease in the miles per marten track. This could reflect an increase in marten numbers, or could be indicative of sampling variables such as snow conditions during surveys. If populations are increasing, it is difficult to attribute this to a particular cause like habitat change, as this monitoring item intended. The most recent science and analysis indicate that pine marten are doing well on the Forest, and we will continue to use monitoring and research results to evaluate this management indicator species.

MONITORING RESULTS:

Each Ranger District has established permanent pine marten monitoring routes. We established these transects in developed areas, areas to be developed, and areas where no development is scheduled. We counted tracks that crossed the transects to establish a base line population index for comparison with future track counts.

The Forest did not complete many marten monitoring transects between 1997 and 2003 because of other funding priorities. The few surveys completed during this period were either consistent with earlier surveys (Larry Creek) or found more marten tracks per mile (Willow Mountain) compared to previous surveys. We completed nine marten transects in FY 2004, but have not completed any since then due to other priorities and a lack of snow.

Table 20 - Marten Transects Conducted in 2004

Transect	Year	Miles	Tracks	No. of times surveyed	Miles/Track
Larry Creek	2004	12	40	2	0.3
Willow Mountain	2004	19	42	2	0.5
Lost Horse	2004	17	30	1	0.6
Skalkaho/Rye	2004	24.5	6	2	4.1
Meadow/Tolan	2004	17	3	1	5.7
Nez Perce Pass	2004	5.5	28	1	0.2
TOTAL		**95**	**149**		**0.6**

The average number of miles surveyed per marten track in 2004 (0.6 miles/track) was considerably lower than the average from 1988 to 1996 (6.7 miles/track). This means that we saw many more marten tracks in 2004 than in

the 1988 to 1996 period. This year's data showed a 91percent decrease in miles per marten track compared to the long-term average, which triggered further evaluation. The apparent decrease in effort required to find tracks could mean that marten numbers have increased dramatically, but could also be a result of other sampling or environmental variables. Results on the Larry Creek and Willow Mountain transects were the same in 2003 and 2004 (Larry Creek had 0.3 miles/track both years; Willow Mountain had 0.5 miles/track both years). Our evaluation only supported the difficulty of drawing conclusions given the number of variables that factor into survey results. Such variables include year-to-year population variability, weather differences between years, and environmental changes caused by events such as wildfires or management activities.

Graduate students from the University of Montana have conducted two research projects related to marten on the Bitterroot NF in recent years. One evaluated the effectiveness of snow tracking, remote cameras, and sooted track plates in detecting the presence of marten, fisher, and wolverine in several large canyons (Foresman and Pearson 1995; Foresman and Pearson 1998). The other looked specifically at the effectiveness of sooted track plates in determining the presence of marten known to be in the area (Ivan 2000). Neither study was designed to determine marten population levels or monitor changes in marten population levels. However, the researchers felt that the canyons they surveyed supported good numbers of marten (K. Foresman, pers. comm.).

Forest biologists have rated the suitability of the marten habitat across the Forest. Considering all the area rated, the Habitat Suitability Index for marten was calculated at 0.32. This index tells us that on average, marten habitat on the Bitterroot Forest (at least the 190,000 acres rated for suitability) is about 1/3 as good as the best marten habitat. This implies that marten are likely to occur in low densities in suitable habitat throughout the Forest. However, marten populations are likely to be robust in the corridors of high quality habitat that exist along many of the larger streams draining the Bitterroot Mountains.

At a Forest wide scale it is estimated that we have approximately 393,400 more acres of marten habitat than is necessary to maintain a minimum viable population (Samson 2006). Another way to say this is that we have an estimated 2,374% of the habitat necessary to maintain a minimum viable population of marten on the Forest.

These findings are also consistent with the broader view offered by the Natural Heritage Program. The international network of Natural Heritage Programs employs a standardized ranking system to denote global (G — range-wide) and state (S) status. Species are assigned numeric ranks ranging from 1 (critically imperiled) to 5 (demonstrably secure), reflecting the relative degree to which they are "at-risk." The Montana Natural Heritage Program classifies the American marten as a G5 S4 species (MNHP, 2006). This means that at the global scale, marten are considered to be common, widespread, and abundant, and not vulnerable in most of their range. At the state scale, marten are considered to be uncommon but not rare, and usually widespread. They are apparently not vulnerable in most of their range, but there is possibly cause for long-term concern. University of Montana mammalogist Kerry Foresman classifies marten as common in Montana, and shows that they occur throughout the western and southwestern parts of the state (Foresman 2001). FWP trapping records indicate that between 1996 and 2002 (the latest year available), the average number of marten taken by trappers annually was 1,133 across Montana, 202 within FWP District 2, and 66 within Ravalli County.

No further evaluation is needed at this time, since all indications are that pine marten appear to be doing well on the Forest. Continued monitoring and research may eventually allow us to draw some clearer conclusions.

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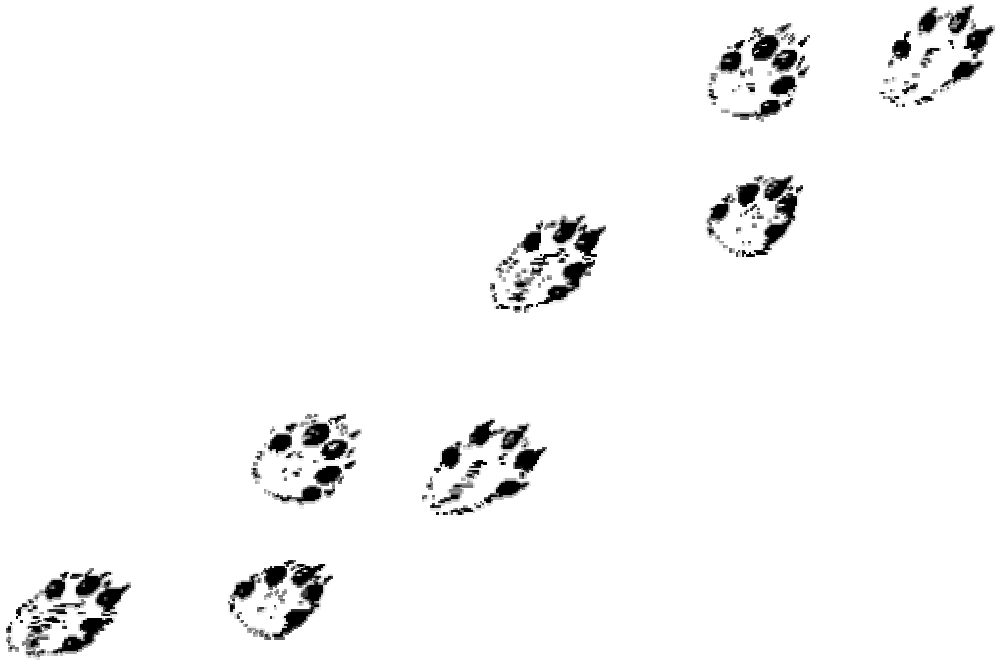

Pileated Woodpecker Population in Relation to Habitat Changes
Item 40

OBJECTIVE: Monitor population trends in relation to habitat changes.

DATA SOURCE: Call transects.

FREQUENCY: Three transects annually after the five-year average is established.

REPORTING PERIOD: 2006.

VARIABILITY: +/- five percent of most recent five-year average.

MONITORING:

Most Forests in Montana and Idaho use the Northern Region's standardized technique for establishing and monitoring pileated woodpecker call routes. We established nine call routes on the Bitterroot National Forest (BNF) that are each monitored three times annually, if weather and budgets allow. In 1997 and 1998, we sampled no transects due to budget constraints. In FY 2006, we completed one survey on one route, two surveys on each of three routes, and three surveys on each of five routes for a total of 22 transects. We recorded an average of 0.19 pileated woodpecker detections per mile of transect, slightly below the 2005 detection rate and the long-term average. This year's figure is within 5 percent of the long-term average of 0.21 detections per mile, and matches the most recent 5-year average of 0.19 detections per mile. Further evaluation of these data follows.

EVALUATION:

Data from nine monitoring transects scattered over the Forest show high variability in pileated woodpecker detections among transects and between years. Although the scientific literature has validated the usefulness of the call route technique to monitor population trends, more transects may be needed to reduce variability and increase confidence in our data. Lack of funding has precluded establishment of more transects, but we do have some base line information. We have systematically run approximately 1283 miles of transects since 1988. We recorded an average of 0.21 calls or sightings per mile of transect over that period. The 2006 recording of an average 0.19 pileated woodpecker detections per mile of transect is within 5% of this long-term average, but matches the most recent 5-year average.

Figure 7 - Results of Pileated Woodpecker Call Counts, 1989-2006

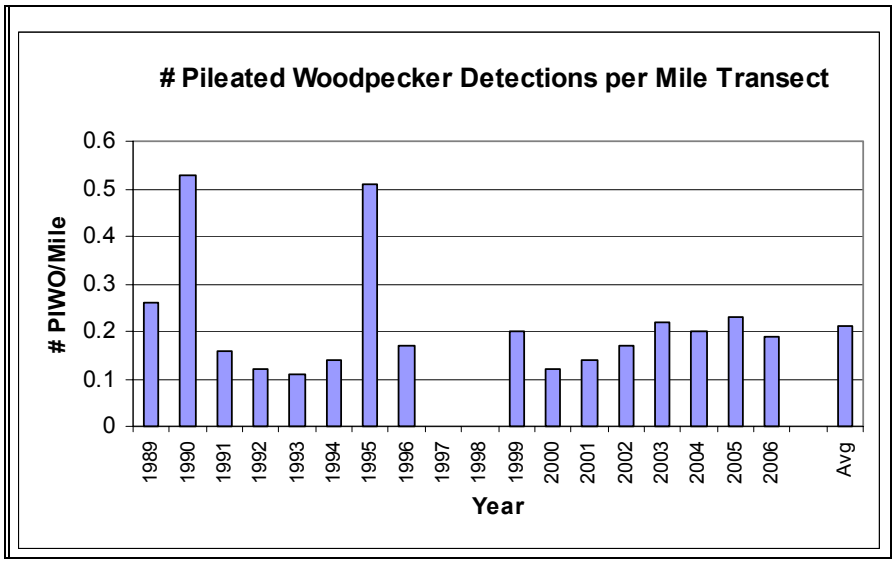

Figure 7 displays the number of pileated woodpecker calls or sightings detected per mile of transect monitored across the entire Forest by year. Ignoring the large spikes in pileated detections in 1990 and 1995, these data show that pileated detections declined somewhat in the early 1990s but have been increasing since then, until 2000. The spikes in 1990 and 1995 illustrate the variability inherent in these types of transects, and may or may not indicate actual changes in population levels. The low number of detections per mile in 2000 could indicate that populations declined that year, but could also be a result of other factors. The number of detections per mile generally increased slightly each year from 2000 to 2005, despite the fact that several of the transects were burned extensively during the fires of 2000. Pileated woodpeckers are not normally associated with moderate to high-severity burned areas.

The number of detections can be influenced by local weather or stream conditions which can make hearing difficult, the period of time during the breeding season when transects are run which can influence the frequency of vocalizations, and the ability of the observer to hear and correctly identify pileated calls. Changes in the number of detections over time may also indicate actual changes in the number of birds present, which could be a result of habitat change or a number of other factors such as weather. Cool, wet springs, for example, drastically reduce the productivity of many bird species. The variability introduced by these factors makes it difficult to determine, by themselves, whether pileated woodpecker populations are changing on the Bitterroot National Forest, and if so, why.

We know that habitat quality for this species declined in the late 1800s and early 1900s across the Forest as a result of extensive cutting of mature ponderosa pine habitats. Fire suppression has also reduced habitat quality since the 1930s. Nevertheless, a recent habitat assessment for the pileated woodpecker indicates adequate habitat exists and is well distributed on the Forest and across the Northern Region. Based on this assessment, the Bitterroot National Forest is estimated to contain sufficient suitable nesting habitat to support about 91 pairs of pileated woodpeckers, and enough winter foraging habitat to sustain almost 800 pairs of this species (Samson, 2006). This habitat is well-distributed across the BNF at lower to mid elevations. Habitat estimates only include National Forest System lands and alone are estimated to provide 86% of the habitat necessary for a minimum viable population (Samson 2006). Additional nesting habitat for pileated woodpeckers is located on private lands in the Bitterroot valley in the mixed cottonwood and ponderosa pine forests along the Bitterroot River and many of its larger tributaries. These bottomland forests provide some of the most productive habitat for this species, and also serve to connect subpopulations in the surrounding mountains. The presence of large amounts of high quality habitat on private land indicates that the Bitterroot drainage is capable of supporting a much larger population of pileated woodpeckers than indicated by the Forest's estimates alone.

At the Regional scale, habitat modeling estimates that there is enough suitable nesting habitat to support about 2362 pairs of pileated woodpeckers, and enough winter foraging habitat to sustain about 19,430 pairs of birds (Samson, 2006). Again, this estimate does not include the high quality habitat located along the river and stream corridors on private land. Median dispersal distance for pileated woodpeckers is estimated to be about 150 miles, which indicates that pileated woodpeckers across the entire Region belong to a single, well connected population. The Forests neighboring the Bitterroot to the north and west show pileated woodpecker habitat in excess of the quantity modeled to maintain a minimum viable population on their Forests alone (Lolo -165%, Clearwater -346% and Nez Perce -459%). Although no population estimates are available, the large amount of apparently suitable habitat well distributed across the Region combined with the interconnectedness of the population indicates that short-term viability of pileated woodpeckers across the Region is not an issue (Samson, 2006).

These findings are also consistent with the broader view offered by the Natural Heritage Program. The international network of Natural Heritage Programs employs a standardized ranking system to denote global (G — range-wide) and state (S) status. Species are assigned numeric ranks ranging from 1 (critically imperiled) to 5 (demonstrably secure), reflecting the relative degree to which they are "at-risk." The pileated woodpecker is listed as G5 and S4 in Montana. G5 indicates that throughout its range, it is considered common, widespread, and abundant, although it may be rare in parts of its range. It is not vulnerable in most of its range. S4 indicates that in Montana, it is uncommon but not rare, although it may be rare in parts of its range, and usually widespread. This statewide rating also indicates the specie is apparently not vulnerable in most of its range, but there is possible cause for long-term concern. The positive trends from Forest monitoring discussed above indicate both the pileated woodpecker and its habitat are doing well on this Forest.

Given the above evaluation of data since 1988, we conclude that current management on the Bitterroot National Forest is having no discernable negative impacts on the pileated woodpecker. Our evaluation of this year's detections equaling the five-year average indicates current management practices are appropriate. Suitable habitat appears to be well distributed across the Forest, river basin, and Region. Most of the Forest's recent

management activities in lower elevation forests emphasize restoration of mature ponderosa pine habitats, which should benefit pileated woodpeckers over time.

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Threatened and Endangered Wildlife Species

OBJECTIVE: Monitor threatened and endangered species populations and trends, and initiate recovery as planned. Determine population and habitat relationships and recovery needs as specified by the Region and USDI Fish and Wildlife Service.

DATA SOURCE: Monitoring wolf recovery updates, off-forest environmental impact statements (e.g., Wolf Recovery Plan and Grizzly Bear Recovery Plan), and other data as available.

FREQUENCY: Annually.

REPORTING PERIOD: 2006.

VARIABILITY: Changes in trends that indicate recovery or further declines.

INTRODUCTION:

The USDI Fish and Wildlife Service (FWS) currently lists gray wolf, bald eagle and grizzly bear as threatened or endangered wildlife species that may occur on the Bitterroot National Forest. FWS also lists the yellow-billed cuckoo (western population) as a Candidate wildlife species that may occur on the Forest. The Bitterroot NF wolf population is considered proposed (see discussion below). FWS reintroduced gray wolves into the Frank Church-River of No Return Wilderness in 1995 and 1996, and those individuals and their descendents dispersed across northern Idaho and western Montana, including the Bitterroot NF. Bald eagles are a common winter resident in the Bitterroot valley, and 11 spring nests were recorded in 2005, most of them along the Bitterroot River. The grizzly bear has not been confirmed as occurring in the Bitterroot drainage since the 1950s, with one exception (see below). Peregrine falcons were delisted by FWS in August 1999, and are now classified as a sensitive species by the Regional Forester. Lynx were proposed for listing under the Endangered Species Act in 1999. FWS listed them as threatened in 2000, and included them on the list of threatened and endangered wildlife species that may occur on the Forest until 2006. In an amendment to the 2005 Canada Lynx Conservation Agreement the Bitterroot National Forest has been classified as Unoccupied Lynx Habitat by the USFWS and the Forest Service. Lynx are no longer included on the FWS list of threatened and endangered species that may occur on the Forest.

GRAY WOLF (Proposed) EVALUATION & MONITORING RESULTS:

The Bitterroot NF is within the boundaries of the Central Idaho Nonessential Experimental Population Area (CINEPA) for gray wolves. The CINEPA includes all of Idaho south of I-90 and north of I-84 and I-86 and west of I-15, and all of western Montana south of I-90 and west of I-15. Any wolves within this area are treated as a proposed species under Section 10 (j) of the Endangered Species Act. Therefore, the Forest is only required to confer with the Fish and Wildlife Service if an action "is likely to jeopardize the continued existence" of the species. The availability of ungulate prey and isolation from human disturbance/mortality are the two most important factors in determining suitable wolf habitat.

Wolves continue to expand their range and numbers within the CINEPA and the Bitterroot National Forest. Wolf monitoring efforts conducted by the Montana Department of Fish, Wildlife and Parks, the Idaho Department of Fish and Game, and the Nez Perce Tribe documented 11 new wolf packs in Idaho and seven new wolf packs in the Montana portion of the CINEPA in 2006. Reproduction was confirmed in 59 packs within the CINEPA, 43 of which met the recovery standards for a breeding pair. These packs produced a minimum of 181 pups in 2006, a 31% increase over the known pup production in 2005. 96 wolves were confirmed to have died in 2006 within the CINEPA, including at least 87 due to human-related causes. The total wolf population across the CINEPA at the end of 2006 was estimated at 739 wolves, a 31% increase over 2005 (USFWS et al. 2007).

Eight wolf packs were known to use portions of the Forest in 2005. Three new wolf packs were documented on the Forest during 2006. As a result, at least eleven wolf packs were known to occur on portions of the Forest at the end of FY 2006. In addition, one additional new pack (the Sleeping Child pack) was discovered, but was later removed through lethal control after repeated livestock depredations. This pack was not included in the totals above.

The Lake Como pack appears to use the area between Lake Como and Trapper Creek, although its territory is uncertain due to a lack of radio collars in the pack. The Brooks Creek pack uses the area between Bass Creek and Mill Creek, as well as the adjacent drainages in Idaho. This pack denned in Idaho in 2006, so was counted as an Idaho pack this year. The Sula pack uses the area between Sula and Lost Trail Pass. The Skalkaho pack's territory seems to include the area between Skalkaho Creek and Willow Creek. The Sapphire pack inhabits the Sapphire crest and the Ross' Fork and West Fork Rock Creek drainages. The Painted Rocks pack inhabits the West Fork of the Bitterroot River. The new Divide Creek pack uses the Divide Creek and Rye Creek drainages. The new East Fork Bitterroot pack uses the area to the north of the East Fork. The new Welcome Creek pack appears to use the north end of the Sapphire Mountains, including the area near the Threemile Game Range. The Selway pack's territory includes the area roughly between Magruder and the vicinity of Elk City, Idaho on the Nez Perce NF. The Magruder pack's territory includes tributaries to the Salmon River and the Harrington Ridge area to the south of the Selway pack. The status of this pack was not confirmed in 2006.

Table 21 summarizes known information on the number of individuals in each pack, as well as the number of known wolf mortalities from any cause and the number of livestock or domestic animals confirmed killed by each pack (USFWS et al. 2007).

Table 21 – Status of Known Wolf Packs on the Bitterroot National Forest as of 12/31/06

Pack Name	State	Known Adults	Known Pups	Known Total	Known Wolf Mortalities	Confirmed Depredations
Brooks Creek	ID	3	6	9		
Divide Creek (new)	MT	1	?	4		
East Fork Bitterroot (new)	MT	3	3	6		
Lake Como	MT	2	?	2		
Magruder	ID	?	?	?		
Painted Rocks	MT	?	?	4		
Selway	ID	?	1	4		
Sula	MT	?	?	7		
Skalkaho	MT	?	?	?	2	1 cow, 2 dogs
Sapphire	MT	10	4	14		
Welcome Creek (new)	MT	?	?	4		
Sleeping Child (new, removed)	MT	0	0	0	15	4 cows, 1 dog
Minimum Totals		19	14	54	17	8

The territories of three other Idaho packs (Hughes Creek, Owl Creek and Indian Creek) may include portions of the West Fork drainage, but territory boundaries for these packs are uncertain. The Forest receives numerous reports of wolf sightings outside the territories of the known packs each year, and it is possible that other packs exist on the Forest. Transient wolves pass through the BNF on a regular basis.

GRIZZLY BEAR (Threatened) EVALUATION & MONITORING RESULTS:

Grizzlies are far-ranging animals that require protection from human caused mortality, but subsist in a wide variety of habitats depending primarily on food availability. Historical records indicate that grizzly bears were once abundant in the Bitterroot Mountains, but did not survive the intense pressure to eliminate them as threats to domestic sheep and cattle. The last known grizzly was hunted and killed in the area in 1956. Since that time, periodic sightings of grizzly bears have been reported in the Bitterroots, most of which were probably black bears. The only recent confirmed sighting of a grizzly bear in the Bitterroot drainage was an apparent transient bear that was seen two nights in a row on private land on Sunset Bench southeast of Stevensville in late September, 2002. This animal had apparently crossed the Sapphire Range from the Rock Creek drainage, where it was seen and photographed feeding on a moose gut pile the previous day. The bear disappeared after it was seen on Sunset

Bench. The origin of this bear is uncertain; no other grizzly bears had been confirmed in either Rock Creek or the Sapphire Range for many years.

The Selway-Bitterroot ecosystem is one of six ecosystems in the continental U. S. outside of Alaska that are managed for grizzly bears. Although grizzly bears have not been confirmed to occur in the Selway-Bitterroot in recent years, FWS studied the Bitterroot Grizzly Bear Evaluation Area to determine its habitat capability for grizzly bears. The evaluation determined the area was suitable for grizzly bears, and it is now a grizzly bear recovery area. The FWS prepared an Environmental Impact Statement and issued a Record of Decision in November 2000 (USFWS, 2000), which approved reintroduction of grizzlies into the Selway-Bitterroot ecosystem as a nonessential experimental population starting in 2002. Implementation of this decision is currently on indefinite hold due to political considerations.

BALD EAGLE (Threatened) EVALUATION & MONITORING RESULTS:

Bald eagles are usually associated with large rivers, lakes or the ocean where fish are readily available as a prey item. They have made a dramatic recovery in Montana and across the country since they were listed as Endangered in 1973. As a result of this recovery, bald eagles were downlisted to Threatened in 1995, and there are ongoing efforts to de-list them altogether. There were only 12 known nesting pairs of bald eagles in Montana in 1973. By 2006, there were about 366 active bald eagle nests known in Montana that fledged a minimum of 504 juvenile eagles (MFWP, 2007).

Montana FWP personnel monitor bald eagle nests along the Bitterroot River from an airplane. They discovered 3 new bald eagle nests in the valley in 2005, but no new nests in 2006. There are now 11 known bald eagle nesting territories in the Bitterroot drainage. In 2006, 11 active bald eagle nests fledged at least 18 juvenile bald eagles (MFWP, 2007). One of the nests washed away due to river bank cutting before the young were fledged, and productivity of another is unknown because the female was still incubating the last time the nest was checked. The presence of these nests indicates that the breeding population of bald eagles in the Bitterroot Valley has increased dramatically in the past five years.

We discovered the first known bald eagle nest on the Bitterroot NF near Lake Como in April 2003. This nest fledged two young in 2003, and one young in 2004. In 2005, the nest again fledged at least one juvenile eagle. To date, this is the only known bald eagle nest on the Forest.

The Bitterroot drainage also provides fall, winter, and spring habitat for bald eagles. The Hamilton and Stevensville Christmas Bird Counts indicate that the number of bald eagles wintering in the Bitterroot Valley is large and stable or increasing. Wintering eagles can be found throughout the Bitterroot Valley, especially in areas near the Bitterroot River and in areas where road-killed deer are common. Wintering bald eagles usually leave the area in February and March for northern breeding grounds. Bald eagles use Painted Rocks Lake and the East and West Forks of the Bitterroot River during migrations. Whether or not they use an area is dependent upon the availability of food (waterfowl, fish, road kills), lake levels, and the weather.

LYNX (Threatened) EVALUATION & MONITORING RESULTS:

Lynx are uncommon and occur in low densities in even the best habitat. Lynx do not use open or semi-open areas (Maj 1992). They use mature and over mature spruce and subalpine fir forests with deadfalls for denning. Foraging habitat typically is dense 20- to 30-year-old sapling and pole-sized stands of lodgepole pine and other conifer species (Quinn and Parker 1987; Koehler and Brittell 1990; and Thompson et al. 1989). Lynx are dependent on snowshoe hare (*Lepus americanus*) as their primary prey. Lynx abundance and density varies with the cyclic snowshoe hare population fluctuations and trapping pressure. In this area, snowshoe hares frequent dense stands of trees in early successional stages (Koehler and Brittell 1990). The shrubs and saplings provide food for the hares as well as cover from predators. Providing good hare habitat will benefit lynx (Quinn and Parker 1987).

Forest personnel identified a set of lynx tracks in the upper Larry Creek drainage in 2004 during a marten monitoring transect. A hunter reported seeing a lynx in the upper Lick Creek drainage in 2002. Montana Fish, Wildlife and Parks personnel sometimes find lynx tracks on or near the Forest while conducting their furbearer track surveys. Montana Department of Fish, Wildlife and Parks trapping records indicate one lynx was taken

during the 1994-95 trapping season in Hunting District 270. This was the first lynx reported taken for several years.

The Forest was part of a pilot program to test the effectiveness of lynx monitoring using hair snare methodology in 1999, 2001, and again in 2002-3. The Forest established a grid of stations scented with a lynx attractant near the Continental Divide east of Lost Trail Pass. We checked hair snares at these stations on a regular basis, and collected any hair samples found. Lab analysis of these samples identified hair from a number of different mammal species, but none of the samples contained lynx hair.

In 2006, the Bitterroot NF analyzed project effects to lynx through Biological Assessments using the objectives, standards, and guidelines contained in the Canada Lynx Conservation Assessment and Strategy (Ruediger et al. 2000). The Forest is part of an ongoing, multi-region, multi-agency effort to amend the Forest Plan to incorporate these or other conservation methods. The draft environmental impact statement for the lynx amendment was released for public comment in January 2004, but was still undergoing revisions in 2006.

In an amendment to the 2005 Canada Lynx Conservation Agreement the Bitterroot National Forest has been classified as Unoccupied Lynx Habitat by the USFWS and the Forest Service. Lynx are no longer included on the FWS list of threatened and endangered species that may occur on the Forest.

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Sensitive Wildlife Species

OBJECTIVE: Monitor sensitive wildlife species habitat and populations to minimize impact until conservation strategies are prepared. Track populations and trends. Determine population and habitat relationships.

DATA SOURCE: Surveys and habitat mapping from project planning.

FREQUENCY: When a project area is analyzed.

REPORTING PERIOD: 2006.

VARIABILITY: Data that indicate downward trends in populations or habitat or stable, viable populations or habitat.

INTRODUCTION: Sensitive species are those animal species identified by the Regional Forester for which population viability is a concern, as evidenced by:

- ♦ Significant current or predicted downward trends in population numbers or density; and/or
- ♦ Significant current or predicted downward trends in habitat capability that would reduce a species' existing distribution.

The regional list was updated in 2005, and the current sensitive wildlife species listed for the Bitterroot NF are black-backed woodpecker, boreal toad, Coeur d'Alene salamander, fisher, flammulated owl, northern bog lemming, northern goshawk, northern leopard frog, peregrine falcon, western big-eared bat, and wolverine.

The management goal for sensitive species is to maintain a viable population of a species throughout its range within the planning area (FSM 2670.5 19,28). The planning area is the Bitterroot NF. The Forest provides special management emphasis to ensure sensitive species viability and to preclude trends toward endangerment that would result in the need for federal listing under the Endangered Species Act of 1973. On National Forest projects, our wildlife biologists complete biological evaluations to determine the effects each project will have on sensitive species.

The following is a description of the sensitive species' habitats and the monitoring and evaluation we did in 2006.

BLACK-BACKED WOODPECKER

Black-backed woodpeckers' preference for recently burned forest has led to its listing as sensitive. Most research on black-backed woodpeckers indicates that they are dependant upon fires, particularly in the Northern Rockies (Hutto 1995, Caton 1996, Hitchcock 1996, Murphy and Lehnhausen 1998, Saab and Dudley 1998, Hejl and McFadzen 2000). Post-burn area studies in Oregon, Montana, Idaho, and South Dakota consistently report that wood-boring beetles that occur in abundance (2 to 8 years) following a fire are an important food source for the woodpecker. Hutto (1995) stated the black-backed appears nearly restricted to post-burns, and Murphy and Lehnhausen (1998) postulated that local populations increase in number in post-burned areas and decrease in unburned areas. Preferred nesting habitat is characterized by high snag densities (Hejl and McFadzen, 2000).

Black-backed woodpeckers however, are also found in unburned forests and in areas of insect outbreaks (Marshall 1992, Bock and Lynch 1970, Apfelbaum and Haney 1981, Harris 1982, Goggan et al. 1988), but they likely occur at lower densities and viability may not be maintained over time without sufficient post-fire habitat. For example, home ranges for black-backed woodpeckers in beetle-killed forests were estimated to be 1,000 acres, compared to an estimated territory size of 56 acres/pair in post fire habitat (Powell 2000). Some studies indicate that black-backed woodpeckers forage primarily on wood-borers, which may explain this difference in suitability between beetle outbreaks and post-fire habitat. Wood borers are much less abundant than bark beetles in areas of bark beetle outbreaks (Powell 2000). However, insect outbreak studies (without fire) suggest the species is attracted to other insects such as bark beetles when these insects provide an abundant prey base (summarized in Samson 2006). Arnett (et al. 1997a and 1997b) found similar densities of black-backed woodpeckers in mountain pine beetle killed areas, as in post-burns, further suggesting the species is not “restricted” to post-burns. Hoyt and Hannon (2002) noted that few studies have considered all habitats in

proportion to availability nor considered the difficulty in comparing bird densities observed in open post-fire habitats versus bird densities observed in closed canopy and structurally complex, live forests.

Monitoring:

Forest personnel located six active black-backed woodpecker nests in 2004 as part of the preliminary stage of a University of Montana PhD study looking at the genetics of black-backed woodpeckers. All of these nests were located in areas that burned during 2003.

The Forest established several transects in 2002 to monitor the amount and duration of cavity nester use of forests burned at different intensities in 2000. We found a number of active cavity nests in forests that burned with moderate to severe severity, but few active cavity nests in forests that burned with low severity. We did not document any black-backed woodpecker nests on these transects in 2003 or 2004, but have not run these transects since then.

A research project conducted by scientists at the Rocky Mountain Research Station, Forestry Sciences Lab in Missoula looked at cavity nesting densities of nine species in the Ward Mountain fire (burned in 1994) and the Swet/Warrior Fire (burned in 1996). The Forest Service harvested portions of the Ward Mountain fire using a salvage prescription in 1995. The Swet/Warrior fire, located within the Selway-Bitterroot Wilderness, was not harvested. The researchers found nesting densities of black-backed woodpeckers were higher in the unharvested area than in the area that had been salvage logged (Hejl et al. 2000).

Evaluation:

It is apparent the Bitterroot National Forest (BNF) has, and continues to provide, sufficient and well distributed habitat to support the black-backed woodpecker. This conclusion is based on Forest monitoring and the following evaluation of other available information.

Habitat modeling based on Forest Inventory and Analysis data (FIA) estimates that the Bitterroot National Forest contains sufficient post-fire habitat to support between 2898 and 4490 pairs of BBWO (Samson, 2005). At a Forest-wide scale it is estimated that we have 373,615 acres of black backed woodpecker habitat over what is necessary to maintain a minimum viable population (Samson 2005). Another way to say this is that we have an estimated 1,371% of the habitat necessary to maintain a minimum viable population of black-backed woodpeckers on the Forest. Although the portion of this habitat that burned in 2000 is losing its suitability, fire records show continual recruitment of new post-burn habitat. This habitat is well-distributed across the BNF as a result of the widespread fires in 2000, 2003, and 2005 plus smaller amounts of fire in other years. Since 1989, the Bitterroot National Forest has averaged over 28,000 acres of new wildfires each year. Excluding the exceptionally large fires of 2000 from the average, the Forest still averaged over 10,000 acres of wildfire (new quality black-backed woodpecker habitat) each year (see the fire section of this report for annual figures). This is in addition to the ongoing bark-beetle epidemic on the Forest (see item 37 – Insect and Disease status).

In broader context, the Montana Natural Heritage Program ranks the black-backed woodpecker as a G5 S2 species (MNHP, 2006). This means that across its range the species is considered common, widespread and abundant (although it may be rare in parts of its range). It is not vulnerable in most of its range. In Montana, the species is considered at risk because of very limited and potentially declining numbers, extent and /or habitat, making it vulnerable to extirpation in the state. The state ranking appears to not reflect the huge increases in the amount of burned habitat created by wildfires in Montana since 1999.

Hillis (2003) reported a 258% increase in habitat (post-fire) for the species in Region One from 2000 to 2003, and Samson (2006) reported that black-backed habitat (post-fire and insect outbreaks) has increased across the Northern Region in the last decade (from 278% on the Kootenai to over 300,000% on the Flathead). Samson (2006) also found that no gap between current post-burn or insect-infested (with no burn) areas occurs that would limit black-backed woodpeckers from interacting Regionwide. Information provided in Dixon and Saab (2000) suggests the species is increasing in numbers in the United States.

At this Regional scale, habitat modeling based on FIA data estimates that there is enough suitable post-fire habitat to support at least 3,719 to 6,405 pairs of black-backed woodpeckers (Samson, 2005). Areas of insect outbreaks offer additional potential habitat, and black-backs have been documented using this habitat in Idaho and Oregon. Median dispersal distance for this species is estimated to be about 65 miles, although they are known to travel farther than this during irruptions. This dispersal distance indicates that black-backed woodpeckers across the entire Region belong to a single, well connected population. Although no population estimates are available, the large amount of suitable habitat well distributed across the Region combined with the interconnectedness of the population indicates that short-term viability of black-backed woodpeckers across the Region is not an issue (Samson, 2005).

Furthermore, a recent state-wide insect and disease condition report shows dramatic increases in tree mortality from 2002 to 2005 (USDA-FS 2005c). Across all Federal ownership in Montana, mountain pine beetle mortality was evident on about 172,050 acres of lodgepole pine and 17,434 acres of ponderosa pine in 2002. In 2005, the area affected by mountain pine beetle mortality increased to 577,481 acres of lodgepole pine and 25,244 acres of ponderosa pine (Ibid. at 48). Across the same area, Douglas-fir beetle mortality in Douglas-fir stands increased from about 60,112 acres in 2002 to about 168,798 acres in 2005. (Ibid. at 46). These areas containing trees recently killed by bark beetles are available as secondary habitat that could support lower numbers of black-backed woodpeckers than recently burned areas.

BOREAL TOAD (aka WESTERN TOAD)

This species is largely terrestrial, but can occur in a variety of habitats from valley bottoms to high elevations. These toads breed in shallow, muddy areas in lakes, ponds, and slow streams. They may lay eggs and reproduce successfully in depressions seasonally filled with water, including wheel ruts on roads. The species seems to be widespread across the Bitterroot NF, although local population trends are unknown.

Monitoring and Evaluation:

There is no formal monitoring program for boreal toads in place on the Bitterroot NF at this time. Amphibian surveys indicate that they are well distributed across the Forest, but are uncommon to rare (Maxell 2004). Personnel from the Montana Natural Heritage Program performed amphibian and reptile surveys on the Bitterroot NF in 1995. They found boreal toads at a number of sites across the Forest, and evidence of reproduction was apparent at several sites (Hendricks and Reichel 1996). An amphibian survey crew working under contract for the Regional Office surveyed many of the ponds and lakes on the Forest from 2000 to 2004 to document evidence of amphibian breeding. They only found evidence of boreal toad reproduction at about 3% of the suitable sites surveyed, which is similar to the percentage they found throughout western Montana (Maxell 2004). The Forest did not have any projects within breeding habitats of boreal toads in 2006. This species has undergone severe population declines in many portions of its range, so the low reproductive success documented in western Montana is a concern.

COEUR D'ALENE SALAMANDER

This small terrestrial salamander is generally found below 5,000 feet in elevation in seeps, spray and splash zones of waterfalls, or cascades along streams and creeks. They use rock fissures or boulder piles covered by moss mats, remaining beneath the moss during the day. The salamanders hibernate from November to April. Removal of overstory vegetation, increases in water temperature, changes in water table and flow, and physical disturbance of talus or rock habitat can affect Coeur d'Alene salamander populations. The southernmost record of this salamander in Montana is in the Chaffin Creek drainage on the east side of the Bitterroot Mountains.

Monitoring and Evaluation:

An amphibian survey crew working under contract for the Regional Office surveyed suitable habitat for this species at numerous sites on the Forest from 2001 to 2004. They found Coeur d'Alene salamanders at five new sites on the Forest: one in the Rock Creek drainage, one in the Little Rock Creek drainage, one in the Chaffin Creek drainage (Maxell 2004), and two along Lake Como (Maxell, pers. comm. 2004). Previous surveys by biologists from the Montana Natural Heritage Program in 1987 (Montana Natural Heritage Program 1987) and 1988 (Genter et al. 1988). only found Coeur d'Alene salamanders at Sweathouse Falls. Coeur d'Alene salamanders are very difficult to survey for, and the new locations probably reflect improved survey techniques and increased effort rather than an increase in the species' abundance or distribution. Still, these new locations hint that Coeur d'Alene salamanders may be more widely distributed in the Bitterroot Mountains than previously thought. Forest Plan standards which protect riparian and aquatic habitats continue to provide appropriate protections for the Couer d'Alene salamander and its habitat. There were not any project related impacts to Couer d'Alene salamander habitat on the Forest in 2006. The Gash Creek fire burned some areas upstream of Swethouse Falls, potentially increasing sediment loads or affecting water flows or water chemistry at the falls.

FISHER

The home range of fishers varies in size from 4 to 32 square miles, wherein optimum habitat is thought to include mature, moist coniferous forest with a woody debris component, particularly in riparian/forest ecotones in low- to mid-elevation areas that do not accumulate large amounts of snow (Jones 1991, Heinemeyer 1993, Ruggiero et al. 1994). A review of fisher research suggests that the species uses a diversity of tree age and size class distributions at the patch or stand level that provide sufficient (generally greater than 40%) overhead cover (either tree or shrub).

Fishers use lower elevations than pine marten (i.e. are restricted to areas of lower snow accumulation compared with marten) and are better adapted to earlier successional stages of forests than marten (Banci 1989, Jones 1991). However, the studies conducted in this region have concluded that fishers use late successional forest more frequently than the early to mid-successional forests that result from timber harvest (Aubry and Houston 1992; Buck et al. 1994; Rosenberg and Raphael 1986). Similarly, fishers in the Rocky Mountain study preferred late-successional forests with complex physical structure, especially during the summer (Jones and Garton 1994). Fisher seem to avoid non-forest and pole/sapling stands, and spend little time in ponderosa pine stands. They show a strong affinity for forested riparian habitats throughout the year (Jones 1991).

Documented den sites have occurred in cavities of live or dead trees in forested areas with some structural diversity (forb/shrub cover, downed wood, multiple forest canopy layers) that maintain a prey base of snowshoe hare, porcupine, and a variety of small mammals (Ruggiero et al. 1994). Almost all known natal dens for fishers (where parturition occurs) and maternal dens (other dens where kits are raised) have been discovered in Eastern North America (Arthur 1987; Paragi 1990). Of these, the vast majority were located high in cavities in living or dead trees. This strongly suggests that female fishers are highly selective of habitat for natal and maternal den sites. Information is available for only two natal dens (California, Buck et al. 1983; Montana, Roy 1991) and one maternal den (California, Schmidt et al. 1993, unpubl.) in the western United States. The den found in Montana was in a hollow log 11m long with a convoluted cavity averaging 30 cm in diameter. Female fishers will use 1-3 dens per litter. (Paragi 1990). Riparian stringers of late successional stage vegetation provide important connectors. Fishers use forested riparian areas extensively for foraging, resting, and as travel corridors (Claar et al. 1999; Witmer 1998, p. 15).

Research and Monitoring:

Observers conducting pine marten track surveys found a set of fisher tracks in the Lost Horse Creek drainage in 2004. Dr. Kerry Foresman from the University of Montana detected fisher in the Big Creek and Bear Creek drainages during his study in the winter of 1994-1995. He feels most of the Bitterroot canyons support fisher populations. Two fishers were taken from the Bitterroot Mountains in 1994-95, one from Big Creek and one from Lost Horse Creek. These were the first taken for several years in the Bitterroot. According to Montana Fish, Wildlife and Parks trapping records, between three and five fisher have been trapped each year for the past eight years in the Bitterroot Valley. Current Montana Fish, Wildlife, and Parks trapping records show a total of six fishers trapped with the most recent taken in 2003.

Evaluation:

Based on the above research, monitoring, and the following evaluation of other available information, it appears suitable fisher habitat is well distributed within capable ecotypes across the Bitterroot National Forest and, although uncommon by nature, the species is using that habitat.

The Montana Natural Heritage Program ranks fisher as a G5 S3 species (MNHP, 2006). This means that across its range the species is considered common, widespread, and abundant (although it may be rare in parts of its range). It is not vulnerable in most of its range. In Montana, the species is considered potentially at risk because of limited and potentially declining numbers, extent and /or habitat, even though it may be abundant in some areas.

Witmer (1998, p.14) states that the status of the fisher in the Western United States is poorly known but generally perceived as precarious and declining. Fisher populations in all the other states in the northern Rocky Mountains and Pacific Northwest are considered Imperiled, Critically Imperiled or Possibly Extirpated (MNHP, 2006). Fisher are apparently secure in their core range, which includes the boreal forest zone across Canada.

Fishers were apparently extirpated from Montana by 1930, and there are no records of their occurrence in the state from then until fishers from other areas were released at several sites in the early 1960s (Vinkey, 2003). The Bitterroot Mountains possess the most verified records of fisher in the state both before and after 1989, and appear to be the stronghold of fisher populations in Montana (Vinkey, 2003). This is largely due to a release of 39

fishers from British Columbia in the Idaho side of the Bitterroots in 1962, although genetic investigations indicate that some native fishers may have survived in the Selway-Bitterroot region (Vinkey, 2003). Twelve fishers from British Columbia were released at Moose Lake on the eastern edge of the Sapphire Mountains in 1962, and apparently became established in the Sapphires based on trapping records. However, there have been few verified records of fishers in the Sapphires since 1989, and researchers have been unable to verify the presence of a self-sustaining population in this area (Vinkey, 2003). University of Montana mammalogist Dr. Kerry Foresman considers the Sapphire Mountains to be generally too dry for fishers, and has been unable to locate any on the east side of the Bitterroot Valley (Foresman, 2006).

At the Bitterroot National Forest-wide scale, a query of FIA data estimates that we have 95,134 acres of summer habitat and 286,142 acres of winter fisher habitat. This is 95% of the habitat necessary to maintain a minimum viable population of fisher (Samson 2006; Samson 2005). The adjacent Lolo National Forest and Clearwater National Forest have an estimated 149% and 358% of the habitat necessary to maintain a minimum viable population, respectively (Samson, 2005).

Given the large amount of suitable habitat on the Bitterroot National Forest and additional connected habitat on the adjacent Forests (indicated, in part, by the successful expansion and continued presence of re-introduced populations), short term viability of the fisher at this scale does not appear to be concern. For the fisher, managing the landscape within the natural range of composition, structure and frequency and extent of ecological drivers (fire, insects, and wind) may be most effective for long-term fisher persistence (Samson 2006 p. 11).

FLAMMULATED OWL

Flammulated owls evolved in an ecosystem primarily shaped by frequent, low severity fires. Fire suppression has resulted in conversion of many pine forests to shade-tolerant fir forests with high tree densities in smaller diameter classes. Overall “fire suppression may be resulting in sub-optimal habitat for flammulated owls” (Linkhart 2001, page 168). These same stand conditions increase the potential for moderate or severe stand replacing fires. A Bitterroot National Forest assessment after the extensive fires of 2000 found that, “Of the 11 sensitive species on the Forest, flammulated owl habitat was the most severely affected” (USDA Forest Service, 2000).

Based on current literature, flammulated owls are dependent on mature to old growth ponderosa pine/Douglas-fir forests at lower elevations in the Rocky Mountains. These habitats correspond very closely to habitat type groups 1, 2 and 3 on the BNF. They are found in mature open park-like stands with some understory shrubs and small trees (McCallum 1994). In general, flammulated owls nest in relatively large trees in relatively open areas. They are not typically associated with burned areas or extensive beetle-killed trees, probably due to the lack of physical and biological components needed to support both the owls and the insects they prey on.

Composition of forests within favored areas where flammulated owls foraged repeatedly suggests the importance of old ponderosa pine or ponderosa pine and Douglas-fir in the foraging behavior of the owl. Old ponderosa pine forests (whether pure or mixed with other species) typically form open stands with well-developed grass or shrub understories, as long as frequent fires are allowed to limit invasion of shade-tolerant conifers. These understories support arthropods (insects for food) in a forest layer that is used extensively by fledged owlets and molting adults in late summer (Reynolds and Linkhart, 1992).

The associated prey for flammulated owls in the early spring are primarily noctuid (night flying) moths and in the summer crickets, grasshoppers, moths and beetles (McCallum, 1994). The openness of these stands also provides space for hawking flying insects between crowns and for hover-gleaning them from outer needle bunches (Reynolds and Linkhart 1987).

