United States
Department of
Agriculture

Forest Service

Northern Region

FOREST PLAN
MONITORING AND EVALUATION REPORT
Fiscal Year 2003
Bitterroot National Forest

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INTRODUCTION

Introduction

The Bitterroot National Forest continued its well established monitoring program and research collaboration in 2003. While the fires of 2000 have long since died out, their effects continue to influence and change the Bitterroot landscape. A bark beetle epidemic, re-energized by the drought and fire weakened trees continued to grow in 2003 and caused widespread 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 continue to be influenced by these events, which in turn are affecting both local and national policies. Besides the standard Forest Plan requirements, we continued to monitor and evaluate these and other ecosystem and social trends in 2003.

In 2003, the Bitterroot National Forest, in conjunction with the Lolo and Flathead National Forests, initiated the process to revise its Forest Plan. At the forefront of this process is a review of forest monitoring and evaluation results and other information to determine which parts of the plan are in the greatest need of revision at this time. The entire revision process will take several years and will include many opportunities for public involvement.

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.

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 with 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. FY2003). 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
- *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
- *TS* Timber Sale
- *USFWS* United States Department of Interior, Fish and Wildlife Service

Table 1 - List Of Preparers

Resource	**Name and Position**
Administrative Appeals, Amendments	Pete Zimmerman, Forester/Assistant Planner
Benefit Values, Costs, Revenues, Outputs	Jim Fears, GIS Coordinator
Conservation Education	Julie Schreck, Conservation Education Coordinator
Diversity	Pete Zimmerman, Forester/Assistant Planner
Fire Management	Rick Floch, Supervisory Forester Fire Management
Fisheries	Rob Brassfield and Mike Jakober, Fisheries Biologists
Grazing	Diane Bessler Hackett, Rangeland Management Specialist; Gil Gale, Range Management Program Manager
Heritage Resources	Mary Williams, Heritage Program Manager
Insect and Disease Status	Sue Macmeeken, Silviculturist
Law Enforcement	Jackie Clark, Law Enforcement Investigative Assistant
Invasive Plant Species	Diane Bessler Hackett, Rangeland Management Specialist; Gil Gale, Range Management Program Manager
Off-Highway Vehicle Effects, Recreation	Dan Ritter, Recreation Program Officer
Old Growth	John Ormiston, Wildlife Biologist
Pine Beetles	Sue Macmeeken, Silviculturist
Research Needs	Sherry Ritter, Research Management Coordinator
Riparian Condition	Rob Brassfield and Mike Jakober, Fisheries Biologists
Roadless Areas	Barry Paulson, Resource Staff Officer
Road Construction and Mitigation	Jacob Pintok, Transportation Engineer
Sensitive Plants	Linda Pietarinen, Botanist
Silviculture and Fuel Prescriptions	Sue Macmeeken, Silviculturist
Soils	Lynne Dickman, Geologist / Soils
Timber	Barry Paulson, Resource Staff Officer
Timber Stocking	Sue Macmeeken, Silviculturist
Watershed	Ed Snook, Marilyn Wildey, Terry Carlson, Hydrologists
Wildlife	Dave Lockman and John Ormiston, Wildlife Biologists

Coordination: Pete Zimmerman, Forester/Assistant Planner

Review: Sue Heald, Planning Staff Officer

Approval: David T. Bull, Forest Supervisor

TERRESTRIAL ECOSYSTEMS

Diversity
Item 5

OBJECTIVE: To determine biological diversity at various scales.

DATA SOURCE: Interdisciplinary team review of altered habitats.

FREQUENCY: One project per District per year.

REPORTING PERIOD: 2003

VARIABILITY: Failure to meet wildlife objectives.

EVALUATION:

The Forest Plan definition of diversity is "the distribution and abundance of different plant and animal communities and species within the area covered by a land and resource management plan." Evolving definitions have expanded this concept of biological diversity into "the variety of life and its ecological processes." The important addition to the definition is the consideration of processes, such as fire and nutrient cycling, which sustain ecological systems. Sustaining ecosystem health and productivity is closely tied to maintaining biodiversity. This concept is reflected in our current management practices and may be further incorporated into the Forest Plan when it is revised. Until the Forest Plan and this monitoring item are revised to incorporate the wider definitions of diversity we will follow the Plan (page IV-6) and measure this item against the variability yardstick of "failure to meet wildlife objectives." Beyond that, we are also measuring how we are meeting our diversity goals on the landscape and regional levels.

Biological diversity exists at several levels, including genetic, species, landscape, and regional diversity. The Forest Plan focuses on monitoring species diversity, and over the past several years we have monitored biodiversity at the landscape level as well. Results of the landscape analyses, including Integrated Resource Analyses (IRAs), Ecosystem Assessments at the Watershed Scale (EAWS), and the Bitterroot Landscape Assessment, indicate changes have occurred in vegetation structure and composition that should be addressed in the Forest Plan revision. Scientific researchers have documented similar conditions in studies throughout the Rocky Mountains. These results also need to be considered in the Forest's future management. In 1996, the Columbia River Basin "Scientific Assessment" was published, which helps us understand diversity at the broad regional scale. In May 1999, the Bitterroot Ecosystem Management Research Project symposium presented to the public and resource professionals data collected at the species and landscape levels by scientists and land managers. Interregional and forest-wide assessments were completed after the massive 2000 fire season, and a post-fire Forest Plan review was completed in 2001. Information from all these sources will be used in revising the Bitterroot Forest Plan.

MONITORING RESULTS:

Species Level Evaluation

Forest Plan goals and objectives for diversity are concerned with the need to support viable populations of wildlife and fish. Surveys for threatened, endangered, sensitive, and management indicator species provide information on distribution and important habitats for fish, plants, and wildlife. Monitoring discussions of these subjects may be found in the Sensitive Plant sections, the Wildlife sections, Old Growth Item 6, and Items 21 and 41 of the Aquatic section.

In an attempt to better preserve biological diversity and meet ecosystem management goals, we have, over the past several years, made many changes in the way we manage the land. These changes, implemented at the project scale, often represent different ways of management compared to what the Forest Plan predicted. For example, our silvicultural prescriptions have de-emphasized clearcutting and expanded other harvest methods such as group and individual tree selection. We are retaining more snags, leave trees, and down woody debris in harvest units. We have designed vegetation management, particularly fire, to reflect the scale and pattern of natural processes. The Forest has reintroduced fire via prescribed burning to reduce natural fuels and restore this critical process in appropriate areas (see the Fire Management section). Grassland restoration has become a

focus of the noxious weed program. The Forest has ongoing efforts to obtain native seed and revegetate disturbed areas with native plants. These ways of managing are not reflected in the current Forest Plan. When we revise the Plan, we will need to consider these new approaches on a Forest-wide basis.

Landscape Level Evaluation

In addition to the individual species approach, the Forest has been monitoring diversity at the landscape scale. Interdisciplinary teams have analyzed diversity by comparing current vegetation patterns and processes to historical conditions. The Forest also completed watershed, fisheries, recreation, transportation system, and wildlife habitat analyses as part of these assessments. We have found changes in vegetation structure and composition for several portions of the forest. The noted changes are primarily a result of fire suppression, uncharacteristically severe wildfire, certain types of timber harvest, and natural succession. We are using the information to guide project proposals.

In 2003 we evaluated over 25,000 acres in the Middle East Fork EAWS. To date, we have completed 18 landscape analyses, ranging in size from approximately 4,000 acres to over 300,000 acres. The largest of these, completed in December 2000, is documented in *Bitterroot Fires 2000, An Assessment of Post-Fire Conditions With Recovery Recommendations.* Parts of this assessment include burned over portions of previous assessment areas.

Regional Level Evaluation

In 1996, we saw the publication of an important document, An Integrated Scientific Assessment for Ecosystem Management in the Interior Columbia Basin, produced through the Columbia River Basin (CRB) project. Many of the findings in that report reflect the same results we have found from our IRAs and EAWS. Ecological changes identified at the Forest level, such as increased fire severity and changed forest structures, are occurring throughout the entire basin. The report provides additional information, particularly with regard to aquatic systems and rangeland. The assessment states that, compared to historic conditions, "aquatic biodiversity has declined through local extirpations, extinctions, and introduction of exotic species" (p.181). Another key finding is that "rangeland health and diversity have declined owing to exotic species introductions [and] changing fire regimes" (p.181). The effects of exotic species and altered fire regimes on biological diversity will be important management considerations as we revise the Forest Plan. Results of the CRB study also indicate the need to coordinate management between Forests so the problems are addressed at the basin-wide scale. Information provided by the Scientific Assessment could help the Bitterroot NF address many issues identified in our Forest Plan Five Year Review (1994), including native fish species, watershed health and restoration, access management, noxious weeds, old growth, altered stand structures, and changing forest composition.

Research Note

A project conducted by the Aldo Leopold Wilderness Research Institute is using mark-recapture to estimate various population parameters of spotted frogs, such as number of breeding individuals, population growth rate, and mortality/emigration. It will complement annual surveys of amphibian breeding sites throughout western Montana that are used to determine population status.

A Final Environmental Impact Statement (FEIS) and Proposed Decision for the Interior Columbia Basin were published in December 2000. The State Directors and Regional Foresters elected not to prepare a Record of Decision and instead have chosen to complete the Project through use of this "*The Interior Columbia Basin Strategy* "(Strategy). The Strategy provides guidance for incorporating the science data and resource information developed by the Project into land and resource management plans and project implementation. The Strategy takes into consideration concerns raised by the public along with the findings of the Science Assessment, and identifies key elements that need to be addressed in future planning efforts. Local planning will identify where, when, and how those needs should be addressed. The Strategy will be used to guide the amendment and revision of the Forest Plan.

Management Effects on Soils
Item 31

OBJECTIVE: To determine the effects of management activities on soil productivity.

DATA SOURCE: Soil inventory and site inspection prior to and after activity on susceptible soils.

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

REPORTING PERIOD: 2003.

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

EVALUATION:

There has been significant recovery from the fires of 2000 in terms of vegetative regrowth. There was one additional area of slope failure thought to be related to the fires of 2000 and that was on the North Fork Rye Road.

The work objectives for the summer were complicated by a new set of fires in 2003, which burned primarily on the Stevensville RD. These were the Cooney Ridge Complex, Gold 1, Big Creek and Frog Pond. The Frog Pond fire was mostly on the Salmon-Challis NF. Most severely burned portions were not within the Bitterroot NF and/or occurred mostly in Roadless Areas.

MONITORING RESULTS:

Pre-activity soils monitoring was conducted on several of the Burned Area Recovery harvest units in 2002 to determine baseline soil conditions. These data will be used to compare pre and post-harvest soil conditions. Monitoring of the applicable units is slated to occur in field season of 2004.

Soil amelioration or mitigation occurred in several areas this year. The affected land areas and types of work were:

Blodgett area	Three acres were restored via road obliteration (1.9 miles) and 250' of old two track trail was ripped.
Burke Gulch	Five acres were restored via road obliteration (1.6 miles) and soils amelioration.
Lake Como	Three acres of lake bed were protected by blocking off OHV access.
Crystal Mountain	Twenty acres (11.82 miles) of road were decommissioned.
Nez Perce Road	Several log grids were placed to stabilize the road cutslopes.
Laird, Reimel, and Guide Rye	Numerous skid trails were rehabilitated.

Salvage and rehabilitation activities were still ongoing in a few of the BAR units. Sale administrators did much of the monitoring during harvest activities. Initial observations indicate soil mitigation measures are being appropriately implemented and resulting effects on soils may be less severe then predicted in the final environmental impact statement.

Baseline conditions for new projects (Elk Bed Timber Sale (TS), Hayes Creek Fuels Reduction, Weird TS, Lyman TS and Fred Burr 80) were established. The data will be used to evaluate the effect of activities on these areas.

Although there were some areas that were severely burned in 2003, this was not the result of a Forest Service planned activity, i.e. prescribed burn, and is therefore not in violation of Forest Plan Standards.

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: 1999 through 2003.

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

EVALUATION:

The Forest Plan contains an objective to "achieve a species mix of offered volume that is nearly proportional to the amount of tree species that is currently growing." The Forest established the objective and supporting monitoring item because of a historic concern for the possible over-cutting of ponderosa pine and the avoidance of lodgepole pine harvest. In current projects the Forest is retaining ponderosa pine stands where they exist, to provide wildlife habitat and to help manage these habitats in an ecologically sound manner. Many recent and current projects are specifically designed to restore ponderosa pine ecosystems.

Ponderosa pine accounted for 19 percent of the volume sold from 1999 to 2003. This is above the ten percent predicted by the Plan, mainly due to the year 2000 fires. This is a short-term situation that is not cause for adjusting the Plan or our sales program. Once fire salvage sales taper off, the percentage of ponderosa pine will also decline. This monitoring item was intended to measure relative harvest of live ponderosa and lodgepole pine, whereas the current average reflects a great deal of dead trees of all species.

Lodgepole pine volume has varied from 4 percent to 36 percent of the total volume sold. Between 1999 and 2003, about 5 percent of the volume sold was lodgepole pine, compared to the 26 percent predicted by the Plan. This too is a temporary situation associated with the fires of 2000 and is not a cause for concern.

MONITORING RESULTS:

Table 2 shows the percentage distribution by species for FY2003 and a five-year average for FY1999 to FY2003. The 2003 data were taken from the Annual Cut and Sold Report.

Table 2 - Annual and Average Sold and Harvested Volumes

Species	Forest[1] Plan ASQ per year		Sold FY 2003[5] MMBF	Sold FY 2003 %	Sold FY 99-03 Average		Harvest FY 2003[5] MMBF	Harvest FY 2003 %	Harvest FY 99-03 Average	
	Volume	Percent			Volume	Percent			Volume	Percent
Ponderosa pine	3.34	10	1.2	15	0.9	19	0.6	6	0.7	11
Lodgepole pine[2]	8.67	26	0.3	4	0.3	5	1.7	18	1.8	26
Douglas-fir	16.02	48	5.1	67	2.7	53	6.2	64	2.9	43
Engelmann spruce	1.67	5	0.0	0	0.03	1	0.002	0	0.1	1
Subalpine fir[4]	3.34	10	0.0	0	0.1	2	0.002	0	0.2	2
Larch	0.33	1	0.0	0	0.01	0	0	0	0.02	0
Fuelwood			1.1	14	1.0	19	1.2	12	1.1	17
Total	**33.37**	**100**	**7.7**	**100**	**5.0**	**100.0**	**9.7**	**100**	**6.7**	**100.0**

1/ Forest Plan predicted first decade volumes (in million board feet) and percentages (Forest Plan EIS, II-73).

2/ Includes dead lodgepole and lodgepole posts & poles.

4/ Includes grand fir.

5/ 2003 data were taken from the Annual Cut and Sold Report.

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: 2003

VARIABILITY: Departure from management practice.

EVALUATION:

Monitoring efforts in 2003 continued to be emphasized in the burned area.

1. The Forest Leadership Team in conjunction with members of both interdisciplinary teams reviewed the Guide Timber Sale on the Sula Ranger District in July 2003 to discuss how well fuel reduction objectives were being met.
2. Prescriptions were reviewed and updated on Big Bull, Little Bull, Guide, Laird, and Bear Timber Sales. Continued beetle mortality is resulting in increased acres being treated, and a greater need for reforestation. Reforestation prescriptions are being updated after post-harvest field review.
3. Units prescribed for manual fuel reduction on the Darby Ranger District were reviewed in the field to assess the economic feasibility of the proposed treatments.

Outside the burned area, monitoring occurred on the Lost Moose Fuel Reduction Project on the Darby Ranger District. This project included non-commercial thinning, piling, and requirements for lopping and scattering slash to protect the treatment stands from insect problems. The project was reviewed for compliance with the prescription and whether the treatment successfully met the stated objectives of fuel reduction.

Research Note

Little is known about the effects of thinning and prescribed burning management practices on the physiological performance of ponderosa pine. Researchers from the University of Montana examined the performance of second growth ponderosa pine trees nine years after the application of four treatments: thinning, thinning followed by spring (wet) prescribed fire, thinning followed by fall (dry) prescribed fire, and unthinned control stands. This was one of many studies that have taken place in the Lick Creek Demonstration/Research Forest northwest of Darby. They found an overall improvement in long-term physiological performance of trees in the actively managed stands relative to trees in unmanaged control stands.

MONITORING RESULTS:

In the burned area, silvicultural prescriptions are being implemented to the extent that is feasible given the rapid deterioration rate of the standing timber. Less material is being removed commercially than what was prescribed in the silvicultural prescription and the end result is often more fuel left on site than was desired. Intensive data collection on fuel loading was collected in 2003 but has not yet been complied. The question remains whether investments in planting on acres with less than satisfactory fuel reduction are a wise use of limited funds.

As conditions change within the Burned Area Recovery project area, many of the silvicultural prescriptions are being updated. In some cases the prescription no longer adequately reflects the needs on the ground but is part of an existing contract with fixed requirements. The prescriptions are being implemented and are consistent with the environmental analysis, but additional entries will be needed to reach the desired stand condition. Several of the manual fuel reduction units will not be implemented because of the cost of accomplishing the work and the need to meet other, higher Forest priorities.

On the Lost Moose Fuel Reduction Project, the prescription was correctly followed and meets the stated objective of fuel reduction.

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: Timber Stand Management Record System (TSMRS) needs assessment and Regional Regeneration Indices Report.

FREQUENCY: Annually.

REPORTING PERIOD: Annually or 5 years from harvest

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

EVALUATION:

There are four significant points which emerge from this years monitoring of the reforestation program:

1. Many thousands of acres of burned land where natural regeneration was prescribed have not yet been surveyed to determine whether they are reforesting adequately on their own
2. The Forest is unable to keep up with the maintenance of the TSMRS database to accurately assess reforestation need
3. A reforestation backlog is emerging due to the fires of 2000 and the subsequent bark beetle epidemic.
4. The Forest is meeting the 5-year objective to reforest in those areas identified as a regeneration need and subsequently salvage logged.

The reforestation program on the Forest is tied almost exclusively to the wildfires of 2000 which burned 141,100 acres at high or moderate severity. In 2001 the burned area reforestation plan estimated that there were almost 50,000 acres on the Forest in need of planting (see Table 3 below) and more than 100,000 acres that needed to be monitored for natural regeneration. At the end of 2003, approximately 8,000 acres had been planted and 1,928 acres certified as successfully regenerated by natural seeding.

MONITORING RESULTS:

Table 3 summarizes the number of acres in need of reforestation on lands where timber management is a Forest Plan objective. The table shows how many of these lands have been planted or successfully regenerated by natural seeding. Both planted acres and lands proposed for natural regeneration are monitored and must be "certified." The term "certified" means that the stand has met the objectives stated in the silvicultural prescription and fully meets NFMA requirements. Monitoring is accomplished through periodic field inventories in every stand, random staked plots in planted stands, and a variety of reports generated from the timber stand management record system (TSMRS).

There are over 170,000 acres on the Forest in need of planting or where natural seeding needs to be verified. As more acres become infested with bark beetles, the acreage in need of reforestation is growing. Limited funding coupled with the enormous task of monitoring burned lands is creating an emerging reforestation backlog. Updating the TSMRS database is, in itself, a huge task which the Forest cannot keep up with. The TSMRS database lists 46,000 acres where planting may still be needed. Many of these acres were identified for planting in 2001 but have not been re-examined since they were inventoried immediately after the fires. Many of these acres still need fuel reduction. Three years after the fires, it is still too early in many areas to adequately assess the success of natural seeding. Very few acres prescribed for natural regeneration have been certified. The Forest will begin a major monitoring effort on lands scheduled for natural seeding in 2004.

Table 3 – Reforestation Needs and Accomplishments since 1999

Year	Estimated Acres in Need of Planting[1]	Acres Planted[2]	Acres Planned for Natural Regeneration [3]	Acres of Successful Natural Regeneration
1999				
2000	50,000		116,724	
2001		1,902	7,534	
2002		3,998	774	
2003		2,073	3,217	1,928
Total	**50,000**	**7,973**	**128,375**	**1,928**

Priority for planting has been in areas where salvage logging has occurred, where plantations were destroyed in the fires, or areas where ponderosa pine restoration is needed. To date, the Forest has planted several thousand acres of burned plantations and is currently planting areas where salvage logging has been completed. Limits in funding have prevented all high priority areas from being planted, and the emphasis is to ensure that areas salvaged are reforested within the 5 year timeframe. Ponderosa pine is the primary species being planted since other species, like Douglas-fir, lodgepole pine, subalpine fir, and engelmann spruce seed in more rapidly.

We track 38 different indices to monitor reforestation success. Four of these induces are listed in Table 4. These indices track the success of planting and natural regeneration activities, whether the desired trees per acre are being met, if Forests are keeping up with monitoring activities, and how long it takes to certify stands as fully reforested. The indices include all stands proposed for reforestation since 1996. A series of years are included in Table 4 to illustrate Forest-wide trends.

Table 4 - Success At Meeting Minimum Regeneration Standards By Year

Item No.	Regeneration Index	Goal	Regional Minimum Standard	1999	2000	2001	2002	2003
1	Percentage of planted stands that are progressing satisfactorily.	>90	>85	97	89	94	93	88
3	Percentage of stands where natural regeneration is proposed that are progressing satisfactorily	>90	>85	95	50	95	1	3
16	Percentage of stands, with regeneration harvest treatments or stand replacing fires for which the current regeneration status has been recorded in the timber stand database	100	>95	99	97	96	4	8
37	Percentage of planted stands that survived the first growing season and are progressing satisfactorily	>95	>90	100	74	96	97	83

[1] Generated from TSMRS after the 2000 wildfires
[2] Actual acreage planted and claimed annually as accomplished
[3] Acres where planting is not needed. Numbers are updated annually from TSMRS. Acres primarily from the 2000 or 2003 wildfires

The 2003 indices for items 1 and 37 indicate that where planting is occurring, reforestation is progressing as planned. First year survival of seedlings (item 37) planted in 2001 and 2002 were above the Regional goal of 90 percent. In 2003, survival dropped to 88 percent as a result of hot, dry summer weather and increasing amounts of vegetation competing for water on planting sites. The percent of stands planted in the last 5 years that are fully meeting reforestation objectives is 88 percent, above the Regional standard of 85 percent. The 2003 indice for item 3 indicates that the Forest has not adequately monitored natural regeneration following the fires of 2000. The index is higher than in 2002 but is still despairingly short of meeting the goal of 90. Index 16 indicates that the Forest has not been able to adequately maintain the TSMRS database.

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 2003

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

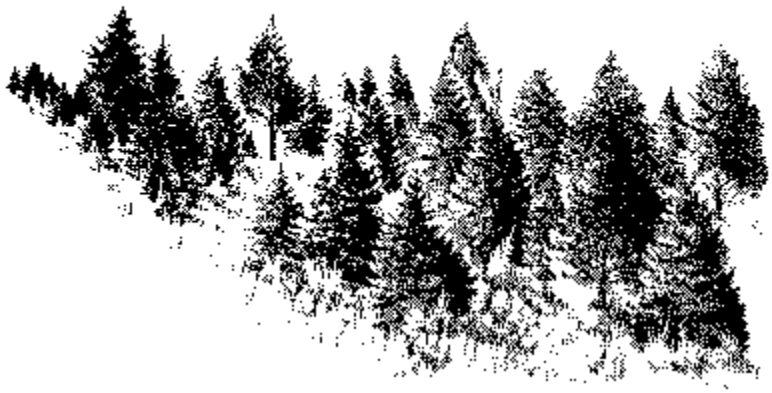
EVALUATION & MONITORING RESULTS:

Ground-truthing 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, at this point the results 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.

Previous monitoring has 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.

As we apply ecosystem management principles, we are finding the Forest Plan has limited our ability to reduce stocking levels 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. To date, site-specific amendments to the Forest Plan which allow 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.



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: Timber Stand Management Record System, environmental analyses, and timber sale folders.

FREQUENCY: 100 percent annually.

REPORTING PERIOD: 1989 to 2003.

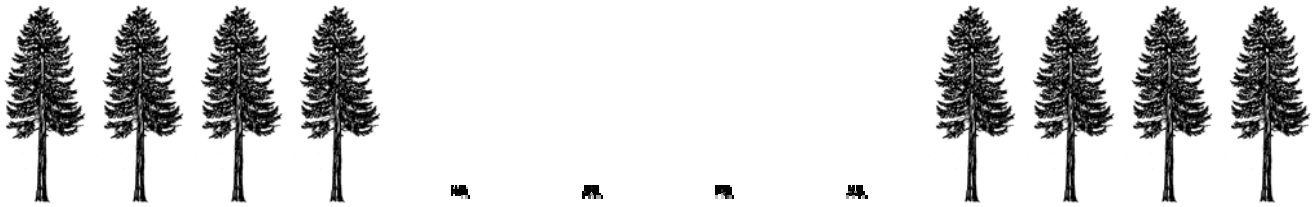
VARIABILITY: Any deviation from regulations.

EVALUATION & MONITORING RESULTS:

The Forest Plan and the Regional Guide stipulate that 40 acres is the maximum size for clearcuts and other harvest methods that create openings. Current planning efforts are evaluating vegetation management on a landscape scale. Historical data show patch sizes within some landscapes to be naturally larger than 40 acres. While clearcuts do not entirely mimic these openings and events, we have proposed some regeneration harvests that were larger than 40 acres, to approximate historical patch sizes. Application of fire along with the harvest treatment is also part of the overall effort to move toward the historic condition of larger patch sizes on the landscape.

Hazardous fuel reduction projects identified in the Burned Area Recovery FEIS, Record of Decision (ROD) and the Settlement Agreement have units larger than 40 acres. However, the ROD (page 28, in response to 36 CFR 219.27(d) Even-aged Management) found that “This management action will not create additional openings beyond those already created by the fires of 2000. In addition, NFMA contains a specific exception (219.27(d)(2)(iii)) that the established size limits will not apply to the size of areas harvested as a result of natural catastrophic conditions, such as fire, insect and disease attack, or windstorm (FEIS 3-408).”

We will continue to consider openings that approximate the historic, naturally occurring patch size. The Bitterroot NF will continue to request approval from the Regional Forester when analysis indicates that larger openings are appropriate.



Fire Management

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

DATA SOURCE: Fire management records.

FREQUENCY: Annually.

REPORTING PERIOD: 2003.

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

EVALUATION:

The challenge of managing wildland fire in the Bitterroot Valley continues to increase in complexity and magnitude. The potential for catastrophic wildfire threatens many wildland acres, particularly where vegetation patterns have been altered by past land use practices and a century of fire suppression. Serious and potentially permanent ecological deterioration is possible where fuel loads exceed historical conditions. As the Forest moves forward with Land Management Plan revision, the following areas may need to be incorporated into the Forest Plan to assist in future forest management.

- Develop a comprehensive approach to the management of wildland fire, hazardous fuels, and ecosystem restoration and rehabilitation on Federal and adjacent State, tribal, and private forest and range; emphasize measures to reduce risk to communities and the environment; and provide an effective framework for collaboration to accomplish this.
- Incorporate into the planning process the role of wildland fire as an essential ecological process and natural change agent, capitalizing on fire use whenever possible.
- Describe fire management objectives and suppression strategies across the Forest that are economically viable and based upon values to be protected.
- In analyzing wildland fire suppression strategies, consider historic burn patterns and how those patterns influence human uses, wildlife habitat needs, and watershed functions.
- Develop management strategies to address the movement of fire between wilderness and non-wilderness lands.

MONITORING RESULTS:

As a result of the Federal Wildland Fire Management Policy and Program Review, fire managers have adopted new terminology to better describe fire use and resource management needs. In order to reduce confusion, the following definitions are being introduced:

Prescribed Fire - Any fire ignited by management actions to meet specific objectives. A written, approved prescribed fire burn plan must exist, and the specific NEPA requirements must be met, prior to ignition.

Wildfire - An unwanted wildland fire. This term is technically no longer in use.

Wildland Fire - Any non-structure fire, other than prescribed fire, that occurs in the wildland. This term encompasses fires previously called both wildfires and prescribed natural fires; in other words, all fires not ignited by managers for predetermined objectives.

Wildland Fire Used for Resource Benefits (WFURB) - The management of naturally-ignited wildland fires to accomplish specific objectives in predefined geographic areas. These were formerly known as prescribed natural fires (PNFs).

Fire Use – The combination of wildland fire and prescribed fire applications to accomplish resource objectives.

Wildland Urban Interface (WUI) – the line, area or zone where structures and other human developments meet or intermingle with undeveloped wildland or vegetation fuels and is synonymous with the term "intermix".

Wildland Fire Situation

The 2003 fire season was typical for the Bitterroot Valley, although the end of the season was unusually dry. 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 2003 season, 1000 hr fuel moistures in late May were at about 20%. By mid-July, they had dropped to about 12%, reached 10% by August 1, and then stayed between 9 and 10% until about October 1, when they dropped to about 8% and stayed there until about Nov. 1.

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 as 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 2003, estimated ERC's in late May started out in the low 30's and by mid July to mid August peaked at about 60, and then slowly dropped back down to the mid 40s by late September. From late September until almost the first of November, ERC's stayed at about 40 so that going into winter, large diameter fuels remained quite dry, which may influence the 2004 fire season. Because of the unusually dry condition of the larger fuels, very little fall prescribed burning was accomplished because of concerns with soil protection.

The season's first fire was human-cause and recorded on April 10th, and the first lightning fire was recorded on May 31. The last lightning fire occurred on September 18th and the last human caused fire occurred on November 6th. Three wildland fires escaped initial attack and incident management teams were utilized to suppress those fires. Eight lightning fires were managed for wildland fire use, burning a total of 705 acres. Typically, the forest has about 150-160 fire starts annually, but in 2003 the forest experienced 101 starts.

Table 5 - Number of Fires by Year within Forest Protection Boundary

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	Average
Lightning	71	112	137	249	50	76	96	130
Human-caused	28	9	32	28	23	23	5	22
Total	99	121	169	277	73	99	101	152

Table 6 - 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	Average
Lightning	22826	2898	308,576	231	1241	11,595	27,433
Human-caused	3835	316	11,559	5	242	1,374	1,648
Total	26,661	3,214	320,135	236	1,483	12,969	29,081

Table 7 - 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	669	2	119	42
Percent of MA	0.2	<0.1	<0.1	<0.1
1990 Acres	2,132	7	534	3,649
Percent of MA	0.5	<0.1	0.2	0.4
1991 Acres	2,414	2,339	121	2,191
Percent of MA	0.6	2.4	<0.1	0.3
1992 Acres	169	7	69	343
Percent of MA	<0.1	<0.1	<0.1	<0.1
1993 Acres	9	<1	<1	448
Percent of MA	<0.1	<0.1	<0.1	<0.1
1994 Acres	1,164	495	3,837	3,961
Percent of MA	0.3	0.5	1.5	0.5
1995 Acres	323	2	6	288
Percent of MA	<0.1	<0.1	<0.1	<0.1
1996 Acres	747	217	367	46,821
Percent of MA	0.2	0.2	0.1	5.7
1997 Acres	119	11	2	108
Percent of MA	<0.1	<0.1	<0.1	<0.1
1998 Acres	3,875	5	157	22,624
Percent of MA	1.0	<0.1	<0.1	2.8
1999 Acres	29	1,415	28	3,130
Percent of MA	<0.1	1.4	<0.1	0.4
2000 Acres	216,998	28,331	20,899	53,907
Percent of MA	54.3	28.6	8.1	6.6
2001 Acres	7	0	11	218
Percent of MA	0.0	0.0	0.0	0.0
2002 Acres	167	63	15	1238
Percent of MA	<.01	<0.01	0.0	0.0
2003 Acres	10,155	6	2,350	458
Percent of MA	2.5	<0.01	0.9	<0.01
1989-2003 Average Annual Acres	**18,565**	**2,443**	**2,202**	**10,834**
1989-2003 Average Annual Percent of MA	**4.6**	**2.5**	**0.8**	**1.3**

The Bitterroot NF Fire Management Plan identifies 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. To this end, acres burned within these FMU's in 2003 included: FMU1 – 1,210; FMU2 – 8,310; FMU3 – 2,350; and FMU4 – 1,099.

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 8, 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. The 2003 program was able to accomplish some burning, but rapid drying in the early summer and an extended fire season into November hampered the program. The Forest continues to work to re-establish its prescribed fire program. We expect to continue increasing the prescribed fire program for the next three to five years, with the total annual area treated planned to level off at roughly 10,000 to 12,000 acres, depending on funding.

Table 8 - 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

	1998	1999	2000	2001	2002	2003	Average
Acres	5,700	5,100	2,982	755	349	2,191	2,701

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, State and Private Forestry program is working cooperatively with the Bitterroot 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

Research Note

A couple of research studies on the Bitterroot National Forest are looking at the effects of long-term fire exclusion on forest resources. Researchers from the University of Montana are studying the effects of long-term fire exclusion and the implications for nitrogen cycling, water availability, and allelopathy (chemical inhibition).

landowners to improve understanding of fire risk in areas that need fuels treatment. They have also been assisting Rural Fire Departments in developing Community Fire Plans that identify 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 catastrophic large fire.

During the past year the Bitter Root RC&D has completely treated about 200 acres of private land hazardous fuels through grants that have been made possible through the National Fire Plan and USFS State & Private Forestry and the State of Montana Department of Natural Resource and Conservation. The purpose of these grants is to reduce the fire risk in high-risk areas and to improve forest health.

The treatment of these 200 acres has provided defensible space and wildland fuel reduction that will assist wildland fire protection agencies in Ravalli County to protect approximately 45 homes. Currently, there are hazardous fuel projects on-going on private lands in Ravalli County being administered by RC&D that will eventually reduce fire risk on approximately 1,070 acres impacting over 250 homes. Indirectly, these treatments will assist in protecting many surrounding homes in the wildland urban interface by creating buffer zones between residential areas and other homes not directly treated with these projects.

Over the past 2 ½ years, the Bitter Root RC&D has treated over 600 acres of private lands, protecting over 150 homes.

All these fuels treatments projects are located in the wildland urban interface. Some of these areas are adjacent to Bitterroot Forest fuels treatment activities. Where possible, Forest Service and private landowner treatments will be planned to compliment each other's efforts.

Harvest of Moderate to High Risk Mountain Pine Beetle Stands
Item 25

OBJECTIVE: Track whether the majority of harvest of lodgepole pine is done within stands with a moderate to high risk of attack by mountain pine beetle.

DATA SOURCE: STARS Report 7

FREQUENCY: 100 percent annually.

REPORTING PERIOD: 2003

VARIABILITY: Less than 50 percent of lodgepole pine offered from high and moderate risk stands.

EVALUATION:

Harvest operations in 2003 continued to occur primarily within the area burned by the wildfires of 2000, removing dead and dying trees. Because of the sizeable amount of harvest planned within the burned area and the emphasis on treating urban-interface lands within the Bitterroot Valley, the amount of harvesting within "at risk" lodgepole stands is anticipated to be a small percentage of the overall program in the next few years. The need to treat these stands still exists but is a lower priority.

MONITORING RESULTS:

No sales were planned or awarded that included harvesting in "green" lodgepole stands. Table 9 shows total acres harvested on the Forest since 1991and how many of those acres were in lodgepole pine.

Table 9 - Summary Of Lodgepole Pine Stands, With High Or Moderate Mountain Pine Beetle Risk, Sold In 1991 Through 2003

Year Sold	Sale Area (acres)	Area of Lodgepole Pine (acres)	Area of High Risk Lodgepole Pine Sold (acres)	Area of Moderate Risk Lodgepole Pine Sold (acres)	Percent of Lodgepole Pine in High or Moderate Risk Category
1991	3348	1144	137	862	87
1992	1660	261	30	198	87
1993	1260	279	91	132	80
1994	1315	200	108	52	80
1995	1338	673	425	103	78
1996	1220	204	62	142	100
1997	1870	429	320	109	100
1998	2213	626	301	205	81
1999	986	193	186	7	100
2000	402	0	0	0	N/A
2001	498	0	0	0	N/A
2002	12,105	0	0	0	N/A
2003	1,874	0	0	0	N/A

Mountain Pine Beetle Infestation
Item 36

OBJECTIVE: Monitor trends of mountain pine beetle infestations and respond if needed.

DATA SOURCE: Forest Pest Management aerial observation by entomologists, field surveys.

FREQUENCY: 100 percent annually.

REPORTING PERIOD: 2003

VARIABILITY: Epidemic conditions approaching the suitable timber base.

EVALUATION:

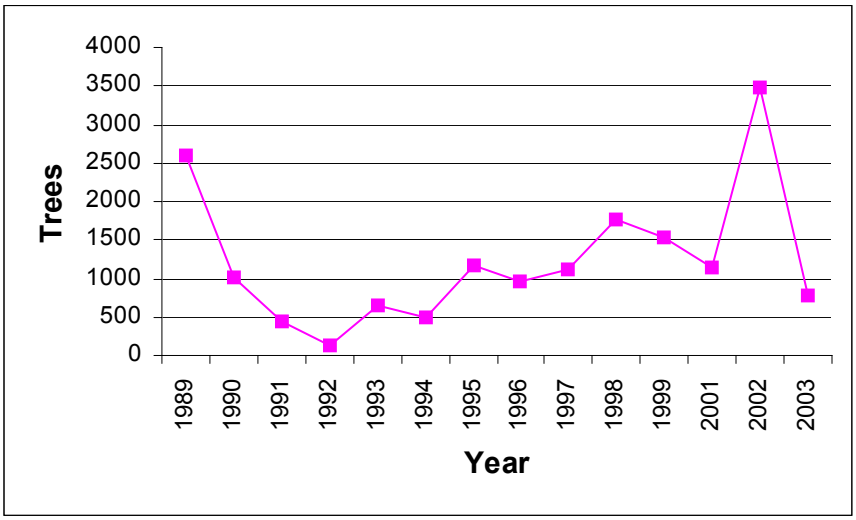
The aerial detection survey reported a decrease in tree mortality from mountain pine beetles in 2003 in both ponderosa pine and lodgepole pine. On-the-ground surveys indicate that this may not be the case and that the aerial detection survey can not accurately discern differences between fire related mortality and mortality caused by bark beetles. Mapped mortality was scattered throughout the Forest primarily on the Stevensville, Darby, and Sula Ranger Districts. Although populations declined on many Forests compared to 2002, overall populations of mountain pine beetle remain at all time highs within the Region and are present over thousands of acres on the adjacent Lolo and Nez Perce NFs. These populations are important to track because they provide a source which could build into a major infestation on the Bitterroot NF. Hot, dry summer conditions could result in beetle populations on the Forest similar to those we saw during the 1986 to 1989 drought.

The long-range strategy to reduce the impacts of mountain pine beetles on lodgepole pine is to increase age class diversity over a broad area. The long-term approach in ponderosa pine is to reduce stand density. Ponderosa pine stands with densities similar to historic conditions are better able to withstand mountain pine beetle attack.

MONITORING RESULTS:

Figure 1 illustrates the number of trees killed by mountain pine beetle on the Bitterroot NF as detected by aerial surveys from 1993 to 2003. In recent years, the presence of mountain pine beetles has not been tied to management activities, but is instead a result of drought conditions and, in some cases, wildfire caused stress.

Figure 1 – Mountain Pine Beetle Activity on the Bitterroot N.F. 1989 - 2003



Insect and Disease Status as a Result of Management Activity
Item 37

OBJECTIVE: To determine insect and disease status as a result of management activities.

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

FREQUENCY: Aerial observations completed annually. Surveys and site visits as needed.

REPORTING PERIOD: 2003

VARIABILITY: Epidemic conditions following management activities.

EVALUATION:

Forest insects and diseases are an integral part of forest ecology. At low levels, these organisms are responsible for subtle changes in forest composition and structure that generally go unnoticed. Epidemics are triggered by factors that increase the availability or susceptibility of host species and can alter forest conditions over large areas. For this reason forest insect and disease activity is often used as an indicator of general forest health, and management activities that provide favorable conditions for insect and disease spread are generally not desirable.

Douglas-fir bark beetles (*Dendroctonus pseudotsugae*) continue to be at epidemic levels across the Forest. The aerial detection survey indicates that tree mortality from other bark beetles has declined since last year. On-the-ground surveys indicate that this may not be the case and that even three years after the 2000 wildfires, it remains difficult to discern differences between fire related mortality and mortality caused by bark beetles.

Increased bark beetle activity is a combined consequence of the fires of 2000, decades of fire suppression, and dry weather conditions. It is not the direct result of management activities other than fire suppression. Beetle populations are high both inside and outside the burned area. Increased bark beetle activity following fire is not uncommon. Low-intensity or mixed severity burns leave fire-weakened trees that are very susceptible to attack by bark beetles. Outside of the burn, decades of fire suppression have created thousands of acres of dense, multistoried stands with a high composition of Douglas-fir. These conditions have resulted in elevated populations of bark beetles and are often associated with other problems like root disease, dwarf mistletoe and pine needle casts.

MONITORING RESULTS:

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, a division of USFS State and Private Forestry. 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 10 summarizes the insect and disease information provided by the aerial detection flights conducted in the summer of 2003. Data is 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. Following the table is a discussion of the insects and diseases that are a concern on the Forest.

Bark Beetles

Douglas fir Beetles: Populations remain epidemic for the fifth year in a row and show no sign of diminishing. Since Douglas-fir beetle epidemics typically last only 2 to 4 years, this is extremely unusual. Warm, dry weather conditions, 50 years of fire suppression, and the 2000 wildfires have created conditions extremely favorable for the spread of Douglas-fir bark beetles. There are thousands of acres classified as high and moderate hazard for Douglas-fir beetle attack on the Forest and as long as weather conditions remain conducive to beetle survival, the potential for continued expansion of bark beetle activity is likely.

Table 10 - Insect and Disease Aerial Survey Summary For 2003

	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	32,005	30,420	1,160	1,003	1,343	601	34,508	32,024
Mountain Pine Beetle (PP)	524	321	190	212	342	149	1,056	682
Mountain Pine Beetle (LP)	74	103					74	103
Mountain Pine Beetle (WBP)	78	54					78	54
Western Pine Beetle	38	29	14	7	2	1	55	37
Fir Engraver Beetle	16	11	18	11			34	22
West. Balsam Bark Beetle (SAF)	873	947					873	947
Engelmann Spruce Beetle	10	9					10	9
White Pine Blister Rust (WBP)	65	80					65	80
Lophodermella concolor (LP)	931		95				1,027	
Other Disease	192						192	
TOTAL ACRES	34,806	31,974	1,477	1,233	1,687	751	37,970	33,958

***** Montana outside of wilderness

Douglas-fir beetle-caused mortality has shifted from fire-injured trees in 2001 to unburned trees in 2002 and 2003. Approximately 16,900 acres of the West Fork Ranger District, including west of Nez Perce pass and almost every tributary of the West Fork, have Douglas-fir beetle-caused mortality. Douglas-fir mortality in the Sula and Darby Ranger Districts multiplied, from 900 and 350 acres to 10,200 and 5,760 acres, respectively. The Stevensville Ranger District has 1,300 scattered acres of Douglas-fir mortality, mostly in the Sapphire Mountains.

