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Northern Region

FOREST PLAN

MONITORING AND EVALUATION REPORT

Fiscal Year 2009

Bitterroot National Forest

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TERRESTRIAL ECOSYSTEMS

Management Effects on Soils
Item 31

OBJECTIVE: Determine the effects of timber sale activities on soil productivity. The effects monitored include: soil compaction, rutting, displacement, severely burned soil, surface erosion, and soil mass movement as described in Region 1 Supplement 2500-99-1.

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

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

REPORTING PERIOD: 2009

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

INTRODUCTION:

The soil quality evaluations were conducted to determine the effects of management activities on soil productivity as required by the BNF Forest Plan and Region 1 Soil Quality Standards (R1 SQS). To accomplish this task, soils were evaluated against definitions and guidelines provided in the BNF Forest Plan as well as the Forest Service Manual (2550, Amendment No 2500-90-2 and Region 1 Supplement 2500-99-1) and Handbook (2509.18 WO Amendment 2509.18-91-1 and Region 1 Supplement 2509.18-2005-1). Part of the objective was to determine if the unit being monitored exceeds the R1 SQS of 15% aerial extent of Detrimental Soil Disturbance (DSD). It is important to consider the 15% as a trigger point at which more in-depth soil quality evaluations would be conducted and soil amelioration is considered to move toward a net improvement in soil quality.

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

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

Soil quality evaluations were conducted for this report (2009) on harvest units using the *Region 1 Approach to Soils NEPA Analysis Regarding Detrimental Soil Disturbance in Forested Areas, A Technical Guide* and also the *Forest Soil Disturbance Monitoring Protocol Volume I: Rapid Assessment*.

EVALUATION – DETERMINE THE EFFECTS OF TIMBER SALE ACTIVITIES ON SOILS

This report provides an evaluation of Bitterroot National Forest projects including:

1. ***Pre-Activity Soil Monitoring Surveys;***
2. ***Post Activity Soil Monitoring Surveys;***
3. ***Monitoring Summary***

1. Pre-Activity Soil Monitoring Surveys

Pre-activity soil monitoring was conducted to determine baseline soil conditions (

Table 1).

The data is used to assess existing conditions and effected environments during the planning process.

Table 1 - Existing Soil Condition Surveys.

Project	Results
Three Saddle EA	Existing soil conditions meet R1 SQS in all units. Units are proposed for ground-based and skyline harvest. All units will meet R1 SQS following activities.
Sweeney Creek CE	Existing soil conditions meet R1 SQS. Units are proposed for winter ground-based harvest to protect soils and minimize weed spread. All units will be within R1 SQS following activities.

These surveys provide the baseline data which help guide project designs. Soil resource protections including Soil and Water Conservation Practices (SWCPs), Montana BMPs, and in some cases mitigations are prescribed to ensure soil resources are protected and maintained within the R1 SQS. Rehabilitation projects are also often derived from these pre-activity surveys.

2. Bitterroot National Forest Post-Activity Soil Quality Monitoring Surveys (2009)

Post-activity soil quality monitoring was conducted to determine the effects of harvest activities on the soil resource. Five harvest units were monitored from two different projects. The results of the 2009 soil quality monitoring are displayed in Table 2. Note that the results indicate the amount of new or additional DSD created following an activity. These figures are independent of the existing soil quality conditions on the site.

Table 2 - BNF Soil Quality Monitoring (2009) - Percent New DSD Post Harvest Activity.

Winter Ground-Based	Helicopter
2 sites monitored	3 Sites monitored
5% New DSD	0% New DSD

Winter ground-based yarding created on average 5% new DSD. Winter ground-based yarding monitored since 2005 has resulted in 1% to 6% DSD.

Helicopter yarding has the least impacts to soils when compared with other yarding methods. No detrimental soil disturbance was detected in the helicopter units during post harvest monitoring. Helicopter units were last monitored in 2006 and similar to 2009, no detrimental soil disturbance was identified. Details concerning the monitoring data in Table 2 are discussed in the following sections.

KERLEEBERT TIMBER SALE

Unit 10B- Harvest Method: Winter Ground-Based

Background: The pre-activity soil assessment completed in the summer of 2004 found the unit had no pre-existing DSD. The unit covers 53 acres and is located on the nose of a gently sloping ridge. The unit wraps around the ridge and has west, south, and east facing slopes. Mitigations recommended by the soil scientist in the Final Environmental Impact Statement (EIS) included ground-based harvest in the winter to minimize soil impacts. Operations were completed in winter 2008.

Observations: Harvest in the unit followed the soil scientist's recommended mitigations for winter operations. DSD and compaction on main skid trails totals approximately 5% across the unit. The detrimentally disturbed areas were

rehabilitated by placing slash on disturbed portions of the skid trails. Native vegetation remained intact and was not affected by winter yarding in most areas. No other detrimental soil conditions were noted off the main skid trail areas.

Conclusion: The unit is within R1 SQS.

Unit 17- Harvest Method: Winter Ground-Based

Background: The pre-activity soil assessment completed in the summer of 2004 found the unit had approximately 5% pre-existing DSD. The unit covers a total of 26 acres and is located on east facing slopes. The unit was divided into two parts with the upper 16 acres being skyline logged and the lower 10 acres winter ground-based. Only the winter ground-based portion of the unit was monitored. Operations were completed in winter 2008.

Observations: Harvest in the unit followed the soil scientist's recommended mitigations for winter operations. DSD and compaction on main skid trails totals approximately 5% across the unit. The detrimentally disturbed areas were rehabilitated by placing slash on disturbed portions of the skid trails. Native vegetation remained intact and was not affected by winter yarding in most areas. No other detrimental soil conditions were noted off the main skid trail areas.

Conclusion: Pre-existing DSD (5%) plus new DSD (5%) totals 10% for the unit and is within R1 SQS.

SPRING MINK TIMBER SALE

Units 37, 51, 70 - Harvest Method: Helicopter

Background: Units 37, 51, and 70 were reviewed in the Spring Mink Timber Sale on August 6, 2009. Fuel hazard reduction in these units utilized a helicopter to remove trees. Soil disturbance from past harvest entry was not noted during the field review.

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

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

3 SUMMARY: Bitterroot National Forest Post-Activity Soil Quality Monitoring Surveys

The following table (Table 3) is a summary of the 2009 post-activity soil quality surveys conducted on the BNF using the *Region 1 Approach to Soils NEPA Analysis Regarding Detrimental Soil Disturbance in Forested Areas, A Technical Guide* and also the *Forest Soil Disturbance Monitoring Protocol Volume I: Rapid Assessment*.

Table 3 – Percent new DSD by harvest activity.

Harvest Activity	# Sites Monitored	Avg. % New DSD	Data Range %
Winter ground-based	2	5.3%	4.9 – 5.7%
Helicopter	3	0%	0%

The 2009 BNF monitoring has shown that:

- **Winter ground-based** yarding averaged approximately 5% DSD. This yarding method is effective at minimizing DSD when compared with summer ground-based operations; however winter operations do limit the ability to complete soil rehabilitation activities. Winter ground-based yarding monitored since 2006 has resulted in 1% to 6% DSD.
- **Helicopter** yarding resulted in no measurable increase in DSD. Helicopter units were last monitored in 2006 and similar to 2009, no detrimental soil disturbance was identified.

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: 1988 to 2009.

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

EVALUATION:

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

Table 4 compares the desired species mix proposed for harvest in the Forest Plan with the species mix actually harvested. More Douglas-fir has been harvested than any other species. In recent years, the removal of beetle-killed Douglas-fir has been a priority across the Forest along with the removal of understory Douglas-fir (ladder fuels) from stands in the wildland urban interface. This trend is expected to continue into the future although salvage efforts in the bug-killed Douglas-fir are not expected to last much longer. As the mountain pine beetle population increases, removal of live and dead lodgepole pine and ponderosa pine is anticipated.

The actual levels of harvest for all species are well below what was predicted in the Forest Plan. The Plan predicted that approximately 734.5 MMBF would be harvested over a 22 year period. Approximately 10%, or 73.45 MMBF, of this volume would be ponderosa pine. The actual 22-year harvest volume for ponderosa pine is 32.0 MMBF which is less than half of what was anticipated in the Forest Plan.

A growing percentage of harvested timber has no species noted. Some sawtimber (lumber) is included in this category but the majority is firewood, pulpwood, and other non-saw products.

MONITORING RESULTS:

Table 4 – Species Mix Harvested in FY 2009, Cumulatively for the Past 5 Years, and from FY 1988 to2009, Compared to the Forest Plan Desired Harvest Species Mix

	Forest Plan ASQ per year		Harvested 2009		Harvested 2005 to 2009 (5 years)		Harvested 1988 to 2009 (22 years)	
Species	Volume (MMBF)	Percent	Volume (MMBF)	Percent	Volume (MMBF)	Percent	Volume (MMBF)	Percent
Ponderosa Pine	3.34	10%	0.23	2%	.75	3%	32.0	14%
Lodgepole pine	8.67	26%	0.90	10%	1.68	6%	36.6	16%
Douglas-fir	16.02	48%	3.90	45%	10.3	38%	82.0	35%
Engelmann spruce	1.67	5%	0	0%	0.14	1%	9.5	4%
Subalpine fir /Grand fir	3.34	10%	0	0%	0.65	2%	8.0	3%
Larch	0.33	1%	0	0%	0.07	0%	0.7	0%
Fuelwood/Dead/Pulp	0	0%	3.87	43%	13.11	48%	42.2	17%
Total	**33.37**	**100%**	**8.9**	**100%**	**26.7**	**100%**	**211.0**	**100%**

Silvicultural and Fuel Prescriptions
Item 14

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

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

FREQUENCY: Annually.

REPORTING PERIOD: 2009

VARIABILITY: Departure from management practice.

EVALUATION:

Forest Service Manual (FSM) 2400, Section 2470 requires that a silvicultural prescription be prepared and signed by a certified silviculturist on all vegetation management projects. Vegetation management projects include timber harvest, prescribed burning, mechanical noncommercial thinning and/or slashing, or reforestation projects. The Forest's Environmental Management System (EMS) also requires ongoing evaluation and monitoring of compliance with the silvicultural handbook including review of pre-action, during implementation, and post-action activities. Monitoring is designed to evaluate whether:

1. The silvicultural prescription was completed and/or approved by a Certified Silviculturist and updated as needed
2. The prescription was followed through all phases of implementation, and
3. The prescription met the desired conditions as defined in the NEPA document and silvicultural prescription.

With the absence of a Forest Silviculturist, no formal documentation was recorded for this monitoring item in 2009.

Fire Management

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

DATA SOURCE: Fire management records.

FREQUENCY: Annually.

REPORTING PERIOD: 2009.

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

EVALUATION:

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

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

At present, fire regime condition class is being evaluated at the project level to determine the departure from natural regimes so that needed treatments can be identified and implemented as funding and conditions allow. While there has been no forest-wide determination, preliminary indications are that in general, lower elevation areas of ponderosa pine and Douglas-fir types have the most departure and are in greatest need of treatment, followed by mid-elevation mixed conifer types. Upper elevation lodgepole and sub-alpine fir types have the least departure from natural regimes.

MONITORING RESULTS:

Wildland Fire Situation

The Bitterroot Valley experienced a relatively mild 2009 fire season. Winter snow pack and spring run-off were average. Spring rains allowed for some prescribed fire. About the middle of June, spring rains ceased and fire indices began to climb but periodic rain events throughout the summer moderated the season. A drying trend established itself in September and fire season severity hit its highest point at the end of September when a season ending event occurred.

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 2009 season, 1000 hr fuel moistures followed normal patterns, starting out high after winter snows. By late July, 1000 fuel moistures had their lowest point at about 10%. With wet thunderstorms, fuel moistures were moderated and with less than normal lightning, initial attack was successful. These conditions continued into October when fuel moistures again began increasing with fall rains.

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 2 years, only about 10% of the days during the summer experience an ERC above 56.

For 2009, estimated ERC's fluctuated from 20-45 all spring, but started to climb sharply in mid-June. Periodic rain events never really allowed ERCs to get much above the 90th percentile (56) during the summer, but ERC's hit their highest mark of 59 on September 29th. Several rain events soon followed and ERCs dropped quickly after that.

The season's first fire was human-cause and recorded on April 23rd, and the first lightning fire was recorded on May 29th. The last lightning fire occurred on September 27th and the last human-caused fire occurred on October 31st. One fire, the Kootenai fire, could not be suppressed safely and ended up being managed as a long term event. When it approached the valley, a team was assembled for about 10 days to manage the event. Twenty-four lightning fires were managed for resource benefit, burning a total of 4,195 acres. On average, the forest has about 136 fire starts annually. In 2009 the forest recorded 73 starts (Table 5). An interesting statistic that is emerging since the fires of 2000 is that from 1989 to 2000, the forest averaged about 167 fires/year. From 2001 to the present, the average is only 95 fires/year – probably a result of having some many acres now in standing snags and thus less fire starts from lightning (Figure 1).

Figure 1 – Fires Per Year from 1989 to 2009

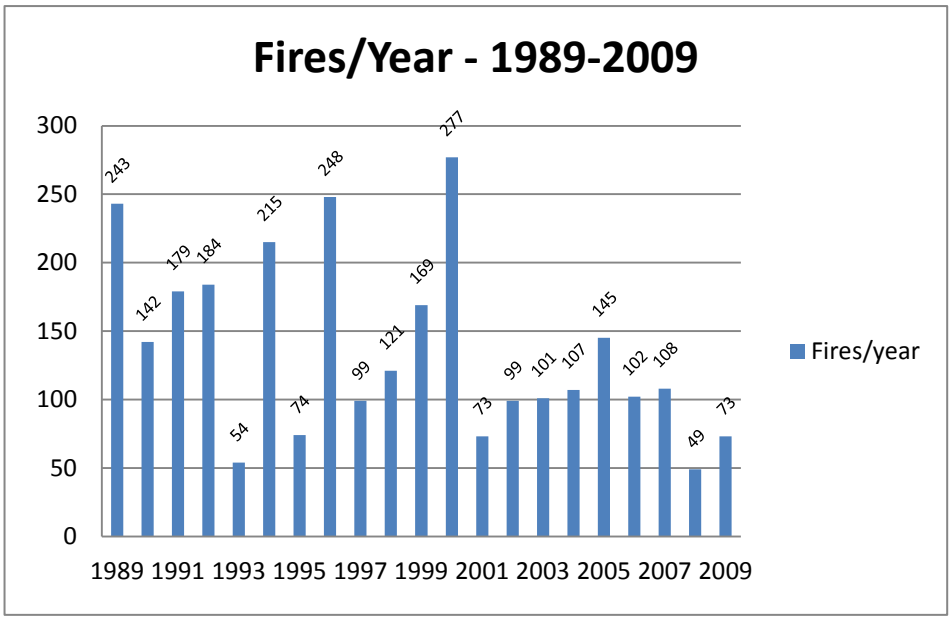


Table 5 - Number of Fires by Year within Forest Protection Boundary and by Type of Fire

Type of Fire	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Lightning	229	125	159	154	37	200	49	203	71	112	137	249
Human-caused	14	17	20	30	17	15	25	45	28	9	32	28
Total	243	142	179	184	54	215	74	248	99	121	169	277

Type of Fire	2001	2002	2003	2004	2005	2006	2007	2008	2009	Average
Lightning	50	76	96	90	126	74	94	33	55	115
Human-caused	23	23	5	17	19	28	14	16	18	21
Total	73	99	101	107	145	102	108	49	73	136

Table 6 - Number of Acres Burned By Year Within Forest Protection Boundary

Type of Fire	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Lightning	183	3,156	3,028	450	454	8,680	244	47,720	207	22826	2898
Human-caused	549	3,166	1,889	161	11	777	375	432	33	3835	316
Total	732	6,322	4,917	611	465	9,457	619	48,152	240	26,661	3,214

Type of Fire	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	Average
Lightning	308,576	231	1241	11,595	1,529	44,994	7,174	50,500	8,092	11291	25,842
Human-caused	11,559	5	242	1,374	37	12	8,886	450	2	28	1,626
Total	320,135	236	1,483	12,969	1,566	45,006	16,060	51,000	8,094	11319	27,108

Table 7 - Acres Burned By Management Area (MA)

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

Percent of MA	0.79	0.00	2.37	4.36
2006 Acres	8,834.24	0	69.8	7,155.78
Percent of MA	2.21	0.00	0.03	0.87
2007 Acres	9,558	10,000	10,006	21,436
Percent of MA	2.39	10.09	3.86	3.23
2008 Acres	4	1	30	8094
Percent of MA	0	0	0.01	0.98
2009 Acres	3515	20	2515	5269
Percent of MA	0.88	0.02	0.97	0.64
1989-2008 Average Annual Acres	**12,471**	**2,044**	**2,259**	**10,333**
1989-2008 Average Annual Percent of MA	**3.12**	**2.06**	**0.87**	**1.26**

The Bitterroot NF Fire Management Plan identifies the following four Fire Management Units (FMUs): 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 and Table 8 tracks acres burned in each FMU since 2003.