Reynolds and Linkhart (1992) reported that males sang from hidden positions next to tree trunks or in dense clumps of foliage and that ponderosa pine and Douglas-fir were the only species used as song trees. These trees had a mean age of 289 years. Security cover is provided by regenerating Douglas-fir thickets and large-diameter, veteran trees with heavy branching. These features are utilized by both foraging and roosting owls for cover from predators (van Woudenberg 1999, including extensive internal citations).

Ponderosa pine is an important habitat component of flammulated owls. Ponderosa pine was found by some researchers to be the preferred nest tree (McCallum 1994 IN van Woudenberg 1999). Wright (1996) found that flammulated owl occurrences were correlated with the number of ponderosa pine trees > 15” and live basal area (IN Samson 2005, p. 55).

Flammulated owls depend on woodpeckers to create nesting cavities, usually in large dead trees. Reynolds and Linkhart (1992) state that in reports where forests surrounding nests were described or photographed, all nests

were in, or adjacent to, mature or old growth stands (Hanna 1941, Bull and Anderson 1978, Cannings et al. 1978, Hasenyager et al. 1979, Cannings 1982, Bloom 1983, Reynolds and Linkhart 1984, 1987, Fix 1986, Goggans 1985, Hayward 1986, Howie and Ritcey 1987, McCallum and Ghelback 1988). However, Hasenyager et al. (1979) and Bloom (1983) reported nests in forests that had been partially cut but contained large, residual trees, and Winter (1974) found the owl in second-growth forests, although they did not report nesting in this age-class (Reynolds and Linkhart 1987).

Flammulated owls appear to be tolerant of humans, and are known to nest close to occupied areas (Hayward and Verner, 1994).

Monitoring:

In 2005, the Forest participated in the first-ever Region-wide survey for flammulated owls. This survey was part of the Region's Landbird Monitoring Program, and was coordinated through the Avian Science Center at the University of Montana. The Region-wide survey indicated that flammulated owls occur on every National Forest (NF) in the Region with the exception of the Custer, Lewis and Clark and Gallatin NFs. The highest detection rates for flammulated owls were on the Nez Perce, Lolo, Helena and Bitterroot NFs. Locally, we surveyed 30 transects across the Forest, many of which had not been previously surveyed for this species. We detected flammulated owls on about 15% of the 279 calling points, on a total of 14 of the transects (Avian Science Center, 2005). Most flammulated owl detections were on the southern half of the Forest, similar to a mid-1990s study (Wright, 1996).

A graduate student from the University of Montana surveyed much of the suitable habitat on the Bitterroot NF for flammulated owls in 1994 and 1995 (Wright 1996). She found concentrations of this species in several locations on the Darby and Sula Districts. The Forest has continued to monitor some of the routes where Wright found owls in the mid-1990s. The number of flammulated owl detections on unburned transects has remained fairly consistent from 2000 to 2004. Owl numbers remained similar on unburned transects resurveyed in 2006High and mixed severity fires burned through several of the areas known to support concentrations of flammulated owls on the Bitterroot NF in August 2000. We monitored several of the previously established transects through these areas in 2001, and detected about half the number of flammulated owls that were found before the fires. Flammulated owl detections on burned transects have continued to decline, and we found very few owls in severely burned areas in 2004. Our 2006 surveys detected very few owls in burned areas except where some unburned patches of trees occurred. We will continue to monitor established transects to determine changes in owl use.

Evaluation:

The Montana Natural Heritage Program classifies the flammulated owl as a G4 S3B species (MNHP, 2006). This means that at the global scale, the species is considered to be uncommon but not rare (although it may be rare in parts of its range), and usually widespread. It is apparently not vulnerable in most of its range, but there is possibly cause for long-term concern. At the state scale, the breeding population is considered to be potentially at risk because of limited and potentially declining numbers, extent and/or habitat, even though it may be abundant in some areas.

The flammulated owl is perhaps the most common raptor of the montane pine forests of the western United States and Mexico (McCallum, 1994). The BNF is near the northeast edge of the known range of this species. As of 1998, flammulated owls were considered to have a widespread presence in Missoula and Ravalli counties, (Wright 1996 in Hart et al. 1998 and http://nhp.nris.state.mt.us/mbd/).

A standardized Regional survey effort in 2005 found that flammulated owls were well-distributed in suitable habitat west of the Continental Divide, but were rather restricted in distribution east of the Divide. On the BNF, flammulated owls were detected on 14 of the 30 completed transects, and on 42 of the 281 sample points (Cilimburg, 2006). These surveys showed that flammulated owls are well-distributed in suitable habitat on the southern half of the Forest, which was heavily sampled. They were only detected on a few transects on the north half of the Forest, but this area was not heavily sampled. Wright (1996) found a similar distribution pattern for flammulated owls on the BNF during field work for her Master's thesis in 1994 and 1995. The Region 1 Wildlife Ecologist has looked at viability for this species and has determined that habitat is well distributed and abundant for the flammulated owl in the Northern Region, and that short-term viability of the species in the Northern Region is not an issue (Samson 2005).

The number of flammulated owl detections on the Bitterroot National Forest on unburned transects has remained fairly consistent from 2000 to 2006. In high and mixed severity fires that burned through areas known to support

concentrations of flammulated owls in 2000, about half the number of flammulated owls were detected in 2001. Flammulated owl detections on burned transects have declined since then.

Bitterroot National Forest-wide, habitat modeling based on FIA data estimates that the Forest contains 11,144 acres of flammulated owl habitat more than what is estimated to be necessary to maintain a minimum viable population (Samson 2006; Samson 2005). Another way to say this is that we have an estimated 337% of the habitat necessary to maintain a minimum viable population of flammulated owls on the Forest.

Based on our evaluation of available research, monitoring, and the above information, it appears flammulated owl habitat is adequately distributed within capable ecotypes across the Bitterroot National Forest and sufficient to support the species. The extensive fires of 2000 did disproportionately reduce the amount and distribution of flammulated owl habitat within the burned portion of the Forest, and the literature indicates the successional trends resulting from fire suppression within the habitats used by the owl may be further reducing the quality of the remaining habitat. Therefore the Forest's policy since the 2000 fires has been to maintain these remaining habitats and, where appropriate, design management treatments that, increase the longevity of the habitat by reducing the risk of moderate-to-severe fires, reducing competition for water and nutrients, and increasing stands' resistance to insect and diseases.

NORTHERN BOG LEMMING

Northern bog lemmings (*Synaptomys borealis*) prefer sphagnum bogs as primary habitat, but they also occur in wet meadows and mesic forest environments. Discovery of individuals on the Beaverhead NF, near its boundary with the Bitterroot NF, extended the known range of the species nearly 100 miles to the south. Populations in Canada are extensive, but bog lemmings are difficult to trap and little is known about their population status in the United States.

Monitoring and Evaluation:

The Regional Forester added the northern bog lemming to the Sensitive Species List for the Bitterroot NF in June of 1994. The Forest has not conducted systematic surveys for bog lemmings, but one was trapped in Meadow Creek in the East Fork of the Bitterroot River in June of 1992. Another was trapped along Big Creek in 1996. The Lost Trail Fen is probably suitable habitat, but we have not completed surveys there. None of the project analyses completed in FY2006 prescribed treatments in potential northern bog lemming habitat. Forest Plan standards which protect riparian and aquatic habitats continue to provide appropriate protections for the northern bog lemming and its habitat.

NORTHERN GOSHAWK

Northern goshawks (*Accipiter gentilis*) are large forest hawks usually associated with coniferous forests in our area. Studies in Oregon found that they tend to nest in mature to over mature forest stands with relatively dense crown closures and open understories, and use a variety of habitats within a large foraging territory (Reynolds et al., 1982). Nest sites identified on the Bitterroot and Beaverhead-Deerlodge National Forests occur in a variety of stand structures, including stands that are somewhat younger and more open than those described in the literature. Goshawks typically build several nests within their territory, and alternate use among these nests on an unpredictable basis. USFWS conducted a status review of the northern goshawk in the western United States in 1997-1998 in response to a petition to list the species. FWS has not proposed to list the species as Threatened or Endangered at this time. The Regional Forester added goshawks to the Sensitive Species List for the Bitterroot NF in March 1999, and subsequently removed goshawks from the Sensitive Species List in October 2004. Goshawks were added back to the Sensitive Species List in 2005.

Monitoring:

The Bitterroot NF has monitored known northern goshawk nests on an intermittent basis since at least 1991. The Forest initiated a more systematic monitoring and nest search effort in the summer of 1998. As of September 2006 we have identified a total of 96 northern goshawk nests across the Bitterroot NF, in 36 different territories. Of the known nests, 55 have been active at least one year since we found them, and 14 have been active more than one year. We know of several alternate nests within many territories. We have documented at least 147 juvenile goshawks fledged from these nests. Forest personnel have identified two additional territories that have been active at least one year since 1995 (courtship displays, active territorial defense, or newly-fledged young were seen). Although no actual nests have been located in these territories, Forest biologists have observed a total of five fledged juvenile goshawks within them.

We have documented the loss of 13 known goshawk nests since 1998, and several others have deteriorated to the point of being unusable. Two of the lost nests burned up during the fires of 2000; two were lost when the nest trees fell over; eight fell out of the nest tree due to unknown but natural causes, and one was knocked out of the nest tree when a firewood cutter dropped a snag through the branches of the nest tree. As of October 2006, 73 of the 96 nests we have discovered are intact and usable, although some need a little maintenance by the birds.

The Forest could not fund the Accipiter survey contract in 2006, so monitoring consisted mostly of checking the status of previously known nests. We were unable to spend much time searching for new nests in territories where none of the known nests were active, or in new areas. Still, we discovered seven new goshawk nests, five of which were active. 2006 appeared to be an average year for goshawk productivity on the Forest. Ten of the 73 known useable nests were active (14%), somewhat below the average occupancy rate. Average productivity was 1.6 young fledged per active nest, also somewhat below the average productivity rate. These results are probably not cause for alarm, as goshawks are known to skip reproductive attempts or fledge fewer young in years where the prey base is limited, which is often dependent on weather.

In 2005, the Forest participated in the first-ever Region-wide standardized survey protocol for goshawks. Crews completed calling transects along grid lines through randomly located primary survey units (PSUs) on every Forest in the Region. The crew on the BNF did not record a single goshawk response over the course of the breeding season, although they did discover seven previously unknown goshawk nests. These results reinforce the theory that 2005 was a poor year for goshawk reproduction on the Forest, since non-breeding goshawks are unlikely to respond to recorded goshawk calls. Across the Region, surveyors detected goshawks on approximately 40% of the randomly selected PSUs. This indicates that goshawks are reasonably abundant and well-distributed across the Region.

Other raptors sometimes use goshawk nests. In 2006, two known goshawk nests were occupied by a great horned owl and a Cooper's hawk, respectively. We have now documented great horned owls using three different goshawk nests (one nest two different years) and great gray owls using one goshawk nest.

Table 22 summarizes the monitoring results for goshawks since 1998.

Table 1 – Goshawk Monitoring Results Since 1998

Year	Newly Discovered Nests [2]	Active Nests (Total)	Number of Young Fledged	Remarks
1998 [1]	5	5	8	
1999 [1]	8	3	5	Several other territories appeared active based on the presence of adults, but known nests within the territories were inactive and we were unable to find active alternate nests.
2000 [1]	5	5	9	One of the active nests contained two young, but was destroyed by the Bear fire before the young could fledge.
2001 [1]	8	6	12	Also found two additional active goshawk territories where we could not locate any nests.
2002 [1]	9	7	16	One of the active nests contained two young, but the nest fell out of the tree before the young could fledge. We also discovered two additional active goshawk territories where we could not locate any nests. In addition to the nests occupied by goshawks, one of the known goshawk nests was occupied by a great horned owl.
2003 [1]	11	15	37	One known goshawk nest was occupied by a great gray owl, and fledged four owls. Another known goshawk nest was occupied by a great horned owl.
2004 [1]	19	13	23	We found five new nests and two new territories. Two active goshawk nests failed.
2005 [1]	12	4	5	We found nine new nests and three new territories. One active goshawk nest apparently failed.
2006 [1]	7	10	16	One known goshawk nest was occupied by a great horned owl, and another by a Cooper's hawk. We found seven new nests (five of which were active), and one new territory. Three active goshawk nests failed.

[1] All known nest sites were monitored.
[2] Some of these are alternate nests within known territories.

We sometimes find Cooper's hawk nests while searching for goshawk nests. The Cooper's hawk is a smaller *Accipiter* species that tends to nest in somewhat younger and denser forest stands than goshawks, but which sometimes use inactive goshawk nests. We did not monitor most of the known Cooper's hawk nests in 2006 due

to time constraints. We found two new Cooper's hawk nests in 2006, one in a new territory and one in an existing territory. Three known Cooper's hawk nests were destroyed by the Gash Creek fire in 2006. Our monitoring results are summarized in Table 23 below.

Table 23 – Coopers Hawk Nests Found While Surveying For Goshawks Since 1998

Year	Newly Discovered Nests[2]	Active Nests (Total)	Number of Young Fledged	Remarks
1998 [1]	1	1	2	
1999 [1]	0	2	5 or 6	
2000 [1]	1	2	6	The new nest and one of the nests active in 1999 were active and each fledged three young.
2001 [1]	2	2	5	One of the new nests was near a previously known nest. Only the newly found nests were active.
2002 [1]	3	2	6	None of the previously known nests were active. One of the new active nests and one new inactive nest were both near a previously known nest.
2003 [1]	4	5	14	One active nest was previously known. Two new nests were near previously known nests. Two new nests were in newly discovered territories.
2004 [1]	4	5	12	Three new nests were found in three newly discovered territories. One active Cooper's hawk nest failed.
2005 [1]	4	2	Unknown	No known nests active. 2 active nests discovered after young had fledged and left area.
2006	2	1	2	Found two new nests, one in a new territory and one in a known territory. One young fledged from new nest, plus another found in a known territory where the only known nest was not active.

[1] All known nest sites were monitored.
[2] Some of these are alternate nests within known territories.

In 2002 we noticed that one of our female Cooper's hawks was wearing a USFWS band. We attempted to capture this bird to get the band number, but were unsuccessful. The same female returned to the same territory in 2003 and rebuilt and successfully used a nest that had partially fallen out of the nest tree in 2002. We were able to capture this bird in 2003. We ran her band number through the USFWS database and discovered that she was at least two years old when she was banded during migration in September 1999 at a HawkWatch International raptor banding site in the Goshute Mountains in Nevada. It is very unusual to get a band return from a bird on its breeding territory that was banded during migration, so this information helped define migration routes for Cooper's hawks from our area. This female returned to the same territory again in 2004. She did not use any of the known nests in her territory in 2005.

We found two active sharp-shinned hawk nests in 2005. Both fledged four young. Sharp-shinned hawks are the smallest *Accipiter* species, and tend to nest in somewhat younger and denser forest stands than Cooper's hawks. We will continue to monitor these nests in the future.

Evaluation:

It is apparent the Bitterroot National Forest has sufficient and well distributed habitat to support the northern goshawk and that the species is using that habitat. This conclusion is based on the following evaluation of the Forest monitoring data considered with other available information.

The Bitterroot National Forest is estimated to have sufficient suitable nesting habitat to support a minimum of 340 goshawk nests, which would provide nesting habitat for at least 57 to 170 goshawk pairs. Inventory and modeling also estimate that there is enough suitable post-fledging habitat to support a minimum of from 68 to 135 goshawk pairs, and enough suitable foraging habitat to support a minimum of 87 goshawk pairs (Samson, 2005). Therefore, a conservative estimate is that the BNF contains enough suitable habitat to support all the life stages of at least 57 goshawk pairs. In other words, this habitat assessment indicates that we have 347,917 acres of goshawk habitat more than what is necessary to maintain a minimum viable population (Samson 2006; Samson 2005). Another way to say this is that we have an estimated 1,254% of the habitat necessary to maintain a minimum viable population of goshawks on the Forest. This habitat is well-distributed across the Bitterroot National Forest. These habitat estimates correlate well with the results of the Forest's active program of monitoring Accipiter nests described above.

For broader context, at the Regional scale (Forest Service Northern Region), habitat modeling based on Forest Inventory and Analysis data (FIA) estimates that there is enough suitable habitat to support at least 1,266 pairs of goshawks (Samson, 2005). Median dispersal distance for goshawks is estimated to be about 167 miles, which indicates that goshawks across the entire Region belong to a single, well connected population. Although no population estimates are available, the large amount of apparently suitable habitat well distributed across the Region combined with the interconnectedness of the population indicates that short-term viability of goshawks across the Region is not an issue (Samson, 2005).

Since goshawks and their habitat are well distributed across the Forest, are reasonably abundant given their large territory size, and produce good numbers of fledglings, we are confident that the goshawk population across the Forest is doing well and that it contributes positively to the viability of goshawk populations in western Montana.

NORTHERN LEOPARD FROG

Northern leopard frogs inhabit lakes and ponds in non-forested areas that contain dense emergent vegetation such as cattails or sedges. They were formerly widespread in Montana, but they appear to have been extirpated from most of their historic range in western Montana (Hendricks and Reichel 1996). The Regional Forester added this species to the sensitive species list for the Bitterroot NF in March 1999, even though their known habitat requirements make it unlikely they ever occupied many sites on National Forest lands.

Monitoring and Evaluation:

Personnel from the Montana Natural Heritage Program performed amphibian and reptile surveys on the Bitterroot NF in 1995. They did not find any northern leopard frogs in the two valley bottom sites where they were reported in the 1960s (Hendricks and Reichel 1996). An amphibian survey crew working under contract for the Regional Office surveyed almost 200 still-water (lentic) habitats on the Bitterrroot NF from 2000 to 2004. Most of these sites were not suitable habitat for leopard frogs and the crew did not find any evidence of leopard frogs in the Bitterroot drainage (Maxell 2004). One of the sites occupied by leopard frogs in the 1960s was filled in for a housing development in 2000 or 2001. It is likely that this species no longer occurs in the Bitterroot drainage, although no thorough survey of lentic habitats on private lands has been conducted (Maxell 2004).

Forest Plan standards which protect riparian and aquatic habitats continue to provide appropriate protections for the northern bog lemming and its potential habitat.

PEREGRINE FALCON (Delisted 1999)

Following their remarkable sustained population recovery across the country, USFWS removed peregrine falcons from the Endangered Species List in August 1999. They were added to the Regional Forester's Sensitive Species List in 2000.

Peregrine falcons occupy a wide variety of habitats, but need adequate cliff ledges or rock outcrops for nesting. Peregrines prefer dominant high open cliff faces. Habitat surveys for the Bitterroot NF identified suitable nesting sites along the west side of the valley on cliffs in or adjacent to the Selway-Bitterroot Wilderness. USFWS considers peregrines as a migratory species for this area.

The Forest, in partnership with The Peregrine Fund, the Liz Claiborne/Art Ortenberg Foundation and Patagonia, Inc., released (hacked) juvenile peregrine falcons in the Painted Rocks area in 1989, 1990, and 1991. In 1992 birds returned to the area, selecting lands along the river for nesting. We also hacked peregrine falcons in the Canyon Creek drainage in 1992, and in the Little Rock Creek drainage in 1993. We curtailed further hacking on the Bitterroot NF after wild adults harassed the recent fledglings at both these sites, indicating that nearby territories were already occupied. Since we now have a number of established breeding pairs, there is no need to continue reintroduction efforts. Known eyries on the Bitterroot NF are on tall, vertical cliff faces, and most are within or near the Selway-Bitterroot Wilderness. The Blodgett fire burned near peregrine nest cliffs in Blodgett and Mill Creeks in August of 2000, but juveniles had left those nests at least a month earlier. We don't expect the fires to negatively affect peregrine occupancy or breeding success in the future. In fact, adult peregrines from territories near the 2000 fires appear to forage above the burned areas quite frequently.

Monitoring and Evaluation:

The Bitterroot NF participates in the statewide peregrine monitoring program coordinated by two peregrine experts under contract with Montana Department of Fish, Wildlife, and Parks. Bitterroot NF personnel and/or volunteers from Bitterroot Audubon monitored all the known eyries on the Forest in 2006 to determine

productivity. They also inventoried a number of canyons that contain good habitat in an effort to find new eyries. We found one new eyrie in 2006.

We currently know of 14 eyries in the Bitterroot drainage that have been active at least once since 1992. 10 of our eyries were occupied by peregrines in 2006, and produced at least 21 fledged peregrines. This was about 14% of the known production of 147 juvenile peregrines in Montana in 2006 (Sumner and Rodgers 2006). One of our active eyries failed to produce any fledglings, apparently because a pair of golden eagles nested near the peregrine eyrie and drove the peregrines away. One other peregrine canyon was occupied by prairie falcons in 2006. Table 24 summarizes known activity and productivity for each eyrie. The year in parenthesis following the territory name indicates when the territory was discovered.

Table 24 - Peregrine Falcon Productivity on the Bitterroot National Forest

Year	Painted Rocks (1992)	Blodgett (1994)	Bear Creek (1996)	Kootenai (1998)	Tin Cup (1999)	Big Creek (2000)	Mill Creek (2000)	Sweeney (2001)	Sheafman (2001)	Sawtooth (2001)	N. Lost Horse (2001)	Boulder (2001)	One Horse (2005)	Trapper (2006)
1992	Act, ?													
1993	Act, ?													
1994	Unk.	Act, 2												
1995	Unk.	Act, 2												
1996	Act, 2	Act, 1	Act, 1											
1997	Unk.	Unk.	Unk.											
1998	Unk.	Act, 1	Act, 1	Act, 3										
1999	Act, 3	Unk.	Act, 3	Act, 3	Act, 0									
2000	Act, 2	Act, 3	Act, 1	Act, 2	Act, 4	Act, 1	Act, 1							
2001	Act, 1	Act, 2	Act, 2	Act, 2	Act, 3	Inact	Act, 0	Act, 2	Act, 1	Act, 2	Act, 2	Act, 2		
2002	Act, 1	Act, 3	Act, 3	Act, 2	Act, 1	Inact	Act, 3	Inact	Inact	Act, 0	Act, 2	Act, 2		
2003	Act, 0	Act, 2	Act, 2	Act, 2	Act, 3	Inact	Act, 0	Inact	Inact	Inact	Act, 3	Act, 1		
2004	Act, 3	Act, 2	Act, 1	Act, 1	Act, 0	Inact	Act, 4	Inact	Inact	Act, 0	Act, 1	Act, 0		
2005	Act, ?	Act, 0	Act, 2	Act, 3	Act, 3	Act, 0	Act, 1	Inact	Inact	Act, 3	Act, 2	Act, 1	Act, 0	
2006	Act, 2	Act, 3	Act, 2	Act, 2	Act, 3	Inact	Act, 2	Inact	Inact	Act, 0	Act, 3	Act, 2	PRFA	Act, 2

Act, # = Active, number fledged Unk = Unknown or no survey conducted Inact = Inactive

WESTERN BIG-EARED BAT

The Bitterroot NF is within the range of the western big-eared bat (*Plecotus townsendii*). Hoffman et al. (1969) reported specimens collected northeast of Florence at the Curlew Mine, in Hamilton, and at Lake Como. The bats used a wide variety of vegetation types, from juniper/pine to high elevation mixed conifer forests (Barbour and Davis 1969). Roosting, maternity, and hibernating colonies use caves, abandoned mine tunnels, and occasionally abandoned buildings. Females generally tend the young alone and are most often found associated with a maternity colony. Males are more solitary and may venture farther out into the forest to forage and occasionally roost in cavities or behind loose bark. Caves or mine tunnels are essential to western big-eared bat nursery colonies.

Monitoring and Evaluation:

The Forest did not propose any projects near suitable hibernacula or roost sites in 2006. Bat surveys using mist nets and audio bat detectors were conducted at several locations on the southern end of the Forest in 2006. A number of bats were captured and identified, but none of them were big-eared bats. A MT FWP biologist did record the echolocation sounds of a big-eared bat near Woods Cabin on Lake Como in August 2006 during a public presentation about bats. The Forest did not monitor any known big-eared bat sites in FY2006.

WOLVERINE

Wolverines (*Gulo gulo*) are solitary animals that range broadly over a wide variety of habitats. Isolation from human impacts and a diverse prey base seem to be the most important habitat components. Within large roadless areas, wolverine use appears to be concentrated in medium density to scattered mature timber and in ecotonal areas around natural openings such as cliffs, slides, basins, and meadows. There seems to be little use in stands of dense young timber or in openings such as clearcuts or wet meadows (Reel et al. 1989; Butts 1992).

Wolverine home ranges are very large, averaging approximately 150 square miles in Montana. Wolverines in Montana seem to display a distinct seasonal elevational movement pattern. In the summer, they move to higher elevations and inhabit forests dominated by subalpine fir. In the winter, low elevation riparian areas may be important (Reel et al. 1989; Butts 1992). Wolverines feed primarily on rodents and carrion, although they are opportunists and will also consume berries, insects, fish, birds, and eggs when available. Ungulate carrion seems to be particularly important in the winter, and wolverine movement to lower elevations during winter may be to take advantage of ungulate mortalities on winter ranges (Reel et al. 1989; Butts 1992).

Monitoring and Evaluation:

The Regional Forester added wolverines to the Sensitive Species List for the Bitterroot NF in June of 1994. We have not specifically monitored for wolverines on the Forest, but we do record incidental observations. Table 25 summarizes known wolverine sightings on the BNF since 1992. With approximately 73% of the Bitterroot National Forest in inventoried roadless areas or wilderness, it appears abundant wolverine habitat exists and is well distributed across the Forest. These sightings indicate that wolverines are present on the BNF, and that they occur in a variety of locations across the Forest.

Table 25 - Wolverine Sightings, Bitterroot National Forest

Year	District	Vicinity	# Wolverine	Observation Type
2004	Stevensville	Willow Mountain	1	Tracks
2004	Stevensville	Bass Creek	1	Tracks
2004	Sula	Sign Creek	1	Sighting
2004	West Fork	Nez Perce Pass	1	Tracks
2003	Stevensville	Upper Mill Creek	1	Sighting
2001	Stevensville	Sharrott Creek	1	Tracks
2001	Darby	Sleeping Child Hot Springs	1	Sighting
2001	West Fork	West Fork Road	2	Sighting
1999	Darby	Lost Horse Creek	2	Sighting
1996	Sula	Mink Creek Saddle	1	Sighting
1995	Stevensville	Sweathouse Creek	1	Sighting
1995	Darby	Gird Point	1	Sighting
1992	Darby	Schumacker Campground	1	Sighting
1992	Darby	Coyote Meadows	1	Sighting

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Neotropical Migratory Birds

OBJECTIVE: Monitor neotropical migratory bird populations and trends. Determine population and habitat relationships. Cooperate with international program of monitoring.

DATA SOURCE: Survey routes established through several bird programs.

FREQUENCY: Annually.

REPORTING PERIOD: 2006.

VARIABILITY: Trends that indicate declines in populations.

EVALUATION & MONITORING RESULTS:

Neotropical migratory birds (NTMBs) breed here and winter in western Mexico or Central American tropical forests. NTMBs have attracted national public attention due to well-documented population declines of many species in the eastern hardwood forests. These general declines have not been noted in forest-nesting species in western North America. In the west, seven species have shown declines, five of which are prairie grassland species. Although the Forest and others are actively monitoring birds in the Bitterroot Valley and Forest, we have found few trends and have only been able to draw limited conclusions about local populations at this time. The effort involves several separate but related programs, which are discussed below.

Monitoring Avian Productivity and Survivorship (MAPS) Program. In cooperation with a national network of MAPS stations coordinated by the Institute for Bird Populations at Point Reyes, CA, we mist-net, classify, and band NTMBs and resident birds at two sites. We have monitored the Lick Creek site since 1993. We established the Lower Rock Creek site in 1994. When netted, the birds are identified, sexed, aged, weighed, and measured before release. As a part of the national network, we hope to gain insight on the production of young and survivorship through the rigors of migration. Through 2006, we have trapped and banded 2,939 birds, including 800 recently fledged young. We have had 1,788 recaptures, including multiple captures of some individuals. Since 1993 about 27 percent of the birds caught and banded have been young of the year. In 2006, about 30 percent of the first time captured birds were young of the year. We have also captured over 200 birds that we released unbanded. We have captured individuals of 63 species since 1993, including 39 species in 2006. The most common species captured at our two sites are Swainson's thrush, McGillivray's warbler, common yellowthroat and black-capped chickadee.

Breeding Bird Surveys (BBS) Program. Volunteers and/or Forest staff currently run five BBS routes on the Forest. The routes are 24.5 miles long, with 50 stations where birds are identified primarily by their songs. The Breeding Bird Laboratory of the National Biological Survey, USDI Fish and Wildlife Service (FWS) sanctions the routes. The information on numbers and species of birds counted is entered in a national database in order to monitor trends of breeding birds. There are approximately 3,000 BBS routes in the U.S.

Moderate and high severity fire affected approximately 50% of the Skalkaho-Rye and Gibbons Pass BBS routes in 2000. The other three routes were unaffected by the fires. Since we have several years of pre-fire data from these routes, we have the opportunity to monitor changes in the bird communities caused by the fires over time.

Raptor Survey. The Raptor Survey is an annual road survey from Florence to Hamilton that counts all raptors seen along the Eastside Highway. This is part of an effort coordinated by the Montana Department of Fish, Wildlife and Parks (FWP) native species program to monitor trends in statewide raptor populations. We counted 109 raptors on this route in 2006, a new record for this transect.

Forest-wide Point Counts. In 1994 we began a program to monitor breeding bird population trends along a network of transects across the Forest as part of the Region 1 Landbird Monitoring Program. Each transect has ten stations where surveyors identify and record every bird seen or heard in 10 minutes. They also record vegetation data at each point. The points are permanently marked for relocation, so that over subsequent years population trends can be ascertained. This point count protocol is followed on all national forests in the Region. In 1994, Landbird Monitoring Program crews established 42 transects and counted resident birds and NTMBs at

413 points on the Bitterroot NF. The crews monitored the transects and points again in 1995 and 1996, with only slight modification. Budget constraints dictated suspension of the point counts for the 1997 breeding season. Crews monitored a subset of the transects in 1998, 2000, and 2004. They collected additional vegetation data but no bird data at a subset of the points in 1999. Researchers have incorporated these data into the revised habitat relationship analysis, which provides information about specific habitats occupied across the Region. Data and results of the LBMP efforts are viewable on the University of Montana's Avian Science Center website at http://avianscience.dbs.umt.edu/research_landbird.

Moderate and high severity fire affected approximately 25% of the Forest's established point count transects in 2000. The other routes were unaffected by the fires. We have several years of pre-fire bird data from these routes as well as baseline vegetation data, so we now have the unique opportunity to detect changes in bird communities along these transects and correlate them with habitat changes caused by the fires. Please see the adjacent "Research Note" for a brief description and the findings from one initial study.

Research Note

In 2001 and 2002, the Forest provided logistical support and funding for a graduate student from the University of Montana who monitored the 13 transects that burned during 2000 as well as a similar number of unburned transects. She also conducted nest searches in several burned areas to determine which parts of the burns were most important to nesting birds. The study found that overall, seven species responded negatively and 16 species responded positively to fire. Further, seven species increased most dramatically at a single fire severity. She also found changes in abundance between one and two years after fire for most species that responded to fire. These findings underscore the importance of fire severity and time since fire, and imply that both factors must be considered to understand the complexities of fire effects on bird

In addition, in 2001 and again in 2003, crews from the Region 1 Landbird Monitoring Program established a number of new point count transects on the Forest in burned and unburned ponderosa pine forest. These transects are intended to monitor the different bird communities that are associated with various combinations of burn intensities and/or mechanical treatments in dry forests.

Christmas Bird Counts. The Forest supports Christmas Bird Counts (CBC) annually at Hamilton and Stevensville. These counts are part of a national effort to monitor broad-scale changes in the distribution and abundance of birds in the early winter. The CBC is coordinated by the National Audubon Society, and is the longest-running bird monitoring program in the world. Volunteer birders count birds on one day within count circles with radii of 7.5 miles centered on the Stevensville Ranger Station and the Hamilton airport. Both count circles include portions of the Forest. The Hamilton CBC started in 1988 and has a cumulative total of 118 species. The Stevensville CBC started in 1963 and has a cumulative total of 148 species. Among other findings, these CBCs document that the number of raptors wintering in the valley has increased dramatically since 1963. These two CBCs are consistently within the top five CBCs in Montana in terms of bird species diversity. In FY 2006 the Hamilton CBC tallied 4237 individual birds and 58 species. The Stevensville CBC tallied 8,308 individual birds and 79 species.

Smucker, K. M. 2003, R. L. Hutto and B. M. Steele. Changes in bird abundance after wildfire: importance of fire severity and time since fire. Ecological Applications 15(5): 1535-1549. Available on the internet at: http://avianscience.dbs.umt.edu/research_pub.

AQUATIC AND RIPARIAN ECOSYSTEMS

Riparian Area Condition
Item 22

OBJECTIVE: Ensure compliance with Forest Plan standards for fisheries, water, and wildlife.

DATA SOURCE: Interdisciplinary team reviews and monitoring information from resource specialists.

FREQUENCY: One project per District per year.

REPORTING PERIOD: 2006.

VARIABILITY: Deviation from riparian area and fisheries objectives.

EVALUATION:

The Forest Plan's fish and wildlife goals are to provide habitat to support viable populations of native and desirable non-native wildlife and fish, provide for the recovery of threatened and endangered species, and maintain riparian flora, fauna, water quality, and recreation activities. This monitoring item discusses activities and monitoring associated with timber harvest, recreation, fire management, facilities management, grazing, or other forest management activities in riparian areas, all of which can affect riparian function. We cover restoration of riparian areas in Item 19 and fisheries in Items 21 and 41.

Riparian monitoring in 2006 (as in past years) far exceeded this item's requirement of one project per District per year. Monitored activities include multiple projects related to developed recreation sites, outfitter and guide camps, fire management, facilities, grazing, weed management, timber management, and activities related to implementation of the Burned Area Recovery decision. Project and activity specific key findings are presented below for each of these monitored activities. It is clear important lessons are being learned and applied. In almost all cases riparian and fisheries objectives are being met or exceeded. In those few cases where problems have been identified, root causes were usually attributable to human error or incorrectly applied practices had limited adverse effects on the riparian and fisheries resources. Most were either corrected upon detection or are scheduled to be remedied.

None of the monitored projects indicate inadequacies in the Forest Plan riparian area and fisheries objectives or protective standards.

MONITORING RESULTS:

Developed Recreation Monitoring

Blodgett Campground and Trailhead Reconstruction (Stevensville Ranger District). In mid-May 2006, Forest fisheries biologists monitored the near-stream campsites that were decommissioned and planted with shrub seedlings, and looked for erosion problems at the large cut-slopes that were disturbed during reconstruction of the trailhead. Seedlings were planted and watered in 2004 in the disturbed area between the campground and the stream. Generally, planted shrubs were alive, but their growth is slow because of the thick conifer overstory and soil compaction. Visitors used constructed trails, and user-created trails that had previously riddled the area were much less common. A campground host onsite helped limit the impacts of campers.

Observations of the floodplain along the trailhead reconstruction area supported the supposition that erosion from steep cut-slopes along the trailhead parking area rarely reached the stream or floodplain. During monitoring water was on the floodplain very near the trailhead. Most of the erosion settles onto the trailhead parking areas.

Bass Creek Bridge Replacement near Charles Waters Campground (Stevensville Ranger District). The approach to the Bass Creek Bridge included a substantial cut-bank. Installation of the bridge and realignment of the road occurred in 2001. There were concerns that the cut-bank resulting from road realignment would be difficult to revegetate and contribute sediment to the riparian area and stream for several years. A combination of hydro-mulching and shrub planting resulted in a robust vegetative cover on the cut-bank, which reduced the amount of sediment reaching the stream to a negligible amount.

Skalkaho Daly Dispersed Campsite Rehabilitation (Darby Ranger District). In late May of 2006, Forest fisheries biologists and recreation foresters reviewed many of the sites along Skalkaho Creek and a few along Daly Creek to track changes in the riparian vegetation and streambanks. Some of these sites were also monitored in the summer and fall. We continued to have mixed results from our efforts to halt the expansion of impacted areas, reduce erosion, and mitigate the soil compaction at these dispersed camping sites. Some short user-created roads that had been blocked in the past remained blocked and the vegetation was growing thickly, effectively rehabilitating the site. Other sites had become dumpsites where garbage, mostly yard wastes, had been discarded.

Graveling accesses to the dispersed sites appeared to encourage users to stay on the graveled areas. The number of parallel access trails that users were creating during wet weather appears to be reduced relative to the time before graveling. Perhaps graveling has kept the trails in a condition that users feel safe on, and they choose not to venture off the gravel to avoid mud or puddles as they had in the past.

At the second site upstream of the Hwy 38/Rd 75 junction the stream has migrated toward the road and washed away the only flat camp spot. This site will be re-evaluated and possibly altered or closed.

The streamside loop-track that had been created in 2005 near one dispersed site, and reported in the last monitoring report, showed signs of reduced use and natural improvement.

Firewood cutting is prohibited within 150 feet of the creek, but did occur. It has been especially evident at the sites between the forks of Skalkaho and Daly creeks. Some campers and non-campers used the small access roads throughout the monitored area as a means to access firewood in the riparian areas.

In 2003, two sites along Skalkaho creek included user-created fords across the stream. These routes led nowhere. Both fords had rock placed and shrubs planted in them to reduce the temptation to ford the creek. In 2006 one ford remained unused and one was used at least as recently as fall 2005. In early summer 2006 we placed a substantial amount of small logs and woody debris in the track across the stream. No use of the fords was observed for the remainder of 2006.

Spring Gulch Campground (Sula Ranger District). On several occasions in 2006, Forest fisheries biologists monitored the large, fallen ponderosa pine in the East Fork at the upstream end of the Spring Gulch campground. The tree did not move in 2006, nor has it moved since it first fell into the river in June, 2003. The tree does trap floating chunks of ice and debris, but it has yet to result in flooding of the campground or significant bank erosion. The tree continues to form an outstanding large pool (one of the finest pools in the entire East Fork) that provides habitat for dozens of fish of all sizes and species. The pool is believed to provide excellent over-wintering habitat for large migratory bull trout. Because of the tree and its large pool, and the boulder/wood structures that were constructed in the late 1990's, fish habitat in the East Fork adjacent to the Spring Gulch campground has improved markedly since the Bitterroot River Section 7 Watershed Baseline was written (August, 2000). Activities at the Spring Gulch campground in 2006 were consistent with our programmatic agreements with the U.S. Fish and Wildlife Service. The campground activities are having a negligible effect on the fishery. Riparian conditions appear to be on a stable trend.

Indian Trees Campground (Sula Ranger District). Forest fisheries biologists monitored this campground in summer, 2006. As described in our 2005 report, the four culverts under the campground loop road continue to function as barriers to the upstream movement of fish in Indian Trees Creek. They are not meeting their objective of providing and maintaining fish passage. The culverts were originally installed in 2001, but were undersized at installation. They initially provided fish passage for a year or two, but then substrate was flushed from the barrels and prohibitive drops formed on the outlets. Given the Forest's lengthy backlog of other fish barrier culverts and the small size of Indian Trees Creek, replacement of the culverts is clearly a low priority at this time. The activities that occurred at the Indian Trees campground in 2006 were consistent with our programmatic agreements with the U.S. Fish and Wildlife Service. The campground activities appear to be having a negligible effect on the fishery. Riparian conditions are on a stable trend.

Crazy Creek and Jennings Campgrounds (Sula Ranger District). Forest fisheries biologists monitored these two campgrounds in summer, 2006. Both campgrounds are located in the riparian habitat conservation areas (RHCAs) surrounding fish-bearing streams. Activities at these campgrounds in 2006 were consistent with our programmatic agreements with the U.S. Fish and Wildlife Service. Campground activities appear to be having a negligible effect on the fishery, and riparian conditions are on a stable trend. Riparian conditions at the Crazy Creek and Jennings campgrounds are essentially the same as those described and analyzed in the Bitterroot River Section 7 Watershed Baseline (August, 2000).

Alta, Rombo and Sam Billings Campgrounds (West Fork Ranger District). Forest fisheries biologists monitored these campgrounds in summer, 2006. All three campgrounds are located in RHCAs surrounding fish-bearing streams. Activities at these campgrounds in 2006 were consistent with our programmatic agreements with the U.S. Fish and Wildlife Service. Campground activities appear to be having a negligible effect on the fishery, and riparian conditions are on a stable trend. Riparian conditions at these three campgrounds are essentially the same as those described and analyzed in the Bitterroot River Section 7 Watershed Baseline (August, 2000).

Magruder Corridor Campgrounds (West Fork Ranger District). Fisheries biologists monitored road maintenance, recreational activities, and stock grazing at four of the five developed campgrounds in the Magruder corridor (Paradise, Indian Creek, Raven Creek, and Deep Creek) during summer, 2006. These four campgrounds are located within the RHCAs surrounding fish-bearing streams (the Selway River, Deep Creek, Indian Creek, and Whitecap Creek). We did not monitor conditions at the Observation Point campground due to its upland location far from any streams. Our monitoring at the RHCA campgrounds detected no new problems or significant impacts on aquatic resources. Conditions at the Indian Creek, Raven Creek, and Deep Creek campgrounds are essentially the same as those described and analyzed in the Upper Selway River Section 7 Biological Assessment (May, 2000). Bank stability has improved at the Paradise campground since the Upper Selway River Section 7 Biological Assessment was written due to the protection offered by a riparian jack-leg fence constructed in 2000. In 2006, activities at the four RHCA campgrounds were consistent with our programmatic agreements with the U.S. Fish and Wildlife Service and NOAA Fisheries. The activities either had no effect on listed fish species or an insignificant effect.

Our key findings are:

- Most of the developed campgrounds and dispersed camping areas on the Forest are located in the RHCAs along fish-bearing streams.
- Many campground visitors fish; therefore, the riparian locations of the campgrounds increases fishing pressure on a local scale and probably results in some intentional and incidental mortality of westslope cutthroat trout, bull trout, and juvenile steelhead (in Idaho). The most vulnerable fish are the larger adults. It is not unusual to observe fewer adult westslope cutthroat trout in the portions of streams right next to campgrounds.
- Management activities have been consistent with our programmatic agreements with the regulatory agencies (U.S. Fish and Wildlife Service and NOAA Fisheries).
- One of the most common management activities in campgrounds that has the potential to impact the fishery is hazard tree removal. Hazard trees that can potentially land in the water and provide fish habitat are being felled into streams and left on site. The hazard trees that are too far away from the stream to land in the water are being evaluated by a fisheries biologist on a case-by-case basis. Depending on site conditions, the trees are sometimes felled and left on site, bucked into firewood, or removed.
- The dispersed campsites along Skalkaho Creek continue to be among the most heavily used and impactive dispersed sites on the Forest. Management attempts to reduce impacts to riparian areas at heavily used dispersed sites have had mixed success.

Outfitter and Guide Camps

Running Creek Ranch (West Fork Ranger District). During the 2006 field season, Forest fisheries biologists inspected the outfitter base camp (Kozak) that is located in the RHCA on the Running Creek Ranch. The base camp is having an insignificant effect on riparian area function and the fishery.

While monitoring the outfitter camps, two impacts on the fishery were detected on the Running Creek Ranch that need to be addressed. One of these impacts is an unscreened irrigation ditch on the Running Creek Ranch that removes 3-4 cfs from lower Running Creek during the summer months. The water is used to irrigate the horse pastures on the ranch. It is likely that some juvenile steelhead and chinook salmon are drawn into the ditch each summer. This is called entrainment. Once in the ditch, the fish usually become trapped as the water goes down and they eventually die when the water is shut off. The Forest will pursue opportunities to work with the Running Creek Ranch to screen the ditch. The other impact is a man-made rock dam in Running Creek (about 0.7 miles upstream from the mouth) that could impede the upstream movement of fish at low flows. The purpose of the rock dam is to back up about two feet of water in Running Creek and make a summer swimming pool. The concern is that the rock dam may be high enough to impede the upstream movement of fall spawning species

such as bull trout and chinook salmon. At low flows, the dam could also impede the movement of other fish species in lower Running Creek such as westslope cutthroat trout, juvenile steelhead, young-of-the-year chinook salmon, longnose dace, and sculpin. The rock dam is located behind a house on the ranch, and it has been used for a swimming pool for at least the past decade. A 1995 basinwide survey noted its presence. The rock dam is partially broken down each spring by high flows, and then rebuilt in summer by the owners of the ranch. It is unknown whether the dam is rebuilt by hand, or with a small piece of machinery operating in the stream such as a bobcat. The location of the rock dam is particularly troublesome because it is strategically located near the mouth of Running Creek, which is a key migratory corridor for adult spawners moving between the Selway River and spawning and rearing habitat in the headwaters of the Running Creek drainage. Forest fisheries biologists will contact the owners of the Running Creek Ranch or the outfitter and communicate their concerns about the dam. The rock dam either needs to be dismantled or configured in such a way that fish can swim freely back and forth past the structure at all flow levels.

Figure 8- Rock dam in lower Running Creek. The left side of the dam was breached to allow fish passage; the right side of the photo is largely intact

Angling by Selway River Commercial Float Outfitters (West Fork Ranger District). In 2006, the Idaho Department of Fish and Game (IDFG) and the Bitterroot National Forest jointly attempted to gather data on fishing use, effort, catch, and harvest by floaters on the Selway River and its tributaries. The Bitterroot National Forest provided the trip leader of each permitted launch with a data sheet developed by IDFG. Trip leaders were instructed to drop off the completed data sheet at the Fenn Ranger Station upon completion of their trip, or mail the data sheet directly to IDFG. Parties that did not fish were asked to indicate that on their data sheet, and turn it in as well.