Figure 2 – Douglas-fir Beetle Infestations on Bitterroot NF

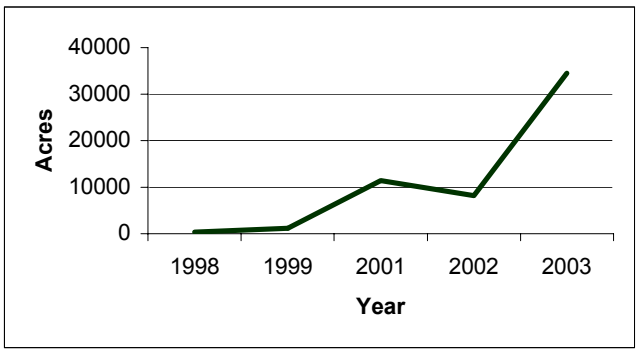


Figure 2 shows how these beetle populations have risen in the Montana portion of the Bitterroot NF since 1998. Early detection flights (1998 to 2001) covered the entire Forest, whereas in the past two years only non-wilderness lands were mapped. In 2001 over 20,000 acres of Douglas-fir beetle mortality were mapped in the wilderness. Observations made from the 2003 aerial detection flight noted numerous large groups of recently killed Douglas-fir in the Frank Church-River of No Return Wilderness. Recent beetle infestation data are not available for the wilderness, but there is no reason to assume that this level of beetle mortality is declining. The 2003 estimates shown in Table 10 are therefore very conservative.

This activity is not a direct result of management activities. Harvest operations within the areas burned in 2000 include removal of dead and dying trees attacked by bark beetles. The removal of beetle-infested trees from the limited number of acres being harvested will not significantly alter the development of future beetle populations on the Forest.

Other Bark Beetles: The aerial observation flight indicates that tree mortality from other bark beetles remains high, although the total number of acres infested and trees killed have decreased slightly since 2002. This may not truly be the case since the cause of mortality inside and adjacent to areas burned in 2000 continues to be difficult to discern. On-the-ground surveys indicate that other bark beetle populations remain high across the Forest.

Mortality of whitebark pine, ponderosa pine, and lodgepole pine from mountain pine (*Dendroctonus ponderosae*) beetle was detected throughout the Forest, with 200-600 acres of mortality on every ranger district. Western Balsam Bark Beetle (*Dryocoetes confusus*) killed subalpine fir on three ranger districts: Stevensville (>230 acres), Sula (60 acres), and West Fork (400 acres).

Bark beetle activity is occurring in and adjacent to areas burned in 2000 as well as in areas outside of the burn. Population expansion is associated with long-term, regional drought, increasing numbers of trees in areas where fire has been suppressed, and where other factors, like root rot, is present. This mortality is generally not associated with management activities except fire suppression.

Forest Diseases: Tree mortality from forest diseases continue to be detected in the aerial observation flight and in field observations. These diseases include White Pine Blister Rust (*Cronaritium*) which attacks and kills whitebark pine; root diseases (*Fomes annosus, Armellaria ostoyae*) which are common in Douglas-fir, and second-growth ponderosa pine stands; dwarf mistletoe (*Arceuthobium sp.*) a parasite on Douglas-fir, lodgepole pine, and western larch; and pine needle casts (*Elytroderma deformans)* in ponderosa pine and *Lophodermella concolor* in lodgepole pine. The 2003 aerial observation flight recorded an increase in *Lophodermella* on the West Fork Ranger District from 64 acres in 2002 to over 1,000 acres in 2003. *Lophodermella* is not a serious disease but should be monitored to determine whether there is an increasing trend on the Forest.

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 , http://www.fs.fed.us/r1-r4/spf/fhp/conditions/entry1.html . The following Forest Health & Protection Reports were completed on the Bitterroot National Forest in 2003:

Gibson, Ken. Douglas-fir Beetle in the Middle East Fork, EAWS, July 9, 2003. Missoula Field Office. R1. TR-03-18. July 9, 2003.

Gibson, Ken. Marking Guides for Blodgett Stewardship Project, Bitterroot National Forest. Missoula Field Office. R1. TR-03-03. January 1, 2003.

Jackson, Marcus; Lockman, Blakey. Elytroderma needle blight in ponderosa pine in the Elk Bed Analysis Area, Bitterroot National Forest, February 20, 2003. Missoula Field Office. R1. TR-03-08. February 20, 2003

Lockman, Blakey. Pathogens and Insects In a CEEM Certification Stand, Elk Bed Analysis Area, April 19, 2003. Missoula Field Office. R1. TR-03-12, April 19, 2003.

Lockman, Blakey, Gibson, Ken. Vegetative Management, Lake Como Campground, Bitterroot NF. Missoula Field Office. R1. TR-03-4. February 28, 2003

Research Note

Two studies conducted by the Northern Region are looking at spruce budworms and a pathogen called p-type *Heterobasidion annosum*, the causal agent of annosum root disease. The spruce budworm study involves returning to study sites set up in the early 1990s. They are looking at growth impact on various tree species, the effect of various harvesting practices on budworm populations, impact of budworm on seed and cone production in Douglas-fir seed trees, and other questions about the budworm. The study on the pathogen is looking at the incidence of p-type *Heterobasidion annosum* in various National Forests in the Northern Region.

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, and inventory.

FREQUENCY: 100 percent every three years.

REPORTING PERIOD: 2003

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 be 40 acres or larger and distributed over the management area. MA 1 requires three percent old growth retention, while MAs 2 and 3 require 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.

We have been inventorying old growth habitat for each project based on Regional old growth definitions and the Forest Plan standard. This requires analysis by third-order drainage and Management Area. During the analysis, 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. If the stand meets or exceeds certain levels for the criteria, based on the Bitterroot Forest Plan and the Regional definitions, we consider the stand to be old growth habitat.

In 2002 the inventory for old growth habitat characteristics of all the Forest's lands with a numerical old growth standard was over 99 percent completed. About 18 percent of the inventoried area has old growth habitat characteristics. This is about 70 percent more old growth than is required by Forest Plan standards. Prior to the 2003 fires, the old growth inventory for the area of the Forest with an old growth standard was completed. The 2003 fires undoubtedly affected some old growth habitat, but the burned areas have not yet been re-inventoried to measure the results. Given the location and scale of the 2003 fires, any loss is expected to be small at the Forest scale, but may be important for those third-order drainages that burned.

There continues to be a lack of information regarding old growth outside management areas 1, 2, and 3(a, b, c). The Plan sets no old growth retention standards for MAs 5 through 11. Updating and expanding the old growth data for these areas is a low priority since the Forest Plan allows for very little management that could impact the amount of old growth in MAs 5 through 11. The Forest Plan clearly sets standards for old growth habitat in areas where management of vegetation is expected to happen, but does not allow for other areas to substitute for a lack of old growth habitat in the managed lands. 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 to 11, as is intended by the Forest Plan.

We may need to update the Forest Plan to incorporate new research on old growth and to be consistent with changing definitions. There is some question as to whether tracking old growth by MA at the third-order drainage scale is the best approach. Through the Forest Plan revision, we may explore whether the minimum old growth amounts in the current Plan are in line with what may have existed under disturbance regimes typical in the past. Scientific findings from the Columbia River Basin study (1996) indicate a decline in the amount and connectivity of old multi-layered and single-layered forests on a basin-wide scale. We need more local analysis in order to understand whether such a decline has occurred on the Bitterroot NF. New information may indicate a need to

re-evaluate our standards for old growth, and to coordinate with other Forests in the basin to retain and restore this component of the ecosystem.

MONITORING RESULTS:

Table 11 shows a summary of the old growth inventory efforts to date, a complete inventory for old growth habitat characteristics of all Forest lands with a numerical old growth standard. As previously noted any effects the 2003 fires may have had on old growth habitat have not yet been evaluated.

Table 11 - 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*	Old Growth Habitat Area (acres)	Old Growth Habitat Area (percent)	Forest Plan Standard (percent)
Stevensville	**1**	**3,109**	**18**	**3**
	2	**890**	**9**	**8**
	3a	**6,133**	**17**	**8**
	3c	**1,490**	**35**	**8**
Total		**11,714**	**17.5**	
Darby	**1**	**8,865**	**13**	**3**
	2	**2,066**	**5**	**8**
	3a	**4,554**	**13**	**8**
	3c	**1,563**	**21**	**8**
Total		**17,048**	**11.3**	
Sula	**1**	**9,427**	**17**	**3**
	2	**7,961**	**18**	**8**
	3a	**4,835**	**19**	**8**
	3c**	**n/a**	**n/a**	**n/a**
Total		**22,223**	**17.5**	
West Fork	**1**	**19,352**	**27**	**3**
	2	**10,675**	**23**	**8**
	3a	**7,757**	**25**	**8**
	3c**	**n/a**	**n/a**	**n/a**
Total		**37,784**	**25.4**	
Forest-wide		**88,769**	**18.0**	

***** 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.

** No MA 3c occurs on the Sula or West Fork Districts.

FINDINGS:

Total current old growth habitat exceeds Forest Plan standards by a large margin.

Management Area 2 on the Darby District is below standards and any vegetation management activity proposed there should consider the fact it is short of old growth habitat. 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.

Similarly, 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 re-examined during Plan revision[4] (also see discussions on flammulated owls in the "Sensitive Wildlife Species" section).

Based on our knowledge of old growth habitat distribution on the Forest and conservatively assuming that old growth associated wildlife species requirements are at least marginally met by current Forest Plan standards, we can conclude that old growth associated species viability is not threatened by current management practices or natural degradation of old growth habitats.

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

Sensitive Plant Species Inventories

OBJECTIVE: To update inventory information on sensitive plant species in order to expand our knowledge of species' distribution and habitat.

DATA SOURCE: Sensitive plant species inventories.

FREQUENCY: Annually.

REPORTING PERIOD: 2002.

EVALUATION:

Inventories in 2003 emphasized fuel reduction and salvage projects. Other small projects, including trail construction, bridge replacements, and outfitter camps were also surveyed for sensitive plants. A total of about 3000 acres were surveyed, less than in past years, but there was a considerable amount of burned area revegetation work accomplished as well. Only one new dwarf onion (*Allium parvum)* and one turkey-pea (*Orogenia fusiformis)* population were found during the 2003 survey season. Monitoring of some of the sensitive plant populations burned in the 2000 fires was continued. Populations of Lemhi penstemon*,* hollyleaf clover *(Trifolium gymnocarpon),* woolly-head clover *(Trifolium eriocephalum* ssp*. arcuatum)* and candystick *(Allotropa virgata)* will be monitored for several years to determine post-fire effects*.*

Table 12displays the sensitive species and species of special concern we found as a result of surveys in 2003.

Table 12 - New Populations of Sensitive Plants and Species of Special Concern Found in FY2003

Common Name	Scientific Name	# New Populations
dwarf onion	*Allium parvum*	1
turkey-peas	*Orogenia fusiformis*	1

SPECIES INFORMATION (for species found in FY2003):

SENSITIVE PLANT SPECIES

Dwarf onion (*Allium parvum*)

Before 1993, dwarf onion was known from only three locations in the state, all in Ravalli County. Project associated field surveys have added thirty-seven new populations since then. All of these populations are located in the southern end of the Forest. The main threat to dwarf onion is spotted knapweed competition, since both species prefer bare soil on open, south-facing slopes. Because of this, the Region added dwarf onion to the sensitive plant list in the spring of 1999. One new population of dwarf onion was found during the 2003 field season.

Turkey-peas (Orogenia fusiformis)

Turkey-peas is a disjunct species in central Idaho and southwestern Montana. It is known to occur from Linn County, Oregon, south to northern California adjacent Idaho, east to southwestern Montana, and south to eastern Oregon, southern Idaho, Utah and western Colorado. There are 15 known populations on the Bitterroot National Forest, one population on the Lolo National Forest, near Lolo Hot Springs, and two populations on the Beaverhead National Forest. In 2002 two populations were found in the North Fork of Rye Creek extending the range of turkey-peas north into the Darby Ranger District. Before that it was only known from the Sula and West Fork Ranger Districts on the Bitterroot Forest. The new populations were found in an area burned in 2000, leading us to speculate that there may be a dormant seed bank stimulated by fire or other disturbances. Turkey-peas has also been found growing in old roadbeds and along the edges of trails. Since turkey-peas is a small plant with fine, linear leaves it is also possible that it has been overlooked in past surveys. There is a short window of opportunity for surveying turkey-peas since it is only apparent above ground for a couple of months in late spring, early summer. One new population was found in 2003 near an area where other populations have been found.

POPULATION INFORMATION

Table 13 includes 28 of the sensitive plant species and the number of known locations on the Bitterroot NF. It compares numbers of known populations in 1991, when the Forest's Sensitive Plant Program began, to numbers of presently known populations. An additional twelve species are suspected to occur on the Forest and are not included in this table.

Table 13 - Bitterroot National Forest Sensitive Plant Species Sites
(VASCULAR AND NON-VASCULAR SPECIES)

SPECIES	KNOWN IN 1991	KNOWN IN 2002	DISTRICT
Bitterroot bladderpod *(Lesquerella humilis)*	3	4	Stevensville
Bryoria subdivergens (lichen)	1	1	Stevensville
California false hellebore *(Veratrum californicum)*	0	1	Sula
candystick *(Allotropa virgata)*	19	56	All
crested shield-fern *(Dryopteris cristata)*	0	2	Darby
dwarf onion (*Allium parvum)*	3	49*	Darby, Sula, West Fork
English sundew *(Drosera anglica)*	1	1	Sula
Evermann's fleabane *(Erigeron evermannii)*	2	2	Darby, West Fork
giant helleborine *(Epipactus gigantea)*	0	1	West Fork
spiny greenbush *(Glossopetalon nevadense)*	1	3	West Fork
hollyleaf clover *(Trifolium gymnocarpon)*	2	17	West Fork
Idaho goldenweed *(Haplopappus aberrans)*	2	4	West Fork
Lemhi penstemon *(Penstemon lemhiensis)*	4	28	Darby, West Fork, Sula
Meesia triquetra (moss)	0	1	Darby
Payette penstemon *(Penstemon payettensis)*	2	2	West Fork
poor sedge *(Carex paupercula)*	0	1	Darby
primrose monkey-flower *(Mimulus primuloides)*	1	3	Sula
puzzling halimolobos *(Halimolobos perplexa)*	0	8	West Fork
Rocky Mountain paintbrush *(Castilleja covilleana)*	6	28	West Fork, Sula
rough fleabane *(Erigeron asperugineus)*	1	1	Stevensville
sandweed *(Athysanus pusillus)*	3	7	Stevensville, Darby
scalepod *(Idahoa scapigera)*	1	4	Stevensville
storm saxifrage *(Saxifraga tempestiva)*	3	3	Darby, West Fork, Sula
tapertip onion *(Allium acuminatum)*	1	1	Sula
turkey-peas *(Orogenia fusiformis)*	3	21*	West Fork, Sula, Darby
western boneset *(Eupatorium occidentale)*	3	8	All
western pearl flower *(Heterocodon rariflorum)*	1	3	Darby
woolly-head clover *(Trifolium eriocephalum* ssp. *arcuatum)*	3	11	West Fork

*New locations found in 2003 (see Table above).

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Lackschewitz, K. 1991. Vascular Plants of West-Central Montana--Identification Guidebook. Gen. Tech. Rep. INT-277, Ogden, UT, U.S. Dept. of Agriculture, Forest Service.

MTNHP (Montana Natural Heritage Program). 2002. Internet Field Guide. http://nhp.nris.state.mt.us/

U.S.D.A. Forest Service. 1999 update. Bitterroot National Forest Sensitive Plant List. On file, Bitterroot National Forest Headquarters, Hamilton, MT.

Effects of Management on Sensitive Plant Populations

OBJECTIVE: Monitor sensitive plant populations to determine effects of management on population viability.

DATA SOURCE: Sensitive plant species surveys.

FREQUENCY: Varies with project.

REPORTING PERIOD: 2003.

EVALUATION:

Monitoring continued in 2003 for the primrose monkey-flower *(Mimulus primuloides)* at the Lost Trail Bog (Fen), harsh paintbrush *(Castilleja hispida)* in the Bear and Huck Trap project areas, candystick *(Allotropa virgata)* in the Buck Little Boulder sale area, and Lemhi penstemon *(Penstemon lemhiensis)* in Beaver Creek. Monitoring also continued on the Bear sale area harsh paintbrush and spotted knapweed *(Centaurea biebersteinii {C. maculosa})* populations that burned at moderate intensity in 2000. Due to constraints caused by weather, prescribed fire treatments still had not occurred on the Beaver Creek Lemhi penstemon site as of the summer of 2003, but are proposed for the spring or fall of 2004. Post-fire monitoring continued on two Lemhi penstemon populations in Robbins Gulch, candystick populations in the Tolan Creek drainage, and a hollyleaf clover *(Trifolium gymnocarpon)* and woolly-head clover *(T. eriocephalum* ssp*. arcuatum)* population in the Blue Joint drainage. The effects of post-fire spotted knapweed encroachment on the Lemhi penstemon and clover populations are also being monitored. Results from these monitoring plots are documented in a separate section: "Effects of Fire on Sensitive Plant Populations".

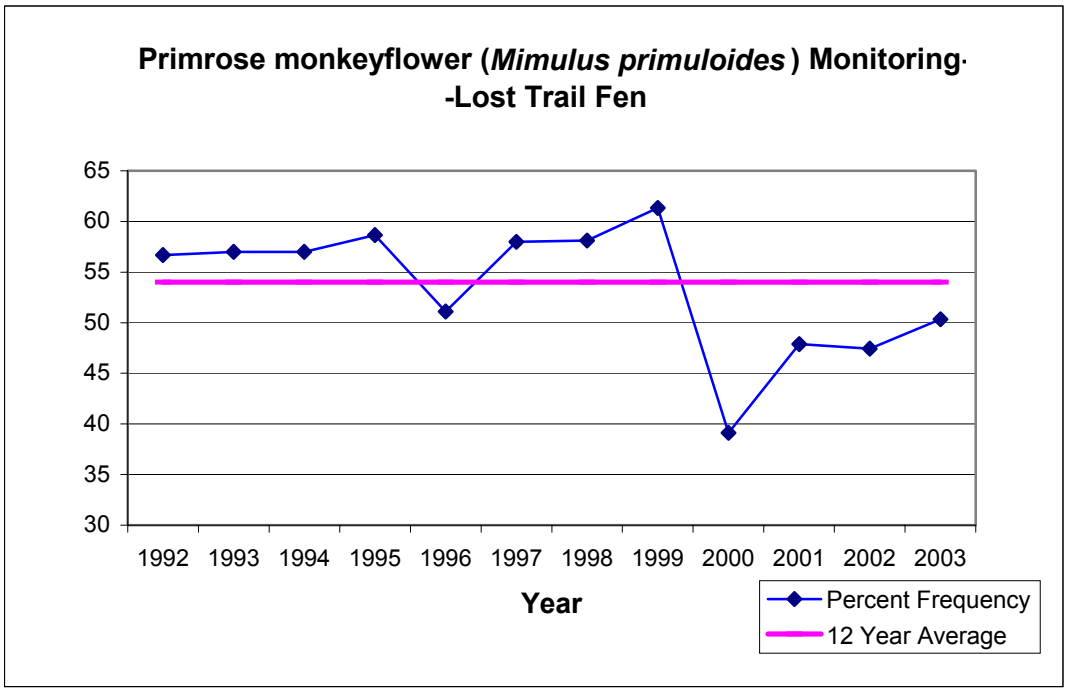
The purpose of monitoring these sensitive plant populations is to assess the effects of management activities and success of mitigation measures on sensitive plant populations. The Beaver Creek Lemhi penstemon data is also being used to measure trends in population over time. Fire effects are addressed in a separate monitoring document.

MONITORING RESULTS:

Primrose Monkey-flower

We established nine permanently marked transects at the Lost Trail Fen in 1992, to determine the effects of activities at the Lost Trail quarry on the population of primrose monkey-flower. Hummocks were mapped where concentrations of primrose monkey-flower occurred, and transects were established to monitor distribution and collect base line frequency data prior to removing rock from the quarry. The quarry was in use between 1993 and 1996. The first eight years of data show minor fluctuations in population size, except for 1996 which was about 4% below average (see graph below). That summer was very hot and dry, possibly contributing to the decreased frequency. The below average frequencies since 1999 are likely due to the drought we have been experiencing with late season snow pack during March 2002 and March 2003 possibly leading to increased sprouting of the rhizomatous monkey-flower.

Figure 3 - Primrose Monkey-flower
Frequency Monitoring at Lost Trail Fen



Filling and recontouring of the quarry was completed in 1997, and revegetation was accomplished in 1998. Upon completion of the quarry reclamation expansion work began on the Lost Trial Ski Area. Two ski lifts and all ski runs are completed but work still remains on an additional lift, ski lodge, and warming cabin. We will continue monitoring primrose monkey-flower and the fen until after completion of the ski area expansion.

Candystick

Candystick is a mycotrophic, non-green plant, obtaining carbohydrates from a mycorrhizal fungus associated with its roots. The mycorrhizae transfer nutrients from a photosynthesizing plant via underground root connections (Furman and Trappe 1971, Castellano and Trappe 1985). In the northern Rocky Mountains, the host photosynthesizing plant is probably lodgepole pine.

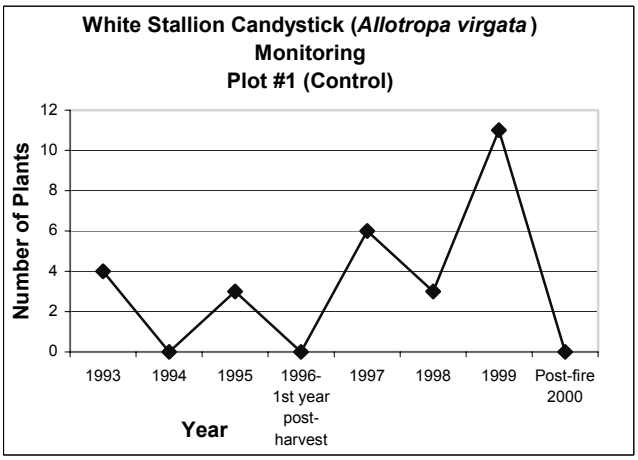
White Stallion Timber Sale

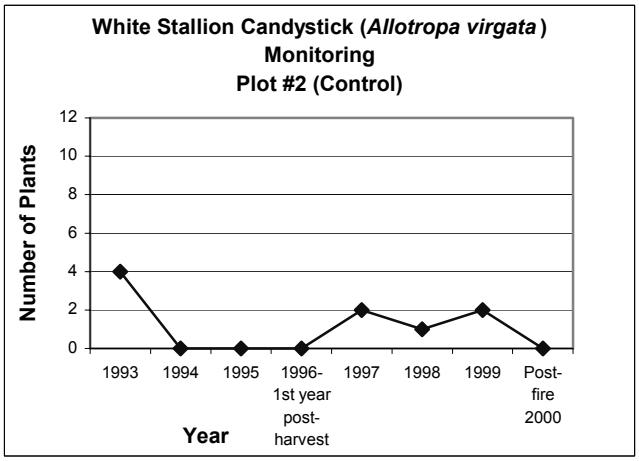
The Forest established five permanent density and general ECODATA plots in 1993 to determine the effects of logging activities on the populations of candystick in the White Stallion Timber Sale. We established two plots (#3 and #4) in a shelterwood unit, with some trees left standing, and a third plot (#5) at the edge of a leave tree unit with a buffer zone of trees between the candystick plants and the cutting unit. Additionally, we set up two control plots (#1 and #2) in unharvested areas containing candystick plants with similar habitat and aspect to test plots #3 and #4. We reread the density plots in 1994 and 1995, prior to logging in the winter of 1995-96. The Forest underburned the shelterwood unit in the spring of 1997, so 1996 data is post-harvest, pre-burn. Since 1996 was a hot, dry summer, the low number of live stems seen that year could have been due to the timber harvest, the weather, or a combination of both. The years 1993, 1995, 1997 and 1999 all had cool summers with either a high snowpack the winter before or a wet spring season. Seven years of data collection seems to show a strong correlation between soil moisture and flowering of candystick plants (see Figure 4 below). The association of candystick with soil mycorrhizae (fungi) backs up this assumption.

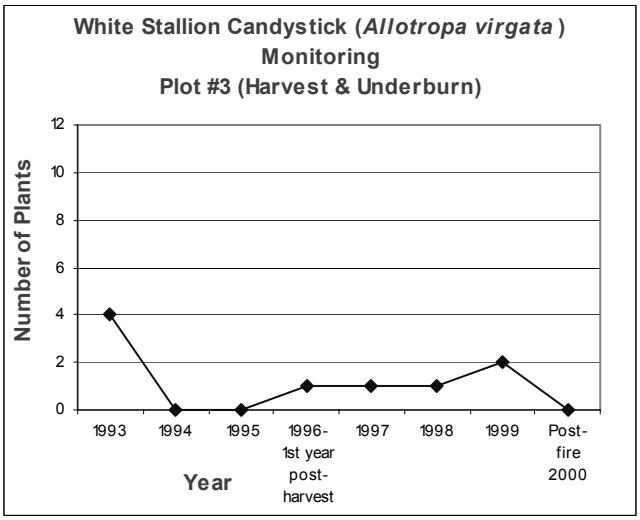
In the summer of 2000, the upper Sleeping Child drainage (including the White Stallion area) was severely burned during the Skalkaho Complex of fires. This area consisted of late successional lodgepole pine which historically burned in a stand-replacing manner. However, the extent of these fires was unprecedented in the Northern Rockies due to the extremely dry weather that began in the fall of 1999 and continued through the summer of 2000. Fuel moisture levels were at record lows and live vegetation greened up earlier than normal, resulting in an abundance of dry, combustible vegetation by late July. The result was that areas with longer fire cycles (as in the

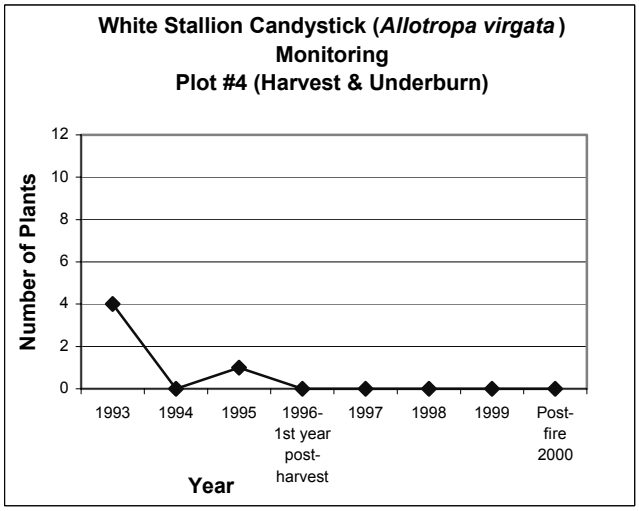
upper Sleeping Child) were ripe for a major fire event. These late successional lodgepole pine stands normally have a stand-replacing fire cycle of 100 to 500 years with lighter ground fires sometimes occurring mid-cycle (Fischer and Bradley, 1987). The candystick plots in the White Stallion Timber Sale were located in this type of fire model and were burned during the 2000 fires. Two of the plots were re-established during 2001 and another in 2002, but there were no live trees and no candystick plants seen. These plots will be revisited periodically for an indefinite period of time to determine if and when candystick reappears in the burned area.

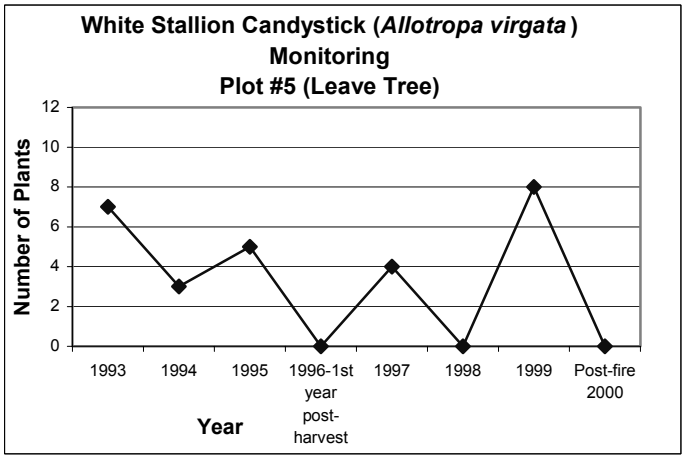
Figure 4 - Candystick Density Monitoring at White Stallion









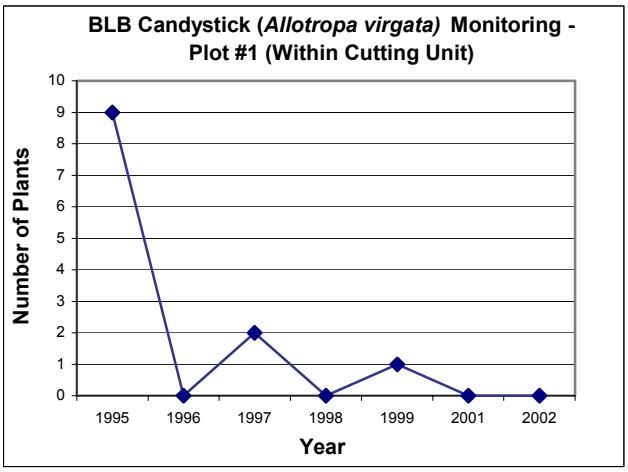


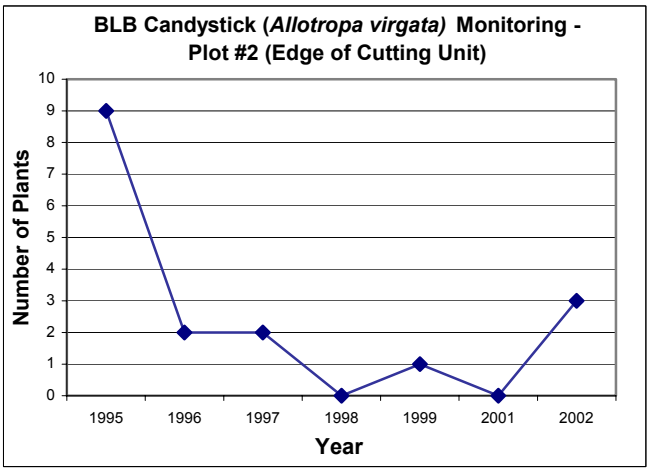
Buck-Little Boulder Timber Sale

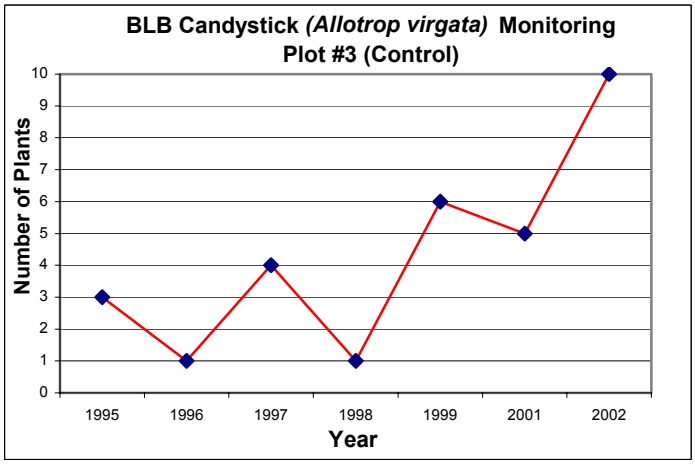
In the summer of 1995, prior to logging activities, the Forest established three permanent circular plots in the Buck-Little Boulder Timber Sale. We established density plots in order to monitor an overstory removal area where most of the trees would be harvested in order to stimulate understory growth. Three plots were set up for the monitoring: one within the unit, one on the edge, and a control plot just outside the unit. Timber was harvested in the winter of 1995-96 and we re-measured the plots five of the following six summers (2000 was excluded due to severe fire danger).

The charts below summarize the results of the seven years of monitoring at Buck-Little Boulder. It is difficult to draw any conclusions about the impact of timber harvest on candystick viability, since precipitation appears to be a major contributing factor in the plant's life cycle (see White Stallion monitoring above). However, since candystick requires a live host tree to survive, any candystick associated with harvested trees should not survive post-harvest. During the hot, dry summer of 1996 populations of candystick declined at Buck-Little Boulder. This was also the first year post-harvest so the loss of host trees most likely contributed to the decline. Fluctuation patterns in plant numbers are similar between Buck Little Boulder and White Stallion, with declines noted in drier years (1996 and 1998). Plots were not read in 2000 due to the extreme fire danger, even though the Buck-Little Boulder area was not burned in the fires. Monitoring was continued in 2001 and estimates of plant numbers that may have occurred in 2000 were made based on the number and condition of dead (year 2000) stems. If these estimates are accurate, then 2000 indicated a slight increase over 1999. The extremely dry weather we've had the past 3 to 4 years may only now be catching up in these higher elevation areas, where snow pack increases the moisture compared to lower elevations. We will continue monitoring for up to ten years post-logging to better determine how timber harvest affects candystick. No data was collected in 2003.

Figure 5 - Candystick Density Monitoring at Buck-Little Boulder (BLB) Timber Sale





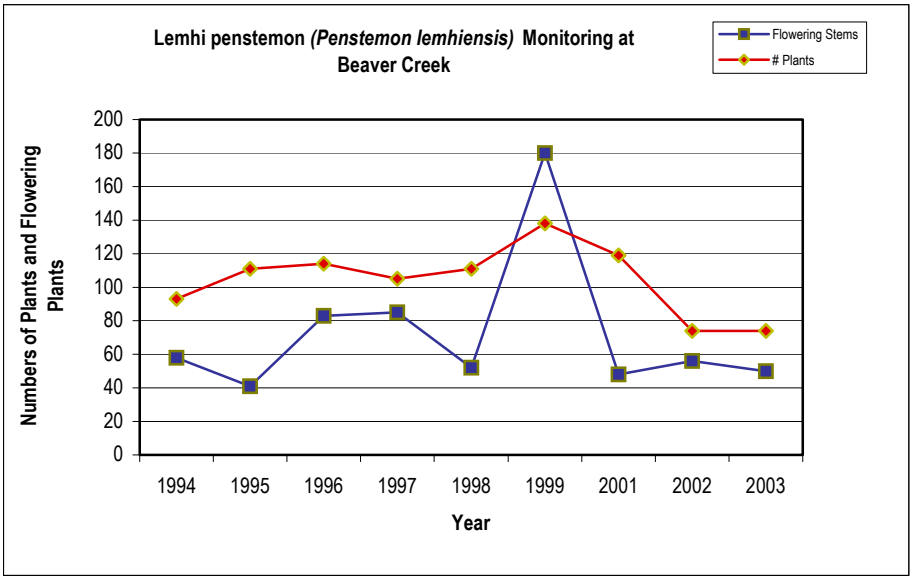


Lemhi Penstemon

In 1994, the Forest established four permanent transects above Beaver Creek on the West Fork District, in conjunction with a conservation strategy for the Lemhi penstemon (Elzinga, 1997). We have reread these plots annually from 1995 to 2003 (excluding 2000) in order to measure trends in population size over time. There have been fluctuations in plant numbers over the nine-year monitoring period, with 2002 and 2003 showing the lowest number of plants. The site is also part of the Beaver Woods Vegetation Management Project, the 1996 Bitterroot NF Noxious Weed EA, and the Noxious Weed Treatment Project EIS (2003). We will use the data we collect to monitor effects of the underburning and noxious weed control measures identified in these projects on Lemhi penstemon. The Forest sprayed for noxious weeds on road cut slopes just below the transects in the spring of 1996, but not in the area where Lemhi penstemon occurs. Under burning is proposed to occur in 2004, targeting areas above the monitoring plots while fire will be allowed to back down to the area where the plots occur. The 2003 Weed EIS proposes upland spot treatments to target the spotted knapweed encroaching on the Beaver Creek grasslands and Lemhi penstemon populations. This area is relatively weed-free but hand pulling over the nine monitoring years has not been effective in controlling knapweed in the vicinity of the monitoring plots. See **Figure 6** below for a summary of results.

The summer of 1994 was particularly hot and dry, after a wet summer of 1993. From 2000 to 2003 we have had above average temperatures in July with below average precipitation annually from 1999 through 2002. Every other year has been moist, at least in the early part of the season, and numbers of Lemhi penstemon plants were higher. More new plants were seen in 1999 than any other monitoring year. This may have been a result of high soil moisture in the early summer. The winter before (1998-1999) had high snow accumulations and it was late spring to early summer before the snow melted off in the Beaver Creek area. Lemhi penstemon seed appears to require the moist chilling conditions of winter to break dormancy, although seeds may germinate in the spring, summer, or fall, depending on unknown environmental factors (Elzinga, 1997). The year after the 2000 fire season new seedlings were seen sprouting in late summer in a moderate to high severity burn area (see “Effects of Fire on Sensitive Plants" for more information on the impacts of fire on Lemhi penstemon populations). Factors such as pollination patterns, seed production, predation, disease and insects may affect population size from year to year. Fluctuations in most plant populations may be normal, but it will be important to continue monitoring this population, since the species is rare in the state. Minor fluctuations could have major impacts on the typically small populations we often find on the Forest. Spotted knapweed competition and fire suppression are the major threats to Lemhi penstemon (Elzinga, 1997), so management activities proposed on this site to treat these concerns should be beneficial to the species.

Figure 6 – Lemhi Penstemon Density Monitoring at Beaver Creek



In order to monitor effects of burning on Lemhi penstemon and Rocky Mountain paintbrush we established a second monitoring plot further up slope in the Beaver Creek area. We will reread this plot after burning activities occur to monitor the effects of underburning on these species.

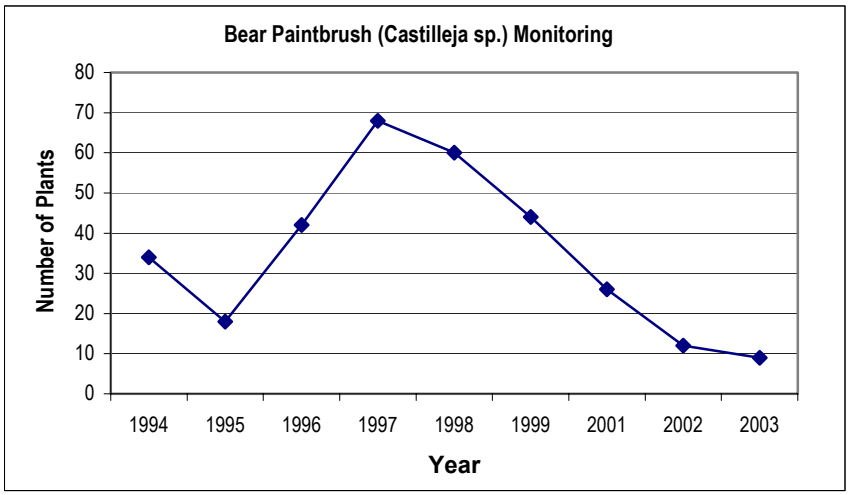
Rocky Mountain Paintbrush

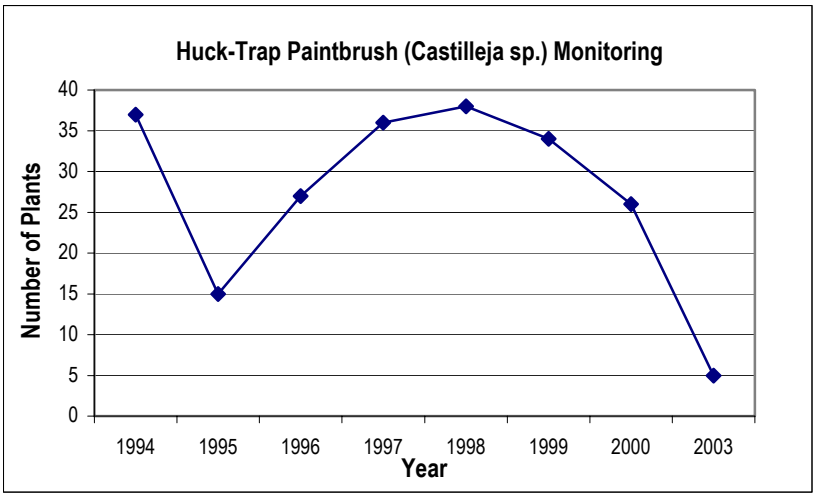
In order to determine the effects of underburning on paintbrush species *(Castilleja spp.)* the Forest established monitoring plots in the Huck-Trap and Bear project areas in 1994. Genetic studies completed on these populations determined that the species being monitored was actually harsh paintbrush *(Castilleja hispida),* rather than the sensitive species, Rocky Mountain paintbrush *(C. covilleana),* as originally suspected (Brunsfeld, 1994). The Forest decided to continue the monitoring since the plots were permanently marked and the effects on either species of paintbrush should be comparable. These populations of harsh paintbrush are being monitored for the

effects of understory removal and burning. In addition to numbers of paintbrush plants, we are collecting frequency data for spotted knapweed to determine the extent of increase following disturbance. Population trend data for both paintbrush and knapweed will be useful in understanding the interaction of noxious weeds with native plant communities, particularly after disturbance.