Table 8 – Acres Burned per FMU per Year

Fire Management Unit	2003	2004	2005	2006	2007	2008	2009	Average
FMU1	1,210	98	1,723	8,828	492	4	13	1,767
FMU2	8,310	6	21	74	9,004	1	30	2,492
FMU3	2,350	165	6,129	3	20,082	4	2,517	4,464
FMU4	1,099	1,297	37,133	7,155	21,422	8,085	8759	12,136
Total Acres	**12,969**	**1,566**	**45,006**	**16,059**	**51,000**	**8,094**	**11,319**	**20,859**

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 restoring 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 9, 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.

In 2009, with several good burning opportunities in both the fall and spring, the Forest completed 412 acres of broadcast burning, 369 acres of hand piling, 1,043 acres of slashing, 593 acres of leave tree protection, 1,062 acres of thinning, and 1,123 acres of pile burning. The majority of these acres were done in the WUI. The Forest will continue to work to reestablish its prescribed fire program, but limits on funding may not allow it to reach its annual goal of approximately 10,000 acres.

Table 9 - Prescribed Fire Program Acres Accomplished Per Year

	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Acres	2,000	2,000	2,100	2,000	2,005	5,234	5,700	5,100	2,982	755

	2002	2003	2004	2005	2006	2007	2008	2009	Average
Acres	349	2,191	5,171	2,100	2,090	7,814	3,710	4,602	3,217

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 Bitter Root Resource Conservation and Development Area, Inc. (RC&D), State of Montana Department of Natural Resource Conservation, and private landowners in the treatment of hazardous fuels on private lands and National Forest lands immediately adjacent to private lands. Bitterroot National Forest fire management personnel have been providing expertise to the RC&D community forester when working with the private landowners to improve understanding of fire risk in areas that need fuels treatment. They have also been assisting Rural Fire Departments in updating a Community Fire Plan that identifies priority areas for fuels treatment in conjunction with work being planned on adjacent public lands (http://www.bitterrootfireplan.org/).

The State and Private Forestry program provides grant monies and fuels treatment expertise to private landowners to assist them in reducing fire risk on their lands. This increases the chance of successfully suppressing a fire during initial attack and correspondingly reduces risks to lives, homes, and property from a catastrophic large fire. In 2009, 54 landowners treated 425 acres of their private lands using $138,295 of grant money.

Table 10 – State and Private Forestry Accomplishments

	2004	2005	2006	2007	2008	2009	Total
Acres	518	799	146	320	405	425	2,613

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

OBJECTIVE: To determine insect and disease status as a result of management activities. Monitor trends of mountain pine beetle infestations and respond if needed. Track whether the majority of harvest in lodgepole pine is done within stands with a moderate to high risk of attack by mountain pine beetle.

DATA SOURCE: Forest Pest Management aerial observations, Forest Health and Protection site trips & reports; field surveys, project monitoring and Forest Activity Tracking System (FACTS) database. Forest Health and Protection is a division of State and Private Forestry in the Forest Service with an office located in Missoula MT.

FREQUENCY: Annually

REPORTING PERIOD: 2009

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

EVALUATION:

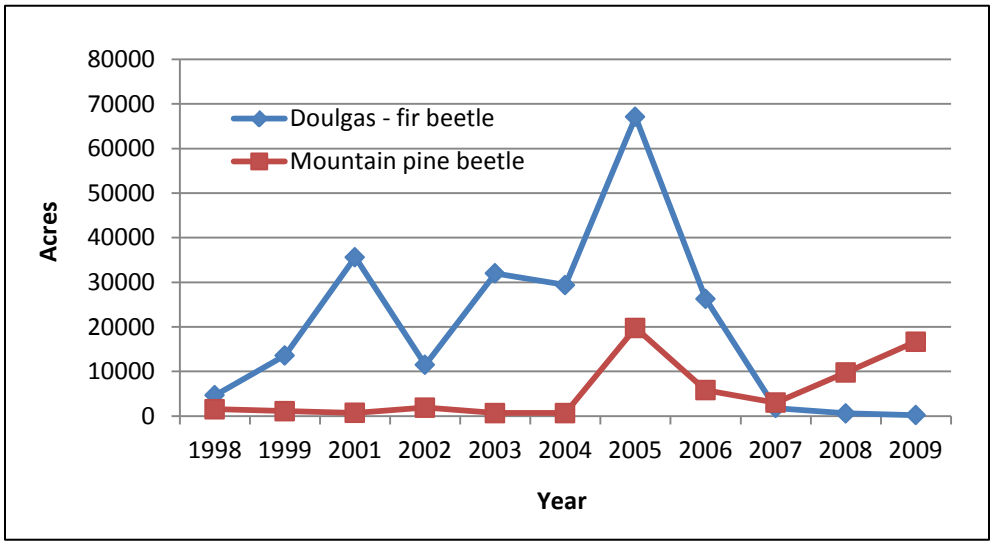
Mountain Pine Bark Beetle (MPB) Activity on the Forest is Increasing. Douglas-fir Bark Beetle (DFB) is Declining. For Douglas-fir beetle, infested area on the Bitterroot was recorded at 229 acres, while ground surveys and observations on the Forest continued to show decidedly marked declines. A few areas on the south end of the Forest are still at higher than normal levels but other areas on the Forest are at or near endemic levels. The 2009 aerial detection flight mapped 18,940 acres of bark beetle caused mortality on the Forest compared to 12,376 acres mapped in 2008. Populations of bark beetles are not directly tied to management activities occurring on the Forest. They are the result of prolonged dry weather, decades of fire suppression, recent large fires and existing vegetation conditions. Since management activities within the planning period are not causing the bark beetle epidemic, we are within the Forest Plan variability threshold.

The bark beetle of primary concern on the Bitterroot NF has transitioned from DFB to MPB and is tied to the fact that there are fewer host trees left remaining on the Forest. DFB populations have been high and/or at epidemic conditions for 14 years on the Bitterroot NF. Many areas on the Forest have few to no large diameter Douglas-fir trees left.

The Forest Plan requires monitoring of mountain pine beetle (MPB) activity since this beetle has historically caused widespread mortality of lodgepole pine (LPP) throughout the western U.S. Recent outbreaks of MPB have occurred on adjacent Forests and still remain at higher than normal levels. MPB associated mortality is starting to show up on the Bitterroot and especially in Ponderosa pine (PP) as well as lodgepole pine. Mortality in whitebark pine (WBP) caused by MBP continues to be the greatest concern on the Bitterroot since the distribution of this species is limited across the Forest.

In 2009, MPB activity in lodgepole pine was the most often-encountered bark beetle-caused mortality on the Forest. Mortality increased from 8,100 acres in 2008 to 12,010 acres in 2009. MPB also killed 5-needle pines (WBP & PP) on 485 acres. Western Balsam Beetle killed nearly subalpine firs on 3,669 acres. Other bark beetle-caused mortality was recorded at very low levels.

Figure 2 – Acres Infested by Douglas-fir Beetle (DFB), Mountain Pine Beetle (MPB) and Western Balsam Beetle (WBB) Since 1998



Management Activities Affecting Insect Activity. Project monitoring in 2009 found relatively few insect and disease problems resulting from management activities. Ongoing activities that have the potential to cause insect or disease activities on the Forest include prescribed burning, timber harvest, precommercial thinning and slashing. Mitigation measures applied to these projects have been effective in preventing any noticeable spread of damaging insects or diseases. Incidental tree mortality was found on some of these projects but was well within the acceptable limits given the project objectives.

Stands at high risk for mountain pine beetle infestation are not being treated at this time. The emphasis of the timber sale program is to treat stands within the urban interface and to salvage dead timber where the opportunity exists. In the future the Forest will resume management activities in ponderosa pine and lodgepole pine areas.

MONITORING RESULTS:

Insect and Disease Aerial Survey: The primary data source for monitoring insect and disease conditions on the Forest is the aerial detection flight conducted annually by Forest Health and Protection. These flights provide general estimates, locations and trends of insect and disease activity on the Forest and are not meant to provide statistically accurate numbers of affected trees. Aerial flights detect dead and dying trees which are usually the result of the previous year's insect, disease or fire activity. Table 11 summarizes the insect and disease information provided by the aerial detection flights conducted in the summer of 2009. Data are presented for the Bitterroot Reporting Area which includes the Bitterroot National Forest, private, and state-owned lands.

Table 11 - Insect and Disease Aerial Survey Summary For 2009

	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	220	121	8	3	0	0	228	124
Mountain Pine Beetle (PP)	485	647	430	573	192	250	1107	1470

	Bitterroot National Forest *		Private Land Bitterroot Area		State Land Bitterroot Area		TOTAL Bitterroot Reporting Area	
Pathogen	**Acres**	**Trees**	**Acres**	**Trees**	**Acres**	**Trees**	**Acres**	**Trees**
Mountain Pine Beetle (LP)	12010	20935	333	496	77	151	12420	21582
Mountain Pine Beetle (WBP)	2940	4308					2940	4308
Engelmann Spruce beetle								
West. Balsam Bark Beetle (SAF)								
Pine Engraver Beetle (PP)			2	5	2	3	4	8
Spruce Budworm	1303	0	63	0	444	0	1810	0
Western Pine Beetle								
TOTAL ACRES							**18,509**	**27,492**

* Montana outside of wilderness

Project Monitoring:

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

Overall, it appears that pest management strategies are working effectively to reduce long-term losses due to both insects and diseases. A list of commonly applied direction and mitigation was reported in the 2006 Forest Plan Monitoring Report.

Monitoring was completed on three projects in 2009. No problems were found on any of these projects.

Insect and Disease Studies Being Completed on the Bitterroot NF:

Evaluating the Effectiveness of Thinning Treatments on DFB-Caused Tree Mortality

In 2005, Forest Health and Protection in cooperation with the Rocky Mountain Research Station, initiated a long-term thinning study in DF stands on the Helena, Lewis & Clark, and Bitterroot NFs to evaluate the effectiveness of two thinning treatments on DFB populations and associated beetle-caused mortality. Replicated treatments consist of: (1) basal area reductions, and (2) stand density index (SDI) treatments to maintain or approximate uneven-aged stands. Basal area reduction treatments will be included in ongoing projects on all three Forests; SDI treatments will be evaluated on the Helena and Lewis & Clark NFs only. Evaluations are in varying stages depending upon project status on each Forest. Pretreatment evaluations were conducted in 2006. Post-treatment evaluations were conducted in 2007 and will be done annually thereafter, if DFB are active in treatment units.

If beetle activity is not found, monitoring will be conducted at 5-year intervals. This project is on-going.

Elytroderma Needle Disease Thinning and Pruning Project
Initially reported in the 2004 Forest Plan Monitoring report, this project is in the Elk Bed area of the Darby RD. Elytroderma has been moderately severe for a number of years in this area. Twelve ponderosa pine stands were randomly assigned one of five treatments: thinning to 12x12 spacing with and without pruning, thinning to 18x18 spacing with and without pruning, and control (no treatment). Annual monitoring began in 2006 and continued in 2007. See FHP Numbered Report 08-03 for establishment data and 2006 re-measurement data. http://www.fs.fed.us/r1-r4/spf/fhp/publications/bynumber/R1Pub08_03_thin_PP_suppress_Elytroderma.pdf

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 2009:

Lockman, Blakey. 2009. Three Saddle Project Area, Stevensville RD, Bitterroot NF, October 8, 2009. Missoula Field Office. R1. MFO-TR-09-35. October 22, 2009.

Invasive Plants
Item 10

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

DATA SOURCE: Inventory of infestations.

FREQUENCY: 100% every three years.

VARIABILITY: Increase in area infested.

REPORTING PERIOD: 2009

EVALUATION:

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

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

MONITORING RESULTS:

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

The Bitterroot National Forest invasive plant management program increased ten-fold in scope with the signing of the 2003 Forest Noxious Weed Treatment Project Record of Decision. The document identified new expanded objectives for the Forest and provided a road map for achieving those objectives over the next ten years. It emphasized application of the progressive principles of Integrated Pest Management. Table 12 below summarizes the key invasive plant activities that occurred on the Forest in 2009.

Table 12 - Program highlights in 2009

Project	Description
1) Backcountry contract	On going (2007-2010) backcountry treatment, mapping, and monitoring project for new invaders and expanding established invaders on trails and remote areas including the FCRNR Wilderness, west side canyon trails, and at-risk grassland sites.
2) Participating Agreement between Ravalli County and Bitterroot Forest	The Forest continually contributes fund to the existing agreement(s) that implement an integrated invasives strategy including: cooperative treatment of high priority invasive plants across Forest / private land boundaries; biological control release and monitoring program with the Victor and Darby schools science departments; mapping of new invaders; and improving and delivering invasive weed education to groups in the county. The agreements included fire recovery special funding and regular appropriations.
3) Resource Advisory Committee (RAC)	On Going RAC project: Phase 2 invaders: Rush skeletonweed, blueweed and common bugloss. Funding was provided for mapping and treatment.
4) Participating	On going 2006 - 2009 with the WI for mapping, monitoring, and hand pulling invasive plants in the

Agreement with the Wilderness Institute	Selway-Bitterroot and Anaconda-Pintler Wildernesses in conjunction with planned NEPA analysis and inventory needs. The program involves the use of volunteers through the WI and promotes education and training about invasive plants.
5) Participating Agreement with Montana Conservation Corps	On going 2006 - 2009 with the MCC that meshes with the Wilderness Institute agreement for mapping and treatment work in remote areas and trails on the Bitterroot Forest. The program also promotes education and training for the participants about invasive plants.
6) Participating Agreement with the Western Agricultural Research Center	This project increased funding, through a pre-existing agreement, to the WARC for the rearing and release of biological control insects on spotted knapweed.
7) Cooperative work with Salmon-Challis (S-C) National Forest	The Bitterroot and Salmon-Challis Forests are implementing a long term strategy for the FCRNR Wilderness to control invasive plants. Particular focus is on treatment and mapping of rush skeletonweed, a new invader on the BNF.
8) Federation of North American Wild Sheep	Funded invasive plant treatment on about 100 acres of sheep range in the Skalkaho watershed. Work focused on treating infestations of knapweed and leafy spurge. The purpose is to maintain the grasslands in the highest and most productive ecological condition possible.
9) General Invasive Plant Education and Training	a) Wilderness Rangers inspect and enforce weed-free feed/hay requirements in the backcountry throughout the field and hunting seasons. In addition, they inform users about best practices to prevent the increase and spread of invasive weeds. b) Invasive plant awareness and prevention was a major theme again in this year's conservation education program. The Forest continued to develop working relationships with groups like the Bitterroot Garden Club, county schools, and Backcountry Horsemen. c) Forest and County specialists trained permanent and seasonal employees on each ranger district in the identification of new invaders and in the basic weed prevention measures outlined in the Region One supplement to the Forest Service Manual 2080 (R1 2000-2001-1).
10) Roadside and ATV treatment	A new multi-year contract was implemented in which numerous weed-vector roads were treated throughout the Forest and selected low relief grassland terrain compatible with ATV treatment for a wide variety of invasive plant species.
11) Biocontrol Program	This program involves: releasing biological control insects for several target invasive plant species at priority sites; recording the GPS locations of the release sites; and pre / post release measurements of plant community features and insect establishment.
12) Post-treatment Plant Monitoring	Grassland plant trend plots were reread on Reimel and Sula Peak aerial treatments.
13) BAER program	Treatment and monitoring work was funded for the 2007 Rombo Fire area.
14) Selway-Bitterroot Wilderness EIS	The four national forests involved in managing the SBW continued work on the SBW Invasive Plant Management EIS.
15) TERRA Database	On going entry of newly found weed sites in the TERRA database. This database serves the important purpose of allowing the quick generation of maps by species and location of invasive weeds. The improved database allows the program manager to target work objectives and timing for maximum effect and efficiency.
16) Continental Divide Barrier Zone	Agencies located along and near the Continental Divide continued joint efforts to determine and stop spread of new invaders from one side of the Divide to the other.

Project	

Noxious Weed Inventory and Mapping

The species listed in Table 13 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 13 - Noxious Weed Infestation Information

Weed Species	Common Name	Category	FY 2009 Inventory (estimated acres)
Cardaria draba	white top	1	1
Centaurea diffusa	diffuse knapweed	1	1
Centaurea bierbersteinii *	spotted knapweed *	1	274,000*
Centaurea repens	Russian knapweed	1	0
Centaurea solstitialis	yellow starthistle	3	0.3
Chondrilla juncea	rush skeletonweed	2	73
Chrysanthemum leucanthemum *	oxeye daisy *	1	3000
Cirsium arvense	Canada thistle	1	632
Crupina vulgaris	common crupina	3	0
Cynoglossum officinale	houndstongue	1	1035
Echium vulgare	blueweed	2	2
Euphorbia esula	leafy spurge	1	48
Hypericum perforatum	St. Johnswort	1	1160
Linaria dalmatica	dalmatian toadflax	1	20
Potentilla recta *	sulfur cinquefoil *	1	689
Ranunculus acris	tall buttercup	2	300
Tanacetum vulgare	common tansy	2	300

*These species generally occur as a complex with spotted knapweed, sulfur cinquefoil, and oxeye daisy.

Control Efforts

In 2009, the Forest used herbicides to monitor and treat approximately 5,200 acres of invasive plants. All treatments complied with the environmental protection measures itemized in Table 14 of the 2003 Noxious Weed Treatment Project Record of Decision.

Approved biological control organisms were released on 215 new acres in 2009. These were all first year releases approved by the 2003 Noxious Weed Treatment Project ROD.