The results of the angling survey were:

- Of 16 commercial launches, 10 (63%) turned in their data sheets. Of those 10 returns, nine trips (90%) reported angling in the Selway River or its tributaries. The data collected from the commercial trips reported: 43 angler days and a catch of 212 trout from the Selway River; and 24 angler days, 52 angler hours and 141 trout caught from the tributaries to the Selway River. Assuming that the unreported commercial trips fished at the same percentage as the reported commercial trips, then the extrapolated data for the 16 commercial launches resulted in 154 angler days and a catch of 742 trout from the Selway River; and 36 angler days, 84 angler hours, and a catch of 224 trout with no harvest from the tributaries to the Selway River.
- The value of the extrapolated estimates is arguable because of the limitations of the data provided. Private trip responses were low, but the data sheets that were turned in were generally complete. The commercial trip responses were considerably higher, but the majority of these data sheets were incomplete, which created significant data gaps. We do know that during the 2006 floating season, floaters reported catching 479 trout from the Selway River, and 156 trout from the tributaries to the Selway River. None of the fish were harvested.
- In the Selway River, it appears that the proportions of angler days and catch between private and commercial trips are fairly consistent with the proportion of private and commercial launches.
- In the tributaries, it appears that the proportions of fishing effort (angler days and hours) and catch between private and commercial trips are not consistent with the proportion of private and commercial launches. Commercial trips were only 23% of the launches, but accounted for 33% of the tributary angler days, 59% of the tributary angling hours, and 55% of the fish caught in the tributaries. This disproportional use in the tributaries could be attributed to camping locations and allocations of camp chores. Most commercial trips provide employees to do the camp chores, thus giving customers more free time to fish the tributaries near their camps. Commercial angling was only reported in Bear and

Moose Creeks, and angler effort was relatively evenly split between those two streams (there are several popular overnight campsites located near the mouths of both of those tributaries). Private angling days were evenly split between Running, Bear, Moose, and "other" creeks. It is important to note that neither private nor commercial trips reported harvesting any fish from the tributaries.

- Two key pieces of data that are missing are estimates of angling use by: (1) private and commercial land-based outfitters; and (2) the amount of angling overlap that occurs between land-based outfitters and floaters. This data would be helpful in determining potential issues of capacity and allocation relative to commercial activity.
- IDFG made three recommendations for 2007: (1) repeat the data collection effort in 2007 with increased emphasis for all launches to complete and mail in their data sheets; (2) look at angler use records for land-based outfitters in a larger-scale analysis; and (3) explore methods of estimating private, land-based angler use in the Selway drainage.

Fire Management

Dozer Line Rehabilitation (Sula and West Fork Ranger Districts). Recovery of the rehabilitated dozer lines from the 2000 fires was actively monitored on the Sula and West Fork Ranger Districts from 2000 through 2005. In 2006, we ceased monitoring because the dozer lines contain good vegetative cover, are stable and not eroding, and in many cases are blending into the surrounding natural vegetation and becoming indistinguishable. They are not a risk to contribute sediment to streams.

Middle East Fork CDZ Fuel Reduction Project (Sula Ranger District). In 2006, Forest fisheries biologists monitored the manual thinning and piling that occurred in riparian habitat conservation areas (RHCAs) along the East Fork Bitterroot River and various tributaries as part of the Middle East Fork CDZ project. The purpose of this monitoring was to document if project mitigations were properly followed. Specifically, we wanted to determine if: (1) any thinning occurred within designated "no cut" zones along stream channels, and (2) slash piles were constructed at proper distances away from stream channels. As for (1), we found no areas where trees were thinned too close to stream channels. The "no cut" zones along stream channels were properly observed. As for (2), we found two slash piles that were placed too close to stream channels (one near the Forest boundary along Jennings Camp Creek, the other near the mouth of Springer Creek). The slash piles were supposed to be built at least 50 feet away from stream channels. The two piles mentioned above were built 30-35 feet from stream channels. This was a violation of the mitigation measures, but needs to be put in perspective because hundreds of slash piles were built in this project, and we could only find two that were located too close to stream channels. After discussion with the contract supervisor, we decided to not burn any piles that were built too close to stream channels. The piles will be left unburned to provide habitat for small mammals and insects. In future thinning projects, contract supervisors should carefully check the distance of piles from stream channels to ensure compliance with the project mitigation measures.

Facilities Management

Threemile Road and Streambank Stabilization

Our objective was to stabilize a section of stream that is eroding the toe of the Threemile Road shoulder. The typical treatment of an eroding road shoulder is to place riprap along the road to prevent the stream from eroding the road. In this case we wanted to work synergistically with the Brown Valley Ranch's restoration activities and be more sensitive to the ecological needs of the stream and riparian area. We built a bank that has become more vegetated and provides better habitat for fish and riparian species. The project should improve cover and shade, and reduce sediment input to the stream, and retain safe road access to the Forest and the state's Threemile Wildlife Management Area.

The project was completed by: the Bitterroot National Forest in cooperation with the Brown Family Ranch, and their contractors (Geum Environmental Consulting, Inc. and WestWater Consultants, Inc.). Tri State Water Quality Council contributed constructive ideas and came through with additional funding at the last minute when it was critical. The Threemile / Ambrose Creeks Watershed Improvement Program (which includes local community members and the Bitter root Water Forum) were also involved. The Ravalli County Road Department did not have time or funds to contribute, but were fully supportive of the project.

Figure 9 - Before. Looking downstream at the section funded by Sikes Act funds. This photo was taken in May (note the higher water level than in summer photos). The area in the shadow is undercut, making the road edge very unstable.

Figure 10 - After implementation in September 2005. The stream was moved away from the road as part of a larger project. The areas was seeded, fertilized and mulched. Willow cuttings were laid horizontally, then backfilled, and pushed vertically into the cobble-filled floodplain and through the lower end of the topsoil (blanket). Dogwood seedlings were planted above the blanket after fencing.

Figure 11 - June 2006. Dense grass growth covers the slope. Dogwood and willow, though present, are relatively small and invisible.

Fred Burr Reservoir

Flow and temperatures were monitored at Fred Burr Reservoir in conjunction with the Montana Department of Natural Resources and the Fred Burr Water Users Association. We suspect Fred Burr Reservoir affects bull trout in Fred Burr Creek both positively and negatively.

Besides being important because it has bull trout, Fred Burr Creek has been emphasized because it was listed as one of nine local bull trout populations within the Bitterroot River Core Area. A core area represents the closest approximation of a biologically functioning unit for bull trout. Recovery of bull trout emphasizes securing the existing distribution and increasing the abundance and connectivity of local populations within core areas.

Bull trout are very sensitive to water temperature. We found higher temperatures downstream of the reservoir, which was expected and had been observed in previous samplings of temperature. What we saw in 2006 that was not expected was much higher than expected daily variations in the temperature of stream water below the dam in the fall after there was no pool left in the reservoir. We will continue to work cooperatively with the irrigators and DNRC to monitor the stream waters downstream of the dam in 2007.

Trollope-Litchford and Trollope-Hawkes Irrigation Ditches (West Fork Ranger District). The Trollope-Litchford and Trollope-Hawkes ditches exit the lower mile of Chicken Creek. The ditches are currently not screened, and fish entrainment (i.e. fish enter, become trapped, and eventually perish in the ditch) is a concern, particularly because juvenile bull trout are present in Chicken Creek at low densities. Forest fisheries biologists completed a formal section 7 consultation on the ditches in 2006. Through the consultation process, the Forest and U.S. Fish and Wildlife Service biologists agreed that the ditches are "likely to adversely affect" bull trout due to the potential for entrainment. The U.S. Fish and Wildlife Service issued a Biological Opinion in November, 2006. The Biological Opinion contains several mandatory terms and conditions and monitoring requirements. One of the monitoring requirements is to electro shock the two ditches annually each summer between 2006 and 2010 to determine if bull trout are being trapped in the ditches. Forest biologists electro shocked the two ditches in July, 2005 and June, 2006. The ditches had also been previously electro shocked in 1999. The following tables summarize available data:

Table 26 – Trollope-Litchford Ditch

Date of survey	Length of survey	Fish species found	# of fish	Size range
August 23, 1999	20 m	Westslope cutthroat Brook trout	4 1	1-4" 4-5"
July 19, 2005	100 m	Westslope cutthroat Brook trout	3 1	3-6" 1-2"
June 28, 2006	100 m	Westslope cutthroat	7	2-5"

Table 27 – Trollope-Hawkes Ditch

Date of survey	Length of survey	Fish species found	# of fish	Size range
August 23, 1999	77 m	Westslope cutthroat Brook trout Longnose sucker Slimy sculpin	1 3 1 2	2-3" 1-4" 4-5" 1-2"
July 19, 2005	100 m	Westslope cutthroat Brook trout Rainbow trout Rainbow X westslope	13 1 3 3	2-9" 2-3" 3-5" 3-5"
June 28, 2006	100 m	Westslope cutthroat Longnose sucker	7 2	3-5" 6-7"

Bull trout have not been found in the ditches, but their presence cannot be discounted because they do occur at low densities in Chicken Creek, and the ditches are only sampled once per summer. Forest fisheries biologists plan on electro shocking the ditches again during summer, 2007. Also, the water right holder plans on installing a fish screen on the headgate of the Trollope-Hawkes ditch in summer, 2007, and reconstructing the diversion structure so that it no longer impedes the movement of fish in Chicken Creek. Both of those actions would achieve the terms and conditions in the Biological Opinion.

Hawkes Irrigation Pipeline (West Fork Ranger District). The Hawkes irrigation pipeline is a buried PVC pipe that exits the lower Deer Creek. The headgate is screened with a ¼ mesh passive screen that was installed in 2001. The screen has functioned well and has had no problems with plugging since it was installed. The diversion is an upstream-V boulder step structure that does not impede fish passage.

Twogood Irrigation Ditch and Diversion Reconstruction Project (Sula Ranger District). The Twogood ditch exits the north bank of the East Fork Bitterroot River about 500 feet downstream of Jennings Campground. The ditch is currently not screened, and fish entrainment is a concern, particularly because juvenile bull trout are present in the East Fork at low densities. Forest fisheries biologists completed a formal section 7 consultation on the Twogood ditch in 2006. Through the consultation process, the Forest and U.S. Fish and Wildlife Service biologists agreed that the Twogood ditch is "likely to adversely affect" bull trout due to the potential for entrainment. The U.S. Fish and Wildlife Service issued a Biological Opinion in August, 2006. The Biological Opinion contains several mandatory terms and conditions and monitoring requirements. One of the terms and conditions is that the ditch will be screened, and the Forest will monitor the screen to ensure that it is properly installed and maintained throughout the irrigation season. The water right holder plans on screening the ditch during the 2007 irrigation season. Forest fisheries biologists will periodically monitor the screen during the 2007 irrigation season to ensure compliance with the Biological Opinion. The rock diversion for the Twogood ditch was reconstructed with a backhoe during August, 2006. Monitoring indicates that the work was completed as planned, and the effects on the fishery were consistent with those described in the Biological Opinion. The following photos show the Twogood diversion, before and after reconstruction.

Figure 12- Twogood diversion, before reconstruction	**Figure 13** - Twogood diversion, after reconstruction
	

Ward Creek Irrigation Ditch (West Fork Ranger District). This ditch exits Ward Creek about 0.5 miles upstream from the West Fork Highway. The ditch provides water for the horse pastures at Lone Pine on the West Fork Ranger Station property. Some small westslope cutthroat trout from Ward Creek get trapped and perish in the ditch during the summer irrigation season. The West Fork Ranger District has screened the ditch, and the screen will be maintained and monitored during the 2007 irrigation season.

Ditch Entrainment Graduate Research Projects (Darby Ranger District). Two research studies by Montana State University fisheries graduate students were completed on the Darby Ranger District in 2006. Both studies investigated issues related to fish entrainment in irrigation ditches.
Ryan Harnish completed a two-year study in 2006 that investigated the efficacy of three recently installed fish screens on Skalkaho Creek at preventing the entrainment of juvenile westslope cutthroat trout. The results of his study are summarized in the following abstract:

> Harnish, R.A., A.V. Zale, and C.G. Clancy. 2007. Efficacy of fish screens at preventing entrainment of westslope cutthroat trout *Oncorhynchus clarkii lewisi* juveniles in three irrigation canals of Skalkaho Creek, Montana. Annual Meeting of the Montana Chapter of the American Fisheries Society. Missoula, MT. February 14-16, 2007.

Fish screens have been installed to prevent fish loss in many irrigation canals of the western U.S., costing millions of dollars annually. However, few studies have attempted to evaluate the effectiveness of fish screens. Our goal was to determine the efficacy of fish screens installed in three of seven irrigation canals on Skalkaho Creek, a tributary of the Bitterroot River. Fish screen efficacy was quantified using half-duplex PIT tags and PIT tag-detecting antennae located in the headgate opening(s), around the bypass pipes, and in the canal downstream from the fish screens. Throughout the irrigation season, juvenile westslope cutthroat trout *Oncorhynchus clarkii lewisi* were captured, PIT-tagged, and introduced into each screened canal between the headgates and the fish screen. Fish screens in the Highline, Ward, and Hughes canals prevented entrainment of 97.5% (116 of 119), 96.7% (116 of 120), and 74.2% (72 of 97) of the PIT-tagged fish introduced into the canals, respectively. Whereas none of the PIT-tagged fish became entrained beyond the screens, 9.5% (32 of 336) remained in the canals upon headgate closure. Seventy percent (21 of 30) of the PIT-tagged fish introduced into the Hughes Canal two weeks prior to headgate closure remained in the canal because no water was being bypassed and the headgates were not open enough to provide an easy upstream exit. If not rescued, fish remaining in the canal upon headgate closure would have perished. Fish screens are an effective management tool for reducing irrigation canal entrainment, but their effectiveness varies among specific installations.

Leslie Bahn completed a two-year study in 2006 that investigated how many and what species of fish were entrained in 12 irrigation ditches exiting Tin Cup and Lost Horse Creeks. The results of her study are summarized in the following abstract:

> Bahn, L., A.V. Zale, C.G. Clancy, and M. Lere. 2007. Fish losses to irrigation diversions on two tributaries of the Bitterroot River, Montana. Annual Meeting of the Montana Chapter of the American Fisheries Society. Missoula, MT. February 14-16, 2007.

Withdrawals of surface water for irrigation and stock water leave the mainstem of the Bitterroot River and its tributaries chronically dewatered during the irrigation season. These water withdrawals affect local trout populations by entraining migratory trout in irrigation diversion canals at multiple life stages, and through the loss and degradation of available habitat for aquatic species. Irrigation losses may be responsible in part for the low abundance and restricted distributions of migratory native westslope cutthroat trout *Oncorhnychus clarkii lewisi* and bull trout *Salvelinus confluentus* in this system. Information about entrainment rates of fish into irrigation diversion canals and the factors that influence these rates is limited. Our goals were to quantify entrainment of fish into 7 irrigation diversions on Lost Horse Creek and 5 irrigation diversions on Tin Cup Creek, two tributaries of the Bitterroot River, and to identify characteristics of these diversions that correlate with rates of entrainment. We sampled fish species by snorkeling, electrofishing, fry trapping, and reconnaissance at the end of the irrigation season at 60 sites in 2005 and 54 sites in 2006. In August, the period of peak abundances of entrained fish, we estimated 5,525 fish in 2005 and 3,372 fish in 2006 to be present in Lost Horse Creek diversions. We estimated 1,904 fish in 2005 and 1,158 fish in 2006 to be present in Tin Cup Creek diversions in August. The highest entrainment of fish occurred in canals diverting the greatest amounts of water.

<u>Our key findings are:</u>

- Very few of the irrigation ditches that exit the Forest are screened, but the Forest has been increasing its efforts in recent years to screen the ditches that have points of diversion on the Forest.
- The fish screens installed on the Skalkaho Creek irrigation canals are effective in preventing the entrainment of fish.
- The number of fish entrained in irrigation ditches across the Bitterroot River basin each summer numbers in the thousands. In the Lost Horse Creek ditch system, an estimated 9,000 fish were entrained in ditches in 2005 and 2006. In the Tin Cup Creek ditch system, the estimate was about 3,000 fish entrained. The most common species entrained in the ditches is usually the westslope cutthroat trout. As of 2006, bull trout have been found in five irrigation ditches (the Sopher ditch in lower Hughes Creek, two ditches that exit lower Nelson Creek, and two ditches that exit lower Lost Horse Creek). Bull trout are probably present in more ditches, but their densities are so low that their presence is difficult to detect.
- Fish screens are expensive. For that reason, the type of screen installed needs to be carefully assessed on a case-by-case basis. It is clearly not practical to install an expensive, self-cleaning 3/32nd inch screen on every ditch that exits the Forest. Those types of screens are very expensive (at least $10,000 for the cheaper models), and they still can plug and require regular maintenance. Clearly, considering the large number of unscreened ditches that exit Forest streams and the high cost of installing self-cleaning screens, another

alternative is needed. One alternative that we are experimenting with on the Trollope-Hawkes, Twogood, and Ward Creek ditches is to allow the ditch owner to install a larger mesh (1/8th inch or ¼ inch) passive screen that can be retrofitted to the existing head gate. The benefit is the low cost and ease of installation. The downside is that passive screens usually require very diligent, daily cleaning by the ditch owner. If diligent cleaning does not occur, the screens often clog with debris and no longer pass water effectively. However, this is not always the case. For example, the ¼ inch passive screen on Deer Creek (Hawkes irrigation ditch, West Fork Ranger District) has been in place since 2001 and has not had plugging problems. The larger mesh sizes do not prevent all fish entry (the smallest fry still can slip through the mesh), but it does prevent the majority of fish from entering the ditch, which is a big improvement over the existing unscreened condition where all fish can enter.

Grazing

There are six riparian exclosure fences or drift fences that are monitored on an annual basis by fisheries biologists and range specialists on the Sula and West Fork Ranger Districts. The six fences that are monitored are:

1. Meadow Creek exclosure fence, constructed in 1996 and extended in 2004 (Meadow Tolan grazing allotment)
2. Waugh Creek exclosure fence, constructed in 1998 and extended in 2004-05 (Waugh Gulch grazing allotment)
3. Bugle Creek exclosure fence, constructed in 2000 (Meadow Tolan grazing allotment)
4. Reimel Creek exclosure fence, constructed in 2001 (Camp Reimel grazing allotment)
5. Paradise Campground jack-leg fence, constructed in 2000 (no allotment is associated with this fence)
6. Meadow Creek jack-leg drift fence, constructed in 2005 (Meadow Tolan grazing allotment)

Each of these fences was monitored in 2006. The results are discussed in the following paragraphs.

Meadow Creek Exclosure Fence (Sula Ranger District). The Meadow Creek exclosure fence was originally constructed in 1996 as part of the INFISH action plan. In 2004, the exclosure was extended downstream by another 1750 feet. There are now three separate exclosures (roughly 1750 feet long + 1200 feet long + 900 feet long) separated by hardened cattle fords. 2006 was the 10th consecutive year that the exclosure was operational. 2006 was a successful season - no cows got inside the exclosure fence during the grazing season. A July, 2006 thunderstorm caused several dozen large trees to blow down across the fence, resulting in considerable damage to the fence. The fence was repaired before any cows could get inside the exclosure. Since 1996, the Meadow Creek exclosure fence has been very effective. There has been very little livestock encroachment inside the exclosure since it was constructed. The riparian vegetation and stream banks inside the exclosure fence have recovered to the point where they are at or near reference conditions. The two cattle fords primarily consist of gravel bedload deposits, and are functioning adequately at this time. The fords need to be watched in future years and hardened if bank erosion becomes excessive. In 2006, fisheries objectives were met inside the Meadow Creek exclosure fence.

Waugh Creek Exclosure Fence (Sula Ranger District). The Waugh Creek exclosure fence was originally constructed in 1998 as part of the Camp Reimel EA. In 2005, the Forest completed a 700-foot long extension on the upstream end of the 1998 exclosure fence. The Waugh Creek exclosure fence now consists of a 700-foot long exclosure and a 1400-foot long exclosure separated by a cattle ford. 2006 was the 8th consecutive year that the Waugh Creek exclosure fence was operational. The Waugh Gulch exclosure fence functioned effectively in 2006 - no cows got inside the exclosure fence during the grazing season. Very little grazing occurred in the Waugh Gulch pasture in 2006. The pasture was used as a late season collector area for any cows leaving the Warm Springs pasture. It did not receive scheduled grazing in 2006. Trespass grazing, which has been a problem in past years, was minimal in 2006. The cattle ford is adequately hardened and is not a significant area of erosion. The Waugh Creek channel inside the exclosure fence has narrowed and healed since 1998. This resulted in much better fish habitat than occurred prior to fencing. In 2006, fisheries objectives were met inside the Waugh Creek exclosure fence.

Bugle Creek Exclosure Fence (Sula Ranger District). The Bugle Creek exclosure fence was originally constructed in 2000 as part of a fisheries improvement project. 2006 was the 7th consecutive year that the exclosure fence was operational. The exclosure fence functioned effectively in 2006 – no cows were able to get inside the exclosure fence during the grazing season. The riparian vegetation and stream banks inside the fence have shown excellent recovery since 2000. The channel has narrowed and healed. The willow seedlings planted by the Forest in 2000 and 2001 are growing. The fence has not shifted stream bank impacts to other unfenced areas, and has not concentrated grazing impacts above or below the fence to any great degree. The hardened

livestock ford at the upper end of the fence has been effective in reducing bank trampling where livestock cross Bugle Creek. In 2006, fisheries objectives were met inside the Bugle Creek exclosure fence.

Reimel Creek Exclosure Fence (Sula Ranger District). In 2001, a five-mile long livestock exclosure fence was constructed around the burned riparian area of Reimel Creek. The upper end of the exclosure fence is located just below the mouth of Wallace Creek; the lower end is located where Reimel Creek exits the Forest. 2006 was the 6th consecutive year that the exclosure fence was operational. Trespass inside the exclosure fence was infrequent and incidental in 2006, and riparian conditions inside the fence looked good at the end of the grazing season. The Reimel Creek exclosure fence performed much better in 2006 than it did in 2005. The success that occurred in 2006 is believed to be attributable to the cattleguards that were installed in August, 2005. The gates in the fence that predated the cattleguards were a chronic trespass problem in 2002-05. A potential project for 2007 is to remove the segment of historic exclosure fence and replace it with a new, regular steel post and barbed wire fence. The historic exclosure is falling apart, is a potential weak point for trespass, and no longer serves a useful purpose. In 2006, fisheries objectives were met inside the Reimel Creek exclosure fence.

Figure 14- Post-grazing season conditions in the lower meadow near the FSR 727 crossing of Reimel Creek	**Figure 15** - Post-grazing season conditions in the upper meadow along Reimel Creek near the Reimel Creek trailhead
	

The Reimel Creek exclosure fence has had mixed success since it was constructed in 2001. There have been some good years with little to no livestock trespass (e.g. 2001, 2002, 2004, and 2006), and a couple of poor years with widespread riparian impacts (2003 and 2005). Despite some livestock trespass, the trend in riparian conditions along Reimel Creek has clearly improved since the late 1990's. The stream channel has narrowed, and damaged banks are healing with good undercut bank formation. Numerous willow and alder shrubs are colonizing the stream banks, with most being about waist-to-chest high. Many of the shrubs originated from 2000-2001 plantings. The fish habitat structures that were constructed in 1999 are providing good pools and hiding cover, and harboring numerous fish. Most of the burned snags that were felled into Reimel Creek in May, 2003 (BAR project) are providing decent hiding cover and small pool formation. Hundreds of new snags have fallen into or across Reimel Creek in the past couple of years. The short sections of Road 727 that were relocated further away from Reimel Creek in 2001-02 and 2005 are stable and have been effective in reducing road impacts on the stream channel. The casual Forest visitor probably would not notice the road relocations.

Paradise Campground Jack-Leg Drift Fence (West Fork Ranger District). The Paradise Campground jack-leg drift fence was constructed in 2000 as part of a fisheries improvement project. 2006 was the 7th consecutive year that the fence was operational. The fence consists of a 0.25-mile long wooden jack-leg drift fence that runs along the north bank of Whitecap Creek adjacent to the Paradise Campground in two segments (separated by a gap of intact riparian vegetation). The fence has two goals: (1) keep stock off of the stream banks; and (2) restore the native riparian community of ponderosa pine trees and hawthorn shrubs to the stream banks. In 2006, the fence was successful in keeping stock off of the stream banks (as it has in all years since it was constructed). However, the pine and hawthorn seedlings that were planted in 2001-02 have almost all died. The stream banks are scheduled to be replanted with larger ponderosa pine seedlings and 5-gallon hawthorn shrubs in 2007. The

shrubs will be planted in the fall this time to get better survivorship. In 2006, fisheries objectives were partially met inside of the Paradise jack-leg fence. The stream banks were protected from stock grazing, but the restoration of the native riparian community of ponderosa pine and hawthorn to the stream banks has failed.

Meadow Creek Jack-Leg Drift Fence (Sula Ranger District). The Meadow Creek jack-leg drift fence was constructed in 2005 along a grazed, upper reach of Meadow Creek. The purpose of the fence is to reduce livestock bank trampling (Meadow Tolan grazing allotment) along a chronically trampled quarter mile-long section of upper Meadow Creek that contains bull trout and westslope cutthroat trout spawning and rearing habitat. 2006 was the 2nd consecutive year that the fence was operational. The fence was successful in 2006. A few cows got inside the fence (probably by skirting around the downstream end of the fence and walking in the stream), but bank trampling inside the fence was light and incidental. The riparian vegetation and stream banks inside the fence were largely intact. A couple snags will be felled at the downstream end of the fence to prevent cows from walking into Meadow Creek. In 2006, fisheries objectives were met inside the fence.

Meadow Tolan Grazing Allotment (Sula Ranger District). In October 2006, Forest fisheries, watershed, and range specialists monitored bank trampling levels and channel cross-sections in the long-term monitoring reaches that were established in the 1997 Meadow Tolan/Bunch Gulch/Shirley Mountain Grazing Allotments EA. This was the 8th consecutive year of post-grazing season monitoring (1999-2006). Results and trends are discussed in Item 17, Watershed Baseline Monitoring.

Waugh Gulch Grazing Allotment (Sula Ranger District). In September 2006, Forest fisheries biologists and range specialists monitored the Waugh Gulch and West Fork Camp Creek pastures for grazing impacts. 2006 was the 4th season in which a new grazing rotation was used in the Waugh Gulch allotment. The objective of our monitoring was to see if the new grazing system resulted in more, less, or about the same amount of utilization of valley bottom forage and wetland impacts as the old system that occurred prior to 2000. The Waugh Gulch pasture did not receive scheduled grazing in 2006. It was used as a late season collector area for any cows leaving the Warm Springs pasture. Trespass grazing was minimal in 2006. At the end of the grazing season, there was very little utilization in the Waugh Gulch pasture. The West Fork Camp Creek pasture was grazed during the month of July, and then cattle were removed from the pasture. Bank trampling along the West Fork of Camp Creek was within the range of past years (2002-05), but more widespread than it was in 2005 because the entire FSR 729 riparian road corridor was grazed harder in 2006. The permittee needs to do a better job of moving cows out of the FSR 729 riparian road corridor and pushing them farther uphill into the upland portions of the pasture. In 2006, there was less utilization and bank trampling along the West Fork of Camp Creek than what annually occurred under the pre-2000 grazing system. Also, cattle are no longer present along West Fork Camp Creek during the bull trout spawning season (September), which eliminates the risk of trampling bull trout redds. That is an important benefit of the new grazing system.

Our key findings are:

- Riparian exclosure fences have proven to be a very effective tool for protecting riparian resources and the fishery within grazing allotments.
- Fenced riparian areas have shown that they respond quickly and positively to the absence of livestock grazing. Considerable recovery of the vegetation and stream banks occurs during the first year of livestock absence, and by year 3 to 5, riparian recovery is generally excellent.
- If they are regularly maintained, the fences essentially have a 100% chance of achieving recovery goals.
- The most negative aspect to riparian exclosure fences is the annual maintenance commitment; another is the lack of visual “naturalness” on the landscape (most of the fences are made out of conventional steel post and barbed wire) and a generally low potential for disrupting big game movement.
- If maintained, exclosure fences are good, reliable solutions for restoring localized riparian grazing problem areas and fish habitat.

Weed Management

Magruder Corridor and Frank Church River-River of No Return Wilderness Herbicide Treatments (West Fork Ranger District). During the 2006 field season, Forest fisheries biologists monitored the herbicide spraying that occurred along the Magruder corridor road ditches. The water protection mitigations appear to have been adequately followed and applied. The herbicide treatments that the Forest conducted in Idaho between 2000-2006 have adequately followed the applicable mitigation measures, and have been consistent with the “may

affect, not likely to adversely affect" determinations made for listed fish species in the 2000 Section 7 Upper Selway River Subbasin Biological Assessment and the 1999 Frank Church Weed EIS and Biological Assessment.

Timber Management

Frazier Interface Stewardship Project (West Fork Ranger District). The Frazier Interface stewardship project consisted of a mix of commercial thinning, manual thinning, and prescribed burning in the wildland urban interface portions of the Pierce, Baker, and Frazier Draw drainages. Within RHCAs, commercial harvest was prohibited, but manual thinning and prescribed burning was allowed. There was no road construction in the project. Yarding consisted predominantly of winter tractor and skyline, with a lesser amount of summer tractor. Forest fisheries biologists monitored the Frazier Interface project repeatedly in 2005 and 2006. The purpose of the fisheries monitoring was to: (1) verify protection of the RHCAs; (2) look for indications of sediment delivery to streams; (3) monitor log hauling conditions; and (4) ensure compliance with the fisheries mitigation measures in the Decision Notice. In the Frazier Interface EA, biological assessment (BA), and biological evaluation (BE), Forest fisheries biologists predicted that the project would result in no measurable changes in sediment levels, water temperatures, water yields, woody debris recruitment, and fish habitat structure. Westslope cutthroat trout populations and habitat would remain at or near their pre-project condition in Baker Creek, Pierce Creek, and the West Fork Bitterroot River. The project would have a negligible effect on the bull trout population and habitat in the West Fork Bitterroot River.

Our monitoring findings indicate:

- There was one instance where an RHCA boundary was improperly painted too close to a stream. The RHCA boundary was supposed to be painted at 50 feet from edge of the stream channel, however, but was as close as 25 feet in a couple of locations. As a result of this painting error, about a dozen commercial-size trees were harvested from the outer 25 feet of the RHCA. This was a violation of the mitigation measure in the Frazier Interface Decision Notice that states no commercial harvest would occur within 50 feet of intermittent streams. The violation was not intentional. It was caused by marking crew confusion. Apparently, there were several flag lines in the area, and the marking crew followed the wrong flag line when painting the RHCA boundary. The harvest of trees that occurred in the RHCA had no effect on the fishery because the small intermittent stream did not support fish and did not contribute water to any fish habitat downstream of the unit.
- The rest of the RHCAs in the project area were properly marked, and no commercial harvest occurred within them.
- There was no sign of sediment exiting the harvest units, crossing RHCA boundaries, and moving towards streams.
- The portion of the Road 363 haul route that encroaches on Pierce Creek was closely monitored during winter 2005-06. This segment of road contains a good gravel aggregate, and it held up well. The sale administrators did a good job of carefully managing the haul, and watching the weather conditions closely. There were several rain-on-snow events during winter 2005-06, but those events did not cause erosion of the Road 363 haul route because the road surface was protected during the rains by a continuous, glassy, thick sheet of ice. The haul was managed well during spring break-up, and few trucks hauled on the roads at that time. We did not observe any direct sediment delivery from the haul road in Pierce Creek. In a few spots, rills left the road shoulder and a small sediment trail was visible over the fill slope before it was stopped by vegetative buffer. None of the rills entered Pierce Creek. Overall, the hauling and associated road maintenance (plowing & grading) that occurred in the Frazier Interface project was consistent with the fisheries mitigation measures.
- With the exception of the RHCA boundary mistake in unit 4, the rest of the project activities complied with the fisheries mitigation measures in the Frazier Interface Decision Notice.
- Our monitoring results indicate that the predictions that were made for the fishery in the Frazier Interface EA, BA, and BE were valid. The project caused no measurable changes in water temperatures, water yields, sediment levels, woody debris recruitment, or fish habitat structure in Pierce and Baker Creeks. We found no indications of direct sediment delivery to streams. The project had no effect on fish habitat in the West Fork Bitterroot River.

Figure 16- Typical conditions on Road 363 along Pierce Creek during winter 2005-06 rain-on-snow events	**Figure 17-** Typical winter tractor skid trail in unit 64E
	

Beaver Woods Timber Sale - Blockhead Modification (West Fork Ranger District). The Blockhead modification of the Beaver Woods timber sale consisted of less than 250 acres of salvage of beetle-killed fir trees. The units were located in the Woods, Thunder, and Castner Creek drainages. No commercial harvest was allowed in RHCAs, and there was no road construction. Yarding consisted of winter helicopter and skyline. Forest fisheries biologists monitored the Blockhead sale twice in 2006. The purpose of the fisheries monitoring was to: (1) verify protection of the RHCAs; (2) look for indications of sediment delivery to streams; (3) monitor log hauling conditions; and (4) ensure compliance with the fisheries mitigation measures in the Decision Memo. In the Blockhead BA/BE, Forest fisheries biologists predicted that there would be no measurable increase in sediment delivery to fish habitat, and no changes in water temperatures, stream shade, woody debris recruitment, and RHCA function. The Blockhead sale was predicted to have no direct or indirect effects on westslope cutthroat trout and bull trout populations in the Upper West Fork drainage.

Our monitoring findings indicate:

- All of the RHCAs in the Blockhead sale were properly marked, and no commercial harvest occurred within them.
- There was no sign of sediment exiting the harvest units, crossing RHCA boundaries, and moving towards streams.
- Most of the haul roads were located in the uplands with few crossings of fish-bearing streams. A short segment of haul road (Road 5669) in the RHCA on the north side of Woods Creek was used for a couple weeks during good winter hauling conditions. We did not observe any sediment delivery from the haul roads into Woods Creek or any other stream. The hauling and associated road maintenance (plowing & grading) that occurred in the Blockhead sale was consistent with the fisheries mitigation measures.
- The RHCA helicopter landing along Woods Creek was properly located and managed in a natural opening on the north side of the stream. The landing was used when the ground was frozen and snow-covered. Use of the landing caused no erosion, and there was no sign of sediment moving towards Woods Creek. Use of the RHCA landing complied with the fisheries mitigation measures.
- All of the project activities complied with the fisheries mitigation measures in the Blockhead CE.
- Our monitoring results indicate that the predictions that were made for the fishery in the Blockhead BA/BE were valid. The project caused no changes in water temperatures, stream shade, woody debris recruitment, or fish habitat structure. There was no evidence of sediment being delivered to fish habitat.

Seed Production Areas Timber Sale - Two Percent Unit (Sula Ranger District). The Two Percent unit consisted of about 25 acres of commercial thinning. The unit was located in the headwaters of the Cameron Creek drainage, just on the Sula side of the Rye Creek/Cameron Creek watershed divide. The yarding system was winter tractor. There were no RHCAs in the unit due to its upland location. There was no road construction. The purpose of the fisheries monitoring was to: (1) monitor yarding conditions; (2) monitor log hauling conditions; and (3) ensure compliance with the fisheries mitigation measures in the Decision Memo. In the Seed Production Areas BA/BE, Forest fisheries biologists predicted that the Two Percent unit only had the potential to affect one fish habitat feature (sediment), and the only area where sediment delivery could occur would be along the Road 311 and Road 75 haul route that parallels Rye Creek and Rye tributary 9.1. Because fewer than ten log trucks would drive on the haul roads, the amount of sediment that could potentially be delivered to fish habitat in Rye Creek and Rye tributary 311 would be immeasurable and insignificant. The only fish species that could be affected by hauling from the Two Percent unit would be westslope cutthroat trout in Rye Creek and Rye tributary 9.1. The Two Percent unit would have no effect on bull trout populations and habitat in the East Fork Bitterroot River or the upper reaches of Rye Creek.

Our monitoring findings indicate:

- The Two Percent unit was yarded with adequate frozen ground conditions. There was no significant ground disturbance or erosion in the unit.
- The Road 311/Road 75 haul roads were used by fewer than ten truck loads during a period of good winter hauling conditions. Because of the light use and good hauling conditions, we did not observe sediment delivery from the haul roads into Rye Creek or Rye tributary 9.1. The hauling and snow plowing that occurred were consistent with the fisheries mitigation measures.
- All of the project activities complied with the fisheries mitigation measures in the Two Percent CE.
- Our monitoring results indicate that the predictions that were made for the fishery in the Seed Production Areas BA/BE were valid. Harvest of the Two Percent unit had essentially no effect on the fishery.

Lost Trail Ski Area Timber Sale (Sula Ranger District). The Lost Trail Ski Area timber sale was completed in 1997-99. The Lost Trail Ski Area timber sale is unique because it involved clearcutting about a quarter mile of riparian area along the East Fork of Camp Creek to make room for the construction of chairlift #3 (the Huckleberry chairlift). Since INFISH amended the Forest Plan in 1995, there is been very little riparian timber harvest conducted on the Forest. Because of its riparian clearcutting, the Lost Trail Ski Area timber sale has the potential to create more substantial and long-ranging negative impacts on riparian areas and the fishery.

The Lost Trail Ski Area FEIS predicted that there would be increased sediment delivery to the East Fork of Camp Creek, but extensive project sediment mitigations would keep the amount of sediment delivered to the East Fork to immeasurable levels. There would be an increased risk of channel instability in the East Fork of Camp Creek due to increased water yields caused by clearcutting for the chairlifts and ski runs. Despite these effects, the FEIS predicted that riparian management objectives for pool frequency, large woody debris frequency, water temperature, width/depth ratio, and sediment would be maintained in the East Fork of Camp Creek (Lost Trail Ski Area Expansion FEIS, page 4-11). The prediction was that overall, some minor impacts to westslope cutthroat trout habitat or individuals could occur in the East Fork of Camp Creek downstream of the project area, but those impacts would be too small of a magnitude to contribute to a trend towards federal listing or cause a loss of viability to the species or population. There would be no effect on bull trout in the main stem of Camp Creek (Lost Trail Ski Area Expansion FEIS, pages C-1 and C-2).

The monitoring plan for fisheries in the FEIS directed the Forest to monitor the effect of the project on the riparian management objectives for woody debris, temperature, width-depth ratios, and pool frequency in the East Fork of Camp Creek (Lost Trail Ski Area Expansion FEIS, page 2-28). In order to do this, Forest fisheries biologists established two monitoring reaches in the East Fork of Camp Creek: (1) a 2.24-mile long reach downstream of Road 729 and below all project activities; and (2) a 1400-foot long reach upstream of Road 729 (1100 feet of the reach above Road 729 was subsequently clearcut in order to construct chairlift #3). Both of the monitoring reaches were surveyed prior to the start of any expansion activities to establish baseline riparian management objective conditions. The reach below Road 729 was surveyed in summer, 1996; the reach above Road 729 was surveyed in summer, 1997. Westslope cutthroat trout are present throughout the reach below Road 729. The reach above Road 729 is naturally fishless due to its steep gradient. The following table summarizes the changes that have occurred in the riparian management objectives in the East Fork of Camp Creek over the past 8-9 years since the Lost Trail Ski Area timber sale was completed.

Table 28 - A Comparison of Riparian Management Objectives Before (1996 and 1997) and After (2006) the Lost Trail Ski Area Timber Sale

Riparian Management Objective	Baseline condition, below Road 729	Post-project condition, below Road 729	Baseline condition, above Road 729	Post-project condition, above Road 729
Pool frequency	436 pools per mile	466 pools per mile	270 pools per mile	294 pools per mile
Large woody debris frequency	354 pieces per mile	621 pieces per mile	512 pieces per mile	400 pieces per mile
Water temperature	A water temperature monitoring site was established near the mouth of the East Fork of Camp Creek. A control site was established near the mouth of the West Fork of Camp Creek. In 1996, 1997, and 1998, the site near the mouth of the East Fork averaged 70 degree days warmer than the site near the mouth of the West Fork.	In 2006, the site near the mouth of the East Fork was 73 degree days warmer than the site near the mouth of the West Fork.	In 1997, 82% of the stream channel was shaded by overstory vegetation. A water temperature monitoring site was established above the Road 729 crossing. In 1997 and 1998, the site averaged 458 degree days.	In 2006, 36% of the stream channel was shaded by overstory vegetation. In 2001 and 2002, the monitoring site above the Road 729 crossing averaged 26 degree days warmer than a control site established upstream of the clearcut riparian area.
Width-depth ratio	9.6	10.8	Not measured above Road 729	Not measured above Road 729

Our monitoring findings were:

- Pool frequency has stayed about the same over the past decade in both monitoring reaches. We measured small increases in the number of pools in both reaches in 2006; however, the increases are so small that they could be caused by observer variability. The pools in the clearcut area are shallower with less woody hiding cover than those in the uncut areas.
- The amount of large woody debris has increased substantially over the past decade in the reach below Road 729, and decreased by about 22% in the clearcut reach above Road 729. The increase below Road 729 has been caused by increased recruitment of beetle-killed trees. Clearcutting most of the overstory trees in the riparian area has caused the decrease in large woody debris recruitment in the reach above Road 729. This decrease is expected to continue for the next half century or so, and may persist as long as chairlift #3 is in its current location. The existing pieces of wood in the upper reach are generally old and rotten, and will continue to disintegrate over time. Also, the stream channel is so small and complex that recruitment of large wood from intact upstream riparian areas will be minimal.
- In the reach above Road 729, we measured an approximate 0.33º C increase in mean daily water temperature at the downstream end of the clearcut riparian area. However, this 0.33º C increase is smaller than the +/- 0.7º C accuracy resolution of our computerized thermographs, so we cannot definitively attribute the temperature increase to the clearcutting. In the reach above Road 729, the percent of the stream channel shaded by overstory vegetation decreased from 82% to 36% after clearcutting of the riparian area. This reduction in overstory shade lends support to the evidence that a small temperature increase has occurred in the reach above Road 729.
- In the reach below Road 729, we were unable to detect a water temperature increase. The difference in degree days between the East Fork of Camp Creek (the treatment site) and the West Fork of Camp Creek (the control site) stayed about the same between 1996-98 and 2006. Whatever small amount of warming that occurs above Road 729 is indistinguishable below Road 729.
- There was little change in width-depth ratio below Road 729. The increase from 9.6 to 10.8 is an insignificant change. We did not measure width-depth ratios above Road 729; however, the length of split channels (a possible indicator of increased channel instability) in the upper reach decreased by nearly half between 1997 and 2006 (182 feet of split channel in 1997; 90 feet of split channel in 2006).

This could indicate that channel stability has not changed much over the past decade. The decrease in split channels could also be caused by drought. 1997 was a big snow year with abundant stream flow throughout the summer. 2006 was a drought year with low base flows.

- The alder has responded to the clearcutting and is getting thicker along the clearcut riparian zones.
- In the reach below Road 729, the FEIS prediction that the riparian management objectives would be maintained was accurate. We have not detected any negative changes to the westslope cutthroat trout population or its habitat in the East Fork of Camp Creek. Also, the project has had no detectable effect on bull trout in the main stem of Camp Creek.
- In the reach above Road 729, the FEIS prediction that the riparian management objectives would be maintained was only partially accurate. We measured changes to the riparian management objectives for large woody debris frequency (a decrease) and water temperature (a small increase). These changes appear to be too small and localized to have a discernable effect on fish habitat quality below Road 729.

Figure 18- Typical condition of the East Fork of Camp Creek in the intact riparian area above Road 729	**Figure 19-** Typical condition of the East Fork of Camp Creek in the clearcut riparian area above Road 729
	

Burned Area Recovery Project (All Districts). There are three fisheries monitoring items in the Burned Area Recovery FEIS (Volume II, Appendix C, pages C-12 to C-16). Forest fisheries biologists monitored these items each year from 2002 to 2006. Monitoring of items #1 and #3 will be completed in 2006 when harvest in the Skalkaho Beetle Salvage sale is finished. Monitoring of item #2 will continue whenever road decommissioning/storage occurs or fish culverts are replaced. The results of our 2006 Burned Area Recovery monitoring are summarized below.

FISHERIES MONITORING ITEM # 1

The objectives of item #1 are to:

- ensure that riparian habitat conservation area (RHCA) buffers are properly delineated and protected and no fuel reduction activities occur within RHCAs
- ensure that the Forest meets management obligations for threatened, endangered, and sensitive fish species
- ensure that Burned Area activities comply with the Forest Plan as amended by the Inland Native Fish Strategy

In order to meet these objectives, we focused our monitoring efforts to answer the following questions.

1. Were RHCA buffer widths properly delineated and of sufficient width?

Yes. Our monitoring during 2006 indicates that all of the RHCA buffers were properly delineated and marked. The salvage harvest portion of the Burned Area Recovery project is nearly over. In 2006, about 200 acres of salvage harvest occurred. In 2007, about 200 acres is under contract be salvaged in the Skalkaho Beetle

Salvage sale. Only one of the units (unit 45) in the Skalkaho Beetle Salvage sale contains RHCA buffers (four isolated, interior wetlands). Those wetland RHCAs have been properly delineated and painted.

Throughout the history of the Burned Area Recovery project, nearly all of the RHCA buffers have been properly delineated and marked.

2. Were the trees inside of the RHCAs protected from felling and harvest?

Yes. We found no areas in 2006 where trees were felled inside RHCA buffers.

Throughout the history of the Burned Area Recovery project, there have been 14 instances (spread across > 130 salvage units) where purchasers erroneously felled and/or removed trees from RHCA buffers. In the 14 instances, a total of 162 trees were cut. The 162 trees affected a lineal buffer length of about 900 feet, which is < 0.1% of the total length of RHCA buffers in the salvage units. In the majority of the 14 cases, the cutting took place within the outer third of 150-200' RHCAs surrounding small intermittent streams and wetlands. This cutting has had a negligible effect on aquatic resources because it either occurred in non-fish bearing areas, or occurred too far from stream channels to affect shade or woody debris recruitment. The expanded RHCA buffers used in the Burned Area Recovery project have been very effective in preventing negative effects to aquatic resources.