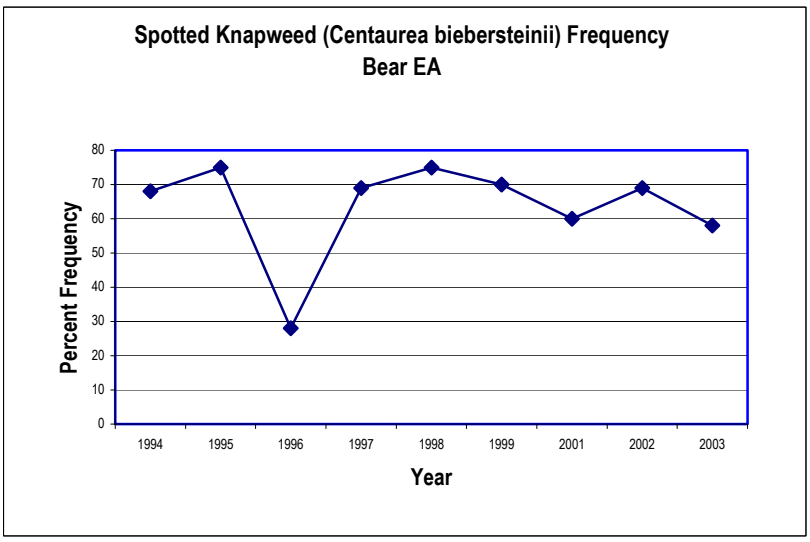
The summer of 1994 was extremely hot and dry and may have stressed paintbrush plants enough to cause the decline in numbers noted in 1995 for both project areas. However, heavier than normal precipitation during the fall of 1995 and winter of 1996 may have assisted in the increased numbers seen in the spring of 1996. It is interesting to note the almost 50% decrease in knapweed frequency in 1996 after the wet fall and winter. The high soil moisture may have also affected knapweed seed germination or seedling survival. Paintbrush plants come up in the spring and flower in early summer, while knapweed plants follow a warmer weather cycle, flowering in late summer. Spotted knapweed also prefers a hot, dry climate. Knapweed frequency was up again in 1997 and paintbrush numbers continued to increase, possibly an indication of the more "normal" wet spring, dry summer and fall conditions. There was a large increase in the number of paintbrush plants present in the Bear EA plot in 1997 as opposed to a smaller increase in the Huck Trap plot. One theory for this could be the lack of knapweed competition the year before, contributing to higher seedling recruitment. Population numbers remained about the same in 1998, when temperatures fluctuated (warm and dry in early spring; wet and cool in late spring and early summer; and hot and dry in middle to late summer). However, numbers were down again in 1999, possibly due to the hotter weather the summer before. Paintbrush plant numbers in the Huck-Trap plot were consistent from 1997 through 1999. In 2000, numbers dropped to 1996 levels, possibly due to the extremely dry weather. Knapweed percent frequency also increased. The Bear plot is about 1200 feet higher in elevation than the Huck-Trap plot and appears to have more spotted knapweed (therefore more competition for habitat), which could affect any comparisons between these two plant communities. The Bear Timber Sale plot was not read in 2000 due to the extreme fire danger. The plot was lightly burned in the fire and salvage logging occurred in the vicinity during the winter of 2001-02. The Huck-Trap plots were not impacted by the 2000 fires and were read prior to the fire season. The Bear plot has been read in 2001 – 2003, the Huck-Trap plot was read in 2003. Paintbrush numbers show a declining trend, particularly at the Huck-Trap site, which doesn't necessarily correlate with knapweed frequency. The extremely dry weather of the past few years may be contributing to this. Paintbrushes are hemi-parasitic plants and rely on a companion plant for survival (Native Plants Network 2004). Since all plant life is probably being impacted by the drought, paintbrushes could be particularly vulnerable due to their dependence on other species

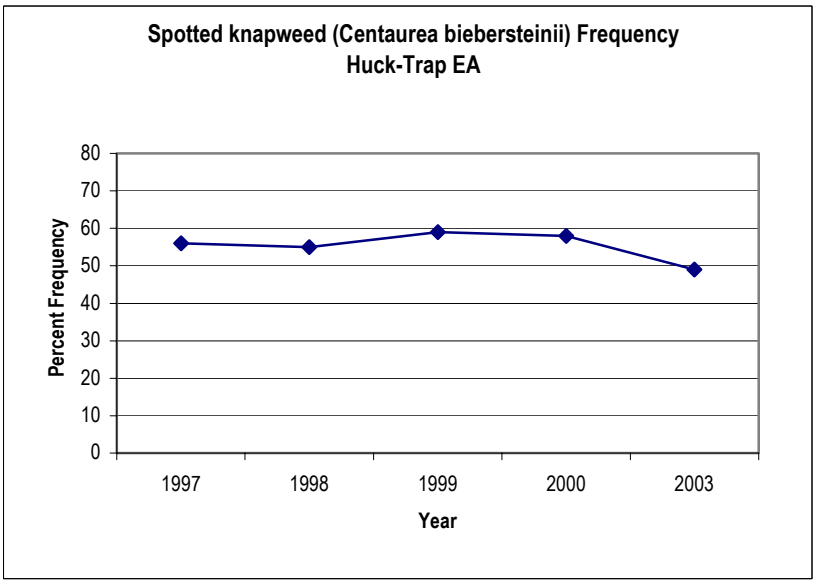
Figure 7 - Paintbrush Monitoring





Spotted Knapweed Monitoring





* Knapweed frequency was not measured first three years on Huck-Trap.

As mentioned above (see Lemhi penstemon), we established another plot on a site above Beaver Creek containing Rocky Mountain paintbrush and Lemhi penstemon to monitor the effects of burning on these two species. We will reread this plot after underburning activities occur.

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Furman, T.E. and J.M. Trappe. 1971. Q. Rev. Biol. 46, 219-225.

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Effects of Fire on Sensitive Plant Populations

OBJECTIVE: Monitor sensitive plant populations to determine effects of fire on population viability.

DATA SOURCE: Sensitive plant species surveys and fire mapping.

FREQUENCY: Varies with project.

REPORTING PERIOD: 2003.

EVALUATION:

The fires of 2000 burned over several sensitive plant populations on the Bitterroot Forest. Most of these species are found in fire-adapted plant communities and they are presumed to have evolved adaptations to survive periodic fire episodes. The 2000 fires were severe in some areas because of the extremely dry weather and the accumulation of fuels from years of fire suppression. A few sensitive plant populations that burned were located in severely burned areas, while others were associated with lighter, more moderate burns that left some live trees and understory vegetation scorched. Some valuable information on these sensitive plant species and their response to fire is being obtained by post-fire monitoring.

Few of the sensitive plant populations that were burned in 2000 had established pre-fire monitoring plots. Plots previously established for candystick *(Allotropa virgata)* in the White Stallion area, and harsh paintbrush *(Castilleja sp.)* in the Two Bear area will continue to be monitored and documented in the "Effects of Management on Sensitive Plant Species" section of this monitoring report. In addition to these previously established plots, monitoring plots were established during the summer of 2001 to monitor the effects of fire on Lemhi penstemon and candystick (under low to moderate burn severities). Plots were also established during the 2002 field season in an area where hollyleaf and woolly-head clover burned. Data on spotted knapweed *(Centaurea biebersteinii)* frequency was also collected on the Lemhi penstemon and clover sites. Budget and time constraints prohibited any further monitoring.

MONITORING RESULTS:

Lemhi penstemon and spotted knapweed

Two monitoring plots were established in the Robbins Gulch area, one during the fall of 2001 and one in 2002. Both plots are in areas that burned moderately to severely. Post-fire observations revealed many new Lemhi penstemon plants (seedlings), as well as resprouting stalks on these sites. Helicopter salvage logging was conducted adjacent to the plot established in 2001, but the monitoring plot and the rest of the Lemhi penstemon population were excluded. However, further survey work along the ridge where this plot was located revealed another large population of plants. Many seedlings were present suggesting a dormant seed bank that was stimulated by the 2000 fires. The second monitoring plot was established at this site. Lemhi penstemon plant density was measured along with spotted knapweed frequency at both sites.

Without any pre-fire data on these populations it will be difficult to show significant changes due to the fire, but increases in seedlings versus resprouting plants may indicate the presence of a seed bank that is stimulated by fire. Continued monitoring should also tell us something about the long-term viability of this population and the possible impacts from knapweed competition. Herbicide treatment with clopyralid will be applied

Table 14 - Lemhi penstemon density and spotted knapweed frequency: Robbins Gulch

Data Collected	Year	Plot #1	Plot #2
Seedlings	2001	21	No data
	2002	0	5
	2003	2	19
# Mature	2001	45	X
	2002	111	336
	2003	120	271
# Mature Flowering	2001	0	No data
	2002	23	27
	2003	15	38
Total Plants	2001	66	No data
	2002	111	341
	2003	122	290
% Freq Knapweed	2001	56%	No data
	2002	70%	56%
	2003	90%	90%

during the fall to help reduce knapweed density while minimizing impacts on Lemhi penstemon. Clopyralid is more specifically targeted for knapweed although it isn't as effective as picloram for long-term control.

Candystick

The White Stallion candystick monitoring that was established in 1993 will be used to continue monitoring of candystick under high severity burn conditions[5]. Three circular plots were established in the Tolan Creek drainage in low severity burn areas and one irregular plot was established in a moderate severity area. Since the species is not very common in the locations it has been found, plots were picked based on the presence of candystick in the area. Three years of data are still not showing anything significant other than possibly confirming the need for live host trees for survival. Plot #3 had some trees killed by beetles since the 2002 survey. This could explain the decrease in candystick in this plot. However, this was also a very hot, dry summer and past monitoring of candystick at White Stallion and Buck Little Boulder indicate candystick thrives on moist soil conditions[1]. The plants recorded below for 2000 include all plants from years previous to 2001, so there may not have been that many plants alive in any one year. However, this will give us some basis for comparison of the pre-burn to post-burn conditions. There is no salvage logging currently proposed for these areas. Two of the plots were located in areas that were excluded from the Tolan Creek Timber Sale (1993) due to the presence of these candystick populations.

Table 15 - Tolan Creek Candystick

Plot #	Numbers of Plants by Year			
	</=2000*	2001	2002	2003
1	10	1	2	0
2	11	3	3	1
3	14	1	3	0**

*Based on # old stems seen in 2001. Could be from 2000 or years previous to then.
**More beetle-killed trees this year.

REFERENCES

Heidel, B. and J. S. Shelly. 2001. The effects of fire on Lemhi penstemon *(Penstemon lemhiensis)* – final monitoring report, 1995-2000. Report to the Beaverhead-Deerlodge National Forest and the Dillon Field Office – Bureau of Land Management. Montana Natural Heritage Program, Helena. 22pp. plus appendices.

[5] See the "Effects of Management on Sensitive Plant Populations" section for monitoring results.

Invasive Plants
Item 10

OBJECTIVE: Monitor the inventory and control program for invasive plants.

DATA SOURCE: Inventory of infestations.

FREQUENCY: 100% every three years.

VARIABILITY: Increase in area infested.

REPORTING PERIOD: 2003

EVALUATION:

Monitoring has shown a substantial increase in invasive plants species and area infested over the past decade. This will likely be an important topic during Forest Plan revision.

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 and quick eradication of new invaders remains a high priority. 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 either used alone or enhanced by combining and timing of these methods. Mapping of noxious weed infestations is ongoing.

Implementation of an Expanded Forest-Wide Invasive Plant Integrated Program:

The Bitterroot Forest invasive plant management program increased ten-fold in 2003 with the signing of the Forest Noxious Weed Treatment Project Record of Decision. The document identified new expanded objectives for the Forest and provided a road map for how to achieve those objectives over the next ten years. It emphasized application of the progressive principles of Integrated Pest Management.

Funds for invasive plant prevention, treatment and monitoring were released to the Forest from the fire recovery effort. Close to one million dollars in IPM work, extending out as far as 2008, was obligated by the Forest in 2003 in three multi-year contracts and one long-term participating agreement with Ravalli County. The work includes biological control, backcountry stock-mounted and backpack herbicide application, ground-based road/off-road herbicide treatment and aerial herbicide application.

A RAC (Resource Advisory Committee) special project was approved that provides the Forest with $8,000 to perform invasive plant control work in support of private landowners adjacent to the Forest in the Little Sleeping Child area.

Invasive plant awareness and prevention was a major theme in this years conservation education program (see Item 42). The forest continued to develop working relationships with groups like the Backcountry Horseman, shared educational materials with the County Weed Board, and increased our hunter awareness effort for use of weed seed free feed. Additionally, Forest activities continue to follow and implement the weed prevention measures outlined in the Region One supplement to the Forest Service Manual 2080 (R1 2000-2001-1).

Monitoring of work authorized under the 2003 Noxious Weed Project ROD included:

1) All invasive plant treatment activities in 2003 complied with the environmental protection measures itemized in Table 14 of the 2003 Record of Decision.
2) An initial meeting with the Ravalli County Health Board was initiated by the Forest to discuss the formation of a citizen monitoring group recruitment program. A plan was discussed to offer potential interested individuals, environmental groups, ranchers, agriculturists, and the County Weed Board the opportunity to participate. Concerns for the monitoring of streams near aerial herbicide application sites were discussed with the Health Board.
3) In 2003, one photo point and one FS vegetation-monitoring plot were established on herbicide treatment sites. Approximately one-third of backcountry treatment sites were also visually monitored.

4) One biological control monitoring transect was established in 2003.

5) Work started on applying state-of-the-art NRIS TERRA protocols to the Bitterroot Forest mapping effort. The technology is not yet available. However, training of key individuals on the Forest was initiated along with preparations for implementing the system when it comes on line.

MONITORING RESULTS (General Program):

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 2003 included 1,200 acres within the Selway-Bitterroot Wilderness, 100 miles of trails, 300 additional acres outside the wilderness, and 200 miles of road Forest-wide.

Changes in infestations tend to be related to incremental differences in plant densities, and may or may not affect the estimated acreages. Increases in acreages are due to updated field surveys and mapping efforts. The species listed in the table 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 2003 Inventory (estimated acres)
Cardaria draba	white top	1	0	0
Centaurea diffusa	diffuse knapweed	1	1	1
Centaurea berbersteinii	spotted knapweed	1	274,000	274,000*
Centaurea repens	Russian knapweed	1	0	0
Centaurea solstitialis	yellow starthistle	3	0.1	0.1
Chondrilla juncea	rush skeletonweed	3	43	43
Chrysanthemum leucanthemum	oxeye daisy	1	Est. 500*	Est. 1000*
Cirsium arvense	Canada thistle	1	100	100
Crupina vulgaris	common crupina	3	0	0
Cynoglossum officinale	houndstongue	1	Unknown	Est. 500
Euphorbia esula	leafy spurge	1	70	100
Hypericum perforatum	St. Johnswort	1	1000	1000
Linaria dalmatica	Dalmatian toadflax	1	20	20
Potentilla recta	Sulfur cinquefoil	1	2000*	2000*
Ranunculus acris	Tall buttercup	2	12	100**
Tanacetum vulgare	common tansy	1	Unknown	Unknown (present)

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

Control Efforts

In 2003, the forest used herbicides to treat approximately 2,500 acres of invasive plants. This included approximately 400 acres which had been authorized under the 2003 Noxious Weed Treatment Project Record of Decision (ROD), well below the 5,000 acre maximum annual limit set in that decision.

Approved biological control organisms were released on 50 new acres in 2003. These were all first year releases approved by the 2003 Noxious Weed Treatment Project ROD.

Whitetop: This species occurs in Ravalli County, but has not been inventoried within National Forest Boundaries. It continues to be a “watch” species.

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. Smaller infestations have been found on the West Fork District (along Painted Rocks Lake road).

Spotted knapweed: In 2003 the Forest treated approximately 1500 acres of spotted knapweed with picloram (Tordon®) at a rate of one pint of herbicide per acre. 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. 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.

Russian knapweed: No known infestations occur on the Forest.

Yellow starthistle: In 2001a 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. No new plants were found in 2003.

Rush skeletonweed: This species is so far isolated to the Salmon River Canyon in Idaho. 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 43 acres and appears to be diminishing in size.

Oxeye daisy: This species is found mostly along roadsides and riparian areas and typically occurs with spotted knapweed and sulfur cinquefoil. Treatments are included in those for spotted knapweed.

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.

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: Leafy spurge has been increasing in both acres and number of infestations. The Little Sleeping Child Drainage supports several small infestations that have been receiving diligent treatments—both chemical and biological. Eradication of this weed species continues to be the goal. Apthona beetles were found on the sites in 2003. It is unknown what effect the fires of 2000 had on the biological control agent populations, but speculations are that some mortality occurred.

St. Johnswort: Updated inventories of this species have revealed larger acreages than previously listed. Infestations occur along the Reimel Creek and Meadow Creek roads, the Magruder corridor, and along many of the west side canyon trails. 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 re-establish in subsequent years.

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

Research Note

Two research projects, one through the University of Montana and the other through the Rocky Mountain Research Station, are focusing on biological controls for invasive species. One is investigating the combined effects of fire and the biological control *Agapeta zoegana* on the growth and reproduction of spotted knapweed. *Agapeta zoegana* is a root-boring moth from Europe.

The other study is testing whether *Urophora* (a gall fly used for biological control of knapweed) increases deer mouse populations and the prevalence of Hantavirus, and whether herbicide treatments can reverse this undesired outcome.

Common tansy: This species has just recently been listed as a category 1 noxious weed within the State of Montana. Because of this recent listing, the species has not yet been accurately mapped, and only a few sites have been treated (in conjunction with spotted knapweed treatments).

Biological Control: A cooperative working relationship with the Montana State University Agricultural Experiment Station has significantly contributed to the expansion and effectiveness of the biological control program. The target species for biological agent introduction are leafy spurge, Dalmatian toadflax and spotted knapweed. Table 17 describes the biological control accomplishments for the 2003 season.

Table 17 - Biological Control Agent Releases

Agent (species)	Location	Target weed spp.	Number released
Cyphocleonus achates	Bitterroot NF	Spotted knapweed	400
Larinus minutus	Bitterroot NF	Spotted knapweed	4,000
Apthona nigriscutis & Lacertosa (mix)	Bitterroot NF	Leafy spurge	5,000
Calaphasa linula	Bitterroot NF	Dalmatian toadflax	50

Biological weed control is still an evolving science, despite having been around as an option for many years. There are still many plant-insect and plant-disease interactions that are not fully understood. Many factors that influence bio-control agent survival, the plant's response to these biological stresses, and how each of these is affected by conditions and forces in the environment are still being researched.

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. Biological control agent populations that were affected by the fires of 2000 will also be given time to recover before survival data can be adequately obtained. Field surveys in the Sleeping Child drainage on leafy spurge showed indications of bio-control agent survival despite the burn intensities experienced in the area.

Invasive plants in Wilderness

A basic weed-monitoring program (visual observations) has been in place for approximately ten 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.

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 -a relative newcomer, which is scattered in trace amounts on most trails on the west side of the Bitterroot Valley.
- Common Tansy-a newcomer in trace amounts along Bass Creek Trail growing in trailside clumps.
- Sulfur Cinquefoil- another relative newcomer in similar habitat to knapweed. It is not limited to the trailside, but tends to run up the hillside. It is difficult to monitor, especially off-trail, because it blends in.
- Goatweed – found along Sweathouse Trail before the wilderness boundary and in an isolated ½ acre patch in the South Fork of Sweeney Creek.
- Oxeye Daisy -Scattered trailside plants.

Monitoring of efforts to spot spray knapweed along trails[6] 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). Knapweed remains on the hillsides above the trails, particularly in the Kootenai, Bass and Big Creek drainages. Still present along trails that were not sprayed are knapweed, Canada thistle, tall buttercup, common tansy, sulfur cinquefoil, goatweed and oxeye daisy. Still present along trails that have been sprayed are Canada thistle and tall buttercup.

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

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. Five years ago 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 remains. Another example of the limited success of volunteer 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. Tansy, buttercup and Canada thistle, which do not respond well to pulling, are still present.

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 2003, approximately 140 acres of spotted knapweed were treated in the Frank Church Wilderness. Treatment areas included the Upper Selway Trail and Fawn Ridge. These treatments were also monitored by fisheries biologists and are discussed further in Item 22, Riparian Area Condition.

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: 2003.

VARIABILITY: Any deviation from Forest-wide objectives.

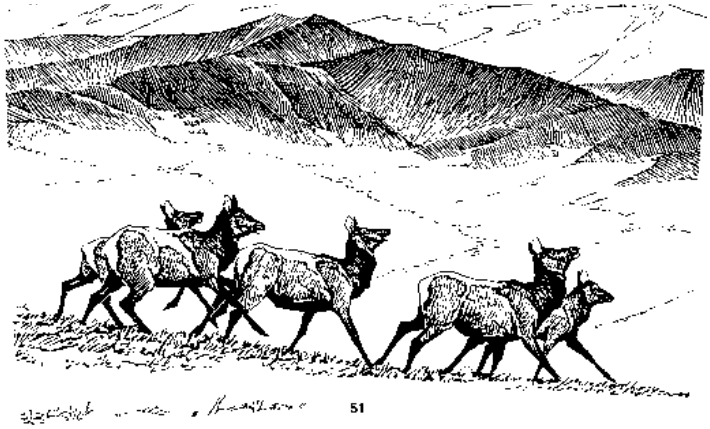
EVALUATION:

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. A new technique, Elk Security (reported on the following pages), has been developed and substituted as an analysis of 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 is revised, the transportation system will be analyzed for its capability to meet the resource needs of the Forest.

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 will use the information from the review when we revise the Forest Plan.



Elk Security

OBJECTIVES: Evaluate elk hunting season security using a method proposed by Hillis, et al. (1991).

DATA SOURCE: Project environmental documents and Forest-wide analysis.

FREQUENCY: Annually.

REPORTING PERIOD: 2003.

EVALUATION:

The Bitterroot Forest Plan contains no standard for elk hunting season security as evaluated using the methods devised by Hillis, et al. (1991). Elk Habitat Effectiveness was adopted as a surrogate for hunting season security, but the technique is more valid for evaluating the capability of land to support elk in the absence of hunting (see Item 7). Since elk security surfaces as an issue in many environmental analyses, we evaluate security area in all elk herd units included in each analysis area. Security areas are defined as nonlinear blocks of hiding cover over 250 acres in size which are more than one-half mile from any road open to motorized use during the hunting season. At least 30 percent of each elk herd unit should be in a security area to ensure a reasonable level of bull survival. Other factors such as vegetation density, topography, road access, hunter use patterns, and elk movements may modify either the acceptable block size or distance from a road.

MONITORING RESULTS:

About 35 percent of the Montana portion of the Forest was security cover prior to the fires of 2000 (see Table 20). Approximately 59,300 acres of security cover burned with moderate or high severity fire during 2000 (USDA, 2000). We assume this area no longer qualify as security cover. Remaining security cover constitutes approximately 30% of the Montana portion of the Forest. The fires reduced security area percentages across the Forest to the minimum recommended level. Elk trend counts (Item 38) may indicate whether we need to consider creating additional security in the short term.

Table 18 and Table 19 show that elk security varied widely among herd units prior to the fires of 2000. The fires reduced security percentages in some herd units, but at this time we have not calculated security area losses on a herd unit basis.

Elk population data indicate that we have a healthy elk herd (see Item 38), and elk security is within guidelines established by Hillis, el al (1991). As we work through each project proposal, we will look closely at the elk security issue. We will evaluate hunting season access to maintain the balance necessary to allow reasonable hunter access without jeopardizing the productivity of the elk herd.

Table 18
Elk Security Cover For The South Half Of The Bitterroot National Forest (Pre-Fires)

Hunting District	Location	Total Acres of Herd Unit	Total Acres of Elk Security	Percent
250	Porcupine-Fire Creek	4,790	533	12
250	Fire-Planet Creek	2,942	1,659	56
250	Planet-Bitterroot	2,060	1,043	51
250	Waugh-Maynard Creek	8,738	3,150	36
250	Warm Springs-Laird Creek	9,715	2,396	25
250	Laird-Dickson Creek	4,642	0	0
250	Dickson-Piquett Creek	20,935	0	0
250	Piquett-Pine Creek	5,967	0	0
250	Pine-Rombo Creek	8,854	0	0
250	Rombo-Slate Creek	17,084	3,097	18
250	Slate-Overwhich Creek	45,243	10,252	23
250	Overwhich-Hughes Creek	31,008	13,039	42
250	Hughes-Johnson Creek	36,471	21,948	60
250	Johnson-Beaver Creek	11,619	5,506	47
250	Beaver-Chicken Creek	31,281	14,687	47
250	Chicken-Coal Creek	11,744	5,571	47
250	Coal-Blue Joint Creek	24,308	14,678	60
250	Blue Joint-Basin Creek	36,399	15,506	43
250	Nez Perce-Watchtower Creek	18,049	11,959	66
250	Watchtower-Little W. Fork	15,924	7,297	46
250	Little W. Fork-Trapper Creek	52,539	5,904	11
250	Trapper-Chaffin Creek	17,882	2,960	17
250	Chaffin-Tin Cup Creek	20,514	6,196	30
270	South Side East Fork	80,917	49,339	61

Table 19
Elk Security Cover For North Half Of The Bitterroot National Forest (Pre-Fires)

Hunting District	Location	Total Acres of Herd Unit	Total Acres of Elk Security	Percent
240	Mormon-One Horse Creek	8,890	6,613	74
240	One Horse-Sweeney Creek	9,337	2,730	79
240	Sweeney-Bass Creek	13,535	1,993	15
240	Bass-Kootenai Creek	14,432	3,681	26
240	Kootenai-Big Creek	27,323	5,217	19
240	Big-Bear Creek	31,471	6,359	20
240	Bear-Fred Burr Creek	15,837	5,575	35
240	Fred Burr-Mill Creek	17,126	4,862	28
240	Mill-Blodgett Creek	16,186	3,963	24
240	Blodgett-Roaring Lion	35,664	7,308	20
240	Roaring Lion-Lost Horse	42,721	4,805	11
240	Lost Horse-Tin Cup Creek	77,245	21,560	28
204	8-Mile-Ambrose Creek	6,782	1,617	24
204	Ambrose-Burnt Fork Creek	21,055	12,817	61
261	Burnt Fork-Willow Creek	27,232	20,943	77
261	Willow-Skalkaho Creek	40,810	19,856	49
270	Skalkaho-Sleeping Child	49,566	24,139	49
270	Daly-Railroad Creek	12,103	4,546	38
270	Sleeping Child-Rye Creek	60,659	1,990	3
270	Railroad-Skalkaho Creek	9,526	7,451	78
270	N. Side East Fork	93,031	34,314	37

Table 20
Elk Security Cover Totals For Bitterroot National Forest

Location	Total Acres of Herd Unit	Total Acres of Elk Security	Percent
South Half of Forest	519,625	196,680	38
North Half of Forest	630,531	202,339	32
Montana Portion of Forest (pre-fire)	1,150,156	399,019	35
Montana Portion of Forest (post-fire)	1,150,156	339,746	30

REFERENCES:

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USDA. 2000. Bitterroot fires 2000: an assessment of post-fire conditions with recovery recommendations. Bitterroot National Forest. Hamilton, MT.

Hunter Trend and Season
Item 8

OBJECTIVE: Track the length of season and number of hunters.

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

FREQUENCY: Annually.

REPORTING PERIOD: 2003.

VARIABILITY: Any change in season length, +/- ten percent change in hunting population.

EVALUATION:

The latest data available on deer and elk hunters are from 2002.

The general big game hunting season in the Idaho portion of the Forest has been open from September 15 through Thanksgiving weekend for several years. The general big game hunting season in the Montana portion of the Forest has been five weeks in length for many years. FWP reduced the season for antlered mule deer bucks to three weeks in length beginning in 1992. Mule deer does have been hunted via special permit in Bitterroot hunting districts since 1990. Mule deer bucks have been hunted via special permit since the mid-90s.

The average and annual changes in the hunting population were within the monitoring allowance for variability until 1995. The large increase in the numbers of deer and elk hunters in 1995 may be a result of the very warm weather during that hunting season. The number of deer hunters in 1996 through 1999 dropped back within the normal range excluding the unusually high numbers for 1995. The number of elk hunters from 1996 to 1998 is unknown. It does appear that the number of hunters exceeded the ten percent monitoring variability in 1995, 1999, and 2000. As other monitoring results for elk (see monitoring items 7, 9, 38, and Security) continue to be favorable, corrective actions or Plan amendments do not appear necessary at this time.

Figure 8 - Montana State Hunting Districts 240 and 261 Near Hamilton

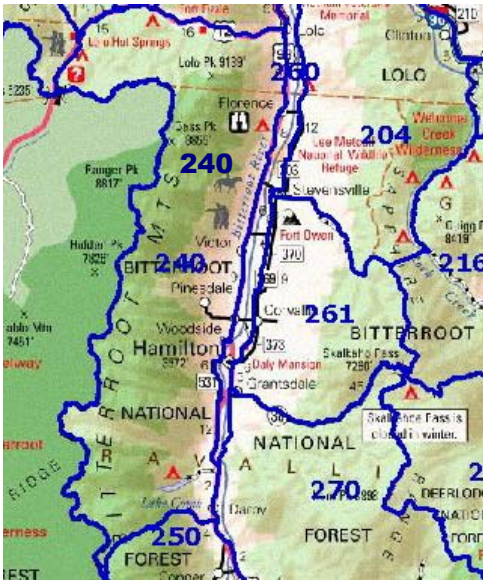
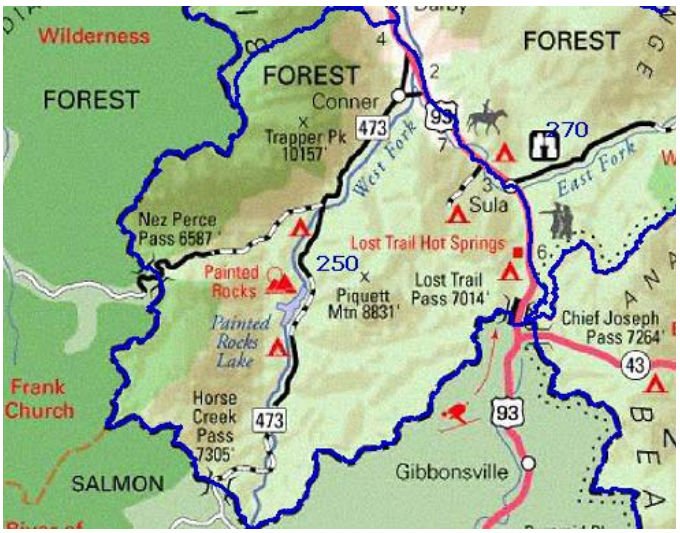


Figure 9 - Montana State Hunting District 250, West Fork Bitterroot River



MONITORING RESULTS:

We combined hunter survey information for Hunting Districts 240, 250, 261, and 270 to draw the following conclusions (see Table 21).

The number of deer hunters in the Montana portion of the Forest fluctuated within a fairly small range from 1993 through 2001. The average for the period was about 7,650 hunters. 2001 recorded the second highest number of deer hunters for the

10 year period, but there were about 1,400 fewer hunters in 2002 than 2001. Elk hunter data are not available for 1996 through 1998, but the numbers for 1999 and 2000 and 2001 were comparable to 1995. About 200 hunters were added between 1999 and 2000, but 2001 showed a decline of about 300. The decline continued in 2002 when about 300 fewer elk hunters participated, about 300 fewer than the ten year average. The trend in elk hunter numbers for all of FWP Region 2 is essentially flat for the past 10 years, with a high of 28,700 in 1993 and a low of 24,300 in 2001. There were 26,154 elk hunters in Region 2 in 2002.

Figure 10 - Montana State Hunting District 270 Near Darby and Sula

Hunter trends are not available for the Idaho portion of the Forest because hunting district boundaries do not coincide with Forest boundaries. Except for the road corridors, the Idaho portion of the Bitterroot NF is Wilderness and little can be done by the Forest Service to directly influence seasons and numbers of hunters. However, the "limits of acceptable change" process, which was instituted in 1992 for the Selway-Bitterroot Wilderness and is being developed for the Frank Church-River of No Return Wilderness, establishes opportunity classes which may affect future amounts and distribution of use, thereby indirectly affecting hunter trends.

Table 21 - Total Number Of Hunters For Hunting Districts 240, 250, 261, And 270

	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	Avg.
Number Deer Hunters	6774	7139	9063	7763	7030	7613	7450	8171	8407	7051	7645
Number Elk Hunters	6572	6318	8381	No Data	No Data	No Data	8273	8463	8122	7356	7602

Bull Elk Harvest in First Week of Hunting Season
Item 9

OBJECTIVE: To assure that there are bull elk available for harvest throughout the season.

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

FREQUENCY: Annually.

REPORTING PERIOD: 2003

VARIABILITY: Greater than 40 percent of bull elk harvest in first week of season in each hunting district.

EVALUATION:

The most recent data available is from the 2002 hunting season. Montana Department of Fish, Wildlife, and Parks did not publish data for this monitoring item from 1996 through 1998 (J. Firebaugh, FWP Missoula, personal communication 2/23/00).

The trend in the proportion of bulls harvested in the first week of the season exceeded 40 percent in Montana Hunting Districts (HD) 240 only in 1990 and 2001 (please refer to Item 8 for HD locations). HD 250 exceeded 40 percent only in 1991 and 2002. HD 261 only exceeded the standard in 1990 and 2002. The total proportion has generally decreased since the 1990 high. Both Forest Plan and State objectives were consistently met through 1995, with the exception of HD 250.

In the summer of 1992, evaluation of the Bare Cone Ridge area indicated too much hunting season access and an elk herd well below carrying capacity. The FWP eliminated antlerless harvest in the area for the 1994 season and the West Fork Ranger District proceeded with hunting season road closures beginning in the 1996 season. The lack of elk hunting data between 1996 and 1998 hampered the Forest's ability to evaluate this monitoring item for several years.

The Montana State Elk Management Plan has established different objectives for percentage of the bull elk harvest during the first week of the season since the Forest Plan was written (generally 30 percent during the first week of the season as opposed to the 40 percent contained in the Forest Plan). This may prompt an evaluation of, and possible change to, the Forest Plan objective regarding hunting seasons and monitoring criteria for this item (Forest Plan, p. IV-6).

MONITORING RESULTS:

Table 22 shows the proportion of bulls killed during the first week of the hunting season in Montana and the State objective by hunting district. No data are available for 1996-1998.

Table 22 Bull Elk Harvest in the First Week of Hunting Season (Percent)

Hunting District	1995	1999	2000	2001	2002	5-Year Average	State Objective
240	24	26	37	46	31	33	35
250	16	24	30	36	42	30	30
261	38	23	17	33	49	32	30
270	22	23	16	29	30	24	30

Bull harvest in the first week of the season was within Forest Plan standards for all hunting districts between 1992 and 1995, and again in 1999 and 2000. Bull harvests exceeded the Forest Plan standard in HD 240 in 2001 but returned to a near average level in 2002. The standard was exceeded for the first time in HD 250 and HD 261 in 2002.

Bull harvest in the first week of the season exceeded the state objective in 2002 in HD 250 and HD 261. State objectives were met for all hunting districts except HD 261 when the five-year average is used. We will continue monitoring to determine whether these higher harvest levels continue next year.

Elk Population in Relation to Habitat Changes
Item 38

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

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

FREQUENCY: 100 percent annually.

REPORTING PERIOD: 1994-2003.

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

EVALUATION:

The change in elk population has exceeded an increase of five percent four times in the last ten years. No further evaluation is necessary, because the increases are occurring in the proper areas according to the Montana Elk Management Plan. The Plan established a population objective for the Bitterroot NF portion of the state to maintain current populations in all hunting districts and allow for an increase of about 20 to 30 percent in the portion of Hunting District (HD) 270 between Sleeping Child and Rye Creek and in HD 250. FWP trend counts indicate compliance with objectives except in the portion of HD 270 south of the East Fork where populations have increased, resulting in an effort to curtail growth.

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 23 displays three-year averages as required by the Forest Plan when monitoring elk populations to detect possible effects of habitat changes.

Just over 6,500 elk were seen in the Bitterroot in 2000, more than were ever seen in the nearly 50-year history of the trend counts. Over the past five years, population trends have continued to increase. The trend counts indicate a healthy, stable or increasing elk herd that meets FWP and Forest Plan objectives.

Table 23
Elk Populations, Three-Year Running Average
(Number of elk and percent change)

3-Year Period	1995-97	1996-98	1997-99	1998-00	1999-01*	2000-02*	2001-03*
Average Elk Population	5784	6099	6091	6112	6204	6441	6842
Percent Change	+10	+5	0	0	+1	+4	+6

* 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: 2003.

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. Variation between transects was high, ranging from one track every four miles to one track every eleven miles. 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.

Research associated with the Bitterroot Ecosystem Management Research Project indicates that transect surveys may not be the most effective method of detecting marten presence (Foresman & Pearson, 1998). Researchers found that remote sensing cameras and tracking plates produce better results in terms of detection. Other research indicates it is unlikely that marten population trends can be monitored by any of these three detection methods given current personnel and budget constraints. Detecting even large changes in population levels would require very large sample sizes over many years to be considered statistically valid (Zielinski and Stauffer, 1996). This in turn would require levels of effort that are simply unrealistic in this era of reduced budgets. It may be more meaningful to monitor habitat quality changes than to try to follow population trends. Pine marten monitoring will need to be reconsidered in the Forest Plan revision.

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 has not completed many marten monitoring transects since 1993, as a result of other funding priorities. We completed two marten transects in FY 2003:

Transect	Year	Miles	Tracks	# of Surveys	Miles/Track
Larry Creek	2003	6	21	1	0.3
Willow Mountain	2003	12	24	1	0.5

The average number of miles surveyed per marten track in 2003 was considerably lower than the average from 1988 to 1996. Put another way, we saw a lot more marten tracks in 2003 than in previous years. This apparent increase could mean that marten numbers have increased dramatically, but could also be a result of other sampling or environmental variables.

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.).

REFERENCES:

Foresman, K.R. and D.E. Pearson. 1995. Testing of proposed survey methods for the detection of wolverine, lynx, fisher, and American marten in Bitterroot National Forest. Final Report for the Research Joint Venture Agreement INT-94918, USDA Forest Service, Intermountain Research Station, Missoula, MT.

Foresman, K.R. and D.E. Pearson, 1998. Comparison of survey methods for the detection of forest carnivores. J. Wildl. Mgmt. 62: 1217-1226.

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Thompson, I. D., I. J. Davidson, S. O'Donnell, and F. Brazeau. 1989. Use of track transects to measure the relative occurrence of some boreal mammals in uncut forest and regeneration stands. Can. J. Zool. 67(1816-1823).

Zielinski, W. J. and H. B. Stauffer. 1996. Monitoring *Martes* populations in California: survey design and power analysis. Ecol. Applications 6(4):1254-1267

Pileated Woodpecker Population in Relation to Habitat Changes
Item 40

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

DATA SOURCE: Call transects.

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

REPORTING PERIOD: 2003.

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

EVALUATION:

Data from nine 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 1123 miles of transects since 1988. We recorded an average of 0.20 calls or sightings per mile of transect.

MONITORING RESULTS:

Most Forests in Montana and Idaho use the Northern Region's standardized technique for establishing and monitoring pileated woodpecker call routes. We established call routes on the Bitterroot NF that are monitored annually, if budgets allow. In 1997 and 1998, we sampled no transects due to budget constraints. In FY 2003, we completed two surveys on each of six routes and three on three routes for a total of 21 transects. We recorded an average of 0.22 pileated woodpecker detections per mile of transect, continuing an upward trend in detections since FY 2000.

Figure 11

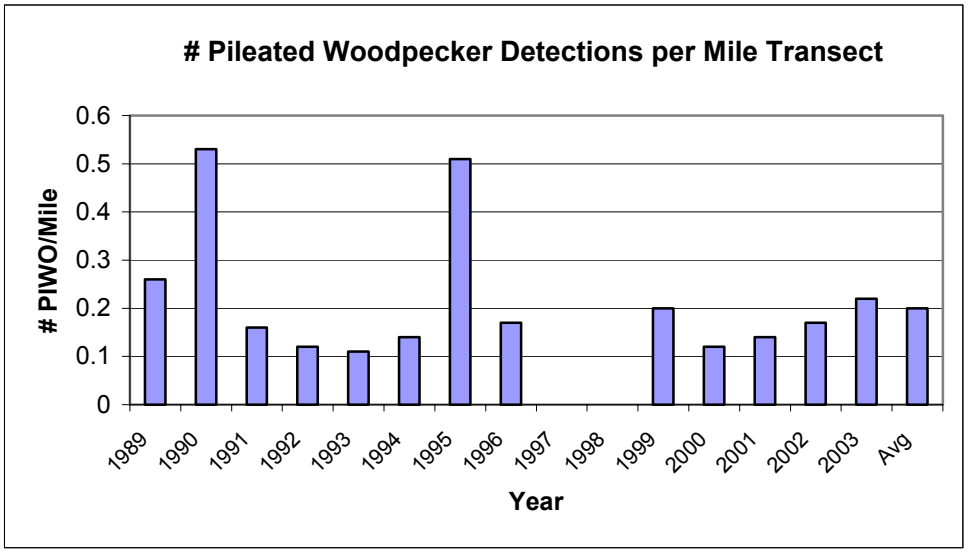

Figure 11 displays the number of pileated woodpecker calls or sightings detected per mile of transect monitored across the entire Forest by year. Ignoring the large spikes in pileated detections in 1990 and 1995, these data show that pileated detections declined somewhat in the early 1990s but have been 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

increased slightly each year from 2000 to 2003, 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 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 whether pileated populations are changing, and if so, why. We know that habitat quality for this species declined in the early 1900s across the Forest as a result of extensive clearcutting of mature ponderosa pine habitats. Fire suppression has reduced habitat quality since the 1930s. It is likely that pileated numbers have declined from historic levels as a result of these habitat changes, although there is no clear data to support this conclusion. 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.

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.

FREQUENCY: Annually.

REPORTING PERIOD: 2003.

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

INTRODUCTION:

The USDI Fish and Wildlife Service (FWS) currently lists gray wolf, bald eagle, grizzly bear and Canada lynx as threatened or endangered wildlife species for 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 several of those individuals or their offspring were sighted on the Bitterroot NF in FY2003. Bald eagles are a common winter resident in the Bitterroot valley, but only a few nest sites have been confirmed, all 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). Lynx were a proposed species in FY1999. FWS listed them as threatened in FY2000. Lynx are occasionally reported on the Forest, and it is likely that some lynx are residents. Peregrine falcons were delisted by FWS in August 1999, and are now classified as a sensitive species by the Regional Forester.

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 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 coordinated by the Nez Perce Tribe documented sixteen new wolf packs in Idaho and three new wolf packs in the Montana portion of the CINEPA. Reproduction was confirmed in 30 packs within the CINEPA, 26 of which met the recovery standards of a breeding pair. These packs produced a minimum of 102 pups in 2003, almost doubling the known pup production in 2002. There were an additional 16 areas of suspected wolf activity where pack activity has not yet been confirmed. At least 18 wolves died in 2003, including 16 due to human-related causes. The total wolf population across the CINEPA at the end of 2003 was estimated at 368 wolves, a 30% increase from 2002 (USFWS, et al. 2004).

Four wolf packs were known to occur on the Forest at the end of FY 2003. The Sapphire pack inhabits the upper East Fork of the Bitterroot River and consisted of at least two adults and three pups in 2003. The Painted Rocks pack inhabits the West Fork of the Bitterroot River and consisted of at least four adults with no known pups in 2003. Both of these packs are currently unmonitored, so their movements and reproductive success are not well known. The Selway pack's territory includes the area roughly between Magruder and the vicinity of Elk City, Idaho on the Nez Perce NF. This pack consisted of at least four adults and three pups in 2003. The Magruder

pack's territory is partially in the upper Selway drainage to the south of the Selway pack. This pack consisted of at least four adults and six pups in 2003. There have been no further reports of the Lake Como pack that was discovered in August 2002 in the Rock Creek drainage above Lake Como, and the area has not been monitored. Due to lack of information, this is currently classified as an area of suspected wolf activity rather than a confirmed pack.

The Forest receives more 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 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 are 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, 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, since 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 is now a grizzly bear recovery area. The FWS prepared an Environmental Impact Statement and issued a Record of Decision in November 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:

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. A pair of bald eagles nested and successfully raised young on the Lee Metcalf Refuge near Stevensville most years from 1990 to 2003. There are several other known bald eagle nests along the Bitterroot River. Nesting success at these other nests is unknown, although at least three other bald eagle nests were active in 2002. These nests indicate that the breeding population of bald eagles in the Bitterroot Valley is slowly expanding.

The Bitterroot NF 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 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. 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).

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. Fish, Wildlife,

and Parks personnel have run carnivore track transects for several years in the Upper East Fork and Piquett Creek drainages. They saw lynx tracks almost annually in the upper East Fork, but not in Piquett Creek. They have now abandoned the Piquett Creek transect. In another transect, Montana Department of Fish, Wildlife, and Parks recorded lynx on the Forest in the head of the East Fork Bitterroot River basin.