Whitetop: This species occurs in Ravalli County, and has only been identified at one site on the forest. It was treated and repeated monitoring has not turned up any new plants.

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 and turned out to be on private land.

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

Spotted knapweed: The majority of acres treated with herbicide in 2009 were for spotted knapweed. Milestone at a rate of 6 ounces of herbicide per acre was used. Good containment results are apparent in areas including Reimel Ridge, Rye Creek Road, Magruder Corridor, and Bass Creek due to the diligent efforts of District spray crews and roadside contractors. Spotted knapweed was treated under contract on 28 trails, and consequently a reduction in occurrence and plant density is resulting from these spray efforts.

Russian knapweed: No known infestations occur on the Forest.

Yellow starthistle: A small infestation was located along the Selway road, between Paradise and the Magruder crossing and was also treated and mapped. One plant was found in 2004 and again treated but none has been found since.

Rush skeletonweed: Only one new plant was found above the Chicken Creek infestation in the fall of 2009. Several new plants were found in the Coal Creek drainage just a couple of miles from the 2006 Deer/Chicken Creek infestation. The site located at Fawn Ridge has received steady attention with chemical treatment since its discovery. The known site, treated in past years, is contained at 57 acres and appears to be diminishing in size. The Rush Skeletonweed polygons along the Dwyer/Smith trail were treated on the multi-year backcountry contract.

Oxeye daisy: This species is found mostly along roadsides, trails and riparian areas. It typically occurs with spotted knapweed and sulfur cinquefoil. Treatments are ongoing.

Canada thistle: This species has been associated with timber sales and roadside areas. It is typically treated only when found with other weed species. The one-acre patch in Blue Joint Meadows continues to be monitored and treated when necessary.

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 expanded in 2009.

Leafy spurge: In past years there were an increasing number of new infestations, however due to diligent spraying over the last few years, the number of plants at each site has greatly been reduced and no new infestations were found in 2009. The Little Sleeping Child, main Sleeping Child and Skalkaho drainages supports several small infestations that have been receiving treatments—both chemical and biological. Eradication of this weed species continues to be the goal. Apthona beetles were found on the sites in 2003 and more releases were established in 2004.

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

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

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

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

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

Biological Control: A cooperative working relationship with the Montana State University Agricultural Experiment Station has contributed to the expansion and effectiveness of the biological control program as well as a past contract. The target species for biological agent introduction are leafy spurge, Canada thistle, and spotted knapweed. Table 14 describes the biological control accomplishments for the 2009 season.

Table 14 - Biological Control Agent Releases

Agent (species)	Location	Target weed spp.	Number released
Cyphocleonus achates	Bitterroot NF	Spotted knapweed	6,150

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 two years to transition into new environments before monitoring is conducted. Good results are being seen on knapweed where biocontrols have been established in the valley bottoms for many years. Knapweed is difficult to find on many of these sites.

Invasive Plants in Wilderness

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

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

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

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

Monitoring of efforts to spot spray knapweed along trails[1] indicates that the canopy coverage of knapweed has been reduced by over 95%. Non-target species do not appear to have been affected by spot treatments (dead or wilting plants not observed).

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. Overall, however, hand pulling has achieved only limited success.

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 2009, over 850 acres of spotted knapweed and rush skeletonweed were monitored and treated in the Frank Church Wilderness. Treatment areas included the Upper Selway Trails, Fawn Ridge and the Prospect to Dywer Trails. Trails between the Elk City road and the Main Salmon River trail were also monitored for invasives. Only a few small infestations have been found and treated to date.

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

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: 2009

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

EVALUATION:

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

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

MONITORING RESULTS:

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

The Forest did not complete many marten monitoring transects between 1997 and 2003 because of other funding priorities. The few surveys completed during this period were either consistent with earlier surveys (Larry Creek) or found more marten tracks per mile (Willow Mountain) compared to previous surveys. We completed nine marten transects in FY 2004; no other surveys have been completed since that time due to other priorities and/or a lack of snow.

The average number of miles surveyed per marten track in 2004 (0.6 miles/track) was considerably lower than the average from 1988 to 1996 (6.7 miles/track). This means that we saw many more marten tracks in 2004 than in the 1988 to 1996 period. The 2004 data showed a 91 percent decrease in miles per marten track compared to the long-term average, which triggered further evaluation. The apparent decrease in effort required to find tracks could mean that marten numbers have increased dramatically, but could also be a result of other sampling or environmental variables. Results on the Larry Creek and Willow Mountain transects were the same in 2003 and 2004 (Larry Creek had 0.3 miles/track both years; Willow Mountain had 0.5 miles/track both years). Our evaluation only supported the difficulty of drawing conclusions given the number of variables that factor into survey results. Such variables include year-to-year population variability, weather differences between years, and environmental changes caused by events such as wildfires or management activities.

The Forest participated in a Regional pilot study designed to determine fisher presence within 25 square mile grid cells in 2007 and 2008. The survey methodology is based on baited hair snares that are left in suitable fisher habitat for three weeks. Hairs collected from animals that attempt to reach the bait are then sent to the Genetics Lab at the Rocky Mountain Research Station facility on the University of Montana campus for identification. Marten hairs are also collected and identified during this process. In 2008, this survey methodology detected marten in five different locations on the North

Zone (Middle Lost Horse Creek, Upper Lost Horse Creek, Lower Roaring Lion Creek, Roaring Lion Creek and Skalkaho Creek), as well as additional locations on the South Zone. In 2007, marten were detected from three locations on the North Zone (Burnt Fork, Daly Creek and Tin Cup Creek) and two locations on the South Zone (Soda Springs Creek and Mine Creek). These results indicate that marten are well distributed on the Forest, although they do not give us much information on abundance.

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

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

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

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

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Pileated Woodpecker Population in Relation to Habitat Changes Item 40

OBJECTIVE: Monitor population trends in relation to habitat changes.

DATA SOURCE: Call transects.

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

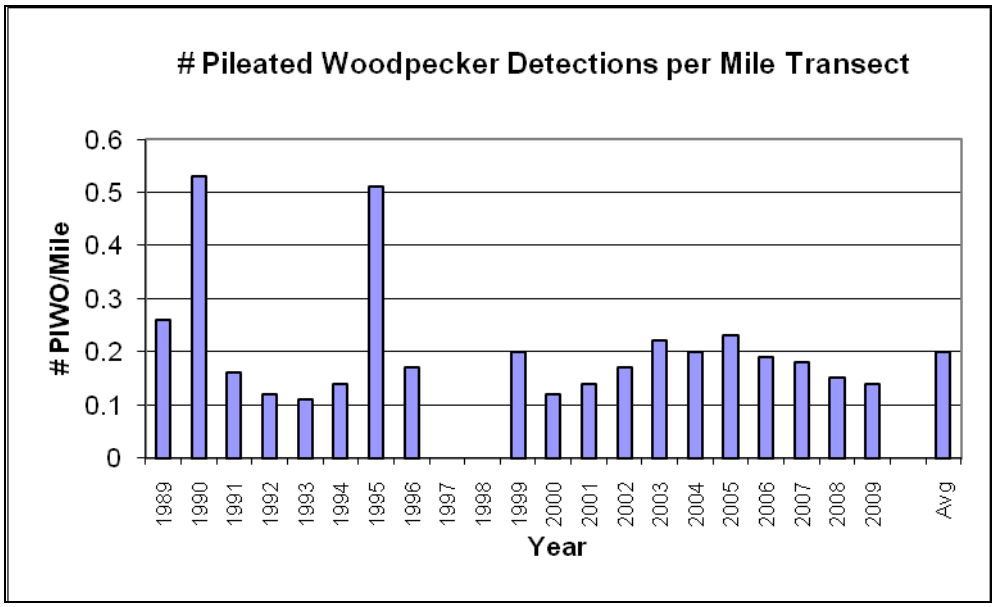
REPORTING PERIOD: 2009.

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

MONITORING:

Most Forests in Montana and Idaho use the Northern Region's standardized technique for establishing and monitoring pileated woodpecker call routes. We established nine call routes on the Bitterroot National Forest (BNF) that are each monitored three times annually, if weather and budgets allow. In 1997 and 1998, we sampled no transects due to budget constraints. In FY 2009, we completed one survey on one route, two surveys on one route, and three surveys on each of five routes for a total of 19 transects. We did not survey two routes. We recorded an average of 0.14 pileated woodpecker detections per mile of transect, slightly below the 2008 detection rate and well below the long-term average. This year's figure is about 30% below the long-term average of 0.20 detections per mile, and is 26% below the most recent 5-year average of 0.19 detections per mile. Further evaluation of these data follows.

Figure 3 - Results of Pileated Woodpecker Call Counts, 1989-2009



EVALUATION:

Data from nine monitoring transects scattered over the Forest show high variability in pileated woodpecker detections among transects and between years. Although the scientific literature has validated the usefulness of the call route technique to monitor population trends, more transects may be needed to reduce variability and increase confidence in our data. Lack of funding has precluded establishment of more transects, but we do have some base line information. We have systematically run approximately 1816 miles of transects since 1988. We recorded an average of 0.20 calls or

sightings per mile of transect over that period. The 2009 recording of an average 0.14 pileated woodpecker detections per mile of transect is about 30% below this long-term average, and is about 26% below the most recent 5-year average.

Figure 3 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 increased from then until 2000, when they declined again. The spikes in 1990 and 1995 illustrate the variability inherent in these types of transects, and may or may not indicate actual changes in population levels. The low number of detections per mile in 2000 could indicate that populations declined that year, but could also be a result of other factors. The number of detections per mile generally increased slightly each year from 2000 to 2005, despite the fact that several of the transects were burned extensively during the fires of 2000. Pileated woodpeckers are not normally associated with moderate to high-severity burned areas. Number of detections has declined slightly each year since 2005.

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

We know that habitat quality for this species declined in the late 1800s and early 1900s across the Forest as a result of extensive cutting of mature ponderosa pine habitats. Fire suppression has also reduced habitat quality since the 1930s. Nevertheless, a recent habitat assessment for the pileated woodpecker indicates adequate habitat exists and is well distributed on the Forest and across the Northern Region. Based on this assessment, the Bitterroot National Forest is estimated to contain sufficient suitable nesting habitat to support about 91 pairs of pileated woodpeckers, and enough winter foraging habitat to sustain almost 800 pairs of this species (Samson 2005). This habitat is well-distributed across the BNF at lower to mid elevations. Habitat estimates for the BNF only include National Forest System lands and alone are estimated to provide 86% of the habitat necessary for a minimum viable population (Samson 2006). Additional nesting habitat for pileated woodpeckers is located on private lands in the Bitterroot valley in the mixed cottonwood and ponderosa pine forests along the Bitterroot River and many of its larger tributaries. These bottomland forests provide some of the most productive habitat for this species, and also serve to connect subpopulations in the surrounding mountains. The presence of large amounts of high quality habitat on private land indicates that the Bitterroot drainage is capable of supporting a much larger population of pileated woodpeckers than indicated by the Forest's estimates alone.

At the Regional scale, habitat modeling estimates that there is enough suitable nesting habitat to support about 2362 pairs of pileated woodpeckers, and enough winter foraging habitat to sustain about 19,430 pairs of birds (Samson 2005). Again, this estimate does not include the high quality habitat located along the river and stream corridors on private land. Median dispersal distance for pileated woodpeckers is estimated to be about 150 miles, which indicates that pileated woodpeckers across the entire Region belong to a single, well connected population. The Forests neighboring the Bitterroot to the north and west show pileated woodpecker habitat in excess of the quantity modeled to maintain a minimum viable population on their Forests alone (Lolo -165%, Clearwater -346% and Nez Perce -459%). Although no population estimates are available, the large amount of apparently suitable habitat well distributed across the Region combined with the interconnectedness of the population indicates that short-term viability of pileated woodpeckers across the Region is not an issue (Samson 2005).

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

Given the above evaluation of data since 1988, we conclude that current management on the Bitterroot National Forest is having little discernable negative impacts on the pileated woodpecker. Our evaluation of this year's detections being

somewhat below the five-year average indicates current management practices are appropriate. Suitable habitat appears to be well distributed across the Forest, river basin, and Region. Most of the Forest's recent management activities in lower elevation forests emphasize restoration of mature ponderosa pine habitats, which should benefit pileated woodpeckers over time.

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Threatened and Endangered Wildlife Species

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

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

FREQUENCY: Annually.

REPORTING PERIOD: 2009.

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

INTRODUCTION:

The USDI Fish and Wildlife Service (FWS) removed gray wolves in Montana and Idaho from Federal listing as an Endangered species on May 4, 2009. Several environmental groups are in the process of challenging this delisting in court and it is possible that wolves may be restored to the Threatened and Endangered Species list by court action. For the remainder of FY 2009, wolves were classified as a Sensitive wildlife species on National Forests throughout Forest Service Region 1. As a result, the summary of gray wolf monitoring efforts in 2009 was moved to the Sensitive Wildlife Species monitoring item.

The USDI Fish and Wildlife Service (FWS) removed bald eagles from Federal listing as a Threatened species on August 8, 2007. Per Region One policy, the bald eagle was automatically added to Regional Forester's Sensitive Species List when it was removed from Federal listing. As a result, the summary of bald eagle monitoring efforts in 2007 was moved to the Sensitive Wildlife Species monitoring item.

FWS also removed Canada lynx and grizzly bear from the list of threatened or endangered wildlife species that may occur on the Bitterroot National Forest in 2006 and 2007, respectively. FWS lists yellow-billed cuckoo (western population) as a Candidate wildlife species that may occur on the Forest. FWS reintroduced gray wolves into the Frank Church-River of No Return Wilderness in 1995 and 1996, and those individuals and their descendents dispersed across northern Idaho and western Montana, including the Bitterroot NF. The grizzly bear has not been confirmed as occurring in the Bitterroot drainage since the 1950s, with one exception (see Grizzly Bear section). Lynx were proposed for listing under the Endangered Species Act in 1999. FWS listed them as threatened in 2000, and included them on the list of threatened and endangered wildlife species that may occur on the Forest until 2006. In an amendment to the 2005 Canada Lynx Conservation Agreement the Bitterroot National Forest has been classified as Unoccupied Lynx Habitat by the USFWS and the Forest Service. Lynx are no longer included on the FWS list of threatened and endangered species that may occur on the Forest. Peregrine falcons were delisted by FWS in August 1999, and are now classified as a sensitive species by the Regional Forester.

GRIZZLY BEAR (Threatened)

Grizzlies are far-ranging animals that require protection from human caused mortality, but subsist in a wide variety of habitats depending primarily on food availability. Historical records indicate that grizzly bears were once abundant in the Bitterroot Mountains, but did not survive the intense pressure to eliminate them as threats to domestic sheep and cattle. The last known grizzly was hunted and killed in the area in 1956. Since that time, periodic sightings of grizzly bears have been reported in the Bitterroots, most of which were probably black bears.

The Selway-Bitterroot ecosystem is one of six ecosystems in the continental U. S. outside of Alaska that are managed for grizzly bears. FWS studied the Bitterroot Grizzly Bear Evaluation Area to determine its habitat capability for grizzly bears. The evaluation determined the area was suitable for grizzly bears, and it is now a grizzly bear recovery area. The FWS prepared an Environmental Impact Statement and issued a Record of Decision in November 2000 (USFWS 2000), which

approved reintroduction of grizzlies into the Selway-Bitterroot ecosystem as a nonessential experimental population starting in 2002. Implementation of this decision is currently on indefinite hold due to political considerations.

Monitoring and Evaluation:

The only recent confirmed sighting of a grizzly bear in the Bitterroot drainage was an apparent transient bear that was seen two nights in a row on private land on Sunset Bench southeast of Stevensville in late September, 2002. This animal had apparently crossed the Sapphire Range from the Rock Creek drainage, where it was seen and photographed feeding on a moose gut pile the previous day. The bear disappeared after it was seen on Sunset Bench. The origin of this bear is uncertain; no other grizzly bears had been confirmed in either Rock Creek or the Sapphire Range for many years.

A mature male grizzly was shot by a black bear hunter in the North Fork Kelly Creek drainage in Idaho about 35 miles northwest of the northern edge of the BNF on September 3, 2007. This was the first confirmed grizzly bear in the Bitterroot Mountains in over 50 years. Testing confirmed that this bear was genetically tied to the small grizzly bear population in the Selkirk Mountains of northern Idaho, northeast Washington and southern British Columbia, indicating that it had traveled at least 140 miles to the North Fork Kelly Creek. It is unclear whether this bear was a wandering individual or if it is part of a previously unknown population that has become established in that area.

In an effort to determine whether this bear was an isolated individual or part of an unknown population, USFWS and various cooperators installed and maintained 68 baited hair snare sites in the Bitterroot Mountains between Lolo Pass and Lookout Pass in 2008 (Servheen and Shoemaker 2009). 55 of these sites were also equipped with motion-triggered cameras. Hair collected on barbed wire around the bait stations was genetically analyzed to determine what animal it came from, and animals shown in photos were identified. They collected 422 non-ungulate hair samples, 379 of which contained material suitable for genetic analysis. 279 of these samples were identified as black bears, but none were identified as grizzly bears. The 408 photos taken at these sites included up to 83 different black bears, but no grizzly bears. Based on these results, it seems unlikely that there is a population of grizzly bears in the northern Bitterroot Mountains at this time. Although none of the stations sampled the BNF, the results imply that it is unlikely that there is a grizzly bear population in the Bitterroots south of Lolo Pass, since the northern Bitterroots would be a potential corridor for grizzlies to reoccupy the BNF.