3. Were the trees felled inside of the RHCA buffers left on site?

This was not an issue in 2006 because no trees were felled inside the RHCA buffers.

Throughout the history of the Burned Area Recovery project, about half (78 of 162 trees) of the trees erroneously cut by purchasers inside of RHCAs were left on site. 84 of those trees were yarded, which violated the mitigation measures in the Record of Decision (ROD). The ROD states that trees cut in the RHCAs must be left on site.

Throughout the history of the Burned Area Recovery project, about 80 hazard trees were cut for flight path safety around the perimeters of ten RHCA helicopter landings. Most of the felled hazard trees were left on site. Removal by purchasers occurred in two cases in 2002 (Robbins Gulch landing #9 and the FSR 75/715 junction landing along Rye Creek), both of which violated the mitigation measure mentioned above. Illegal removal of the felled hazard trees by firewood cutters occurred at most of the RHCA landings.

In July 2004, 15 hazard snags were felled for safety reasons in the RHCA surrounding Laird Creek, just upstream from the Forest boundary. The snags were felled because they posed a risk of falling onto private property. The landowner was afraid that the snags could kill or injure his family or destroy his home. The hazard snags were felled into Laird Creek to provide fish habitat, and left on site per the mitigations in the ROD. The snags have remained on site and are providing good habitat for fish.

4. Did the equipment or skyline corridor entries into the RHCAs comply with the Montana SMZ Law?

Yes. There was one instance in 2006 where skidding equipment was allowed to enter an RHCA. In the Papa Waugh salvage sale (unit 717-B), tractor skidders were authorized to skid across a frozen wetland as long as they remained on the driving surface of Road 73394. The wetland had formed on the surface of the road because of the lack of a culvert in the bottom of a draw crossing. The wetland was adequately frozen and protected from disturbance when the tractors skidded across it. The skid caused no ground disturbance or sediment movement. Montana Department of Natural Resources and Conservation foresters inspected the site prior to the skid and determined that an SMZ variance was not needed as long as the skid was conducted under frozen conditions, which it was.

Throughout the history of the Burned Area Recovery project, there have been 12 instances where tractor skidders or skyline corridors entered RHCAs. All of the entries complied with the Montana SMZ Law; all have had a negligible effect on RHCAs or aquatic resources. Only one of the entries required a SMZ variance from the Montana Department of Natural Resources and Conservation (Elk Point I salvage sale in March, 2002). In that instance, the streamside management zone (SMZ) variance was properly obtained and implemented. In summary, equipment entering RHCAs has had no effect on the fishery, and a negligible effect on RHCA function and aquatic resources.

5. Did we find evidence of sediment moving from the harvest units into the RHCA buffers?

No. We observed no evidence of sediment moving into the RHCA buffers from the adjacent salvage units in 2006.

Throughout the history of the Burned Area Recovery project, more than 130 salvage units have been monitored for sediment movement into RHCAs. We have not found a single instance where sediment from the harvest units

was visible crossing into an RHCA buffer. 22 units were double-checked for sediment movement one and two years post-harvest, and still, there was no evidence of sediment moving into RHCAs.

6. Did temporary roads cross or enter RHCAs?

This was not an issue in 2006 because there was no construction of temporary roads.

Throughout the history of the Burned Area Recovery project, four short temporary roads have been constructed, used, and then recontoured. The longest was 250 feet in length. All of the temporary roads were located on dry uplands, and none crossed or entered RHCAs. The temporary roads did not contribute sediment to streams because of their benign locations and considerable distances from the nearest stream channels. Monitoring indicates that the recontouring of the temporary roads was adequately done.

7. Were new landings constructed in the RHCA buffers?

No. This was not an issue in 2006 because no landings were used in RHCAs.

Throughout the history of the Burned Area Recovery project, nine helicopter landings have been used in RHCAs on Forest Service land. All were properly sited in existing clearings, per the mitigations in the ROD.

Five of the RHCA helicopter landings were located within 300 feet of fish-bearing streams; the other four were located within 200 feet of non fish-bearing streams. At all two landings, a road separated the disturbed landing area from the nearest stream.

Forest fisheries biologists monitored all of the RHCA helicopter landings during and after their use to ensure that sediment mitigations were appropriately used. At six of the RHCA helicopter landings, silt fences and/or straw bale windrows were installed around the perimeters of the landings to contain erosion and keep sediment from moving off-site, per the mitigations in the ROD. These sediment control devices were installed for extra insurance, but they did not trap any sediment because the landing sites were flat and the eroded sediments remained on site and did not move towards streams.

One RHCA landing was proposed, but never used, at the Road 370/5732 junction next to Gilbert Creek (Laird salvage sale). This landing would have required extensive clearing of burned snags along Gilbert Creek, which was a violation of the mitigations in the ROD. Before the landing was dropped from consideration, ten hazard trees were felled by the purchaser in the Gilbert Creek RHCA (this occurred in February, 2003). Some of those trees landed in and across Gilbert Creek. All of the felled trees were left on site. The Gilbert Creek landing was dropped for two reasons: (1) it constituted construction of a new landing in an RHCA, which violated the mitigations in the ROD; and (2) it violated the Forest Plan as amended by INFISH because it would have reduced shade and retarded the attainment of the water temperature RMO in Gilbert Creek.

The effect on the Gilbert Creek fishery from felling the ten hazard trees has been minimal. It resulted in a short-term (2-3 years), small, and localized reduction of shade on Gilbert Creek. By 2006, this reduction in shade has mostly been offset by the increased shade provided by the recovery of alder shrubs along the stream banks. Since 2003, many of the undisturbed snags along Gilbert Creek have also blown down, which has mimicked the losses of shade caused by the felling of the ten hazard trees. On the positive side, the felled trees have trapped woody debris and created some complex habitats which are beneficial to the westslope cutthroat trout in Gilbert Creek.

Throughout the history of the Burned Area Recovery project, several private landowners have allowed helicopter landings to be located on their lands within 300 feet of streams. These landings were located in open areas such as pastures, burned over homesites, and gravel pits. None of the landings on private land required clearing of vegetation. None of the landings appear to have had a negative effect on aquatic resources.

Tractor and skyline landings have not been constructed inside of RHCAs in the Burned Area Recovery project.

In summary, the landings used in the Burned Area Recovery project have had a negligible effect on aquatic resources. There are several reasons for this. First and foremost, most of the landings avoided RHCAs and were located in benign upland locations that posed a negligible sediment threat to streams. In the nine instances where helicopter landings were allowed to use existing clearings within RHCAs, the terrain was flat and unlikely to move sediment, and roads almost always separated the disturbed landing floor from the nearest stream. Finally, straw bale and/or silt fence windrows were applied around the perimeters of some of the RHCA helicopter landings where biologists felt extra protection was needed.

8. Did fuel storage and refueling occur in the RHCAs?

No. Fuel storage and refueling did not occur in RHCAs in 2006.

Throughout the history of the Burned Area Recovery project, fuel storage and refueling has not been allowed to occur inside RHCAs. Fuel storage and refueling usually occurs at the helicopter service landings, but none of those have been located in RHCAs. Monitoring indicates that spill containment mitigations have been properly applied at the service landings, and no significant fuel spills have occurred.

Item #1 Conclusions:

The key findings and lessons learned from monitoring item #1 are:

- RHCA buffers were properly delineated and marked in nearly all cases.
- Erroneous cutting and/or harvesting of trees from the RHCAs occurred infrequently. There were 14 instances where erroneous cutting in RHCAs occurred, and that affected less than 0.1% of the total RHCA buffer length in the project area. In all but a few isolated cases, the purchasers did a good job of avoiding the RHCAs.
- The little cutting that occurred in the RHCAs had an insignificant effect on aquatic resources.
- There was no evidence of sediment moving into the RHCA buffers from adjacent salvage units.
- Temporary roads and RHCA helicopter landings had a negligible effect on aquatic resources. We attribute this to careful location, mitigation, and rehabilitation.
- The mitigation that required purchasers to leave merchantable sized hazard trees lying on the ground on the floor of the RHCA helicopter landings was ineffective. Nearly all of those trees were removed by firewood cutters within a year or two.

FISHERIES MONITORING ITEM # 2

The objectives of item #2 are to:

- Ensure that Best Management Practices (bmps) are properly applied to minimize sediment production during the replacement of fish culverts and the decommissioning and storage of roads.
- Ensure that the Forest meets management obligations for threatened, endangered, and sensitive fish species.
- Ensure that culvert replacement and watershed improvement activities comply with the Forest Plan as amended by INFISH.
- Ensure that state water quality standards are being met.

In order to meet these objectives, we focused our monitoring efforts to answer the following questions.

1. Were BMPs properly applied to minimize sediment production during the replacement of fish culverts and the decommissioning and storage of roads?

One fish barrier culvert was replaced in 2006, bringing the total number of culvert replacements in the Burned Area Recovery project to 15. These 15 culvert replacements are listed below:

1. Sand Creek, Road 362. July, 2003
2. Magpie Creek, Road 362. July, 2003
3. Took Creek, Road 362. July, 2003
4. Took Creek, Road 1303. July, 2003
5. Bugle Creek, Road 725. October, 2003
6. Crazy Creek, Road 370-A. October, 2003
7. West Fork Camp Creek, Road 729. October, 2003
8. West Fork Camp, unnamed tributary 0.9, Road 8112. October, 2003
9. West Fork Camp, unnamed tributary 1.0, Road 8112. October, 2003
10. Railroad Creek, Road 75, August 2005
11. Hog Trough Creek, Road 75, August 2005
12. Weasel Creek, Road 75, August 2005

13. Rye Creek, unnamed tributary 12.3, Road 75, September 2005

14. Rye Creek, unnamed tributary 12.3, Road 75, September 2005

15. North Rye Creek, Road 321, August 2006

Two fish barrier culverts are under contract to be replaced in 2007 (Coal Creek, Road 5662 and Moose Creek, Road 726). The Moose Creek culvert will be replaced with a new bridge. Two other fish barrier culverts on Hart Creek (the Road 311 and Road 73180 crossings) may be replaced in 2006 if sufficient funds are available.

Our monitoring indicates that Best Management Practices have been properly applied during the culvert replacements. The same is true of the road decommissioning and storage that has occurred so far in the Burned Area Recovery project.

2. Were Forest Plan and State water quality standards met during the replacement of fish culverts and the decommissioning and storage of roads?

Yes. Our monitoring indicates that Best Management Practices have been properly applied. The culvert replacements and road decommissioning/storage projects have not produced unexpected or unusually high sediment pulses. The new fish culverts have been sized to pass the 100-year flood (INFISH standard RF-4), and installed in a stream simulation manner to maintain fish passage (INFISH standard RF-5). The road decommissioning activities have been implemented in a manner that promotes the long-term health of watersheds (INFISH standard WR-1). This is consistent with the Forest Plan as amended by INFISH.

Item #2 Conclusions:

The key findings and lessons learned from monitoring item #2 are:

- BMPs were properly applied during culvert replacement and road decommissioning activities.
- The culvert replacements did not produce excessive sediment inputs to streams. Water quality was protected to the extent possible given that short-term sediment inputs are unavoidable while replacing culverts.
- The road decommissioning and storage produced negligible sediment inputs to streams. Most of the ground disturbance did not occur near live water.

FISHERIES MONITORING ITEM # 3

The objectives of item #3 are to:

- ensure that Burned Area Recovery road maintenance and prescribed burning activities comply with the mitigation measures in the U.S. Fish and Wildlife Service's programmatic biological assessments for bull trout
- ensure that the Forest meets management obligations for TES fish species
- ensure that Burned Area Recovery road maintenance and prescribed fire activities comply with the Forest Plan as amended by INFISH

In order to meet these objectives, we focused our monitoring efforts to answer the following questions.

1. Did prescribed burning activities comply with the Forest Plan and the bull trout programmatic assessment?

Yes. The only prescribed burning activity that occurred in 2006 was the burning of slash piles at landings.

Slash pile burning and water drafting for dust abatement are the only prescribed fire activities that have occurred in the Burned Area Recovery project. Both have been conducted in a manner consistent with the Forest Plan and the prescribed fire programmatic biological assessment.

2. Did road maintenance activities comply with the Forest Plan and the bull trout programmatic assessment?

Yes. All of the road maintenance activities that were conducted in 2006 complied with the Forest Plan and bull trout programmatic road maintenance assessments. Due to the low amount of salvage harvest that occurred in 2006 (about 200 acres), the amount of Burned Area Recovery road maintenance that was conducted in 2006 was also light compared to previous years. Burned Area Recovery road maintenance will also be light in 2007 because only about 200 acres remains to be salvage harvested.

Throughout the history of the Burned Area Recovery project, there have been nine instances when non-compliance with bull trout programmatic road maintenance biological assessments has been observed. Non-compliance has generally involved purchaser graders sidecasting road material over the fill slope, either during

grading or snow plowing. The quality and skill of purchaser road grading and snow plowing has been variable in the Burned Area Recovery project. Some operators have done good work, others have been shoddy.

Item #3 conclusions:

- Spring snowmelt run-off on ice-rutted encroached haul roads is much more of a threat to deliver sediment to streams than non-channelized overland sediment movement through RHCAs adjacent to salvage units. Sediment produced by water running down ice-rutted roads can move from the road bed to a nearby stream quickly and in large quantities.
- Ice rutting can be avoided, but it takes careful sale administration. The key is to avoid driving large numbers of log trucks on ice-covered roads anytime when temperatures are above freezing. The most vulnerable time period is late winter and early spring when nighttime temperatures are typically below freezing, but daytime temperatures rise into the 40's and 50's. It is best to finish the bulk of the hauling before March arrives.
- Once deep ice ruts form in the road surface, they cannot be erased by plowing. They will have to melt off, and that usually takes at least a week. Chipping water bars into the frozen surface with a pulaski to divert the water running down the ruts is difficult and has limited effectiveness.
- Drainage holes in the snow berm should be established during the first plowing job, and maintained at regular intervals throughout the winter. Waiting to punch the holes until after the snow berm has set up does not work. The berm becomes rock hard and very difficult to move.
- Along some roads, depending on topography and location relative to streams, an alternative to punching drainage holes in snow berms is to push the snow berm far enough off the road shoulder to allow the road bed to adequately drain during snowmelt. On some roads, that can eliminate the need for most drainage holes. The berm needs to be pushed far enough off the road shoulder on the first plowing, and then maintained on each subsequent plowing. In obvious drainage locations such as the outlets of drive-through dips and pronounced low spots in the road where pools of water form, drainage holes are still needed.
- Along roads that closely encroach on streams, a combination of numerous drainage holes along with pushing the snow berm off the road shoulder has been effective in preventing erosion during spring break-up. We have not observed sidecasted snow damming streams or diverting the stream channel into nearby road fills. Encroached roads are predominantly located at low elevations on the Bitterroot National Forest. These roads typically do not receive enough snow to cause sidecasting problems, with the possible exception of blocking the outlets of ditch relief pipes.
- Outlets of the ditch relief culverts need to be kept free of snow blockage during plowing. This means that they need to be marked with snow stakes before it starts to snow. Once snow covers the outlets, they are difficult to find.
- The items listed above typically require close and timely monitoring and attention by the timber sale administrator to achieve the desired results.

Water and Sediment Yield
Monitoring Item 17

OBJECTIVES: Validate prediction models and monitor compliance with State and Federal water quality standards and BMPs.

DATA SOURCES: Flow and sediment sampling before and after project activities. Additional sources used: Water monitoring stations (water column monitoring of flow and sediment); Stream surveys (channel shape, composition, stability, and productivity); precipitation and snow pack information; coordination with State Department of Environmental Quality (DEQ) relative to water quality standards, 303(d) listing, and TMDL development; the State of Montana Department of Forestry for BMP compliance; and internal BMP audits.

FREQUENCY: Annually (six streams representing major geologic types).

REPORTING PERIOD: 2006.

VARIABILITY: Twenty percent variation from predicted sediment increases and changes in water quality.

EVALUATION - General

The 2001 and 2002 Forest Plan Monitoring and Evaluation Reports, Item 17, discuss the results of fourteen years of monitoring the "streams representing major geologic types" identified in the Forest Plan. In summary, results using the prescribed methodologies have been highly variable, primarily due to natural variation. While we continue to collect this data for other purposes, it has provided limited usefulness in directly addressing the objectives of this monitoring item. These findings are consistent with recent literature. Additional monitoring methods, along with ongoing evaluation of relevant scientific literature, are now being used to better address this monitoring item's objectives.

EVALUATION –Validation of Prediction Models

Water yield modeling for project planning is done using the Equivalent Clearcut Analysis (ECA) model. This model evaluates potential changes in water yield from fire and timber harvest activities. The method provides a basic quantitative tool to compare various management scenarios (alternatives). During 2006, the ECA model was used to predict current and potential future water yields for the Trapper-Bunkhouse project area. Results were compared to existing literature on water yield and forest management. ECA levels that could result from proposed management were found to be far below those associated with measurable water yield increases in the extensive literature on the subject, and no further water yield modeling was conducted. If the "coarse filter" (ECA) model had indicated a substantial water yield increase and raised concerns, the Bitterroot Water Yield Analysis Procedure (or a similar model), would provide a more detailed estimate of existing and proposed conditions.

Sediment yield modeling is generally conducted using the Water Erosion Predictive Project (WEPP) model. This model is used for both harvest units and forest roads and predicts sediment contributions from various activities. The estimates obtained from the model are not absolute and are best used to compare various management scenarios (alternatives).

Riparian area monitoring conducted by fish biologists and hydrologists have found no sediment movement from harvest units into riparian zones or streams (refer to Monitoring Item 22). This monitoring suggests that the WEPP model tends to overestimate the amount of sediment moving from hillslope harvest units. In addition, it appears that the INFISH-specified riparian area buffers are adequate to capture and store hillslope material.

Recent WEPP validation efforts include Dun, et.al, 2006; Covert et.al.2005; and Elliot and Foltz, 2001. In these studies, Disturbed WEPP sediment and runoff estimates were compared to actual field measurements at study watersheds, including one on the Bitterroot National Forest. These studies found that newer versions of WEPP that included new equations for sediment and runoff estimates compared well with observed values, suggesting that Disturbed WEPP is appropriate for runoff and sediment yield estimates on this forest. WEPP model accuracy

was found to be roughly equivalent to, or better than, other sediment models in use. Please refer to the above citations for additional information on WEPP validation.

EVALUATION – Compliance with Federal and State Water Quality Standards (TMDL – Total Maximum Daily Load analysis)

The 2006 Bitterroot Headwaters TMDL provided a landscape-scale assessment of water quality and human impacts in the area upstream of the East and West Fork Bitterroot River confluence. Much of this study area is on the Bitterroot National Forest and the TMDL included sediment-reduction guidance for the Forest's Road system. Compliance monitoring included pebble counts for several East Fork Bitterroot River sites within the TMDL's scope. Pebble count results suggest that this stream reach has appropriate channel substrate and is not sediment-impaired.

The Bitterroot National Forest worked cooperatively with Montana Department of Environmental Quality on the Bitterroot Headwaters and Bitterroot Mainstem TMDL analyses and water quality issues on National Forest lands. The Water Quality Restoration Plan and Total Maximum Daily Loads for the Bitterroot Headwaters Planning Area was released in October of 2005 and approved by the EPA in April of 2006. This analysis used a methodology to estimate sediment yields that involved extensive field review of stream crossings in listed watersheds, measurement of the area contributing sediment, and estimated sediment contribution at each site. The contributions were then used to determine an average sediment estimate per crossing in the West and East Forks of the Bitterroot River. This methodology was used in the Middle East Fork watershed analysis and is likely to be used in future analysis. Please refer to the TMDL available at http://www.deq.state.mt.us/wqinfo/TMDL/finalReports.asp.

The Bitterroot Headwaters TMDL includes all 303(d)-listed water bodies upstream of the confluence of the East and West Forks of the Bitterroot River. This TMDL process included analysis of the data available for each stream, an impairment source assessment, and a determination of whether the stream meets the pertinent state water quality standards. TMDLs were developed for ten streams: Buck Creek, Ditch Creek, Hughes Creek, Nez Perce Fork, Overwhich Creek, West Fork Bitterroot River, Reimel Creek, Gilbert Creek, Laird Creek, and East Fork Bitterroot River. During the impairment determination, Deer Creek, Moose Creek, and Martin Creek were found to be fully supporting their beneficial uses and were not sediment-impaired. The TMDL included a restoration plan of sediment reductions and improved shading in the impaired streams to improve beneficial use achievement. More details are available at the DEQ website listed above.

The Bitterroot Mainstem TMDL started in 2006 and will cover the remainder of the Bitterroot Basin from the West and East Forks of the Bitterroot River to the confluence with the Clark Fork River. Thirty-four streams are currently listed on the State of Montana's 2004 303(d) list in this reach. Please refer to the DEQ website (www.deq.state.mt.us/wqinfo/tmdl/index.asp), for information on those streams currently believed to require a TMDL analysis. Of the 34 streams listed, 18 are partially located within the BNF. Five of these 18 streams have been classified as not needing a TMDL because no pollutant-related impairment has been identified. Based on stream survey data, the Forest is recommending that three additional streams be removed from the list. The public is encouraged to become involved in the TMDL process by contacting the State of Montana DEQ.

MONITORING – Water Quality Standards

To comply with the Headwaters TMDL, the Forest Service would locate and treat active sediment sources in TMDL target and other stream basins, with the long-term goal of reducing the overall chronic sediment load. This plan includes crossing improvements, road and crossing decommissioning, riparian area fencing, and other applicable treatments to reduce connected disturbed areas. Sediment/erosion reduction projects accomplished in 2006 are listed below.

Table 29 - The Bitterroot Headwaters TMDL Watershed Projects (2006)

Watershed/Projects - 2006	Treatment/area
Robbins Gulch Soil Remediation Site #4 (East Fork Bitterroot)	Obliterate & revegetate old skid road (1 acre)
Shrub Planting (various watersheds and site types)	Stabilize soils with native shrubs (5 sites)
Jennings Camp Crossing Restoration (East Fork Bitterroot)	1
Tin Cup Trailhead Vehicle Control (Tin Cup Creek, mainstem Bitterroot River)	Limit vehicle parking area, 2 acres
FR 5623 Landing/Como Overlook -- Rehabilitate an unauthorized ATV trail closure /Elk Bed TS (Lick Creek)	4 acres
Cathouse Culverts Stewardship (NF Rye Creek)	Remove 2 eroding crossings
Trapper-Bunkhouse ATV Trail Closures (Bitterroot River)	Close and revegetate 4 unauthorized ATV trails
Railroad Creek Mud Bog Rehab (Skalkaho Creek)	Close 1 unauthorized OHV trail
Indian Trees CG FR13340 (Camp Creek, EF Bitterroot)	Remove 1 crossing
ATV Closures and Rehab (various watersheds)	Close and revegetate 8 unauthorized ATV trails
Coal Creek Stewardship (West Fork Bitterroot)	Remove 3 crossings, place 0.8 mile road into long-term storage
Lyman TS Roads(Lyman Creek, East Fork Bitterroot)	road decommissioning & storage
Weird Tom Roads (Weird Tom Creek, EF Bitterroot)	road decommissioning & storage
Moonshine Saddle OHV (Moonshine Gulch, Robbins Gulch, East Fork and mainstem Bitterroot River)	Close and revegetate unauthorized ATV trail
Reimel/Coffee Gulch OHV (Reimel Creek, EF Bitterroot River)	Close and revegetate unauthorized ATV trail
Gird Creek OHV (mainstem Bitterroot River)	Close and revegetate unauthorized ATV trail
Buck Creek OHV (West Fork Bitterroot)	Close and revegetate unauthorized ATV trail
CB Ranch Road Stewardship (mainstem Bitterroot River)	Crossing removal, road decommissioning & storage

Five sites on the East Fork Bitterroot River, in the Bitterroot Headwaters TMDL planning area, were surveyed for substrate/sediment composition. These sites have been surveyed since 2000 to monitor changes in the river following the fires and also to provide data for the TMDL.

Bitterroot River Pebble Count Sites were re-surveyed in 2006. Trend results continue to be variable. Pebble counts have inherent variability and may have limited use in determining sediment transport and deposition trends, especially in steeper, cobble-dominated rivers such as the East Fork Bitterroot (Archer et al. 2004; Roper et al. 2002). On the other hand, the information collected can be used to evaluate broad-scale river condition especially when used in context with other habitat parameters.

In the Headwaters TMDL analysis, water quality targets derived from reference or minimally managed streams were used to compare to listed streams. The TMDL identified, the following thresholds in the East Fork Bitterroot River.

Table 30 - The Bitterroot Headwaters TMDL Thresholds Identified in the East Fork Bitterroot River

Stream Type	Threshold for % fines < 2mm	Threshold for % fines < 6mm
C4	Mean 23%, Range 14-32%	Mean 33%, Range 17-49%
C3	Mean 13%, Range 6-20%	Mean 16%, Range 8-24%
B3	Mean 12%, Range 5-19%	Mean 16%, Range 7-25%

Table 31, below, displays 2006 survey results for the five sites located on the East Fork Bitterroot River.

Table 31 - Summary of Pebble Count Results, East Fork Bitterroot River, Years 2000-2006

Site Name	Range % fines <2mm	Average % fines <2mm	Range % fines <6mm	Average % fines <6mm	Comments about 2006 Data
East Fork at Indian Tree (Lowest Site on EF Bitterroot) C4	2-11%	4.2%	5-14%	7.2%	Larger sized particles sampled this year than previous years.
East Fork at Spring Gulch, C4	3-11%	6.3%	4-15%	8.8%	Similar to previous surveys.
East Fork above Sula Bridge C4	6-12%	9.0%	7-16%	11%	Similar to previous surveys.
East Fork below Mink Bridge B3	8-23%	13.5%	10-23%	15.3%	Similar to previous surveys.
East Fork below Meadow Bridge B3 (Upper most site)	7-13%	9.3%	8-19%	12.1%	Similar to previous surveys.

Based upon monitoring conducted in 2006, all locations on the East Fork, except the East Fork below the Mink Creek Bridge, have substrates suitable for their stream types. Below the Mink Bridge the percentage less than 2mm is slightly over reference at 13.5% (12% for reference stream type). East Fork sites will continue to be monitored due to TMDL status.

The BNF continues to participate in National and Regional efforts to evaluate stream survey protocols and the variability of data. A major player in this effort is the Forest Service Fish and Ecology Unit located in Logan, Utah (www.fs.fed.us/biology/fishecology/emp). These efforts will help the Forest refine its monitoring strategy and choose monitoring protocols and techniques that will allow detection of system change related to management activities.

EVALUATION – Compliance with State Best Management Practices

Best management practices (BMPs) are included in project design and contracts to protect water quality and soil productivity. BMPs were monitored for implementation and effectiveness several different ways in 2006. Four timber sales were audited internally using the Montana Department of Natural Resources and Conservation (MTDNRC) methodology, and multiple BAR timber sale units were inspected for riparian buffer effectiveness. Results suggest that BMPs associated with riparian area protection have been consistently implemented and are successfully preventing harvest unit sediment from reaching streams. Comparing results from this monitoring program with Bitterroot Headwaters TMDL findings suggests most water quality problems on the Forest continue to be associated with permanent, streamside, native surface collector roads built before BMPs or Forest Plans were developed, rather than with timber harvest or temporary roads from current projects.

MONITORING – Best Management Practices

The Bitterroot National Forest implemented numerous Best Management Practices to reduce road and activity-related sediment. Projects listed in Table 32 below were implemented in 2006 to comply with BMP direction and

reduce sediment sources. Funding for the projects was provided by watershed, National Fire Plan, stewardship, and other program funds. See Item 19 for a more complete list of 2006 improvements.

Table 32 – 2006 Projects to comply with BMP direction and reduce sediment sources.

Gravel four crossings on FDR 5753 (0.8 mi) Mink Creek Road.	Remove two blown out culverts in Cat House drainage on newly acquired lands, BAR stewardship.	Limit traffic on numerous seasonally and fully closed roads, for watershed & wildlife resource protection included in various decisions.

One (State-initiated) BMP audit occurred on the Bitterroot National Forest in 2006. The Guide Timber Sale was audited and found that FDR 5790 (a previously closed road) had been opened and allowed short-term summer use on a section of road without culverts and resulted in sedimentation in wetlands and stream. This was a BMP violation. This area was later effectively closed using decompaction and recontouring of the road prism to prevent future motorized access. The soils were seeded, mulched and slashed.

Four timber sales were audited internally for BMP application and effectiveness using the DNRC methodology. The audit focused on timber sale units with riparian areas, unique mitigation requirements, and/or temporary roads. Two open and two closed sales were audited. The findings of the audits are detailed below:

1) All applicable BMPs were consistently applied to each sale. Common non-applicable BMPs included BMP 14.23, Reforestation requirement (not needed unless the harvest was a regeneration harvest), BMP 14.16, Meadow Protection During Harvest (no meadows included within harvest units), BMP 18.04 and 18.05, Fire Suppression related BMPs (not fire suppression activity), and those BMP related to only to new road construction as no new permanent roads were constructed.
2) Most applied BMPs were rated as 4/4 (Operation meets requirement of BMP, Adequate protection of Soil and Water Resources). Exceptions to this are described in the next section, Problem Areas and Corrective Actions.
3) In the two open sales, not all erosion control had been completed at the time of the audit. This is not a BMP violation due to the fact that July and August are not good seasons to be seeding. This work was scheduled to be completed later in the season when weather was more amenable to seeding.
4) Highlights and sucesses of the audit:
    - Papa Waugh received no ratings below 4/4.
    - For the burned area modifications to Bear TS (and other burned area sales) RHCA widths were increased above requirements to reduce risk of sediment input to streams. All RHCAs consistently received this treatment. This resulted in a rating of 5/4 for BMP 14.06, operation exceeded requirement of BMP.
    - In Gold 1, all recommended BMPs and mitigations were implemented as planned. A section of FDR 13152 and several temporary spur roads were recontoured (approximately 200 yards), contributing to improved watershed conditions. Two stream crossings on FDR 969 within Unit 2 were graveled. Driveable dips were installed along FDR 969 and were effective in getting runoff off the road surface and preventing formation of rills.
    - Restoration of temporary roads and road storage included seeding, as well as recontouring and slashing that effectively will block traffic. Revegetation success will be monitored and additional seed applied as needed.
    - Bear TS implementation included storage of several roads in the Two Bear drainage. Work included scarification, culvert removal, seeding and shrub planting. This work reduces the risk of culvert failure, maintenance needs, and erosion. Seeded areas and shrub plantings from October 2005 appear successful.
    - There was no evidence of rilling on haul routes. This was especially true in areas that would channel water to streams.

- In almost all cases, BMPs were applied and were effective in protecting soil and water resources (only 4 instances were not).

5) Problem areas and corrective actions:

- In Frazier TS, Unit 64W was yarded using a low ground pressure forwarder that, due to an inadequate slash mat, resulted in undesired conditions and didn't meet the intent of BMP 14.02 and 14.08 on 3-5 acres. This was rated a minor departure from BMP with a minor and temporary impact to soil and water resource (given a rating 3/3). The remaining area of the unit was rated as 4/4, meeting the requirement of the BMP. The BNF soil scientist reviewed the area and determined effects were acceptable and within soil standards. It is important to note that although this area didn't meet the intent of the BMP, no sediment was contributed to streams from this activity. See the Soils section of this report (Item 31) for further information.

- In Frazier TS Unit 4, the RHCA boundary was measured at approximately 35-40 feet instead of the required 50 feet along an intermittent stream adjacent to an area yarded with an excaliner. Due to the suspension of logs during excaliner yarding, the activity did not result in any sediment input to streams. There was no ground disturbance within 100 feet of the stream, and no sediment movement towards the stream within the required buffer width.

- Bear TS Unit 4 was part of the original Bear TS (1997), and according to the older treatment prescription, the area was machine-piled. During the BMP audit of 2006 about five acres were rated as 2/2 major departure from BMP and minor and prolonged impact to soil and water, due to lack of lodgepole pine revegetation. Most of this unit met the BMP and was identified as 4/4 on the audit, meeting the requirement of the BMP. Silvicultural surveys suggest this site met re-vegetation requirements, which allow for small areas to seed in over time, as long as the larger unit passes inspection. To speed up regeneration on this site and mitigate machine piling effects, it was planted with conifers in fall 2006.

- A temporary road in the eastern portion of Unit 4 was recontoured, decompacted and seeded but revegetation success was marginal. Restoration of the temporary road prism was satisfactory but the area needs additional seed. This area was rated as 2/2, a major departure from BMP and minor and prolonged impact to soil and water due to the likelihood the area would convert to weeds. It was re-seeded with native grass species in fall 2006 to address this BMP departure.

2006 monitoring suggests BMPs are being applied consistently on current timber sales on the Bitterroot and are effective in protecting water quality. The Forest is generally successful at implementing BMPs as stated in the appropriate NEPA documents. The literally hundreds of correctly and successfully applied BMPs compare favorably with the five cases surveyed where the BMP wasn't applied correctly or resulted in undesired effects on the ground. These cases were small in size compared to the entire project areas, didn't cause long-term degradation of the watershed resource, and didn't result in sediment input to streams. Most water quality problems on the Forest continue to be associated with permanent, streamside, native surface collector roads built before BMPs or Forest Plans were developed, rather than with timber harvest or temporary roads from current projects.

The Bitterroot National Forest averages about 250 days per year of logging operations. In 2006, 12 different sales were overseen and monitored by timber sale administrators (TSAs) and various resource specialists. Four departures from contract provision BMPs were noted by internal audits and are described above. One departure from BMPs was noted by the external state audit, also described previously. All of the BMP violations have been corrected.

Citations:

Archer, E.K.; B.B. Roper; R.C. Henderson; N. Bouwes; S.C. Mellison; and J.L. Kershner. 2004. Testing Common Stream Sampling Methods for Broad-Scale, Long-Term Monitoring. Rocky Mountain Research Station, General Technical Report RMRS-GTR-122.

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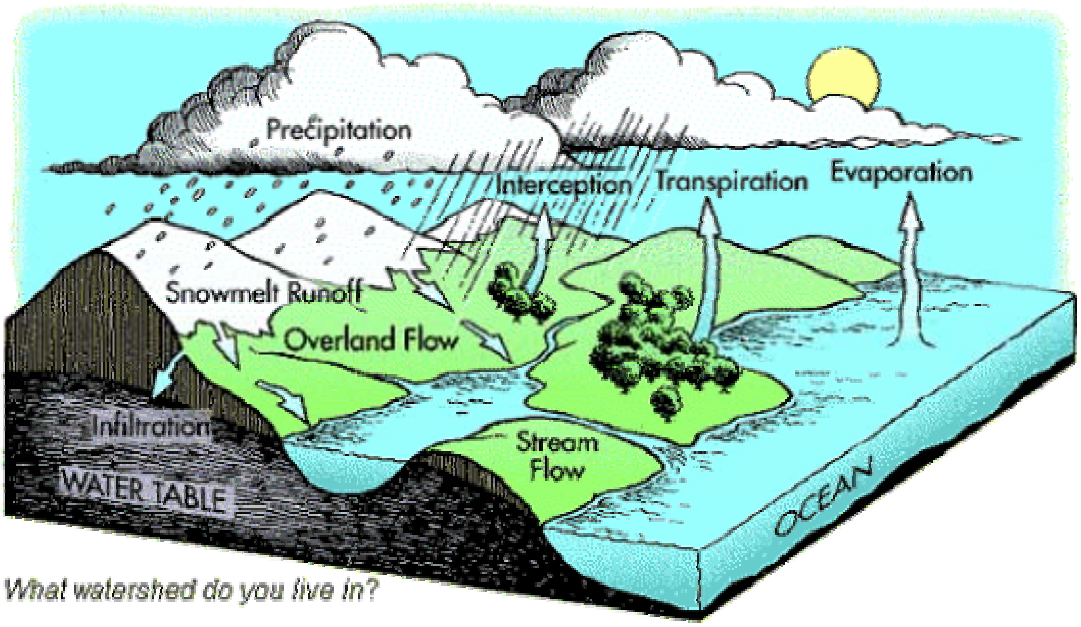


Cumulative Watershed Effects
Item 19

OBJECTIVE: Determine cumulative watershed effects and to promote management consistent with water quality goals.

DATA SOURCE: Monitoring of off-site watershed effects is done indirectly through the evaluation of existing conditions for specific projects, TMDL-oriented monitoring and the effectiveness of the Forest watershed improvement program. Off-site watershed effects are also measured directly through TMDL and river stream reach monitoring. WEPP (erosion) and ECA (water yield) model results produced during environmental analysis are compared to field data from stream reach surveys and project monitoring.

FREQUENCY: One timber sale that includes road construction per District per year.

REPORTING PERIOD: 2006

VARIABILITY: Exceeding geomorphic threshold of concern.

EVALUATION:
Inventories on over 33,000 acres occurred in analysis areas in 2006. They focused on watershed improvement needs in the Trapper Bunkhouse and Lower West Fork areas. Inventories in Trapper Bunkhouse resulted in four high priority and fifteen medium priority stream crossings being identified for fish passage and BMPupgrades. Analysis is ongoing in the Lower West Fork area.

Project monitoring was completed on 21 different projects in 2006. The results indicate watershed improvement projects are reducing sediment sources and contributing to improvements in watershed conditions.

Results of water yield modeling used in analysis (ECA and Bitterroot Water Yield Analysis Procedure) indicate that the levels of proposed harvest are estimated to be below that thought to measurably increase water yields or affect channel conditions. Monitoring of 115 individual project units found that estimated sediment yield increase from treatment units, such as from the WEPP model, are greater than what has occurred from recent harvest. In our monitoring, no sediment was found to leave harvest units, cross buffers, or enter streams. Refer to the Riparian section (Item 22) of this report for more detail.

Recent analysis predicted that sediment from hauling on roads that are within sediment contributing distance from streams is the biggest risk to water quality and monitoring found that to be true. As a result, silt traps/filters are now installed where needed to mitigate effects from winter hauling on stream channel condition. Refer to Item Monitoring Item 22 for more detail.

System roads are contributing less stream sediment where best management practices (BMPs) have been applied. Road closures and obliterations also reduce stream sediment input as indicated by the monitoring described in Table 34.

In addition, the Forest continues to rehabilitate OHV trails where resource damage has been identified.

MONITORING:

Existing Condition Surveys and Watershed Improvement Projects

Table 33 - Summary of Existing Condition Surveys and Watershed Improvement Projects

Activity	Units Accomplished	Location
Stream Reach Inventory	5.75 miles	PACFISH/INFISH stream monitoring McClain Creek Trapper-Bunkhouse project (Chaffin, SF Chaffin, Tin Cup, Little Tin Cup, Spoon, McCoy, Trapper, and Little Trapper Creeks) Meadow Tolan Allotment
Watershed Improvement Projects	100 acres watershed funding only, 25 acres mixed funding	Numerous sites – see narrative below.
Watershed Improvement Needs Inventory	33,100 acres	Lower West Fork Analysis Area Road system not inventoried in 2005 (42.3 Miles, 11,100 acres) Trapper-Bunkhouse project (22,000 acres)

Stream Reach Inventory

The PACFISH/INFISH Biological Opinion (PIBO) monitoring group sampled 4 stream reaches on the BNF during 2006 as part of their Effectiveness Monitoring Program for Streams and Riparian Areas within the Upper Columbia River Basin (www.fs.fed.us/biology/fishecology/emp). In total, there are 33 sites located on the BNF, all of which were monitored between 2001 and 2006. This project is also providing data on monitoring protocol repeatability and sensitivity to detect change. In addition, the data are being used during the TMDL efforts the forest is participating in. As the program continues and additional data are collected at these sites, trends may be discernable.

Multiple tributary reaches were surveyed in the Trapper-Bunkhouse project area and McClain Creek was monitored as part of the landslide remediation project.

Watershed Improvement Projects

Watershed improvement projects consisting of road and trail prism treatments totaled over 125 acres in 2006. Some of this work centered on prevention and reduction of soil impacts due to unauthorized user-created motorized trails. These illegal trails were decompacted (by hand or by machine), seeded, slashed and mulched to allow for vegetation recovery and reduction in erosion. Another watershed focus was on reduction of sediment into streams from active surface erosion and/or mass failure associated with roadbeds no longer maintained for public travel. Roads selected for storage received a minimum treatment of surface decompaction, waterbars as needed, culvert removal, and associated channel reshaping to provide naturally functioning drainage. Portions of road segments selected for full recontouring generally presented greater risks of sediment input due to location on the landscape or density of roads within a watershed.

The following watershed improvement projects were completed in 2006:

- Store FDR 74160, Coal Creek. This road was identified in the Burned Area Recovery Project (BAR) as a storage opportunity. It was completed using stewardship authority (monies made available through vegetation treatments managed under a stewardship contract).

- Tepee Road (FDR 5778) gravel and BMP upgrades (1.2 mi); Mink Creek Road (FDR 5753) gravel four crossings (0.8 mi). This work was identified as watershed mitigation in the Middle East Fork Project (MEF). It was completed using appropriated road maintenance funds.
- Seed roadside ditches on FDR 723 and 725 as directed in MEF mitigation. This work was accomplished in late 2005 and monitoring in 2006 found that grass seedlings were common in the seeded area and looked 'green and fuzzy'. Monitoring in 2007 will determine effectiveness of seeding and/or need for additional seeding.
- Obliterate three non-system roads in Robbins Gulch. This project was identified as a soil amelioration project during Burned Area Recovery. It consisted of completely recontouring two non-system roads and decompaction combined with recontouring on another non-system road. Sites were seeded, slashed, and mulched.
- Store Jennings Camp roads (FDR 73259, 73261). Storage of these closed roads was identified as MEF mitigation (1.1 mi). The work was completed using one of the stewardship contracts from the Burned Area Recovery project (BAR).
- Remove culvert, restore crossing, and decompact FDR 13340, near Indian Trees Campground. This work was identified during a routine monitoring trip. The undersized culvert on a tributary to East Camp Creek was rusting, plugged and backing up during peak flows. Watershed funding was available to remove this culvert and restore the crossing. Access was retained for OHVs as the grazing permittee accesses sections of the allotment from this road. Sections of the road that access this crossing were decompacted and recontoured above the gravel pit. FDR 13340 was closed to full sized vehicles in 1996 at milepost 0.2 (Camp Reimel EA).
- Store FDR 13431 (1.8 mi). This road was identified in BAR as a storage opportunity. Another closed system road is about 200 feet downhill of FDR 13431. As directed in BAR, OHV access was retained on this road by leaving the outer 1/3 of the travel-way intact.
- Restore unauthorized user-created OHV trails at fifteen different locations. These small projects located, blocked, slashed, seeded, mulched signed and/or decompacted fifteen illegal trails across the Forest. Most of these trails were short hill-climbs that accessed steep easily eroded slopes and allowed additional access onto road systems that are closed to motorized travel. New sites are often identified throughout the year and will be treated depending upon environmental effect, funding and personnel. See the OHV Effects section of this report for more information.
- Shrub planting on 49 different sites to stabilize soils. Each year, depending on budget, shrubs are planted at culvert removal sites, or other unstable soils, to improve vegetative cover. In 2006 shrubs were planted at 49 different locations including sites where culverts were upsized or pulled, recontoured sections of newly stored roads, or unstable, unvegetated stream banks.
- Revegetate disturbed areas around the Gird Point Road (FDR 714) parking area. This project was completed by the Darby Ranger District recreation department with the assistance of a volunteer group and the Forest road crew. They cleaned up trash, placed rock, and spread seed and straw. The purpose of the project was to clean-up and stabilize areas used and sometimes overused by off-road recreationists.
- Store FDR 73691 (Warm Springs Drainage).. Stewardship credits and some watershed dollars were used to decompact, pull culverts and recontour sections of this road as prescribed in the Warm Springs EA (1996). Disturbed soils were seeded, fertilized and mulched where appropriate. Monitoring in late 2006 found that one crossing needs additional stabilization work that is planned in 2007.
- Place sediment traps at two cross drain pipes on the Jennings Camp Road (FDR 723) . FDR 723 was reconstructed in 2005 and the ditch has not yet stabilized; although it was seeded, the grass seedlings are not yet effective in reducing erosion. The sediment traps are intended to trap sediment until the ditch stabilizes.
- Rehabilitate two crossings on FDR 73253 in Jennings Camp per MEF mitigation. This project consisted of laying back steep, eroding slopes left from pulling pipes but not removing road fill adjacent to the crossing. The work occurred on one crossing on Jennings Camp Creek and another on a tributary to Jennings Camp. The old road travel-way and landing area was decompacted, seeded, and mulched. The Sula fire crew assisted with mulching and seeding.

- Remove undersized pipe on tributary to Crazy Creek (FDR 73702) and restore crossing as directed in the Warm Springs EA. Recontour stream banks, seed, fertilize, mulch, and plant shrubs.
- Store FDR 74137, 74138 (0.8 mi) in the Coal Creek drainage per BAR direction. These two 0.4 mile roads were identified in the Burned Area Recovery Project for storage. They were seldom used, well vegetated, and not a sediment source. FDR 74138 provided obvious access for OHVs to a road system closed year long to motorized use and was heavily slashed to restrict future access. Effectiveness will be monitored.

Watershed Improvement Needs Inventory

More than 42 miles of road were inventoried for watershed improvement needs in the Lower West Fork project area in 2006. This covered most of the analysis area outside of the Piquett Creek watershed. From the data collected on road conditions in 2005 and 2006 in this area, a proposed action was developed for the Lower West Fork to improve watershed conditions. The project was released for public review in March of 2007.

More than 33,000 acres of the Forest were reviewed for potential watershed improvement projects in the Trapper-Bunkhouse and Lower West Fork project areas.