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.

The Bitterroot NF currently analyzes 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 Plan to incorporate these or other conservation methods. The draft environmental impact statement was released for public comment in January 2004.

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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: 2003.

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

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 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 preclude trends toward endangerment that would result in the need for federal listing as threatened or endangered under the Endangered Species Act of 1973. On National Forest projects, our wildlife biologists complete biological evaluations to determine the effects the project will have on sensitive species.

In March 1999, the Regional Forester revised the Sensitive Species List. Boreal owl was dropped from the list because surveys across the Region indicated that they are well distributed in suitable habitat. When lynx was classified as a Proposed species by FWS, the Regional Forester removed it from the sensitive list. The Regional Forester added northern goshawk, northern leopard frog, and boreal toad to the list for the Bitterroot NF in 1999. The peregrine falcon was added to the list in early 2000 after being removed from the Endangered Species List by FWS. Sensitive wildlife species known to occur on the Bitterroot NF are black-backed woodpecker, boreal toad, Coeur d'Alene salamander, fisher, flammulated owl, northern bog lemming, northern goshawk, peregrine falcon, western big-eared bat, and wolverine.

The following is a description of the sensitive species' habitats and the monitoring we did in FY2003.

BLACK-BACKED WOODPECKER

Black-backed woodpeckers (*Picoides arcticus*) are opportunistic feeders typically associated with mid-to upper-elevation coniferous forests in the northern Rocky Mountains. This species is highly mobile and tends to concentrate in areas of bark beetle outbreaks usually associated with fires. Outbreaks typically decrease within three years (at least where fire was the cause of tree mortality), and concentrations of these birds then move on to other foraging opportunities. Black-backed woodpeckers seem to be more strongly associated with beetle outbreaks in fire killed trees, whereas the closely related three-toed woodpecker (*Picoides tridactylus*) tends to be more closely tied to non-fire related beetle irruptions, but there is considerable overlap between the two species. There is little information available on the number of dead trees or the size of tree mortality centers needed to attract either of these species (Hutto, pers. comm. 1992).

Hutto found that black-backed woodpeckers prefer fire killed Douglas-fir, western larch, and ponderosa pine, whereas lodgepole pine is a secondary species. Weydemeyer and Weydemeyer (1928) also list Douglas-fir as the bird's preferred species. Black-backed woodpeckers usually forage on larger diameter trees, probably because larger sizes are more prone to beetle attack. They are stronger drillers than many other woodpeckers, so they are capable of excavating in harder wood and through thicker bark than other species.

Black-backed woodpeckers excavate nest cavities in live or dead trees in close proximity to foraging areas. They nest relatively close to the ground (3-16 feet) in trees larger than 12 inches diameter. Clusters of snags provide both nesting and foraging habitat. Snag concentrations seem to be more critical for winter foraging than for summer foraging. Small flocks of black-backed woodpeckers often seen in snag concentrations in the winter seem to disperse during the summer, probably due to territoriality associated with nesting.

Monitoring and Evaluation:

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 our transects in 2003.

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).

BOREAL 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. 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 2003 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). 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.

Research Note

Researchers from the Rocky Mountain Research Station and Montana Department of Fish, Wildlife and Parks are studying the use of streams by boreal toads. They are measuring distribution in 24 streams in the Blackfoot and Bitterroot river basins, and looking at two streams in particular to assess population size, characteristics, and movement.

COEUR D'ALENE SALAMANDER

This small terrestrial salamander is found below 6,000 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:

Personnel from the Montana Natural Heritage Program surveyed suitable habitat for this species at 19 sites on the Bitterrroot NF in 1987 (Montana Natural Heritage Program, 1987) and at an additional six sites in 1988 (Genter, et al., 1988). They found Coeur d'Alene salamanders at a site in Swethouse Creek in 1987, but not in 1988. They did not find this species at any other site on the Forest. An amphibian survey crew working under contract for the Regional Office surveyed suitable habitat for this species at 10 sites on the Bitterrroot NF from 2001 to 2003. They found Coeur d'Alene salamanders at three new sites on the Forest: one in Rock Creek, one in Little Rock Creek and one in Chaffin Creek (Maxell, 2004). Based on these new locations, it now seems possible

that Coeur d'Alene salamanders occupy suitable habitat throughout the Bitterroot Mountains. This crew will survey additional sites on the Forest in 2004.

FISHER

Fishers (*Martes pennanti*) in the northern Rocky Mountain area are associated with coniferous forests that have relatively closed canopies. They spend the majority of their time in mature and overmature stands during the summer, but split their time almost evenly between mature/overmature and immature stands during the winter. They seem to avoid non-forest and pole-sapling stands. They show a strong affinity for forested riparian habitats throughout the year. The vegetative characteristics of suitable habitat for pine marten and fisher are remarkably similar (Quinn and Parker 1987), but fishers are somewhat restricted to the lower portions of marten range because they are not as adept at moving through deep snow. Important prey species are snowshoe hare, voles, pine squirrels, and assorted carrion (Jones 1991).

Monitoring and Evaluation:

Dr. Kerry Foresman detected fisher in Big Creek and Bear Creek 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. Observers conducting the pine marten track surveys did not note any fisher tracks, but they were not asked to record fisher tracks they encountered

Habitat suitability indices for pine marten probably approximate the productivity of an area for fisher since their habitat requirements are similar. The Forest evaluated potential fisher habitat in the Meadow Tolan and Lost Moose analysis areas. Neither Meadow Tolan nor Lost Moose have habitat suitability indices for pine martin that would indicate they are high quality fisher habitat.

FLAMMULATED OWL

Flammulated owls (*Otus flammeolus*) inhabit mature or old-growth ponderosa pine/Douglas-fir forests and depend on woodpeckers for their nesting holes. They rely on large insects for food and migrate to Mexico and Central America in winter. Lower elevation mature or old growth stands are potential habitat. 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.

Monitoring and Evaluation:

The number of flammulated owl detections on unburned transects has remained fairly consistent from 2000 to 2003. High 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 we found before the fires. We monitored the same transects in 2002, and detected more owls than we did in 2001. The Robbins Gulch transect was salvage logged after we surveyed it in 2002. We monitored this transect in 2003, and detected far fewer flammulated owls than we did before the timber harvest. We did not monitor the adjacent burned but unlogged transect in 2003, so are unable to say whether this apparent decline was due to logging. We will monitor both transects in 2004, and compare them to other transects that burned but were not harvested, and to unburned transects.

We are unsure of how these drastic habitat changes will affect the owls that occupied those sites in the long term, since no studies have examined the effects of high severity fire to flammulated owl populations. It is possible that the owls returned to the burned sites in 2001, 2002 and 2003 due to high fidelity to previously occupied territories, but were unable to successfully reproduce due to changes in available prey species or number of suitable nest cavities. If this is the case, they may not return to these areas in 2004. It is also possible that the owls returned to their previously occupied territories and were adaptable enough to reproduce successfully using the prey species and nest habitat available following the fires. A graduate student working in a previously occupied area in 2001 found the first example of flammulated owls nesting in a hole in the ground ever documented in the scientific literature. The adults raised three young almost to fledging, but a great horned owl killed at least two of the young at that point. This example of adaptability gives us some hope that flammulated owls may continue to occupy the burned areas. We will continue to monitor established transects to determine changes in owl use.

Project proposals consider any potential suitable habitat to be occupied, and we design prescriptions either to avoid suitable habitat or create habitat favorable to flammulated owls.

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 FY2003 prescribed treatments in potential northern bog lemming 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.

Monitoring and Evaluation:

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 August 2003 we had identified a total of 57 northern goshawk nests across the Bitterroot NF, in 28 different territories. Of the known nests, 35 have been active at least one year since 1991, and several have been active more than one year. We know of several alternate nests within many territories. 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. Other raptors commonly use goshawk nests. In 2002, a great horned owl occupied one known goshawk nest, and a long-eared owl occupied a newly discovered goshawk nest. In 2003, a great gray owl fledged four young from a known goshawk nest.

2003 was an extraordinary year for Accipiter monitoring on the BNF. We discovered 11 new goshawk nests and 4 new Cooper's hawk nests. We had more than twice as many active nests of each species than we've ever documented before, and found more than twice as many fledglings of each species than ever before. In addition, the average number of young fledged per active nest was higher than we've ever found. Apparently 2003 was a very good year for Accipiter productivity on the BNF.

Research Note

A researcher from Boise State University took samples of northern goshawk feathers from breeding territories throughout western North America, including some on the Bitterroot National Forest. Analysis of the feather's chemical makeup may help to estimate the breeding or natal origins of goshawks captured at multiple migration-monitoring stations in western North America, as well as assess various aspects of goshawk migration.

Table 24 summarizes the monitoring results for goshawks since 1998.

Table 24 – 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 discovered 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, and another was occupied by a long-eared owl.
2003 [1]	11	15	37	One known goshawk nest was occupied by a great gray owl, and fledged four owls.

[1] All known nest sites were monitored.

[2] Some of these are alternate nests within known territories.

The fires of 2000 destroyed one known, active goshawk nest and one known, inactive goshawk nest, and almost certainly destroyed a number of undiscovered nests. In 2002, one recently discovered active nest fell out of the tree before the young could fledge and they did not survive. Another recently discovered, inactive nest was in a snag that fell over during the summer, destroying the nest. In 2003, we found that one previously known goshawk nest had been knocked out of the nest tree by a firewood cutter, and three previously known goshawk nests had partially fallen out of their nest trees.

We have also found 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 uses inactive goshawk nests. Our monitoring results are summarized in Table 25 below.

Table 25 – Coopers Hawk Nests Found While Surveying For Goshawks Since 1998

Year	Newly Discovered Nests	Active Nests (Total)	Number of Young Fledged	Remarks
1998	1	1	2	
1999	0	2	5 or 6	
2000	1	2	6	The new nest and one of the nests active in 1999 were active and each fledged three young.
2001	2	2	5	One of the new nests was near a previously known nest. Only the newly found nests were active.
2002	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.

The two active Cooper's hawk nests found in 1999 were in timber sale units that were sold but not harvested. One of these units was harvested in the fall of 1999 after the young fledged. That nest has not been active since 1999, even though we modified the unit to exclude the area surrounding the nest. The other unit has not been harvested, and the nest in that unit was active again in 2000. We discovered a second active nest within the unit in 2001, and a third in 2003. Cooper's hawks are more likely than goshawks to move to alternate nests each year, so we don't know whether the harvest caused the nesting pair to leave the nest near the unit that was harvested. We will continue to monitor these nests in the future.

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's 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.

We found two active sharp-shinned hawk nests and several other nests within the same territories while searching for goshawk nests in 2001. Neither of these territories was active in 2002 or 2003. 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.

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 2003. 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). We have no other leopard frog monitoring efforts on the Forest at this time.

Research Note

The cause of declining amphibian populations in the Pacific Northwest is the subject of research conducted by the Aldo Leopold Wilderness Research Institute, USGS Forest and Rangeland Ecosystem Science Center, and Idaho State University. This project will contribute to the understanding of how widespread *Saprolegnia ferax*--a pathogenic aquatic fungi--is in the wild, whether *Saprolegnia ferax* is associated with fish stocking, whether infection rates of *Saprolegnia ferax* are related to occurrence of other fungi, and the distribution and frequency of other potential pathogens and whether they are related to site characteristics. These data will elucidate how great a threat these potential pathogens pose to regional amphibian fauna, help to identify other fungi that can be experimentally tested for pathogenicity, and frame potential management actions.

PEREGRINE FALCON (Delisted 1999)

Following their remarkable sustained population recovery across the country, FWS 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. FWS considers peregrines as a migrant 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. No projects occurred near any eyries in FY2003. 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 participated 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 to determine productivity. They also inventoried a number of canyons that contain good habitat in an effort to find new eyries. We did not find any new eyries in 2003.

We currently know of 12 eyries in the Bitterroot drainage that have been active at least once since 1992. Eight of our eyries were active in 2003, and produced at least 13 fledged peregrines. This was about 16% of the known production of juvenile peregrines in Montana in 2003. Two of our active eyries failed to produce any fledglings, for unknown reasons. Another of our eyries that had been active for several years was inactive in 2003 because a pair of golden eagles nested within 100 yards of the peregrine eyrie and apparently displaced the falcons. Table 26 summarizes known activity and productivity for each eyrie. The year in parenthesis following the territory name indicates when the territory was discovered.

Table 26 - 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)
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

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 further 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 and we did not find any big-eared bat habitat or populations in FY2003. The Forest did not monitor any known big-eared bat sites in FY2003.

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 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. Montana Department of Fish, Wildlife, and Parks trapping records show that wolverines have been trapped in the Bitterroot Valley as recently as 1986. No more than two have been taken in any year, and the harvest has averaged less than 0.5 per year. One wolverine was reported taken from Hunting District 204 in the 1994-95 fur trapping season, although it is unclear whether this occurred on the Bitterroot side of this hunting district. None were reported taken in subsequent seasons.

Wolverine home ranges average 150 square miles and can cover up to 800 square miles, so an individual wolverine may use several of the large Bitterroot drainages. Dr. Kerry Foresman detected wolverine in the Sweathouse Creek drainage during his study in winter 1994-95. Recent reports of wolverine sightings by Bitterroot NF employees include one in Camas Creek in 1992, one in the vicinity of Gird Point Lookout in 1995, one near Mink Creek Saddle on the Sula District in 1996, two in the Lost Horse Creek drainage in 1999, one south of Sleeping Child Hot Springs in 2001, two along the West Fork Road in 2001 and one in the upper Mill Creek drainage in 2003.

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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: 2003.

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 a well-documented general decline in the eastern hardwood forests. In western North America these general declines have not been noted. In the west, seven species have shown declines, five of which are prairie grassland species. Although the Forest and others are actively monitoring 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 2003, we have trapped and banded 2,304 birds, including 621 recently fledged young. We have had 1,378 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 2003, about 19 percent of the first time captured birds were young of the year. We have also captured 204 birds that we released unbanded. We have captured individuals of 62 species since 1993, including 30 species in 2003. 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 currently run five BBS routes on the Forest. The routes are 25 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. The Bitterroot NF routes have all been established in the past ten years so trend information is not yet meaningful.

Moderate and high severity fire affected approximately 50% of the Skalkaho 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.

Migration Count. The Forest has participated in the "May Count" since its inception in 1992. On the second Sunday in May, volunteer birders attempt to count all the birds in Ravalli County. Jim Stasz, an employee of the FWS, coordinates this nationwide effort. The Migratory Bird Count is a sanctioned activity of the Partners in Flight Program. We have recorded as many as 154 species in Ravalli County on this one-day count.

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) non-game program to monitor trends in statewide raptor populations. We counted 92 raptors on this route in 2003, the fourth year in a row that we've set a new tally record.

Forest-wide Point Counts. In 1994 we began a program to monitor breeding bird population trends along a network of transects Forest-wide as part of the Region 1 Landbird Monitoring Program. Each transect has ten stations where birds are identified and counted. We 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 and 2000. They collected additional vegetation data but no bird data at a subset of the points in 1999. We will incorporate this data into the revised habitat relationship analysis, which will provide information about specific habitats occupied across the Region.

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. Since we have several years of pre-fire bird data from these routes as well as baseline vegetation data, we have the opportunity to detect changes in bird communities along these transects and correlate them with habitat changes caused by the fires.

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 magnitude of change in vegetation variables from before to after fire increased with fire severity. In addition, the relative abundance of nine bird species showed significantly greater changes from before to after fire at burned points compared with unburned points. When burned points were separated into low, moderate, and high severity, an additional ten species showed significant changes in relative abundance from before to after fire at one or more severities. 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 communities. Her results suggest a need to manage for a range of fire severities because different bird species respond positively to different fire severities.

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 113 species. The Stevensville CBC started in 1963 and has a cumulative total of 142 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 2003 the Hamilton CBC tallied 6607 individual birds and 60 species. The Stevensville CBC tallied 10,092 individual birds and 85 species.

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: 2003.

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, Watershed Effects and Restoration. Fisheries monitoring may be found in Items 21 and 41.

Currently the Forest Plan does not acknowledge the role of fire in riparian areas, or specify the desired effects of fires and fire suppression on fisheries and riparian areas. Although fire is a natural process on the landscape, it can have adverse effects on fish and riparian habitat. These issues may be addressed in the Forest Plan revision.

MONITORING RESULTS:

Dispersed Recreation Monitoring

Skalkaho/Daly Creek Dispersed Campsite Rehabilitation (Darby Ranger District). Monitoring of the vegetation and stream banks at the Skalkaho Creek and Daly Creek dispersed recreation sites showed mixed success at improving the streamside area with the recent boulder placements and shrub plantings. As expected, all the sites were still being used for camping and some sites were recovering slowly (such as the site along Daly Creek immediately downstream of the Road 711 bridge). In contrast, the site along Daly Creek approximately 1/2 mile upstream of the Road 711 bridge exhibited increases in dispersed camping use, impacts in the established camping areas, and size of the area impacted. Monitoring will continue in 2004.

Developed Recreation Monitoring

Indian Trees Campground Reconstruction (Sula Ranger District). During field season 2003, fisheries biologists monitored four culverts that were replaced in the Indian Trees Campground in 2001. The culverts are located along the campground loop road, which crosses two channels of “Indian Trees Creek” at four locations. Indian Trees Creek is a small, officially unnamed tributary to the West Fork of Camp Creek that runs through the middle of the campground. It contains small westslope cutthroat trout and brook trout. One of the culverts is maintaining a native material bottom throughout its barrel, and appears to provide adequate fish passage. The other three culverts contain no substrate in their barrels, have slightly perched outlets, and do not provide adequate fish passage. The reason those three culverts are not providing adequate fish passage is because they are too small and were not buried deeply enough into the streambed when they were installed. Those are the two most common reasons why fish passage culverts are ineffective on the Forest. In summary, three of the four new culverts in the Indian Creek Campground are not meeting fisheries objectives for fish passage.

Magruder Corridor Campgrounds (West Fork Ranger District). During the 2003 field season, fisheries biologists monitored maintenance, recreational activities, and stock grazing at the five developed campgrounds in the Magruder corridor: Paradise, Indian Creek, Raven Creek, Deep Creek, and Observation Point. This monitoring detected no problems or significant impacts on aquatic resources. Activities at these five sites are meeting fisheries objectives and programmatic agreements (e.g. Central Idaho Level I Team programmatic

biological assessments), and are either having no effect or an insignificant effect on listed fish species and their habitat.

Paradise Campground Hazard Tree Removal (West Fork Ranger District). In autumn 2003, 40-50 insect-killed hazard trees were removed from the Paradise campground with a cable yarder and log truck. The trees were killed by a combination of Douglas-fir bark beetle and root rot, and posed a safety risk to campers. Forest fisheries biologists monitored the felling activity, and were key participants in designing the project so that the removal would have no effect on the fishery. All but a couple of the hazard trees were located greater than one site potential tree length from Whitecap Creek. Because of their distance from the channel, the trees could not provide woody debris recruitment and were not shading the stream. The two closest trees were located barely within a tree length of the channel, but were leaning away from the channel and towards nearby campsites. Yarding of the hazard trees occurred by a self-loading log truck parked on the campground loop roads. Because the terrain was gentle and the log truck could park very close to the downed trees, yarding the logs produced minimal soil disturbance and no risk of sediment input to streams. The Central Idaho Level I Team's Developed Recreation Site Maintenance Programmatic Biological Assessment contains a mitigation measure that states "If hazard trees in riparian habitat conservation areas are needed to attain riparian management objectives, as defined by PACFISH, they will be left on-site or will be felled with reasonable attempt to direct the tree into the stream to contribute to instream large woody debris." In the case of the Paradise campground, fisheries biologists reviewed the locations of the hazard trees in the field, determined that the hazard trees were not able to contribute to riparian management objectives (i.e. they could not provide wood or shade because of their proximity to the stream channel or their lean), and concluded that the trees could be removed for safety reasons with no effect to the fishery. For those reasons, the removal of the hazard trees was determined to be consistent with fisheries objectives and programmatic agreements.

Outfitter and Guide Camps

Selway Outfitter Camps (West Fork Ranger District). During the 2003 field season, Forest fisheries biologists inspected several outfitter camps that are located in riparian habitat conservation areas (within 300 feet of streams) in the Selway River drainage. These camps included the Paradise trailhead, Cooper's Flat, the 4-mile and 8-mile camps along Canyon Creek, and the Mitchell Camp along Deep Creek. Stock grazing at these camps causes small, localized effects in riparian areas such as trailing and minor bank erosion, but on the stream reach and watershed scales, are having an insignificant effect on riparian area function and the fishery. At present, the level of impacts are acceptable and do not warrant moving these camps out of their present locations. The camps observed in 2003 are meeting fisheries objectives.

Fire Management

Gold 1 Fire Retardant Monitoring (Stevensville Ranger District). The Inland Native Fish Strategy (INFISH) standard FM-2 states that fire incident activities are to be located outside of riparian habitat conservation areas (RHCAs) unless there is no alternative and the resource advisor approves the site. During the Gold 1 fire (2003) in the Burnt Fork of the Bitterroot River drainage a retardant batch plant was needed for fire suppression activities and the logical location was near the junction of Corely Gulch and the Burnt Fork. Retardant was mixed and stored at this site and transported to the fire via helicopter. Phoschek was the type of retardant used. If Phoschek enters water, ammonia is the component that would be most lethal to fish. During the operation water samples were taken during one of the periods when retardant had its highest potential to be measured in the nearby surface waters. Samples were taken immediately downstream and upstream of the site. The upstream samples served as a control. Sample results indicated that Corely Gulch, a fishless stream, did have elevated levels of ammonia. The Burnt Fork, which contains bull trout and westslope cutthroat trout, did <u>not</u> show elevated levels of ammonia. Sample results were shared with the US

Figure 12 - A helicopter lifts off after filling its tank using the "snorkel". The tank was one of the components of this retardant mixing plant site near the Burnt Fork of the Bitterroot River in 2003.

Fish and Wildlife Service. The determination was that the levels of ammonia did not reach a point where fish were likely to be adversely affected. Recommendations for future placement and containment of these sites were developed.

Dozer Line Rehabilitation (Sula and West Fork Ranger Districts). During the 2000 fire season, approximately 200 miles of dozer line were constructed and subsequently rehabilitated across the Forest. Dozer line rehabilitation was completed in early October, 2000. Dozer line rehabilitation consisted of restoring the soil prism with an excavator, seeding with grass and fertilizer, covering the lines with woody debris, and in some instances, spreading straw or rolling out straw erosion matting. In the years since the fires, Forest fisheries biologists have periodically monitored the recovery of these rehabilitated dozer lines. In 2003, rehabilitated dozer lines were monitored in the following areas:

- The Mink Creek area, including revisiting the photo points established in 2000 (Mink Fire)
- The Blue Joint area (Little Blue Fire)
- The Coal Creek area (Razor Fire)
- The Waugh Gulch area (Valley Complex Fires)
- The Reimel Creek area (Valley Complex Fires)
- The Jennings Camp Creek area (Valley Complex Fires)

In all of these areas, very positive recovery has occurred. The grass seed that was planted in 2000 has developed into thick cover, and the majority of the rehabilitated dozer lines contain abundant levels of downed woody debris. In most areas, if a person did not know the dozer line was there before, they would drive right past and never even notice it. The features that make rehabilitated lines discernable are the linear arrangement of the woody debris, and the slightly different shade of green caused by the planted grass. There were no signs of significant overland erosion or sediment flow on any of the lines. In the forested areas, the rehabilitated lines have so much woody debris mixed in them that they would be very difficult to drive with an ATV, and impossible with a full-size vehicle. In summary, there is no evidence that the 2000 dozer lines did, or are, contributing sediment to fish habitat on the Bitterroot National Forest. The rehabilitated dozer lines are meeting fisheries objectives.

In August 2000, 12 photo points were established along representative dozer lines in the Mink Fire area (East Fork drainage). Photos were taken immediately after the construction of the dozer lines, and approximately two weeks after they were rehabilitated. These photopoints were revisited one, two, and three years after construction (see **Figure 13**). The Mink Creek dozer line was chosen for rehabilitation monitoring because it was mostly steep and potentially erosive, and contained a representative set of rehabilitation challenges that occurred throughout the 2000 fire area, including several steep pitches in the range of 40-45%, some incised side hill with cuts in the hill slope 1-2' deep, and a large cleared safety zone at its bottom. As the photo points indicate, the recovery observed in 2003 continues to be very encouraging. Specific findings include:

- Grass cover was thick throughout the entire line.
- There was no evidence of erosion, rilling, or gullying.
- There is too much woody debris woven into the line for eroded sediments to travel any significant distance.
- There were no indications of ATVs driving on the line. There is so much downed woody debris on the line that it would be very difficult to drive on it. It is easier to walk in the surrounding forest than it is to walk on the line.

Figure 13 – Mink Fire dozer line, photo point #4

August 20, 2000, immediately following construction.

October 1, 2000, immediately following rehabilitation

August 6, 2001, one year after rehabilitation.

August 30, 2002, two years after rehabilitation

August 19, 2003, three years after rehabilitation.

Facilities Management

Deer Creek Headgate and Irrigation Pipeline (West Fork Ranger District). In August 2001, a new head gate and buried irrigation pipeline was constructed on National Forest land on the north side of lower Deer Creek. During autumn 2003, Forest fisheries biologists inspected the head gate and buried pipeline. No significant problems were observed. The disturbed areas of stream bank are stable and recovering. Construction-caused sediment deposits in Deer Creek documented in the 2001 Forest Plan Monitoring Report have been flushed and scattered – they are no longer visible in the stream bottom downstream of the head gate. Water removals were not causing visible reductions in the water line of Deer Creek downstream of the head gate. The fish screen on the headgate is functioning as planned. The rock diversion in Deer Creek is not a fish passage barrier. In summary, the installation of this headgate, rock diversion, and buried pipeline caused localized sedimentation in the immediate downstream vicinity of the structure. This sediment was visible on the stream bottom until the next high flow, when it was flushed and scattered. Disturbance to the stream bank was localized to a few feet in the immediate vicinity of the headgate. The overall effect on the fishery was similar to that of a culvert replacement or removal. The Deer Creek headgate will be periodically monitored in the future as the opportunity arises. Forest fisheries biologists no longer plan on visiting it on a regular basis because fisheries objectives are being met and annual monitoring is unnecessary at this time.

Grazing

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

- the Meadow Creek exclosure fence, constructed in 1996 (Meadow-Tolan grazing allotment)
- the Waugh Creek exclosure fence, constructed in 1997 (Waugh Gulch grazing allotment)
- the Bugle Creek exclosure fence, constructed in 2000 (Meadow-Tolan grazing allotment)
- the Reimel Creek exclosure fence, constructed in 2001 (Camp-Reimel grazing allotment)
- the Paradise Campground jack-leg fence, constructed in 2000 (no allotment is associated with this fence)

Each of these exclosure fences was monitored in 2003. The results are discussed in the following paragraphs.

In addition to the five permanent fences listed above, for the second straight year, a temporary electric exclosure fence was installed around a 0.3-mile long key bull trout spawning area on Meadow Creek during August and September, 2003. The goal of the fence was to seasonally exclude cattle and prevent trampling of redds. The electric fence was installed on August 15, 2003, and dismantled on October 20, 2003.

Riparian exclosure fences have proven themselves 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. There are several negative aspects to riparian exclosure fences. The biggest is the annual maintenance commitment; others are the lack of visual “naturalness” on the landscape (most of the fences are made out of conventional steel post and barbed wire) and the potential for disrupting big game movement. In summary, if the fence maintenance commitments are sustainable, exclosure fences are good, reliable solutions for restoring localized riparian grazing problem areas.

Meadow Creek Exclosure Fence (Sula Ranger District). The Meadow Creek exclosure fence was constructed in 1996 as part of the INFISH action plan. 2003 was the 7th consecutive year that the fence was operational. The fence consists of two roughly 1000-foot long exclosures separated in the middle by a small cattle ford. The fence functioned effectively in 2003. No cows were able to get inside the fence during the 2003 grazing season. The riparian vegetation and stream banks inside the fence are in excellent condition. The livestock ford in the middle of the two exclosures has worsened since the fence was constructed in 1996, and is in need of rock hardening due to bank erosion and channel widening. The livestock ford at the downstream end of the lower exclosure has improved because gravel bedload deposits have narrowed the channel and hardened the crossing. At present, fisheries objectives are being met inside of the Meadow Creek exclosure fence.

In 2004, if funding is available, the Forest plans on building another 1750-foot segment of exclosure fence immediately downstream of the existing fence. The reason for this extension is to protect an important bull trout spawning and rearing area in the beaver pond section of Meadow Creek. Attempts to protect this area with a temporary electric fence have largely failed.

Waugh Creek Exclosure Fence (Sula Ranger District). The Waugh Creek exclosure fence was constructed in 1998 as part of the Camp Reimel EA. 2003 was the 6th consecutive year that the fence was operational. The fence consists of two 700-foot long exclosures separated in the middle by a small cattle ford. The fence functioned effectively in 2003. Channel recovery inside of the lower exclosure received a set back in 2003, but it was due to a natural event. The high flows in June 2003 deposited a large amount of gravel bedload inside and adjacent to the lower exclosure. This caused the Waugh Creek to jump its banks and cut several new channels outside of the exclosure. Forest fisheries biologists were able to divert Waugh Creek back into its historic channel within 1-2 weeks of the escape. However, a large delta of gravel bedload now covers the banks and riparian area throughout the lower exclosure. As a result, Waugh Creek has become considerably wider and shallower, and will be unstable for several years. The bedload deposition dried up a 600-foot length of lower Waugh Creek for 1-2 weeks, filled in the pools, and caused a substantial kill of westslope cutthroat trout in that reach. Forest fisheries biologists and hydrologists plan on monitoring fence effectiveness, channel conditions, and fish populations in Waugh Creek in 2004. At present, fisheries objectives are being met inside the Waugh Creek exclosure fence.

Figure 14 – (Top) Typical conditions in the unfenced section of Meadow Creek downstream of the 1996 exclosure fence. The Forest is proposing to fence this section in 2004.

(Bottom) Typical conditions along Meadow Creek inside of the 1996 exclosure fence. Excellent recovery has occurred over the past seven years of livestock exclusion.

In 2004, the Forest plans on extending the Waugh Creek exclosure fence another 1000 feet upstream to protect stream banks that were severely burned in the 2000 fires. Prior to the fires, the stream banks were naturally protected by the thick spruce forest and large amounts of downed woody debris. The fires removed this material, and now the area is vulnerable to trampling. Construction of the extension is planned for summer, 2004. Funding for this project was recommended by the Ravalli County Resource Advisory Committee.

Bugle Creek Exclosure Fence (Sula Ranger District). The Bugle Creek exclosure fence was constructed in summer, 2000 as part of a fisheries improvement project. 2003 was the 4th consecutive year that the exclosure fence was operational. The exclosure fence functioned effectively in 2003. No cows were able to get inside the fence during the 2003 grazing season. The riparian vegetation and stream banks inside the fence are on a healthy recovery trend. Willow seedlings planted by the Forest in 2000 and 2001 are numerous and 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 controlling where livestock ford Bugle Creek and reducing bank trampling. The Bugle Creek exclosure fence will be monitored during the 2004 grazing season. At present, fisheries objectives are being met inside of the Bugle Creek exclosure fence

Figure 15 - Typical conditions inside the 2000 Bugle Creek exclosure fence. Good recovery has occurred over the past four years of livestock exclusion.

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 at Wallace Creek; the lower end is located upstream of the Forest boundary. 2003 was the 3rd consecutive year that the exclosure fence was operational. The exclosure fence performed poorly in 2003. Livestock got inside the fence for most of September, and the resulting bank trampling and riparian utilization were similar to the years before fencing occurred. Some of the 4000 willow and alder seedlings that were planted in 2001 were trampled in 2003. The problem appears to be the lack of cattleguards at three road crossings on roads that are open to public use. When the fence was constructed, the decision was made to install gates on these crossings instead of cattleguards. The public often leaves these gates open (despite the signs that say "please close the gate"), and livestock simply walk through the open gate into the riparian area. The Forest needs to install cattleguards at the three road crossings, then the exclosure fence can be successful. At present, fisheries objectives are not being met inside of the Reimel Creek exclosure fence.

Paradise Campground Jack-Leg Fence (West Fork Ranger District). The Paradise Campground jack-leg fence was constructed in 2000 as part of a fisheries improvement project. 2003 was the 4th 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 goal of the fence is to restore the riparian vegetation along a section of stream bank that was chronically grazed by stock from the campground. Monitoring in 2003 indicated that the fence was successful in protecting the stream banks from stock grazing. In 2001 and 2002, Forest fisheries biologists planted the areas inside the fence with ponderosa pine and hawthorn seedlings to speed the recovery of the riparian vegetation. Monitoring in 2003 indicated that 45 pine seedlings were alive and growing out of 233 that were planted in 2002 (about a 19% success rate). About 20-30 hawthorn seedlings are alive and growing from the 2001 planting. The areas inside the fence are hot, weedy, and droughty, and it has been difficult to keep seedlings alive throughout the summers. The lack of water is believed to be the main problem. Watering the seedlings would help, but is infeasible because of the remoteness of the site. Choking by knapweed is a related problem that is enhanced by the droughty conditions. The main lesson learned from this project is the importance of protecting and maintaining the intact hawthorn and ponderosa pine community that is well adapted to the south-facing banks along lower Whitecap Creek. When this vegetation is removed by activities such as stock grazing, knapweed moves in quickly and takes over the site. Then, it becomes very difficult to re-establish hawthorn (the main understory shrub) and ponderosa pine (the main overstory tree). At present, fisheries objectives are being met inside of the Paradise jack-leg fence.

Meadow Tolan Grazing Allotment (Sula Ranger District). In October 2003, 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 5th consecutive year of post-grazing season monitoring (1999-2003). Results and trends are discussed in Item 17, Watershed Baseline Monitoring.

Waugh Gulch Grazing Allotment (Sula Ranger District). In September 2003, Forest fisheries biologists monitored the lower reach of the West Fork of Camp Creek for riparian grazing impacts. The objective of the monitoring was to check if the new grazing system implemented in 2003 resulted in more, less, or about the same amount of bank trampling as the previous system. We observed less bank trampling and better bank stability with the new grazing rotation. Taking the cows out of the West Fork Camp stream bottom earlier in the summer also

allowed decent regrowth of grass and forbs following grazing in the riparian area. Utilization along the roads was about the same as with the previous grazing system, but was lighter in the riparian areas. One bull trout redd and a spawning pair were observed, which confirms that bull trout do spawn and rear in the affected portion of the West Fork of Camp Creek, but at very low densities. A little further upstream, two other possible redds were observed, but we did not see any fish associated with them and could not tell if they were created by bull trout or brook trout. A major benefit of the new grazing system is that cows are not present during the bull trout spawning season. In summary, the new grazing system caused less riparian impact than the previous system, and eliminates the threat of livestock trampling bull trout redds.

Weed Management

Magruder Corridor and Frank Church River-River of No Return Wilderness Herbicide Treatments (West Fork Ranger District). During the 2003 field season, Forest fisheries biologists monitored herbicide spraying along the Selway River Trail #4 corridor and the Magruder corridor road ditches. In all areas, the water protection mitigations appear to have been adequately followed and applied. In summary, the herbicide treatments that the Forest conducted in Idaho in 2000-2003 appear to have adequately followed 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. Fisheries objectives are being met.

Timber Management

Burned Area Recovery FEIS Monitoring (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 in 2002 and 2003. The results are summarized below. If the reader desires more detailed information on Burned Area monitoring, that information is available in the unit logs that were recorded on each visit to the sale areas. The unit logs are kept on file at the Supervisor's Office, and are available upon request.

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 indicates that the vast majority of RHCA buffers were properly delineated during initial layout and project monitoring effectively caught and corrected the few instances where an RHCA buffer was found to be too narrow. In addition, in a couple cases prior to cutting, the purchaser discovered and reported small wetlands in the interior of units that had been missed by the marking crews. The buffers surrounding these wetlands were immediately painted, and the buffers were not compromised by project activities. We found only one small intermittent stream buffer that was missed and cut through, and that was located in the Laird Creek salvage sale. In summary, RHCA buffers were implemented correctly during initial layout in all but a few instances and project monitoring was effective in finding and correcting all but one minor exception prior to project activities.

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

Yes, in the vast majority of RHCA (99.96% of the total linear RHCA). Across this very large project area (115 harvest units), there were only 11 instances where trees were cut by the fellers inside RHCA buffers. Our monitoring was very intensive and extensive. Nearly all of the RHCA buffers in the Burned Area project were inspected following salvage harvest, including all of the RHCA buffers in the Roan Burke, Harlan, Robbins Gulch, Elk Point I, Elk Point II, Little Bull, Big Bull, Bitter Camp, Laird, Guide, Maynard, Reimel, Papa Waugh, Mama Waugh, and Coal Little Blue salvage sales. About two-thirds of the RHCA buffers were checked following salvage harvest in the Bear, Blodgett, and Dugout Moon salvage sales. The majority of this buffer monitoring was conducted by Forest fisheries biologists, but hydrologists and sale administrators also assisted as needed. Visits and monitoring results were documented in unit logs and photographs.

In the 11 instances where trees were cut by the fellers inside the RHCA buffers, the total number of trees cut was 62. The 62 trees affected a lineal buffer length of about 350 feet, which was only 0.04% of the total length of the RHCA buffers in the sale areas. Of the felled trees, 41 were left on-site and 21 were removed.

In nearly all cases, the cutting inside of the RHCA buffers occurred within the outer 30 feet of the 200-foot RHCAs surrounding small intermittent streams. This cutting is predicted to have no effect on the fishery because it occurred too far from the stream channel to affect shade or woody debris recruitment. The expanded RHCA buffers that were used in the Burned Area project prevented any negative effects to streams.

In one instance (unit 385-A in the Little Bull sale), 17 trees were cut in a swath about 60-120 feet away from a very small intermittent headwater tributary to Doran Creek. The cutting did not affect woody debris recruitment because a road separated the felled trees from the stream, and the trees were too far away to land in the stream. The cutting did remove a small amount of overhead shade (estimated at 25-33%) from the draw. However, because of the stream's narrow width (about 1 foot wide), most of the shade is provided by shrubs and forbs. The nearest fish habitat in lower Doran Creek is also more than three miles downstream. Because of these factors, the cutting had a negligible effect on water temperatures, and essentially no effect on the downstream fishery, consistent with predictions in the FEIS.

The main reason that trees were cut in RHCAs was confusion over the location of the RHCA paint lines. The green RHCA paint lines in the Burned Area project were sometimes crossed or closely located to blue paint lines or blue flag lines from older projects, and the fellers followed the wrong line. A few of the cuttings occurred for safety and hazard tree concerns. These were reported by the fellers and authorized by the sale administrator. In Bear unit 49, the cutting occurred in an RHCA buffer that was painted at the site but was not marked on the sale area map.

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

Sometimes, as 41 of the 62 trees (66%) that were cut inside of RHCAs by the fellers were left on site. 21 of those trees were yarded, which was a violation of the mitigation measure in the FEIS and ROD that states that trees cut in the RHCAs must be left on site. Only a few of those 62 trees were specifically cut for safety reasons, and those were left on site.

In addition to the 62 trees mentioned above, another 35-40 hazard trees were cut for safety reasons around the perimeters of the RHCA helicopter landings. All but about eight trees were correctly left on site. The purchaser helped mitigate the one violation by scattering cull logs across the landing during rehabilitation.

Overall, across the entire project area, there were relatively few trees cut inside RHCAs for safety reasons. In most cases, the fellers would request to cut an individual hazard snag inside of the RHCA buffer, and the snag would then be reviewed in the field by the sale administrator prior to granting authorization. In a couple of cases, fellers cut hazard snags without first getting authorization. Where riparian resources were more of a concern, the fisheries biologist was consulted before granting authorization.

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

Yes, there were eight instances where tractor skidders or skyline corridors entered RHCAs, and all of these complied with the Montana SMZ Law as mandated in the Burned Area FEIS and ROD. Only the crossing of the wetland in unit 392 required a SMZ variance from the Montana Department of Natural Resources and Conservation. The variance was obtained prior to skidding, and the monitoring requirements in the variance were met. The remainder of the entries did not enter SMZs, did not require variances, did not generate appreciable amounts of sediment, and had either "no effect" or a negligible effect on the fishery.

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 harvested areas. Because of the large percentage of helicopter and skyline yarding that occurred in the Burned Area salvage sales, there was usually little soil disturbance in close proximity to the RHCA buffers. Often, in the helicopter units, the most widespread disturbance was from the footprints of the fellers walking across the burned soils. Most of the RHCA buffers were monitored for sediment movement within several weeks of the completion of salvage yarding. Several units were monitored again one year after harvest, including the units in the Elk Point I, Elk Point II, Roan Burke, and Robbins Gulch sales that had entries with different yarding systems. In either case, we saw no indications of sediment moving overland from the harvested areas into the RHCA buffers. By 2002 and 2003, the vegetative recovery that had occurred in the salvage units was considerable, particularly by pine grass and fireweed. We plan to monitor the RHCA buffers in a subsample of representative units in 2004 in order to see if any sediment movement has occurred 1-2 years post-harvest.

6. Did temporary roads cross or enter RHCAs?

No, all temporary roads avoided RHCAs. The temporary roads were located on upland sites generally on or close to ridges, only went short distances, and were not a sediment concern because of their benign locations and considerable distances from the nearest stream channels. In several instances, temporary short (< 300 feet in length) "jump-up" roads were constructed to access upland helicopter landings. These were either recontoured following use, or stabilized and mulched and seeded. Monitoring indicates that the recontouring of the temporary roads was adequately done. This monitoring is documented in the unit logs.

7. Were new landings constructed in the RHCA buffers?

No. Seven helicopter landings were used inside of RHCAs on Forest Service land. All seven were located in existing openings or previously used sites, which was consistent with mitigations in the FEIS and ROD. There were no tractor or skyline landings inside the RHCAs.

Three of the RHCA helicopter landings were located within 300 feet of fish-bearing streams: (1) Hamburger Flat; (2) the junction of Road 720 and the Sleeping Child Road; and (3) the junction of Roads 75 and 715. At landings (2) and (3), a road separated the landing from the stream corridor. The Robbins Gulch landing and the Road 311 landings were located within 100 feet of non-fish bearing perennial streams. Most were separated from the stream by a road. Forest fisheries biologists monitored the RHCA helicopter landings during and after their use to ensure that sediment protection mitigations were appropriately used. At five of the RHCA landings (Hamburger Flat; the Road 75/715 junction along Rye Creek; and the three Road 311 landings), silt fences and straw bales were installed around the perimeter of the landing to contain erosion and keep sediment from moving off-site. These sediment control devices were installed for extra insurance, but they did not trap any appreciable amounts of landing-derived sediment because the potential sediments remained on site.

In summary, because of their locations and the sediment mitigations, use of the RHCA landings had an insignificant, immeasurable effect on the fishery. The one landing that had the potential to adversely affect water temperatures in Gilbert Creek was stopped before significant reductions in standing shade occurred. Monitoring of the RHCA helicopter landings was documented in unit logs and photographs.