LYNX (Threatened)

Lynx are uncommon and occur in low densities in even the best habitat. Lynx habitat in the Bitterroot National Forest has been identified through an interdisciplinary process with FWS to be generally areas exceeding 6,200' elevation which support vegetation types dominated by subalpine fir or spruce. 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).

The US Fish and Wildlife Service (FWS) no longer includes lynx on its list of Threatened, Endangered and Candidate species that may occur on the BNF. In an amendment to the 2005 Canada Lynx Conservation Agreement (PF-WILD-061) the Bitterroot National Forest has been classified as Unoccupied Lynx Habitat by USFWS and the Forest Service.

The Record of Decision (ROD) (USDA Forest Service 2007a) for the Northern Rockies Lynx Management Direction (NRLMD) FEIS (USDA Forest Service 2007b) became effective July 16, 2007. The ROD amended the management direction in the selected alternative into all Forest Plans in the planning area, including the BNF Forest Plan. The NRLMD FEIS management direction incorporates the Terms and Conditions the US Fish and Wildlife Service (USFWS) issued in their Biological Opinion and Incidental Take Statement (USDI Fish and Wildlife Service 2007). Direction in the NRLMD FEIS ROD applies to mapped lynx habitat on National Forest System land presently occupied by lynx, as defined by the Amended Lynx Conservation Agreement between the Forest Service and USFWS.

In 2009, the Bitterroot NF analyzed project effects to lynx within some analysis documents using the objectives, standards, and guidelines contained in the NRLMD ROD (USDA Forest Service 2007a) and FEIS (USDA Forest Service 2007b) for some

projects. Technically, the objectives, standards, and guidelines only apply on Forests classified as Occupied Lynx Habitat, and then only when projects are in lynx habitat. Although the NRLMD ROD (USDA Forest Service 2007a) encourages compliance with the objectives, standards, and guidelines even on Forests classified as Unoccupied Lynx Habitat, there is no requirement to do so. Neither is there any requirement to consult FWS through the usual Biological Assessment process for effects to lynx on Forests classified as Unoccupied Lynx Habitat.

Monitoring and Evaluation:

Forest personnel identified a set of lynx tracks in the upper Larry Creek drainage in 2004 during a marten monitoring transect. A hunter reported seeing a lynx in the upper Lick Creek drainage in 2002. Montana Fish, Wildlife and Parks personnel sometimes find lynx tracks on or near the Forest while conducting their furbearer track surveys. Montana Department of Fish, Wildlife and Parks trapping records indicate one lynx was taken during the 1994-95 trapping season in Hunting District 270. This was the first lynx reported taken for several years.

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

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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: 2009.

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

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

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

The regional list was updated in 2005, and the current sensitive wildlife species listed for the Bitterroot NF are black-backed woodpecker, boreal toad, Coeur d'Alene salamander, fisher, flammulated owl, northern bog lemming, northern leopard frog, peregrine falcon, western big-eared bat, and wolverine. Northern goshawk was dropped from the list in 2007, while bald eagle was added. Gray wolf was added to the list in 2009 when it was removed from the Endangered Species List.

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

The following is a description of the sensitive species' habitats and the monitoring and evaluation we did in FY2009.

BALD EAGLE

Bald eagles are usually associated with large rivers, lakes or the ocean coast where fish are readily available as a prey item. During the winter, they are sometimes found in more diverse locations that provide concentrations of other foods such as waterfowl or carrion.

Bald eagles have made a dramatic recovery in Montana and across the country since they were listed as Endangered in 1973. As a result of this recovery, USFWS downlisted bald eagles to Threatened in 1995, and removed them from Federal listing as a Threatened species in August 2007. Per Region 1 policy, the bald eagle was automatically added to the Regional Forester's Sensitive Species List when it was removed from Federal listing.

Monitoring:

Bald eagle nests in the Bitterroot drainage are monitored by a combination of BNF personnel, Lee Metcalf NWR personnel, private landowners and Montana FWP personnel. Observers did not discover any new bald eagle territories in the Bitterroot drainage in 2009. There are now 17 known bald eagle nesting territories in the Bitterroot drainage. In 2009, 15 bald eagle nests were active in the spring. Ten of these nests were successful, producing a total of at least 19 juvenile bald eagles (MFWP 2010), for an average productivity of 1.27 fledglings per active nest. The presence of these nests indicates that the breeding population of bald eagles in the Bitterroot Valley has increased dramatically in the past five years.

We discovered the first and only known bald eagle nest on the Bitterroot NF near Lake Como in April 2003. This nest has been successful every year since then, and fledged one young in 2009. Two nests in the Painted Rocks Lake territory (the

second discovered in 2007) are on private land but are very close to the BNF boundary. The second Painted Rocks Lake nest was active in the spring of 2009, but failed early in the nesting season.

The Bitterroot drainage also provides fall, winter, and spring habitat for bald eagles. The Hamilton and Stevensville Christmas Bird Counts indicate that the number of bald eagles wintering in the Bitterroot Valley is large and stable or increasing. Wintering eagles can be found throughout the Bitterroot Valley, especially in areas near the Bitterroot River and in areas where road-killed deer are common. Wintering bald eagles usually leave the area in February and March for northern breeding grounds. Bald eagles use Painted Rocks Lake and the East and West Forks of the Bitterroot River during migrations.

Evaluation:

The breeding population of bald eagles in the Bitterroot valley has increased dramatically since the late 1990s, when the only known active nests were one on the Schroeder Ranch east of Florence and another on the Lee Metcalf National Wildlife Refuge. Active bald eagle nests are now scattered along the entire length of the Bitterroot River. The valley's bald eagle population swells during the winter when migrants join the resident birds, and the species is now a fairly common winter resident in the Bitterroot valley. The biggest threat to the local breeding population appears to be residential development on private lands along the Bitterroot River.

There were only 12 known nesting pairs of bald eagles in Montana in 1973. The number of eagle territories rose slightly through the 1980s, but has increased steadily every year since then. By 2009, there were about 526 identified bald eagle territories across Montana. 421 of these territories were monitored in 2009, and 367 of those were considered active. At least 148 of the active nests were successful, while 43 were unsuccessful and 176 had unknown outcomes. The nesting success rate for the 191 known fate active nests was 77.5%. The successful nests fledged a minimum of 262 young eagles, which gives a mean brood size of 1.77 fledglings per successful nest. When extrapolated to the nests with unknown outcomes, this mean brood size results in an estimate of 503 eagles fledged from known active nests in Montana in 2009 (MFWP 2010). Comparing fledgling numbers between years may be difficult due to the variation in monitoring effort. However, the nesting success rate for known fate active nests and mean brood size should be comparable regardless of monitoring effort. The nesting success rate of known fate nests decreased from 84.6% to 77.5% from 2008 to 2009, while the mean number of eaglets fledged per successful nest increased slightly from 1.7 to 1.8.

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

BLACK-BACKED WOODPECKER

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

Black-backed woodpeckers however, are also found in unburned forests and in areas of insect outbreaks (Marshall 1992, Bock and Lynch 1970, Apfelbaum and Haney 1981, Harris 1982, Goggan et al. 1988), but they likely occur at lower densities and viability may not be maintained over time without sufficient post-fire habitat. For example, home ranges for black-backed woodpeckers in beetle-killed forests were estimated to be 1,000 acres, compared to an estimated territory size of 56 acres/pair in post fire habitat (Powell 2000). Some studies indicate that black-backed woodpeckers forage primarily on wood-borers, which may explain this difference in suitability between beetle outbreaks and post-fire habitat. Wood borers are much less abundant than bark beetles in areas of bark beetle outbreaks (Powell 2000). However, insect outbreak studies (without fire) suggest the species is attracted to other insects such as bark beetles when these insects provide an abundant prey base (summarized in Samson 2006). Arnett (et al. 1997a and 1997b) found similar densities of black-backed woodpeckers in mountain pine beetle killed areas, as in post-burns, further suggesting the species is not "restricted" to post-burns. Hoyt and Hannon (2002) noted that few studies have considered all habitats in proportion to availability nor

considered the difficulty in comparing bird densities observed in open post-fire habitats versus bird densities observed in closed canopy and structurally complex, live forests.

Monitoring:

The Avian Science Center at UM coordinated a four-year study of black-backed woodpecker occurrence within 17 fires that burned in 2003. These fires were scattered across western Montana, and included the Big Creek and Gold 1 fires on the BNF. The results confirmed that black-backed woodpeckers are more restricted to burned forest conditions than any other bird species for which there is sufficient data, at least in western Montana. Further, black-backed woodpeckers are relatively abundant only in high fire severity portions of burns. Intensive salvage harvest soon after a fire appears to have strong negative effects on black-backed woodpeckers, while light salvage appears to have little effect on the species. Finally, burned forests that were harvested fairly intensively (seed tree or shelterwood cuts) within a decade or two prior to the fires were much less suitable as postfire habitat for black-backed woodpeckers. Even forests that were harvested more selectively within a decade or two prior to fire were less likely to be occupied by black-backed woodpeckers. The species apparently prefers areas that were recently burned with high severity fire where snag densities are high (Hutto 2007).

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

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

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

Evaluation:

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

Habitat modeling based on Forest Inventory and Analysis data (FIA) estimates that the Bitterroot National Forest contains sufficient post-fire habitat to support between 2898 and 4490 pairs of BBWO (Samson, 2005). At a Forest-wide scale it is estimated that we have 373,615 acres of black backed woodpecker habitat over what is necessary to maintain a minimum viable population (Samson 2005). Another way to say this is that we have an estimated 1,371% of the habitat necessary to maintain a minimum viable population of black-backed woodpeckers on the Forest. Although the portion of this habitat that burned in 2000 may no longer be suitable, fire records show continual recruitment of new post-burn habitat. This habitat is well-distributed across the BNF as a result of the widespread fires in 2000, 2003, and 2005 plus smaller amounts of fire in other years. Since 1989, the Bitterroot National Forest has averaged over 28,000 acres of new wildfires each year. Excluding the exceptionally large fires of 2000 from the average, the Forest still averaged over 10,000 acres of wildfire (new quality black-backed woodpecker habitat) each year (see the fire section of this report for annual figures). This is in addition to the ongoing bark-beetle epidemic on the Forest (see item 37 – Insect and Disease status).

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

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

interacting Regionwide. Information provided in Dixon and Saab (2000) suggests the species is increasing in numbers in the United States.

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

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

COEUR D'ALENE SALAMANDER

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

Monitoring and Evaluation:

An amphibian survey crew working under contract for the Regional Office surveyed suitable habitat for this species at numerous sites on the Forest from 2001 to 2004. They found Coeur d'Alene salamanders at five new sites on the Forest: one in the Rock Creek drainage, one in the Little Rock Creek drainage, one in the Chaffin Creek drainage (Maxell 2004), and two along Lake Como (Maxell, pers. comm. 2004). Previous surveys by biologists from the Montana Natural Heritage Program in 1987 (Montana Natural Heritage Program 1987) and 1988 (Genter et al. 1988). only found Coeur d'Alene salamanders at Sweathouse Falls. Coeur d'Alene salamanders are very difficult to survey for, and the new locations probably reflect improved survey techniques and increased effort rather than an increase in the species' abundance or distribution. Still, these new locations hint that Coeur d'Alene salamanders may be more widely distributed in the Bitterroot Mountains than previously thought. Forest Plan standards which protect riparian and aquatic habitats continue to provide appropriate protections for the Coeur d'Alene salamander and its habitat. There were not any project related impacts to Coeur d'Alene salamander habitat on the Forest in 2009.

FISHER

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

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

and spend little time in ponderosa pine stands. They show a strong affinity for forested riparian habitats throughout the year (Jones 1991).

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

Research and Monitoring:

The Forest participated in a Regional pilot study designed to determine fisher presence within 25 square mile grid cells in 2007, 2008 and 2009. The survey methodology is based on baited hair snares that are left in suitable fisher habitat for three weeks. Hairs collected from animals that attempt to reach the bait are then sent to the Genetics Lab at the Rocky Mountain Research Station facility on the University of Montana campus for identification. Surveys in 2009 were limited to the southern half of the Forest, and did not detect any fishers. In 2008, this survey methodology identified fishers from two locations on the Forest, one in Trapper Creek and the other in Bear Creek. In 2007, one fisher was identified in the Burnt Fork drainage. A number of marten were also identified.

A BNF wilderness ranger spotted a fisher near Nez Perce Creek in 2009. A wildlife biologist spotted a fisher while hiking in the Larry Creek area in 2006. Observers conducting pine marten track surveys found a set of fisher tracks in the Lost Horse Creek drainage in 2004. Dr. Kerry Foresman from the University of Montana detected fisher in the Big Creek and Bear Creek drainages during a study in the winter of 1994-1995. He feels most of the Bitterroot canyons support fisher populations. Two fishers were taken from the Bitterroot Mountains in 1994-95, one from Big Creek and one from Lost Horse Creek. These were the first taken for several years in the Bitterroot. According to Montana Fish, Wildlife and Parks trapping records, between three and five fisher have been trapped each year for the past eight years in the Bitterroot Valley. Current Montana Fish, Wildlife, and Parks trapping records show a total of six fishers trapped with the most recent taken in 2003.

Evaluation:

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

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

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

Fishers were apparently extirpated from Montana by 1930, and there are no records of their occurrence in the state from then until fishers from other areas were released at several sites in the early 1960s (Vinkey, 2003). The Bitterroot Mountains possess the most verified records of fisher in the state both before and after 1989, and appear to be the stronghold of fisher populations in Montana (Vinkey, 2003). This is largely due to a release of 39 fishers from British Columbia in the Idaho side of the Bitterroots in 1962, although genetic investigations indicate that some native fishers may have survived in the Selway-Bitterroot region (Vinkey, 2003). Twelve fishers from British Columbia were released at Moose Lake on the eastern edge of the Sapphire Mountains in 1962, and apparently became established in the Sapphires based on trapping records. However, there have been few verified records of fishers in the Sapphires since 1989, and researchers

have been unable to verify the presence of a self-sustaining population in this area (Vinkey, 2003). University of Montana mammalogist Dr. Kerry Foresman considers the Sapphire Mountains to be generally too dry for fishers, and has been unable to locate any on the east side of the Bitterroot Valley (Foresman, 2006).

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

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

FLAMMULATED OWL

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

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

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

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

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

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

Flammulated owls depend on woodpeckers to create nesting cavities, usually in large dead trees. Reynolds and Linkhart (1992) state that in reports where forests surrounding nests were described or photographed, all nests were in, or adjacent to, mature or old growth stands (Hanna 1941, Bull and Anderson 1978, Cannings et al. 1978, Hasenyager et al. 1979, Cannings 1982, Bloom 1983, Reynolds and Linkhart 1984, 1987, Fix 1986, Goggans 1985, Hayward 1986, Howie and Ritcey 1987, McCallum and Ghelback 1988). However, Hasenyager et al. (1979) and Bloom (1983) reported nests in forests that had been partially cut but contained large, residual trees, and Winter (1974) found the owl in second-growth forests, although they did not report nesting in this age-class (Reynolds and Linkhart 1987).

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

Monitoring:

In 2009, BNF personnel and volunteers ran 9 flammulated owl transects with a total of 86 calling points. We detected flammulated owls on about 17.9% of the points, or 15 total owls. Comparing these transects with previous years of our own surveys shows a slight increase in the number of owls detected on some, a slight decrease on others and no change on the rest. Based just on these surveys, flammulated owl populations overall appear to be relatively stable over the last few years. BNF surveys are not necessarily comparable with the LBMP surveys described below.

In 2008, the Landbird Monitoring Program conducted a second round of surveys for flammulated owls in those Forests within Region 1 that support flammulated owl populations based on the 2005 surveys (see below). 24 transects were surveyed on the BNF, and many of them were surveyed twice. We detected flammulated owls on about 7.8% of the 245 calling points, on a total of 8 of the transects (Smucker et al. 2008). Most flammulated owl detections were on the southern half of the Forest, similar to the 2005 survey.

In 2005, the Landbird Monitoring Program initiated the first systematic Region-wide survey for flammulated owls. This survey was coordinated through the Avian Science Center at the University of Montana. The Region-wide survey indicated that flammulated owls occur on every National Forest (NF) in the Region with the exception of the Custer, Lewis and Clark and Gallatin NFs. The highest detection rates for flammulated owls were on the Nez Perce, Lolo, Helena and Bitterroot NFs. Locally, we surveyed 30 transects across the Forest, many of which had not been previously surveyed for this species. We detected flammulated owls on about 15% of the 279 calling points, on a total of 14 of the transects (Cilimburg 2006). Most flammulated owl detections were on the southern half of the Forest, similar to a mid-1990s study (Wright, 1996).