In the Trapper-Bunkhouse project area, (4) high priority and (15) medium priority stream crossings were identified for fish passage and best management practice (BMP) upgrades. Several road segments are being considered as decommissioning candidates and relocation of approximately one mile of road out of a riparian area along Little Trapper Creek is proposed. A draft EIS was released in April 2007, with a final decision expected late in 2007.

Project Monitoring

Table 34 – Summary of Project Monitoring, highlights the past or on-going projects that were monitored for compliance, implementation, and effectiveness during 2006. Individual monitoring reports are available from Forest hydrologists.

Table 34 - Summary of Project Monitoring

Activity	Item	Location and Findings
Completed Watershed Improvement (WI) projects inventoried for effectiveness and maintenance needs	Project Areas Visited	Reimel Cattle Guard and Road Relocation (implemented 2005). Field review found that vegetation recovery on disturbed soils progressing well. However, in the restored road section desired species are facing heavy competition from cheat grass. Meadow Tolan Site 10 (implemented October, 2005). Monitoring conducted in summer 2006 found banks well vegetated and more stable than before the project was implemented. May need additional slashing to protect the stream banks as existing slash decomposes. Bear Creek Channel Stabilization (2004). Monitoring of this channel stabilization project in 2006 showed that vegetation recovery is very good and the channel is stable. Meadow Creek Exclosure Fence (2004). Monitoring in 2006 found that the fence is effective in eliminating livestock access to Meadow Creek. Seeding Effectiveness on FDR 723 and 725 (October, 2005). Monitoring finds that seed has germinated and road shoulders outside of graveled travel-way and ditches are green and fuzzy. It is expected that grasses will continue to grow and be effective in reducing erosion and trapping sediment and will reduce sediment inputs to Meadow and Jennings Camp Creeks. FDR 73691 (October, 2005). Monitoring in 2006 found that the first crossing needs some additional stabilization work. This work will be accomplished in 2007 with help from the Job Corps Natural Resource Crew. Vegetation Success on roads stored from Warm Springs EA (October 2005 and 2004). Monitoring found that grasses are recovering and doing better than initially thought in 2005 following implementation. Additional seeding will not be necessary. Waugh Gulch Aspen Exclosure (2001). Monitoring in 2006 found that the majority of aspen are five feet tall and some are over 5 feet. Removal of fence will be considered for 2008 depending upon further growth of aspen. CB Ranch Road Effectiveness (October, 2005). This non-system road was decompacted and portions recontoured in 2006. Vegetation recovery is progressing as expected. Shrubs were planted on crossing in spring, 2006. Vegetation recovery and shrub planting success on 4 Fish Culverts on Camp Creek and tributaries (2004). Monitoring in 2006 found some sparse recovery of vegetation. Shrubs planted in 2005 were still alive. Monitor and reseed if needed in 2007. FDR 73315/73315 Mink Creek Road Storage, (2004). Monitoring found vegetation recovery on recontoured section very successful. Treatment was effective in restricting access and allowing the ford on Mink Creek to recover. The stream is more stable and erosion sites have been reduced.

Activity	Item	Location and Findings
BMP, implementation, effectiveness, and validation monitoring	5 Projects Monitored	Forest Internal BMP Audits conducted in July 2006: Bear, Papa Waugh, Gold, and Frazier timber sales. Results described in Item 17. Middle East Fork BMP Upgrades (mitigation). Results reviewed on the ground in September 2006. Gravel on the road surface and in the ditch is effective in preventing erosion of the road surface and the transport of sediment to Tepee Creek. Most of the ditch was gravelled (no seeding needed as identified and required in Middle East Fork ROD). The Lower 100 feet of the ditch was not seeded or gravelled because about 100 feet below the outlet of the last cross drain pipe, the entire stream is diverted into an irrigation ditch. We will monitor this culvert for the need to apply seed or install a sediment trap in 2007.
BAR Road Decommissioning Project Monitoring	1 site visited	Crystal Mountain Road Decommissioning (2002). Monitoring in 2006 found that revegetation was effective and recontouring was well done and effective. Stream crossings are stable and are not sediment sources.
BAR Project BMP Implementation and Effectiveness Monitoring	3 fish passage structures	Hogtrough Creek fish passage-stream simulation box culvert. Railroad Cr. fish passage-stream simulation pipe arch. Weasel Creek fish passage-stream simulation pipe arch. Shrubs were planted at these three sites in 2006. Monitoring in August 2006 found the majority of shrubs were still alive and the structures functioning as aquatic organism passages.
Other Project Monitoring	1 allotment, 14 sites	Meadow Tolan Allotment Monitoring Sites (Bunch Gulch, Springer, Bugle Exclosure, Bugle Below Exclosure, Tributary to Meadow Site #6, Tributary to Meadow Site #10, Meadow Balsam Reach, Meadow Sagebrush Reach, Meadow Old Exclosure, Meadow 2004 Exclosure, Tolan, Swift, Lodgepole, Tributary to Meadow Site #13)
McClain Landslide Stabilization Monitoring	35 ac	Repairs to the erosion mat from 2004 appear effective. No new major soil movement was observed in 2006. A small burrito drain was installed in 2006 near the toe of the landslide deposition to address minor soil movement. Vegetation on the landslide continues to improve.

Meadow Tolan AMP

Monitoring of this allotment consists of measuring streambank trampling, tracking photo points, and profiling the valley/stream cross-section at 14 established reaches. These reaches are each 200 feet long. A total of 400 feel of bank is monitored at each site. The complete report is available at the Supervisor's Office.

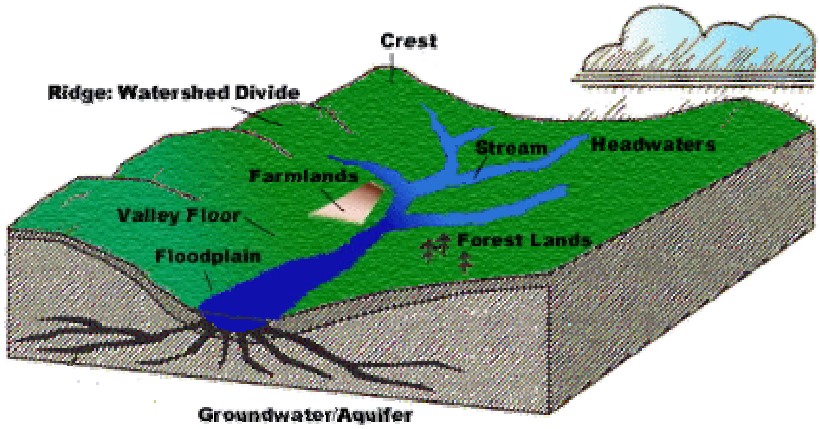
To summarize, conditions in 2006 were similar to 2005. Even though conditions were dry, livestock use was within acceptable ranges at most sites. Of the 14 sites, only Site 9, North Fork Springer, was above recommended utilization levels. At the time this site was reviewed in early October 2006, livestock were still on site. Site 3, on Meadow Creek above the FDR 5759 bridge, was very slightly above recommended levels at 22%, but is considered within sampling variability.

In 2005, Bunch Gulch was above the recommended utilization level. In 2006, this portion of the allotment was voluntarily rested by the permittee and received no livestock use. Seed heads were numerous within the sample reach, indicating that this year of rest allowed grasses to mature and go to seed; seed heads have not been observed during previous sampling efforts.

Fences are constructed around four sensitive reaches within this allotment. In 2006 a windstorm damaged sections of one of the fences in the main "meadow" section of Meadow Creek. Prompt action by the fisheries and

watershed crew repaired the fence prior to livestock gaining access inside the exclosure. Monitoring finds these fences are effective in restricting livestock and improving bank and vegetation conditions along the riparian area. Wildlife access continues inside these fences and some bank trampling (7% noted on Bugle Creek in 2006) occurs each year that can be identified as wildlife only.

McClain Landslide. Stream flow and suspended sediment were monitored in McClain Creek below the McClain landslide in 2005. Data collected between 2001 and 2005 suggest that suspended sediment load continues to decrease, but sensitivity to intense hydrologic events (precipitation or snowmelt) still exists. This trend is attributed to the ongoing and successful revegetation and drainage efforts which appear to be reducing the off-site effects of the landslide. A complete monitoring report, including vegetation, bedload, and drainage outflow monitoring, is available.



Validation of Aquatic Habitat Quality and Fish Population Assumptions Used to Predict Effects of Activities And Cutthroat Trout Population in Relation to Habitat Changes Items 21 and 41

OBJECTIVES: Monitor fish populations and trends. Determine fish population/habitat relationships. Determine indicators of aquatic habitat quality and effective monitoring methodologies. Monitor the population trends of management indicator species (westslope cutthroat trout) and determine the relation to habitat changes.

DATA SOURCE: Fish population census, habitat inventory and condition, channel structure, redd counts, radio-telemetry and streambank vegetation data. Data collected cooperatively with the Montana Department of Fish, Wildlife, and Parks (MFWP).

FREQUENCY: Annually.

REPORTING PERIOD: 2006.

VARIABILITY: A decline in aquatic habitat quality and/or fish population for more than one year (Item 21); 10 percent difference from projected cutthroat trout yield (Item 41).

INTRODUCTION:

Forest monitoring of the fisheries and aquatic environment in 2006 again far exceeded the minimum requirements set in the 1987 Forest Plan. Research and analysis of fisheries and fish populations since the Forest Plan was signed have shown that the ten percent annual variability noted above is too narrow given the natural annual variation in fish populations. Based on our ongoing long-term monitoring, fish populations are either stable on the Bitterroot National Forest, or trends are inconclusive at this time. Habitat quality is either being maintained or improving. Individual measures and evaluations are discussed further in the following sections.

The current emphasis of the Bitterroot National Forest's fisheries monitoring program is to:

1. Monitor population densities and distributions of resident trout.
2. Determine viability trends of bull trout and westslope cutthroat trout populations on the Forest scale.
3. Validate fish/habitat relationships.
4. Locate the strongest bull trout populations and monitor their status.
5. Monitor compliance with Anadromous Fisheries (PACFISH) and Inland Native Fish (INFISH) requirements.

MONITORING RESULTS AND EVALUATION:

The following monitoring was accomplished in 2006 and is discussed and evaluated in this section:

- Fish Habitat Inventories
- Fish Population Monitoring
- Mountain Lake Surveys
- Viability of Bull Trout and Westslope Cutthroat Trout Populations
- Water Temperature Monitoring
- Bull Trout Redd Surveys
- Fish Movement Monitoring
- Culvert Inventories and Replacements
- Project Level Monitoring of Fisheries/Watershed Improvement Projects

Fish Habitat Inventories:

Table 35 lists the fisheries habitat inventories that were conducted by Forest fisheries biologists in support of project planning and monitoring efforts in 2006. The inventories supply information used at a variety of scales to address short-term and long-term aquatic issues on and off the Forest.

Table 35 - Fish Habitat Inventories Conducted in 2006

Year	Stream	District	Inventory Length (mi.)	Inventory Method[3]
2006	East Fork Bitterroot River	Sula	4.1	I-walk
	Tolan Creek	Sula	1.9	I-walk
	Moose Creek	Sula	2.4	I-walk
	Martin Creek	Sula	1.1	I-walk
	Hughes Creek	West Fork	0.9	I-walk
	Malloy Gulch	West Fork	0.2	I-walk
	Boulder Creek	West Fork	0.1	50m Overviews
	Bear Creek	Stevensville	0.1	50m Overviews
	Blodgett Creek	Stevensville	0.2	50m Overviews
	Sawtooth Creek	Darby	0.1	50m Overviews
	Roaring Lion Creek	Darby	0.3	50m Overviews
	Lost Horse, including the South Fork	Darby	0.5	50m Overviews
	Chaffin Creek	Darby	0.1	50m Overviews
	Trapper Creek	Darby	0.1	50m Overviews
Total			12.1	

On the Stevensville, Darby, and West Fork Districts, fish habitat was quantified at 50 meter sections in eight westside canyon streams that were snorkeled in 2006. The surveys included parts of three ranger districts (Table 35), and the number of sections surveyed in each stream varied from 3 to 19 depending on the distribution of bull trout. Larger or scattered populations required more surveys than populations confined by barriers. Details are in *Bull Trout Presence in Eight Tributaries of the Bitterroot River, Summer 2006.*

On the Sula District, fish habitat inventories were conducted in the East Fork Bitterroot River, Tolan Creek, Moose Creek, and Martin Creek. The purpose of the East Fork Bitterroot River inventory was to monitor the pool and large woody debris targets in the Bitterroot Headwaters Total Maximum Daily Load (TMDL)[4]. The purpose of the Tolan Creek inventory was to collect baseline riparian management objective data for the West Tolan project. The purpose of the Moose Creek and Martin Creek inventories was to collect riparian management objective data in stream reaches that lacked data.

On the West Fork District, fish habitat inventories were conducted in the lower reaches of Hughes Creek and Malloy Gulch to collect baseline riparian management objective data for the Hughes Malloy ecoburn project.

Fish Population Monitoring:

The Forest Plan recommends monitoring fish populations in six streams annually to meet the Forest objectives. In 2006, fish populations were monitored in 29 streams at 31 monitoring reaches.

[3] I-walk: A survey method in which habitat parameters such as stream width and depth are correlated with bull trout presence or absence. 50m Overviews: A survey method that looks at pool quality, substrate composition, large wood, and pools per mile to quantify fish habitat as described by INFISH. Habitat was quantified at sections that were snorkeled in 2006. Details are in Bull Trout Presence in Eight Tributaries of the Bitterroot River, Summer 2006.

[4] Total Maximum Daily Load (TMDL): A TMDL is the toal amount of a pollutant that a water body may receive from all sources without exceeding water quality standards. A TMDL can also be defined as a reduction in pollutant loading that results in meeting water quality standards.

At each monitoring reach, we have set a goal of monitoring trout populations for at least three years to serve as a baseline for future population studies. This "pulsed" monitoring technique is necessary for assessing long-term changes in fish populations (Bryant, 1995). Complete methods are described in Clancy (1998). As displayed in Table 36, most of the reaches monitored in 2006 have been sampled for at least three years, and many have been sampled between 5-10 years. Since 1989, the Forest has accomplished its fish population monitoring requirements cooperatively with biologists from Montana Fish, Wildife, and Parks (MFWP).

Table 36 summarizes the fish population estimates that were conducted on the Forest between 1989 and 2006. Years in which a population estimate was conducted in a monitoring reach are denoted with **X**.

Table 36 - Fish Population Estimates Conducted Between 1989 and 2006

Monitoring Site	89	90	91	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06
Andrews Creek 0.5													X	X	X			
Bear Creek 6.0			X															
Beaver Creek 0.3			X	X														
Bertie Lord Creek 0.2		X	X								X		X	X	X	X	X	X
Big Creek 6.5				X														
Blue Joint Creek 5.9						X	X											
Boulder Creek 2.0				X														X
Bunkhouse Creek 1.3																	X	
Burnt Fork Creek 19.7						X		X				X						X
Cameron Creek 6.1					X						X							
Cameron Creek 10.1		X									X		X	X	X	X		
Camp Creek 2.3															X	X	X	X
Camp Creek 3.2										X								
Camp Creek 6.6									X									
Castle Creek 0.1																		X
Chaffin Creek 3.1		X	X														X	
Chicken Creek 1.0												X	X	X	X	X		
Coal Creek 1.3		X												X	X	X	X	
Daly Creek 0.7	X	X						X			X		X	X	X			X
Divide Creek 0.1	X	X	X					X					X	X	X			
Doran Creek 0.1					X													
EF Bitterroot River 2.5										X		X	X		X	X	X	X
EF Bitterroot River 12.0		X					X		X			X	X	X	X	X	X	X
EF Bitterroot River 19.1				X														
EF Bitterroot River 25.6				X													X	
EF Bitterroot River 28.4		X																
EF Bitterroot River 31.4				X		X				X		X	X	X	X			
East Piquett Creek 0.2																		X
Fred Burr Creek 9.0										X								
Gilbert Creek 0.1														X	X	X		
Gold Creek 0.3		X	X					X										
Guide Creek 0.1																	X	X
Hart Creek 2.8													X	X	X			
Hughes Creek 1.6										X	X							
Hughes Creek 9.0								X			X							
Jennings Camp Creek 0.5																	X	X
Johnson Creek 0.7			X															
Kootenai Creek 0.3										X								
Laird Creek 1.4		X	X									X		X	X	X	X	
Laird Creek 2.3												X		X	X	X	X	
Lavene Creek 0.2																		X
Lick Creek 1.9		X	X	X			X		X		X		X		X		X	
Lick Creek 2.1							X		X				X					
Little Blue Joint Cr 1.4												X	X	X	X	X	X	
L. Sleeping Child Cr 4.2													X	X		X		
Little Tin Cup Creek 1.3					X													
Little West Fork 1.3				X												X	X	X
Little West Fork 3.1				X														
Martin Creek 1.3			X	X	X	X			X		X		X	X	X			
Martin Creek 7.5				X	X	X	X						X		X			

Monitoring Site	89	90	91	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06
Maynard Creek 0.1													X	X	X	X		
Meadow Creek 5.2		X	X															
Meadow Creek 5.6	X	X	X			X	X	X				X	X	X	X	X		X
Meadow Creek 7.3	X	X	X										X	X	X			
Medicine Tree Creek 1.5													X	X	X	X	X	
Mine Creek 0.2										X	X		X	X	X			
Moose Creek 1.4			X	X	X				X		X		X	X	X			X
Moose Creek 3.6				X	X	X												X
NF Sheephead Creek 0.5					X													
North Rye Creek 1.9	X	X	X					X	X			X	X	X	X	X	X	X
Nez Perce 1.2												X	X					
Nez Perce 9.8				X								X	X	X	X			
Nez Perce 11.8				X														
Overwhich Creek 2.0					X	X	X			X	X							X
Overwhich Creek 8.9					X													
Pierce Creek 0.5																		X
Piquett Creek 1.3		X	X										X	X	X		X	X
Praine Creek 1.0							X					X	X	X	X	X		
Railroad Creek 1.4				X														
Reimel Creek 2.6		X	X	X								X	X	X	X	X		
Reimel Creek 2.9		X	X	X														
Reimel Creek 3.8		X	X	X								X	X	X	X			
Rye Creek 6.6													X	X	X	X	X	
Rye Creek 12.4	X	X	X					X	X			X	X	X	X	X	X	X
Salt Creek 0.2								X	X									
Sheep Creek 0.2			X															
Sheephead Creek 0.2																X	X	X
Sheephead Creek 2.5					X													
Skalkaho Creek 0.4		X																
Skalkaho Creek 5.8								X										
Skalkaho Creek 8.1	X																	
Skalkaho Creek 12.5									X									
Skalkaho Creek 13.1			X	X		X				X	X		X		X			
Skalkaho Creek 16.8	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Skalkaho Creek 17.2												X						
Skalkaho Creek 20.6			X	X	X	X							X		X			
Slate Creek 1.6			X	X	X						X		X	X	X			
Sleeping Child Creek 1.9					X													
Sleeping Child Creek 4.5									X									
Sleeping Child Cr 10.2	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Sleeping Child Creek 14.5	X	X	X					X					X	X	X			
Sleeping Child Creek 16.9	X	X	X															
Soda Springs Creek 0.3																X	X	X
Sweathouse Creek 5.7			X															
Swift Creek 0.7							X						X	X	X			
Tepee Creek 0.9																	X	X
Threemile Creek 2.6			X															
Threemile Creek 3.9				X														
Threemile Creek 6.3			X															
Threemile Creek 8.3			X													X		
Threemile Creek 10.0																X		
Threemile Creek 12.6																		X
Threemile Creek 15.3								X		X			X					
Tin Cup Creek 7.2				X														
Tolan Creek 2.1		X	X										X	X	X			X
Tolan Creek 5.1	X	X	X					X	X				X	X	X	X		
Tolan Creek 7.3	X												X	X	X			
Trapper Creek 1.7				X														
Trapper Creek 3.5				X													X	
Two Bear Creek 0.8			X										X	X	X	X		
Ward Creek 0.7																		X

Monitoring Site	89	90	91	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06
Warm Springs Creek 3.5				X	X	X	X					X	X	X	X	X		
Warm Springs Creek 5.6		X		X														
Warm Springs Creek 7.4				X		X	X											X
Watchtower Creek 0.1																X	X	X
Watchtower Creek 0.8				X														
Waugh Creek 0.7		X	X										X	X	X	X	X	
WF Bitterroot River 1.2							X		X	X				X				
WF Bitterroot River 22.2										X								
WF Bitterroot River 34.0			X	X			X			X	X							
WF Bitterroot River 40.0			X										X	X	X			
WF Camp Creek 0.3					X								X	X	X			
Willow Creek 12.1		X																
Woods Creek 0.3			X															
Woods Creek 0.9								X	X				X	X	X			

The following narratives summarize our most current knowledge of the fish populations in the 31 monitoring reaches that were sampled in 2006.

- Bertie Lord Creek 0.2 This reach is located near the mouth of Bertie Lord Creek. It was sampled in 1990-91, 1999, and 2001-06. The reach is being monitored for effects from the Middle East Fork (MEF) project. In 2006, no MEF project activities were conducted in the Bertie Lord drainage. Westslope cutthroat trout numbers have generally remained stable since monitoring began in 1990. In 2006, cutthroat numbers were lower than usual, possibly due to drought and low stream flows. Bull trout are incidental and rare in the lower end of Bertie Lord Creek, with an individual showing up in the sample roughly every other year. Bull trout have never occurred in large enough numbers to calculate a population estimate. In 2006, one bull trout was captured. It was a 9-inch long migratory bull trout from the East Fork Bitterroot River. Brook trout are more common than bull trout in this reach, but have not increased in abundance since 1990. In 2006, three brook trout > 3 inches in length were captured in the reach, not enough to calculate a population estimate. In 2005, only a few young-of-the-year brook trout were captured in the reach.
- Boulder Creek 2.0 This reach is located near the wilderness boundary on Boulder Creek. It was sampled in 1992 and 2006. Westslope cutthroat trout and bull trout numbers have not changed much between 1992 and 2006. In 1992, a total of 36 bull trout > 4 inches in length were captured in two electro shocking runs through the reach. In 2006, a total of 34 bull trout > 4 inches in length were captured in the reach.
- Burnt Fork 19.7. This reach starts at the Burnt Fork trailhead. It was sampled in 1995, 1996, 2000, and 2006. Compared to past population estimates, the populations of both westslope cutthroat and bull trout in 2006 were lower for fish less than 6 inches, and similar for larger fish.
- Camp Creek 2.3 This reach is located in the newly reconstructed portion of Camp Creek upstream of the Sula Ranger Station. It was sampled for the first time in 2003, one year after channel reconstruction. Since reconstruction, it has been sampled in 2003-06. A reach of the old channel was sampled in 1999 before reconstruction occurred. Due to widespread hybridization between cutthroat and rainbow trout, the two species are combined in the population estimates. The data indicate that the number of fish in 2006 was similar to pre-construction on a density basis (number of fish per 1000 feet of stream). Due to the increased length of the stream resulting from new channel construction, there has likely been a significant increase in the number of trout in this reach. Bull trout were rare in the reach prior to the reconstruction and have not been captured since.
- Castle Creek 0.1 This reach is located near the mouth of Castle Creek. The reach was established in 2006 to monitor the Lower West Fork project. The reach supports westslope cutthroat trout (common) and juvenile bull trout (rare). One 5-inch juvenile brown trout and one bull trout X brook trout hybrid was captured in the reach. The estimate for westslope cutthroat trout was 163 fish > 3 inches in length per 1000 feet.
- Daly Creek 0.7 This reach is located in the lower end of Daly Creek along the paved portion of the Skalkaho Highway. It was sampled in 1989-90, 1996, 1999, 2001-03, and 2006. The 2006 population estimates fall within the range of past estimates, although the number of smaller bull trout were at the low end of the range.
- East Fork Bitterroot River 2.5 This reach is located near the Trinity Ranch. It was sampled in 1998, 2000-01, and 2002-06. Due to high infection rates of whirling disease, the rainbow trout in this reach have declined. The 2006 estimate of rainbow trout is slightly higher than 2005, but still well below past estimates. Current levels of other species are similar to pre-2000 fire levels, although juvenile brown trout were very abundant in 2006. It is unlikely that the 2000 fires are a direct cause.

- East Fork Bitterroot River 12.0 This reach is located in the river canyon near Maynard Creek. It was sampled in 1990, 1995, 1997, and 2000-06. The 2006 population estimate of rainbow trout was lower than historic levels. Whirling disease infection rates have generally been increasing in this reach and may be responsible for this decline. Current levels of other species are similar to pre-2000 fire levels.
- East Piquett Creek 0.2 This reach starts at the Forest boundary. The reach was established in 2006 to monitor the Lower West Fork project. Westslope cutthroat trout and brook trout are common in the reach. One 4-inch juvenile brown trout was captured. The estimate for westslope cutthroat trout was 159 fish > 3 inches in length per 1000 feet. The estimate for brook trout was 30 fish > 3 inches in length per 1000 feet.
- Guide Creek 0.1 This reach starts at the Forest boundary. It was sampled in 2005 and 2006. The reach was established to monitor effects of the MEF project. In 2006, no MEF project activities were conducted in the Guide Creek drainage. There was no MEF log hauling on Road #311 in 2006. A limited amount of hauling from the Lil' Lyman timber sale occurred on Road #311 in February-March, 2007. Westslope cutthroat trout are the only fish that have been found in the reach, and they are uncommon. In 2005, 25 westslope cutthroat trout 3 to 6 inches in length were captured. In 2006, only two westslope cutthroat trout were captured. Low stream flows and drought are believed to be the reason for the lack of fish in 2006. Guide Creek is a small stream (2-3' base flow wetted width), and flows were very low when the reach was sampled in August, 2006.
- Jennings Camp Creek 0.5 This reach starts about 0.3 miles upstream of the Forest boundary. It was sampled in 2005 and 2006. The reach was established to monitor effects of the MEF project. In 2006, no MEF project activities were conducted in the Jennings Camp drainage, and there was no MEF log hauling on Road #723 along Jennings Camp Creek. Westslope cutthroat trout are the only fish that have been found in the reach, but they are common. Cutthroat numbers were similar in 2005 and 2006.
- Lavene Creek 0.2 This reach starts at the Forest boundary. The reach was established in 2006 to monitor the Lower West Fork project. Westslope cutthroat trout are the only fish that have been found in the reach, but they are common. The estimate for westslope cutthroat trout was 167 fish > 3 inches in length per 1000 feet.
- Little West Fork 1.3 This reach is located near the Road #5635 bridge. It was sampled in 1992 and 2004-06. Westslope cutthroat trout are abundant in the reach; bull and brook trout are common; and rainbow and brown trout are incidental and rare. The populations of all species appeared to be similar during these years.
- Meadow Creek 5.6 This reach is located upstream of the Road #5759 bridge. It was sampled in 1989-91, 1994-96, 2000-04, and 2006. The westslope cutthroat population has decreased in recent years, but remains within the long-term range. The number of bull trout less than 6 inches in length were lower than average in 2006. The number of bull trout greater than 6 inches in length was within the historic range.
- Moose Creek 1.4 This reach is located downstream of the Lick Creek confluence. It was sampled in 1991-93, 1997, 1999, 2001-03, and 2006. The number of westslope cutthroat trout was within the long-term range in 2006. We were unable to collect a bull trout population estimate.
- Moose Creek 3.6 This reach is located near the Moose Creek trailhead. It was sampled in 1992-94 and 2006. The number of westslope cutthroat trout was slightly below the long term range in 2006. The number of bull trout less than 5 inches in length was below past estimates in 2006. The number of bull trout greater than 5 inches in length was similar to past estimates.
- North Rye Creek 1.9 This reach is located near the Forest boundary. It was sampled in 1989-91, 1996-97, and 2000-06. The 2000 fires and mudslides (in 2001 and 2002) killed most of the fish in this reach. The westslope cutthroat population is recovering and is at or near pre-2000 fire levels. In contrast, brook trout abundance has decreased and remained at low levels since the fires and mudslides. In 2006, no brook trout were captured, and westslope cutthroat trout numbers were within the long-term range.
- Overwhich Creek 2.0 This reach is located downstream of the Road #5703 bridge. It was sampled in 1993-95, 1998-99, and 2006. In July 1992, mudslides killed most of the fish in this reach. The fish populations rebounded during 1993-98. The 2006 population estimate was slightly below past estimates.
- Pierce Creek 0.5 This reach is located downstream of the Road #5629 crossing. The reach was established in 2006 to monitor the Lower West Fork project. Westslope cutthroat trout are the only fish species that have been found in the reach, but they are common. The estimate for westslope cutthroat trout was 88 fish > 3 inches in length per 1000 feet.

- Piquett Creek 1.3 This reach starts upstream of the Forest boundary. It was sampled in 1990-91, 2001-04, and 2005-06. The reach will be used to monitor the Lower West Fork project. Westslope cutthroat trout numbers have remained relatively stable over the last 15 years, while brook trout numbers have been declining since the early 1990's. 2006 was the first year in which the estimated number of westslope cutthroat trout > 4 inches in length exceeded that of brook trout. A few bull trout and bull X brook hybrids are typically found in the reach, but never in large enough numbers to calculate a statistically valid population estimate. Bull trout are more common further upstream in Piquett Creek above the Piquett Creek trailhead. Incidental rainbow trout and brown trout have also been captured in the reach in some years.
- Rye Creek 12.4 This reach is located near the Road #75 bridge. It was sampled in 1989-91, 1996-97, and 2000-06. The reach was burned at moderate-to-high severity in 2000. Since then, most of the trees have died along the reach. Most of the mudslide activity in 2001 occurred downstream of the reach. Following the fires and mudslides, the westslope cutthroat trout population initially declined in 2001, but rebounded to just below its pre-fire level in 2003. The westslope cutthroat trout population has been declining in the past few years. Bull trout were present in low numbers before and immediately after the fires, but have not been found since the August, 2000 survey. Over the same time period, brook trout numbers have increased, and in 2003-2006, they made up almost 20% of the fish captured in the reach. This is the one reach in the burned area where brook trout have clearly increased since the 2000 fires.
- Sheephead Creek 0.2 This reach is located near the Sheephead Creek trailhead. It was sampled in 2004-06. Westslope cutthroat trout are abundant in the reach; bull and brook trout are common; and brown trout are incidental and rare. One large (24 inches in length) migratory bull trout spawner was observed in the reach in late August, 2005. The fish populations in 2006 were similar to 2004 and 2005.
- Skalkaho Creek 16.8 This reach is located near the Railroad Creek confluence. It has been sampled every year since 1989. Current levels of bull trout and westslope cutthroat trout are similar to pre-2000 fire levels. The number of larger westslope cutthroat trout and bull trout increased between 2000-05 with the implementation of catch and release fishing regulations. In 2006, the smaller bull trout and westslope cutthroat trout were less abundant than in the past. Brook trout are incidental in this reach, and bull trout appear to be hybridizing with brook trout.
- Sleeping Child Creek 10.2 This reach is located near the Sleeping Child Hot Springs. It has been sampled every year since 1989. The 2000 fires did not cause a noticeable kill of fish in this reach, but the 2001 mudslides killed most of the fish. By 2004 and 2005, westslope cutthroat, bull trout and brook trout populations recovered to within pre-fire ranges. The 2006 population of westslope cutthroat was within the long-term range, with an increased number of larger fish.
- Soda Springs Creek 0.3 This reach is located near the Road #5635 bridge. It was sampled in 2004-06. Westslope cutthroat trout are abundant in the reach, with lesser numbers of bull and brook trout also present. The fish populations in the reach were similar during 2004-06.
- Tepee Creek 0.9 This reach starts at the Forest boundary. It was sampled in 2005-06. The reach was established to monitor the effects of the MEF project. In 2006, the segment of Road #5778 that encroaches on Tepee Creek was graveled. There was no MEF timber harvest or log hauling in the Tepee Creek drainage in 2006. Westslope cutthroat trout are the only fish that have been found in the reach, and they are uncommon. In 2005, eight westslope cutthroat trout 2 to 5 inches in length were captured in the reach. In 2006, no fish were seen. Low stream flows and drought are believed to be the reason for the absence of fish in 2006. Tepee Creek is a very small stream (2' base flow wetted width), and flows were very low when it was sampled in August, 2006. Our limited sampling in Tepee Creek suggests that the number of westslope cutthroat trout residing in the stream is strongly affected by discharge. When we have sampled in June, flows are higher and more westslope cutthroat trout are present. sampling in August, when flows are low yields few (or no) westslope cutthroat trout. We suspect that declining water levels trigger a downstream exodus of fish out of the lower end of Tepee Creek and into the irrigation ditches on private land that contain more water in late summer.
- Threemile Creek 12.6 This reach is located just downstream of the Threemile Game Range on Bitterroot National Forest property. It was sampled for the first time in 2006. The fish in this reach are predominantly westslope cutthroat trout, with brook trout also present in moderate numbers.
- Tolan Creek 2.1 This reach starts at the Forest boundary. It was sampled in 1990-91, 2001-03, and 2006. Westslope cutthroat trout are abundant in the reach, bull and brook trout are generally uncommon, and brown and rainbow trout are incidental and rare. Populations have not changed much since 1990. Westslope

cutthroat trout have remained strong, bull trout and brook trout have remained low, and brown and rainbow trout continue to be incidental.

- Warm Springs Creek 7.4 This reach in located near the Sheeps Head Creek confluence. It was sampled in 1992, 1994-95, and 2006. In 2006, the westslope cutthroat trout population was similar to past estimates. The number of bull trout, however, was significantly lower than past estimates.
- Ward Creek 0.7 This reach is located downstream of the Road #373 crossing. The reach was established in 2006 to monitor the Lower West Fork project. Westslope cutthroat trout are the only fish that have been found in the reach, but they are common. The estimate for westslope cutthroat trout was 186 fish > 3 inches in length per 1000 feet.
- Watchtower Creek 0.1 This reach is located near the Road #468 bridge. It was sampled in 2004-06. Westslope cutthroat trout are abundant in the reach; bull and brook trout are generally uncommon; and brown and rainbow trout are incidental and rare. The fish populations in the reach were similar during 2004-06.

These are the key findings of the Forest's fish population monitoring

- Westslope cutthroat trout populations across the Forest appear to be stable and generally strong.
- The number of young bull trout in the core area bull trout populations (Burnt Fork, Daly, Meadow, Moose, Skalkaho, and Warm Springs Creeks) was lower than usual in 2006. We do not know if this was just a natural fluctuation in the populations, or the beginning stages of a longer-term decline. Water temperatures have been increasing in Forest streams since 1993 due to climatic warming, and that could be a factor. We plan on re-sampling the core area streams again in 2007 to shed more light on this issue.
- There is circumstantial evidence that the number of large migratory bull trout in the lower East Fork (Sula to Conner) has declined since 2000. A more intensive study is needed to determine if this is the case. It is unclear whether a similar decline in large bull trout has occurred in the lower West Fork.
- In the burned streams, bull trout and westslope cutthroat trout numbers have recovered to levels that are at or near those that occurred prior to the 2000 fires. Recovery to pre-fire levels occurred for most of the populations sometime between 2003 and 2005 (3 to 5 years post-fire). The one exception is upper Rye Creek, where bull trout have not been found since the 2000 fires, and brook trout have increased and now make up about 20% of the fish.
- The long-term status of brook trout in the burned streams remains unclear. As of 2006 (six years post-fire), brook trout are still well below their pre-fire levels in all of the burned streams except upper Rye Creek, where brook trout have expanded their population.
- Since the late 1990's, whirling disease infection rates have become high in the rainbow trout population in the East Fork downstream of Sula. This has resulted in a decline in rainbow trout numbers. In monitoring reach East Fork 2.5 above Conner, the fish population has shifted from one dominated by rainbow trout, to one that is a relatively equal mix of rainbow and brown trout.

In addition to the population estimates described above, numerous presence/absence surveys were conducted across the Forest in 2006. These surveys were generally conducted to gather existing condition data for various Forest projects. Presence/absence surveys are usually conducted with single-passes of either electrofishing or snorkeling. Species presence/absence and relative abundance levels were entered into a Forest-wide database maintained by the Montana Department of Fish, Wildlife and Parks in Hamilton. Forest-wide presence/absence of bull trout and westslope cutthroat trout has also been mapped on GIS.

Running Creek Snorkel Survey

In late July 2006, Forest fisheries biologists conducted a backcountry presence/absence snorkel survey in the Running Creek drainage. Several of the smaller tributaries to Running Creek (Eagle and Grouse creeks) and the Selway River (Gardiner, North Star, and Goat creeks) were also snorkeled near their mouths. The objectives of the survey were to: (1) map the distribution and relative abundance of bull trout, steelhead, and chinook salmon, and (2) locate important spawning areas. Prior to the survey, spotty fish population data was available for the Running Creek drainage, and no data was available for Grouse, Gardiner, North Star, and Goat creeks. Fourteen 500-foot long reaches were snorkeled over a six day period. Nine of the reaches were scattered throughout the lower eight miles of Running Creek from the mouth to Warm Springs Bar. Reaches were also snorkeled in the lower ends of Eagle, Grouse, Gardiner, North Star, and Goat creeks, near their confluences with Running Creek (Eagle and Grouse) and the Selway River (Gardiner, North Star, and Goat). Snorkeling was conducted during the daytime with 2-3 snorkelers in Running Creek, and one snorkeler in the tributaries to Running Creek and the

Selway River. The fish species that were found and their observed numbers per 500 feet are summarized in Table 37.

Table 37 - Fish Presence and Relative Abundance in the Running Creek Drainage and Several Tributaries to the Selway River

Stream	Mean wetted width (ft)	Channel type	# Bull trout	# Westslope cutthroat trout	# Juvenile steelhead	# Juvenile chinook salmon	Other fish species
Running Creek @ Selway River	49	B3	0	0	13	0	sculpin, longnose dace
Running Creek @ Selway trail bridge	49	B3	0	0	37	5	sculpin, longnose dace
Running Creek @ Green Ridge Creek	49	B3	0	4	52	21	sculpin, longnose dace
Running Creek @ Eagle Creek	37	B3	0	0	47	20	sculpin, longnose dace
Running Creek @ Sec 29, SE ¼ of SE ¼	37	B3	0	8	43	22	sculpin, longnose dace
Running Creek @ Sec 29, SW ¼ of SW ¼	37	B3	0	20	87	5	longnose dace
Running Creek @ Sec 29, SW ¼ of SE ¼	37	A2	0	29	116	9	longnose dace
Running Creek @ Grouse Creek	35	A2	1	12	97	9	none
Running Creek @ Warm Springs Bar	30	B3	1	39	65	0	brook trout (1), sculpin
Eagle Creek	19	B3	0	3	50	2	sculpin, longnose dace
Grouse Creek	12	A4	2	31	44	0	none
Gardiner Creek	6	A4	0	0	74	0	none
North Star Creek	4	B4	0	0	27	0	none
Goat Creek	28	B4	0	8	36	0	sculpin

Figure 20 - Snorkeling in lower Running Creek, July 2006

We found very few bull trout in our survey, and none in the Bitterroot NF portions of Running Creek. It appears that bull trout are absent, or nearly so, in the Bitterroot NF portions of Running Creek during the warmest part of the summer.

Maximum daytime water temperatures in the lower half of Running Creek approach or exceed 20º C during the warmest several weeks of an average summer. Our survey coincided with the hottest temperatures of summer 2006, and we recorded maximum daily temperatures between 20-23º C in the lower three miles of Running Creek. Temperatures above 18º C probably function as a thermal barrier to bull trout and preclude juvenile rearing. The first bull trout we found in Running Creek was in the Nez Perce NF portion of Running Creek. It was a 16-inch migratory adult in a large pool a short distance upstream from the mouth of Grouse Creek (the temperature was 17º C at the time). We also saw a couple of juvenile bull trout in the lower 500 feet of Grouse Creek, and one juvenile bull trout in Running Creek in the vicinity of Warm Springs Bar.

The Bitterroot NF portions of Running Creek do function as a migratory corridor for adult bull trout moving between overwintering habitat in the Selway River and spawning habitat in the Running Creek headwaters. Typically, these adult bull trout spawners are believed to run upstream during the falling limb of the hydrograph (usually June) when flows are high and water temperatures are relatively cold, and run back downstream in October and November when water temperatures are cold.

We did not find any large areas of potentially good spawning habitat for bull trout in the Bitterroot NF portions of Running Creek. The habitat consisted of B3, A2, and A3 channel types, which are dominated by cobble and boulder substrates and lack significant deposits of gravel.

Eagle Creek is one of the most important spawning and rearing tributaries for bull trout in the Running Creek drainage, and the only spawning and rearing tributary for bull trout in the Bitterroot NF portion of the drainage. Eagle Creek contains about ten miles of decent spawning and rearing habitat for bull trout, and at its mouth is markedly colder than Running Creek (by 5-6º C during our survey). These colder waters attract upstream moving bull trout spawners to leave Running Creek and swim up Eagle Creek. Grouse Creek, a tributary on the Nez Perce/Bitterroot NF boundary, also contains a very limited amount of bull trout spawning and rearing habitat in its lower 500 feet. Above that point, a large waterfall blocks upstream fish movement.

North Star and Gardiner creeks do not appear to support bull trout due to their small sizes, steep gradients, and prohibitively warm summer water temperatures in their lower ends near the Selway River. We did not observe any bull trout in the lower end of Goat Creek; however, the drainage is large and we suspect that bull trout are present further upstream where water temperatures are colder.

Juvenile steelhead were relatively common throughout all of the portions of Running Creek that we sampled. They were also common in the lower ends of Eagle, Grouse, Goat, Gardiner, and North Star creeks. Juvenile steelhead were the most numerous fish species that we observed in all 14 of the reaches we sampled. The lengths of the juvenile steelhead typically ranged between 3-6 inches. A few young-of-the-year (YOY) steelhead were observed in most of the Running Creek reaches, but never in numbers approaching those of juvenile steelhead. We did not see any adult steelhead.

Running Creek and the lower ends of the smaller tributaries to the Selway River (Goat, Gardiner, and North Star creeks) lack large, gravel-dominated low gradient spawning areas; however, they still appear to provide important spawning and rearing areas for steelhead.

We observed young-of-the-year (YOY) chinook salmon (< 4 inches in length) in Running Creek between its mouth and Grouse Creek. We did not find any chinook salmon in Running Creek in the vicinity of Warm Springs Bar. The highest numbers (20-22 per 500 feet) of YOY chinook salmon occurred on the Bitterroot NF in the lower three miles of Running Creek. Some YOY chinook salmon were scattered throughout Running Creek as far upstream as Grouse Creek, but at lower densities. We observed only a few 4-6 inch chinook salmon, and no adults. Interestingly, despite the occurrence of YOY chinook salmon throughout the lower six miles of Running Creek, we did not find any large, gravel-dominated low gradient spawning areas. The substrates were dominated by cobbles and boulders (B3, A2, and A3 types). We also did not find any large areas of spawning gravel in the vicinity of Warm Springs Bar. As for the tributaries, we found two YOY chinook salmon in the lower end of Eagle Creek, and none in the other tributaries (Grouse, Goat, Gardiner, and North Star creeks).

Some large (14-16 inches in length) westslope cutthroat trout adults are present in the Selway River near the mouth of Running Creek and in the lower 2-3 miles of Running Creek. We found few juvenile westslope cutthroat trout in those areas. Above Eagle Creek, westslope cutthroat trout gradually increase in abundance in Running Creek as one heads upstream and the water temperatures get colder. However, in our survey, we always saw considerably more juvenile steelhead than juvenile cutthroat in all of the reaches we sampled. In the tributaries, juvenile cutthroat trout were common in the lower end of Grouse Creek, uncommon in the lower ends of Eagle and Goat creeks, and absent in Gardiner and North Star creeks. Westslope cutthroat trout are common-to-abundant further upstream in Eagle and Goat creeks. It is unknown if westslope cutthroat trout are present in the upstream portions of Gardiner and North Star creeks.

A single, 6-inch long brook trout was found in the Nez Perce NF portion of Running Creek near Warm Springs Bar. It was the only non-native fish species that we observed during the entire survey. Brook trout are present in Running Lake in the upper headwaters of the drainage, and apparently some individuals have filtered downstream out of the lake and taken up residence in Running Creek. The Nez Perce NF has recently made efforts to eradicate brook trout from Running Lake. It is hoped that if brook trout can be eradicated from the lake, then the source of brook trout to Running Creek itself will be eliminated, and the few individuals that reside in the creek will eventually die off without establishing viable populations.

Other native fish species that we observed included sculpin and longnose dace. Several species of sculpin were commonly observed throughout Running Creek from its mouth to Warm Springs Bar. Longnose dace were also common in the Bitterroot NF portions of Running Creek and the lower end of Eagle Creek.

We observed the following amphibians and reptiles during our survey: tailed frog larvae, two adult Pacific giant salamanders, one adult spotted frog, and numerous rattlesnakes and garter snakes. We found no tailed frogs in the warmer portions of Running Creek until we got close to Grouse Creek. Above Grouse Creek, where water temperatures are colder, tailed frog larvae appear to be relatively common. We found one Pacific giant salamander in the lower end of Grouse Creek, and one in Running Creek in the vicinity of Warm Springs Bar. We found one adult spotted frog near the mouth of Running Creek. Garter snakes were observed in all areas; rattlesnakes were observed near the mouth of Eagle Creek and along the Selway River between the Paradise trailhead and Goat Creek. One crayfish was seen in Running Creek a short distance upstream from the mouth of Eagle Creek; another was seen in North Star Creek.

Mountain Lake Surveys:

On June 28, 2006, the Forest cooperated with MFWP biologists, and local boy scouts to survey Gleason Lake, which is a tributary to Willow Creek. This lake was revisitied on August 28 by one technician. On July 17 to 19, 2006, six mountain lakes were surveyed in the headwaters of the Carlton and One Horse Creek drainages in cooperation with MFWP biologists, and the Bitterroot Chapter of the Back Country Horsemen.