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

No. Fuel storage and refueling activities occurred at several helicopter service landings, but none were located within an RHCA. Spill containment mitigations were properly followed, and no significant fuel spills occurred at the service landings.

In an unrelated event, a log truck tipped over on Road 13323 in Lord Draw and dumped several gallons of diesel fuel on the edge of the road fill slope within an RHCA surrounding an intermittent stream. This spill occurred in March, 2003. The driver attempted to collect as much fuel as he could in a 10-gallon bucket, but most of the fuel soaked into the snow and road fill. The contaminated soils were dug out of the road fill by an excavator, and removed from the site. It did not appear that fuel entered live water during the spill.

Item #1 Conclusions:

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

- RHCA buffers were implemented correctly during initial layout in all but a few instances and project monitoring was effective in finding and correcting all but one minor exception prior to project activities.
- Very little cutting occurred inside of the RHCAs. Only 0.04% of the total RHCA buffer length was affected. The fellers did a good job of staying out of the RHCAs.
- The effect of what little cutting did occur was either "no effect" on aquatic resources, or a negligible effect
- We observed no evidence of sediment moving into the RHCA buffers from the adjacent harvested units
- With careful location, mitigation, and rehabilitation, temporary roads and RHCA helicopter landings can be used with an insignificant effect on aquatic resources
- It may be infeasible to require purchasers to leave merchantable sized hazard trees in the RHCA helicopter landings. If left on site, firewood cutters will usually remove them anyway.

FISHERIES MONITORING ITEM # 2

The objectives of item #2 are to:

- ensure that 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 Best Management Practices properly applied to minimize sediment production during the replacement of fish culverts and the decommissioning and storage of roads?

Yes. Forest fisheries biologists monitored all nine of the fish culvert replacements that occurred in 2003, and the Robbins Gulch, Crystal Mountain, and Gilbert Creek road decommissioning projects. We found no instances where BMPs were either ignored or improperly applied. The contractors and Forest Service personnel working on these projects did a satisfactory job of minimizing short-term sediment inputs and stabilizing disturbed soils. The seeding, slashing, and straw mulching activities that occurred on the disturbed soils following implementation were well done. The culverts were properly sized and installed to provide fish passage and pass the 100-year flood.

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

Yes. BMPs were properly applied, which is the key to meeting state water quality standards. The new culverts were sized to pass the 100-year flood (INFISH standard RF-4), and installed to maintain fish passage (INFISH standard RF-5). The road decommissioning activities were designed and 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.

Figure 16 – December 2003. Typical view of decommissioned roads in the Laird Creek drainage, Gilbert decommissioning project (lower left and the lower right side of the photo near the draw bottom).

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 BAR 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 burning activity that occurred was the burning of landing slash piles. No underburning has been conducted. The slash pile burning was completed in a manner consistent with the Forest Plan and the bull trout programmatic assessment.

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

Most of the time, but there were several instances when non-compliance with the road maintenance programmatic assessment was observed. These are listed below. Of the eight occurrences, only the non-compliance on road 321 appears to have resulted in sediment entering fish habitat. Non-compliance usually occurred when purchasers sidecasted road material over the fill slope, either during grading or snow plowing. The quality of purchaser road maintenance was variable in the Burned Area project. For example, some purchasers were reluctant to punch drainage holes in the snow berm, while others did a good job of snow plowing. The same is true for road grading. Our monitoring documented non-compliance with the road maintenance programmatic biological assessment on the following roads:

Figure 17 - March 2002, spring break-up, water flowing down the ice ruts in Road 321 along North Rye Creek.

1. Road 1301, snow plowing sidecasted dirt off the road. February, 2002 (Roan Burke sale)
2. Road 13356, snow plowing sidecasted dirt off the road. February, 2002 (Elk Point I sale)
3. Road 369, snow plowing sidecasted dirt off the road. February, 2002 (Elk Point I sale)
4. Road 446, blading prior to application of gravel fill sidecasted dirt into Robbins Gulch in the very encroached section of road upstream of milepost #2. June, 2002 (Robbins Gulch sale)
5. Road 5612, blading following hauling sidecasted dirt off the road for several miles. September, 2002 (Little Bull sale)
6. Road 321, blading during hauling resulted in short sections of sidecast and dirt berms on the shoulder near Cat House Creek, near the No-see-um Creek culvert crossing, and around milepost 1.8. October, 2002 (Roan Burke and Harlan sales)
7. Road 321, snow plowing sidecasted dirt down the fill slopes in scattered spots between the 1 and 2 mile markers. March, 2003 (Roan Burke and Harlan sales)
8. Road 311, sidecasted snow blocked the outlets of three ditch relief pipes, which caused the pipes to back up with water and freeze solid under the road; during March 2003, water could not get through the pipes for a couple of weeks, so the water backed up at the inlets; eventually the water overtopped the culvert and drained into the next inslope ditch down the hill; with more water than the ditch was designed to carry, there was more erosion of the road shoulder; the final result was the erosion of a couple of cubic yards of road shoulder, and sediment input to Guide Creek in the range of a cubic yard; straw bale check dams installed below the ditch relief pipes trapped considerable material and were instrumental in minimizing sediment input from this incident. March, 2003 (Guide sale)

With the exception of the sidecasting that occurred on Road 321, it is very unlikely that any of the sidecasting resulted in sediment entering fish habitat. Non-compliance items #1, #2, #3, and #5 occurred in upland sites far from streams. Non-compliance item #4 contributed a small amount of sediment to Robbins Gulch, which is a small non-fish bearing stream that does not contribute much water or sediment to the East Fork of the Bitterroot River. Non-compliance items #6 and #7 contributed a small amount of sediment to sediment-laden westslope cutthroat trout habitat in North Rye Creek. Sidecasting along Road 321 has been a chronic problem for many years because in numerous spots between mileposts 1 and 3.5, the road shoulder is perched right above North Rye Creek. Non-compliance item #8 contributed sediment (estimated at about a cubic yard) to the non-fish bearing upper reaches of Guide Creek. Some of this sediment was transported downstream into westslope cutthroat trout habitat in lower Guide Creek.

The biggest road problem (and the greatest sediment risk to streams) in the Burned Area project occurred when ice ruts were allowed to form in the frozen surface of several roads. Ice ruts are primarily formed in late winter and spring when large numbers of log trucks are allowed to haul on ice-covered roads during above-freezing temperatures. It was primarily a problem on two roads in the Rye Creek drainage: (1) the lower five miles of Road 321 in March, 2002 (North Rye Creek), and (2) between mileposts 6 and 8 on Road 75 in March, 2003 (Rye Creek). Ice ruts and runoff were also observed on a smaller scale on the steep pitches of Roads 311 and 5745 in March, 2002 and 2003. During the warmest days, enough water and sediment was coming off of the ice ruts to make Rye Creek and North Rye Creek turbid for several miles downstream. This is believed to be the largest source of sediment produced by the Burned Area project, and may have produced more sediment than all salvage harvest (felling and yarding) put together. Numerous unit logs and photographs documented these events.

Figure 18 - March 2003, spring break-up, water from ice ruts gathered in a low spot in Road 75, overwhelmed the silt fence, and poured directly into Rye Creek.

In the second (2002-03) and third (2003-04) winters of Burned Area hauling, the Forest did a much better job of preventing ice rut formation and erosion. No significant ice rutting was observed on Forest Service haul routes during winters 2002-03 and 2003-04, and spring melt-off occurred with far less erosion and sedimentation than occurred in March, 2002. The one road where ice rutting and sedimentation was a problem in 2003 was Road 75 along Rye Creek. In that case, the log truck traffic on the road was predominantly coming off State of Montana lands in French Basin. Careful administration of the log haul was the key to preventing ice rut problems.

Figure 19 - April 2002. Water running down ice ruts formed this depositional fan of sediment on the fill slope of Road 321, and caused some of this sediment to enter North Rye Creek.

The key findings and lessons learned from monitoring item #3 are:

- Ice rutting and run-off on encroached log haul roads has the potential to produce much larger sediment inputs to streams than sediment movement through RHCA buffers. Once the sediment gets into streams, it can be easily transported several miles downstream
- Ice rutting can be avoided, but it takes careful sale administration. It is particularly important to avoid driving large numbers of log trucks on the ice-covered roads in late winter or spring when temperatures are above freezing. It is best to finish the bulk of the hauling before March arrives.
- 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 been set up does not work. The berm becomes rock hard and very difficult to move. Some purchasers are reluctant to punch holes in snow berms.
- Once deep ice ruts form in the road surface, they cannot be erased by plowing. They will have to melt off. Chipping water bars into the frozen surface with a pulaski to divert the water running down the ruts can be done, but is not easy.
- The 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.

Watershed Baseline Monitoring
Item 17

OBJECTIVES: Monitor water and sediment yields; validate prediction models; monitor compliance with State water quality standards and BMPs.

DATA SOURCES: Water monitoring stations (water column monitoring of flow and sediment); stream surveys (channel shape, composition, stability, and productivity); and precipitation and snow pack information.

FREQUENCY: Annually. Six streams representing major geologic types; selected project monitoring sites for stream reach surveys; selected projects for Best Management Practices (BMP) implementation monitoring.

REPORTING PERIOD: 2003.

VARIABILITY: Twenty percent variation from predicted sediment increases and changes in water quantity, quality, or other stream parameters; minor departure from BMP implementation monitoring.

CHANGES IN MONITORING PROTOCOLS: Stream flow and sediment was not measured on the Forest in 2003 using the methodology presented in the current forest plan. The basis for this decision can be found:

- In the 2002 Forest Plan Monitoring Report that documents changes in monitoring protocols.
- In broad scale monitoring projects, such as the Interior Northwest PACFISH/INFISH Biological Effectiveness Monitoring Project, Logan Utah. Products from these projects document the natural and observational variability of stream monitoring protocols, especially sediment sampling.
- In the Bitterroot NF review of streamflow changes related to land management activities, Forest Plan Watershed Monitoring Items 18 and 20.

EVALUATION – PROJECT MONITORING :

Table 27 - Fire and Debris Flow Monitoring - Overwhich Creek

Stream Name	Survey Year	Percent < 2mm	Percent < 6mm	D50
Overwhich Creek below FDR 5699 bridge Rosgen Channel Type C4	1992	29	31	41
	1993	18	26	57
	1994	6	9	61
	1996	22	27	36
	1997	8	9	58
	1998	6	7	71
	1999	1	3	40
	2000	11	18	29
	2001	3	5	64
	2002	1	2	82
	2003	3	3	88

Results: Surveys have been conducted on the mainstem of Overwhich Creek to monitor stream channel conditions following the 1992 debris flows. Approximately 20 percent of the watershed was burned at high and moderate severity during the 2000 fires. Pebble count measurements indicated that substrate composition has coarsened over time. Between 1992 and 2003, the percent fines <2 mm and <6 mm has decreased from approximately 20 percent to less than 5 percent. The mean bed material (D50) has increased from gravel (41 mm) to small cobble (88 mm) indicating that fire and debris flow fines are being moved out of this stream reach. Fines related to the 2000 fires moved out of the system quickly as evidenced by the data collected in 2000 and 2001. This data is consistent with published literature on fine sediment and fire related effects.

Table 28 - Timber Harvest, Road Improvements - Beaver Woods Area

Stream Name	Survey Year	Percent < 2mm	Percent < 6mm	D50
South Fork Woods Creek Rosgen channel type A4	1992	16	37	11
	1998	18	26	23
	1999	9	19	26
	2000	12	19	17
	2001	15	16	29
	2003	36	38	17
Lower Sheep Creek Rosgen channel type C4	1992	28	48	7
	1998	22	33	16
	1999	12	16	22
	2000	29	36	10
	2001	25	33	10
	2003	49	56	4
Salt Creek Rosgen channel type B4	1997	24	32	29
	1998	25	28	35
	1999	22	28	25
	2000	33	39	17
	2001	17	20	26
	2003	30	34	17
Woods Creek Rosgen channel type C4	1998	12	15	48
	2000	18	19	63
	2001	4	6	55
	2002	10	16	51

Results: Harvest occurred in the project area beginning in 1998 and continued through 2003. Results from sediment monitoring are inconclusive; the data illustrate the range of variability encountered when measuring sediment. Archer et al (2004) and Roper et al (2002) have found that sediment values may vary by as much as 100 percent (plus/minus) and that pebble count sampling may not be sensitive enough to detect small project related effects. Observations by the South Zone Hydrologist indicate that channel conditions have not changed during project implementation.

Table 29 - Ski Area Expansion - Lost Trail Ski Area

Stream Name	Survey Year	Percent < 2mm	Percent < 6mm	D50
East Fork Camp	1998	19	32	30
	1999	21	28	51
	2001	11	16	42
	2002	13	18	26
	2003	28	30	20

Results: Results from sediment monitoring are inconclusive; the data illustrates the range of variability encountered when measuring sediment. Archer et al (2004) and Roper et al (2002) have found that sediment values may vary by as much as 100 percent (plus/minus) and that pebble count sampling may not be sensitive enough to detect small project related effects. Observations by the South Zone Hydrologist indicate that channel conditions have not changed during project implementation.

Table 30 - Range Allotment - Meadow Tolan Allotment

Monitoring Site	Allowable Trampling	Trampling Following '99 Season	Trampling Following '00 Season	Trampling Following '01 Season	Trampling Following '02 Season	Trampling Following '03 Season
1) Meadow Cr. below exclosure fence	20%	21%	22%	15%	28%	21%
2) Meadow Cr. inside exclosure fence	20%	0	2%	0	.05%	1%
3) Meadow Cr. above Rd 5759 crossing	20%	13%	16%	19%	30%	23%
4) Lodgepole Cr	20%	9%	10%	17%	29%	21%
5) Meadow Cr, above end of Rd 5761	10%	22%	21%	25%	19%	36%
6) Lower Trib to Meadow Cr off Rd 5759	20%	11%	15%	14%	9%	XX
7) Bugle Cr	10%	31%	4%	10%	3%	4%
8) Swift Cr	20%	13%	10%	10%	20%	15%
9) No. Fk. Springer Cr	20%	28%	38%	23%	53%	XX
10) Trib to Meadow, Sec 2	30%	26%	16%	17%	37%	20%
11) Bunch Gulch	30%	14%	16%	15%	49%	XX
12) Upper Tolan Cr	30%	<1%	<1%	3%	3%	<1%
13) Upper Trib to Meadow Cr off Rd 5769	20%	24%	26%	26%	54%	XX
14) Bugle Creek, below exclosure fence	10%	2%	7%	11%	11%	8%

Results:

- Nine of the sites had trampling equal to or less than previous years. Conditions are considered maintained at these sites.
- One site, above FDR 5761, was over the desired trampling level every year since 1999. A fence will be built to exclude livestock at this site.
- Bank trampling was not measured at the four sites marked “XX” in 2003. Review of these sites by the Interdisciplinary Team determined that trampling was not an appropriate monitoring tool and conditions would be better determined by utilization techniques. Photo point monitoring will continue at these four sites.

EVALUATION – TMDL (TOTAL MAXIMUM DAILY LOAD) AND STATE WATER QUALITY STREAM SURVEYS

The Bitterroot National Forest worked cooperatively with Montana Department of Environmental Quality on TMDL and water quality issues on National Forest lands. Twenty-seven streams were surveyed in 2003 (protocols available at the Bitterroot NF Supervisors Office). This data will be used to complete the Bitterroot Headwaters TMDL (out for public review in April 2004) and Bitterroot Mainstem TMDL (to be completed by 2006).

Table 31 - Streams Surveyed in 2003 and Survey Location (mile mark)

East Fork Bitterroot River, 5 partial surveys	Ditch Creek, 0.4	Reimel Creek, 2.9, 3.0, 3.8, 4.3
Meadow Creek, 7.3	Hughes Creek, 0.5	Buck Creek, 0.5
Deer Creek, 0.3	Hughes Creek, Restoration	Nez Perce Fork, 10.8
Rombo, 3.8	Hughes Creek, 4.4	Upper West Fork, 30.3
Moose, 4.1	Hughes Creek above Restoration	Tolan, 5.1
Moose 1.4	Willow 9.0, 11.0	Sleeping Child 4.3, 9.3, 20.7
Tin Cup 4.5	Two Bear 0.1	Bass 3.0
Lost Horse 5.6, 6.6	Rye 6.1, 12.4	NF Rye 1.9
Lick (Darby) 1.3, 2.4, 3.7	Bear 6.0	Mill 6.0
Roaring Lion 4.4	Skalkaho 11.4, 15.8	

EVALUATION – SEDIMENT YIELDS AND SEDIMENT MODELING

In an effort to determine the effectiveness of pebble counts for monitoring channel conditions following management activity, five existing stream survey sites, each with four to nine years of survey data, were reviewed for status or trend. Chi Square analysis (Forest Service Publication Stream Notes, October 1993) was used to determine if percent fines and D50 values showed trends or changes over time. Measurement and protocol variability was observed throughout the period of record, restricting the use of the data for making status or trend determinations.

The forest is participating in regional and national efforts to evaluate stream survey techniques and determine variability in both the protocols and observers. These efforts will help the forest refine its monitoring strategy and be able to detect change in stream channels related to management activities.

MONITORING – WATERSHED IMPROVEMENTS AND INVENTORIES

Table 32 - Watershed improvement projects completed during 2003

Project Area	Miles of Road Stored	Miles of Road Decommissioned	Notes
Warm Springs/Camp Reimel	10.8	3.7	
Slate Hughes	0	17.8	Included boulder placement at two dispersed recreation sites

REFERENCES

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Roper, Brett; Jeffrey Kershner; Richard Henderson; Nicolaas Bouwes. 2002. An Evaluation of Physical Stream Habitat Attributes used to Monitor Streams. Journal of the American Water Resources Association, Vol 38, No 6.

Watershed Effects and Restoration
Item 19

OBJECTIVES: Monitor cumulative off-site watershed effects. Report the results of watershed analyses for project proposals. Monitor watershed restoration and hydrologic recovery.

DATA SOURCES: R1 WATSED model data, coarse filter data, and MAGIS model data produced during environmental analysis. Field data from stream reach surveys.

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

REPORTING PERIOD: 2003

VARIABILITY: Exceeding geomorphic threshold of concern or other criteria.

EVALUATION:

This item was intended to monitor cumulative off-site watershed effects using one of several hydrologic models or processes. The data collected during stream surveys and for projects are used for both Watershed Baseline Monitoring (Item 17) and to determine Cumulative Watershed Effects (Item 19). Generally, hydrologists use a combination of equivalent clearcut area and road analysis to determine cumulative watershed effects. This information is analyzed for all planning projects and is documented in the planning files.

MONITORING RESULTS:

The reader is referred to Item 17 for a discussion of project assessments and effects analysis underway or completed for 2003. Additional project results are reported below.

Project Assessment And Cumulative Effects Analysis

Table 33 - Project assessment and cumulative effects analysis worked on during 2003 are or will be found in the following documents:

Middle East Fork	On-going	Sula Ranger District. Area includes the north side of the East Fork between Tepee and Bunch Gulch and between Meadow Creek and Tolan Creek on the south side of the river.
Lyman	On-going	Cameron Creek Drainage
Weird Salvage Sale	On-going	Cameron and Rye Creek Watersheds
Frazier Interface EA	Completed	Alternative 5 (modified) selected for implementation

Field Monitoring and Assessment of Cumulative Effects Analysis

The majority of field work completed during 2003 was related to the burned area recovery (BAR) analysis. Watershed and fisheries crews worked to ensure that activities were implemented as planned. Post activity monitoring found that BMPs and mitigations were implemented during the projects and were effective in reducing activity related sediment. Problems with implementation were corrected as soon as possible, further reducing any risk of off-site effects of the project. Additional evaluation can be found in Items 22.

McClain Landslide

Stream flow and suspended sediment were monitored in McClain Creek below the McClain landslide in 2003. Data collected between 2001 and 2003 suggest that suspended sediment load continues to decrease. This decrease is attributed to the ongoing and successful re-vegetation 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 from the Stevensville Ranger District hydrologist.

Watershed Modeling and Assumptions
Validation Items 18 and 20

OBJECTIVES: Assess local concern that timber harvest reduces late season low flows and causes flooding during the runoff period (Item 20). Predict hydrologic recovery rates (Item 18). Formulate storm runoff modeling assumptions. Validate Forest-wide watershed analysis.

DATA SOURCE: Stream flow sampling before and after projects.

FREQUENCY: Annually.

REPORTING PERIOD: 2003

VARIABILITY: 10 percent variation in flow pattern after project is completed or deviation from soil and water objectives.

EVALUATION:

In the original Forest Plan monitoring criteria, we estimated that hydrologic recovery (water yield and visual changes) would average about 20 years. We also expected visual and hydrologic recovery would occur at about the same rate on the sensitive land types. That is, the water yield increases and visual effects of timber harvest would diminish over about 20 years. The maximum area allowed by the Plan to be hydrologically and visually un-recovered ranges from 25 to 40 percent of habitat and land type groups. However, we have found that visual and hydrologic effects seem to recover at different rates. Therefore, the visual monitoring is now focused in Item 4 and all of the hydrologic effects were combined into one monitoring item in 1993 because of the apparent overlap between Items 18 and 20.

The Forest is also cooperating with USGS in Helena Montana on a study evaluating the effects of fire on stream flow. A USGS Technical Report related to stream flows and rainstorm events is being prepared and should be available by summer 2004.

MONITORING RESULTS:

Bitterroot National Forest hydrologists conducted a literature review on the state of knowledge related to streamflow modeling and hydrologic recovery. This report is summarized below. The complete report is available in the Bitterroot National Forest Supervisor's Office.

The knowledge of vegetation-stream flow relationships gained from numerous paired-watershed experiments can be used to address the monitoring items in the Bitterroot National Forest Plan. While the specific values on any given year and site will vary, general relationships are obvious in the literature:

- Reducing vegetation increases soil moisture and stream flow, but the amount of change is dependent on precipitation and the proportion of the watershed treated. Cutting an equivalent of 15-20% of a forested watershed generally creates a measurable increase in annual water yield (although this increase may not be statistically significant);
- Allowing vegetation to grow back or increase will decrease soil moisture and stream flow;
- The water yield increase is almost always seen on the rising limb of the hydrograph with little effect on the peak flow or recession limb.
- The duration of near-bankfull flows are generally increased;
- The major cause of flow variation is precipitation rather than vegetation management, especially for large flow events;
- Peak flows are increased up to 15% in some studies utilizing aggressive treatments (over 40% of the vegetation removed within a watershed), but most practical applications resulted in no statistically significant increase in peak flows;

- Hydrologic recovery on conifer-dominated sites is progressive and dependant on vegetation re-growth, but exact duration of recovery has not been well documented. Different researchers suggest crown closure or fully stocked pole-sawtimber stages as indicators of maximum moisture use on western conifer sites.
- Other aspects of these monitoring items, for example, “Formulate storm runoff modeling assumptions” and “Validate Forest-wide watershed analysis” cannot be addressed without intensive research-level efforts. Hydrologic response of specific sites and treatments can be statistically determined only with extended, intensive studies requiring substantial monitoring resources. The questions that drove the creation of these monitoring items have been answered to a functional level by other existing studies.
- Late summer baseflows are either unchanged or in some instances slightly increased by timber harvest. No published studies found during the literature review noted decreases in low flows from timber harvest.

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 (36 CFR 219.19(a)(b)).

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.

FREQUENCY: Annually.

REPORTING PERIOD: 2003.

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).

EVALUATION:

Research and analysis of fisheries and fish populations since the Forest Plan was signed have shown that the variability noted above is too narrow given the natural variation in fish populations. The current emphasis of the Bitterroot NF'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 population on the Forest scale
2) Validate fish/habitat relationships.
3) Locate the strongest bull trout populations and monitor their status.
4) Monitor compliance with Anadromous Fisheries (PACFISH) and Inland Native Fish (INFISH).

MONITORING RESULTS:

The following monitoring was accomplished in 2003 and is discussed and evaluated in this section:

FISH HABITAT INVENTORIES

Table 34 lists the fisheries habitat inventories that were conducted by Forest fisheries biologists in support of project planning and monitoring efforts in 2003. The inventories supply information used at a variety of scales to address short-term and long-term aquatic issues on and off the Forest.

On the Stevensville and Darby Districts, fish habitat inventories were focused in areas of upcoming projects; specifically Threemile Creek downstream of the Forest boundary in coordination with the developing community action plan, and phase I (partial breaching) of the Canyon Dam reconstruction project.

On the Sula (D3) District, fish habitat inventories focused on the Middle East Fork analysis area, Bugle Creek, and Lyman Creek. The objective of the inventories was to gather baseline fish habitat data in support of the Middle East Fork project, the Lyman Salvage project, and any future projects in the Bugle Creek drainage.

On the West Fork (D4) District, fish habitat inventories focused on the upper West Fork of the Bitterroot River, Coal Creek, and West Creek. The objective of the inventories was to fill in data gaps in the upper West Fork, and gather baseline habitat data in support of the Painted Rocks West project.

Table 34 - Fish Habitat Inventories Conducted in 2003

Year	Stream	District	Inventory Length (mi.)	Inventory Method
2003	Threemile Creek (with State and Private)	D1	2	Combination
	Canyon Creek (immediately below dam)	D2	0.5	Cross-sections
	East Fork of the Bitterroot River	D3	13.1	I-walk
	Bertie Lord Creek	D3	2.1	I-walk
	Bertie Lord Creek, trib 0.4	D3	1.0	I-walk
	Bertie Lord Creek, trib 3.5	D3	0.4	I-walk
	East Fork Bertie Lord Creek	D3	0.9	I-walk
	Guide Creek	D3	1.0	I-walk
	Jennings Camp Creek	D3	1.4	I-walk
	Mink Creek	D3	0.7	I-walk
	Tepee Creek	D3	0.7	I-walk
	Springer Creek	D3	0.4	I-walk
	Bugle Creek	D3	1.3	I-walk
	Lyman Creek, trib 1.8 (North Fork of Lyman)	D3	1.4	I-walk
	West Fork of the Bitterroot River	D4	12.7	I-walk
	Coal Creek	D4	1.2	I-walk
	West Creek	D4	0.8	I-walk
Total			41.6	

Threemile Creek Inventory: This survey used a combination of methods to document baseline fish habitat and riparian conditions in the Ambrose and Threemile Creek watersheds. The data have been used to explain the existing condition to the local community, and will hopefully inspire projects to improve fish habitat and watershed conditions in areas that need it the most.

Canyon Creek Cross-Sections were completed below the dam to document current channel shape and for estimating changes that will occur. Channel shape immediately below the dam's outlet is expected to change because of flow through the temporary breach rather than over the spillway. The breach was completed in fall of 2003.

Middle East Fork I-walk Inventories: These surveys used the I-walk methodology to document baseline fish habitat conditions in the Middle East Fork analysis area. The I-walk methodology is an abbreviated version of the R1/R4 method of surveying streams. The data were used to complete the Middle East Fork watershed analysis, and will be analyzed in any future NEPA decisions.

Lyman Creek I-walk Inventory: This survey began at the Forest boundary on the unnamed "North Fork of Lyman Creek" (also known as tributary 1.8), and continued upstream to the Road 311 crossing. The objective of the survey was to document baseline fish habitat conditions following the fires of 2000. The data will be analyzed in the Lyman Salvage project.

Bugle Creek I-walk Inventory: This survey began at the mouth of Bugle Creek and continued upstream to the Road 73609 crossing. The objective of the survey was to document baseline fish habitat conditions following the fires of 2000. The data may be used to analyze future burned area projects in the Bugle Creek drainage.

West Fork of the Bitterroot River I-walk Inventory: This survey was a continuation of the survey that occurred downstream of Painted Rocks Dam in 2002. In 2003, we began at the inlet of Painted Rocks Reservoir and inventoried fish habitat in the river as far upstream as Johnson Creek. The objective of the survey was to collect baseline fish habitat data from previously unsurveyed portions of the river.

Coal Creek/West Creek I-walk Inventory: This survey included Coal Creek between the Forest boundary and the Road 5662 crossing, and the lower mile of West Creek. The objective of the survey was to document baseline fish habitat conditions following the fires of 2000. The data will be analyzed in the Painted Rocks West project.

FISH POPULATION MONITORING

Table 35 summarizes the fish population estimates conducted on the Forest in 2003. Similar to 2001 and 2002, monitoring focused on the streams that were affected by the fires of 2000. We concentrated on the sites that were burned with high severity fire, but also sampled a mix of moderate, low, and unburned sites.

The Forest Plan recommends monitoring fish populations in six streams annually to meet the Forest objectives. In 2003, fish populations were monitored in 36 streams at 48 long-term monitoring reaches. This expanded level of monitoring effort also occurred in 2001 and 2002, primarily as a result of the 2000 fires and the increased assistance provided by a fisheries graduate research project funded by Montana State University and the Rocky Mountain Research Station.

At each long-term 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 35, nearly all of the reaches monitored in 2003 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 the Montana Department of Fish, Wildlife, and Parks.

Table 35 - Fish Population Estimates Conducted in 2003

Monitoring Site	Species Found *	Number of Years Sampled	Purpose of Sample
Andrews Creek 0.5	012	3	Post-fire estimate
Bertie Lord Creek 0.2	003, 012	6	MSU post-fire research project
Cameron Creek 10.1	003, 012	5	MSU post-fire research project
Camp Creek 2.0	001, 003, 004, 012	1	Reconstructed channel
Chicken Creek 1.0	003, 005, 012	4	MSU post-fire research project
Coal Creek 1.3	003, 012	3	Post-fire estimate
Daly Creek 0.7	005, 012	10	Long term monitoring
Divide Creek 0.1	005, 012	7	MSU post-fire research project
East Fork Bitterroot River 2.5	001, 003, 004, 005, 012,	4	Post-fire estimate
East Fork Bitterroot River 12.0	001, 003, 004, 005, 012	5	Post-fire estimate
East Fork Bitterroot River 31.4	004 ,005, 012	6	Post-fire estimate
Gilbert Creek 0.1	001, 003, 012	2	Post-fire estimate
Hart Creek 2.8	012	3	Post-fire estimate
Laird Creek 1.4	001, 003, 004, 005, 012	4	MSU post-fire research project
Laird Creek 2.3	001, 005, 012	3	Post-fire estimate
Lick Creek 1.9	003, 012	6	Post project monitoring
Little Blue Joint Creek 1.4	003, 005, 012	4	MSU post-fire research project
Martin Creek 7.5	005, 012	8	MSU post-fire research project
Martin Creek 1.3	005, 012	9	MSU post-fire research project
Maynard Creek 0.1	001, 003, 005, 012	3	Post-fire estimate
Medicine Tree Creek 1.5	012	3	Post-fire estimate
Meadow Creek 5.6	005, 012	10	MSU post-fire research project
Meadow Creek 7.3	004, 005, 012	6	MSU post-fire research project
Mine Creek 0.2	003, 005, 012	5	MSU post-fire research project
Moose Creek 1.4	005, 012	8	MSU post-fire research project
North Rye Creek 1.9	001, 003, 012	9	MSU post-fire research project
Piquett Creek 1.3	003, 005, 012	5	MSU post-fire research project
Praine Creek 1.0	012	5	MSU post-fire research project
Reimel Creek 2.6	003, 004, 012	7	MSU post-fire research project
Reimel Creek 3.8	003, 012	7	MSU post-fire research project
Rye Creek 6.6	012	3	Post fire estimate
Rye Creek 12.4	003, 012	9	MSU post-fire research project

Monitoring Site	Species Found *	Number of Years Sampled	Purpose of Sample
Skalkaho Creek 13.1	004, 005, 012	7	Long term monitoring
Skalkaho Creek 16.8	005, 012	15	Long term monitoring
Skalkaho Creek 20.6	005, 012	6	MSU post-fire research project
Slate Creek 1.6	003, 005, 012	7	MSU post-fire research project
Sleeping Child Creek 10.2	003, 004, 005, 012	15	MSU post-fire research project
Sleeping Child Creek 14.5	003, 005, 012	7	MSU post-fire research project
Swift Creek 0.7	005, 012	4	Post fire estimate
Tolan Creek 2.1	003, 005, 012	5	MSU post-fire research project
Tolan Creek 5.1	005, 012	8	MSU post-fire research project
Tolan Creek 7.3	005, 012	4	MSU post-fire research project
Two Bear Creek 0.8	005, 012	4	MSU post-fire research project
Warm Springs Creek 3.5	003, 004, 005, 012	8	Long term monitoring
Waugh Creek 0.7	004, 012	5	MSU post-fire research project
West Fork Bitterroot River 40.0	005, 012	4	MSU post-fire research project
West Fork Camp Creek 0.3	003, 012	4	MSU post-fire research project
Woods Creek 0.9	003, 005, 012	6	MSU post-fire research project

BOLD FONT = study reaches included in the Montana State University/Rocky Mountain Research Station post-fire fish research project
* = Species Found: 001 = rainbow trout, 003 = brook trout, 004 = brown trout, 005 = bull trout, 012 = westslope cutthroat trout

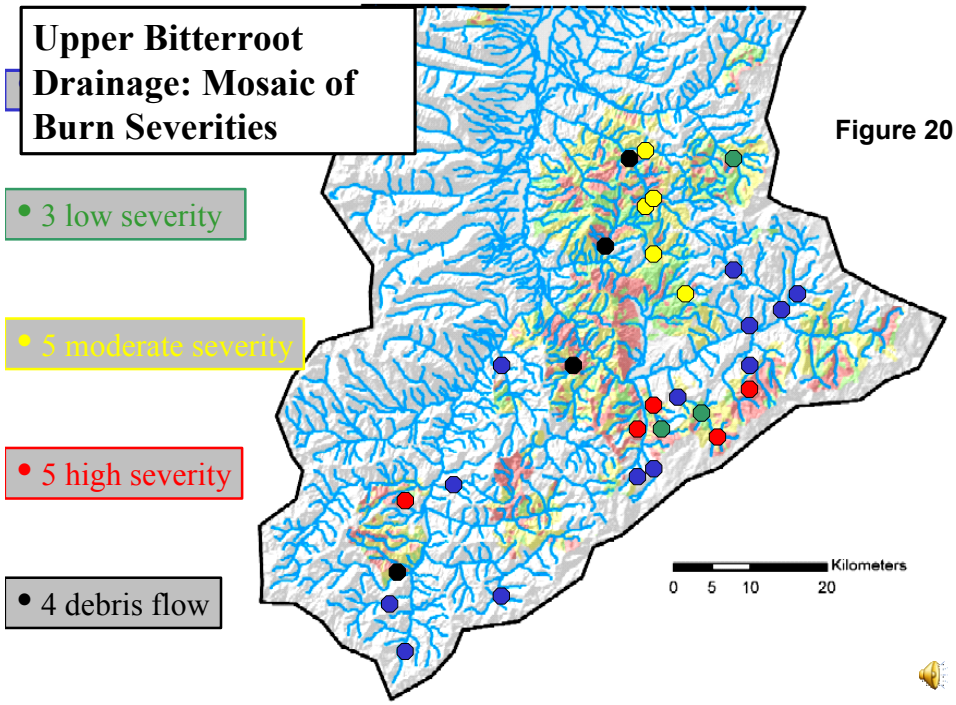


Figure 20

From 2001 to 2003, a joint research project was conducted by Montana State University (Clint Sestrich, fisheries graduate student) and the Rocky Mountain Research Station (Michael Young, fisheries researcher) to study the effects of the 2000 fires on fish populations in the burned streams. The objective of this research project was to determine if non-native trout species (brook, brown, and rainbow trout) have invaded or spread in the burned streams since the fires.

Fish abundance levels in 30 study reaches were monitored with mark-recapture electrofishing in 2001, 2002, and 2003. The 30 study reaches are displayed on the map in Figure 20, and highlighted in bold font in Table 35. Prior to the fires, each of the study reaches had at least one pre-fire abundance estimate (range 1-13 years of estimates). The mean number of years of pre-fire abundance estimates per study reach was three. Study reaches were selected to adequately sample the range of burn severity conditions that existed after the fires (e.g. five reaches were burned at high severity; five reaches were burned at moderate severity; three reaches were burned at low severity; four reaches experienced large debris flows in 2001, and 13 study reaches functioned as unburned controls).

Figure 21

Abundance: Change From Pre-Fire Average Burned

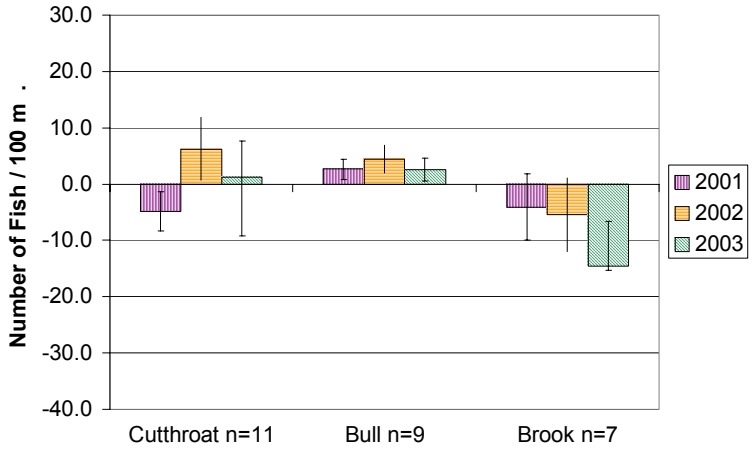


Figure 22

Brook Trout Relative Abundance: Change from Pre-Fire Average

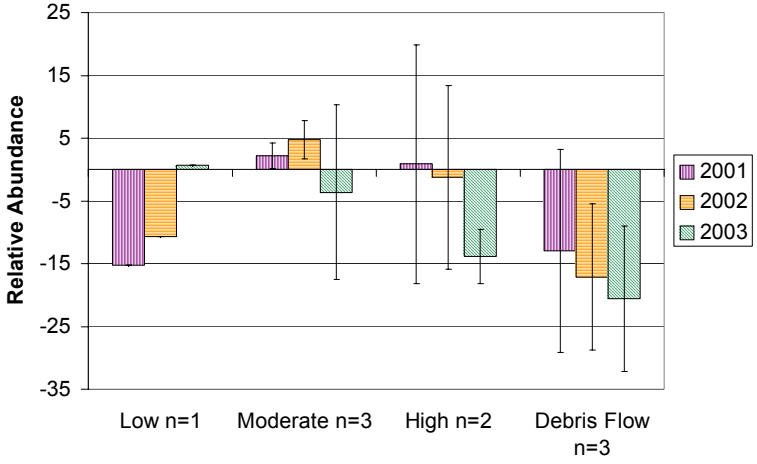


Figure 23

Abundance: Change From Pre-Fire Average Debris Flow

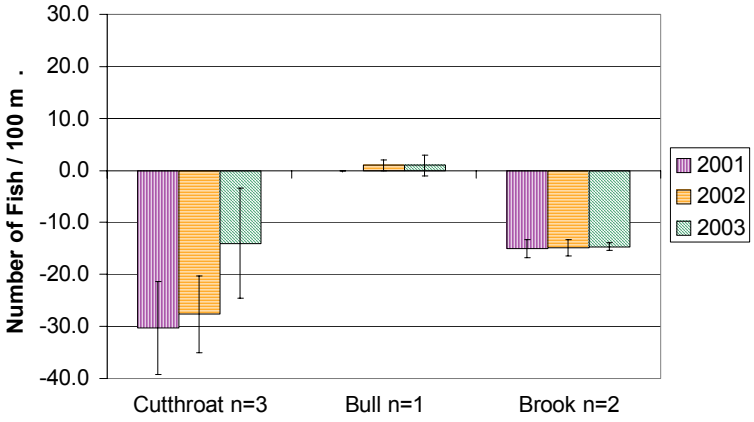
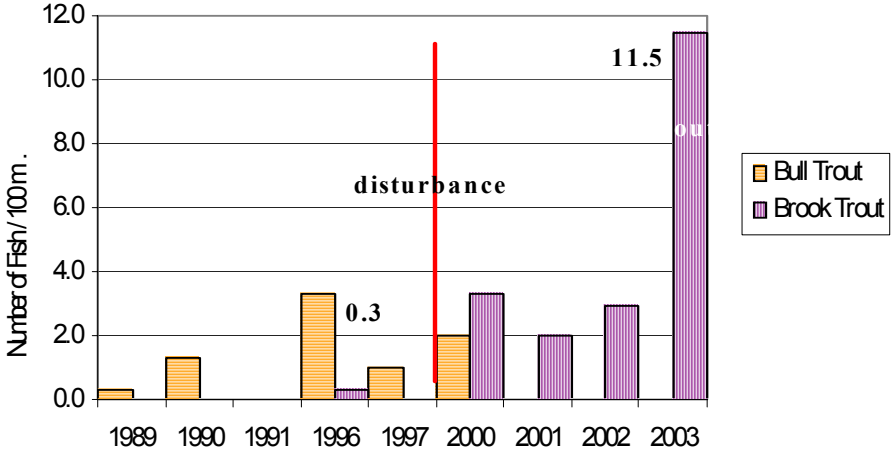


Figure 24

Rye Cr. Invasion



The key findings of the Montana State University/Rocky Mountain Research Station study are:

1. Across the project area, there was no significant difference in the pre-fire and post-fire relative abundance of non-native trout species in the burned versus the unburned streams. This suggests that in the majority of the burned streams, non-native trout species have not increased in abundance since the fires.
2. Westslope cutthroat trout and bull trout have increased above pre-fire levels to a small degree in most of the burned study reaches. Brook trout, in contrast, have declined in most of the burned study reaches, and in most of the unburned study reaches also. **Figure 21** displays how westslope cutthroat trout, bull trout, and brook trout abundance has changed in the burned streams since the fires. The "0" line in the graph represents no change from pre-fire levels. Positive bars indicate increases in abundance; negative bars indicate decreases in abundance.
3. Brook trout were believed to be the most likely non-native species to spread following the fires. However, with the exception of one study reach (Rye Creek 12.4), this has not occurred. Brook trout have declined in 6 of the 8 study reaches where they occurred prior to the fires, and increased in one study reach (Rye Creek 12.4). Brook trout have also declined in the unburned control reaches over this same time period. **Figure 22** displays how brook trout abundance has changed in the burned streams since the fires. The "0" line in the graph represents no change from pre-fire levels.
4. In the debris flow streams, westslope cutthroat trout and brook trout abundance is down considerably from pre-fire levels. However, westslope cutthroat trout show a recovering trend, but brook trout do not. Bull trout have remained near pre-fire levels, but this apparent "stability" is believed to be the result of small sample sizes and very low numbers of bull trout. There were few bull trout in the debris flow streams prior to the fires, and there are few now. Figure 23 displays how westslope cutthroat trout, bull trout, and brook trout abundance has changed in the debris flow streams.
5. Brown trout were responsible for 71% of the instances where non-natives appeared in a burned stream for the first time. However, brown trout appearance was incidental (1-2 fish per 1000 feet of stream), and never occurred in large enough numbers to calculate a statistically valid population estimate. An incidental brown trout was found in the following study reaches: Meadow Creek 7.3, Moose Creek 1.4, Reimel Creek 2.6, Reimel Creek 3.8, Waugh Creek 0.7, Laird Creek 1.4, East Fork Bitterroot River 31.4, and Sleeping Child Creek 10.2.
6. A single brook trout appeared in 2003 for the first time in one burned study reach (Sleeping Child Creek 14.5). Prior to the fires, brook trout had never been observed this high upstream on Sleeping Child Creek. However, about four miles downstream at study reach 10.2, overall brook trout numbers appear to have declined since the fires.
7. Brook trout are rapidly increasing in Rye Creek 12.4, while no bull trout have been found in this reach since the 2000 survey, which was conducted a few weeks after the fire. Figure 24 displays how brook trout have rapidly increased in Rye Creek 12.4 since the 2000 fires, while bull trout have not been found since August, 2000.