A graduate student from the University of Montana surveyed much of the suitable habitat on the Bitterroot NF for flammulated owls in 1994 and 1995 (Wright 1996). She found concentrations of this species in several locations on the Darby and Sula Districts. The Forest has continued to monitor some of the routes where Wright found owls in the mid-1990s. The number of flammulated owl detections on unburned transects remained fairly consistent from 2000 to 2004, but seems to have declined somewhat since then. 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 were found before the fires. Flammulated owl detections on burned transects have continued to decline, and we found very few owls in severely burned areas in 2004. Our 2008 surveys detected very few owls in burned areas except where some unburned patches of trees occurred. We will continue to monitor established transects to determine changes in owl use.

Evaluation:

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

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

Regional surveys in 2005 and 2008 showed that flammulated owls are well-distributed in suitable habitat on the southern half of the Forest, which was heavily sampled. They were only detected on a few transects on the north half of the Forest, but this area was not heavily sampled (Smucker et al. 2008, Cilimburg 2006). Wright (1996) found a similar distribution pattern for flammulated owls on the BNF during field work for her Master's thesis in 1994 and 1995. The Region 1 Wildlife Ecologist has looked at viability for this species and has determined that habitat is well distributed and abundant for the flammulated owl in the Northern Region, and that short-term viability of the species in the Northern Region is not an issue (Samson 2005).

Bitterroot National Forest-wide, habitat modeling based on FIA data estimates that the Forest contains 11,144 acres of flammulated owl habitat more than what is estimated to be necessary to maintain a minimum viable population (Samson

2006; Samson 2005). Another way to say this is that we have an estimated 337% of the habitat necessary to maintain a minimum viable population of flammulated owls on the Forest.

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

GRAY WOLF

The reporting period for grey wolves in this monitoring item is calendar year 2009, rather than Fiscal Year 2009. This is because the Rocky Mountain Wolf Recovery Report (USFWS et al. 2010) that contains all the wolf population data used in this monitoring item is based on the calendar year, and wolf population numbers are as of December 31, 2009, which of course is technically in FY 2010. This means that the wolf population figures shown in this monitoring item include wolf mortalities resulting from the first legal hunting season for wolves in Montana and Idaho, which occurred in the fall and early winter of 2009.

Gray wolves in Montana and Idaho were removed from federal listing for the second time on May 4, 2009 (PF-WILD-008). Several environmental groups are in the process of challenging this delisting in court and it is possible that wolves may be restored to the Threatened and Endangered Species list by court action. For the remainder of FY 2009, wolves were classified as a Sensitive wildlife species on National Forests throughout Forest Service Region 1 (Montana, northern Idaho, and North Dakota).

On February 27, 2008 the U.S. Fish and Wildlife Service (USFWS) published a rule designating the Northern Rocky Mountain population of the gray wolf as a Distinct Population Segment (DSP), and removing this DSP from the Federal list of Threatened and Endangered species (PF-WILD-131). This rule was scheduled to take effect on March 28, 2008 (*Ibid*). However, a number of plaintiffs petitioned the Montana District Court requesting an injunction to defer designation of the Northern Rocky Mountain DSP, and delisting of this DPS while the lawsuit was pending. On July 18, 2008, Judge Molloy ruled in favor of the plaintiffs and granted their request for an injunction. As a result, gray wolf populations throughout Montana, Idaho and Wyoming were returned to whatever status they had under the Endangered Species Act prior to the 2008 USFWS delisting.

The Bitterroot NF is within the boundaries of the Central Idaho Experimental Population Area (CIEPA) for gray wolves. The CIEPA 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 consult with USFWS if an action "is likely to jeopardize the continued existence" of the species. The availability of ungulate prey and isolation from human disturbance/mortality are the two most important factors in determining suitable wolf habitat.

Monitoring:

Wolf range and numbers within the CIEPA and the Bitterroot National Forest were similar to 2008. Wolf monitoring efforts conducted by the Montana Department of Fish, Wildlife and Parks, the Idaho Department of Fish and Game, and the Nez Perce Tribe documented a total of 102 wolf packs in the CIEPA at the end of 2009, 82 in Idaho and 20 in Montana. New packs included in these totals included 12 in Idaho and two in Montana. However, eight previously documented packs in Idaho and four packs in Montana were dropped from the documented pack list due to inactivity or control, resulting in a net increase of four packs in Idaho and a net loss of one pack in Montana. Reproduction was confirmed in 60 packs within the CIEPA, 49 of which met the recovery standards for a breeding pair. These packs produced a minimum of 183 pups in 2009, a 7% decrease from the known pup

production in 2008. 336 wolves were confirmed to have died in 2009 within the CIEPA, including at least 306 due to human-related causes. 146 of the human-caused mortalities were legal harvest during the wolf hunting season. The total wolf population across the CIEPA at the end of 2009 was estimated at 913 wolves, one less than in 2008 (USFWS et al. 2010).

Thirteen wolf packs were known or suspected to use portions of the Forest in 2009. One new wolf pack (Gird Point) was documented using the Montana portion of the Forest in 2009, while one pack present in 2008 (East Fork Bitterroot) apparently disbanded in 2009. The range map for Idaho's Hughes Creek pack indicated that they used portions of the West Fork Bitterroot drainage in 2008, but not in 2009.

Table 15 summarizes known information on the number of individuals in each pack, as well as the number of known wolf mortalities from any cause and the number of livestock or domestic animals confirmed killed by each pack (USFWS et al. 2010).

Table 15 – Status of Known Wolf Packs on the Bitterroot National Forest as of 12/31/09

Pack Name	State	Known Adults	Known Pups	Known Total	Known Wolf Mortalities	Confirmed Depredations
Brooks Creek	MT	3	?	3		
Divide Creek	MT	3	4	7		
Gird Point	MT	2	2	4		
Indian Creek	ID	?	?	?		
Lake Como	MT	3	?	3	2	
Magruder	ID	?	?	?		
Painted Rocks	MT	3	4	7	2	
Selway	ID	?	?	?		
Sula	MT	5	?	5	2	
Trail Creek	MT	4	2	6	2	
Trapper Peak	MT	1	5	6	2	1 calf
Watchtower Creek	MT	6	?	6	1	
Welcome Creek	MT	4	5	9		1 dog
MINIMUM TOTALS		**34**	**22**	**56**	**11**	**2**

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

Evaluation:

The number of known packs and the number of known individual wolves using portions of the BNF at the end of 2009 were little changed from the known number of packs and individuals at the end of 2008, despite the additional mortalities associated with Montana's first hunting season for wolves. There still appear to be some areas on the Forest that are outside the territory boundaries of any known pack, but we do not know whether those areas support unknown packs.

The Brooks Creek pack uses the Bitterroot Mountains between Bass Creek and Mill Creek, as well as the adjacent drainages in Idaho. The Divide Creek pack uses the Sleeping Child and Rye Creek drainages in the Sapphire Mountains. The East Fork Bitterroot pack appeared to disband after the alpha male died in March 2009, and is no longer considered a pack. The Indian Creek pack appears to use the area around Paradise on the Selway River, but lack of a radio collar in the pack makes territory boundaries uncertain. The Lake Como pack appears to use the Bitterroot Mountains between Lake Como and Blodgett Creek, although the lack of a radio collar in the pack makes territory boundaries uncertain. The Magruder Pack appears to use the headwaters area of the Selway River, but lack of a radio collar in the pack makes territory boundaries uncertain. The Painted Rocks pack inhabits the West Fork of the Bitterroot River south of Painted Rocks Lake. The Selway pack's territory includes the area roughly between Magruder and the vicinity of Elk City, Idaho on the Nez Perce NF. The Gird Point pack is a new pack that uses parts of the old Skalkaho pack's former territory, but lack of a radio collar in the pack makes territory boundaries uncertain. The Sula pack uses the "triangle" area west of Highway 93 between Sula and Lost Trail Pass. The Trail Creek pack is believed to use the southwest part of the East Fork drainage including Tolan Creek, as well as the Trail Creek area on the Beaverhead-Deer Lodge NF. The Trapper Peak pack uses the Bitterroot Mountains between Tin Cup Creek and Trapper Creek. The Watchtower pack appears to use the drainages to the north of the Nez

Perce Road in Montana, and probably adjacent areas in Idaho, but lack of a radio collar in the pack makes territory boundaries uncertain. The Welcome Creek pack uses the north end of the Sapphire Mountains from Ambrose Creek north to Miller Creek and over into the Rock Creek drainage on the Lolo NF.

Wolves were not present on the Forest during much of the past period of management activities. Statewide bounties were placed on gray wolves from 1883 to 1915 with approximately 80,730 wolves killed during that period. Wolves were exterminated from most of Montana with the last known wolf shot in Lincoln in 1961. Wolves were reintroduced into central Idaho in 1995, and populations have increased and expanded their ranges since then. Most wolves on the Bitterroot National Forest are probably descendents of wolves released in central Idaho.

The Montana Natural Heritage Program classifies the gray wolf as a G4 S3 species (MNHP and FWP 2009). This means that at the global scale, wolves are considered to be uncommon but not rare (although they may be rare in parts of their range), and usually widespread. They are apparently not vulnerable in most of their range, but there is possibly cause for long-term concern. At the state scale, they are considered to be potentially at risk because of limited and potentially declining numbers, extent and/or habitat, even though they may be abundant in some areas.

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 FY2009 prescribed treatments in potential northern bog lemming habitat. Forest Plan standards which protect riparian and aquatic habitats continue to provide appropriate protections for the northern bog lemming and its habitat.

NORTHERN LEOPARD FROG

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

Monitoring and Evaluation:

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

Forest Plan standards that protect riparian and aquatic habitats continue to provide appropriate protections for the northern leopard frog and its potential habitat if it still exists on the Forest.

PEREGRINE FALCON (Delisted 1999)

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

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

The Forest, in partnership with The Peregrine Fund, the Liz Claiborne/Art Ortenberg Foundation and Patagonia, Inc., released (hacked) juvenile peregrine falcons in the Painted Rocks area in 1989, 1990, and 1991. In 1992 birds returned to the area, selecting lands along the river for nesting. We also hacked peregrine falcons in the Canyon Creek drainage in 1992, and in the Little Rock Creek drainage in 1993. We curtailed further hacking on the Bitterroot NF after wild adults harassed the recent fledglings at both these sites, indicating that nearby territories were already occupied. Since we now have a number of established breeding pairs, there is no need to continue reintroduction efforts.

Monitoring:
The Bitterroot NF participates in the statewide peregrine monitoring program coordinated by two peregrine experts under contract with Montana Department of Fish, Wildlife, and Parks. Bitterroot NF personnel and/or volunteers from Bitterroot Audubon monitored all the known eyries on the Forest in 2009 to determine productivity. They also inventoried several canyons that contain good habitat in an effort to find new eyries. We did not find any new eyries in 2009.

We currently know of 14 eyries in the Bitterroot drainage that have been active at least once since 1992. 11 of our eyries were occupied by peregrines in 2009, and produced at least 22 fledged peregrines. The number of fledged peregrines in 2009 tied the previous 2008 record for the Forest. We were unable to detect any fledglings at one of our eyries that had appeared active, although some may have been present. One former peregrine canyon was occupied by prairie falcons again in 2009. Table 16 summarizes known activity and productivity for each eyrie. The year in parenthesis following the territory name indicates when the territory was discovered.

Table 16 - 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)	Sawtooth (2001)	N. Lost Horse (2001)	Boulder (2001)	One Horse (2005)	Trapper Peak (2006)	Fred Burr (2007)
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, 2	Act, 2	Act, 2			
2002	Act, 1	Act, 3	Act, 3	Act, 2	Act, 1	Inact	Act, 3	Inact	Act, 0	Act, 2	Act, 2			
2003	Act, 0	Act, 2	Act, 2	Act, 2	Act, 3	Inact	Act, 0	Inact	Inact	Act, 3	Act, 1			
2004	Act, 3	Act, 2	Act, 1	Act, 1	Act, 0	Inact	Act, 4	Inact	Act, 0	Act, 1	Act, 0			
2005	Act, ?	Act, 0	Act, 2	Act, 3	Act, 3	Act, 0	Act, 1	Inact	Act, 3	Act, 2	Act, 1	Act, 0		
2006	Act, 2	Act, 3	Act, 2	Act, 2	Act, 3	Inact	Act, 2	Inact	Act, 0	Act, 3	Act, 2	PRFA	Act, 2	
2007	Act, 2	Act, 2	Act, 1	Act, 2	Act, 2	Inact	Act, 2	Inact	Act, 1	Act, 0	Act, 2	PRFA	Act, 0	Act, 0
2008	Act, 2	Act, 4	Act, 1	Act, 4	Act, 2	Inact	Act, 3	Inact	Act, 2	Act, 0	Act, 2	PRFA	Act, 0	Act, 2

Year	Painted Rocks (1992)	Blodgett (1994)	Bear Creek (1996)	Kootenai (1998)	Tin Cup (1999)	Big Creek (2000)	Mill Creek (2000)	Sweeney (2001)	Sawtooth (2001)	N. Lost Horse (2001)	Boulder (2001)	One Horse (2005)	Trapper Peak (2006)	Fred Burr (2007)
2009	Act, 1	Act, 1	Act, 2	Act, 3	Act, 5	Inact	Act, 2	Inact	Act, 3	Act, 2	Act, 1	PRFA	Act, 0	Act, 2

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

Evaluation:

Peregrine falcons were widespread and common raptors across much of North America until the 1950s, but they were one of the species most affected by DDT. Not a single peregrine eyrie was known to exist in Montana in the early 1980s. Following a ban on DDT and intensive reintroduction efforts across the west and in Montana, peregrine numbers have rebounded dramatically. The east face of the Bitterroot Mountains now contains the highest known density of peregrine falcon eyries in Montana. The BNF accounted for about 13% of the 84 known active territories and about 12.5% of the known production of 176 juvenile peregrines in Montana in 2009 (Sumner and Rodgers 2010). Peregrine productivity in Montana in 2009 was the highest on record.

Known eyries on the Bitterroot NF are typically located on tall, vertical cliff faces, and most are within or near the Selway-Bitterroot Wilderness. The Blodgett fire burned near peregrine nest cliffs in Blodgett and Mill Creeks in August of 2000, but juveniles had left those nests at least a month earlier. The Kootenai Creek fire burned near peregrine nesting cliffs in Kootenai Creek in 2009, and there was smoke and helicopter flights in the area while juveniles were at or near the nest. The eyrie still fledged at least three juveniles. There is no indication that the fires negatively affected peregrine occupancy or breeding success at these eyries. In fact, adult peregrines from territories near the 2000 fires appear to forage above the burned areas quite frequently.

The Forest has permitted a number of helicopter flights up occupied peregrine canyons to transport equipment and supplies for dam maintenance and repair at several dams in the Selway-Bitterroot Wilderness. Mitigations typically include limiting the helicopter flight path to the side of the canyon furthest from the nesting cliffs. To date, we have seen no indication that these flights have affected peregrine productivity.

The Montana Natural Heritage Program ranks the peregrine falcon as a G4 S2 species (MNHP 2007). This means that across its range the species is considered uncommon but not rare (although it may be rare in parts of its range), and usually widespread. It is apparently not vulnerable across most of its range, but there is possibly cause for long term concern. In Montana, the breeding population is considered at risk because of very limited and potentially declining numbers, extent and /or habitat, making it vulnerable to extirpation in the state. This ranking may not reflect the aforementioned recent increases in the known breeding population in Montana.

WESTERN BIG-EARED BAT

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

Monitoring and Evaluation:

Bat surveys using mist nets and audio bat detectors were conducted at several locations on the southern end of the Forest in 2006. A number of bats were captured and identified, including one big-eared bat near the confluence of Meadow Creek and the East Fork Bitterroot River. A MT FWP biologist recorded the echolocation sounds of a big-eared bat near Woods Cabin on Lake Como in August 2006 during a public presentation about bats. The FWP biologist and a BNF biologist

surveyed the same area for bats in August 2007, and detected a number of bat species. They did not detect any big-eared bats. The Forest did not propose any projects near suitable hibernacula or roost sites in 2009.

WESTERN TOAD (aka 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 western toads in place on the Bitterroot NF at this time. Amphibian surveys indicate that they are well distributed across the Forest, but are uncommon to rare (Maxell 2004). Personnel from the Montana Natural Heritage Program performed amphibian and reptile surveys on the Bitterroot NF in 1995. They found western toads at a number of sites across the Forest, and evidence of reproduction was apparent at several sites (Hendricks and Reichel 1996). An amphibian survey crew working under contract for the Regional Office surveyed many of the ponds and lakes on the Forest from 2000 to 2004 to document evidence of amphibian breeding. They only found evidence of western toad reproduction at about 3% of the suitable sites surveyed, which is similar to the percentage they found throughout western Montana (Maxell 2004). The Forest did not have any projects within breeding habitats of western toads in 2009. 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.

WOLVERINE

In 2000 the US Fish and Wildlife Service was petitioned to list wolverine under the Endangered Species Act. That petition was denied after the formal 90 day review because the petition did not present substantial scientific information warranting the listing of the wolverine in the contiguous U.S. Several of the petitioners sued USFWS over this finding, and a partial settlement was reached that will result in a new status review in late 2009 or 2010.

Wolverines are solitary animals that range extensively over a wide variety of habitats. Isolation from human presence and association with subalpine habitats characterize the general understanding of wolverine-habitat associations in the southern extent of the species' North American range (Copeland et al. 2007). Wolverine home ranges are very large, averaging approximately 150 square miles for females and 163 square miles for males in a study in northwest Montana (Hornocker and Hash 1981), and 142 square miles for females and 611 square miles for males in a study in central Idaho (Copeland 1996). 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.