At each lake a variety of measurements were taken: temperature, lake depths, fish and amphibian presence, substrata, aquatic vegetation types, shoreline cover types, inlet and outlet location and morphology, and presence of aquatic vegetation. Gill nets, fly rods, spinning rods, and snorkeling were used to sample angling success, and fish characteristics. Fish caught were measured, and then returned to the lake if still alive. Three cutthroat trout caught in gill nets at Carlton Lake did not survive. Total angler hours, time of day, and species caught were recorded.

Table 38– Summary Data For The Lakes Surveyed In 2006.

Lake Name	Maximum Depth (feet)	Relative Productivity[5] (Conductivity (μS) / Secchi Depth (ft))	Fish	Amphibians
Gleason[6]	34	Moderately High (98/14)	Cutthroat Trout, Redside Shiners	Western Toad
Carlton	45	Very Low (0/38)	Cutthroat Trout (very few, 6-7 inch fish)	Not Observed
Little Carlton	9	Very Low (0/>max.depth)	None	Long-toed Salamander
McClain	4	nd[7]	None	Not Observed
South One Horse	18	Low (5/>max.depth)	None	Spotted Frogs, Long-toed Salamander
Reed	37	Very Low (nd/29)	None	Not Observed
North One Horse	8	Very Low (nd/>max.depth)	None	Spotted Frogs, Long-toed Salamander

Viability Of Bull Trout And Westslope Cutthroat Trout Populations:

The Forest Plan defined a fish population viability concern as a decline in aquatic habitat quality and/or fish population for more than one year (Item 21), and a 10 percent difference from projected cutthroat trout yield (Item 41). Research and monitoring of fish populations over the past 15 years on the Forest has shown the Forest Plan viability stated above is too narrow given the natural variation that occurs in fish populations. We have learned that the only way to define the upper and lower bounds of the natural variation in fish populations is through numerous years of population monitoring.
The key findings from the fish population monitoring that has occurred across the Forest since 1989 are:

- Westslope cutthroat trout populations appear to be stable and relatively strong across the Forest. Populations do fluctuate naturally over time, but the monitoring data indicate a stable trend Forest-wide.
- Westslope cutthroat trout are easily the most abundant fish species on the Forest. They are present in nearly every fish-bearing stream, and likely occupy greater than 90% of their historic habitat across the Forest.
- An estimated 63% of the westslope cutthroat populations that have been tested on the Forest are genetically unaltered. In general, hybridized populations are more prevalent in the westside canyon streams and the larger rivers (East Fork, West Fork, and main stem Bitterroot), while genetically unaltered populations tend to occur on the eastside of the valley and in the headwaters on the south half of the Forest.
- Westslope cutthroat trout occur at reduced numbers in the Bitterroot River and the private reaches of tributaries on the valley floor. However, the population of migratory westslope cutthroat trout has been increasing in the Bitterroot River and the East and West Forks since the mid 1990's. The implementation of catch-and-release regulations has been a positive factor fueling the increase. The genetic make-up of the migratory westslope cutthroat trout populations in the rivers consists of a mix of some pure fish and some hybridized fish.
- The overall viability of westslope cutthroat trout in the Bitterroot River basin is considered to be "depressed", primarily because of the habitat fragmentation that occurs on private land between the Bitterroot River and its tributaries, and the reduced numbers of migratory adult fish in the river. A key problem is the lack of year-round connectivity between the Bitterroot River and its spawning and rearing tributaries on the east and west

[5] Relative Productivity gives some information the potential for the lake produce plants and animals, and it was estimated by using two factors: conductivity (measured as microSiemens/cm (μS)) and clarity of the waters (measured by secchi depth).
[6] Separation is made between Gleason and the other lakes because of it being located in the Sapphire Range rather than the Bitterroot Range. The two ranges have geologic differences.
[7] nd = no data

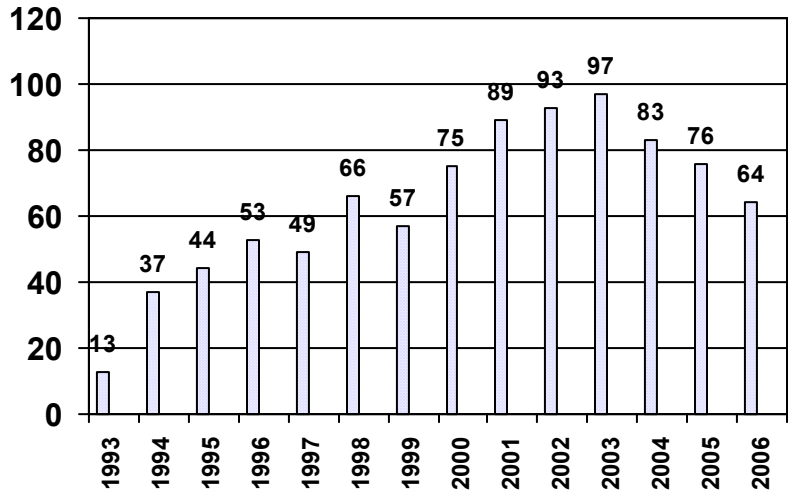
sides of the valley. Considerable efforts and funds have been expended in recent years to screen irrigation ditches and eliminate fish passage barriers in Skalkaho Creek, a key spawning and rearing tributary near Hamilton.

- Since 1989, the resident bull trout populations across the Forest have shown stable or inconclusive trends. The populations typically show some natural fluctuations from year to year. In 2006, the number of young bull trout in the core area bull trout populations (Burnt Fork, Daly, Meadow, Moose, Skalkaho, and Warm Springs Creeks) was lower than usual. We do not know if this was just a natural fluctuation in the populations, or the beginning stages of a longer-term decline. Water temperatures have been increasing in Forest streams since 1993 due to climatic warming, and that could be a factor. We plan on re-sampling the core area streams again in 2007 to shed more light on this issue.
- There is circumstantial evidence that the number of large migratory bull trout in the lower East Fork (Sula to Conner) has declined since 2000. A more intensive study is needed to determine if this is the case. It is unclear whether a similar decline in large bull trout has occurred in the lower West Fork
- One stream where the monitoring data indicate that bull trout have declined or possibly been extirpated is upper Rye Creek. In contrast, bull trout population numbers have remained strong in the Skalkaho Creek drainage, despite research that shows there is little to no interchange of bull trout with the Bitterroot River.
- Connectivity between the rivers and spawning and rearing tributaries is a major problem for bull trout. The connectivity of westslope cutthroat trout populations in the Bitterroot River basin is better than that of bull trout populations, particularly in the main stem of the Bitterroot River and its tributaries. Westslope cutthroat trout have the distinct advantage of entering the spawning tributaries when flows are high, and connectivity is at its annual best. Bull trout, by contrast, enter the spawning tributaries at low flows when water is being removed from the tributaries for summer irrigation. In the East and West Forks, connectivity for both species is considerably better than it is in the main stem of the Bitterroot River.

Water Temperature Monitoring:

The Forest Plan does not contain water temperature monitoring requirements. Nevertheless, since 1993 the Bitterroot National Forest and the MFWP have cooperatively developed an extensive system of water temperature monitoring sites in streams across the Forest. The number of monitoring sites has grown considerably since monitoring began in 1993, as displayed in Figure 21.

Figure 21 - Number of Water Temperature Monitoring Sites on the Bitterroot National Forest



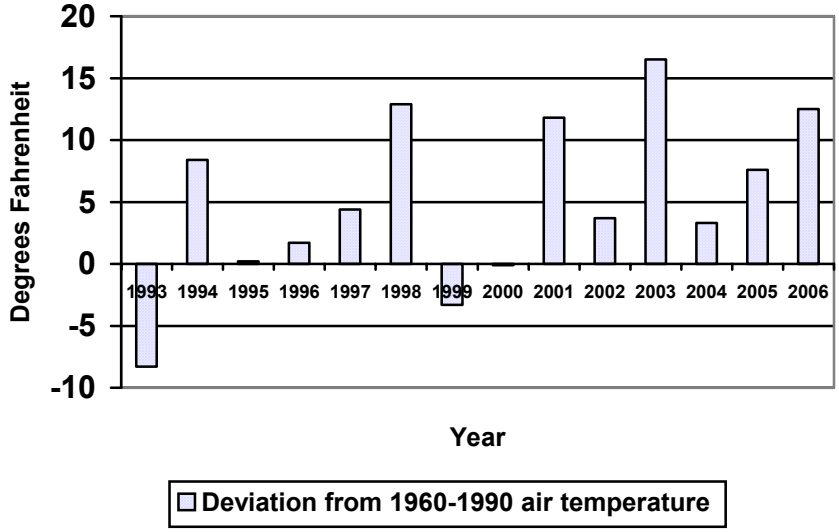
On the Forest, we have established an annual temperature monitoring period that starts on July 18th, and ends on October 1st. This 76-day monitoring period usually captures the warmest part of the year, and is the part of the year where water temperatures probably have their greatest influence on native salmonids.

The unit of measure used to compare sites is the degree-day. Degree-days are calculated by summing the mean daily temperature that occurs at each site for every day between July 18th and October 1st (a 76-day monitoring period). For example, summing the 76 mean daily temperatures that occur at a given site between July 18th and October 1st gives you the total number of degree-days that were accumulated at that site. The higher the number of degree-days, the warmer the site. Degree-days are a useful variable because they standardize temperature data and allow comparisons between different years and different size streams.

There is a correlation between summer air temperatures and water temperatures, and this affects the number of degree-days. For example, during hot summers like 2003, most of the monitoring sites on the Forest set their all time highs for degree-days. During cold summers like 1993, most of the sites set their all time lows. Because the weather causes a lot of the variation in the degree-days at a given site from year to year, the Forest has established a network of index monitoring sites to reduce some of that variability. Index sites are unburned reference sites that are monitored every year. They function as control sites. By comparing the degree-day trends in the burned and/or managed sites against the degree-day trends in the unburned and/or unmanaged index sites, we can reduce the variability caused by the weather and make some inferences about the influence of the fires and/or management activities on stream temperatures.

Figure 22 displays how the mean air temperatures for July, August, and September have varied from the 30-year mean at the Stevensville Ranger Station weather station since 1993. The 30-year period used for reference is 1960-1990. The mean air temperature for the 1960-1990 period is represented by the "0" horizontal line in the graph. Each bar represents the sum of the deviations from the 30-year mean air temperature for the months of July, August, and September. The bars near the "0" line are the years where the July-September air temperatures were very close to the 30 year average. The bars above the "0" line are the years where the July-September air temperatures were warmer than average. The bars below the "0" line are the years where the July-September air temperatures were colder than average. Summer 2006 was much warmer than the 30-year average, and warmer than most summers since 1993. The trend over the past 15 years indicates rising summer air temperatures on the Bitterroot National Forest.

Figure 22 - Deviations from the mean 30-year July-September air temperatures at the Stevensville Ranger Station Weather Station, 1993-2006



Between 2001 and 2005, our water temperature monitoring program focused on the streams burned by the 2000 fires. In 2006, we still monitored a few of the more severely burned streams, but our emphasis shifted more to project level, TMDL, and index site monitoring. Table 39 lists the sites that were monitored in 2006, the reason for monitoring the site, the elevation of the site, and the degree days that were recorded at the site. The sites are listed from the lowest elevation to the highest elevation.

Table 39 – 2006 Water Temperature Monitoring Sites

Stream and Milepost	District	Monitoring Objective	Elevation (feet)	Degree Days
Selway River 66.7	West Fork	Snorkel survey	2770	1115
Running Creek 0.1	West Fork	Snorkel survey	2790	1023
North Star Creek 0.1	West Fork	Snorkel survey	2812	839
Gardiner Creek 0.1	West Fork	Snorkel survey	2894	876
Bad Luck Creek 0.1	West Fork	Snorkel survey	3050	916
Selway River 73.6	West Fork	Index site	3065	1039
Whitecap Creek 0.1	West Fork	Index site	3070	1048
Indian Creek 0.1	West Fork	Index site	3240	883
Gird Creek 1.0	Private	Fill data gap	3460	1066
Little Clearwater River 0.1	West Fork	Index site	3680	839
Selway River 81.8	West Fork	Index site	4090	866
Deep Creek 0.1	West Fork	Index site	4096	900
East Piquett Creek 0.3	West Fork	Lower West Fork project	4118	793
Piquett Creek 1.3	West Fork	Lower West Fork project	4168	757
Pierce Creek 0.4	West Fork	Lower West Fork project	4200	841
Baker Creek 1.1	West Fork	Lower West Fork project	4265	782
Rye Creek 6.6	Darby	Fires 2000 site	4315	930
Lavene Creek 0.1	West Fork	Lower West Fork project	4345	814
Britts Creek 0.1	West Fork	Lower West Fork project	4357	721
Piquett trib 4.2, 0.1	West Fork	Lower West Fork project	4357	708
Boulder Creek 0.1	West Fork	Lower West Fork project	4400	884
Ward Creek 0.1	West Fork	Lower West Fork project	4412	780
Castle Creek 0.1	West Fork	Lower West Fork project	4425	646
Piquett Creek 4.7	West Fork	Lower West Fork project	4425	665
Skalkaho Creek 13.2	Darby	Fill data gap	4434	695
Cameron Creek 0.1	Sula	Fill data gap	4447	915
Buck Creek 0.5	West Fork	Lower West Fork project	4465	807
Laird Creek 1.5	Sula	Fires 2000 site	4498	752
North Rye Creek 1.9	Darby	Fires 2000 site	4520	976
Sleeping Child Creek 10.2	Darby	Index site	4530	887
Beavertail Creek 0.1	West Fork	Fill data gap	4549	776
Rombo Creek 0.1	West Fork	Fill data gap	4550	637
Cameron Creek 6.1	Sula	Fill data gap	4575	917
East Fork Bitterroot River 17.8	Sula	Headwaters TMDL site	4580	959
West Fork Bitterroot River 22.2	West Fork	Fill data gap	4600	928
Warm Springs Creek 3.5	Sula	Index site	4680	754
Chicken Creek 1.0	West Fork	Litchford/Hawkes ditch project	4682	857
Mink Creek 0.1	Sula	Middle East Fork project	4736	743
Christisen Creek 0.7	West Fork	Lower West Fork project	4793	737
Daly Creek 1.3	Darby	Weasel project	4800	639
Springer Creek 0.1	Sula	Middle East Fork project	4810	692
Guide Creek 0.1	Sula	Middle East Fork project	4824	697
East Piquett trib 2.0, 0.1	West Fork	Lower West Fork project	4935	776
Overwhich Creek 2.0	West Fork	Headwaters TMDL site	4988	836
Meadow Creek 0.3	Sula	Fill data gap	4990	709
Hughes Creek 1.4	West Fork	Headwaters TMDL site	5023	864
Lloyd Creek 1.0	West Fork	Lower West Fork project	5033	704
West Fork Camp Creek 0.1	Sula	Lost Trail Expansion project	5060	649

East Fork Camp Creek 0.1	Sula	Lost Trail Expansion project	5062	722
Deer Creek 0.1	West Fork	Fill data gap	5095	774
Little Blue Joint Creek 1.5	West Fork	Fires 2000 site	5100	852
Bertie Lord trib 0.4, 0.1	Sula	Middle East Fork project	5152	689
Bertie Lord Creek 0.2	Sula	Middle East Fork project	5219	719
Tepee Creek 0.9	Sula	Middle East Fork project	5240	766
Daly Creek 4.0	Darby	Weasel project	5280	575
Rye Creek 12.4	Darby	Index site	5325	815
Piquett trib 6.2, 0.1	West Fork	Lower West Fork project	5420	555
Jennings Camp Creek 1.1	Sula	Middle East Fork project	5431	679
Overwhich Creek 7.0	West Fork	Headwaters TMDL site	5484	765
Hughes Creek 9.0	West Fork	Headwaters TMDL site	5635	721
Tolan Creek 5.1	Sula	Index site	5680	618
Notch Creek 0.1	West Fork	Lower West Fork project	5690	506
West Fork Bitterroot River 40.0	West Fork	Index site	5880	631
Meadow Creek 5.6	Sula	Index site	5925	621

Along with the warming climate, our data indicates that water temperatures have been steadily rising across the Forest for the past 15 years. Figure 23 and Figure 204 display the trend in degree days and 7-day mean-maximum temperatures in the key bull trout streams across the Forest between 1993 and 2006. As would be expected, the raw data displays quite a bit of variability from year to year, depending on how warm the summers were. However, the trend lines for both degree days and 7-day mean-maximum temperatures clearly indicate that stream temperatures have been increasing in the key bull trout streams.

Figure 23 – Trend in degree days in key bull trout streams across the Bitterroot National Forest, 1993 to 2006

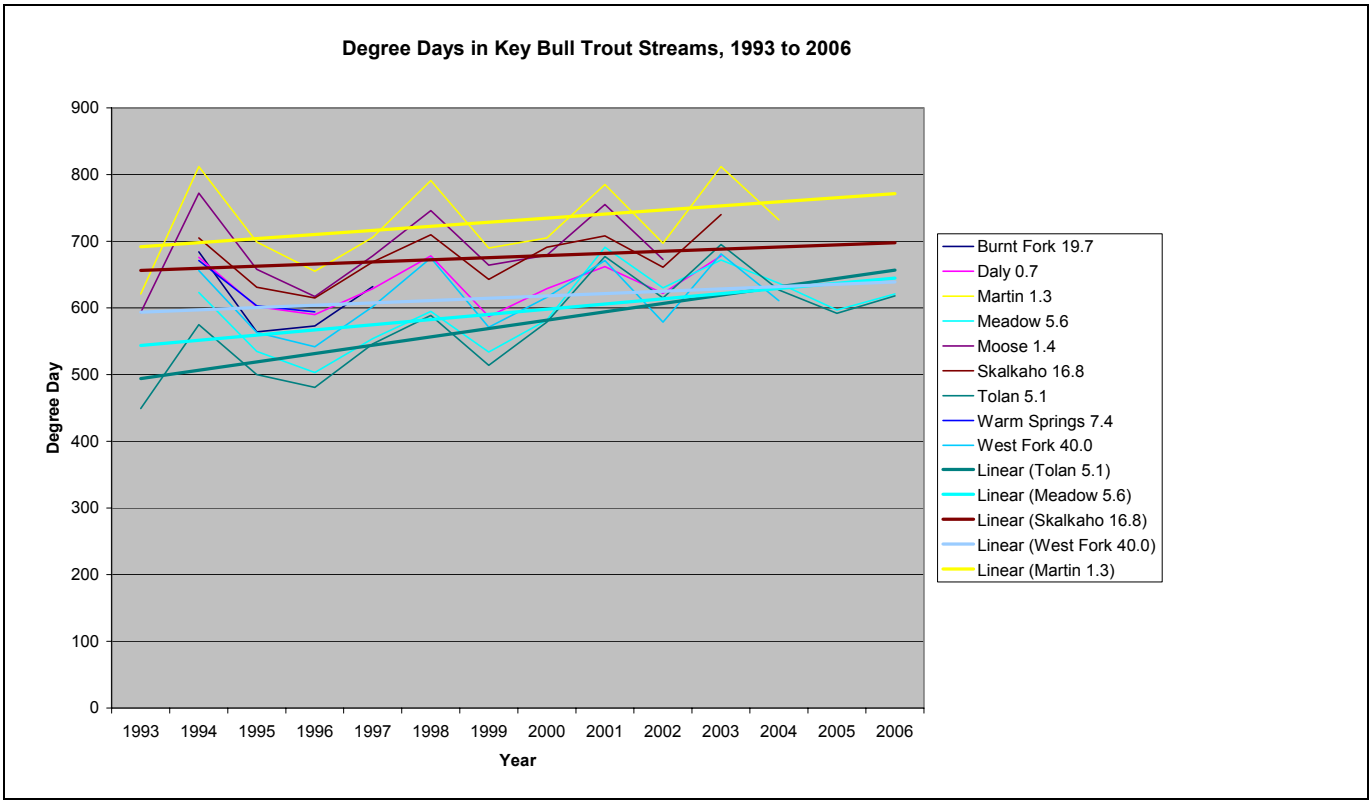
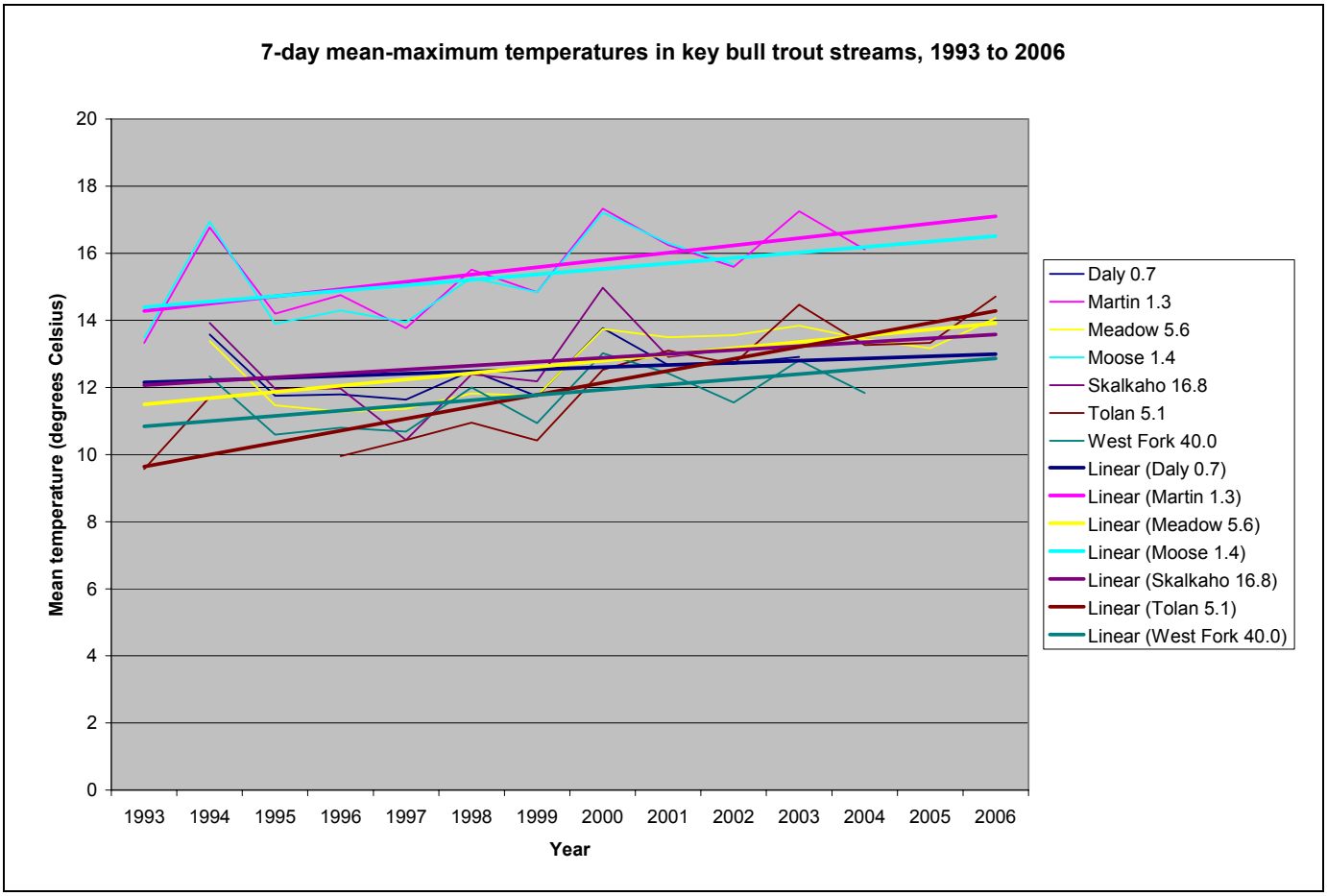


Figure 24 – Trend in 7-day mean-maximum temperatures in key bull trout streams across the Bitterroot National Forest, 1993 to 2006



In 2006, Shad Mahlum, a senior undergraduate fisheries student at the University of Montana, analyzed the Forest's water temperature monitoring data to discern trends in post-fire water temperatures in the streams burned by the 2000 fires. Shad was assisted by Dr. Lisa Eby, head professor of the University of Montana fisheries program, and Dr. Mike Young, aquatic researcher at the Rocky Mountain Research Station in Missoula. Shad summarized his findings in the following abstract. *Mahlum, S.K., L. Eby, M.K. Young, C.G. Clancy, and M.J. Jakober. Effects of Fire on Stream Temperatures in the Bitterroot River Basin, Montana. Presentation submitted to the Wild Trout Symposium to be held in October, 2007.*

Stream temperature is an important abiotic factor affecting the distribution of native trout. Much of our understanding of the effects of wildfires on stream temperatures is derived from individual case studies. In 2000, major wildfires burned in the Bitterrroot River Basin, Montana. We used a Before-After-Control-Impact design to address immediate effects of wildfires on stream temperatures and how summertime stream temperatures recovered from these wildfires. We examined temperature data from 33 streams in three treatment groups: reference streams with 0 to <6% watershed burn, streams with temperature loggers located downstream of the burn, and streams with temperature loggers located within the burned area. To account for potential seasonal differences in recovery, we analyzed each month separately. There were no immediate effects on maximum water temperature in sites located within or downstream of the burn area. For sites located within a burn area, maximum temperatures increased the summer after the fire (2001). Five years post-fire (2005), there is not complete recovery to pre-fire conditions, but a trend towards recovery was seen for August and September, but not July. Stream sites downstream of the burn also had increased temperatures but recovery was seen within two years (2002) of the wildfires for all months.

These are the key findings of the Forest's water temperature monitoring:

- Stream temperatures have been increasing in key bull trout streams across the Forest over the past 15 years. Seven-day mean-maximum temperatures increased by about 1.5º C between 1993 and 2006. Degree days increased by about 80-100 between 1993 and 2006.
- The number of young bull trout in the core area bull trout populations (Burnt Fork, Daly, Meadow, Moose, Skalkaho, and Warm Springs Creeks) was lower than usual in 2006. Increasing water temperatures could be a cause, but we cannot pinpoint that as the reason at this time. Additional sampling in future years is needed to determine trends. Optimum bull trout growth occurs at about 13º C. Bull trout tend to be absent or rare in streams which have maximum temperatures > 15º C for extended periods of time.
- If water temperatures continue to increase in future years, bull trout distribution is expected to shrink across the Forest, with the populations at the lowest elevations disappearing first.
- Shad Mahlum's research indicates that some recovery of water temperatures has occurred in the streams that were burned by the 2000 fires. Temperatures in the monitoring sites that are located in unburned sections of stream downstream of the burned areas recovered to pre-fire conditions within two years post-fire (2002). Temperatures in the burned monitoring sites still had not recovered to pre-fire conditions five years post-fire (2005).

Bull Trout Redd Surveys:

Starting in 1994, Forest and MFWP fisheries biologists have cooperatively conducted annual bull trout redd surveys in three streams: (1) Meadow Creek on the Sula District; (2) Deer Creek on the West Fork District; and (3) Daly Creek on the Darby District. With the exception of a few missed years, redd counts have been conducted in these reaches every year since 1994. In 2000, in response to a bull trout radio telemetry project, a fourth bull trout redd survey reach was added in the upper East Fork of the Bitterroot River in the Anaconda-Pintlar Wilderness Area. In 2005, a fifth bull trout redd survey reach was added in Chicken Creek on the West Fork Ranger District in response to a U.S. Fish and Wildlife consultation.

Meadow Creek Redd Survey (Sula Ranger District). The "Meadow reach" is a two-mile long section of Meadow Creek that the Forest has monitored each autumn for bull trout redds since 1994. On October 6, 2006, MFWP biologists counted 18 bull trout redds in the Meadow reach. The total number of redds counted (18) was higher than the 2006 count (11), and on the upper end of the range of counts observed during 1994-2005 (range = 1 to 21 redds). Most of the redds were located inside of the riparian exclosure fences.

Despite low redd counts, mark-recapture population estimates indicate that bull trout are common in Meadow Creek. Over the years, there has not been a correlation between the number of bull trout redds and the number of bull trout captured in the mark-recapture estimates. Redd counts have fluctuated at low numbers, while the number of bull trout captured at long-term population monitoring sites indicates that numbers are stable and the species is common. One reason for the lack of correlation may be that most of the bull trout in Meadow Creek are resident fish, and resident bull trout redds cannot be reliably counted because they are too small and cryptic. Other possible reasons are that the bull trout are not spawning in the types of habitat or sections of stream that we think they should be, or we are unable to identify their redds. In summary, our data suggest that at least for now, redd counts are not a reliable way to detect resident bull trout trends in Meadow Creek. Despite doubts about reliability, Forest fisheries biologists will continue to survey redds in Meadow Creek in 2007. There are two reasons for this: (1) it complies with direction in the Headwaters TMDL, and (2) if migratory bull trout ever do make a strong comeback in the East Fork drainage, Meadow Creek is likely to be a key spawning tributary, and we should be able to document increased spawning use because redds produced by migratory bull trout are easier to count.

Figure 25 – Migratory Bull Trout Redd in Deer Creek

Upper East Fork Bitterroot River Redd Survey (Sula Ranger District). This reach was

established by MFWP biologists in 2000 in response to several radio-tagged bull trout moving in this reach to spawn from the lower East Fork. In October 2000, MFWP biologists surveyed the upper East Fork between Moss Creek and Clifford Creek. Five migratory bull trout redds were counted, were located between Moss and Cub Creeks. In October 2001, the reach was shortened to include just the section between Moss and Cub Creeks. Two migratory bull trout redds were counted in 2001. The redd survey in 2002 was problematic in that ice covered portions of the reach. In 2002 and 2003, one migratory bull trout redd was counted each year. In 2004, no definite redds were found. In 2005 and 2006, one migratory bull trout redd was counted. MFWP biologists plan on continuing to survey redds in the Upper East Fork in 2007 for the same reasons described above for Meadow Creek.

Deer Creek Redd Survey (West Fork Ranger District). The Forest has conducted a bull trout redd survey in the lower 1.3 miles of Deer Creek since 1994. On October 13, 2006, MFWP biologists counted 18 possible bull trout redds in Deer Creek. The majority of redds were assumed to have been made by bull trout; however, brook trout are also present in the reach, and we are not able to accurately distinguish between brook trout redds and redds made by resident bull trout. The number of redds counted in 2006 was the highest since annual surveys began in 1994. Good spawning gravel is plentiful throughout this reach, and beaver activity in the reach has increased significantly in recent years. We currently do not have fish population data to correlate with the redd surveys in Deer Creek. Forest fisheries biologists plan on continuing to survey redds in Deer Creek in 2007 for the same reasons described above for Meadow Creek.

Chicken Creek Redd Survey (West Fork Ranger District). This reach was established by Forest fisheries biologists in 2005 in response to a consultation with the U.S. Fish and Wildlife Service. The reach was surveyed for the first time in October, 2005, and 13 possible bull trout redds were counted. On October 13, 2006, MFWP biologists counted 15 possible bull trout redds in Chicken Creek. The majority of redds were assumed to have been made by bull trout. However, brook trout are more common than bull trout in the reach, and we are not able to accurately distinguish between brook trout redds and redds made by resident bull trout. The number of redds counted in 2006 (15) was similar to the 2005 count (13). In both years, about 75% of the redds were located downstream of the Hawkes ditch diversion. This supports our belief that the Hawkes diversion functions as a barrier to upstream migrating fall spawning fish. The Forest plans on reconstructing the Hawkes diversion in summer, 2007 to eliminate the fish barrier. Forest fisheries biologists plan on continuing to survey redds in Chicken Creek in 2007.

Daly Creek Redd Survey (Darby Ranger District). The Forest has conducted a bull trout redd survey in a 1.2 mile long reach of Daly Creek since 1994. The 1.2 mile-long reach is located near the Road 711 bridge crossing. Thirty-nine redds were observed in 2005 and 2006. All of the redds appeared to be made by resident bull trout. The 2005 and 2006 redd count was up slightly from 2003-2004, but considering the variability over the sampling period, 39 could be said to be about average. In recent history, the drainage above the surveyed section has been relatively unaltered by fire, roads, or other obvious human activities. There were no readily observable changes in the habitat quality of the surveyed section. Forest fisheries biologists plan on continuing to survey redds in Daly Creek in 2007.

Figure 26 - Annual Bull Trout Redd Counts, 1994 To 2006

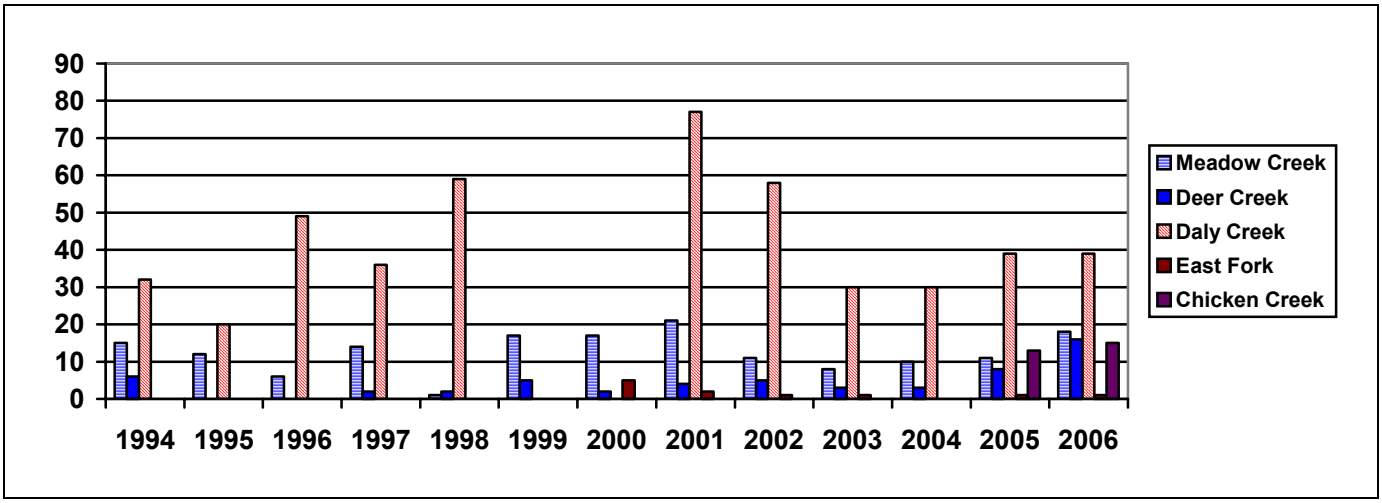


Table 40 – Annual Bull Trout Redd Counts, 1994 to 2006

	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Meadow Creek (D3)	15	12	6	14	1	17	17	21	11	8	10	11	18
East Fork (D3)	ND	ND	ND	ND	ND	ND	5	2	1	1	0	1	1
Deer Creek (D4)	6	0	0	2	2	5	2	4	5	3	3	8	16
Chicken Creek (D4)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	13	15
Daly Creek (D2)	32	20	49	36	59	ND	ND	77	58	30	30	39	39

ND = No data, not surveyed

These are the key findings of the Forest's monitoring of bull trout redds:

- The previous decade of redd count data indicates that the counts have not been reliable indices of bull trout population trends. There could be several reasons for this: (1) we are looking in the wrong places (i.e. what we think is good spawning habitat is not what most of the bull trout are using for spawning); (2) we are looking in the right places but cannot reliably identify the redds that are present; or (3) there just are not many migratory bull trout redds, and what redds are present are very widely scattered and not concentrated in any one reach.
- Redd counts are best used as an index of population trend after the key, concentrated spawning areas have been identified. Without knowing where the key spawning areas are, redd counts have very limited utility. That is the situation on most of the Forest now.
- How can the redd count methodology be improved? Biologists need to find out if concentrated spawning areas are being used by migratory bull trout, and if they are, pinpoint their locations. The best way to do that is by following the movements of migratory bull trout spawners by radio telemetry. MFWP biologists tracked the movements of ten radio-tagged migratory bull trout spawners in the East Fork drainage in 2000. However, the 2000 fires interfered with the project right at the critical time when the radio-tagged bull trout were entering their spawning tributaries, so we were unable to discover the most important information concerning key spawning areas. In 2005 and 2006, MFWP biologists attempted to repeat the bull trout radio telemetry project in the East Fork. However, the project failed in both years because biologists were unable to find enough bull trout in the East Fork that were large enough to be implanted with transmitters (i.e. only found two large bull trout in 2005, and one large bull trout in 2006). The electrofishing effort that was conducted in 2005 and 2006 was equal to or greater than what was expended to capture the ten bull trout in

2000. This anecdotal evidence suggests that the number of large bull trout in the East Fork between Sula and Conner has declined since 2000.

- Future radio telemetry projects are needed to locate the key spawning areas for migratory bull trout in the upper West Fork drainage above Painted Rocks Dam. Trapping data collected by researchers working in Slate Creek in 2003 indicate that migratory bull trout in Painted Rocks Reservoir may be more common than was originally believed, but little is known about where those bull trout spawn.

Fish Movement Monitoring:

There were no fisheries radio telemetry projects conducted on the Forest in 2006.

Culvert Inventories And Replacements:

The Forest Plan as amended by INFISH and PACFISH directs the Forest to "provide and maintain fish passage at all road crossings on existing and potential fish-bearing streams" (INFISH/PACFISH standard RF-5). In order to meet this standard, Forest fisheries biologists and engineers have focused much of their attention in recent years on the identification and elimination of fish passage barriers at culverts.

During the 2003 field season, the majority (> 80%) of the fish-bearing culverts on the Bitterroot National Forest were surveyed with the Fish Crossing protocol to assess whether or not they function as a barrier to native trout passage. The field data collected in 2003 was entered into the FishXing model to predict whether or not a culvert was likely to be a barrier to juvenile and adult trout. The FishXing model predictions were checked and validated by Forest fisheries biologists. This validation step is necessary because the FishXing model is conservative (i.e. during some times of the year, at least a few fish are able to swim through some of the culverts that the model predicts are barriers). Most of the fish-bearing culverts that were not surveyed in 2003 were visited by Forest biologists in 2004-06. Only a few still need to be visited.

Table 41 summarizes our most current knowledge of fish culvert passage status on the Forest. The numbers in the table differ from past reports because they are adjusted as new information becomes available, or as barriers are eliminated through replacement or removal. The numbers in the table are close to the actual condition on the ground, and future adjustments will be minor.

Table 41 – Fish Passage Barriers at Culverts

Location	# of fish-bearing culverts	# known or suspected to be passage barriers	# unknown – not seen or surveyed	# likely to be offering suitable fish passage conditions
Sula and W. Fork R.D.	118	87 (74%)	1 (1%)	29 (25%)
Stevensville and Darby R.D.	46	34 (74%)	2 (4%)	10 (22%)
Montana DNRC land	6	1 (17%)	0	5 (83%)

Since the 2000 fires, the elimination of fish passage barriers at culverts has been a focus of the Forest fisheries and engineering programs. Since then, 49 culverts have been replaced or removed to improve fish passage on the Bitterroot National Forest and adjacent state and private lands. The Bitterroot National Forest is responsible for the bulk (41 of the 49) of these culvert replacements and removals. The rest have occurred on Sula State Forest lands (4 culverts), along U.S. Highway 93 (3 culverts, Sula North/South reconstruction phase), or along the West Fork Highway (1 culvert, Slate Creek).

In 2006, the Forest replaced one fish barrier culvert, and removed six fish barrier culverts (See Table 42 for locations).

Figure 27a - Non-system road crossing of Springer Creek, before removal. August, 2006

Figure 27b - Non-system road crossing of Springer Creek, after removal. September, 2006

Figure 27c - Springer Creek, after removal. September, 2006

Table 42 lists the fish passage culvert replacements and removals that have occurred since 2000, and summarizes their current fish passage status based on our most recent monitoring visits. The current fish passage status of each culvert was classified as "fully functioning", "partially functioning", or "not functioning". These categories are defined as:

- Fully functioning = native material is stable and present throughout the culvert barrel; there are no prohibitive vertical drops on the inlet or outlet; all sizes and species of fish can pass through the culvert at high and low flows
- Partially functioning = since replacement, some of the native material has been flushed from the barrel and now less than half of the barrel is either bare or contains reduced amounts of substrate material; there are no prohibitive vertical drops on the inlet or outlet; most adult fish can still pass through the culvert at high and low flows, but passage of juvenile fish is probably restricted at the higher flows due to prohibitive water velocities inside of the barrel; culverts that also provide good fish passage at high flows but their flows go subsurface at low flows were also placed in this category

- Not functioning = since replacement, all or most of the native material has been scoured from the barrel; prohibitive vertical drops may have developed on the inlet or outlet (in some cases they haven't, but the barrel is still bare); the majority of adult and juvenile fish probably cannot pass through the culvert at high or low flows

Table 42 – Status of culverts replaced or removed to eliminate fish passage barriers, 2000 to present

District[8]	Stream	Road	Year replaced or removed?	Fully functioning	Partially functioning	Not functioning
D4	Little Blue Joint Creek	5658	Replaced, 2000		X	
D4	Sheep Creek	6223	Replaced, 2001	X [9]		
D4	Washout Creek	6223	Replaced, 2001	X		
D4	Two Creek	732	Replaced, 2001			X
D4	Trout Creek	Tr #674	Removed, 2001	X		
D4	Nelson Creek	468	Replaced, 2002	X		
D4	Gemmell Creek	468	Replaced, 2002	X		
D4	Sentimental Creek	13482	Replaced, 2003	X		
D4	Sand Creek	362	Replaced, 2003 (BAR)	X		
D4	Magpie Creek	362	Replaced, 2003 (BAR)	X		
D4	Took Creek	362	Replaced, 2003 (BAR)	X		
D4	Took Creek	1303	Replaced, 2003 (BAR)	X		
D4	Gabe Creek	468	New bridge, 2004	X		
D3	Gilbert Creek	370	Replaced, 2000	X		
D3	Laird Creek	370	Replaced, 2000		X	
D3	Laird Creek	5615	Replaced, 2000	X		
D3	Reimel Creek	727	Replaced, 2000	X		
D3	Needle Creek	724	Replaced, 2001		X	
D3	Cameron Creek	311	Replaced, 2001	X		
D3	Bugle Creek	725	Replaced, 2003 (BAR)	X		
D3	Crazy Creek	370-A	Replaced, 2003 (BAR)	X		
D3	West Fork Camp Creek	729	Replaced, 2003 (BAR)	X [10]		
D3	West Fork Camp, trib 0.9	8112	Replaced, 2003 (BAR)	X		
D3	West Fork Camp, trib 1.0	8112	Replaced, 2003 (BAR)	X		
D3	Diggins Creek	727	Replaced, 2003	X		
D2	North Rye Creek, trib 2.1	321	Replaced, 2000		X	
D2	Rye Creek, trib 9.1 (lower)	311	Replaced, 2001	X		
D2	Rye Creek, trib 9.1 (upper)	311	Replaced, 2001	X		
D2	Gird Creek	1365	Replaced, 2001	X		
D2	Railroad Creek	75	Replaced, 2005 (BAR)	X		
D2	Hog Trough Creek	75	Replaced, 2005 (BAR)	X		
D2	Weasel Creek	75	Replaced, 2005 (BAR)	X		
D2	Rye Creek, trib 12.3	75	Replaced, 2005 (BAR)	X		
D2	Rye Creek, trib 12.3	5607	Replaced, 2005 (BAR)	X		
DNRC	North Cameron Creek	1397	Replaced, 2000	X		
DNRC	North Cameron Creek	73160	Replaced, 2000	X		
DNRC	Lyman Creek	DNRC	Replaced, 2000	Unknown		
DNRC	Praine Creek	DNRC	Replaced, 2001	X		
MDOT	Warm Springs Creek	Hwy 93	Replaced, 2002		X	

[8] D2 – Darby District, D3 – Sula District, D4 – West Fork District, DNRC – Montana Department of Natural Resources, MDOT – Montana Department of Transportation, FHA – Federal Highway Administration

[9] The Sheep Creek culvert was not installed in a stream simulation manner; it is undersized for the wetted channel but has been able to maintain it's substrate of boulders and cobbles throughout the length of its barrel; it is adequately passing fish at this time

[10] The Burned Area Recovery culvert replacement on the West Fork of Camp Creek (Road 729) experienced some scouring of substrate near the inlet during runoff, 2006. The sediment retention plates have held enough substrate to form 2-3 plunge pools inside the barrel, and the culvert still provides year-round passage.

District[8]	Stream	Road	Year replaced or removed?	Fully functioning	Partially functioning	Not functioning
MDOT	Andrews Creek	Hwy 93	Replaced, 2002		X [11]	
MDOT	Praine Creek	Hwy 93	Replaced, 2002		X [12]	
FHA	Slate Creek	WF Hwy	Replaced, 2003	X		
D2	North Rye Creek	321	Replaced, 2006	X		
D2	Cathouse Creek	Non-syst	Removed, 2006	X		
D2	Cathouse Creek	Non-syst	Removed, 2006	X		
D3	Lyman Creek, trib 1.8	13304	Removed, 2006	X		
D3	Lyman Creek, trib 1.8	13304	Removed, 2006	X		
D3	Springer Creek	Non-syst	Removed, 2006	X		
D3	West Fork Camp, trib 0.1	13340	Removed, 2006	X		

In addition to the culverts that have been replaced or removed since 2000, there are 33 other fish barrier culvert replacements or removals on the Forest that have NEPA analysis completed, but lack funding to implement. The Forest is continuing to pursue outside funding opportunities as they arise, but it is a slow process.

Table 43 lists the fish barrier culvert replacements or removals that have NEPA analysis completed, but have not been implemented due to lack of funding.