More detailed information is available concerning the fish populations in the 30 study reaches in the Montana State University/Rocky Mountain Research Station research project, including numerous fish abundance graphs and photographs for each of the study reaches. A research progress report containing that information has been incorporated into this Forest Plan monitoring report by reference, and is available at http://www.fs.fed.us/r1/bitterroot/planning/forest_index_planning.htm. Over the next few years, Montana State University and the Rocky Mountain Research Station research project will publish their findings in a thesis and the fisheries literature.

In the Burned Area Recovery Fish-Water-Soils Full Scale Monitoring Plan (item 1b), the Forest made a commitment to monitor post-fire fish populations in 17 burned monitoring reaches. Those 17 reaches were monitored in 2001, 2002, and 2003. Some of the reaches were incorporated into the Montana State University/Rocky Mountain Research Station research project. The following narratives summarize our most current knowledge of the fish populations in the 17 Burned Area Recovery monitoring reaches.

- Two Bear Creek 0.8 The fires have not had a noticeable effect on fish populations in this reach. Current levels of bull trout and westslope cutthroat trout are similar to pre-fire levels. Non-native trout have not been detected in this reach since the fires.

- Sleeping Child Creek 10.2 The fires did not cause a noticeable kill of fish in this reach, but the 2001 mudslides killed most of the fish. In 2003, bull trout and westslope cutthroat trout populations are still below pre-fire levels, but are recovering. Brook trout abundance has decreased since the fires.
- Skalkaho Creek 16.8 The fires have not had a noticeable effect on fish populations in this reach. Current levels of bull trout and westslope cutthroat trout are similar to pre-fire levels. Non-native trout have not been detected in this reach since the fires.
- Rye Creek 6.6 Prior to the fires, westslope cutthroat trout were abundant in this reach. Brook trout were common, but at much lower densities than cutthroat trout. After the fires and subsequent flooding the number of both species dropped substantially. In 2003, westslope cutthroat trout were still less abundant than prior to the fires and floods, but appear to be rebounding. No brook trout were found in the 2003 survey.
- Rye Creek 12.4 The westslope cutthroat trout population declined in 2001, but rebounded to just below its pre-fire level in 2003. Bull trout were present in low numbers before and immediately after the fires, but have not been found since the August, 2000 survey. At the same time, brook trout numbers have increased dramatically, and in 2003, 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 fires.
- North Rye Creek 1.9 The fires and mudslides (in 2001 and 2002) killed most of the fish in this reach. The westslope cutthroat population is recovering, though not as quickly as in high severity study reaches not impacted by debris flows. This may be a result of chronic fine sediment inputs limiting recruitment. In 2003, 50 to 100 young-of-the-year westslope cutthroat trout fry were observed. This was the first indication of successful post-fire spawning. In contrast, brook trout abundance has decreased following the fire and mudslides. One suspected 147 mm rainbow trout was captured in 2003.
- Meadow Creek 5.6 The fires have not had a noticeable effect on fish populations in this reach. Current levels of bull trout are similar to pre-fire levels. Westslope cutthroat trout were at an all-time high in 2003. Non-native trout have not been detected in this reach since the fires.
- Tolan Creek 5.1 The fires have not had a noticeable effect on fish populations in this reach. Current levels of bull trout and westslope cutthroat trout are similar to pre-fire levels. Non-native trout have not been detected in this reach since the fires.
- Warm Springs Creek 3.5 The fires have not had a noticeable effect on fish populations in this reach. Current levels of bull trout and westslope cutthroat trout are similar to pre-fire levels. Brook trout, brown trout, and rainbow trout are incidental and rare in the reach.
- East Fork Bitterroot River 12.0 This reach is located in the river canyon near Maynard Creek. The fires have not caused significant changes to the fish populations in this reach. Current levels of all species are similar to pre-fire levels. Westslope cutthroat trout and brown trout were slightly more common in 2003.
- Laird Creek 1.4 The 2000 fires and 2001 mudslides killed all of the fish in this reach. In 2002, due to the close proximity of this reach to source populations in the East Fork of the Bitterroot River, low numbers of bull trout, westslope cutthroat trout, rainbow trout, rainbow X cutthroat hybrids, brook trout, and brown trout recolonized the reach, along with hundreds of young-of-the-year westslope cutthroat trout fry. In 2003, 40 juvenile and adult westslope cutthroat trout and rainbow X cutthroat hybrids were found, along with low numbers of bull, brook, and brown trout, indicating that a good recovery was underway. Several of the rainbow trout and cutthroat trout had cranial deformities consistent with clinical signs of whirling disease.
- Reimel Creek 2.6 Since the fires, westslope cutthroat trout abundance has declined to well below pre-fire levels in this reach. Brook trout abundance peaked in 2001, and also declined to well below pre-fire levels in 2003. It is unknown what has triggered this decline in both species. One 149 mm brown trout was captured in 2001, and one 130 mm brown trout was captured in 2002 and 2003.
- Praine Creek 1.0 Westslope cutthroat trout abundance has increased sharply between 2001 and 2003. By 2003, it was considerably higher than pre-fire levels. Brook trout have not recovered following the fires, and none were captured in the 2003 survey.
- Maynard Creek 0.1 The fires do not appear to have not had a significant effect on fish populations in this reach. Westslope cutthroat trout, rainbow trout, and rainbow X cutthroat hybrids are abundant. Bull trout were documented for the first time in Maynard Creek in 2002, when one 5-inch fish was captured. In the

2003 survey, three 7-inch bull trout were captured. Brook trout were common in the 2001 and 2002 surveys, but rare in the 2003 survey. Brown trout are incidental and rare in this reach.

- Medicine Tree Creek 1.5 The fires and numerous small mudslides killed most of the fish in this stream. In 2001, only one westslope cutthroat trout was captured in the reach. In 2002, two westslope cutthroat trout were captured. In 2003, eleven westslope cutthroat trout were captured, along with several hundred young-of-the-year westslope cutthroat trout fry. This was the first indication of successful post-fire spawning. It appears that recovery of the westslope cutthroat trout population is slowly occurring.
- Little Blue Joint Creek 1.4 The fires killed most of the fish in this stream. The westslope cutthroat trout population showed steady recovery in 2001 and 2002 (123 fish sampled per 100 m in 2002), but declined sharply in 2003 (only 29 westslope per 100 m were sampled in 2003). It is unknown what caused this decline. Possibilities could include mortality from high summer water temperatures, poor over-winter survival, or high spring flow conditions. Low numbers of bull trout and brook trout were observed in this reach in 2001-2003. One 244 mm bull trout was captured in 2002, and one 145 mm bull trout was captured in 2003.

The Bitterroot National Forest and Montana Department of Fish, Wildlife, and Parks also monitored fish populations in other streams that were not designated in the Burned Area Recovery Fish-Water-Soils Full Scale Monitoring Plan or part of the Montana State University/Rocky Mountain Research Station research project. Most of these streams were burned in 2000. A few were not burned along the study reach, but contained sizeable portions of their upper watersheds that were burned. The current status of fish populations in these streams is summarized in the following narratives:

- Andrews Creek 0.5 This reach was severely burned in 2000. The westslope cutthroat trout population has made a good, steady recovery over the 2001-2003 time period.
- Camp Creek 2.0 This is a new monitoring reach 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. In the 2003 survey, westslope cutthroat trout were abundant, brook trout were common, rainbow trout were uncommon, brown trout were incidental and rare, and bull trout were not found. The 2003 data indicate that fish quickly recolonized the reconstructed channel at healthy numbers.
- Coal Creek 1.3 This reach was unburned in 2000. Portions of the headwaters were burned at mixed severity. The fires have not had a noticeable effect on fish populations. Westslope cutthroat trout abundance is similar or slightly higher than pre-fire levels. Brook trout increased in 2002, and declined in 2003. One juvenile bull trout was captured in 2002.
- Daly Creek 0.7 This reach was unburned in 2000, but portions of the headwaters were burned. Bull trout and westslope cutthroat trout abundance is similar to pre-fire levels.
- East Fork Bitterroot River 2.5 This reach is located near the Trinity Ranch. The fires have not caused significant changes to the fish populations in this reach. Current levels of all species are similar to pre-fire levels. Westslope cutthroat trout and brown trout were slightly more common in the 2003 survey.
- East Fork Bitterroot River 31.4 This is an unburned reach with a large amount of burned area upstream of it in the Anaconda-Pintlar Wilderness Area. The fires have not caused significant changes to the fish populations in this reach. Bull trout and westslope cutthroat trout abundance is similar to pre-fire levels.
- Gilbert Creek 0.1 This reach was severely burned in 2000, and is believed to have experienced a fish kill similar to what occurred in lower Laird Creek. The westslope cutthroat trout population has steadily recovered since the fires. Rainbow trout have also increased in 2002 and 2003. A couple of brown trout were captured in 2002, and a couple of brook trout were captured in 2003.
- Hart Creek 2.8 This reach was moderately to severely burned in 2000. The westslope cutthroat trout population has made a good, steady recovery over the 2001-2003 time period.
- Laird Creek 2.3 This reach is located in a small unburned “island” of stream bottom about a quarter mile upstream of the Gilbert Creek confluence. During the 2000 fires, it served as refugia habitat, and its fish populations were relatively untouched by the negative effects of the fires. In 2001, all of the fish in the reach may have been killed by the mudslides. In 2002 and 2003, a slow, gradual recovery of the fish populations was evident. The 2003 survey captured 18 juvenile and adult westslope cutthroat trout, 8 rainbow trout, and one 190 mm bull trout. A couple of brook trout and brown trout were captured in the 2002 survey.

- Skalkaho Creek 13.1 This reach was unburned in 2000. Bull trout and westslope cutthroat trout abundance is similar to pre-fire levels. Many of the bull trout in this reach appear to be hybrids. Brown trout and brook trout are incidental and rare in this reach.
- Swift Creek 0.7 This reach was unburned in 2000, but much of the watershed upstream of the reach was burned at high severity. Bull trout and westslope cutthroat trout abundance is similar to pre-fire levels.
- Fred Burr, Sleeping Child, Rye, Lost Horse, Kootenai and Blodgett Creeks. This list includes a mixture of burned and unburned sites. These streams were snorkeled with the primary purpose of refining where bull trout exist. Bull trout were usually found in areas where they were previously observed (the exception being Rye Creek where they were not observed in 2003). Bull trout and other species were not found in any locations where they were not previously seen or suspected to occur.

Species presence/absence and abundance levels were entered into a Forest-wide database maintained by the Montana Department of Fish, Wildlife and Parks in Hamilton. Species presence/absence is also being mapped on GIS.

These are the key findings of the Forest's post-fire fish population abundance monitoring:

- Overall changes and trends in post-fire trout populations validate those reported by the Montana State University/Rocky Mountain Research Station research project
- Based on the monitoring of the riparian habitat conservation area (RHCA) buffers and the fish population data, there are no reaches where sediment from the salvage harvest units has caused detectable changes to fish populations. The harvest-related sediment effects on the fishery predicted in the FEIS/ROD were overestimated.
- Road sediment continues to be a problem in Rye and North Rye Creeks. The problem was present prior to the fires and will continue indefinitely into the future until the road problems can be corrected.
- There is one reach where sediment from log hauling is believed to have contributed to the suppression of fish populations in 2002 – North Rye Creek 1.9. However, it is impossible to quantify the hauling effect on populations because much larger sediment-producing events were occurring at the same time (e.g. the 2002 mudslides and the continued routing of sediments from the 2001 mudslides). These larger sediment-producing events mask the much smaller effects of hauling-caused sediment.

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 13 years on the Forest has shown the Forest Plan viability definition 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 1990 are:

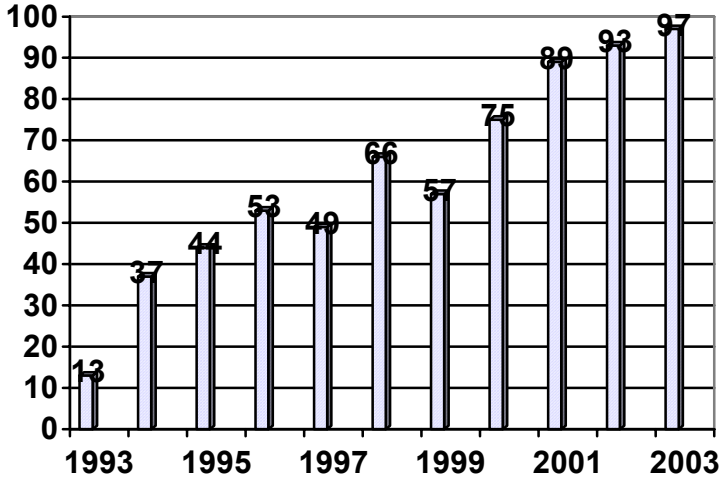
- Westslope cutthroat trout populations appear to be stable across the Forest. Populations do fluctuate naturally over time, but the monitoring data indicate a stable trend Forest-wide.
- Westslope cutthroat trout are easily the most abundant fish species on the Forest. They are present in nearly every fish-bearing stream, and likely occupy greater than 90% of their historic habitat on 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 in the river has been increasing over the past 10 years.
- 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.

- Since 1990, bull trout populations appear to be stable in the majority of Forest streams. Bull trout populations also fluctuate naturally, but again, the monitoring data indicate a stable trend Forest-wide.
- One stream where the monitoring data indicate that bull trout have declined or possibly disappeared is upper Rye Creek (i.e. the Rye Creek 12.4 monitoring reach). In the Skalkaho Creek drainage, bull trout population numbers have remained particularly strong.
- Connectivity between the rivers and spawning and rearing tributaries is also a problem for bull trout. The connectivity of westslope cutthroat trout populations in the Bitterroot basin appears to be better than that of bull trout populations, particularly in the main stem of the Bitterroot River and its tributaries. 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. Since 1993, the Bitterroot National Forest and Montana Department of Fish, Wildlife, and Parks 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 25.

Figure 25 - Number of Water Temperature Monitoring Sites on the Bitterroot National Forest



The growth in water temperature monitoring on the Forest can be attributed to the low cost and availability of computerized thermographs, the emphasis on obtaining good water temperature data in the INFISH and PACFISH aquatic conservation strategies, increased project-level temperature monitoring, and the overall importance of cold-water temperatures to our native salmonids.

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 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. By comparing the degree-day trends in the burned sites against the degree-day trends in several unburned index sites that have been monitored across the Forest since 1993, we can eliminate some of the bias caused by year-to-year weather variations and make some inferences about the influence of the fires and/or harvest activities on stream temperatures.

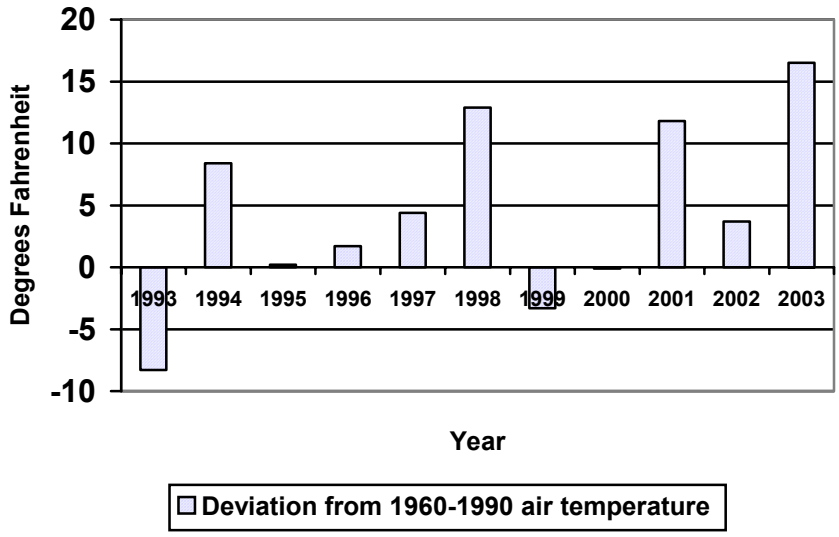
Because of the abundance of pre-fire water temperature data, the Forest was in a good position to monitor the effects of the 2000 fires on water temperatures in the burned streams.

In 2003, water temperatures were monitored at 47 burned sites. The majority of the burned sites have been monitored in all three summers since the 2000 fires. Monitoring the burned sites has been a cooperative effort conducted by the Bitterroot National Forest, the Montana Department of Fish, Wildlife, and Parks, the Rocky Mountain Research Station, and Montana State University.

2003 was a record hot summer, and our degree-day data reflects that. Of the 97 sites monitored across the Forest in 2003, 64 (or 66% of the sites) recorded their all-time high degree-day reading. At most of the monitoring sites, there appears to be a relatively strong relationship between ambient air temperatures and degree-days.

Figure 26 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. As you can see, the trend over the past decade indicates rising summer air temperatures.

Figure 26 - Deviations from the mean 30-year July-September air temperatures at the Stevensville Ranger Station Weather Station, 1993-2003



From 2001 to 2003, the Montana State University/Rocky Mountain Research Station research project studied the effect of the 2000 fires on stream water temperatures. Water temperatures were continuously recorded in 9 burned and 11 unburned streams. Post-fire temperatures were compared to pre-fire temperatures (1993-1999) collected at the same sites to quantify the amount of warming that has occurred since the 2000 fires. The 11 unburned sites were used as controls to minimize the variability caused by air temperature differences between summers. Each of the 20 streams in this water temperature study were classified as either receiving high, moderate, or low severity burn, or being an unburned control site. Pre-and post fire temperature changes were then calculated and graphed for each of the four classes of stream. Figure 27 displays the results.

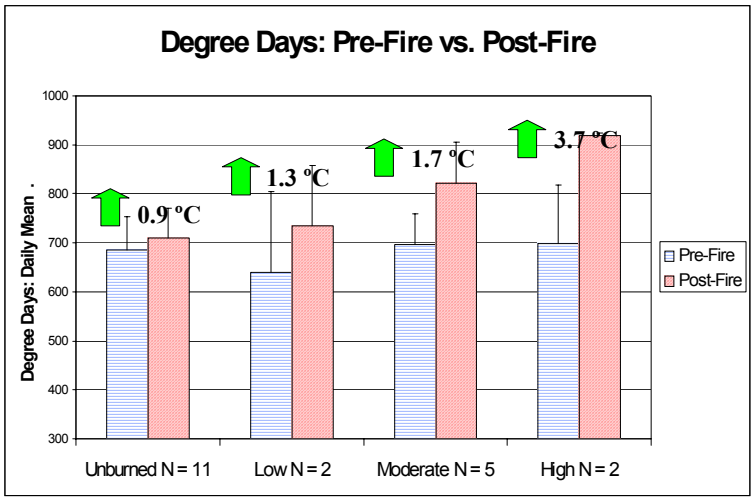


Figure 27 - Pre-and-post fire changes in mean water temperatures and degree-days, 2001-2003

The data in Figure 27 indicate that water temperatures have risen in the burned streams since the fires, and the magnitude of the rise increases with fire severity. Note also that degree-days and water temperatures in the unburned control streams have increased since 2000, but the magnitude of increase is smaller than that which has occurred in the burned streams. This suggests that the degree-day and water temperature increases in the burned streams are attributable to the 2000 fires. The rise in degree-days and water temperatures in the unburned control streams was caused by the warmer than average summer temperatures that the valley experienced in 2001 and 2003 (see Figure 26).

When corrected for between-summer weather differences (by subtracting off the 0.9° C increase observed in the unburned control sites), the streams burned at high severity experienced a mean temperature increase of 2.8° C, and a mean increase of > 200 degree-days. These numbers indicate that considerable stream warming has occurred in the severely burned streams since the fires. The 2000 fires have produced water temperature increases in the range of 2-4° C in the following streams:

- Rye Creek
- North Rye Creek
- Cathouse Creek
- Laird Creek
- Gilbert Creek
- Reimel Creek
- Andrews Creek
- Praine Creek
- Cameron Creek
- North Fork Cameron Creek
- Lyman Creek
- Medicine Tree Creek
- Little Blue Joint Creek
- Chicken Creek

When corrected for between-summer weather differences, the streams burned at moderate severity experienced a mean temperature increase of 0.8° C, and a mean increase of about 100 degree-days. These increases are generally less than half of those that occurred in the high severity streams. The 2000 fires have produced small water temperature increases in the range of 1° C in the following streams:

- East Fork Bitterroot River
- Guide Creek
- Camp Creek
- Maynard Creek
- Waugh Creek
- Hart Creek
- Meadow Creek
- Swift Creek
- Tolan Creek
- Sleeping Child Creek
- Divide Creek
- Overwhich Creek

When corrected for between-summer weather differences, the streams burned at low severity experienced a mean temperature increase of 0.4° C, and a mean increase of about 25 degree-days. These are small increases relative to the unburned control streams. The water temperature increase is about half that of the moderately burned streams, and only about 14% that of the severely burned streams. The 2000 fires have produced either insignificant or inconclusive temperature increases in the following streams:

- West Fork Bitterroot River
- Blodgett Creek
- Canyon Creek
- Daly Creek
- Deer Creek
- Two Bear Creek
- Blacktail Creek
- Skalkaho Creek
- Little Sleeping Child Creek
- Warm Springs Creek
- Piquett Creek
- Jennings Camp Creek
- Slate Creek
- Coal Creek
- West Creek
- Hughes Creek
- Taylor Creek

There is no evidence that Burned Area Recovery salvage harvest activities have affected water temperatures. The degree-day and water temperature data collected in the harvested and unharvested drainages exhibited the same patterns in 2001 (prior to any salvage harvest) and 2002-2003 (during and following salvage harvest). This lack of effect on water temperatures was predicted in the Burned Area Recovery FEIS (page 3-224 to 3-225) and ROD (page C-5), and is validated by the temperature monitoring data. The preservation of riparian shade is the key factor in maintaining water temperatures, and the expanded RHCA buffers used in the Burned Area Recovery project have successfully preserved riparian shade. As for shade losses in the uplands (i.e. caused by the harvest of upland snags) causing water temperature increases in adjacent streams, there is no evidence that this has occurred. In most of the salvage units, numerous snags were retained in the harvest units and meaningful reductions in shade did not occur. If the removal of upland shade had any effect on water temperatures, the resulting increase was invisible, immeasurable, and inconsequential. The Forest will continue to monitor water temperatures in the 37 sites designated in the Burned Area Recovery Fish-Water-Soils Full Scale Monitoring Plan (item 21). This monitoring began in 2001, and is planned to continue through 2006.

Under most conditions it will be important to preserve whatever shade is remaining along the severely burned streams until the riparian shrubs recover to the point where they can start to create effective shade of their own. The effective recovery period for shade from riparian shrubs is expected to take at least a decade to achieve.

BULL TROUT REDD SURVEYS

Starting in 1994, Forest fisheries biologists have 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, Montana Fish, Wildlife, and Parks fisheries biologists added a fourth reach in the upper East Fork of the Bitterroot River in the Anaconda-Pintlar Wilderness Area. Redd counts have been counted in the upper East Fork reach since 2000.

Figure 28 – Typical Bull Trout Redd

Meadow Creek Redd Survey (Sula Ranger District). The "Meadow reach" is a two-mile long section of Meadow Creek the Forest has monitored each autumn for bull trout redds since 1994. On October 20, 2003, Forest fisheries biologists counted eight bull trout redds in the Meadow reach (seven resident redds and one migratory redd). This number is on the lower end of the range counted in the years 1994-2002 (range = 1 to 21 redds). Most of the redds occurred between the top of the exclosure fence and the Road 725 culvert, which was similar to the pattern observed in 2002. Almost no redds were seen downstream of the exclosure fence, which goes against the pattern observed in 2001, where most of the redds occurred downstream of the exclosure fence. Three migratory bull trout were seen while conducting the 2003 survey. Despite the 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 relatively 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. In summary, our data suggest that redd counts are not a reliable way to detect resident bull trout trends in Meadow Creek. Forest fisheries biologists plan on conducting this redd survey again in autumn, 2004, primarily because a TMDL is being developed for sediment in Meadow Creek (Bitterroot Headwaters TMDL). In the draft Headwaters TMDL, the Montana Department of Environmental Quality recommends that the redd survey be continued and used to assess if future increases in migratory bull trout in the East Fork basin are occurring (redds produced by migratory bull trout can be counted much easier than redds produced by resident bull trout).

Upper East Fork Bitterroot River Redd Survey (Sula Ranger District). This reach was established by the Montana Department of Fish, Wildlife, and Parks in 2000 in response to several radio-tagged bull trout moving in this reach to spawn from the lower East Fork. In October 2000, Montana Department of Fish, Wildlife, and Parks biologists surveyed the upper East Fork between Moss Creek and Clifford Creek. Five bull trout redds (probably migratory redds) were counted, all located between Moss and Cub Creeks. In October 2001, the reach was shortened to include just the section between Moss and Cub Creeks. Two bull trout redds (probably migratory 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 redd was counted each year.

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 9, 2003, Forest fisheries biologists counted three bull trout redds in Deer Creek. Two of the redds were small (roughly 1' X 1'), probably from resident bull trout and/or brook trout. One migratory redd was observed in a pool tailout about 150 feet upstream from the irrigation pipe headgate. This redd was approximately 3' long X 2' wide. During the 2002 survey, a migratory redd was also seen in this same pool tailout. The number of redds observed in 2003 was within the range of past surveys conducted during the 1994-2002 period (range = 2 to 6 redds). Good spawning gravel is plentiful throughout this reach, but counts have always been low. Beaver activity in the reach increased significantly in 2003, with several new dams, lots of willow cutting, and more impounded areas.

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 redds were observed on October 7, 2003. All of the redds appeared to be made by resident bull trout. The 2003 redd count was low relative to the last three surveys (1998, 2001, and 2002). The reason for the low number of redds is unknown. In recent history, the drainage above the surveyed section has been relatively unaltered by fire, roads, or other obvious human activities. There were no major changes in the habitat quality of the surveyed section.

Figure 29 - Annual Bull Trout Redd Counts, 1994 to 2003

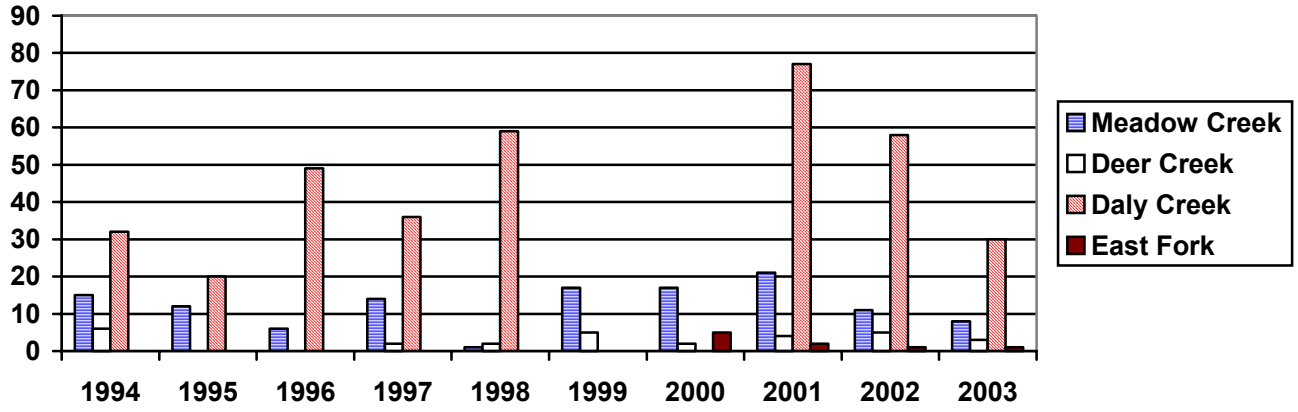


Table 36 - Annual Bull Trout Redd Counts, 1994 to 2003

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

ND = No data, not surveyed

The previous decade of redd count data suggests that the Forest has been unable to pinpoint the key spawning areas used by migratory bull trout, and the counts themselves have not been reliable indices of bull trout population trends. The Daly Creek reach is a different situation, because it is one of the most obvious key spawning reaches for resident bull trout on the Forest.

Redd counts are best used as an index of population trend after the key spawning areas have been identified. Without knowing where the key spawning areas are, redd counts have very limited utility. That is the situation that most of the Forest is in now.

How can the redd count methodology be improved? First and foremost, the Forest needs to pinpoint the key spawning areas for migratory bull trout. The best way to do that is through following the movements of migratory bull trout spawners by radio telemetry. An effort was made to radio-track migratory bull trout spawners in the East Fork drainage in 2000, but the fires interfered with the project right at the critical time when the radio-tagged bull trout were entering their spawning tributaries. In the future, additional radio telemetry projects need to be conducted to follow migratory bull trout spawners in the East Fork drainage and the West Fork drainage upstream of Painted Rocks Dam. Trapping data collected by researchers working in Slate Creek in 2003 indicates that migratory bull trout in Painted Rocks Reservoir may be more common than was originally believed. Hopefully, additional radio telemetry efforts would pinpoint the key spawning areas for migratory bull trout in the East Fork and upper West Fork drainages. Once the Forest knows where the key spawning areas are, then effective redd survey reaches could be established in those areas to track population trends over time. That is the way that redd surveys are typically used, and that is what the methodology is best suited for.

Research Note

Several streams on the Bitterroot National Forest are part of a Montana State University study of bull trout. The university is comparing age structure, growth, age at migration, and age at maturity of bull trout in tributaries throughout the lower Clark Fork drainage. This will provide baseline data describing individual populations, as well as provide analyses of age characteristics across the study area and their relationships to biotic and abiotic factors such as temperature, productivity, basin size and elevation, fish density, and species composition.

FISH MOVEMENT MONITORING

In 2002, fisheries researchers from the Rocky Mountain Research Station (Michael Young) and Montana Department of Fish, Wildlife, and Parks (David Schmetterling) studied the effects of mark-recapture electrofishing on the movement of westslope cutthroat trout, bull trout, and brook trout in Slate Creek and Little Blue Joint Creek. Specifically, Young and Schmetterling wanted to see if electrofishing caused trout to flee the sampling reaches, which would then bias (overestimate) the population abundance estimates derived from the mark-recapture protocol. One of the key assumptions in using the mark-recapture protocol is that the population you are attempting to sample remains “closed” between the marking survey and recapture survey. In other words, fish do not leave or enter the study reach between the marking and recapture surveys. In the late 1990’s, Montana Department of Fish, Wildlife, and Parks biologists conducted some informal fish marking studies in certain Forest monitoring reaches in order to see if much fish movement was occurring between the mark and recapture electrofishing surveys. Their data suggested that movement in and out of the monitoring reaches was minimal between the mark and recapture surveys. However, the data were never published and the studies were not statistically rigorous.

The Young and Schmetterling study has important ramifications for the Forest fisheries monitoring program because we use the mark-recapture electrofishing protocol to monitor the trend of trout abundance on the Forest, and have used this technique for the past 13 years. If large numbers of fish are leaving the monitoring reaches between the mark and recapture surveys, then our population abundance estimates are biased and too high.

The key findings from the Young and Schmetterling study are:

- Electrofishing did not cause fish to flee the study reaches. There was a small increase in the number of fish leaving the study reaches in the first day after the marking survey (most of the fish that moved out of the study reach moved downstream), but little emigration or immigration occurred in subsequent days.
- The small number of fish leaving the study reaches only marginally altered abundance estimates. The emigration of fishes resulted in a mean overestimate of population abundance by 4.7%, which was small relative to the precision of the original estimate (95% confidence interval was +/- 27% of the abundance estimate).
- Disregarding movements of marked fishes from the study reaches only produced small (< 5%) positive biases in abundance estimates.
- For this suite of salmonids (westslope cutthroat trout, bull trout, and brook trout) in small streams in mid summer, the effect of electrofishing on fish movement and abundance estimates was minor.

The Young and Schmetterling study suggests that the mark-recapture electrofishing protocol that is used on the Bitterroot National Forest is a valid and appropriate technique to estimate and monitor trout abundance levels. The Young and Schmetterling study is published in the Journal of Fish Biology.

Since 1998, an effort has been made to identify spawning migration patterns by fluvial westslope cutthroat trout between the Bitterroot River and tributary streams. In early spring, prior to the start of spawning migrations, radio transmitters were surgically implanted in westslope cutthroat trout in the Bitterroot River. The locations of fish were monitored several times a week through late June. This effort has been successful in identifying many tributaries used by fluvial westslope cutthroat trout for spawning. The data through 2002 is summarized in a Federal Aid Job Progress Report (Clancy 2003) available through Montana Fish, Wildlife and Parks.

A similar radio telemetry effort in 2003 was less successful than previous years. In 2003, transmitters were implanted in 12 fish (believed to be westslope cutthroat trout, based on morphological features) in the Bitterroot River between Bell Crossing and Florence. A summary of the data is not yet available; however, most of the fish stayed in the river and did not enter tributary streams. This behavior may be due to the fact that many of the fish we captured were actually westslope cutthroat X rainbow trout hybrids, and not pure westslope cutthroat trout.

CULVERT INVENTORIES AND REPLACEMENTS

The Forest Plan as amended by INFISH directs the Forest to “provide and maintain fish passage at all road crossings on existing and potential fish-bearing streams” (INFISH 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, nearly all of the fish-bearing culverts on the Bitterroot National Forest were surveyed to assess whether or not they function as a barrier to native trout passage. Culvert data was collected in the field by a dedicated Forest culvert survey crew between July and September, 2003. The survey included all of the significant fish-bearing culverts, accounting for over 90% of all fish-bearing culverts on the Forest. A few fish-bearing culverts were not surveyed due to access difficulty or lack of time, but those missed culverts were located in the headwaters of small tributaries. The field data were entered into the FishXing model software package, which predicted whether or not a culvert was likely to be a barrier to juvenile and adult trout.

Following data collection and entry, the FishXing model predictions were checked and validated by Forest fisheries biologists. This validation step is necessary because emerging research is showing that the FishXing model is quite conservative (i.e. the model tends to predict culverts are barriers when at least some fish passage is occurring).

Table 37 summarizes our most current knowledge of fish culvert passage status on the Forest. The numbers in the table are not final and will be adjusted as new information becomes available, or as barriers are eliminated through replacement or removal. However, the numbers in the table are close to the actual condition on the ground, and future adjustments are likely to be minor.

Table 37 – Fish Passage Barriers at Culverts

Ownership	# of fish-bearing culverts	# known or suspected to be passage barriers	# unknown – not seen or surveyed	# likely to be offering suitable fish passage conditions
BNF (Sula and W. Fork R.D.)	114	76 (67%)	6 (5%)	32 (28%)
BNF (Stevensville and Darby R.D.)	48	42 (88%)	2 (4%)	4 (8%)
Highways and private land **	46	28 (61%)	7 (15%)	11 (24%)
Montana DNRC land	6	2 (33%)	0	4 (67%)

** = the number of fish-bearing culverts on private land is higher than this chart indicates; access limits our knowledge of culvert status on private lands

Since the 2000 fires, the elimination of fish passage barriers at culverts has been a focus of the Forest fisheries and engineering programs. Since 2000, 37 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 (29 of the 37) of these culvert replacements and removals. The rest have occurred on Sula State Forest lands (4 culverts), along U.S. Highway 93 (3 culverts), or along the West Fork Highway (1 culvert).

Table 38 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 very little 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
- 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 38 – Status of culverts replaced or removed to eliminate fish passage barriers, 2000 to present

District	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		
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		

District	Stream	Road	Year replaced or removed?	Fully functioning	Partially functioning	Not functioning
D4	Took Creek	362	Replaced, 2003 (BAR)	X		
D4	Took Creek	1303	Replaced, 2003 (BAR)	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		
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 Cr	727	Replaced, 2003	X *		
D2	Cathouse Creek	1126	Replaced, 2000		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		
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		
MDOT	Andrews Creek	Hwy 93	Replaced, 2002		X ***	
MDOT	Praine Creek	Hwy 93	Replaced, 2002		X ***	
FHA	Slate Creek	WF Hwy	Replaced, 2003	X		

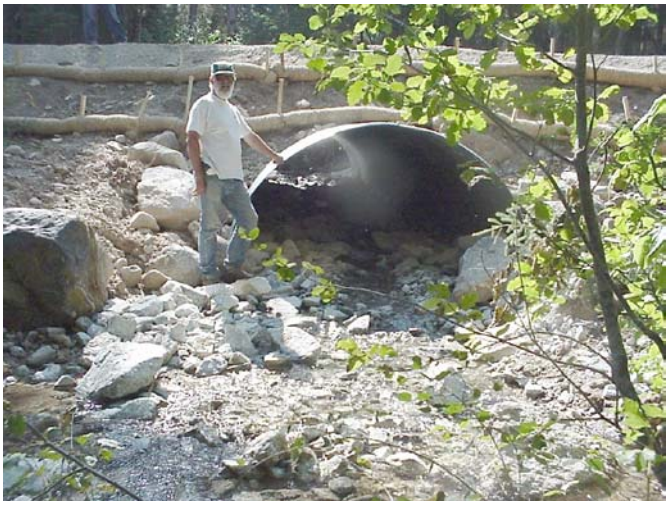
* = culvert was originally replaced by the BAER teams in autumn 2000, but was not installed deep enough in the streambed; the Forest road crew corrected the problem by installing a larger culvert deeper into the streambed in 2003

** = culvert was originally replaced by the BAER teams in autumn 2000, but was not installed deep enough in the streambed; a contractor corrected the problem by resetting the culvert deeper into the streambed in 2001

*** = the highway culverts on Andrew Creek and Praine Creek were properly installed for fish passage; however, other problems such as oversteepened approaches on the cutslope coming into the inlet (Andrews) or private driveway culverts upstream of the highway culvert (Praine) still impede fish passage

Figure 30 - August, 2003. Looking upstream through the Sentimental Creek culvert (Road 13482) prior to replacement. Culvert was a fish barrier due to the perched drop on the outlet and the lack of substrate material in the barrel.

Figure 31 - September, 2003. Looking upstream through the Sentimental Creek culvert (Road 13482) after replacement. Culvert is no longer a fish barrier. The perched drop on the outlet has been eliminated, and native substrate material is present throughout the barrel.



The key findings of our culvert monitoring are:

- The majority of the replacements have been successful at eliminated fish passage barriers, at least for the present time
- Success depends on three 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; and (3) there are no prohibitive drops on the culvert inlet and outlet. When those three criteria are met, fish passage is provided and maintained for all sizes and species of fish.
- Where culverts have been ineffective or only partially effective, the main reasons have been undersizing the diameter of the culvert (i.e. this pinches down the channel and increases water velocities inside of the culvert, which flushes the substrate out of the barrel), or not installing the culvert deep enough into the streambed (this contributes to the formation of vertical drops on the inlet and/or outlet)

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

PROJECT LEVEL MONITORING OF FISHERIES/WATERSHED IMPROVEMENT PROJECTS

Lick Creek Large Woody Debris Placement Project (Darby Ranger District). This fisheries improvement project was conducted in 1996. It consisted of placing large woody debris in the stream, and planting the riparian area with about 300 ponderosa pine seedlings. Forest fisheries biologists visited the site in September 2003, seven years after the project was implemented. The woody debris structures that were constructed in 1996 are still in place. Drifting of logs has not occurred. The sill log that was placed at the lower end of the treatment reach to catch drifting woody debris was still empty. This indicates that there has been essentially no significant drift of large woody debris in recent years, either from natural sources or placed logs. The constructed structures, such as the upstream-V's, have mostly been buried by sand and gravel, and are now ineffective. The logs that were placed above the pools to provide overhead hiding cover are functioning as planned. The ponderosa pine seedlings are growing well. Most are 3-6 feet high, some of the largest are already over 6 feet tall. A mark-recapture estimate conducted in the treatment reach in 2003 indicates that the fish population has not changed much since project implementation. The population is still dominated by numerous small brook trout, with very few westslope cutthroat trout. The woody debris additions have failed to increase westslope cutthroat trout numbers in the treatment reach, as was hoped.

Hughes Creek Channel Reconstruction Project (West Fork Ranger District). During 1998, the Forest reconstructed a 0.25 mile long section of the upper Hughes Creek channel as part of a mine reclamation project. Following reconstruction, the area was planted with willow (along the stream banks) and lodgepole pine (on the floodplain and terraces) seedlings, and seeded with grass. Supplemental plantings of willow and lodgepole pine seedlings also occurred in 2001 and 2002. Forest fisheries biologists monitored the success of these plantings in 2003. The stream banks are adequately covered with numerous small willow shoots (1-3' in height) – but they appear to be growing slowly, probably due to the rocky conditions. At this time, we feel that there is no longer any need to plant willow at this site. The floodplain is heavily infested with knapweed. Imbedded within the knapweed are about 100 small lodgepole pine seedlings from the 2002 planting. The terrace has a few small lodgepole pine growing on it, but is mostly bare of vegetation, and is very rocky. We feel that the floodplain and terrace would need chemical treatment with herbicides in order to reduce knapweed and restore good grass cover. Application of herbicides would have to be done very carefully to avoid killing the surviving lodgepole pine seedlings. After treating the knapweed, grass would need to be replanted. There is not much grass on the site at present. The lessons learned from this project are:

- Reconstruction of the stream channel and fish habitat was straightforward and easy compared to revegetation of the banks, floodplain, and terrace.
- Fish populations and habitat recovered quickly, within 1-2 years. The reconstructed channel has supported a healthy fishery since 1999.
- Floodplain vegetative recovery has been slow and difficult, even after several supplemental plantings.
- To get willow back on the stream banks, jute mats imbedded with willow shoots would be faster and more effective than planting individual willow tubelings; the jute mats were very effective along the reconstructed section of Camp Creek in 2003, despite the hot, droughty summer.
- A deeper layer of topsoil should have been imported to this site and spread across the floodplain; the thin layer of topsoil over a hardpan layer of rock is one reason that it has been difficult to get conifer seedlings re-established on the site.
- The silt layer from Painted Rocks Reservoir may not be a good source of topsoil – it may contain a large number of dormant knapweed seeds .
- Knapweed invasion is a serious problem and will require chemical treatment to overcome.
- The lodgepole/wortleberry vegetative community, once removed, is difficult to restore.