Recent research indicates that wolverine distribution in the mountains of the western United States is closely tied to high-elevation areas containing alpine vegetation, alpine climatic conditions, or relatively high probabilities of spring snow cover (Aubry et al. 2007). Copeland et al. (2007) found that wolverines in central Idaho favored high elevations throughout the year, and that the downward shift in elevation during the winter described by earlier investigators was relatively minor in their study area, and was restricted largely to males. They noted that carrion resulting from hunter wounding losses was an important forage resource for wolverines in the winter, but that wolverines utilized carrion found in mid-elevation forests and largely avoided big game winter ranges.

With few exceptions, known wolverine reproductive dens have been located in alpine, subalpine, taiga, or tundra habitats (Magoun and Copeland 1998 including extensive internal citations). In Idaho, wolverine dens occurred in snow-covered boulder talus in subalpine cirque basins located at high elevations, and consisted of long, complex snow tunnels leading under inaccessible boulder scree that provided a high degree of security (*Ibid*). A critical feature of wolverine denning habitat appears to be dependability of deep snow throughout the denning period (February through April). Almost all verified reproductive dens were under 1-5 meters of snow (*Ibid*).
Female wolverines appear to be quite sensitive to human disturbance in the vicinity of natal and maternal dens, and may abandon dens and move their kits a considerable distance if they detect human presence in the area (Copeland 1996,

Magoun and Copeland 1998). Outside of the denning season, wolverines do not appear to avoid people or roads and trails, and are sometimes found near trails and active campgrounds during summer (Copeland et al. 2007). They will also use unmaintained winter roads for travel (*Ibid*).

Monitoring:

The Regional Forester added wolverines to the Sensitive Species List for the Bitterroot NF in June of 1994. We have not specifically monitored for wolverines on the Forest, but we do record incidental observations. Table 17 summarizes known wolverine sightings on the BNF since 1992. With approximately 73% of the Bitterroot National Forest in inventoried roadless areas or wilderness, it appears abundant wolverine habitat exists and is well distributed across the Forest. These sightings indicate that wolverines are present on the BNF, and that they occur in a variety of locations across the Forest.

Table 17 - Wolverine Sightings, Bitterroot National Forest

Year	District	Vicinity	# Wolverine	Observation Type
2006	Darby	Tamarack Lake	1	Sighting
2004	Stevensville	Willow Mountain	1	Tracks
2004	Stevensville	Bass Creek	1	Tracks
2004	Sula	Sign Creek	1	Sighting
2004	West Fork	Nez Perce Pass	1	Tracks
2003	Stevensville	Upper Mill Creek	1	Sighting
2001	Stevensville	Sharrott Creek	1	Tracks
2001	Darby	Sleeping Child Hot Springs	1	Sighting
2001	West Fork	West Fork Road	2	Sighting
1999	Darby	Lost Horse Creek	2	Sighting
1996	Sula	Mink Creek Saddle	1	Sighting
1995	Stevensville	Sweathouse Creek	1	Sighting
1995	Darby	Gird Point	1	Sighting
1992	Darby	Schumacker Campground	1	Sighting
1992	Darby	Coyote Meadows	1	Sighting

Evaluation:

The wolverine is one of the rarest and least-known mammals in North America (Aubry et al. 2007). Since the 1800s, dramatic contractions have occurred within the historical range of the wolverine in the contiguous United States. Although the species once occurred in California, Utah, Colorado and the Great Lakes states, its current range in the lower 48 states is limited to north-central Washington, northern and central Idaho, western Montana, and northwestern Wyoming (Ruggiero et al.2007).

Wolverines in the Western United States and the interior Columbia basin occur widely at very low densities, but only in northwestern Montana are wolverine populations considered to be healthy and thriving (Witmer et al. 1998). In Montana, the wolverine was thought nearly extinct by 1920 from over-trapping. Wolverine numbers increased in the western, mountainous region of Montana from 1950 to 1980 (Hornocker and Hash 1981), presumably as a result of reduced trapping seasons on other furbearers and increased dispersals from Canada. Hornocker and Hash (1981) concluded that in Montana, extensive wilderness habitat, coupled with more restrictive furbearer harvest regulations, should provide secure wolverine populations in the foreseeable future.

Today, the Montana Natural Heritage Program ranks the wolverine as a G4 S3 species (MNHP and FWP 2009). This means that across its range the species is considered uncommon but not rare (although it may be rare in parts of its range), and usually widespread. It is apparently not vulnerable across most of its range, but there is possibly cause for long term concern. In Montana, the species is considered potentially at risk because of limited and potentially declining numbers, extent, and /or habitat, even though it may be abundant in some areas.

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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: 2009.

VARIABILITY: Trends that indicate declines in populations.

EVALUATION & MONITORING RESULTS:

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

Monitoring Avian Productivity and Survivorship (MAPS) Program. In cooperation with a national network of MAPS stations coordinated by the Institute for Bird Populations at Point Reyes, CA, we mist-net, classify, and band NTMBs and resident birds at two sites. We have monitored the Lick Creek site since 1993. We established the Lower Rock Creek site in 1994. When netted, the birds are identified, sexed, aged, weighed, and measured before release. As a part of the national network, we hope to gain insight on the production of young and survivorship through the rigors of migration. Through 2008, we have trapped and banded 3,464 birds, including 1,115 recently fledged young. We have had 2,088 recaptures, including multiple captures of some individuals. Since 1993 about 32 percent of the birds caught and banded have been young of the year. In 2008, about 19 percent of the first time captured birds were young of the year. We have also captured over 200 birds that we released unbanded. We have captured individuals of 68 species since 1993, including 32 species in 2008. The most common species captured at our two sites are common yellowthroat, Swainson's thrush, McGillivray's warbler, (all migratory species) and black-capped chickadee (a resident species). We did not run our banding stations in 2009 because the lead bander had knee surgery and was unable to negotiate the sites. We will resume banding in 2010.

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

The five BBS routes that are at least partially on the BNF are named Painted Rocks (53086), Skalkaho-Rye (53-176), Sula (53036), Threemile WMA (53902), and Victor (53901). Summaries and species trends generated by the data collected on these routes can be viewed online at http://www.pwrc.usgs.gov/bbs. Click on USGS Results and Analysis, and then on Route Level Analysis.

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

Bitterroot Valley Raptor Survey. The Raptor Survey is an annual road survey from Florence to Hamilton that counts all raptors seen along the Eastside Highway. This is part of an effort coordinated by the Montana Department of Fish, Wildlife and Parks (FWP) native species program to monitor trends in statewide raptor populations. We counted 118 raptors on this route in 2009, including 94 adults and 22 nestlings that had not yet fledged. This is the second highest number of raptors we've counted on this transect, and is 7% above the five-year average count (110 raptors).

Forest-wide Point Counts. In 1994 we began a program to monitor breeding bird population trends along a network of transects across the Forest as part of the Region 1 Landbird Monitoring Program (LBMP). Each transect has ten stations where surveyors identify and record every bird seen or heard in 10 minutes. They also record vegetation data at each point. The points are permanently marked for relocation, so that over subsequent years population trends can be ascertained. This point count protocol is followed on all national forests in the Region. In 1994, LBMP crews established 42 transects and counted resident birds and NTMBs at 413 points on the Bitterroot NF. The crews monitored the transects and points again in 1995 and 1996, with only slight modification. Budget constraints dictated suspension of the point counts for the 1997 breeding season. Crews monitored a subset of the transects in 1998, 2000, and 2004. They collected additional vegetation data but no bird data at a subset of the points in 1999. Researchers have incorporated these data into the revised habitat relationship analysis, which provides information about specific habitats occupied across the Region. Data and results of the LBMP efforts are viewable on the University of Montana's Avian Science Center website at http://avianscience.dbs.umt.edu/research_landbird.

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

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

In 2007, LBMP crews established point count locations in stands that were classified as dry forest old growth based on criteria in Green et al. (1992, errata 2005). Point counts were established in five National Forests across Region 1, including 136 points in 29 stands on the BNF. These point counts were intended to characterize the bird communities associated with xeric old growth forests, and to determine whether that community was different from the birds associated with mature forests. Results indicated that many of our most common bird species, including several generalists that inhabit a wide range of forest types, are more abundant in, and possibly prefer old growth when it is available on the landscape. However, most of the birds that occur in old growth are also found in mature or younger forests, indicating that there is not a unique bird community restricted to old growth. The final report is available online at: http://avianscience.dbs.umt.edu/projects/documents/CompletedOldGrowthReport12_13.pdf.

Christmas Bird Counts. The Forest helps support 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 120 species. The Stevensville CBC started in 1963 and has a cumulative total of 153 species. Among other findings, these CBCs document that the number of raptors wintering in the valley has increased dramatically since 1963. In addition, two species that we now think of as being very common winter residents (house

finches and mourning doves) were rare or non-existent during the early years of the CBCs, and have both become much more common here in the winter since the mid-1990s. More recently, both CBCs have documented the arrival and increase of populations of the Eurasian collared-dove, a Eurasian species that has rapidly colonized North America. In addition, both CBCs have recorded the recent population increases of wild turkeys and California quail, both species native to other parts of North America that were introduced here and have now established naturalized populations. These two CBCs are consistently within the top five CBCs in Montana in terms of bird species diversity. In FY 2009 the Hamilton CBC tallied 8,909 individual birds and 65 species. The Stevensville CBC tallied 8,651 individual birds and 82 species.

NORTHERN GOSHAWK

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

The Regional Forester again removed the northern goshawk from the Sensitive species list on July 17, 2007. Reviews of recent goshawk research (summarized in Samson 2005, Samson 2006, Brewer et al. 2007) and the Region's 2005 goshawk surveys (Kowalski 2006) demonstrate that (1) habitat exists to support reproductive individuals on each Forest; (2) habitat is well-distributed; and (3) individual goshawks can interact with one another across the Region. The Forest Service Manual (2670.5) states that Sensitive Species are those for which there is a significant current or predicted downward trend in population numbers/density and a similar downward trend in habitat capability that would reduce distribution of the species. Regional data collection and analysis demonstrates that neither condition exists; therefore, the species no longer meets the definition for "sensitive."

Monitoring:

The Bitterroot NF has monitored known northern goshawk nests on an intermittent basis since at least 1991. The Forest initiated a more systematic monitoring and nest search effort in the summer of 1998. As of September 2008 we have identified a total of 99 northern goshawk nests across the Bitterroot NF, in 36 different territories. Of the known nests, 56 have been active at least one year since we found them, and 17 have been active more than one year. We know of several alternate nests within many territories. We have documented at least 161 juvenile goshawks fledged from these nests. Forest personnel have identified two additional territories that have been active at least one year since 1995 (courtship displays, active territorial defense, or newly-fledged young were seen). Although no actual nests have been located in these territories, Forest biologists have observed a total of five fledged juvenile goshawks within them.

We have documented the loss of 19 known goshawk nests since 1998, and six others have deteriorated to the point of being unusable. Two of the lost nests burned up during the fires of 2000; three were lost when the nest trees fell over; 13 fell out of the nest tree due to unknown but natural causes, and one was knocked out of the nest tree when a firewood cutter dropped a snag through the branches of the nest tree. As of October 2009, 66 of the 99 nests we have discovered are intact and usable, although some need a little maintenance by the birds.

The Forest no longer funds an Accipiter monitoring contract, so monitoring consisted mostly of checking the status of previously known nests. We did not check all the known nests, and were unable to spend much time searching for new nests in territories where none of the known nests were active, or in new areas. We discovered one new, inactive goshawk nest in 2009. Two previously known nests were active in the spring. One fledged two juveniles, and the other fledged three. 2009 appeared to be another slow year for goshawk productivity on the Forest. Two of the 39 known useable nests that we checked were active (5.1%), well below the Forest's average occupancy rate. However, average productivity was 2.5 young fledged per active nest, which is quite good. These results are probably not cause for alarm, as goshawks are known to skip reproductive attempts or fledge fewer young in years where the prey base is limited, which is often dependent on weather.

An alternate explanation is that goshawks are using many nests that we have not discovered the past few years as our ability to survey territories has declined, and that we are simply failing to document reproduction that is actually occurring.

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

Other raptors sometimes use goshawk nests, but we did not observe this in 2008. In previous years we have documented great horned owls using three different goshawk nests (one nest two different years), great gray owls using one goshawk nest, red-tailed hawks using one goshawk nest and Cooper's hawks using two goshawk nests.

Table 18 summarizes the monitoring results for goshawks since 1998.

Table 18 – Goshawk Monitoring Results Since 1998

Year	Newly Discovered Nests [2]	Active Nests (Total)	Number of Young Fledged	Remarks
1998 [1]	5	5	8	
1999 [1]	8	3	5	Several other territories appeared active based on the presence of adults, but known nests within the territories were inactive and we were unable to find active alternate nests.
2000 [1]	5	5	9	One of the active nests contained two young, but was destroyed by the Bear fire before the young could fledge.
2001 [1]	8	6	12	Also found two additional active goshawk territories where we could not locate any nests.
2002 [1]	9	7	16	One of the active nests contained two young, but the nest fell out of the tree before the young could fledge. We also discovered two additional active goshawk territories where we could not locate any nests. In addition to the nests occupied by goshawks, one of the known goshawk nests was occupied by a great horned owl.
2003 [1]	11	15	37	One known goshawk nest was occupied by a great gray owl, and fledged four owls. Another known goshawk nest was occupied by a great horned owl.
2004 [1]	19	13	23	We found five new nests and two new territories. Two active goshawk nests failed.
2005 [1]	12	4	5	We found nine new nests and three new territories. One active goshawk nest apparently failed.
2006	7	10	16	One known goshawk nest was occupied by a great horned owl, and another by a Cooper's hawk. We found seven new nests (five of which were active), and one new territory. Three active goshawk nests failed.
2007	3	6	13	One known goshawk nest was occupied by a red-tailed hawk. We found three new nests (two of which were active), all in existing territories. One active goshawk nest failed.
2008	0	3	0	All three active nests failed.
2009	1	2	5	

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

Evaluation:

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

The Bitterroot National Forest is estimated to have sufficient suitable nesting habitat to support a minimum of 340 goshawk nests, which would provide nesting habitat for at least 57 to 170 goshawk pairs. Inventory and modeling also estimate that there is enough suitable post-fledging habitat to support a minimum of from 68 to 135 goshawk pairs, and enough suitable foraging habitat to support a minimum of 87 goshawk pairs (Samson, 2005). Therefore, a conservative estimate is that the

BNF contains enough suitable habitat to support all the life stages of at least 57 goshawk pairs. In other words, this habitat assessment indicates that we have 347,917 acres of goshawk habitat more than what is necessary to maintain a minimum viable population (Samson 2006; Samson 2005). Another way to say this is that we have an estimated 1,254% of the habitat necessary to maintain a minimum viable population of goshawks on the Forest. This habitat is well-distributed across the Bitterroot National Forest. These habitat estimates correlate well with the results of the Forest's active program of monitoring Accipiter nests described above.

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

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

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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: 2009

VARIABILITY: Deviation from riparian area and fisheries objectives.

EVALUATION:

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

Riparian monitoring in 2009 (as in past years) far exceeded this item's requirement of one project per District per year. Monitored activities include multiple projects related to developed recreation sites, outfitter and guide camps, fire management, facilities, grazing, weed management, timber management, and activities related to implementation of the Burned Area Recovery decision. Project and activity specific key findings are presented below for each of these monitored activities. It is clear important lessons are being learned and applied. In almost all cases riparian and fisheries objectives are being met or exceeded. In those few cases where problems have been identified, root causes were usually attributable to human error or incorrectly applied practices had limited adverse effects on the riparian and fisheries resources. Most were either corrected upon detection or are scheduled to be remedied.

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

Developed and Dispersed Recreation

Carbaryl Application near Bass Creek (Charles Waters Campground, Stevensville Ranger District). In May 2008 Carbaryl, an insecticide, was used at Charles Waters Campground as a short-term preventative measure against beetle attacks on large pine trees. The presence and density of stoneflies nymphs in Bass Creek was monitored to detect effects to aquatic invertebrates from spraying carbaryl on nearby pine trees. Stoneflies in Bass Creek were used as an indicator of potential effects to trout and other aquatic species. Two approaches were used: a before and after treatment approach, and a control versus treatment approach. Spraying did not appear to affect stoneflies numbers in the areas sampled. No-spray zones of 75 ft appear sufficient to protect the most sensitive aquatic insects (Fettig, et al. 2008). Because of the convenience of using the campground road as the near-steam project boundary, and because the stream was at low flow (not accessing its floodplain) the closest sprayed tree was 130 feet from Bass creek. In 2009, snorkeling of the creek and general observations of the riparian area did not detect negative effects of spraying on fisheries or riparian trees.

Dispersed Sites along Upper Skalkaho Creek (Darby Ranger District). The Forest's intent is to maintain the availability of the popular dispersed campsites along Skalkaho and Daly Creek while maintaining or improving stream and riparian conditions. Maintaining the streamside conditions favorable to native fish has turned into an ongoing project because of the annual impacts of dispersed camping and illegal firewood collection that often occur in the streamside areas. In 2009, three fords illegally used by OHV's were closed by piling woody debris in the access points. This has worked in the past, but is temporary (lasting a few years). Fish crews placed debris in a short cross-country OHV route that was established at one

of the dispersed sites. We also hardened and narrowed the access to a dispersed site along Daly Creek (711 bridge area). More work was planned but was interrupted by wildfire and other priorities.