Table 43 – Backlog of fish barrier culverts with completed NEPA analysis

Stream	Road #	NEPA Document and Date of Decision
Two Bear Creek	County 85-D	Burned Area Recovery FEIS/ROD, 2001
North Rye Creek	Road 8111	Burned Area Recovery FEIS/ROD, 2001
Spring Gulch	Road 75	Burned Area Recovery FEIS/ROD, 2001
Rye Creek	Road 5612	Burned Area Recovery FEIS/ROD, 2001
Moose Creek	Road 726	Burned Area Recovery FEIS/ROD, 2001
Waugh Creek	Road 13334	Burned Area Recovery FEIS/ROD, 2001
Hart Creek	Road 311	Burned Area Recovery FEIS/ROD, 2001
Hart Creek	Road 73180	Burned Area Recovery FEIS/ROD, 2001
Mink Creek	Road 5753	Burned Area Recovery FEIS/ROD, 2001
East Piquett Creek	Road 731	Burned Area Recovery FEIS/ROD, 2001
Castle Creek	Road 49	Burned Area Recovery FEIS/ROD, 2001
Elk Creek	Road 13860	Burned Area Recovery FEIS/ROD, 2001
Malloy Gulch	County 104-D	Burned Area Recovery FEIS/ROD, 2001
Mill Gulch	County 104-D	Burned Area Recovery FEIS/ROD, 2001
Taylor Creek	County 104-D	Burned Area Recovery FEIS/ROD, 2001
Coal Creek	Road 5662	Burned Area Recovery FEIS/ROD, 2001
Mine Creek	Road 5688	Burned Area Recovery FEIS/ROD, 2001
Pete Creek (Idaho)	Road 468	Sentimental, Gabe, and Pete Creek Culvert Replacements EA/DN, 2003
Baker Creek, north channel	Road 5629	Frazier Interface EA/DN, 2003
Baker Creek, south channel	Road 5629	Frazier Interface EA/DN, 2003
Pierce Creek	Road 5629	Frazier Interface EA/DN, 2003
Pierce Creek	Road 13466	Frazier Interface EA/DN, 2003
Pierce Creek	Road 363	Frazier Interface EA/DN, 2003
Warm Springs Creek	Road 370	Warm Springs and Meadow Creek Culvert Replacements EA/DN, 2005
Meadow Creek	Road 5758	Warm Springs and Meadow Creek Culvert Replacements EA/DN, 2005
Meadow Creek	Road 725	Warm Springs and Meadow Creek Culvert Replacements EA/DN, 2005
Bertie Lord Creek	Road 5786	Middle East Fork FEIS/ROD, 2006

[11] The highway culvert on Andrew Creek was installed at a suitable grade for fish passage; however, other problems such as oversteepened approaches on the cutslope coming into the inlet still impede fish passage.

[12] The highway culverts on Praine Creek were installed at a suitable grade for fish passage; however, other problems such as private driveway culverts upstream of the highway culvert still impede fish passage.

Stream	Road #	NEPA Document and Date of Decision
Bertie Lord Creek, trib 3.5	Road 5786	Middle East Fork FEIS/ROD, 2006
Springer Creek	FDR 13302	Middle East Fork FEIS/ROD, 2006
Scimitar Creek (Idaho)	Non-system rd	Deep Creek Culverts DM, 2007
Scimitar Creek (Idaho)	Road 468	Deep Creek Culverts DM, 2007
Schumaker Creek (Idaho)	Road 468	Deep Creek Culverts DM, 2007
Halfway Creek (Idaho)	Road 468	Deep Creek Culverts DM, 2007

The key findings of our culvert monitoring are:

- The majority of the replacements have been successful at eliminating fish passage barriers, at least for the present time.
- Success depends on meeting five criteria: (1) the culvert is sized large enough to capture the bankfull width of the stream channel; (2) native material is present and stable throughout the culvert barrel; (3) there are no prohibitive drops on the culvert inlet and outlet; (4) the approach and exit grades of the stream channel near the culvert approximate the natural grade of the channel, with no formation of headcut barriers above and below the culvert; and (5) adequate surface flow (depth and volume) is maintained through the barrel at all discharges. When those five criteria are met, fish passage will be provided and maintained for all sizes and species of fish.
- Where culverts have been ineffective or only partially effective, the main reasons have been: (1) undersizing the diameter of the culvert (this pinches down the channel and increases water velocities inside of the culvert, which flushes the substrate out of the barrel); (2) not installing the culvert deep enough into the streambed (this contributes to the flushing of substrate and the formation of vertical drops on the inlet and/or outlet); (3) not matching the grade of the culvert with the grade of the stream channel (this can cause the formation of headcut barriers); or (4) water flowing subsurface through the barrel at base flows (this is caused by not mixing enough fines into the substrate that is placed inside the barrel).
- An important lesson we have learned is that an appropriate amount of fines must be mixed into the substrate that is placed inside the barrel. Otherwise, the water will flow subsurface through the barrel at base flows, forming an impassable seasonal barrier. This appears to be more of a problem on small streams than on large streams.
- Obtaining sufficient funding for survey, design, and contract award is a major bottleneck to replacing fish barrier culverts on the Forest.

Forest fisheries biologists intend to continue to monitor the completed culvert replacements in future years to ensure that adequate fish passage conditions are being provided and maintained (INFISH/PACFISH standard RF-5).

Project Level Monitoring Of Fisheries/Watershed Improvement Projects:

Burned Area Recovery FEIS Fisheries Projects (All Ranger Districts). The Burned Area Recovery FEIS/ROD authorized three types of fisheries improvement work. These were:

1. The replacement and/or removal of 37 fish barrier culverts.
2. The placement of large woody debris in 16 miles of small streams (Rye Creek, North Rye Creek and unnamed tributaries, Reimel Creek, Jennings Camp Creek, and Taylor Creek).
3. Riparian conifer planting (primarily spruce seedlings) in 4.5 miles of severely burned spruce bottom along Little Blue Joint Creek and Cow Creek.

Fifteen of the Burned Area Recovery culverts have been replaced so far, and two are under contract for replacement in 2006 (the Road 5662 culvert on Coal Creek will be replaced with a fish passage culvert and the Road 726 culvert on Moose Creek will be replaced with a new bridge). The culvert replacements are well behind schedule (e.g. 20 were supposed to be completed by the end of 2003) because of the loss of Forest's fire restoration funds. The Forest continues to chip away at the replacements as funding becomes available. The culverts that have been replaced are meeting the goal of stream simulation.

The large woody debris placement was completed in 2004 with the addition of woody debris to the lower half mile of Taylor Creek and the lower mile of Jennings Camp Creek. All of the woody debris placement occurred either by hand, or by chainsaw felling. Putting woody debris in the streams caused negligible sediment inputs because

machinery was not used. So far, the woody debris additions have increased hiding cover for westslope cutthroat trout and caused some localized pool scour, but have not resulted in significant accumulations of spawning gravel. The wood has not caused significant bank erosion, nor has it moved much. In Rye Creek, photo points are being monitored to track changes in habitat over time caused by the woody debris additions. Overall, these low impact woody debris additions appear to achieve a moderate amount of success with minimal implementation costs. Benefits are accruing over time as the stream adjusts and scours around the wood, forming good pool habitat and hiding cover. Drift or shifting of the wood can also be beneficial because the stream tends to place its wood where it can do the most good for fish. So far, there has been insignificant drift of the woody debris pieces.

The riparian conifer planting was completed in 2004 with the planting of ponderosa pine and larch seedlings along Cow Creek in the Blodgett Fire area. In Cow Creek and Little Blue Joint Creek, photo points are being monitored to track the growth of the seedlings over time. Follow-up stocking surveys indicate that survivorship of the seedlings has been very successful so far (> 80% survival by year three).

Each spring, the Forest sends a monitoring report to the U.S. Fish and Wildlife Service which documents our progress in meeting the terms and conditions in the Burned Area Recovery Biological Opinion. Copies of that report are available from the Supervisor's Office upon request.

Gabe Creek Bridge Installation and Snake Creek Bridge Replacement Projects (West Fork Ranger District). In August 2004, the Forest installed two new bridges over tributaries to the Selway River (Snake Creek) and Deep Creek (Gabe Creek). At Gabe Creek, the Forest removed a fish passage culvert and replaced it with a new bridge. At Snake Creek, the Forest replaced a 1948-era bridge with a new bridge. Forest fisheries biologists monitored both bridges in 2006. At both bridges, fish passage is being maintained and channel conditions are fine. Effects on the fishery were consistent with the project Biological Assessments.

Chicken Creek Meander Reconstruction Project (West Fork Ranger District). In November 2004, about two hundred feet of unstable, braided channel in lower Chicken Creek were reconstructed into a single thread meandering channel. The goal of the project was to create a stable, channel that would alleviate flooding risk to the nearby Alta Meadows Ranch. The flooding was caused by large quantities of bedload transported into the area in 2001 and 2002 from severely burned areas upstream. An attempt was made to control the flooding with sand bags in 2002, but that attempt subsequently failed. Forest fisheries biologists visited the reconstructed meander on several occasions in 2006. The meander looks natural and would be indistinguishable to the casual forest visitor. Flooding has not occurred since the meander was reconstructed. During runoff in 2006, the high flows dissipated onto the floodplain on the south side of the channel, as planned. Quite a bit of spawning gravel-sized bedload has moved into the meander from upstream. In the middle portion of the meander, the thalweg is shifting towards the south a bit and moving away from our reconstructed bank. At the upper and lower ends of the area, the transition between the reconstructed meander and the undisturbed areas is smooth. There are no headcuts or unnaturally abrupt changes in gradient. The project has been successful. The project determination for bull trout was "not likely to adversely affect (NLAA)". Our monitoring indicates that project effects were consistent with the NLAA determination in the Biological Assessment and concurrence letter.

Figure 28 – April, 2004. The meander on Chicken Creek prior to reconstruction, looking upstream.

Figure 29 – June, 2006. The reconstructed meander on Chicken Creek, looking upstream.

Pierce Creek Woody Debris Addition (West Fork Ranger District). In June 2006, Forest fisheries biologists implemented a project to improve westslope cutthroat trout habitat in Pierce Creek, a small tributary to the lower West Fork Bitterroot River. The project had two objectives: (1) increase woody hiding cover for cutthroat; and (2) reduce sediment contributions from a nearby encroached road (Road 363). A backhoe was used to load single woody debris pieces and pieces with rootballs onto a trailer. The pieces were then hauled to Pierce Creek and placed in the stream by a hand crew. A total of 88 single woody pieces (8-10 inches in diameter; 6-8 feet in length) and 51 rootballs were placed throughout one mile of Pierce Creek. At the same time, 50 straw bales were used to construct a dozen straw bale check dams below sediment contributing points along Road 363. Pierce Creek lacks large woody debris due to the long-term loss of overstory cover caused by road encroachment. This project increased the amount and quality of woody hiding cover for the westslope cutthroat trout population in Pierce Creek. The wood is creating more complex habitats and better hiding cover.

Figure 30 - June, 2006. Pierce Creek Woody Debris Project – rootballs to be placed in Pierce Creek	**Figure 31 -** June, 2006. Pierce Creek Woody Debris Project – hand crew places wood in Pierce Creek
	

Hughes Creek Reclamation Project (West Fork Ranger District) – In 1998, a mine reclamation project was implemented in the Hughes Creek valley bottom. The project was located along the portion of Hughes Creek between the confluence of Mine Creek and the Forest boundary upstream of Mine Creek. A quarter mile of Hughes Creek was reconstructed back into its historic meander pattern (the stream had been unnaturally straightened by mine tailings). The floodplain and terraces were also reconstructed and planted with grass, shrubs, and conifer seedlings. Supplemental plantings of willow and lodgepole pine were completed between 2000 and 2002. Nearly a decade has passed since the reclamation work was completed. Forest fisheries biologists monitored the Hughes Creek reclamation project during spring and autumn of 2006. In general, the stream channel restoration has been successful, while the revegetation of the floodplains and terraces has been marginal. The stream channel is stable and contains good fish habitat and populations. As far as the revegetation is concerned, willow cover along the stream banks is still not contiguous, but small willows are slowly filling in along the bare sections of bank and gradually improving shrub cover. Lodgepole pine seedlings (2-4 feet in height) are spotty on the floodplain and terrace. In some places they are numerous, in others, sparse. The most pressing revegetation concern continues to be the dominance of spotted knapweed on the floodplain. This has been a chronic problem and is undoubtably suppressing the recovery of native grasses and forbs. It may require chemical treatment in order to give the natives a chance to establish themselves.

Figure 32 - June, 2006. The Hughes Creek Reclamation Project, nine years after implementation	**Figure 33** - June, 2006. The Hughes Creek Reclamation Project, nine years after channel reconstruction
	

Sula North/South U.S. Highway 93 Reconstruction Project (Sula Ranger District). In spring 2006, Forest fisheries biologists monitored the section of the East Fork Bitterroot River that parallels the 2001-03 U.S. Highway 93 reconstruction project. The historic meander that was reconnected in 2002 is stable and contains good fish habitat. The positive changes that have occurred to fish habitat are:

- The new meander resulted in more available habitat for fish because of increased channel length, and habitat is of better quality than what previously existed. Habitat complexity in the new meander has certainly improved because of more pool habitat and better hiding cover. Building the meander required moving soil, and there is still quite a bit of sand stored in the low velocity depositional areas between the new meander and the highway bridge above Spring Gulch Campground.
- The three new highway bridges that were installed do not pinch the river channel. There is ample room for the river channel to laterally migrate under the bridges and and to pass through large wood and bedload. The new bridges are an improvement in river channel health over the old, undersized bridges.
- Fire-killed snags have increased the amount of large woody debris in the river and improved fish habitat. In future years, many more snags will fall into this section of river. As of 2006, only a small portion of the available snags have fallen.

The negative changes that have occurred to fish habitat are:

- Shade on the river has been substantially reduced due to the cumulative effect of highway widening and the 2000 fires. The East Fork Bitterroot River has a TMDL due to thermal concerns. Over the next couple of decades, climatic warming could develop into a major threat to the cold water fishery in the East Fork, particularly for bull trout and westslope cutthroat trout.
- Revegetation of the disturbed cut and fill slopes along the highway has generally been poor. Much of the area surrounding the new highway consists of rock. The dominant vegetation in many spots is weeds. Most of the pine seedlings that were planted along the ditches have died. Due to the harshness of the growing sites, it may take many years for vegetation to approach the levels that occurred prior to 2000.

PEOPLE

Emerging Issues and Changing Social Values Toward Forest Activities
Item 27

OBJECTIVE: To identify emerging issues and changing social values toward Forest activities.

DATA SOURCE: Personal contacts, letters, meetings and other public comments, social assessments, surveys.

FREQUENCY: 100 percent annually.

REPORTING PERIOD: 1987 through 2006.

VARIABILITY: Any change in the major planning issues.

EVALUATION & MONITORING RESULTS:

In January 2004, an Analysis of the Management Situation (AMS) was prepared for the Forest. This document summarized the public uses and condition of the land as well as identified what should be changed in the 1987 Forest Plan. The needed changes became the basis for our Forest Plan revision process. Findings from previous Forest Plan reviews were incorporated into the 2004 AMS.

Fire, Fuels, and People: In August 2000, President Clinton directed the Secretaries of Agriculture and the Interior to develop a response to severe wildland fires, reduce fire impacts on rural communities, and ensure sufficient firefighting capacity in the future. Congress in turn mandated implementation of the resulting National Fire Plan through its appropriation actions and written direction. The National Fire Plan addresses conditions that have evolved over many decades and cannot be reversed in a single year. It is a long-term commitment based on cooperation and communication among federal agencies, states, local governments, tribes, and interested publics. The federal wildland fire management agencies worked in close consultation with states, governors, and interested partners to prepare a 10-Year Comprehensive Strategy for implementation of the National Fire Plan. More information on the National Fire Plan can be found at the internet site http://www.fireplan.gov/

President Bush proposed the Healthy Forests Initiative in August 2002, and directed federal agencies to develop several administrative and legislative tools to restore these ecosystems to healthy, natural conditions and assist in executing core components of the National Fire Plan. These tools will also move forward the Implementation Plan for the 10-year Comprehensive Strategy.

On December 3, 2003, President Bush signed the Healthy Forests Restoration Act of 2003. The Healthy Forests Restoration Act of 2003 (P.L. 108-148) contains a variety of provisions to expedite hazardous fuel reduction and forest restoration projects on specific types of Federal land that are at risk of wildland fire or insect and disease epidemics.

On a more local and site-specific basis, the Bitterroot fires and their effects on the communities continued to dominate local public discussions and interest in management of the Bitterroot National Forest. Many of these effects and community/National Forest issues have been documented in *Bitterroot Fires 2000, An Overview,* in the technical report *Bitterroot Fires 2000*, as well as in the Bitterroot National Forest Burned Area Recovery FEIS and ROD (2001).

Research Note

Researchers from the University of Montana and Aldo Leopold Wilderness Research Institute conducted a social survey in the spring of 2004 to measure local public trust in the U.S. Forest Service and the Bitterroot National Forest. During a landscape-scale fuel reduction and forest restoration project, they will continue to monitor trust levels.

The issue of reducing fuels, particularly within the wildland-urban interface has been an overriding public focus since the 2000 fires. The Bitter Root Resource Conservation and Development Area, Inc. facilitated the development of a Community-Based Wildland Fire Risk Mitigation Plan, or "Community Fire Plan" for Ravalli County (http://www.bitterrootfireplan.org/). Diverse groups of Valley residents met repeatedly during the winter of 2002-2003 to prioritize potential actions to address the most pressing issues that affect the Valley's ability to reduce the risks associated with wildland fires. The strategy is a cooperative effort of volunteer fire chiefs, county officials, conservationists, community-based non-profit organizations, realtors,

tourism and timber industry leaders, federal and state land managers, business people, and interested residents. The resulting Community Fire Plan reflects consensus among those who participated in its development and among those who, by signing, support the approaches outlined within. The protection of private homes and property in the interface will continue to be an important social and ecological consideration in Plan revision.

Fire fighter fatalities such as those that occurred on the South Canyon Fire (1994) Thirty Mile Fire (2001) and the Esperanza Fire (2006) as well as a Bitterroot National Forest fire fighter fatality in 2001 have stimulated an increased emphasis on fire fighter safety, accountability, and liability in recent years.

The increasing costs of fighting wildfires reached a critical point in 2006 when a record $1.5 billion was spent on fire suppression nationally. Fire suppression costs are consuming an increasing percentage of the agency's budget making it more difficult to finance other land management programs. This issue is receiving attention at both the state and national levels and will likely result in changes in how fires are managed.

Wilderness Dams: There are 16 privately owned dams within the Selway-Bitterroot Wilderness (SBW). All of the dams were built prior to wilderness designation, and six were built prior to reservation of the national forest. While many of the issues surrounding management of these easements and special use authorizations are not new, several factors have increased the focus and controversy in recent years.

In managing the Selway-Bitterroot Wilderness dams, Forest Service line officers have dual, and sometimes competing, responsibilities. They are required to protect the wilderness character while also ensuring, from a regulatory standpoint, that these dams are maintained in a safe condition. Dam owners, on the other hand, have certain rights and responsibilities for access, operation and maintenance of their facilities. Limits of line officer discretion and the reasonableness of conditions placed on access, operations, and reconstruction are constantly debated both internally and externally. As a result, consistent, predictable, and timely decisions are difficult to achieve.

Strategic Forest Plans: The Bitterroot Forest began revising its land and resource management plan in 2003. In 2005, a new planning rule was published which provided direction for a more streamlined, strategic land management plan. The new planning rule instituted an important paradigm shift in the way plans are developed. The Forest began using the new rule to guide its revision of the Land Management Plan. In May 2006 a Proposed Land Management Plan for the Bitterroot Forest was distributed for public comment.

Law Enforcement Efforts on the Bitterroot National Forest

OBJECTIVE: To monitor law enforcement problems and trends.

DATA SOURCE: Law enforcement management and records system (LEIMARS).

FREQUENCY: Annually.

REPORTING PERIOD: 2006

EVALUATION AND MONITORING RESULTS:

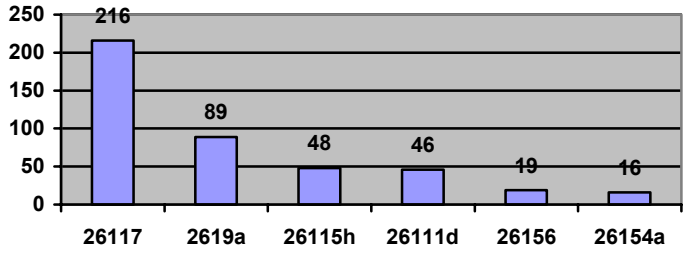
There were 562 recorded law enforcement incidents on the Bitterroot NF in 2006. Law Enforcement Officers wrote 167 warning notices, 368 incident reports and 27 violation notices. Many of the incidents occurred with no identifiable witnesses or too little information for a complete investigation. The chart below lists the most common incidents reported in 2006.

Failure to pay a recreation fee is the most common incident with 126 warning notices and 88 incident reports written and 7 violation notices.

Damage to resources by vehicle use off roads and dumping on the forest continue to be major law enforcement problems. Use of vehicles off road has created new trails and caused erosion in some areas, which the Forest addresses as soon as possible. For additional information, see Items 17, 19, and 28.

Garbage dumps on the forest make some areas unsightly and are expensive to clean up. Additionally, they have the potential to cause soil and water pollution.

Figure 34 - 2006 Most Common Incidents on the Bitterroot Forest



26117 – Failing to pay any fee.

2619a – Damaging any natural feature or other property of the United States.

26115h – Use of a vehicle off-road in a manner which damages or unreasonably disturbs the land, wildlife, or vegetative resources.

26111d – Failing to dispose of all garbage.

26156 – When prohibited by an order, possessing or using a vehicle off National Forest System roads.

26154a- Using any type of vehicle prohibited by an order.

Condition of Developed Recreation Sites
Item 2

OBJECTIVE: Evaluate the need for increasing or decreasing developed facilities (Forest Plan, p. II-4). Assure compliance with Forest Plan direction in the maintenance of facilities (Forest Plan, p. III-69).

DATA SOURCE: Meaningful Measures standards.

FREQUENCY: Annually.

REPORTING PERIOD: 2006

VARIABILITY: Failure to eliminate, replace, or repair 50 percent of MC 2 (facility condition is substandard) and MC 5 (facility condition needs betterment); and 25 percent of MC 3 (facility condition needs heavy maintenance) and MC 4 (facility condition needs replacement).

EVALUATION:

The recreation facilities analysis conducted in FY2006 (described below) has addressed the objectives for this monitoring item. As a result of this analysis managers concluded that the Forest should increase the number of cabin rentals by three within the next five years. Buildings to be added to the rental system are the Lost Horse Cabin, Magruder Office, and Boulder Lookout. We also determined that we should not close any existing sites, but should reduce facilities at some, improve services at others, and make operational changes in order to maintain facilities to national standards.

Maintenance needs have gone unmet for many years at some sites, leaving an inventory of deferred maintenance estimated at over one million dollars. We are outside the monitoring variability on the maintenance issue, and the recreation facilities analysis constitutes our evaluation of that situation.

MONITORING RESULTS:

Recreation Facilities Analysis

In FY2006 the Forest completed a strategic evaluation of our developed recreation facilities. This process involved updating information regarding condition of facilities, operating costs, and costs associated with bringing many deficient sites up to national standards (deferred maintenance). Based on this updated information, the estimated deferred maintenance costs for the Bitterroot N.F. are over one million dollars. We then described the unique recreation opportunities that the Bitterroot N.F. offers and used a variety of survey and use information to understand how the public uses the Forest and what they value. The Proposed Program of Work, a 5-year plan to bring developed recreation sites up to national standards within expected budgets, is the outcome of that process. This document, along with other information about the analysis, is available for public comment and review on the Forest's website at http://www.fs.fed.us/r1/bitterroot/recreation/rs_fmp/rsfmp.shtml. The Proposed Program of Work describes the vision for the Bitterroot N.F. developed recreation program, with specific actions proposed for developed recreation sites.

The recreation facilities analysis basically fulfilled the objective of this monitoring item to "evaluate the need for increasing or decreasing developed facilities" and also addressed the maintenance backlog concern. The proposed program of work is intended to provide developed sites that consistently meet management standards, reduce the maintenance backlog, and allow recreation visitors to enjoy the unique opportunities on the Bitterroot N.F.

The Proposed Program of Work recommends the following actions related to our 80 developed recreation sites over the next five years:

- No changes proposed — 7 sites
- Change in season of operation — 33 sites
- New site fees (3 cabin rentals, 3 existing campgrounds) — 6 sites
- Increase of existing fees (8 cagin rentals, 13 campgrounds & group sites, 5 sites associated with Lake Como) — 26 sites
- Increase or improvement in services — 12 sites
- Removal of facilities or operation as dispersed sites — 16 sites
- Seek partners to help operate sites — 10 sites

We know that conditions and needs will change frequently, so managers will review and update the analysis and this list of actions regularly.

Off-Highway Vehicle Effects on Lands
Item 28

OBJECTIVE: Monitor OHV effects on land.

DATA SOURCE: Site inspection and interdisciplinary team reviews.

FREQUENCY: Twenty-five percent of high use areas and trails annually.

REPORTING PERIOD: 2005 and 2006

VARIABILITY: Irreversible ecosystem damage, user conflicts, displacement of wildlife, and public safety.

EVALUATION:

In areas where motorized recreation use is recognized by the Forest Plan as compatible with other resource values, and where trail systems have been designed to accommodate the use, unacceptable resource impacts are generally not occurring. Where we have developed trail systems to avoid problem areas, users are mostly staying on the trails. Monitoring of OHV trails has indicated that when trail system maintenance is obvious, visitors respond by being more careful in their use of the area. The highly visible presence of an OHV ranger since 2002 has enabled us to educate OHV users and offset to some degree the impacts of increasing OHV use.

Generally, where the terrain and vegetation do not provide opportunities to ride OHVs off the road or trail system, there is little overall damage from OHV use. However, in areas of the Forest where travel off roads is easier, impacts to sensitive vegetation and soils do occur. To date, we have not found any of this damage to be irreversible. Rehabilitation efforts are generally successful in terms of restoring the physical and vegetative resources, but are less successful in preventing future damage to restored areas. The Bitterroot NF is using travel restrictions and other methods of reducing resource impacts (signs, barriers, and public education) to address this problem. The illegal use of vehicles on closed roads continues to be a problem. Many of these roads are gated, but each year gates are vandalized in an effort to gain access to closed roads.

Conflicts between motorized and non-motorized users of the Forest occur every fall during the big game hunting season. In areas of the Forest where both motorized and non-motorized use is allowed, users who expect a non-motorized experience are dismayed to find motorized use. User conflicts are increasing as OHV use increases and as technological advances allow OHVs to access areas that historically have only been accessible by foot or horseback.

The Forest has identified a need, through many discussions with the public, to provide well-designed loop routes for OHV use, using old roads where possible. Without designed routes available, motorized users will find their own opportunities in places that may be inappropriate and more likely to cause resource damage. With use focused on routes designed and designated for OHV use, our monitoring has shown less likelihood of resource damage and user conflict. We have determined that the travel management planning process is the best way to delineate a manageable system of routes for motorized uses while providing non-motorized opportunities as well. The Forest has mapped out a timeline to complete travel planning, with production of a motorized vehicle use map by 2009.

MONITORING RESULTS:

It is difficult to directly monitor OHV use and the impacts resulting from inappropriate or illegal use. This monitoring requires motion sensitive cameras and/or enough on-the-ground personnel to cover thousands of acres throughout a six-month season. Because of these difficulties, there is no “numerically based” monitoring system in place for OHV effects.

However, Forest personnel do watch for, take note of, and address OHV resource damage, illegal use, and user conflicts. These are recorded each year via trail condition surveys, law enforcement records, site-specific project planning inventories, and other resource monitoring reports and notes. OHV effects are also considered either directly or indirectly in these other Forest monitoring and evaluation items: Monitoring Items numbered 3, 7, 10,

17, 19, 21, 22, 24, 27, 28, 29, 38, 39, 40, 41 and additional monitoring headings Threatened and Endangered Wildlife Species, Sensitive Wildlife Species, Neotropical Migratory Birds, and Law Enforcement on the Bitterroot Forest. In an effort to compile this knowledge, we have developed a list of areas that are currently being used by OHVs and where we have found some form of resource damage (see Table 44). This is not an all-inclusive inventory.

Impacts that have been noted may include: deep ruts, trail widening around wet areas, stream crossings that contribute sediment, trees cut down, signs torn down, or user conflicts. While noteworthy for monitoring use and for scheduling management actions and maintenance, damage was generally such that it seldom required immediate or emergency action. Existing trails that are hardened and open for OHV use are not included. We will track this information to establish a more complete record of OHV effects. In addition to the areas noted, some damage is occurring where OHVs cut switchbacks on system roads.

Table 44 - Areas of Noted OHV Resource Damage by District,

District	Areas of Noted Damage
Stevensville	Glen Lake Trailhead; Larry Creek/Big Creek – reduced use in 2006; Sawmill Creek; Sweeney Creek; Smith Creek; Cow Creek; the Willow Creek drainage, specifically Beartrap Creek and Eastman Creek; McCalla Creek; the area between trail #44 and Burnt Fork Lake; Fulkerson Gulch; Sharrott Creek; Cleveland Mountain, Sawmill Saddle
Darby	Robbins Gulch; Sawdust Gulch; Chaffin Creek at intersection of Trapper-Chaffin Road; Bunkhouse Road; Brennan Gulch and Coffee Gulch off Gird Point Road; Lost Horse/Lick Creek area - reduced use in 2006; Hart Bench; Weasel Creek; Crooked Creek; Lost Horse Observation Point Road; Butterfly mine rehab area; Skalkaho Daly dispersed campsites
Sula	East Fork out of Martin Creek Campground; Reynolds Creek Road; Shook Mountain; Meadow Creek has heavy use over to Mink Creek; Ambrose
West Fork	Capri Lake Trail (100 yards); Meadow Gulch; Spruce Creek; Hughes Creek; Coal Creek; Flat; Mink Creek

It should be clarified that the Forest's "inventory" of user created routes, mentioned in the FY 2004 Monitoring Report, likely does not reflect all the routes that existed on the ground in 2001, as was intended. Nevertheless, the map has proven useful as one piece of information that helps us determine when a new, illegal route appears so that we can close it.

In 2005 and 2006 we have been seeing many more off-highway vehicles registered for use on public roads. This has the effect of increasing opportunities for OHVs on the Forest by making them legal on roads open to passenger cars.

In 2006 the Forest monitored the effectiveness of gate closures. All the gates associated with winter/spring seasonal closures were monitored once in the spring, and 84% were found to be effectively closed. In order to establish meaningful numbers and trends on closure effectiveness, monitoring needs to be continued and expanded to include year-round closures. Data from hunting season monitoring should be available for the FY 2007 Monitoring Report.

Education and Law Enforcement

The Forest has hired an "OHV ranger" since 2002, with the assistance of a state grant. Each year the OHV ranger focuses on educating OHV users through field contacts and by posting signs so that users know where they can legally ride. In 2005 our seasonal OHV Ranger made approximately 75 contacts per month (May-November), mostly in the field. He also works regularly with the local OHV dealers, Western Montana Trail Riders Association, and Ravalli County Off-Road Users Association.

Signing areas and trails for appropriate uses and closures has been an important focus for several years. Many signs are damaged or removed through vandalism, so it is a constant battle to keep areas posted. The OHV ranger put up 52 signs in 2006.

In 2005 the OHV ranger filed 220 incident reports, seven warning notices, and two violation notices related to illegal OHV use. For 2006 the OHV ranger recorded 124 incidents and issued one warning notice. The reduction in incident reports may reflect our education and signing efforts, and perhaps the influence of having an organized OHV group in the valley. The OHV ranger noted a decrease in illegal use in the Hart Bench area, where he has

spent considerable time working with users. The Ravalli County Off-Road User Association has agreed to assist with monitoring of this area.

A new Forest Visitor Map with information on which roads and trails are open to specific vehicle types was made available to the public in 2006.

The Forest has mapped out a timeline to comply with the Travel Management Rule, with production of a Motorized Vehicle Use Map consistent with that rule planned in 2009.

Ongoing Prevention and Restoration

The Forest made a major effort in 2004 to place closure signs on user created routes within the Brennan Gulch area closure. This area has received unauthorized use over the years, and the signing effort met with resistance from OHV users. However, the signing and additional patrolling did reduce the off-road use. Signs were torn down on a regular basis, but were replaced as needed. We followed up in 2005 with physical rehabilitation and barriers on these trails. In 2006 we rehabilitated three sites impacted by OHVs in the Brennan Gulch area.

Minor rehabilitation was completed on several sites during 2005, including Sawmill Creek, Reynolds Creek gate, Hart Bench, and Lost Horse. In 2006 we physically closed unauthorized OHV trails at the following locations:

Lake Como Overlook	East Piquett	Gird Trail	Moonshine
Hart Bench	Gold Creek	Buck Creek	
Forest Road 1319 (3 trails)	Reimel/Coffee Gulch	Coal Creek	

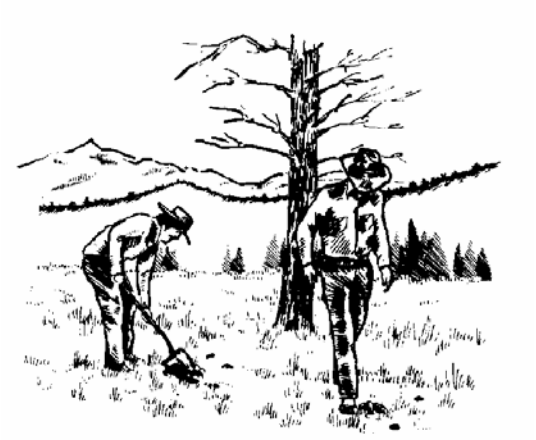
The Forest also rehabilitated damage from “mud-bogging” at Dam Creek Lake, Railroad Creek, and Forest Road 720 in 2006.

Monitoring of Past Rehabilitation:

The Forest issued an order in January 2003 closing the Lake Como lake shore (below the high water mark) to off-road motorized travel. This closure was implemented to reduce impacts from OHVs on sensitive sites when the reservoir level drops below full pool. Monitoring shows the closure has been followed for the most part.

Between 1996 and 1997, a user created OHV spur trail had intruded on a sensitive prehistoric site on the Sula District. In response to tribal concerns, we obliterated and posted the spur closed in October of 1998. Monitoring visits from 2000 to 2004 indicated that the trail was continuing to revegetate well and that no additional OHV use was evident. In 2002, monitoring revealed another area on the Sula District where off-trail OHV traffic was corroding two archaeological sites. Measures were taken in 2002 and 2003 to prevent further impacts, but monitoring has shown that they were only marginally successful (also see the 2004 monitoring report, Heritage Program section). In 2006 a portion of the Bitterroot/Rock Creek Divide Trail #313 was closed to motorized use to protect heritage values in this area until travel management planning can be completed.

Unauthorized trails closed in Sheep Creek, Johnson Creek, and Thunder Mountain were monitored in 2005 and the closures were found to still be effectve.



Recreation Site and Trail Use Effects on Land
Item 29

OBJECTIVE: Identify areas that are proceeding toward irreversible ecosystem damage.

DATA SOURCE: Site and trail inspection and interdisciplinary team review.

FREQUENCY: Annually (25 percent of high use areas and trails).

REPORTING PERIOD: 2006

VARIABILITY: Irreversible ecosystem damage.

EVALUATION:

We did not identify any irreversible ecosystem damage attributable to recreation site and trail use in 2006.

MONITORING RESULTS:

Condition surveys were completed on the trails and recreation sites shown in the following tables:

Table 45 – Trails with Completed Condition Surveys

Trail Name	Trail #
Bear Creek	5
Palisade	44
Sears Lake	312
Nez Perce (Nee-Me-Poo)	406
North Star Ridge	519

Table 46 - Condition surveys were completed on the following recreation sites:

Numerous (10) Trailheads	Charles Waters Campground	Rock Creek Horse Camp
Bass Creek Kiosk	Larry Creek Group Site	Lake Como Campground
Bass Creek Picnic Area	Gold Creek Campground	Upper Como Campground
Bass Day Use Interp. Site	Bear Creek Pass Horse Camp	Black Bear Campground
Crazy Creek Campground	East Fork Guard Station	Twogood Cabin
Observation Point Campground	Alta Campground	

A national recreation visitor use survey was completed in 2003. Results are available at http://www.fs.fed.us/recreation/programs/nvum or by contacting the Bitterroot NF Supervisor's Office. An update of this survey is scheduled for 2007.

Roadless Areas
Item 3

OBJECTIVES: Track the contribution of timber from roadless areas as projected by the Forest Plan. Monitor the change in the roadless inventory from project implementation.

DATA SOURCE: Roadless inventory and project documentation.

FREQUENCY: Annually.

REPORTING PERIOD: 1988 to 2006.

VARIABILITY: Change in roadless base different from projections in Appendix C of the Forest Plan EIS.

EVALUATION:

In FY2006 the Bitterroot NF did not harvest or construct roads in any roadless area on the Forest.

Between 1988 and 2006, the Forest has harvested 9.0 MMBF from roadless areas. This is less than 15 percent of the Forest Plan scheduled volume planned to come from roadless areas during the nineteen-year time period (Forest Plan Record of Decision, p. 6). Most of the volume was harvested from the Rock Creek fire salvage located in the Selway-Bitterroot Roadless Area.

Almost half of the roadless area component of the Forest Plan allowable sale quantity (ASQ) involves Montana Wilderness Study Act areas that are not available for harvest without legislative action. Combining this with the difficulty of entering other roadless areas that are available, it is clear that the Forest will not approach the roadless component of the ASQ (Forest Plan Record of Decision, p. 6).

Activities in roadless areas between 1988 and 2006 have not reduced the roadless inventory because we did not construct any roads in connection with these projects. Timber harvest activity can be consistent with the natural integrity of the area, and is usually not an irreversible loss of the roadless resource. Through NEPA scoping over the last few years, the public raised an issue regarding portions of the Forest that do not have roads (i.e., "unroaded") but were not included in the roadless inventory completed for the Forest Plan. "Unroaded" as well as inventoried roadless areas are often analyzed in NEPA documents for site-specific projects. The Middle East Fork Hazardous Fuel Reduction EIS, completed in 2006, contained such an analysis.

Nationally, roadless areas have been a subject of public debate, concern, and litigation for over 30 years. These National Forest System lands have remained unroaded for a variety of reasons--inaccessibility, rugged terrain, or environmental sensitivity. Extensive controversy continues over management of these areas, including lawsuits, appeals, letters, and Congressional hearings. There is a strong need to come to agreement on the future management and protection of these lands.

MONITORING RESULTS:

Below is a discussion of the planned and completed activities in inventoried roadless areas on the Bitterroot NF from 1988 to 2006. Table 47 displays the acres of actual roading or harvesting once it has occurred on the ground.

Activities in the Allan Mountain Roadless Area (01946)

The Buck-Little Boulder Timber Sale was designed to restore the ponderosa pine type through improvement cuts followed by underburning. Two units of this sale fell entirely within the roadless area, and approximately one-half of a third unit was also in the roadless area. We helicopter logged all three units in the summer and fall of 1996. The inventoried roadless boundaries remained the same.

Activities in the Blue Joint Roadless Area (01941)

In the fall of 1992, Pegasus Gold Corporation performed exploration work on a block of mining claims in the Blue Joint Roadless Area. This was a core drilling operation using portable equipment they flew to the project site.

They drilled three holes and then shut the project down for hunting season. This project did not change the roadless character of the Blue Joint Roadless Area.

Activities in the Selway-Bitterroot Roadless Area (01067)

For the period 1988 through 1991 the only activity affecting this roadless area was the Rock Creek fire salvage. We reported this in the 1989-1990 Monitoring and Evaluation Report. In 1992, we sold the St. Joseph's Timber Sale. Approximately 20 acres of the sale was in the roadless area. The area was harvested using shelterwood silvicultural systems with over-the-snow tractor skidding. We reported this roadless area harvest in 1994. The harvest did not require any new system roads. The 1996 Ward Mountain Timber Sale was a fire salvage sale located entirely within this roadless area. We logged all 137 acres of the sale by helicopter.

The Stevensville Southwest Decision Notice was signed in 1994. This project planned to harvest 385 acres in the roadless area using a helicopter and ground-based skidding. The project had no new road construction planned. We advertised the Stevensville SW Timber Sale in 1995, but received no bids. The Forest has no further plans to pursue harvesting in the roadless portions of this timber sale.

The 1996 Stevensville West Central Decision Notice included 22 acres of group selection harvest in the roadless area. No roads were planned to be built into the roadless area and the logging was to be done by helicopter. This activity was determined to not preclude the area's consideration as part of the National Wilderness Preservation System. These 22 acres were not included in the Stevensville West Central Timber Sale due to the economic considerations of harvesting small groups with a helicopter. The Forest has no further plans to pursue harvesting in the roadless portions of this timber sale.

The roadless inventory acreage remains the same for the Selway-Bitterroot Roadless Area.

Activities in the Sleeping Child Roadless Area (X1074)

The White Stallion Timber Sale was sold to Darby Lumber Company in 1993. Approximately 67 acres were harvested in the roadless area.

The Decision Notice for the Bear Project on the Darby Ranger District was signed in 1994 and planned to harvest 113 acres within this roadless area. The Bear Timber Sale sold in FY1998 and logging began on these two units. The fires of 2000 burned a portion of these units and logging was not completed until 2004. The harvest prescription for these units required the removal of dead and dying trees with some areas to be regenerated leaving a sparse overstory. The final units appear as a mosaic of burned areas, areas with a sparse overstory, and more forested areas where limited harvesting occurred. No new or temporary roads were built. The final harvest acreage was 125 acres.

The roadless boundaries remain the same for the Sleeping Child Roadless Area.

Activities in the Stony Mountain Roadless Area (01808)

We sold the Gird Point MA5 Heli Salvage Timber Sale in 1994. Two units totaling 265 acres fell within the roadless area. These units were harvested by helicopter in 1995. The inventoried boundaries remain the same.

Table 47 - Roadless Area (MA 1, 2, 3a, 3b, and 3c) Access and Harvest 1988 To 2006

Roadless Area & No.	Total Roadless Acres	Forest Plan MA 1-3c Acres (roaded emphasis)	Acres Planned for Development in Decade 1	Actual Acres Affected by Roads, 1988-2006	Actual Acres Affected by Harvest, 1988-2006	Change in Inventoried Roadless Acres
Allan Mountain (01946)	102,300	18,700	1,600	0	214	0
Blue Joint (01941)	65,400	16,700	6,200	0	0	0
Lolo Creek (01805)	587	0	0	0	0	0
Needle Creek (01066)	1,100	1,100	0	0	0	0
North Big Hole (01001)	3,700	700	0	0	0	0
Sapphire (01421)	44,100	15,800	1,100	0	0	0
Selway-Bitterroot (01067)	115,100	18,700	3,000	0	1,677	0
Sleeping Child (X1074)	21,400	9,200	2,100	0	192	0
Stony Mountain (01808)	43,700	10,700	2,700	0	265	0
Swift Creek (01065)	700	700	0	0	0	0
Tolan Creek (X1070)	7,100	7,100	3,300	0	0	0
TOTAL	405,187 [1/]	99,400 [2/]	20,000	0	2,348[3/]	0

[1/] 25.7% of Bitterroot NF lands.
[2/] 24.5% of roadless acres.
[3/] 11.7% of acres planned in Decade 1.

Road Construction, Mitigation, and Maintenance
Item 24

OBJECTIVE: To determine if Forest Plan Soil and Water Conservation Practices and State of Montana Best Management Practices are being implemented in project management activities.

DATA SOURCE: Road construction and timber sale contracts, post-sale ID team review, force account crew work accomplishments, and INFRA database records.

FREQUENCY: One sale per district per year.

REPORTING PERIOD: 2006.

VARIABILITY: Deviation from Best Management Practices standards.

EVALUATION:

The Bitterroot National Forest (BNF) uses Best Management Practices (BMPs) as a mechanism to help us achieve water quality standards. The Forest incorporates BMPs as mitigation in all projects that may impact soil and water resources. In recent years new road construction has become a very minor part of the National Forest program of work, while maintenance, reconstruction, hydrological stabilization, and road obliteration have become more prominent.

For several years prior to 1999, this monitoring item was not reported as a separate item; however the Forest has continued to conduct interdisciplinary team reviews of projects on a yearly basis. We have reported these reviews, including road impacts to soil and water, in the yearly monitoring report (see Items 19, 21, 22, and 31 in this and previous reports). However, what has not been covered in the other reports is the overall status of roads on the Forest and our ongoing road maintenance, reconstruction, and decommissioning. Those are the subjects we will cover in this monitoring item for FY 2006.

MONITORING RESULTS:

Road Reconstruction

The Bitterroot National Forest has been reconstructing roads each year to reduce sedimentation, meet best management practices (BMPs) and to assure the standard of the roads meet traffic and safety needs.

In FY 2006 the Bitterroot National Forest reconstructed and placed gravel on 1.14 miles of the Paint Creek Road 5778, 0.72 miles of the Kerlee Dowling Road 5758, and at four stream crossings on the Mink Creek Road 5753. In addition to the road reconstruction and gravel placement, nine (9) ditch relief culverts were also installed under the Middle East Fork Road Reconstruction Project.

Spring rains in 2006 damaged a section of Two Bear Road 720. The BNF put an emergency closure on this section of road until road work was completed. The fill slope failed in locations, narrowing the road and leaving a near vertical fill slope. The reconstruction objective was to move the road as far into the hillside as possible without using explosives. Vertical fill slopes were set back and road surface drainage improved.

The BNF road crew accomplished 8.80 miles of road reconstruction work during fiscal year 2006. The work included prism reconstruction, gravel surfacing and surface shaping/grading.

Road Storage and Obliteration

The Bitterroot National Forest has been storing roads that are not needed today, but will be needed for future management, by removing culverts, installing no-maintenance cross-drains, and revegetating the road prism. The Forest has also been obliterating (decommissioning) unneeded system and non-system roads in an effort to reduce sedimentation and to restore areas to pre-road conditions (Figure 35). Much of the work associated with road storage and obliteration in 2006 was identified in the Burned Area Record of Decision (ROD) and Middle

East Fork Hazardous Fuels Reduction Project. In addition to work identified in various projects, the Forest has also been obliterating non-system, unauthorized roads that are within the scope of other ongoing projects.