Camp Creek Channel Reconstruction Project (U.S. Highway 93, Sula North/South Reconstruction). This project was not a Forest Service project. It was conducted on state lands by a private contractor, immediately upstream of the Sula Ranger Station. During 2002, about one mile of Camp Creek was restored to its historic channel, just upstream of the Sula Ranger Station. Previously, the stream had been located in the east ditch of the highway. In July 2003, Forest and Montana Fish, Wildlife, and Parks biologists established a new population monitoring reach in the reconstructed channel. We found healthy numbers of fish (mostly westslope cutthroat trout, some brook trout, one brown trout) in the reconstructed channel, with good revegetation success in spite of the very hot and dry conditions. Willow cuttings imbedded in jute mats were growing in abundant numbers along all of the stream banks. The jute mats appear to enhance willow revegetation success. On the upland terraces, most of the shrubs and tree seedlings are alive and growing, in spite of the hot, droughty growing conditions this summer. Using the Hughes Creek reconstruction as a comparison, the following observations were made:

- Fish populations in both streams showed strong recovery the first year after channel reconstruction.
- Jut mats and willow cuttings (Camp Creek site) are superior to planting individual willow tubelings (Hughes Creek site); recovery of willow along Camp Creek will occur much faster than along Hughes Creek.
- The Camp Creek site is a better growing site; it is moister, has deeper topsoil, and less rock than the Hughes Creek site; in just one year, vegetative recovery on the Camp Creek floodplain and terrace is better than the Hughes Creek site after six years.
- Weeds are present on the Camp Creek site, but they do not dominate the landscape like they do at Hughes Creek; again, the moister conditions on the Camp Creek floodplain have allowed fast recovery of grass cover, making it difficult for knapweed to invade.

West Fork Bank Stabilization Project (West Fork Ranger District). In September 2001, the Forest constructed several log and boulder-deflection weirs along the west bank of the West Fork of the Bitterroot River for several hundred feet upstream of the boat launch site near the West Fork Ranger Station. The objective was to reduce bank erosion and protect the boat launch from scour at high flows. Our monitoring indicates that the effects of this project have been consistent with those described in the West Fork Bank Stabilization EA, Biological Assessment, and bull trout Biological Opinion. The terms and conditions in the Biological Opinion were met. On the local scale, this project has improved fish habitat and reduced bank erosion, while at the same time protecting the boat launch from scour. In future years, Forest fisheries biologists plan on monitoring this project on an "as needed" basis.

Selway Roads Sediment Stabilization EA (West Fork Ranger District). In summer 1999, the Bitterroot National Forest signed the Decision Notice for the Selway Roads Sediment Stabilization EA. The determination of effect on bull trout and steelhead was "may affect, not likely to adversely affect" (NLAA). Concurrence on the NLAA determination was received from the U.S. Fish and Wildlife Service and National Marine Fisheries Service. Phase I of the Selway Roads Sediment Stabilization project was completed during summer, 2001. Phase I accomplished the following tasks:

- Graveled 6.6 miles of encroached road along the Selway River.
- Attempted to stabilize (with wooden planks) and revegetate numerous slumping and eroding cut and fill slopes along the Selway River.
- Improved road surface drainage by constructing additional drive-thru dips and cross drains along the Selway River.
- Replaced two culverts on Selway River tributaries (Sheep Creek and Washout Creek) to eliminate fish passage barriers.

Forest fisheries biologists monitored these areas in 2003. The gravel and drainage features along the Selway River road have reduced rilling and sediment production from the road surface. The new culverts at Sheep Creek and Washout Creek are adequately maintaining fish passage. Native material is present throughout the bottom of both culverts. The revegetation and stabilization of the cut and fill slopes along the Selway River road needs more work. It is a slow and gradual process, and is the most difficult part of the project to successfully accomplish. At present, most of the shrubs and trees that were planted on the cut slopes in 2000-2002 are alive, but too small to effectively stabilize the erosive cut and fills. Most of the wooden planks installed on the cut and fill are trapping and holding some eroding ravel, but an increasing number of planks get knocked over by falling rocks each year. About 10-20% have been knocked over and are no longer functional. A log grid structure was constructed in July 2003 on an eroding cut slope about one mile upstream of the Magruder Crossing bridge, and it shows more promise than the log planks. After the grid was built the cut slope covered by the grid was seeded with grass and straw mulched. Monitoring of similar grid structures on other parts of the Forest has indicated that grids are one of the best ways to stabilize and revegetate bare, erosive cut slopes.

References

Young, M.K., and D.A. Schmetterling. 2004. Electrofishing and salmonid movement: reciprocal effects in two small montane streams. Journal of Fish Biology (2004) 64, pgs 750-761".

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 2003.

VARIABILITY: Any change in the major planning issues.

EVALUATION & MONITORING RESULTS:

The "Bitterroot NF Forest Plan, Five Year Review," completed in July 1994, provides findings and discussion on emerging issues that will need to be considered in updating the Forest Plan. Most findings are still considered relevant in 2003. The Post-fire Plan Review (2001) points out additional Plan revision issues.

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).

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. received a grant from the USDA Forest Service - State & Private Forestry to facilitate the development of a Community-based Wildland Fire Risk Mitigation Plan, or "Community Fire Plan" (http://www.bitterrootfireplan.org/). Diverse groups of valley residents met repeatedly during the winter of 2002-2003 to brainstorm and 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 is likely to be an important social and ecological consideration in Plan revision.

The National Fire Plan and Strategy, Healthy Forest Initiative, Ravalli Community Fire Plan, Bitterroot fire assessments and Burned Area Recovery ROD will continue to be used to guide short-term fire response and restoration priorities as well as to identify issues and topics that may need to be addressed in the upcoming Forest Plan revision.

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. These issues may be explored further during the upcoming Forest Plan revision to see if additional programmatic direction would be helpful.

Research Note

Researchers from the Aldo Leopold Wilderness Research Institute are working on a history of wilderness dams on the Bitterroot National Forest. They also are trying to develop understanding of the influences of natural resource management (including water resources) on quality of life of diverse segments of residents. They will develop and test hypotheses about the knowledge level of residents about the dams, awareness of the role wilderness water resources play in the Bitterroot Valley, attitudes toward maintenance methods of dams, and the relationship between quality of life and natural resource attributes of the Bitterroot Ecosystem.

Effects of National Forest Management on Adjacent Land and Communities Item 42

OBJECTIVE: To monitor the effects of National Forest management on adjacent land and communities (36 CFR 219.7 (f)).

DATA SOURCE: Interdisciplinary team review of management activities.

FREQUENCY: Annually.

REPORTING PERIOD: 2003

VARIABILITY: Eliminating effects would change National Forest outputs by five percent, or would change access.

EVALUATION:

National Forest management continues to be an integral part of Bitterroot Valley communities and to be important to people who derive products from the Forest or enjoy its scenic beauty, recreation opportunities, and other amenities. Approximately 73 percent of the land base in Ravalli County is National Forest System land. An additional 464,000 acres of the Bitterroot NF is in Idaho County, Idaho. The Magruder Corridor road extends through this county, between the Selway-Bitterroot Wilderness and Frank Church-River of No Return Wilderness.

The Bitterroot Forest Plan Five Year Review (July 1994) described the ongoing coordination among the Forest Service, other government agencies, the community, tribes, and the general public. These relationships are further described throughout this year's monitoring report and below.

Our activities and programs did not appear to have significant adverse effects on adjacent land and communities.

MONITORING RESULTS:

The following Bitterroot NF programs could have affected adjacent land and communities.

Air Quality Program. Outside the summer wildfire season, air quality standards continue to be met. The Forest Service is cooperating with BLM and the state on air quality monitoring in Western Montana (http://smokemu.org/home.php).

Bitterroot Community Wildfire Protection Plan. The Bitterroot National Forest has been supporting and participating in the collaboratively developed Community Wildfire Protection Plan. The Bitter Root Resource Conservation and Development Area, Inc. is facilitating the production and maintenance of the plan by a diverse group of valley residents and government agencies (http://www.bitterrootfireplan.org/).

Conservation Education. The Forest continues its involvement in school programs and community service groups to provide information on natural resources. Forest personnel provided over 200 presentations to a wide range of audiences in 2003. These included ninety-five indoor and 114 outdoor presentations. The presentations were part of a number of educational programs including weeds awareness, OHV ethics, wilderness skills, fire ecology, wildlife and fisheries, forestry, Lewis and Clark history, moonwalk series, special events and individualized requests. These programs reached over 9,100 individuals throughout the year including 4,404 students, 85 teachers, and 308 individuals from community organizations and youth groups.

Coordination - Confederated Salish and Kootenai Tribes and Nez Perce Tribe. The Forest Service and the Tribes consulted several times in FY2003. The Forest is fulfilling its desire to consult on projects, share information, and discuss issues and highlights. Refer to the Heritage Program monitoring section for more detail.

Coordination - Ravalli County. The Forest Service and Ravalli County continued to implement their memorandum of understanding by keeping one another informed on issues and coordinating in the areas of fire management, law enforcement, weed control, air and water quality, road management and maintenance, and planning efforts.

Dam Management. Management of dams for water storage continued throughout the year. The Forest has increased its emphasis on the monitoring, maintenance, and repair of the many aging private dams within our

boundaries. How the dams are managed has aesthetic, economic, safety, and ecological effects on lands and people in the Bitterroot Valley.

Fire and Fuel Management. The Forest continues to cooperate with other fire protection agencies in the area. The Forest is also actively working to reduce hazardous fuels, especially along National Forest boundaries with private lands (also known as the wildland/urban interface).

The Bitterroot National Forest, State and Private Forestry program, has been cooperatively working with the Bitterroot Resource Conservation and Development Area, Inc. (RC&D) in the treatment of hazardous fuels on private lands and National Forest lands immediately adjacent to the private lands. The Bitterroot National Forest Fire Management personnel have been providing expertise to the RC&D community forester when assisting private landowners to improve understanding of fire risk in areas that need fuels treatment. Please see the Fire Management section for more details.

Grazing There are 25 grazing allotments on the Bitterroot National Forest. Nineteen of these allotments were active in 2003 on approximately 9.8 percent of the Forest area.

Heritage Program. We continued to inventory cultural resources in FY2003 and protected known sites from effects of other activities. We actively coordinated and consulted with the Tribes.

Noxious Weeds. The Bitterroot National Forest continues in its efforts to control the spread of noxious weeds throughout the Forest and along Forest Service roads. We are working with other federal, state, county agencies to control these invaders throughout the Bitterroot Valley. Some residents adjacent to BNF lands have requested that the Forest Service treat noxious weeds, on adjacent National Forest lands, so as to enhance containment efforts on private lands. We are coordinating these efforts with the assistance of Ravalli County.

Roads. Under the Forest Road and Trail Act the Bitterroot NF trades road maintenance equally with Ravalli County. The Forest maintains some county roads and the county maintains some Forest Service roads depending on what is most efficient.

Rural Development Program. Bitterroot National Forest participation in the Rural Community Assistance Program increased dramatically after the fires of 2000 resulting in extensive financial and technical assistance to the people of Ravalli County this year.

Timber Program. The Forest offered 7.8 million board feet (MMBF) of timber for sale in FY2003. More detail is provided in Monitoring Item 11, and revenue information is summarized in the Forest Revenues section.

Trapper Creek Job Corps Center. The Trapper Creek Job Corps Center continued to provide services to local communities through their on-the-job training for skilled labor employment.

Wildlife, Watershed, and Botany Programs. Please refer to these sections for efforts in these areas. None of the activities resulted in adverse effects on adjacent lands or communities.

Research Note

The Aldo Leopold Wilderness Research Institute is developing quantitative descriptions of the relationships between community members and the Bitterroot landscape. This is called “place meanings.” This information will help develop fuel treatment programs that reflect the social values of the local community.

Effects of Other Government Agencies Activities on the National Forest
Item 43

OBJECTIVE: To identify those activities which could have an effect on National Forest management.

DATA SOURCE: Interdisciplinary team review of other agency activities.

FREQUENCY: Annually.

REPORTING PERIOD: 2003.

VARIABILITY: Effects cause +/- five percent change in National Forest outputs or services.

EVALUATION:

The intent of this monitoring item has evolved since 1987. Initially, we intended this item to recognize other governmental activities that were often unrelated to Forest Service actions or objectives and how they would impact the Bitterroot NF. What we are experiencing more commonly are cooperative or partnership actions. Several of the actions listed below involve cooperative efforts.

MONITORING RESULTS:

Following is a list of interagency activities that have occurred throughout the year.

Fisheries

Steelhead, which are native to the upper Selway River, were listed as threatened in 1997 by the **National Marine Fisheries Service (NMFS)**. **The U.S. Fish and Wildlife Service** (USFWS) listed the bull trout as threatened on July 10, 1998. Since then the Forest has been participating in the streamlined consultation process with the **NMFS and USFWS**. Forest activities that may affect these species are reviewed by these agencies through the Endangered Species Act (ESA) consultation process.

Wildlife

The U.S. Fish and Wildlife Service listed Canada lynx as Threatened in March 2000. They concluded that the threat to the lynx in the contiguous United States is the lack of guidance to conserve the species in current federal land management plans. The Forest Service completed a biological assessment of current Forest Plans within lynx habitat in December 1999 and entered into a Canada Lynx Conservation Agreement with the U.S. Fish and Wildlife Service in February 2000. In FY2000 the Forest Service and Bureau of Land Management (BLM), with the assistance of the USFWS, completed a conservation strategy for the species across its range in the contiguous United States. Subsequently, the Forest Service and Bureau of Land Management have begun environmental analysis to amend management plans throughout the Northern Rockies, including the Bitterroot National Forest's Forest Plan (http://www.fs.fed.us/r1/planning/lynx.html). For more information on lynx see Threatened and Endangered Wildlife Species discussion.

The U.S. Fish and Wildlife Service released wolves in Yellowstone National Park and central Idaho in 1995 and 1996. Four wolf packs were known to occur on the Forest at the end of FY 2003 (see Threatened and Endangered Species section). The Nez Perce Tribe is designated as the lead agency for monitoring these populations, with the USFWS as the lead agency overseeing the recovery effort.

The U.S. Fish and Wildlife Service issued a Final Environmental Impact Statement (March 2000) evaluating a proposal to reintroduce an experimental population of grizzly bears into the Bitterroot Ecosystem. The Record of Decision (November 2000) 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.

Heritage

Continually strengthening the government-to-government relationship with neighboring Tribes is a priority of the Bitterroot National Forest. Since Bitterroot NF lands were once part of the traditional Bitterroot Salish homeland, tribal members continue to exercise their treaty rights and regularly visit cultural sites on the Forest, and the Forest heritage program personnel consult regularly with the **Confederated Salish and Kootenai Tribes**. The Forest also consults with the **Nez Perce Tribe of Idaho** and the **Joseph Band of the Confederate Tribes of the Colville Reservation** regarding Nez Perce sites and cultural concerns, and with the **Shoshone-Bannock Tribes of Fort Hall**.

Fire

The Bitterroot National Forest, State and Private Forestry program, has been cooperatively working with the **Bitterroot Resource Conservation and Development Area, Inc**. (RC&D) in the treatment of hazardous fuels on private lands and National Forest lands immediately adjacent to the private lands throughout this last year. The Bitterroot National Forest fire management personnel have been providing expertise to the RC&D community forester when working with the private landowners in the Bitterroot Valley to improve understanding of fire risk in areas that need fuels treatment.

The Bitterroot National Forest has been supporting and participating in the collaboratively developed Community Wildfire Protection Plan. The Bitter Root Resource Conservation and Development Area, Inc. is facilitating the production and maintenance of the plan by a diverse groups of valley residents and government agencies (http://www.bitterrootfireplan.org/). The plan is founded on, and will guide the implementation of, the National Fire Plan and the related 10 Year Comprehensive Strategy and Implementation Plan, in the Bitterroot Valley.

Research

The **Intermountain Research Station**, the **University of Montana**, and the Bitterroot National Forest are cooperating in research on the Forest, called the Bitterroot Ecosystem Management Research Project. The partnership began in 1994, and the first five years (Phase 1) were completed in 1998. The cooperators held a symposium in May 1999, and presented what we have learned in the first five years. Further details are provided in Monitoring Item 44, Research Needs.

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.

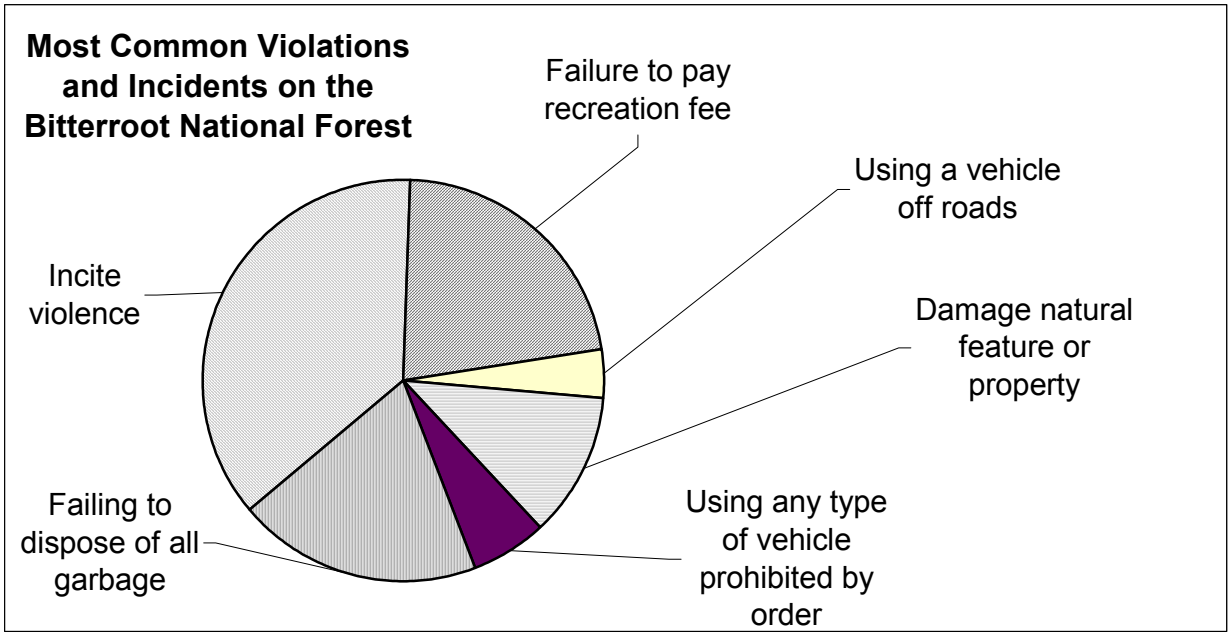
REPORTING PERIOD: 2003

EVALUATION AND MONITORING RESULTS:

There were 1,159 recorded law enforcement incidents on the Bitterroot NF in 2003. Law Enforcement Officers wrote 113 warning notices and 24 violation notices. Many of the incidents occurred with no identifiable witnesses or too little information for a complete investigation. Table 39 lists the most common incidents reported in 2003. Other less common incidents included timber trespass, illegal outfitting, illegal occupancy, person-caused fire, wilderness and special use violations, FS work related incidents, accidents, refuse dumping, grazing violations, recreation and civil disturbances, road closure violations, and malicious mischief.

Table 39 - Most Common Incidents or Violations

Offense	Description	Total
261.4 (c)	Incite violence	250
261.15	Failure To pay recreation fee	149
261.11 (d)	Failing to dispose of all garbage	135
261.56	Using a vehicle off roads	27
261.9 (a)	Damage natural feature or property	80
261.54(a)	Using any type of vehicle prohibited by an order	41



Heritage Program

OBJECTIVES: Ensure compliance with Forest Plan standards for inventory, evaluation, preservation, and interpretation of cultural resources, and continue coordination with Native American tribal groups.

DATA SOURCE: Annual report by forest heritage program manager.

FREQUENCY: Annually.

REPORTING PERIOD: 2003

EVALUATION & MONITORING RESULTS:

The Bitterroot NF heritage program continued to strive for a balance of efforts including support for on-the-ground management activities, forest planning, tribal relations, and public outreach, as well as protection, maintenance and enhancement of the Forest's heritage properties.

In 2003, BNF heritage specialists provided input to a total of 47 projects. Overall, heritage specialists surveyed approximately 1,265 acres, excluding fieldwork associated with Burned Area Recovery implementation monitoring. Six new sites were recorded on the Forest – three historic irrigation ditches, an historic dam, a Forest Service lookout point, and one prehistoric site.

Over the past year, monitoring by heritage specialists determined that vandalism continues to be a problem at St. Mary's lookout, where both deliberate and inadvertent human-caused damage has occurred. The District and Forest have been doing some short term fixes and will be working with the regional preservation team to identify and implement some long term solutions. Off-trail OHV traffic has corroded two important archaeological sites. Measures were taken to deter OHV traffic over these locations in 2002 and 2003. The Forest will continue monitoring these sites to determine the effectiveness of the measures or identify if additional actions are needed.

In preparation for the approaching Lewis and Clark Bicentennial, the Bitterroot NF has identified three Lewis and Clark Trail segments on the Forest. They are the Lost Trail Pass/Saddle Mountain/Camp Creek area, the Gibbon's Pass Road area, and the Spring Gulch/Low Saddle area. Field inventory of these segments was completed in August 2002, with work underway on the final inventory report as well as a protection and monitoring plan.

During 2003, the Forest continued its ongoing lookout restoration program with four building or structure restoration projects. In April, the Region 1 Historic Preservation Team, working with heritage specialists and West Fork and Sula district personnel, completed restoration of the National Register-listed Blacky Foster Cabin. The second phase of stabilization work at Boulder Point Lookout on the West Fork District was undertaken in July 2003. This project, a partnership among the Forest Service, the West Fork Ski Club, the National Forest Foundation, and the Forest Fire Lookout Association, is aimed at preserving the historic lookout and eventually restoring it for participation in the public cabin rental program. (Gird Point Lookout, restored in 2001-2002, was officially added to the rental program in July.) In August, the Region 1 Historic Preservation Team returned to the Bitterroot to direct the restoration of Lost Horse Cabin, a National Register-listed building on the Darby Ranger District. The project consisted of complete re-roofing, sill log and purlin repairs, and floor repairs (to be completed in 2004). Later the same month, volunteers in the Passport In Time program assisted the Forest's heritage program manager and Sula District personnel in a ten-year maintenance of McCart Lookout. Listed on the National Register, McCart was fully restored in 1996 and has been among Region 1's most popular rentals.

In meeting our responsibilities under Section 110 of the National Historic Preservation Act (NHPA), heritage specialists participated in a number of public education and outreach activities. These included participation in more than a dozen educational events, both internal and with the general public.

Continually strengthening the government-to-government relationship with neighboring Tribes is a priority of the Bitterroot National Forest. Since Bitterroot NF lands were once part of the traditional Bitterroot Salish homeland, tribal members continue to exercise their treaty rights and regularly visit cultural sites on the Forest. The Forest heritage program personnel consult regularly with the Confederated Salish and Kootenai Tribes. The Forest also consults with the Nez Perce Tribe of Idaho and the Joseph Band of the Confederate Tribes of the Colville Reservation regarding Nez Perce sites and cultural concerns, and with the Shoshone-Bannock Tribes of Fort Hall.

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: 2003.

VARIABILITY: Deviation from Best Management Practices Standards.

EVALUATION:

The Bitterroot National Forest 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, and obliteration have become more prominent.

For several years 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 2003.

MONITORING RESULTS:

Road Reconstruction

The Bitterroot National Forest has been reconstructing roads each year to reduce sedimentation, meet best management practices (BMP's) and to assure the standard of the roads meet traffic and safety needs.

In FY 2003 the Bitterroot National Forest reached substantial completion on the Skalkaho 75 Road Reconstruction Project and Cow Creek Road 438 Reconstruction Project, and began work on the Warm Springs - Laird Creek Road Reconstruction Project.

Skalkaho 75 Road Reconstruction Project restored 13.82 miles of roadway to meet BMP standards. The project included reconstruction of 13.82 miles of road, 24 culvert installations, 28 drain dips, and 10.0 miles of gravel placement. The project was completed in early 2004.

Cow Creek Road 438 Reconstruction Project restored 5.74 miles of roadway to meet BMP standards. The project includes reconstruction of 5.74 miles of road, 20 culvert/casing installations, 21 drain dips and 1.94 miles of gravel placement. Projected completion is scheduled for 2004.

Warm Springs – Laird Road Reconstruction Project will restore 11.16 miles of roadway to meet BMP standards once completed. The project includes 11.16 miles of road reconstruction, 46 culvert installations, 25 drain dips and 4.74 miles of gravel surfacing. Projected completion is scheduled for 2004.

In FY 2003 the Bitterroot National Forest completed upgrades of 3.7 miles of the Nez Perce Road to a paved Objective Maintenance Level 5 road.

Road Storage and Obliteration

The Bitterroot National Forest has been placing future needed roads in storage, and obliterating un-needed system and non-system roads in an effort to reduce sedimentation, reduce road maintenance costs, and to restore areas to pre-road conditions. Much of the work associated with road storage and obliteration in 2003 was identified in the Record of Decision (ROD) of the Burned Area Recovery project following the fires of 2000. In addition to work identified in the ROD the Forest has also been obliterating non-system roads that are within the scope of other ongoing projects.

In FY 2003 the Bitterroot National Forest completed 26.56 miles of road storage and 18.24 miles of road obliteration. This work was accomplished in the Crystal Mountain Decommissioning Project, Robbins Gulch Stewardship Project, Burke Gulch call when needed contract, Blodgett Decommissioning Project, and smaller projects elsewhere on the Forest.

Figure 32 – "Bumping rocks off the road" has a whole other meaning for the Forest road maintenance crews. This one landed on the Nez Perce Road #468 in September 2003.

Road Maintenance

In FY2003 the Forest graded 345 miles road and brushed 66.4 miles of road. Road maintenance crews installed five new culverts. Yearly routine maintenance items completed in FY 2003 include spot gravelling, removing large rocks from road surfaces, culvert maintenance and repair, and road surface repair. A number of roads suffered flood damage and required additional clean up and repairs. Work included replacing fill and rip rap, repairing slumps and installing Elgen and French drains, and adding gravel surface.

Road Maintenance Status

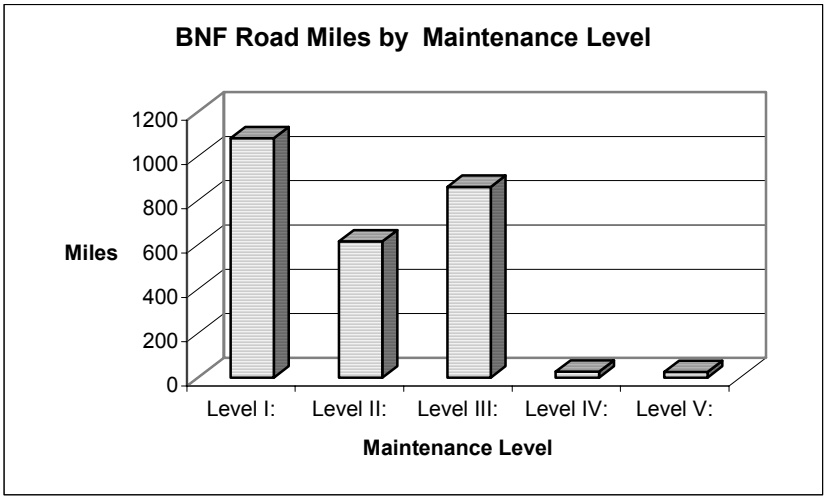
Existing roads are maintained and managed based on access needs, volume and types of traffic, and the impacts the roads have on other resources. There are five levels of maintenance. They are as follows:[7]

Level I:	Not maintained for public use. These are only maintained to preserve the road template. There are 1081 miles of Level I roads on the Forest.
Level II:	Maintained for high clearance vehicles. There are 615 miles of Level II.
Level III:	Native and gravel surface, low traffic volumes, maintained for template preservation and some user comfort. There are 864 miles of Level III.
Level IV:	Higher traffic volumes, gravel surfaced arterial roads, maintenance at a higher standard. There are 27 miles of Level IV.
Level V:	High traffic volumes, paved arterial roads. There are 25 miles of Level V roads.

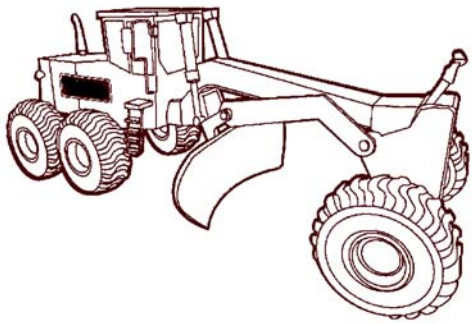
[7] Please note that minor variations from year to year reflect on-the-ground changes as well as adjustments and corrections to the INFRA database.

Figure 33 illustrates the miles of road we have at each maintenance level.

Figure 33



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.



Off-Highway Vehicle Effects on Lands
Item 28

OBJECTIVE: Monitor effects of off-highway vehicle (OHV) use on soil, water, wildlife, and other resources.

DATA SOURCE: Site inspection and interdisciplinary team reviews.

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

REPORTING PERIOD: 2003.

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 now 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. Voluntary closures and Forest visitor education have helped to reduce some impacts of 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. 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.

The Forest has identified a need to provide opportunities for OHV riders in response to increased use. Without trail/road options available, users will find their own opportunities in places that are 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.

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 Plan revision proposes to address this issue by separating motorized and non-motorized uses in some areas.

In response to resource damage and user conflicts resulting from off-road vehicle use regionally, the Bureau of Land Management and Forest Service jointly prepared an OHV EIS for Montana, North Dakota, and South Dakota. A final decision was issued in January 2001, which amended the Bitterroot National Forest Plan. This decision restricts yearlong wheeled cross-country travel where it was not already restricted (with several exceptions) and directs each Forest to complete site-specific planning on priority areas.

Forest priority areas for site-specific travel planning were identified based on input from various local groups. These include the following:

High Priority areas identified through travel management planning are:[8]

- Trail #313 – Need to clarify management of the trail, designate which sections will be open or closed to various uses and develop consistent maps. The trail passes through three national forests, Montana state land, and private land. Analysis of Trail #313 began in FY2002, but is on hold until the Forest Plan revision determines motorized versus non-motorized land use allocations.

[8] See January 10, 2002 letter to Regional Forester titled “Site-Specific Travel Management Planning Priorities”.

- Slate Hughes Area – Travel management planning for this area was completed in FY2002. The decision includes restricting motorized access on some roads and trails, as well as establishing an OHV trail/road loop.
- North Zone OHV Loop Trail – Development of an OHV trail/road loop on the Darby or Stevensville District. Planning was initiated in December of 2002 for an OHV trail system using primarily existing roads and trails on Hart Bench, west of the town of Darby. This project would also involve closing some user-created trails in the area. We were unable to fund this project in FY2003 but intend to continue the when funding becomes available.

Medium Priority areas identified through travel management planning include:

• Sawdust Gulch	• Gird	• Lost Lick.

Low priority areas include the remainder of the Forest.

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 review, 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[9]. In an effort to compile this knowledge, we have developed a list of areas, which are currently being used by OHVs, and where we have found some form of resource damage (see Table 40). This is not an all-inclusive inventory.

Impacts that have been noted in these areas may include: deep ruts, trail widening around wet areas, stream crossings that contribute sediment, 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 each year in the Monitoring Report to establish a more complete record of OHV effects. In addition to the areas noted, some damage is occurring where OHVs cut switch backs on system roads.

Table 40 - Areas Of Noted OHV Resource Damage By District

District	Areas of Noted Damage
Stevensville	Larry Creek; Sweeney Creek; Smith Creek; several areas in 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.
Darby	Robbins Gulch, Sawdust Gulch, Chaffin Creek at intersection of Trapper-Chaffin Road, Tin Cup Trailhead, Bunkhouse Road, Brennan Gulch and Coffee Gulch off Gird Point Road, Lost Horse/Lick Creek area, Hart Bench, Weasel Creek, Crooked Creek.
Sula	Trail #103, 1/2 mile north of Pass Lake; Digging Creek (100 yards); Trail #400 below Capri Lake (150 feet), Shook .
West Fork	Capri Lake Trail (100 yards), Meadow Gulch (user created trail), Spruce Creek (user created trail), Hughes Creek (user created trail).

The Forest is working to complete an inventory of user-built routes on the Forest. This will provide a baseline so we can determine which routes are new and immediately close them The information collected by the OHV

[9] OHV effects are also considered either directly or indirectly in these other Forest monitoring and evaluation items: Monitoring Items numbered 1, 3, 7, 8, 9, 10, 17, 19, 21, 22, 24, 27, 28, 29, 38, 39, 40, 41 and additional monitoring headings Sensitive Plant Species Inventories, Effects of Management on Sensitive Plant Populations, Elk Security, Threatened and Endangered Wildlife Species, Sensitive Wildlife Species, Neotropical Migratory Birds, Law Enforcement on the Bitterroot Forest, Anadromous Fisheries and Inland Native Fish, and Heritage Program.

ranger in 2003 revealed that a few areas still need inventory information. We expect to complete the inventory by the end of 2004.

The Forest has hired an "OHV ranger" since 2002, with the assistance of a state grant. In 2003, the OHV Ranger focused on educating OHV users through presentations, local media, and field contacts. We reached seventh grade classes in Darby and Corvallis, and provided information to all the OHV dealers between Darby and Missoula. The OHV Ranger also installed twenty-five travel management signs and fixed numerous damaged road gates.

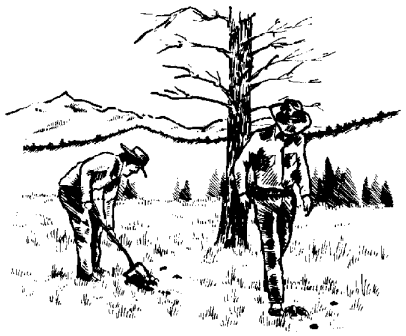
This year the Forest developed educational handouts for OHV riders on how to become “street-legal,” covering both Idaho and Montana requirements. Vehicles must be street legal to be used on Forest Service roads open to regular traffic.

The Forest increased law enforcement and Forest Service presence in priority areas, particularly on weekends and during hunting season. Priority areas were identified and staffed in 2003. Thirty-seven incident reports of OHV violations were documented. Three warning notices were issued for illegal OHV use and one violation notice was issued.

Ongoing Prevention and Restoration:

Repair and rehabilitation of OHV impacts off approved roads and trails occurred in a few areas in FY2003. Information provided by users alerted the Darby District Ranger that unauthorized OHV use was causing unacceptable resource impacts on Trail 105 in the upper Sleeping Child drainage. This trail was open to motorcycles and closed to OHV’s. Damage to riparian and wet areas along the trail prompted the District to close the trail to all motorized use until further analysis can be completed to determine if motorized use is appropriate for this trail.

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 OHV’s on sensitive sites when the reservoir level drops below full pool. The closure order does not include snowmobiles.



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 2003 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 an archaeological site. Measures were taken in 2002 and 2003 to prevent further impacts, and we will continue to monitor the situation (also see the Heritage Program section).

The Hughes Creek area is the West Fork Ranger District’s primary concern for OHV resource problems. The following user-created trails were closed in 2003 to implement the Slate-Hughes Decsion: Hughes Creek (.2 mile), Salt Creek (.2 mile), Cooper Draw (.5 mile), Sheep Creek (.6 mile), and Coal Creek (.2 mile).

Monitoring in 2003 indicated that the closure of an area near Tin Cup Trailhead in 2002 was successful in keeping vehicles out of a riparian area. Although closure signs were tampered with, the large boulders blocking access to the riparian area appeared to be effective.

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: 2003.

VARIABILITY: Irreversible ecosystem damage.

EVALUATION:

We did not identify any irreversible ecosystem damage attributable to recreation site and trail use in 2003.

MONITORING RESULTS:

Condition surveys were completed on the following trails:

Trail Name	#
Access	505
Archer Point	546
Bad Luck Creek	93
Bad Luck Ridge	52
Bald Top-Sleeping Child	160
Bear Creek	5
Bear Gulch	508
Big Storm	307
Bitterroot-Rock Creek Divide	313
Blodgett Creek	19
Castle Rock	627
Cayuse Mountain	35
Chicken Creek	138
Corral	500
Cross Country	510
Deer Creek Point	602
Divide	16
Dwyer/Smith	114
Eagle Creek	562
Eagle Point/Parachute Ridge	70
Eakin Ridge	6
Elevator Mountain	521
Elk Ridge	172
Elkhorn Mountain	97
Elkhorn Spring	712

Trail Name	#
Fawn Ridge	17
Fitness Trail	390
Forest Divide	710
Gash Creek	122
Gird Creek/Middle Ridge	41
Gold Creek	311
Grass Ridge	65
Hughes Point	650
Kim Creek	26
Kootenai Lakes	302
Lappi Lake	324
Little Blue Joint	223
Little St. Joe	392
Lodgepole Hump	61
Martin Creek Loop	330
Martin Creek Trail Connect	331
Moose Creek	168
Nature Trail	391
Nez Perce Trail	13
Nez Perce Trail Connect	7
NF Hayes Creek	511
North Star Creek	219
North Star Ridge	519
One Horse Lakes	326
Parachute Ridge	536
Pasture Ridge	62

Trail Name	#
Piquett Creek	675
Prospect Ridge	113
Razorback Ridge	106
Reimel-Tolan Divide	78
Running Creek	532
Rye Creek/Hot Springs	504
Salamander Creek	27
Salmon River	96
Sawdust Gulch	512
Schofield Ridge	34
Scimitar/Cayuse Mountain	720
Sears Lake	312
Sheafman Creek	82
Skalkaho/Little Burnt Fork	149
South Fork Big Creek	82
Spot Mountain	3
Spot Mountain/Bad Luck	40
Storm Creek	30
Stripe Creek Divide	69
Tolan-Reimel Cutoff	403
Tolan-Reimel Ridge	203
Upper Signal Creek	322
Vance Mountain	46
Waugh Mountain/West Horse	11
Witter Ridge	575
Piquett Creek	675

Condition surveys were completed on the following recreation sites:

- Beaver Point
- Deep Creek
- Gird Point Lookout
- Horse Heaven Cabin
- McCart Lookout
- Medicine Point Lookout
- Pete Creek
- Raven Creek
- Slate Creek

A national recreation visitor use survey was completed in 2003. Results are being tabulated for the Bitterroot National Forest and should be available in 2004.

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 STARS database, Annual Cut and Sold Report, and Timber Stand Management Record System.

FREQUENCY: Annually.

REPORTING PERIOD: 1988 to 2003

VARIABILITY: +/- 20 percent difference from Forest Plan annually and +/- ten percent over a five-year period.

EVALUATION:

Our evaluation of the 1988 to 2003 harvest levels indicates that the allowable sale quantity (ASQ) for the Forest Plan was not exceeded in total. Only 27 percent of the ASQ was sold, which is significantly outside the 10 percent variability. In comparing the offered volume to the Forest Plan volume, our data show that the annual, as well as a sixteen-year summary of offered volumes by management area (MA), are outside the variability in all Management Areas. The acres sold are 51 percent of the acres estimated to be harvested in the Forest Plan.

The harvest of timber products from the Forest is far below predicted levels, and this has affected a segment of the local economy. Almost all the National Forests have experienced similar declines. This is a national issue tied to changing social values, listing of new threatened and endangered species, and many other factors. When we revise the Forest Plan, we will update the predictions of timber outputs to reflect the current social and regulatory environment.

MONITORING RESULTS:

Table 41 - Timber Acres and Volume Offered And Sold By Management Area, Fiscal Year 2003

Forest Plan, p. III-80			Offered				Sold			
MA	Acres	Volume (MMBF)	Acres	Volume (MMBF)	% of Forest Plan Acres	% of Forest Plan Volume	Acres	Volume (MMBF)	% of Forest Plan Acres	% of Forest Plan Volume
1	1,528	14.57	1161	3.779	76%	26%	1061	3.666	69%	25%
2	1,439	12.01	162	0.505	11%	4%	162	0.505	11%	4%
3a	283	3.05	1089	3.514	385%	115%	1089	3.515	385%	115%
3b	385	3.62	0	0	0%	0%	0	0	0%	0%
3c	12	0.12	3	0.01	25%	8%	3	0.01	25%	8%
Total	3,647	33.37	2415	7.808	66%	23%	2315	7.696	63%	23%

Table 42 - Summary of Fiscal Years 1988 to 2003 (16 years)

Forest Plan, p. III-80			Offered				Sold			
MA	Acres	Volume (MMBF)	Acres	Volume (MMBF)	% of Forest Plan Acres	% of Forest Plan Volume	Acres	Volume (MMBF)	% of Forest Plan Acres	% of Forest Plan Volume
1	24,448	233.12	16,330	84.359	67%	36%	14,152	72.206	58%	31%
2	23,024	192.16	10,581	49.625	46%	26%	9,789	44.885	43%	23%
3a	4,528	48.8	8,060	35.404	178%	73%	5,159	23.875	114%	49%
3b	6,160	57.92	317	1.000	5%	2%	206	0.540	3%	1%
3c	192	1.92	402	1.250	209%	65%	199	0.740	104%	39%
Total	58,352	533.92	35,690	171.638	61%	32%	29,505	142.246	51%	27%

Figure 34

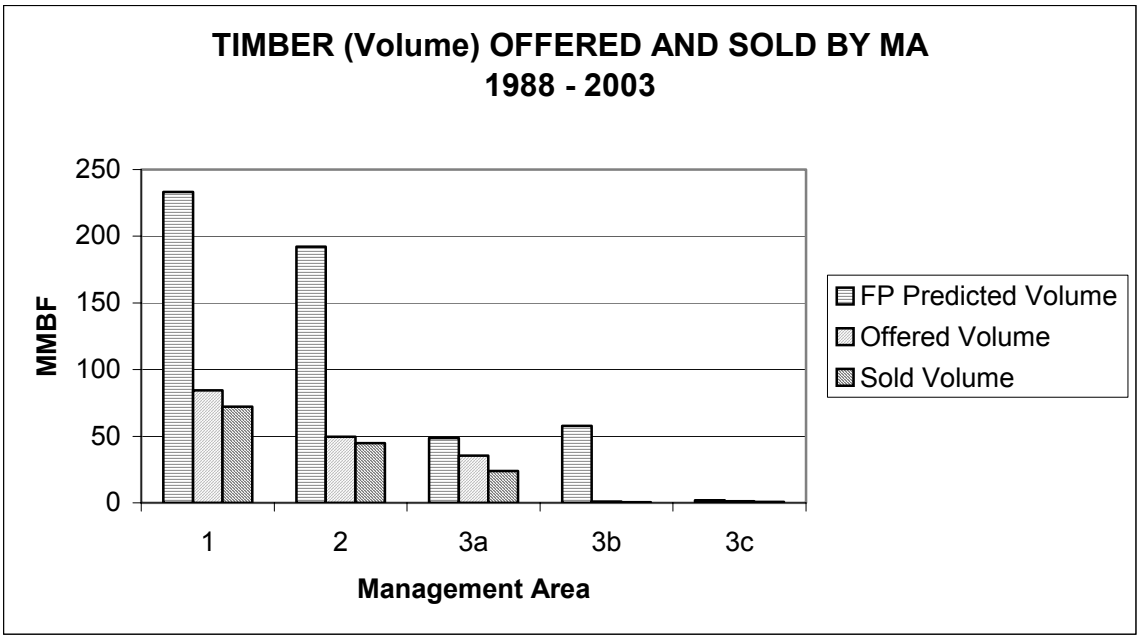
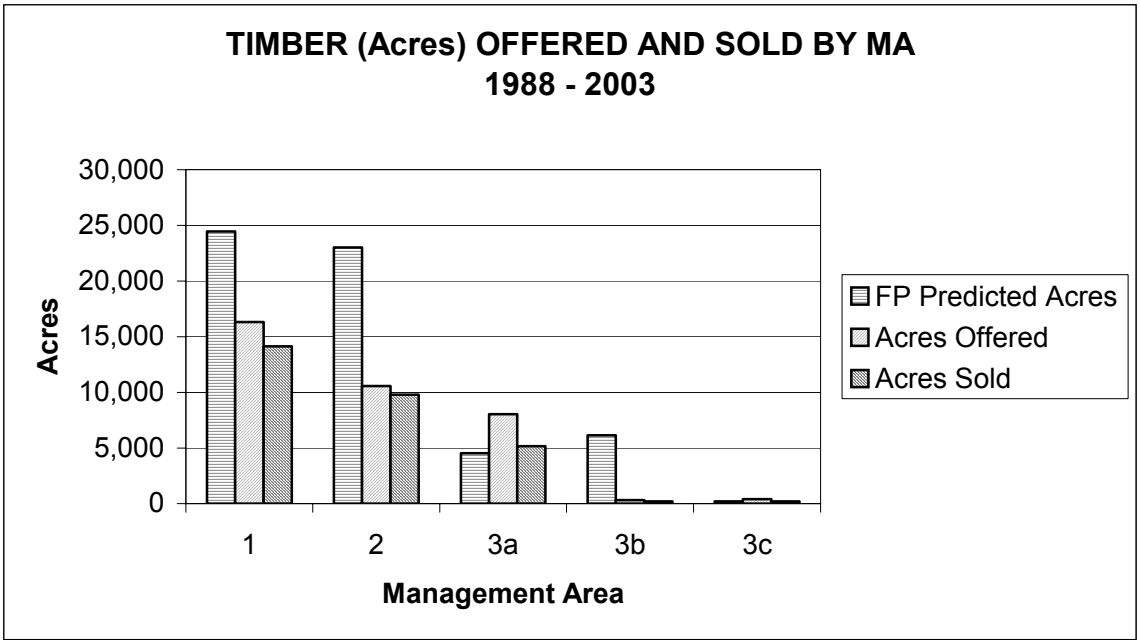


Figure 35



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 the Annual Cut and Sold Report.