Haley Chute Boat Launch River Bank Restoration Project (Darby Ranger District). In early May 2009, three bare and eroding user-created boat ramps along the West Fork Bitterroot River were obliterated at the Haley Chute boat launch site. The broken down river banks were recontoured with topsoil, seeded with grass, fertilized, and mulched with straw. The high river flows that occurred on May 19-20th eroded away the lower 2-3 feet of topsoil closest to the river. This left behind a bank scour mark similar to what is present on the undisturbed banks above and below the recontoured sites. The recontoured sites grew grass vigorously in summer 2009, but weed growth (mostly *Lipidium*) was also strong. This was caused by the topsoil being infected with *Lipidium* seeds. In late summer 2009, the recontoured sites were sprayed with aquatic 2-4,D to kill the weeds. This project partially met its objectives – it successfully blocked off use of the user-created boat launches and restored the natural shape of the river banks. However, the revegetation aspect of the project was not completely successful due to the outbreak of *Lipidium*. This project will be monitored in 2010 to determine if additional herbicide spraying or riparian planting is needed. The goal is to make the recontoured sites indistinguishable from the undisturbed river banks.

Figure 4 – User-created boat launch before recontouring and seeding. March 2009.

Figure 5 – User-created boat launch immediately after recontouring and seeding. May 2009.

Figure 6 – Recontoured boat launch after one summer's growing season. September 2009.

Spring Gulch Campground Flooding (Sula Ranger District). The Spring Gulch campground flooded on nearly the same day in May, 2008 and 2009 when runoff flows in the East Fork Bitterroot River exceeded flood stage for several days. Flood stage at the USGS Darby gage on the Bitterroot River is 7.5 feet. In 2008, peak flows reached 8.1 feet on May 20th, and

remained above flood stage until May 22nd. In 2009, peak flows reached 8.03 feet on May 20th, and remained above flood stage for a couple of days. The 2008 and 2009 floods had a recurrence interval of about nine years. Despite similar river flows, the amount of flooding that occurred in the campground in 2008 was considerably more extensive than what occurred in 2009. In 2008, most of the campground was covered by more than six inches of water and remained submerged for a couple of weeks before the flood waters receded. In 2009, about 30% of the campground was covered with 3-4 inches of water, which was about half as much of the campground area that flooded in 2008. In both years, the most flood prone area was near the outhouse in the middle of the campground. The main reason for the reduced amount of flooding that occurred in the campground in 2009 was the location and alignment of the Schoolmarm tree in the East Fork Bitterroot River. The 2008 floods shifted the tree from an alignment perpendicular to the river flow to one parallel with the river flow. While shifting the tree, the 2008 floods also washed out an adjacent section of FSR 5727. In 2009, the Schoolmarm tree did not move during flood stage flows, and FSR 5727 was not damaged. The relocation and flood repair work that was conducted on FSR 5727 in 2008 held up well to the high river flows in 2009. The parallel alignment of the Schoolmarm tree appears to be slowly shifting the river thalweg to the west, towards the campground and away from FSR 5727.

Tough Creek OHV Ford Restoration (West Fork Ranger District). During summer 2009, the Bitterroot NF south zone fisheries crew restored a user-created OHV ford on Tough Creek, and blocked off a 0.3 mile long user-created OHV road in the RHCA along Tough Creek and the Nez Perce Fork. The ford received a shallow rip (with hand tools), then was planted with grass and shrub seedlings, fertilized, and straw mulched. The user-created OHV road was covered with slash. Prior to treatment, the ford was a sediment source to westslope cutthroat trout spawning and rearing habitat in Tough Creek, and the user-created road was used to illegally cut firewood in the Nez Perce RHCA. There has been no OHV use of the ford and road since this project was implemented.

Figure 7 – User-created ford on Tough Creek, before treatment. June 2009.

Figure 8 – User-created ford on Tough Creek, after treatment. August 2009.

Piquett Trailhead Rehabilitation Project (West Fork Ranger District). In 2007, a user-created road was obliterated in the Riparian Habitat Conservation Area (RHCA) at the Piquett Creek trailhead, and 16 large, beetle-killed fir trees were felled into the Piquett Creek and Britts Creek stream channels to increase woody hiding cover for bull trout and westslope cutthroat trout. The trailhead area was burned at mixed severity in August, 2007 (Rombo Fire). Forest fisheries biologists monitored the Piquett Trailhead Rehabilitation project during summer, 2009. The project was successfully achieving its objectives. Vehicles did not attempt to drive into the RHCA, and vegetation was satisfactorily growing on the obliterated user-created road. The large wood in Piquett and Britts creek was forming pools and creating complex hiding cover for fish.

Slate Creek Campground Hazard Tree Removal (West Fork Ranger District). In 2009, a small timber sale was conducted to remove about two log truck loads of dead lodgepole pine hazard trees from the Slate Creek campground. The Slate Creek campground is located in the 300 foot RHCA surrounding Slate Creek. There are also several wetland RHCAs near the campground. Forest fisheries biologists assisted in the marking of the hazard trees prior to the sale. Two mitigation

measures were implemented to protect fish habitat in Slate Creek and preserve wetland quality: (1) all hazard trees located within one tree length of Slate Creek and its wetlands would be left standing unless they posed undue risk to campground users. Where leaving a hazard tree was deemed too risky, the tree would be directionally felled into Slate Creek or its wetlands and left on site; and (2) hazard trees located more than one tree length from Slate Creek and its wetlands could be felled and removed with a self-loading log truck as long as the yarding equipment did not operate off of the campground loop road or hardened campsite spurs. Post-sale monitoring indicated that the mitigation measures were properly followed. The yarding equipment did not operate off of the campground loop road or its hardened spurs. As a result, ground disturbance was negligible. Because of the flat terrain and the lack of ground disturbance, there was no sediment input to streams or wetlands. Nearly all of the hazard trees that were located within one tree length of Slate Creek and its wetlands were left standing; a couple with pronounced leans were directionally felled into Slate Creek. No trees were cut and removed that should have been left on site. Meeting mitigation (2) retains the shade on Slate Creek and its wetlands to the best degree possible, and preserves future woody debris recruitment. Endangered Species Act consultation for the Slate Creek campground hazard tree removal project tiered to the Recreation Site Maintenance Programmatic BA for Bull Trout and Westslope Cutthroat Trout (U.S. Fish and Wildlife Service; March 2000). The determination of effect for bull trout was "*may affect, not likely to adversely affect*". The determination of effect for westslope cutthroat trout was "*may impact individuals, but not likely to contribute to a trend towards federal listing or loss of viability*". The determination of effect for bull trout critical habitat was "*no effect*". These effects determinations were contingent on meeting the two mitigation measures, which was satisfactorily achieved.

Our key findings are:

- Most of the developed campgrounds and dispersed camping areas on the Forest are located in the RHCAs along fish-bearing streams. This makes them sensitive areas for most management activities. Particular activities of concern are the spraying of herbicides such as carbaryl and hazard tree removal.
- Carbaryl spraying in the Charles Waters campground which was as close as 130 ft from Bass Creek, which was within the 300-foot riparian habitat conservation area (RHCA), did not appear to have any negative effect on Bass Creek.
- One of the most common management activities in campgrounds with the potential to impact the fishery is hazard tree removal. This has become more of an issue in recent years because of beetle infestations. Hazard trees that are close enough to the stream to provide shade and potentially land in the water (typically those within one tree length of the edge of water) are left standing if possible. If too risky to leave standing, hazard trees are directionally felled towards the stream and left on site. Hazard trees that are located more than one tree length from streams are being evaluated by a fisheries biologist on a case-by-case basis. Depending on site conditions, the trees are sometimes felled and left on site, cut into firewood, or removed.
- Many campground visitors fish; therefore, the location of the campgrounds in riparian areas increases fishing pressure on a local scale and probably results in some intentional and incidental mortality of westslope cutthroat trout, bull trout, and juvenile steelhead (in Idaho). The most vulnerable fish are the larger adults. It is not unusual to observe fewer adult westslope cutthroat trout in the segments of streams that are located close to campgrounds.
- User-created roads in riparian areas should be obliterated soon after their detection. If left alone, the road networks tend to expand and become much more difficult to eliminate, both environmentally and socially. Activities detrimental to fish habitat and water quality often occur where user-created roads are present in riparian areas. These activities include illegal cutting of trees within 150 feet of streams, and increased sediment inputs from poorly located and erosive user-created roads and fords.
- Forest management activities in developed and dispersed recreation sites on the Forest have generally been consistent with our programmatic agreements with the regulatory agencies (U.S. Fish and Wildlife Service and NOAA Fisheries).

Outfitter and Guides

Kit Carson Outiftter Camp (West Fork Ranger District). In June and October 2009, Forest fisheries biologists monitored the Kit Carson outfitter camp that is located in the RHCA along Deep Creek. The purpose of the monitoring was to ensure that the mitigation measures specified in a 2007 Section 7 Endangered Species Act consultation were properly applied. The key mitigation required the outfitter to fence off a small portion of Deep Creek where stock are allowed to walk into the stream to drink water. The fencing was properly implemented in 2009. A smaller portion of Deep Creek was fenced off in 2009 as compared to 2007 and 2008, and there was less trampling of Deep Creek's stream banks and channel as a result. No redds

or spawning fish were seen in the vicinity of the stock watering area. Forest fisheries biologists will monitor the Kit Carson outfitter camp one more time in 2010, which will fulfill the monitoring requirement in the 2007 consultation. In 2011 and beyond, the camp will be monitored on an "as needed" basis.

Angling by Selway River Float Outfitters (West Fork Ranger District). In 2009, the Idaho Department of Fish and Game (IDFG) and the Bitterroot National Forest continued to collect angler use data from commercial and private floaters on the Selway River during the permitted float season (May 15 – July 31). This was the fourth year of the data collection effort (i.e. the first was in 2006). The Bitterroot National Forest provided the trip leader of each permitted launch with a data sheet developed by IDFG. Trip leaders were instructed to drop off the completed data sheet at the Fenn Ranger Station upon completion of their trip, or mail the data sheet directly to IDFG. Parties that did not fish were asked to indicate that on their data sheet, and turn it in as well. In 2009, IDFG modified the data sheet so that anglers provided more detailed information on water bodies fished and fish species caught.

The results of the 2006, 2007, 2008, and 2009 angler surveys are compared in Figures 9-13.

Figure 9 - Percent of Trips Returning Their Data Sheets

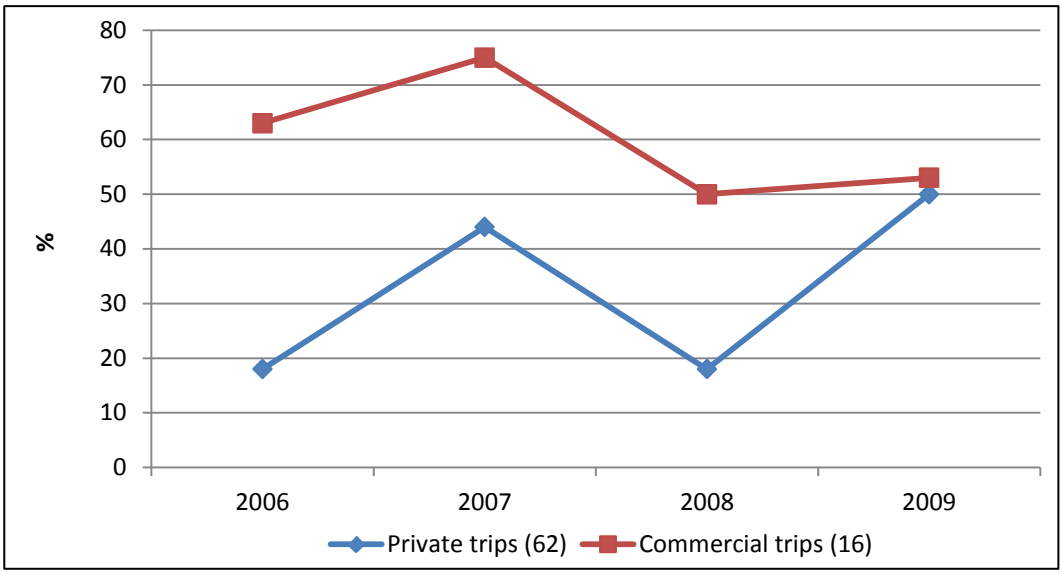


Figure 9 displays the percent of trips (commercial or private) that returned their data sheets. The results indicate that commercial trips have been better at returning their data sheets than private trips, although in 2009, private returns improved and were nearly identical to those of commercial trips. Similar to 2008, high water in May and June, 2009 caused an unusually high number of trip cancellations (18 private and 1 commercial).

Figure 10 - Percent of Trips That Reported Fishing

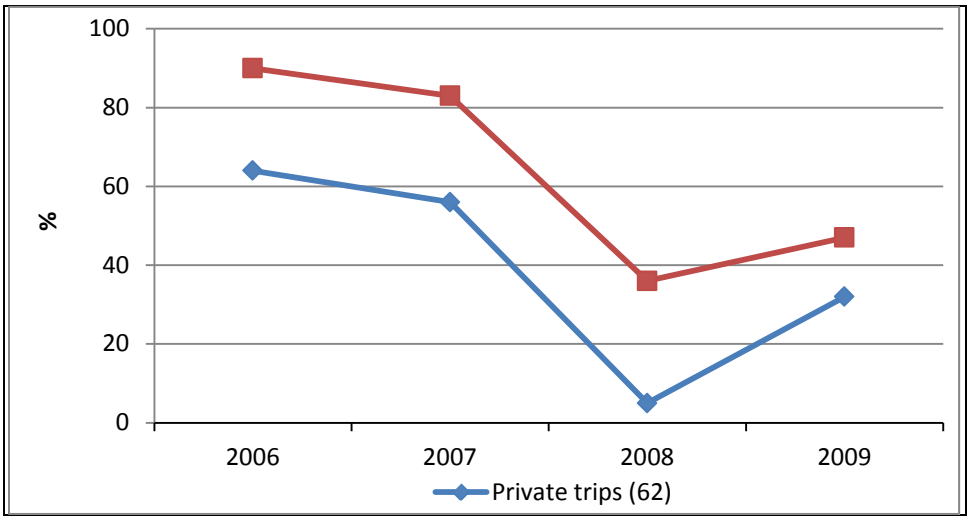


Figure 10 displays the percent of trips (commercial or private) that reported fishing. Trips that did not return their data sheets are assumed to have not fished, which may or may not be true. This graph displays the percent of trips (commercial or private) that reported fishing. In all years, a higher percentage of commercial trips have reported fishing than private trips. Both private and commercial trips were more likely to fish in low water years (2006 & 2007) than high water years (2008 & 2009). Assuming an average of 11 people per private trip and 15 people per commercial trip, 23% (109 of 484) of the people on private trips and 25% (57 of 210) of the people on commercial trips fished in 2009.

In all years, the vast majority of float angler fishing has occurred on the main stem Selway River, with minimal fishing in the tributaries. When tributary fishing has occurred, it has usually been associated with a commercial trip, and has almost always occurred in the lower reaches of Moose or Bear creeks. About 90% of the tributary fishing effort in 2007-09 occurred in the lower reaches of Moose Creek, with the other 10% occurring in the lower reaches of Bear Creek. Almost no angling has been reported in tributaries other than Moose or Bear creeks.

Figure 11 - Angler Hours

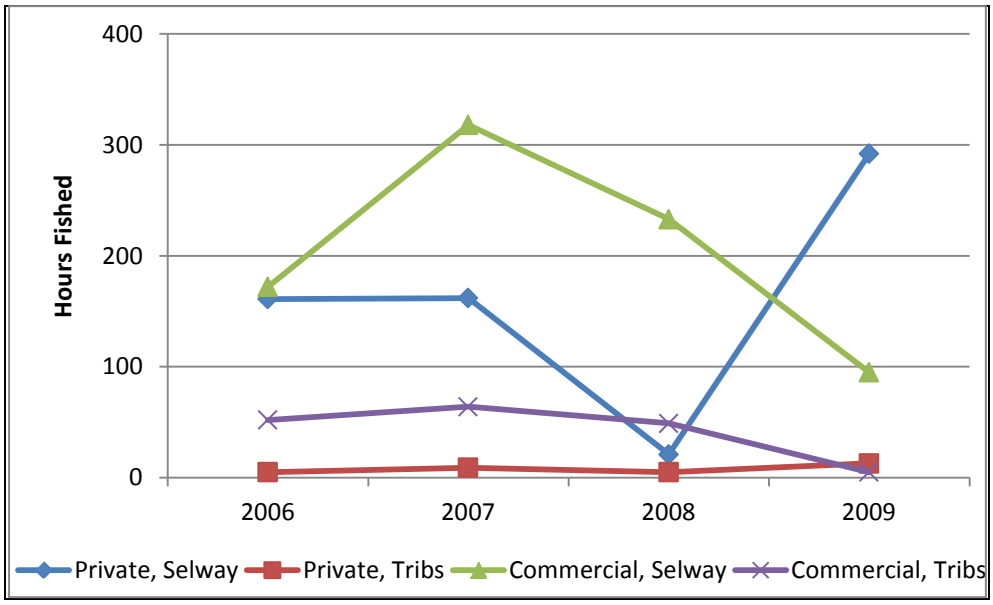


Figure 11 displays the total number of hours fished per season by type of trip (commercial or private) and water body (Selway River or tributaries). Angling effort by type of trip and water body has varied from year-to-year. In 2006, commercial and private trips fished the Selway River at roughly equal effort. In 2007-08, commercial trips fished the Selway River with greater effort. In 2009, private trips fished the Selway River with greater effort. In the tributaries (i.e. Moose

and Bear creeks), commercial trips fished with greater effort in 2006-08, and private trips fished with slightly greater effort in 2009, although total angler hours was low for both types of trips. For some unknown reason, angler effort on commercial trips declined in 2009. The big jump in angler hours on the Selway River reported by private trips in 2009 may be a reflection of better reporting (i.e. more data sheets were returned).