In FY 2006 the Forest completed 5.1 miles of road storage, 0.40 miles of system road obliteration, and 3.6 miles of unauthorized road obliteration. This work was accomplished through the watershed program of work.

Figure 345 - Picture of oblliterated Road 13326 taken in the spring of 2007. This work was completed in the Gilbert Creek Decommissioning Phase 1, 2004.

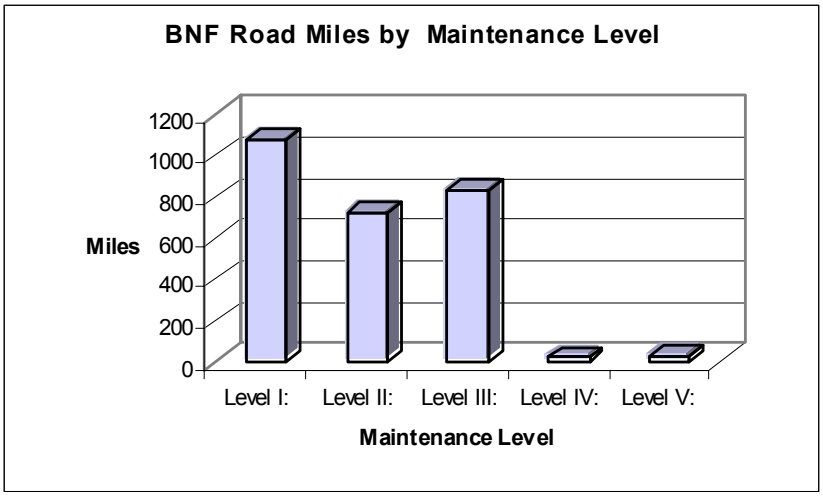
Road Maintenance Status

Existing roads are maintained and managed based on access needs, volume and types of traffic, and the impacts the roads have on other resources. There are five levels of maintenance as shown in the following table and figure.

Table 48 - Maintenance Level and Description

Maintenance Level	Forest Miles	Description and Status
Level I:	1080	Not maintained for public use. These are only maintained to preserve the road template. These roads are closed yearlong to full size motorized vehicle traffic.
Level II:	721	Managed for high clearance vehicles, maintenance mainly focused on erosion control.
Level III:	836	Native and gravel surface, low traffic volumes, maintained for template preservation and some user comfort. These roads are managed for use by standard highway vehicles.
Level IV:	17	Higher traffic volumes, gravel surfaced arterial roads, maintenance at a higher standard.
Level V:	21	High traffic volumes, paved arterial roads.

Figure 36 - Miles of road at each maintenance level on the Bitterroot Forest



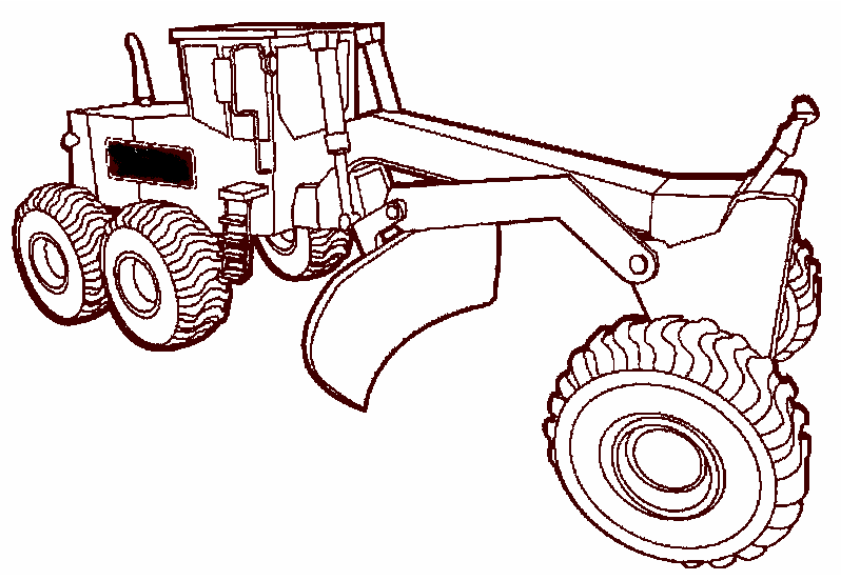
Road Maintenance

In FY2006 the BNF maintained 57.2 miles of Maintenance Level I road, 82.8 miles of Maintenance Level II road, 506.8 miles of Maintenance Level III road, 7.9 miles of Maintenance Level IV road, and 10.6 miles of Maintenance Level 5 road. Yearly routine maintenance items completed include spot gravelling, removing large rocks from road surfaces, culvert maintenance and repair, road surface repair, and bridge maintenance.

At the end of FY 2005 the BNF restructured its engineering organization and transferred the brushing equipment to the Nez Perce National Forest. Brushing work on the BNF will now be done through contract only.

The Forest Service has special authorities under the Forest Road and Trail Act to trade road maintenance equally with the counties where it is more efficient for the Forest Service to maintain some county roads and for the

county to maintain some Forest Service roads. Under the most recent agreement with Ravalli County, the county will perform normal spring maintenance and grading on all or portions of the following Forest Service roads: Mill Creek, Blodgett Creek, Warm Springs-Laird, North Kootenai, Rye Creek, and Lost Horse. The Bitterroot NF will perform normal spring maintenance and grading on portions of the following county roads: Three Mile, Willow-St. Clair, Bitterroot-Big Hole, Hughes Creek, Fred Burr, and Pierce Creek. We will do joint maintenance on Nez Perce Road.



Timber Suitability
Item 34

OBJECTIVE: Examine lands identified as not suited for timber production at least every ten years to determine if they have become suitable. If they are determined to be suitable, such lands are returned to the timber base.

DATA SOURCE: Stand exams, land typing, and timber sale reports.

FREQUENCY: Ongoing.

REPORTING PERIOD: 1988 to 2006

VARIABILITY: +/- five percent over a five-year period.

EVALUATION & MONITORING RESULTS:

Ground verification of lands suitable for timber production, as identified in the Forest Plan, has been ongoing with project planning. We are finding that site-specific mapping shows some lands identified as unsuitable in the Forest Plan are actually suitable, and vice versa. Most projects are identifying more unsuitable land than was identified in the Forest Plan, however the changes have not been significant.

Land classification to determine whether land is suitable or not suitable for timber production is being updated in the Forest Plan revision using new vegetation and soils data sets and geographic information system mapping tools. This classification process is in progress and is expected to result in changes to the acres classified as not suited for timber production.

Part of the ongoing reforestation program has been to evaluate lands burned by the fires of 2000 to determine whether they are suitable for reforestation and timber production. Many stands classified as suitable have now been changed to non-suitable. These sites have been primarily on steep, dry, south to southwest facing slopes, with rocky soils. A map of stands evaluated on the south end of the Forest was compared to the recent mapping done as part of the Forest Plan revision. The maps are similar which helps affirm the work being completed in the revision process. Our work indicates that unsuitable sites are on a variety of habitat types with the majority of them on forest-grassland vegetation types, and many of them on the Douglas-fir/ninebark habitat type. This reaffirms the importance of field verification of Forest-wide mapping. It is the combination of several factors together (habitat type, landform, soils, slope, and aspect) that determines whether a site should be managed for timber production.

Previous monitoring indicated that the Douglas-fir/ninebark habitat type, which was considered unsuitable in the Forest Plan, should actually be classified as suitable. Some higher elevation habitat types were designated as having inadequate information in the Forest Plan. The consensus now is that one of the types, subalpine fir/woodrush (except the menziesia phase), should be classified as unsuitable. The draft suitability maps being used in Forest Plan revision have accounted for these adjustments, although, as noted above, in some cases these habitat types may be classified differently depending on other factors.

As we apply ecosystem management principles, we are finding the Forest Plan has limited our ability to reduce stocking levels or otherwise manage forest vegetation to meet resource objectives on some unsuitable lands. Managers need this option so fire can be restored as a natural process and vegetation can be returned to more sustainable conditions on these landscapes. Prior to 2006, site-specific amendments to the Forest Plan allowing vegetation treatment on unsuitable lands have been made for the Buck-Little Boulder and Beaver Woods Timber Sales on the West Fork Ranger District, and the Warm Springs Project on the Sula Ranger District. Similarly, in 2006, the Middle East Fork Record of Decision approved a site specific standard to be applied to this project as follows: “For the Middle East Fork project, vegetation manipulation, including timber harvest or removal, and associated activities are permitted to meet project objectives on unsuitable lands in MA 1, 2, 3a, and 8b.” Timber harvest would be used as a tool to accomplish project objectives on approximately 800 acres of land classified as not suited for timber production by the Forest Plan.

The individual and cumulative nature of these timber suitability amendments will have an almost imperceptible effect on achieving the overall Forest Plan goals, objectives, and desired conditions forest-wide. The total harvest treatments within unsuitable lands amount to only 1170 acres of the total forest acres (0.07%) since the Forest Plan was signed in 1988.

Timber Volume and Area Offered and Sold
Item 11

OBJECTIVE: Track timber harvest as a contribution to the local economy and as projected by the Forest Plan.

DATA SOURCE: Bitterroot NF Timber Information Management (TIM) database, STARS database, and Timber Sale Reports.

FREQUENCY: Annually.

REPORTING PERIOD: 1988 to 2006 (19 years)

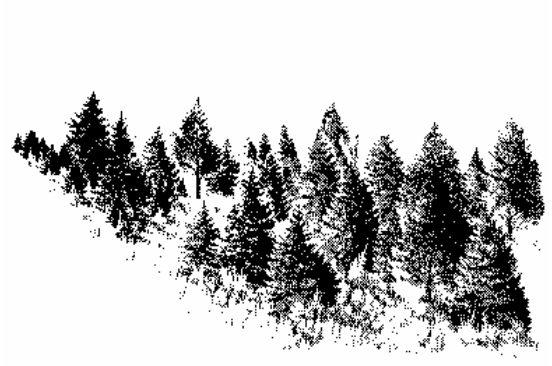
VARIABILITY: +/- 20 percent difference from Forest Plan annually and +/- ten percent over a five-year period.

EVALUATION:

The 1987 Forest Plan projected a planned annual timber sale quantity (allowable sale quantity, or ASQ) of 33.37 million board feet (MMBF). The Plan predicted that this volume would be harvested each year from approximately 3,647 acres in Management Areas 1, 2, 3a, 3b and 3c. Actual harvest volumes and acres cut would vary by year but the intent of the Forest Plan was to offer and award approximately 333.7 MMBF during the first decade after the Plan was signed. The second decade program was planned to be at the same level as the first decade.

Since 1988 annual harvest levels have been well below the ASQ predicted in the Plan. In 2006, the Forest offered and sold 11% of the planned annual ASQ and 18% of the planned annual harvest acres. All sales offered for sale were sold. Since 1988 the Forest has sold roughly 27% of the timber volume and 52% of the planned harvest acres predicted to be offered in the nineteen year period since the Forest Plan was approved. In the past 19 years approximately 86% of the total volume offered was also sold. Since 2001, all timber sales offered for sale have been sold. As shown in Figure 37 below, actual volume harvested has been less than what was offered and sold during the last ten years. This is particularly true of sales sold since 2000 where the rapid deterioration of burned timber prevented all sold timber from being harvested.

Both the annual harvest and the nineteen year harvest levels are outside the desired variability, as specified in the Forest Plan. In nineteen years, 2002 was the only year the Forest met or exceeded the annual ASQ. Almost all National Forests have experienced similar declines. This is a national issue tied to changing social values, listing of new threatened and endangered species, declining budgets, and many other factors. When the Forest Plan Revision is finalized, we will update the predictions of timber outputs to reflect the current social and regulatory environment.



MONITORING RESULTS:

Table 49 – Timber Acres and Volume Sold By Management Area, Fiscal Year 2006 Compared to Forest Plan Predicted Annual Program

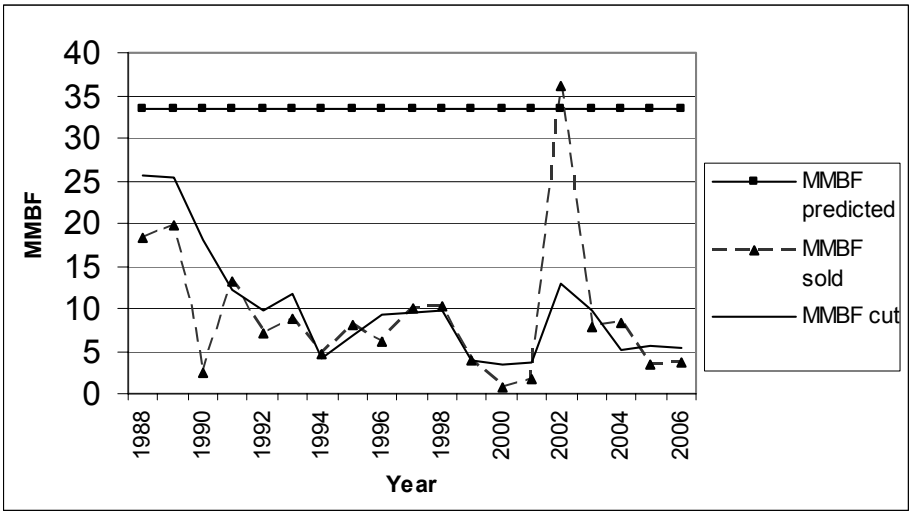
Forest Plan, p. III-80			Offered & Sold			
					% of Forest Plan	
MA	Acres	Volume (MMBF)	Acres	Volume (MMBF)	Acres	Volume
1	1,528	14.57	154	0.72	10%	5%
2	1,439	12.01	330	1.16	23%	10%
3a	283	3.05	385	1.81	136%	59%
3b	385	3.62	0	0	0%	0%
3c	12	0.12	0	0	0%	0%
Total	3,647	33.37	**869**	**3.69**	24%	11%

Table 50 - Timber Acres and Volume Sold By Management Area, Fiscal Years 1988 to 2006 (19 years) Compared to Forest Plan Predicted Program [1/]

Forest Plan, p. III-80			Sold			
					% of Forest Plan	
MA	Acres	Volume (MMBF)	Acres	Volume (MMBF)	Acres/Volume	
1	29,032	276.8	17,821	84.0	61%	30%
2	27,341	228.2	12,059	56.5	44%	25%
3a	5,377	58.0	6,189	28.2	115%	49%
3b	7,315	68.8	206	0.5	3%	1%
3c	228	2.3	199	0.7	87%	32%
Total	69,293	634.0	36,474	170.0	53%	27%

1/ A review of all acres and volume harvested since 2000 found errors in the 2002 monitoring report. Table 50 has been updated to show corrected cumulative acres and volume.

Figure 37 - Timber Volume Sold and Harvested, Fiscal Years 1988 to 2006 (19 years) Compared to Forest Plan Predicted Program [1/]



Timber Volume Offered by Logging System and Harvest Method
Item 13

OBJECTIVE: Track timber harvest as a contribution to the local economy and as projected by the Forest Plan. Validate Forest Plan assumptions on projected volumes by logging system and harvest method.

DATA SOURCE: Bitterroot NF Sale Tracking and Reporting System (STARS) Database and Timber Sale Reports

FREQUENCY: Every three years.

REPORTING PERIOD: 2006.

VARIABILITY: Volume and acres offered by logging system are within +/- 20 percent of Forest Plan.

EVALUATION:

The Forest Plan requires that logging systems and harvest methods be prescribed for each project based on site-specific conditions. The logging methods are indicative of the land types associated with each sale. Therefore, timber volume offered by logging system and harvest method is likely to vary greatly from that anticipated in the programmatic Forest Plan. The monitoring results show that this is the case.

In the past 19 years, the most common method of logging has been to use tractors. This was predicted in the Forest Plan since a large number of acres managed for timber are on gentle terrain. In recent years, cut-to-length and forwarding equipment has been used in lieu of tractors because this equipment results in less soil disturbance and less damage to residual standing trees. Approximately half of the acres harvested since 1988 have been logged using helicopters. This was not anticipated in the Forest Plan. Helicopter and skyline logging systems have been the preferred harvest system on steep slopes since they result in less ground disturbance than cable yarding. The use of this type of logging equipment is expected to increase in the future.

The Forest Plan expected that over 80% of the acres harvested would be regeneration harvests (clearcut, shelterwood, and seedtree harvest methods). Instead, over the last nineteen years, over half the acres harvested have been salvage removal of dead and dying trees, either as selected trees from an otherwise live forested area or, like many of the stands after the 2000 wildfires, the removal of almost all commercial trees from areas where all the trees were burned. Outside of salvage areas, about one quarter of the harvested stands have been regeneration harvests and approximately 17 percent selection cuts. Since 2000, almost all non-salvage harvest have been thinning (selection harvest) to improve stand vigor or remove smaller trees (ladder fuels). With the current emphasis on fuel reduction projects, the amount of selection cutting is expected to increase. Selection harvesting often provides the best alternative for addressing a variety of resource concerns and objectives including maintaining visual quality, protecting watershed and soil resources, providing enhanced wildlife habitat, reducing fuels, and improving forest health.

MONITORING RESULTS:

Table 51 - Timber Offered by Logging System [1/]

	FY 2006		FY 1988 to 2006 [2/]	
	Acres Sold	Volume Sold	Acres Sold	Volume Sold
Tractor	216	0.74	15,019	74.79
Skyline	366	1.48	7,681	39.63
Cable	0	0	5,248	14.01
Manual	287	1.47	6,098	22.7
Aerial	0	0	11,666	49.36
Totals	869	3.69	45,712	200.49

1/ Tractor - tracked or rubber-tired equipment is used to skid logs or trees over the ground. This category also includes cut-to-length and log forwarding equipment. Skyline - logs or trees are skidded over 800 feet to a road by cables. Cable - logs or trees are skidded less than 800 feet to a road by cables. Manual - methods used to remove primarily small merchantable products and fuel wood. Some horse logging is included in this category. Aerial - logs are removed from harvest units by helicopters; this method does not require roads in the immediate area and does not disturb the soil.

2/ A review of all acres and volume harvested since 2000 found errors in the 2002 monitoring report. Table 51 has been updated to show corrected cumulative acres and volume.

Table 52 - Timber Offered by Harvest Method

	FY 2006		FY 1988 to 2006 [2/]	
	Acres Sold	Volume Sold	Acres Sold	Volume Sold
Clearcut	0	0	3,330	35.84
Seedtree	0	0	5,056	15.19
Shelterwood	0	0	2,733	14.21
Removal[1/]	0	0	538	4.2
Selection	205	0.77	7,710	31.74
Salvage	664	2.92	26,345	99.31
Totals	869	3.69	45,712	200.49

1/ Seed tree and shelterwood final removal harvests.

2/ A review of all acres and volume harvested since 2000 found errors in the 2002 monitoring report. Table 52 has been updated to show corrected cumulative acres and volume. The 2004 monitoring report for this item showed 588 clearcut acres with an associated volume of 2.1 MMBF. These acres should have been coded as salvage and not clearcut since the harvest was removal of dead timber following stand replacing fire. This correction has been made in the above table.

Livestock Effects and Grazing Permit Revision Status
Item 30

OBJECTIVE: To report on allotment monitoring and progress of allotment management plan (AMP) revisions.

DATA SOURCE: Technical review of condition and trends, forage production, transitory range, and other parameters as needed.

FREQUENCY: Ten percent of allotments annually.

REPORTING PERIOD: 2006.

VARIABILITY: +/- ten percent change in the carrying capacity

EVALUATION:

Although transitory range increased within allotments as a result of the 2000 fires, these are not calculated in any allotment's permanent carrying capacity. Therefore this does not affect the Forest Plan variability thresholds noted above. In 2006, the Forest completed and signed a NEPA decision to reauthorize grazing under the current management prescription for the Sweathouse/Gash grazing allotment. The quantity of monitoring in 2006 exceeded minimum Forest Plan annual requirements.

MONITORING RESULTS:

2006 Actual Use

Nineteen of the 25 grazing allotments hold active permits. Of these, two permittees took full non-use and one took partial non-use for the 2006 grazing season. Eleven permittees grazed a total of 3,202 Animal Unit Months (AUMs)

Land Area Grazed

Cattle grazing is authorized on approximately 11 percent of the land area of the Bitterroot NF.

Transitory Forage Status From Large Fires

The loss of tree canopy in the moderate and high severity burned areas from large fires in 2000, 2003, 2005 and 2006, combined with harvest of burned timber from salvage sale units did not lead to an increase in permitted grazing animals. The Forest no longer includes transitory forage in the calculation of the carrying capacity of an allotment. The transitory forage produced by the opened canopy of a burned timber habitat type is classified as secondary or supplemental rather than part of the primary permanent forage base. The amount of transitory forage does not change the allowable stocking rate of an allotment (the number of animals and the duration of grazing) in most cases. Natural plant succession eventually returns these areas to a forested cover type and phases out any flush of palatable forage plant growth.

New transitory feeding areas may change established livestock foraging patterns. The amount of grazing that occurs in these areas is dependent on the forage production and palatability, distance to water, natural barriers, elevation, steepness of slope, noxious weed invasion, and availability of other forage. Many of the sites that experienced fire since 2000 and that are accessible by permitted livestock are not producing palatable herbaceous forage species. For example, pinegrass (Calamagrostis rubescens), an unpalatable grass that livestock generally avoid, dominates many acres of Douglas-fir habitat types. As tree roots and boles weaken from fire effects, the resulting downfall increasingly prevents livestock movement through burned areas.

Allotment Compliance Results Summary

Forest rangeland specialists inspected 16 active allotments during the 2006 grazing season. The Forest uses these inspections to determine range readiness, permit compliance, and utilization levels, as well as to collect data for the AMP revision process. In addition, range specialists inspect allotments to determine if they are in compliance with Forest Plan standards. These standards vary by management area, but generally require that forage use by livestock not exceed 50% on elk summer range or 35% on elk winter range. Rangeland monitoring

work continues to focus strongly on grazing impacts to riparian condition. Specialists also employ supplemental streambank alteration standards prescribed for some drainages to address fisheries concerns.

Five allotments were rested in 2006. Of the 16 allotments monitored, only one failed to comply with any of the utilization standards. Range specialists and the permittee agreed to a set of corrective actions and expectations for the 2007 season.

Ambrose Creek Allotment: The permittee took non-use for the 2006 grazing season.

Andrews, Warm Springs, Waugh Allotments*:* Since 2001, these three grazing allotments have been run as pastures of one grazing allotment. Waugh Gulch is showing improvements in riparian areas and increased grass vigor with removal of season long grazing. Cattle were not turned into the Waugh Gulch area and were removed in a timely fashion when they drifted into the area. Warm Springs Allotment did not receive high amounts of use this year, as the cattle would not stay in the area. The permittee felt the wolves were scaring the cattle.

Bunch Gulch and Shirley Mountain Allotments: The permittee rested these allotments this year.

Camp Reimel Allotment: Fences burned during the 2000 fires were rebuilt in 2001 and restructured so cattle were excluded from the riparian areas. Gates were left open during the grazing season and a few cattle were occasionally found in the riparian areas. Pastures met standards.

Gold Creek Allotment: Forest plan utilization standards were met. The riparian exclosure at Muddy Springs remains cow-proof and effective.

Harlan Gulch: Grazing met riparian standards in Roan Gulch, however the permittee will need to continue diligent attention to removing cattle in order to successfully comply with standards in riparian areas. Discussions with the permittee emphasized riparian standards and Forest Service expectations for compliance with those standards.

Main Sleeping Child Allotment: The allotment is now classified as an inactive or vacant allotment.

Meadow Creek Allotment: Annual riparian monitoring continued in Meadow Creek and results are reported in Item 19. Cages established in 2004 were clipped and monitored with all but one site meeting standards. Additional work was done on the Meadow Creek Fence.

Piquett Allotment: In 2003, this allotment received its tenth and final year of rest directed by the 1993 AMP. The allotment was used temporarily in 2001 to rest another severely burned allotment. It has not been grazed since then and was rested again in 2006.

Skalkaho Allotment: Coffee Gulch met riparian standards in 2006 with a five head reduction from previouse years. Cattle were moved straight from Brennan to the Gird Creek Pasture. The uplands appear to be in good condition. Weeds were treated along the roadsides as were known patches of leafy spurge.

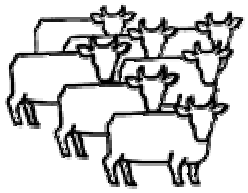
Sula Peak and East Fork Allotments: Sula Peak and East Fork Allotments were rested in 2006 to provide for native plant recovery after an aerial herbicide treatment of almost 1,000 acres to reduce invasive plants.

Trapper Peak Allotment: Forage use in the Waddell pasture met standards. Cattle were grazed in Waddell until mid-summer in 2006 and then moved to the Lost Horse Pasture. This worked well as cattle were not wandering looking for water.

Allotment Management NEPA and Plan Revision Status:

Public scoping was initiated for the **Waugh Gulch and Andrews Allotment Management Plan** revisions in 2002. An interdisciplinary team was formed and a large portion of the analysis document was developed. A NEPA decision is expected in 2008. The proposed action is to combine the allotments to increase efficiency of management, reduce stocking levels, and institute a more progressive management approach that incorporates principles of rest/deferment.

The Forest completed a Decision Memo for the **Sweathouse/Gash Allotment** that reauthorized the grazing of 22 animal unit months on the Forest between July 1 and October 30 of each year.



ADMINISTRATION

Administrative Appeals of Project Decisions

OBJECTIVES: Evaluate and disclose number and types of administrative appeals affecting Forest Plan implementation.

DATA SOURCE: Planning databases, Regional appeal records, project records.

FREQUENCY: As interest and data warrant.

REPORTING PERIOD: FY1991 - FY2006

INTRODUCTION:

Debate over forest management has increased interest in the rate and type of administrative appeals of Forest Service project decisions and the effects the Forest Service administrative appeal process has on Forest Plan implementation.

The Northern Region has maintained good records on the type, number, name, and disposition of appeals since the mid-1980s. These data alone provide useful, but limited, information. Additional data collected by the Bitterroot National Forest is reasonably complete and reliable from FY1998 to the present and provides information on how many decisions were not appealed and some additional insight into the types of decisions most likely to be appealed.

The monitoring results provided below are not meant to be a comprehensive study on the subject, and the information is clearly limited by both the type and amount of information available. The reader is advised not to draw conclusions beyond the face value of the data and keep the following in mind;

- In the broadest use, "decisions" include almost any project, activity, or action taken by the Forest Service.

- Not all decisions are subject to the National Environmental Policy Act (NEPA), and of those that are, the most routine do not require formal documentation (e.g. mowing a lawn, painting a building).

- Not all decisions are subject to the notice, comment, and appeal laws and regulations (35 CFR 215, 217, 218, 251). Except for the Regional data presented below, only decisions subject to notice, comment, and appeal under the Appeal Reform Act (36 CFR 215) and those subject to the pre-decision objection process of the Healthy Forest Restoration Act (36 CFR 218) are tracked here. Also, the appeal regulations themselves, as well as the types of activities subject to appeal, have changed over the years.

- Any grouping of this data, as done here, can easily lead to oversimplified conclusions. The types of activities and projects proposed by the Forest, and the choices made by groups and individuals to appeal those decisions, occur within a complex social, economic, and political environment. Only a few of those factors are discernable in the available data. For example, every project and activity has unique benefits and effects, which likely influence who appeals the decision. Similarly, the grouping by "type of activity" combines small projects with large ones and remote activities with those adjacent to private land or communities, both factors which might influence people's decisions to appeal, but which can't be distinguished here.

MONITORING RESULTS (36 CFR §215 and prior 36 CFR §217):

In fiscal year 2006, six Bitterroot National Forest project decisions were subject to the notice, comment, and appeal regulations at 36 CFR 215. [13] These are listed in Table 53 below. Of the six decisions subject to appeal, three were appealed. All three decisions were affirmed by the Appeal Deciding Officer.

[13] One other project, the Twogood Ditch Diversion Reconstruction project, was subject to the "notice and comment" portion of the appeal regulations, but was not subject to appeal because no comments or expression of interest were received during the 30 day comment period.

Table 53 – Appeal of 2006 project decisions subject to 36 CFR 215 requirements

Decision Name	Type	Appealed?
Non-commercial Thin North Zone	Vegetation Treatment	No
Tin Cup Lake Access	Special Uses	No
Skalkaho Bug Salvage	Vegetation Treatment	Yes
School Point Ecoburn and Hazard Fuel Reduction	Fuels Reduction	No
Lost Trail Salvage	Vegetation Treatment	Yes
Lil Lyman Salvage and Reforestation	Vegetation Treatment	Yes

Northern Region Appeal Records for the Bitterroot National Forest, FY 1991 through FY 2006

During this sixteen-year period, 233 separate administrative appeals were filed challenging 52 individual project decisions.[14] Of those 52 decisions that were appealed, ten decisions were either withdrawn or reversed. The remaining 42 decisions were either affirmed after administrative review or the appellants withdrew their appeal.

Bitterroot National Forest Appeal Records, FY 1998 through FY 2006

From fiscal year 1998 through 2006 (nine years), the Bitterroot National Forest issued 40 decisions that were subject to appeal (Table 54). Thirty-six separate appeals were filed on fourteen of those decisions. Of the fourteen decisions that were appealed, eleven were affirmed after administrative review or the appellants withdrew their appeal, one was reversed, and the Forest withdrew the two remaining decisions. Of the eleven broad categories describing the types of project decisions made in this period, the appealed decisions fell into seven categories (shown in bold face in Table 55). Within those seven categories, 45 percent of the project decisions were appealed (14 of 31).

Further refinement of the data shows that of the 36 total appeals received during the nine year period, fifteen (42%) were appeals of decisions which included commercial timber harvest as a project activity (Table 54). The appeal rate of timber harvest related decisions averaged 67%. Conversely, the appeal rate on non-timber related decisions averaged 21%.

Twenty-four groups and ten individuals were party to the 36 appeals filed in this time period (Table 55). It is not uncommon for more than one group or individual to be party to a single appeal or to have more than one appeal on a single decision.

Table 54 – All BNF Project Decisions Subject to Appeal[15] and the Number of Appeals, FY 1998 through 2006

Fiscal Year	**Decisions Subject to Appeal** (#)	**Decisions Appealed** (#)	**Individual Appeals** (#, some decisions had more than one)
1998	5	1	1
1999	6	4	11
2000	5	0	0
2001	7	2	2
2002	2	0[16]	0[16]
2003	4	2	2
2004	2	1	16
2005	3	1	1
2006	6	3	3
Total	40	14 (35%)	36

[14] Includes project and activity appeals under both 36 CFR §217 and 36 CFR §215 and changing regulations.
[15] Only decisions subject to appeal under 36 CFR §215 are included as these are the most prevalent and have been the focus of most data requests. The Forest Service has three other administrative review processes as well. These are defined at 36 CFR §217, 36 CFR §218, and 36 CFR §251.
[16] This does not include the Burned Area Recovery project decision, which was not subject to appeal, yet received three appeals and two lawsuits. The appeals were dismissed without administrative review.

Table 55 – General Category of BNF Decisions and Appeals[15], FY 1998 through 2006

General Category of BNF Decisions Subject to Appeal (1998-2006)	Decisions Subject to Appeal (#)	Decisions Appealed (#)	Appeal Rate (%)	Individual Appeals (#, some decisions had more than one)
Administrative Site	1	0	0%	0
Ecosystem Management	2	0	0%	0
Forest Plan Amendment (Wilderness Direction)	2	1	50%	16
Fuels Reduction	4	2	50%	2
Range Management	2	1	50%	1
Recreation / Wilderness	1	0	0%	0
Road Management	4	1	25%	1
Special Uses	5	1	20%	1
Vegetative Treatment	11	6	55%	13
Fish Habitat or Watershed Improvement	5	0	0%	0
Weed Management	3	2	67%	2
Total:	40	14	35%	36

Table 56 - BNF Decisions Subject to Appeal[15] Which Included Timber Harvest as an Activity, FY 1998 through 2006

Fiscal Year	**Decisions Subject to Appeal** (with a timber sale component, #)	**Decisions Appealed** (#)	**Individual appeals** (#, some decisions had more than one)
1998	1	0	0
1999	3	3	10
2000	3	0	0
2001	1	1	1
2002	0	0[16]	0[16]
2003	1	1	1
2004	0	0	0
2005	0	0	0
2006	3	3	3
Total	12	8 (67%)	15

Table 57 – Project Appellants[15], FY 1998 through FY 2006[17]

Appellant	# of Appeals Party To
WildWest Institute[18]	8
Alliance for the Wild Rockies	7
Friends of the Bitterroot	6
Floyd E. Wood	4
Friends of the Clearwater	3
Wilderness Watch	3
American Wildlands	2
Action Whitewater Adventures	1
Aggipah River Trips	1
Aircraft Owners and Pilots Association	1
Bernie Kosolo	1
Bill Worf	1
Californians for Western Wilderness	1
Carlotta Grandstaff	1
Columbia Seaplane Pilots Association	1
Idaho Aviation Association, Inc.	1
Idaho Outfitters and Guides Association	1
Jennifer Callahan	1
John Lehrman	1
John Swanson	1
Kirby Erickson	1
Larry Campbell	1
National Organization for Rivers	1
Northwest Rafters Association	1
Paul Stanton	1
River Runners for Wilderness	1
State of Idaho, Dept of Transportation, Division of Aeronautics	1
Valley Co. Board of County Commissioners	1
West Fork Citizens Committee	1
Western Whitewater Association	1
Whitewater Expeditions	1
Wild Wilderness	1

MONITORING RESULTS (36 CFR §218 – Healthy Forest Restoration Act (HFRA) objection process):

In 2003 Congress passed the Healthy Forest Restoration Act. For authorized projects, this act established a pre-decisional "objection" process instead of the post-decisional appeal process described above. The Forest had one project reviewed under this process in fiscal year 2006. Based on our limited experience with this new administrative review process, we feel it provides a more constructive approach to public participation than afforded by the more common post-decisional appeal process.

In September 2005 the Bitterroot National Forest issued the final environmental impact statement for the Middle East Fork Hazardous Fuel Reduction project, the Forest's first HFRA proposal. This began the thirty day pre-decision "objection" period. Twenty objections were submitted by individuals and groups.

Five of the objections were set aside, as the objectors were ineligible because they had not provided written comments to the Forest during the draft environmental impact review period.

The remaining fifteen objections were reviewed in detail. In each case the Reviewing Officer concluded the project and environmental analysis were consistent with legal requirements. The Forest Supervisor made his decision for this project on March 29, 2006. Because objections are received prior to the decision, the Forest Supervisor was able to address some of the objectors' concerns in the decision.

[17] Six additional groups were also party to appeals filed on the Burned Area Recovery project decision in FY2002, but these appeals were dismissed without review as this project was not subject to administrative appeal.
[18] WildWest Institute formed in 2006 from a merger of the Ecology Center (previously listed here) and the Native Forest Network (previously not an appellant).

Research Needs
Item 44

OBJECTIVE: To identify research needed to accomplish national forest management activities.

DATA SOURCE: Interdisciplinary and management team review of activities.

FREQUENCY: Every two years.

REPORTING PERIOD: 2006

VARIABILITY: Inability to accomplish Plan goals and objectives with existing research.

EVALUATION AND MONITORING RESULTS:

The Bitterroot NF continues coordination with research through the Bitterroot Ecosystem Management Research Project (BEMRP), which provides a forum for communication between managers and scientists. Participants in BEMRP include the Bitterroot National Forest, USFS Northern Region Office, five science programs of the Rocky Mountain Research Station (RMRS), and University of Montana. This research and other research funded through other sources are providing information that will be useful as we revise the Bitterroot Forest Plan and continue to manage National Forest lands using results of current research. The Bitterroot Ecosystem Management Research Project's website is http://www.fs.fed.us/rm/ecopartner.

The fires of 2000 highlighted the need for new or additional research and fires since then have provided additional opportunities. A number of research and monitoring efforts occurred on the Bitterroot National Forest to help answer fire-related management questions. These included:

- **Effectiveness of Burned Area Emergency Rehabilitation (BAER) treatments for controlling erosion, retaining soil moisture, and reducing peak flow.** There were three studies, conducted by RMRS, looking at the effects and effectiveness of straw wattles, silt fences, and contour-felled logs. These studies concluded in 2004 and along with other studies have changed the recommendations for how post-fire treatments are applied.
- **Interactions of noxious weeds and fire, particularly at low elevations; weed invasion due to fire-suppression, BAER treatments, and burned area restoration treatments.** A researcher from RMRS studied weeds in three of the large fire areas from the 2000 fires. The study also measured vegetative response to weed control efforts as they occurred. The researcher added another study looking at cheatgrass invasion on burned sites. Another researcher from RMRS also looked at weed invasion on plots throughout the burned area as part of long-term monitoring of vegetation recovery after the fires.
- **Effects of fires and burned area restoration on fish, birds, and other wildlife.** A researcher from the University of Montana revisited bird transects set up several years before the 2000 fires and studied bird population response for three years after the fires. Montana Fish, Wildlife and Parks, the RMRS, and the Bitterroot National Forest monitored fish and fish habitat recovery post-fire, including previous fires. RMRS and Aldo Leopold Wilderness Research Institute studied effects of prescribed and wildland fires on amphibians. Other studies looked at the effects of burned area recovery treatments on birds, plants, and small mammals, although many of these studies took place on more recent fires on other forests.
- **Vegetation recovery post-fire and after burned area restoration treatments.** A researcher from RMRS is looking at long-term (15 years) vegetation response post-fire and post-treatment. He revisited his sites in 2005. Also, one hundred photo points set up by the Forest immediately post-fire were re-photographed in 2002 and 2003 and will be re-taken periodically to provide a visual documentation of vegetation response, with the next set scheduled for 2008. RMRS remeasured the Forest Inventory and Analysis (FIA) plots done shortly prior to the fire to record immediate post-fire plant and fuel-load responses. These plots are long-term plots. A researcher at the University of Montana monitored vegetation response for use in a Montana Ecosystem Management Learning Center Site within the burned area.

- **Effects of pre-burn forest structure on fire severity.** From 2001 to 2003, researchers from the RMRS studied how age, structure, and previous forest management affected fire severity in the 2000 fires.
- **Effects of fire on soils.** A researcher from RMRS focused on soil infiltration changes due to wildfire.
- **Preventing residential fire disasters.** A researcher from the RMRS looked at houses and landscaping and how they contributed to survivability of structures during fires. Researchers from the U.S. Geological Survey and the University of Montana studied the debris flows from the storms of 2001. Another study modeled building trends in the wildland-urban interface. BEMRP and the Bitterroot National Forest are working on a large-scale fuel reduction and forest restoration project that will reduce threats to homes, private property, and forest resources while studying the effects of the treatments on various resources including vegetation and weeds, and soil compaction and productivity.
- **Developing standard methods for collecting and moving data during fires.** Researchers at RMRS are exploring this.
- **Developing modeling tools to better understand trade-offs among natural fires, prescribed fires, mechanical treatments, and no treatments.** Researchers at the RMRS and the University of Montana continue to work on modeling.

The Bitterroot National Forest has a long history as a research site. In particular, there is significant, long-term research on ecosystem management in riparian, grassland, and forest habitats. New research needs are also arising as we delve further into ecosystem management, and attempt to use the information gleaned from recent research. Areas ripe for further investigation, and some ongoing research efforts designed to help answer these questions, include:

- **Historical conditions in riparian areas, the processes that operate in natural riparian systems, and how they have been affected by people**. A RMRS study is looking at the historical role of fire in maintaining riparian areas. In 2003 and 2004, they visited actively burning areas to monitor stream conditions immediately before, during, and after wildfire. We expect to learn results of the final analysis of data in 2007.
- **Applications of ecosystem management principles to larger land areas, such as landscapes.** Modeling efforts by RMRS are allowing researchers and land managers to take a landscape-level view of management actions. Integrated modeling efforts allow managers to look at the long-term effects of actions or of inaction. BEMRP is involved in a landscape-scale study that will recommend optimum thinning and prescribed fire treatments near the wildland-urban interface on the Bitterroot front.
- **Effects of fuel reduction and forest restoration treatments on physical and chemical soil properties.** BEMRP and RMRS are planning a study to measure the effects of fire and mechanical fuel treatments on soils and how changes in soil physical and chemical properties affect organic matter decomposition.
- **Disturbance regimes (particularly fire) in low, middle and high elevation forests.** Researchers from RMRS, University of Montana, University of Idaho, and University of Arizona are looking at the historical roles fire and other disturbances have played and still play in all of these forests, from the low elevation, dry ponderosa pine forests to the high elevation whitebark pine forests. This includes looking at the effects of long-term fire exclusion.
- **The response of trees, forests, and wildlife to ecosystem management and fuel reduction treatments.** Researchers from RMRS and the University of Montana are studying how different treatments affect the survival and growth rates of individual trees, condition of the understory, populations of wildlife such as birds, weed colonization and expansion, and amounts of fuels that can affect future fire severity. Some of these studies are long-term, providing the forest and the public with additional data as each year goes by.
- **Improving communication of research results among scientists, managers, and the public.** One study from the RMRS and the University of Montana looked at ways to improve communication among environmental education groups in the Bitterroot Valley. As part of the BEMRP landscape project, the Aldo Leopold Wilderness Research Institute is studying if and how the Bitterroot National Forest and BEMRP build trust for a large forest management project.
- **Population information, habitat needs, and resource management impacts on management indicator species, sensitive species, and other species of concern.** Researchers from RMRS, University of Montana, and University of Idaho, Owl Research Institute, and the Bitterroot National Forest are currently studying lynx, snowshoe hares, wolverines, black-backed woodpeckers, boreal owls, spotted frogs, boreal toads, tailed frogs, migratory birds, northern goshawks, bull trout, and cutthroat trout on the Bitterroot National Forest.

Forest Plan Amendments

OBJECTIVE: Track formal changes to the Forest Plan.

DATA SOURCE: Amendments.

FREQUENCY: Annually.

REPORTING PERIOD: 1987 to 2006.

VARIABILITY: Repeated amendments for the same reason may indicate a need to adjust the Plan.

EVALUATION:

The Bitterroot National Forest and Northern Region decisions amended the Forest Plan twenty-six times between 1987 and 2006. Four of the amendments (numbers 11, 13, 14, and 25) were required to allow timber harvest on unsuitable lands for the purpose of restoring historic forest structures and reducing fuels. Current direction does not allow harvest on unsuitable lands, yet harvest is an important tool needed to sustain some forest communities in some areas. This indicates a need to look again at Forest Plan standards, guidelines, goals, and objectives related to unsuitable lands.

Three amendments have allowed site-specific exceptions to the elk habitat effectiveness standard. Monitoring shows that Forest Plan big game objectives continue to be met or exceeded, confirming the amendments have been appropriate and non-significant. See the monitoring section on Elk Habitat Effectiveness (Item 7) for further discussion of this standard.

MONITORING RESULTS:

Table 58 lists all the amendments to the Forest Plan and the nature of each decision.

Table 58 - Forest Plan Amendments 1987 Through 2006

Year	Amendment Number	Nature of Decision
1989	1	Changed a Management Area boundary.
1990	2	Changed a standard to allow new temporary outfitter camps in MA 11a along the Magruder Road.
1990	3	Allowed a temporary entry into MA 5 to salvage trees killed by Gird Point Fire.
1991	4	Changed a management objective for timber. Dealt with splitting ASQ within and outside inventoried roadless areas.
1991	5	Changed the schedule for reducing obtrusive outfitter caches and removing plumbing fixtures from Frank Church-River of No Return Wilderness.
1991	6	Identified Running Creek as eligible for the Wild & Scenic River system.
1992	7	Incorporated revised management direction for the Selway-Bitterroot Wilderness.
1992	8	Amended the Forest Plan standard for issuing new outfitter and guide permits.
1992	9	Allowed a boat launch facility to be built in a riparian zone.
1992	10	Allowed a fishing pier and trail to be built in a riparian zone.
1994	11	Allowed timber harvest on unsuitable lands in the Buck-Little Boulder Timber Sale.
1994	12	Refined the vegetation management direction for the Selway-Bitterroot Wilderness.
1995	12.5	Inland Native Fish Strategy (INFISH); provides interim direction to protect habitat and populations of resident native fish.[19]
1995	13	Allowed timber harvest on 174 acres of unsuitable lands in the Beaver Woods Vegetation Management Project area.
1996	14	Allowed timber harvest on unsuitable lands in the Warm Springs Project area.
1997	15	Allowed disposal of winter range via land exchange for specific sites in MA 8a.
1997	16	Allowed two third-order drainages on the Sula District to be managed at Elk Habitat Effectiveness values less than the 50% standard.
1997	17	Changed management area boundaries in MA 3a, 5, and 10 to allow for expansion of Lost Trail Ski Area. Changed the visual quality objective for the ski area from retention to modification.
1998	18	Established the Salmon Mountain Research Natural Area
2000	19	Updated wilderness direction for the Anaconda Pintler Wilderness
2001	20	Restricts, yearlong, wheeled cross-country travel where it was not already restricted (with several exceptions) and directs the Forest to complete site-specific planning on priority areas.
2001	21	Established the East Fork Bitterroot River Research Natural Area
2001	22	Site-specific amendment for the Burned Area Recovery Project. Refined snag, coarse woody debris, and elk habitat effectiveness and thermal cover standards.
2002	23	Site-specific amendment for the Slate Hughes Watershed Restoration and Travel Management project. Allowed five third-order drainages on the West Fork District to be managed at Elk Habitat Effectiveness values less than the 50% standard.
2004	24	Replaces the 1985 Frank Church-River of No Return Wilderness Management Plan with a 2003 version. The 2003 version combines management direction in three different documents into one management plan.
2006	25	Site-specific amendment for the Middle East Fork Hazardous Fuel Reduction project. Refined snag, coarse woody debris, thermal cover, and unsuitable land standards.

[19] INFISH, intended as interim direction, was not listed in this table prior to the 2001 monitoring report.