FREQUENCY: Annually.

REPORTING PERIOD: 2003.

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 methods is likely to vary greatly from that anticipated in the programmatic Forest Plan. The monitoring results show that this is the case. Another variable that could have an effect on the logging system and harvest method used is the total timber volume offered. Due to difference between the projected and actual timber volume offered by logging system and harvest method, this monitoring item will be reviewed during the Forest Plan revision process.

The selection and salvage volume offered exceeds what was anticipated in the Forest Plan by several times, and the even-aged methods (clearcut, shelterwood, and seed tree) are a fraction of the anticipated levels. The total salvage volume is more than the Forest Plan anticipated because of fire salvage offerings, in addition to the normal salvage volume. Selection harvest is more than the anticipated volume because of the more widespread application of this system in management areas other than those specifically identified in the Forest Plan. The selection harvest method has been used in all management areas for addressing visual quality, wildlife, watershed, soils, and forest health concerns. We anticipate that the selection harvest method will continue to be a major silvicultural treatment as we implement ecosystem management prescriptions.

MONITORING RESULTS:

Table 43 - Timber Offered By Logging System FY 2003

Logging System[1]	Offered Acres	Offered Volume[2]	Forest Plan Acres	Forest Plan Volume[2]
Tractor	210	0.631	1750	15.7
Skyline	-	-	400	3.7
Cable	355	0.882	1060	9.7
Manual[3]	97.5	1.102	0	0
Aerial	1653	5.080	440	4.3
Horse[3]	100	0.113	0	0
Total	2415.5	7.809	3650	33.4

[1/] Tractor - tracked or rubber-tired equipment is used to skid logs or trees over the ground. 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. 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/] Measured in million board feet.

[3/] The Forest Plan does not project acres entered or board feet of timber produced by manual or horse method.

Figure 36

Data is from the second column in Table 43.

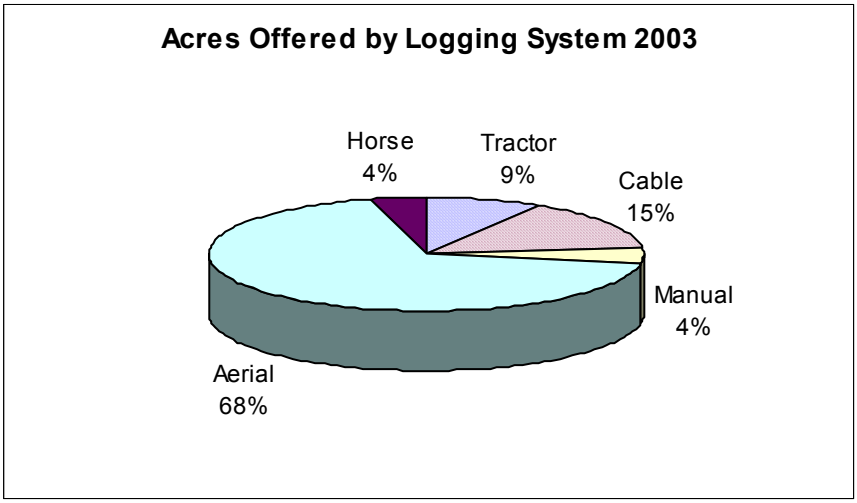


Table 44 - Timber Offered By Harvest Method FY2003

Harvest Method	Offered Acres	Offered Volume[1]	Forest Plan Acres	Forest Plan Volume[1]
Clearcut[2]	1	0.004	1840	22.1
Seed Tree[2]	-	-	-	-
Shelterwood	-	-	1040	9.2
Removal[3]	-	-	170	0.8
Selection	103	0.123	100	0.2
Salvage	2311.5	7.682	500	1.1
Total	2415.5	7.809	3650	33.4

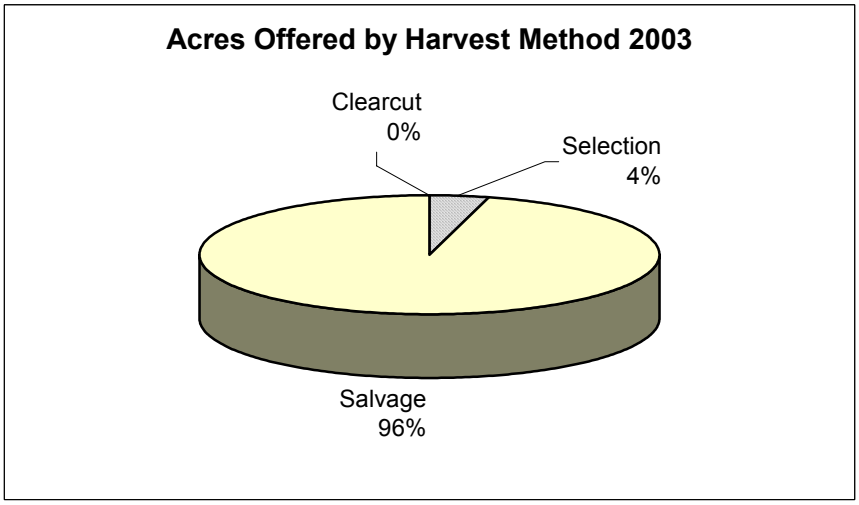
[1/] Measured in million board feet.

[2/] Seed tree and clearcutting were combined in the Forest Plan. Clearcut percents include seed tree.

[3/] Seed tree and shelterwood final removal harvests.

Figure 37

Data is from the second column in Table 44.



Mineral Activities
Item 23

OBJECTIVE: Track the amount of mining related activities for use in determining economic and environmental effects and for reasons of national security.

DATA SOURCE: Number, location, and kind of activities in terms of plans of operations, notices of intent, and mineral material permits and sales.

FREQUENCY: One project per District per year.

REPORTING PERIOD: 2003.

VARIABILITY: Adverse effect upon surface resources or departure from condition of the Forest Plan.

EVALUATION:

This monitoring item in the Forest Plan is concerned with the impact of gas and oil activities on surface resources. There is no gas or oil activity on the Bitterroot NF, but the Forest does have requests for use of other minerals. We have, therefore, expanded this monitoring item to encompass all minerals found on the Bitterroot NF.

There were no additional adverse effects on the surface resources as the result of mining, nor was there departure from conditions of the approved plans.

A draft report was completed by the Montana Bureau of Mines and Geology on an inventory of abandoned mines on the Bitterroot National Forest. The only mine site they deemed necessary for further sampling and testing was the fluorite mine on Crystal Mountain near Darby, which they did. The sampling and testing did not reveal any toxic waste problems.

The Forest continues to receive numerous requests for riprap material, sand, gravel and decorative or landscaping stone. The common use and community pit designations are an effective way of meeting this need while insuring that management plans are developed and reclamation funds are available. However, new sources should be sought, as many of the old sources are becoming exhausted and will soon need reclamation. Increased population in the Bitterroot Valley has also increased the demand for material sources.

Minerals monitoring may be adjusted in the revision to include all minerals, not just oil and gas activities.

MONITORING RESULTS:

There were no additional adverse effects on the surface resources as the result of mining in FY2003.

The Forest approved one notice of intent on the West Fork District for minor exploration activities. A plan of operation and bond is held for an exploration trench which was dug at an old mine site on Taylor Creek, also on the West Fork Ranger District.

A plan of operation was approved for some minor exploration trenching for thunder eggs on Thunder Mountain.

The vermiculite mine near Hamilton never began operations and is now considered abandoned. There are funds available in the original bond to complete needed restoration work. Additional money has been granted for this project though the USFS Abandoned Mine program. Reclamation is planned for 2005.

There are four pit/collecting areas on the Forest used by the public for riprap material, sand, gravel and landscaping rock.

Tee Pee Pit near Sula RD	15 permits (one permit included 162 residences)
Railroad Creek Rock Site near Darby RD	18 permits
Alta Shale Pit near West Fork RD	11 permits
Gold Creek Rock Site near Stevensville RD	8 permits

An unsafe mine portal, the Highland Mine, was encountered in the Overwhich drainage during road rehabilitation. The mine was examined by a qualified mineral examiner, deemed unsafe for entry, and closed by stacking rock over the entrance.

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: 2003.

VARIABILITY: +/- ten percent change in the carrying capacity

EVALUATION:

Although transitory range has 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. At the end of 2003, the Forest revised the Recission Bill schedule for grazing allotment NEPA decisions because of other higher priority work associated with the 2000 wildfires.

MONITORING RESULTS:

2003 Actual Use

Nineteen of the 25 grazing allotments hold active permits. Of these, two took non-use for the 2003 grazing season. Thirteen permittees ran a total of 5,977 animal unit months.

Land Area Grazed

Cattle grazing is authorized on approximately 11 percent of the land area of the Bitterroot NF.

Transitory ranges

Loss of tree canopy in the moderate and high severity burn areas, combined with removal of burned timber from proposed salvage units did not result in an increase in permitted grazing animals. Transitory ranges typically are not included in the overall carrying capacity of an allotment, and are therefore usually considered as secondary ranges. The use of an allotment, as determined by Animal Unit Month's (AUMs) generally will not change as a result of increases in transitory ranges, as natural succession will eventually return these areas to forested types and they cannot be relied upon as primary forage sources. Foraging patterns will most likely be altered by the use of new transitory areas. The amount of grazing that will occur in these areas will be dependant on the forage production and palatability, distance to water, natural barriers, elevation, steepness of slope, noxious weed invasion, and availability of other forage. The overall changes in herbaceous cover and how it relates to attractiveness to cattle for grazing is not readily discerned at this time. Notable increases in forage use on transitory areas or changes in use patterns can only be documented over time. To date, mostly non-palatable grasses and shrubs have grown into areas opened by the fires.

Allotment Compliance Results Summary

We inspected 15 active allotments during the 2003 grazing season. The Forest uses these inspections to determine range readiness, permit compliance, and utilization level, as well as to collect data for the AMP revision process. In addition, we 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. Due to another year of drought, many allotments had little forage left by late in the season and most displayed some areas of heavy use.

Four allotments were rested in 2003. Of the remaining eleven allotments monitored, five allotments failed to comply with at least one primary utilization standard. Two additional allotments had borderline livestock impact problems. Solutions to the problems were discussed with all the permittees involved and will be implemented in 2004.

Ambrose Creek Allotment: The allotment exceeded riparian zone utilization standards. Heavy wetland trampling was evident in one key riparian area. The permittee was informed of the need for him to monitor utilization more closely in 2004 and relocate his livestock or remove them from the allotment when grazing approached the allowable limits.

Andrews, Warm Springs, Waugh Allotments*:* For the second year, these three grazing allotments were 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. A hot wire fence extension along Warm Springs Ridge is proposed to reduce cattle drift from the ridge into Waugh Creek. Some grassland areas of the Warm Springs Allotment showed heavy use that indicates the need for improved cattle herding or earlier removal in a dry year. Problems and solutions were discussed with the permittee.

The Waugh Pasture of the Waugh Allotment was successfully rested while the other pastures were grazed and met standards. This showed good effort in riding and herding by the permittee.

Bunch Gulch and Shirley Mountain Allotments: Uplands met utilization standards on one large grassland area. Utilization of riparian vegetation in Bunch Gulch exceeded the 50% allowable level. Problems and solutions were discussed with the permittee.

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. The Barley Ridge pasture showed upland utilization in excess of 50%. Forage production was poor this year due to dry conditions. Cattle will need to be relocated or removed after a shorter grazing duration on these sites in any future dry years. The permittee was informed of the need for closer monitoring and earlier removal should weather/forage conditions repeat those of 2003.

Gold Creek Allotment: The permittee removed cattle in August due to the Gold Creek fire. Forest plan utilization standards were met. The riparian exclosure at Muddy Springs remains cow-proof and effective but needs maintenance. The permittee was reminded of his responsibility to keep up with preventative maintenance of the exclosure.

Harlan Gulch: Grazing exceeded riparian standards in Roan Gulch. The problem and solutions were discussed with the permittee and will be included in the 2004 annual operating plan. Riparian standards and Forest Service expectations for compliance with those standards was emphasized.

Main Sleeping Child Allotment: This allotment was not grazed in 2003 and has not been for several years.

Meadow Creek Allotment: Annual riparian monitoring continued in Meadow Creek. Several sites have consistently exceeded riparian standards. Some proposed solutions will be implemented in 2004. A change in sampling method was proposed for several wetland, non-stream channel sites in which clipped samples inside and out of grazing cages would be used instead of stream channel methods. An extension of the Meadow Creek exclosure was also proposed as well as a solid fence to replace the hotwire. Another bull trout spawning area exists here. Some riparian zones showed heavier than desirable utilization levels. Problems and solutions were discussed with the permittee.

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.

Skalkaho Allotment: No compliance determination was made on this allotment because the inspection was only cursory. The uplands appear to be in good condition, however the Coffee drainage is still of concern. Weeds are very thick through here and grass vigor is poor. Weed treatments and, if possible, rest for a year or two would be very helpful.

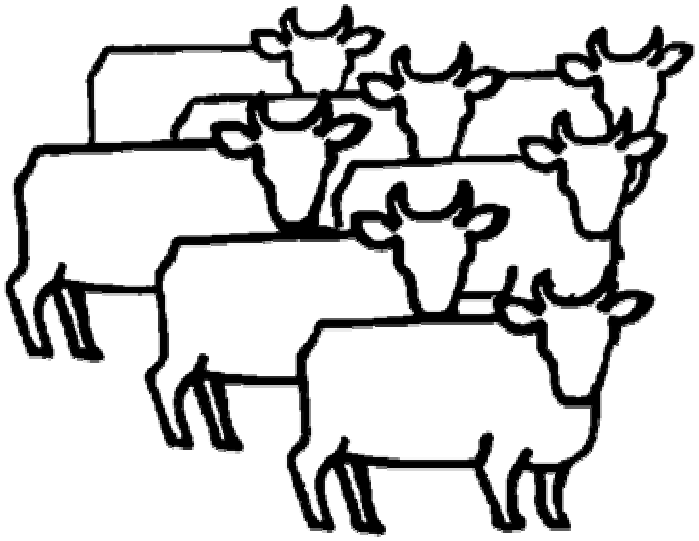
Sula Peak and East Fork Allotments: Sula Peak and East Fork Allotment were rested in 2003 for resource protection.

Trapper Peak Allotment: Forage use in the Waddell pasture exceeded standards. The permittee was asked to move cattle to the Lost Horse Pasture in late August as this pasture had not received much use yet. Problems and solutions were discussed with the permittee.

Allotment Management NEPA and Plan Revision Status:

Public scoping was initiated for the **Waugh Gulch and Andrews Allotment Management Plan** revisions in 2003. An interdisciplinary team was formed and a large portion of the analysis document was developed. A NEPA decision is expected late in 2004. The proposed action is to combine the allotments to increase efficiency of

management, institute a more progressive and adaptive management approach that incorporates principles of rest / deferment, and reduce the stocking level.



Benefit Values for Outputs
Item 26

OBJECTIVE: To determine if unit values used in the Forest Plan model have changed significantly.

DATA SOURCE: Montana Business Quarterly, Montana Sawlog and Veneer Log Price Report

FREQUENCY: Annually

REPORTING PERIOD: 2003

VARIABILITY: +/- ten percent of projected values.

EVALUATION:

Output values have varied widely since first estimated for the 1987 Forest Plan. This information and its analysis is being reviewed in the ongoing Forest Plan revision process. Continued documentation in these annual reports is unlikely to provide additional value, and probably won't be continued in future year's reports.

MONITORING RESULTS:

Factors that affect timber supply and cost on national forests include cumulative harvest impacts, legal challenges and administrative appeals, changes in management emphasis toward ecosystem management, staff and budget reductions, large scale wildfires, and below cost timber sales.

After very low levels during the first six months of the year, wood products prices increased substantially in the last half of 2003. Plywood prices reached all-time highs, and lumber prices reached their highest level since early 2000. The upward surge in prices was attributable to a number of factors, including:

- Continuing high domestic lumber consumption, with low mortgage rates encouraging builders and buyers;
- A weaker U.S. dollar, leading to decreased lumber imports;
- Increased demand in other countries, Japan in particular;
- Heavy rain in the southeastern U.S., reducing log availability in that region; and
- Severe forest fires in British Columbia causing mill closures;
- Wood products orders by the federal government for reconstruction in Afghanistan and Iraq

Montana mills did not benefit fully from the high prices, with Forest closures due to this summer's wildfires and court decisions related to federal lands creating log shortages and curtailments at numerous mills. [10]

Although mill delivered log values were not used directly in the Forest Plan to determine average stumpage values, they produce an accurate indicator of changes in the timber market. The figures in Table 45 represent values for the market region, not just for the Bitterroot National Forest. Average stumpage prices for the Bitterroot National Forest have been more volatile during the same period.

Table 45 - Mill Delivered Log Values for 1996-2003 (2003 base year dollars per MBF)

Species	1996	1997	1998	1999	2000	2001	2002	2003	8-Year Average
Ponderosa Pine	408	408	448	638	504	510	435	430	473
Lodgepole Pine	439	482	393	421	404	470	433	384	428
Douglas-fir	456	445	393	464	401	461	372	388	423
Average Values	434	445	411	508	436	480	413	401	441

[10] Keegan, et al., Montana's Forest Products Industry – Current Conditions and 2004 Forecast. Montana Business Quarterly, v 41, Number 1; Spring 2004.

ADMINISTRATION

Actual Costs Compared with Estimated Costs in the Forest Plan
Item 32

OBJECTIVE: To track experienced costs in relation to Forest Plan estimated costs.

DATA SOURCE: Project reports, Contracts, Timber Sale Program Information Reporting System (TSPIRS), Program Accounting Attainment Reporting System, Timber Sale Program Analysis System (TSPAS).

FREQUENCY: Annually.

REPORTING PERIOD: 2003

VARIABILITY: +/- 10 percent of projected costs.

EVALUATION:

Most costs have varied by greater than 10 percent from predicted values during the planning period. Additionally, the yearly fluctuations are considerable for most line items we have tracked. This is probably largely explained by the highly variable conditions found across the forest (i.e. project specific combinations of topography, vegetation types, access, weather, proximity to non-federal lands, and environmental protection measures each can influence actual costs). Additional shifts may also be influenced by changing management focus and technology. The data indicate that if cost predictions continue to be important in the upcoming Forest Plan revision, increased accuracy would likely require additional stratification of the costs based on these influences.

MONITORING RESULTS:

Planting costs were obtained this year from the actual costs. Costs of road obliteration were not estimated in the Forest Plan, but we started tracking them in 1999 since this has become an important item. The TSPIRS program was discontinued in 1999 so sale preparation and sale administration costs are not directly available.

Table 46 - Unit Costs (2003 base year dollars)

Description	Forest Plan	Forest Plan	Actual	Actual	Actual	Actual	Actual
	1987$	2003 Base $	1999$	2000$	2001$	2002$	2003$
Sale Preparation/Exams ($/MBF) [1/]	9-11	23.12-28.39	13.50	[4/]	[4/]	[4/]	[4/]
Sale Administration [1/]	6	14.02	13.31	[4/]	[4/]	[4/]	[4/]
Fuel Treatment ($/Acre) [2/]							
Hand Pile and Burn	120-270	311-720	295	357	519	128	200-500
Broadcast Burn	115-160	307-366	494	189	130	205	190-250
Underburn	70	184	162	137	52	164	150-200
Jackpot Burn	40	101	98	238	671	61-162	70-150
Planting ($/Acre)	143-158	253-420	348	125	395	448	300
Road Construction ($/Mile)	28,000-49,000	74,675-122,866	33,817	0[3]	0[3]	0[3]	0[3]
Road Engineering ($/Mile)	12,000	31,967	5,392	0[3]	0[3]	0[3]	0[3]
Road Reconstruction ($/Mi)							32,000[5/]
Road Obliteration ($/Mile)				4,492	1,520	0[3]	12,000

[1/] Values are based on the volume sold. Volumes can fluctuate significantly from year to year, which affects the cost per unit.
[2/] Values for 1999 are from TSPAS. Values for 2000 through 2003 are from Sula, Darby, and Stevensville Districts.
[3/] No road activities of this type this year.
[4/] This information not directly available or comparable.
[5/] Approximate. Higher than average costs due to 2003 focus on fisheries and watershed restoration priorities from the BAR decision.

Comparison of Forest Plan Outputs, Services, and Budget With 2003 Accomplishments and Budgets

OBJECTIVE: To compare actual outputs and expenditures with those predicted in the Forest Plan.

DATA SOURCE: Management Attainment Reports, Data Warehouse Expenditure Reports, Foundation Financial Information System (FFIS) Reports, Forest Plan Monitoring Report and Evaluation Report Fiscal Year 1988

FREQUENCY: Annually

REPORTING PERIOD: 2003

EVALUATION AND MONITORING RESULTS:

Table 47 compares Forest Plan output targets with FY 2003 accomplishments, and Table 48 compares the Forest Plan projected budget with 2003 expenditures. The 2003 program largely reflects recovery efforts after the 2000 fires and was not typical of the planning period. Both funding and accomplishments vary widely from what the plan predicted. When reviewed for the entire planning period, these numbers do reflect substantial changes in the Forest's management emphasis. Over the last 5 years, the budget structure for the Forest Service has changed almost annually. In a continuing effort to reduce the impact on our accounting system, program activities have been consolidated and more recently, programs themselves have been combined (e.g. recreation, heritage and wilderness are now one program code where they used to be three separate program codes). New program activities have been created to accommodate changes in management requirements. These changes are reflected in the changes in budget codes. To more accurately reflect the changes between the Forest Plan budget and actual 2003 expenditures Table 48 has been improved. In previous years' reports, budget codes were converted from the prior year codes. In this year's report the codes converted are from the 1987 Forest Plan. Large expenditures for Law Enforcement, the National Fire Plan, and Salvage Sales reflect the large number of acres burned during the 2000 fire season. Table 47 and Table 48 do not reflect all of the activities that occurred in 2003 or the total budget of the Forest.

Table 47 - Comparison of Average Annual Forest Plan Outputs and Services with 2003 Accomplishments

Target Item	Activity	Unit of Measure	Forest Plan	Accomplished FY 2003
Recreation	Wilderness	RVD's[1]	129	[2]
	Non-wilderness	RVD's	422	[2]
Wildlife	Wildlife Hab. Imp	Acres	285	800
	Fish Hab. Imp.	Miles	5	13
	T&E Hab. Imp.	Acres	0	0
Range	Permitted Grazing	MAUM's	11.2	6
	Range Improvement	Acres	225	0
	Noxious Weed Control	Acres	80	2,100
Soil and Water	Soil & Water Improvement	Acres	15	66
Lands	Land Exchange	Acres	320	0
	Land Line Location	Miles	16	9
Minerals	Minerals Management	Cases	100	13
Timber	Harvest Method [3]			
	Clearcut	Acres	1,840	1,389 [4]
	Seed Tree	Acres	0	77[4]
	Shelterwood	Acres	1,040	0
	Removal	Acres	170	0

Target Item	Activity	Unit of Measure	Forest Plan	Accomplished FY 2003
	Selection	Acres	100	0
	Salvage	Acres	500	61
	Commercial Thin	Acres	0	6
	Planting and Site Prep	Acres	3,312	2,073
	Timber Stand Improvement	Acres	1,200	557
	Fuel Management (Brush Disposal)	Acres	3,146	2,041
Protection	Fuels Management	Acres	250	2,191
Facilities	Trail Construction & Reconstruction	Miles	16	764
	Road Construction	Miles	25	0
	Road Reconstruction	Miles	6	7
	Road Obliteration [5]	Miles		18.2
	Road Storage [5]	Miles		26.6

[1] Recreation Visitor Days
[2] This information is no longer being collected
[3] From the Timber Stand Management Record System
[4] Most of these acres are fire salvage of dead trees to be followed by planting, not live tree harvest. The database activity coding as clearcut, seedtree, or shelterwood reflects the intent to regenerate the burned stands.
[5] New item. Not mentioned in Forest Plan

Table 48 Comparison of Forest Plan Budget with 2003 Expenditures

2003 Fund Code	Projected Avg. Budget per Forest Plan 2003 (M$)	Fiscal Year 2003 Actual Expenditure (M$)	Expenditures as a Percentage of Plan Projection	Program Activity Associated with Fund Code
BDBD	820	11	10%	Brush Disposal
CMFC	339	191	56%	FA&O Facility Mtc. & Construction
CMI		132		Deferred Maintenance[1]
CMRD	1,233	1,165	94%	Road Mtc. & Construction
CMTL	679	638	94%	Trail Mtc. & Construction
CWFS	71	14	20%	Coop. Work
CWKW	1,237	74	6%	KV
HTAER		18		Federal Highway[1]
LALW		41		Land Acquisition[1]
NFMG	218	77	35%	Minerals
NFRG		49		Range
NFRW	954	501	53%	Recreation
NFSA / NFSD	0	40		SCSEP
NFTM	1,817	1,022	56%	Timber
NFVW	1,430	791	55%	Vegetation Mgt. (Including Noxious Weeds)
NFWF	309	471	452%	Fish, Wildlife, Botany
RBRB	24	1	4%	Range Betterment
RTRT		26		Reforestation Trust Fund[1]
SSSS	97	41	42%	Salvage Sales

2003 Fund Code	Projected Avg. Budget per Forest Plan 2003 (M$)	Fiscal Year 2003 Actual Expenditure (M$)	Expenditures as a Percentage of Plan Projection	Program Activity Associated with Fund Code
FDAS FDCL / FDSS		7		Fee Demo[1]
NFLE	18	47	261%	Law Enforcement
NFLM	258	399	155%	Lands
NFNE		4,706		National Fire Plan[1]
NFIM		286		Inventory & Monitoring[1]
NFMP		175		Planning[1]
NFLM	10	74	740%	Landline Location
SPS7		15		Forest Stewardship[1]

[1] New item. Not mentioned in Forest Plan

Forest Revenues

OBJECTIVE: Track trends in Forest revenues.

DATA SOURCE: Timber Sale Program Information Reporting System (TSPIRS), Automated Timber Sales Accounting System, Department of Interior - Bureau of Land Management, Annual Collection Statements, Ravalli Republic Newspaper

FREQUENCY: Annually

REPORTING PERIOD: 2003

EVALUATION & MONITORING RESULTS:

This monitoring item provides information on revenues generated by produ cts removed from the Bitterroot National Forest, or by use of the Forest. These include timber sales, road rights-of-way, easements, irrigation ditches, outfitter and guide permits, recreational residences, Lost Trail Ski Area, campground fees, government-owned recreational lodging rentals, and other special uses. In the past, a proportion of these revenues (the 25 percent fund) have been returned to the states or counties (Table 49). Counties receiving these funds from the Bitterroot Forest were Missoula, Ravalli, and Idaho Counties. Ravalli County, with 73 percent of its lands under national forest administration, receives the largest portion of these "25% Fund Payments to Counties." Payments from this fund have varied widely in the past depending upon revenues produced and funding authorized by congress.

In 2000, national legislation was enacted that offered an alternative to the 25 percent fund to stabilize annual payments to states and counties for schools and roads. This new legislation breaks a 92-year-old link between revenues collected from sale and use of national forest products and services, and payments to states (the 25 percent fund). The new legislation – entitled “Secure Rural Schools and Community Self-Determination Act of 2000” -- stabilizes payment levels to their average historic high. The new formula is based on averaging a state’s three highest payments between 1986 and 1999 to arrive at a payment amount. The new legislation is slated to guide payment activities through fiscal year 2006. The first payments using the new formula occurred in October 2001. Counties could choose to continue to receive payments under the old 25 percent fund, or to receive the county’s proportion of the state’s full payment amount under the new legislation. Ravalli County chose to participate in the revised payment legislation.

Forests with counties receiving $100,000 or more under the Secure Rural Schools and Community Self-Determination Act, as Ravalli County has, are required to reserve no less than 15 and no more than 20 percent of their distribution for special projects on federal lands, for county projects, or to return the reserved amount of their portion to the General Treasury. With federal land projects, at least 50 percent of the reserved funding shall be road maintenance, decommissioning or obliteration, or restoration of streams and watersheds. The Act requires that a consensus-based Resource Advisory Committees (RAC) be formed in each county to recommend which special projects are to be funded under the Act. These committees are to be balanced and diverse with equal representation from industry, environmental groups, and local individuals. The fifteen regular members and three replacements serve three year terms and work closely with the Bitterroot National Forest.

For counties that choose to remain with the 25 percent fund program, payments are largely influenced by the total revenue from timber sales. Although collection from other uses on the Forest may vary widely, the downward trend in timber sales has led to an overall downward trend in 25 Percent Fund payments to counties.

Another transfer of funds to counties is the Payments in Lieu of Taxes (PILT) program. This is a federal revenue-sharing program designed to compensate local governments for the presence of tax-exempt federal lands within their jurisdiction. PILT payments are tied to and adjusted by other federal revenue sharing programs, which are tied to federal land management activities. PILT is one of the ways that the federal government can fulfill its responsibilities to communities throughout the west. Through these payments, local governments carry out such vital services such as fire fighting, police protection, and construction of public schools and roads. PILT payments vary from year to year due to the amount appropriated by Congress and changes in other federal revenue sources.

Collections associated with various Forest uses for FY 2003 are shown in Table 50. Over the past decade, collections from timber and grazing have been on a downward trend.

Table 49 - Payments to Counties 1996-2003
(2003 base year dollars)

	1996	1997	1998	1999	2000	2001 [1]	2002	2003
Payment to Counties [1]	$274,123	$366,547	$285,274	$106,806	$92,696	$573,522	$369,121	$368,289
PILT for Ravalli County Only [2]	$187,6 32	$237,967	$859,665	$831,403	$560,085	$1,353,897	$1,254,605	$1,408,485

[1] Figures are for Ravalli, Idaho, and Missoula Counties. Starting in 2001 the "25% Fund Payment to Counties" was replaced by "Secure Rural Schools and Community Self-Determination Act" payments.
[2] Counties receive PILT funds from the Federal Government for all federal lands. Amounts are tied to population and acreage of Federal entitlement land, and also reflect funding levels set by Congress.

Table 50 - Forest Collection Summary 1996 - 2003
(2003 base year dollars)

Year	Timber Sales 4/	General Special Uses 1/	Recreation Special Uses, Wilderness 2/	Minerals	Recreation User Fees 3/	Grazing	Total
1996	$971,897	$13,073	$71,293	$4,043	$26,163	$7,558	$1,097,027
1997	$219,186	$5,832	$16,138	$1,833	$72,771	$6,494	$322,254
1998	$95,954	$5,024	$18,639	$3,299	$70,707	$6,634	$200,257
1999	$135,011	$5,858	$19,123	$5,647	$23,255	$6,516	$195,410
2000	$176,471	$6,656	$18,019	$5,503	$18,019	$6,656	$231,325
2001	$123,232	$5,477	$17,889	$5,279	$21,743	$6,091	$182,712
2002	-$14,611 5/	$6,603	$19,951	$2,723	6/	$6,014	$188,803
2003	$38,074	$8,689	$16,468	$4,488	6/	$4,036	$148,476

1/ Includes road rights-of-way, easements, irrigation ditches, and apiaries.
2/ Outfitter and guide permits, recreational residences, Lost Trail Ski Area.
3/ Campgrounds and government-owned recreational lodging.
4/ We changed the way timber sale collections were reported in FY 1996 to more accurately reflect timber receipts. Thus, FY 1996 -2003 values are not directly comparable to values in previous years' monitoring reports.
5/ Negative amounts are the result of adjustments between NFF, SSF, and KV Trust Funds.
6/ This information not available.

Administrative Appeals of Project Decisions

OBJECTIVES: Evaluate and disclose number and types of administrative appeals affecting Forest Plan implementation.

DATA SOURCE: Bitterroot planning database, Regional appeal records, project records.

FREQUENCY: As interest and data warrant.

REPORTING PERIOD: FY1991 - FY2003

EVALUATION:

Debate over forest management has recently 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. On the Bitterroot National Forest we have had an increased number of requests for information about administrative appeals from the public, regional and national Forest Service offices, and the General Accounting Office. Our responses and other data have been used to support various reports for private, congressional, and public use. Examples include:

- Factors Affecting Timely Mechanical Fuel Treatment Decisions, USDA Forest Service, July 2002 (available at http://www.fs.fed.us/emc/nepa/includes/hazardousfuelreductionreport070502.pdf).
- Mechanical Fuel Treatment Decisions Not Appealed FY's 2001-2002, USDA Forest Service, August 7, 2002 (available at http://www.fs.fed.us/emc/nepa/includes/mechanical.pdf).
- Analyzing USDA Forest Service Appeals: Phase I, the Database, March 2003, H.J. Cortner, G.M.R. Teich, J.Vaughn, Ecological Restoration Institute (http://www.eri.nau.edu/forms/files/FS-appeals-database-web.pdf).
- Forest Service Information on Appeals and Litigation Involving Fuels Reduction Activities, October, 2003, United States Government Accountability Office (http://www.gao.gov/new.items/d0452.pdf).

The Northern Region has maintained good records on the type, number, name, and disposition of appeals since the mid-1980's. This data alone provides useful, but limited information. While it tells how many appeals occurred, it lacks important context such as might be provided by knowing how many decisions were not appealed, whether specific types of projects or activities were more likely to be appealed, who is appealing projects, and what were the size or scope of the appealed projects compared to those that weren't appealed.

The Bitterroot National Forest has only recently begun to formally track additional project/decision specific information and maintain the information in a usable database. To the extent time and resources have allowed and the information has been available, we have also "backfilled" the database with some previous years' information and have used it to answer some of the data requests mentioned above. The data in the database are reasonably complete and reliable from FY1998 to present.

The monitoring results provided below summarize project and appeal information gathered in response to several recent government and private information requests. It is 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 and the specific questions that were being asked.

MONITORING RESULTS:

Northern Region Appeal Records for the Bitterroot National Forest, FY 1991 through FY 2003

During this thirteen year period, 213 separate administrative appeals were filed challenging 47 individual project decisions[11]. Of those 47 decisions that were appealed, ten decisions were either withdrawn or reversed. The remaining 37 decisions were either affirmed after administrative review or the appellants withdrew their appeal.

[11] Includes appeals under both 36 CFR §217 and 36 CFR §215.

Bitterroot National Forest Appeal Records, FY 1998 through FY 2003

From fiscal year 1998 through 2003 (six years), the Bitterroot National Forest issued 29 decisions which were subject to appeal (Table 51). Sixteen separate appeals were filed on nine of those decisions. Of the nine decisions that were appealed, six were affirmed after administrative review, 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 five categories (Table 52). Within those five categories, 50 percent of the project decisions were appealed (9 of 18).

Further refinement of the data showed that of the 16 total appeals received during the six year period, twelve (75%) were appeals of decisions which included commercial timber harvest as a project activity (Table 53). The appeal rate of timber harvest related decisions averaged 56%. Conversely, the appeal rate on non-timber related decisions averaged 20%.

Seven groups and two individuals were party to the 16 appeals filed in this time period (Table 54). It is not uncommon for more than one group to be party to a single appeal or to have more than one appeal on a single decision.

Table 51 – All BNF Project Decisions Subject to Appeal[12] and the Number of Appeals, FY 1998 through 2003

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[13]	0[13]
2003	4	2	2
Total	**29**	**9 (31%)**	**16**

Table 52 – General Category of BNF Decisions and Appeals[12], FY 1998 through 2003

General Category of BNF Decisions Subject to Appeal (1998-2003)	**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)	1	0	0%	0
Fuels Reduction	2	2	100%	2
Range Management	2	1	50%	1
Recreation / Wilderness	1	0	0%	0
Road Management	3	0	0%	0
Special Uses	4	1	25%	1
Vegetative Treatment	7	3	43%	10
Watershed Improvement	3	0	0%	0
Weed Management	3	2	67%	2
Total:	**29**	**9**	**31%**	**16**

[12] Only decisions subject to appeal under 36 CFR §215 are included as these are the most prevalent and have been the focus of recent data requests. The Forest Service has three other administrative appeal processes as well. These are defined at 36 CFR §217, 36 CFR 218, and 36 CFR §251.

[13] 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 53 - BNF Decisions Subject to Appeal[12] Which Included Timber Harvest as an Activity, FY 1998 through 2003

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[13]	0[13]
2003	1	1	1
Total	**9**	**5 (56%)**	**12**

Table 54 – Project Appellants[12], FY 1998 through FY 2003[14]

Appellant	**# of Appeals Party To**
Alliance for the Wild Rockies	4
American Wildlands	2
Floyd E. Wood	4
Friends of the Bitterroot	6
Friends of the Clearwater	2
Larry Campbell	1
The Ecology Center	4
West Fork Citizens Committee	1
Wilderness Watch	2

[14] 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.

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: 2003

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 Regional Office, 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. Several of these studies are mentioned throughout this monitoring report.

The fires of 2000 highlighted the need for new or additional research. A number of research and monitoring efforts occurring on the Bitterroot National Forest have been started to help answer fire-related management questions. When results are available, the Forest posts them on the internet at http://www.fs.fed.us/r1/bitterroot/planning/research/research_proj_list.htm. These include:

- **Effectiveness of Burned Area Emergency Rehabilitation (BAER) treatments for controlling erosion, retaining soil moisture, and reducing peak flow.** There are three studies, conducted by the RMRS, currently looking at the effects and effectiveness of straw wattles, silt fences, and contour-felled logs.
- **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 the RMRS is studying weeds in three of the large fire areas from the 2000 fires. The study will also measure vegetative response to weed control efforts as they occur.
- **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 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. The RMRS and Aldo Leopold Wilderness Research Institute are studying the effects of prescribed and wildland fires on amphibians. Studies planned for 2004 and later will look at the effects of burned area recovery treatments on birds, plants, and small mammals.
- **Vegetation recovery post-fire and after burned area restoration treatments.** In addition to the weeds study, a researcher from the RMRS is looking at long-term (15 years) vegetation response post-fire and post-treatment. 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. The 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 is monitoring 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 the RMRS is currently focusing on soil infiltration changes due to wildfire.

- **Preventing residential fire disasters.** A researcher from the RMRS looked at houses and landscaping and how they contribute to survivability of structures during fires. Several social analyses are studying communities in the wildland-urban interface. Researchers from the U.S. Geological Survey and the University of Montana studied the debris flows from the storms of 2001. Another study is modeling building trends in the wildland-urban interface.
- **Developing standard methods for collecting and moving data during fires.** Researchers at the 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, they visited actively burning areas to monitoring stream conditions before, during, and after wildfire.
- **Applications of ecosystem management principles to larger land areas, such as landscapes.** Modeling efforts by the RMRS are allowing researchers and land managers to take a landscape-level view of management actions. These modeling efforts also allow managers to look at the long-term effects of actions or of inaction. BEMRP is establishing a landscape-scale study that will recommend optimum thinning and prescribed fire treatments near the wildland-urban interface on the Bitterroot front.
- **Disturbance regimes (particularly fire) in low, middle and high elevation forests.** Researchers from the RMRS, the University of Montana, the University of Idaho, and the 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 the RMRS and the University of Montana are studying how different treatments affect the survival and growth rates of individual trees, the condition of the understory, the populations of wildlife such as birds, weed infestations, and amounts of fuels that can affect future fire severity.
- **Improving communication of research results among scientists, managers, and the public.** One study from the RMRS and the University of Montana is looking at ways to improve communication among environmental education groups in the Bitterroot Valley. A RMRS study is asking land managers how they access and use research information needed to make management decisions.
- **Population information, habitat needs, and resource management impacts on management indicator species, sensitive species, and other species of concern.** Researchers from the RMRS, University of Montana, and University of Idaho, Owl Research Institute, and the Bitterroot National Forest are currently studying lynx, snowshoe hares, boreal owls, spotted frogs, boreal toads, tailed frogs, migratory birds, northern goshawks, bull trout, and cutthroat trout on the Bitterroot National Forest.

Additional information about ongoing research on the Bitterroot National Forest can be found on the internet at http://www.fs.fed.us/r1/bitterroot/planning/research/research_proj_list.htm. Additional information on Regional post fire research and monitoring, much of which also applies to the Bitterroot National Forest, can be found at http://www.fs.fed.us/r1/pgr/afterfire/research/. The Bitterroot Ecosystem Management Research Project's website is http://www.fs.fed.us/rm/ecopartner.

Forest Plan Amendments

OBJECTIVE: Track formal changes to the Forest Plan.

DATA SOURCE: Amendments.

FREQUENCY: Annually.

REPORTING PERIOD: 1987 to 2003.

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-four times between 1987 and 2002. Three of the amendments (numbers 11, 13, and 14) 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 these 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 55 lists all the amendments to the Forest Plan and the nature of each decision. There were no new amendments in 2003.

Table 55 - Forest Plan Amendments 1987 Through 2003

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.[15]
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.

[15] INFISH, intended as interim direction, was not listed in this table prior to the 2001 monitoring report.