Figure 12 - Number of Trout Caught

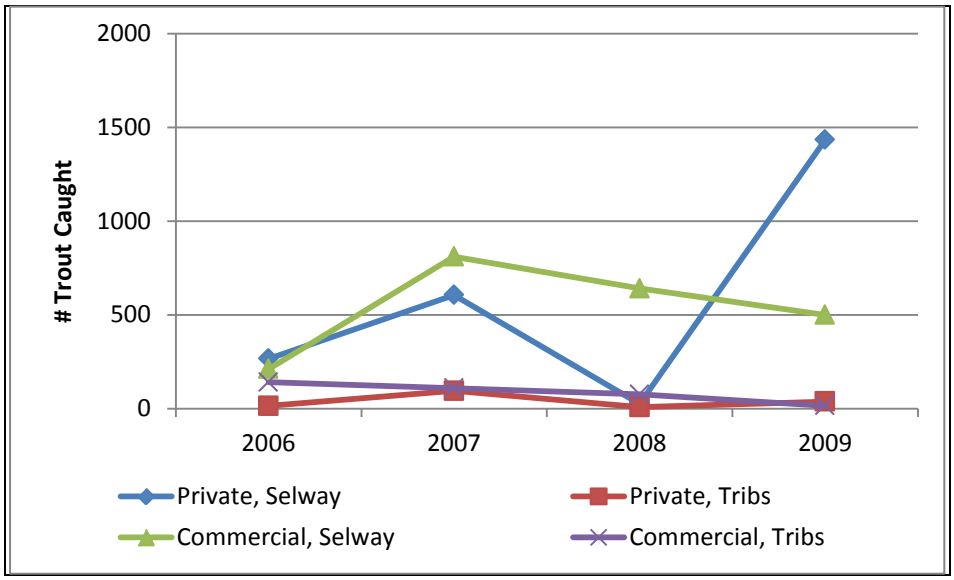


Figure 12 displays the total number of trout caught per season by type of trip (commercial or private) and water body (Selway River or tributaries). In 2006-08, commercial trips usually caught more trout than private trips in both the Selway River and the tributaries. In 2009, that changed, particularly in the Selway River where the number of trout caught by private trips soared. Again, this big increase could mostly be a reflection of better reporting.

The average number of trout caught in the Selway River during the 2006-09 float seasons was 1,124 (range 479-1934). In the tributaries, the average annual number of trout caught was 125 (range 54-205). No fish were reportedly harvested in any water body in any years. Each year, one or two trips that fished intensively accounted for a high percentage of the trout caught. 2009 had the highest reported catch of trout (1,934) of any year since the survey has been conducted.

Figure 13 - Fish Species Reportedly Caught in 2009

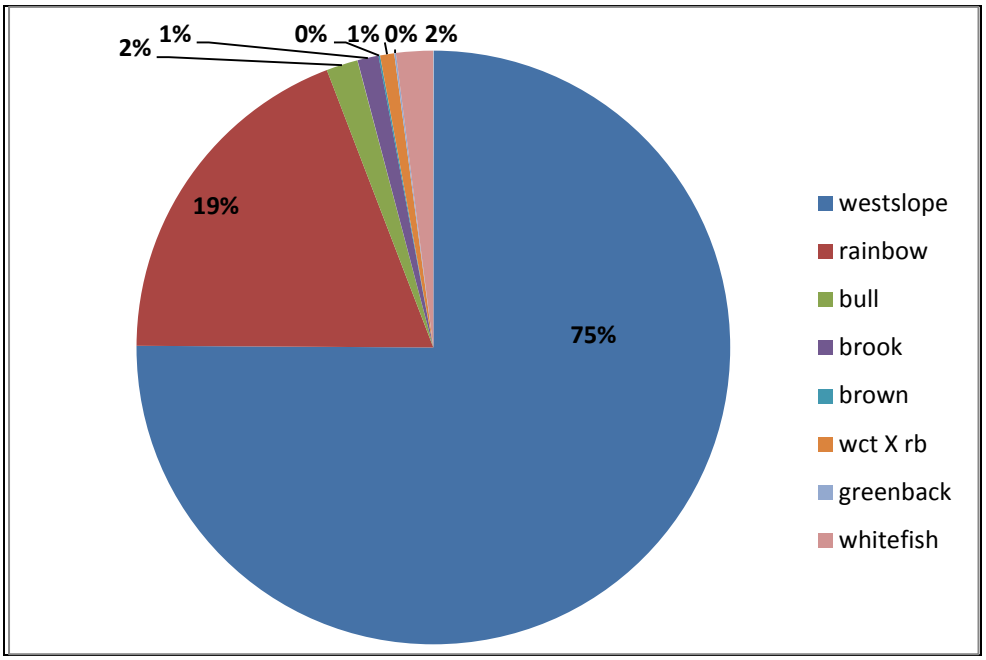


Figure 13 displays the fish species that were reported as caught on the returned data sheets. Westslope cutthroat trout (784) were by far the most numerous fish species reportedly caught in 2009, followed by rainbow trout (199), mountain whitefish (21), bull trout (18), brook trout (12), westslope X rainbow hybrids (8), brown trout (1), and greenback trout (1). There are no non-native trout species that are known to occur in the areas fished, so the brook, brown, and greenback trout were likely misidentified. The brook trout were reportedly caught throughout the Selway River from Paradise to the take-out point above Selway Falls. The brown trout was reportedly caught in the Selway River between Paradise and Bear Creek. The greenback trout was reportedly caught in the Selway River near Moose Creek. There are no records of those species occurring in the Selway River.

In 2006-08, there was only one report of a bull trout being caught, and that information was obtained because an angler voluntarily wrote down the species he caught on the back of his data sheet. In 2009, 18 bull trout were reportedly caught, all from the Selway River. Two trips (one private and one commercial) were responsible for catching 16 of the 18 bull trout. Bull trout make up less than 1% of the fish that are seen in the Selway River during IDFG snorkel surveys, so the fact that two trips were able to catch 16 bull trout is questionable and raises the question of whether the number of bull trout caught in 2009 was actually overestimated.

The 2006-09 float angler surveys have provided the Forest with useful information on fishing effort and the approximate number of trout being caught by floaters in the Selway River and its tributaries. Only limited and anecdotal information was available prior to 2006. In 2009, information was also obtained on the mix of species caught. There are still some missing pieces of information, most notably the sizes of the fish caught, the amount of hooking mortality that occurs, and the amount of overlap that occurs between float anglers and land-based angling by outfitters and private individuals. IDFG and the Bitterroot National Forest will repeat the float angler survey in 2010. In 2010, floaters will be given a color handout of the fish species found in the Selway River drainage along with their angler use datasheet to aid in fish identification. IDFG will also collect hooking mortality data during their annual surveys. This data will be used to help estimate potential hooking mortality caused by float anglers.

The 2006-09 float angler surveys have validated the Endangered Species Act effects determinations that were made by the Forest in 2000. In the 2000 Upper Selway Subbasin Biological Assessment, the Forest concluded that the Selway River float program was “not likely to adversely affect” threatened bull trout and steelhead populations and their habitat. The data collected so far has been consistent with those determinations.

Fire Management

Kootenai Wildfire (Stevensville Ranger District). The Kootenai Fire burned most actively in September 2009. It was in Larson, Kootenai and Brooks creeks, which are tributaries to Bitterroot River west of Stevensville, MT. Larson and Brooks Creek are not known to provide fish habitat on the Forest, but cutthroat trout are in Brooks Creek on private land downstream of the Forest. Larson Creek is dewatered for irrigation soon after flowing onto private land. Kootenai Creek provides fish habitat from high in its watershed, within two miles of the ID/MT state line, to the river. In Kootenai Creek, the fire burned approximately 13% of the watershed at moderate to high severity. The Burned Area Emergency Response report by the Forest's Hydrologist suggests that post-fire run-off may produce minor increases in flow during melt or rain events, and especially during moderate to intense summer thunderstorms. This effect may increase bank erosion where they existed prior to the fire, but is not likely to add substantially to flood or erosion risks. These are effects that native trout are likely to tolerate well. The main Brooks drainage experienced high and moderate severity burn over an estimated 41% of its contributing area. Brooks Creek had and has potential for high flows, ash and sediment during thunderstorms.

Frazier Interface Prescribed Burn, Units 64W and 64E (West Fork Ranger District). This prescribed burn is located in the Frazier Draw drainage in the wildland-urban interface west of the Triple Creek Ranch. Units 64W and 64E were ignited by hand crews on May 21-22, 2009. Fisheries biologist review of the burned area occurred on May 26, 2009. The only place in the units where fire had potential to burn close to surface water was the lower boundary of unit 64W, which was located within the 150-foot wide RHCA surrounding Frazier Draw. Frazier Draw is a small, perennial non-fish bearing stream. Prescribed burning was predicted to have insignificant effects on water quality and the fishery in the 2003 Frazier Interface EA. The majority of the burned area experienced low intensity fire, and the duff layer was not consumed. The fire was allowed to back into the Frazier Draw RHCA, but it did not in most areas because of the shade and high moisture content of the vegetation near Frazer Draw. The only place where fire burned close to Frazier Draw was a 10 foot X 15 foot spot where riparian shrubs were lightly burned. A low impact fireline was constructed around portions of the units. Existing roads and trails were used as fireline where feasible. All portions of the fireline in the Frazier Draw RHCA were recontoured following the burn. The burn was consistent with the mitigation measures in the Frazier Interface EA and the U.S. Fish and Wildlife Service's Programmatic Biological Assessment/Evaluation for Prescribed Burning (April, 2001). The burn had no effects on the fishery and negligible effects on water quality in Frazier Draw. A spring rain occurred a day or so after the burn was completed, but because of its low severity and the presence of a functioning duff layer, the burned area showed negligible erosion, and no sediment trails were seen exiting the burned area and moving downhill towards Frazier Draw. It is unlikely that the fire will cause any significant recruitment of large wood to Frazier Draw. It did not kill large enough trees that are located close enough to Frazier Draw. In conclusion, the Frazier Interface EA predicted that prescribed burning would have an insignificant effect on water quality and the fishery, and post-fire monitoring validates that prediction.

Rombo Wildfire (Sula and West Fork Ranger Districts). On July 26, 2009, an intense thunderstorm in the headwaters of the Piquett and Warm Springs Creek drainages caused very turbid streamflows to occur in Piquett Creek, Warm Springs Creek, the East Fork Bitterroot River below Warm Springs Creek, and the West Fork Bitterroot River below Piquett Creek. The turbid flows commenced on the evening of July 26th. Piquett Creek and the West Fork below Piquett Creek ran turbid until the evening of July 27th. Warm Springs Creek and the East Fork below Warm Springs Creek ran turbid until July 30th. The source of the turbidity is believed to be accelerated runoff from severely burned soils in the roadless headwaters of Piquett and Warm Springs Creek. No debris flows or stream channel blow-outs apparently occurred. Fire aircraft conducted a cursory search for debris flows a couple of days following the July 26th event, but saw none. The turbid flows caused a moderate amount of sediment to be deposited in the low velocity sections of Piquett and Warm Springs Creek (e.g. the bottoms of pools, the margins of riffles, and downstream of flow obstructions). It also left behind a thin layer of black, silty sediment along the bottoms of pools and margins of riffles in the West Fork and East Fork. The silt layer in the rivers was visible for a couple of months, then it gradually dissipated. It was not visible going into winter. Dead, injured, or sickly fish were not found or reported following the July 26th runoff event, and there is no evidence that a fish kill occurred. In 2008 and 2009, water temperature monitoring in the lower ends of Piquett and East Piquett creeks did not detect discernable temperature increases as a result of the Rombo fire (see Item 21 and 41 for details).

Facilities Management

Fish Screen at the Long Conner A Ditch (Darby Ranger District). The headgate and a short section of flume and ditch of the upper Long Conner Ditch at Chaffin Creek washed away in a flood in early November 2006. During the flood the stream at the point of diversion down-cut about eight feet and that made the diversion unusable without considerable alteration. The ditch owners proposed and the Forest authorized the POD to be moved upstream to get water into the ditch.

The owners of the ditch (a private party) agreed to install a fish screen to benefit the fisheries resource and expedite the consultation process with the USFWS. Field visits late in 2009 by forest personnel have noted that the fish screen to be placed in the *Long Conner A Ditch* has not been installed. The operating plan states: "A USFWS approved fish screen will be installed in the *Long Conner A Ditch* as soon as data gathering, materials availability, and weather conditions make installation of the fish screen possible, and not later than the termination date of August 1, 2008." The ditch has been operational for over two years. The fish screen was an integral piece of the project because of its benefit to the conservation of native fish in Chaffin Creek and needs to be completed and maintained. Bull trout continue to be present in Chaffin Creek near the point of diversion. Discussions between the FS and ditch owners are ongoing.

Other aspects of the ditch reconstruction project appear to have impacts to the stream near the amounts predicted in the project analysis. Sediment in the stream, from ditch and adjacent road reconstruction, has not been noticeable beyond the immediate period of construction. A primary reason for this is that the ditch, which is between the road and the stream, intercepts much of the run-off from disturbed sites. Large trees that were cut for reconstruction were left in the stream, as recommended, and continue to provide habitat complexity.

Trollope-Litchford and Trollope-Hawkes Irrigation Ditches (West Fork Ranger District). The Trollope-Litchford and Trollope-Hawkes ditches exit the lower mile of Chicken Creek. These ditches were a concern to Forest fisheries biologists because they were unscreened and had the potential to entrain bull trout. Forest fisheries biologists completed a formal Section 7 consultation on the ditches in 2006. Through the consultation process, the Forest and U.S. Fish and Wildlife Service biologists agreed that the ditches are "likely to adversely affect" bull trout due to the potential for entrainment. The U.S. Fish and Wildlife Service issued a Biological Opinion in November 2006. The Biological Opinion contains four terms and conditions that mandate monitoring. These are listed below, along with our findings:

<u>Term and Condition #1 (TC1). Monitor instream flows to determine minimum flow levels for the section of stream below the headgates to function as a migratory corridor</u>

Monitoring of TC1 was completed in 2007. The Forest completed a wetted perimeter study on Chicken Creek in 2007. The wetted perimeter data was submitted to the USFS Region One Office in Missoula, and the Forest Service used the data to file an instream flow claim for approximately 4 cfs on Chicken Creek.

<u>Term and Condition #2 (TC2): Implement the proposed action as described in the Biological Opinion.</u>

Monitoring of TC2 is mostly completed, but there is still one action pending. The proposed action in the Biological Opinion contains four actions:

1. Screen the headgate to the Litchford ditch
2. Screen the headgate to the Hawkes ditch
3. Reconstruct the rock diversion for the Hawkes ditch so that it no longer blocks upstream fish movement
4. When actions #1 - #3 have been satisfactorily completed, issue Ditch Bill easements to the water right holders of the Litchford and Hawkes ditches.

Action #1 – screening the Litchford ditch – is the only action left to be done. The Hawkes ditch was screened with a ¼ inch mesh screen in 2008 (action #2). The rock diversion structure for the Hawkes ditch was reconstructed in 2007 (action #3). The Forest has issued a Ditch Bill Easement to Robert Hawkes (action #4).

<u>Term and Condition #3 (TC3): Determine if the proposed mesh sizes are effective in reducing entrainment and impingement of juvenile fish. Determine if young-of-the-year bull trout are present in the ditches.</u>

Monitoring of TC3 is ongoing. To answer TC3, the Forest made a commitment to electrofish the Litchford and Hawkes ditches annually for a period of five years, starting in 2006 and ending in 2010. The ditches were electrofished in 1999, 2005, 2006, 2007, 2008, and 2009. No bull trout were found in the ditches in 1999 and 2005-2008. However, that changed in 2009 because bull trout were found in <u>both</u> ditches for the first time. On August 13, 2009, two juvenile bull trout (6.4 and 7.1 inches in length) were found in the Hawkes ditch, and one juvenile bull trout (7.2 inches in length) was found in the Litchford ditch. Young-of-the-year bull trout have yet to be found in the ditches.

In the Litchford ditch (which is unscreened), westslope cutthroat trout and brook trout juveniles and young-of-the-year have been found in the ditch every year it has been surveyed (Table 1). A few juvenile longnose sucker were also found in the 2008 and 2009 surveys, along with the first detection of a bull trout. The total number of fish captured in the Litchford ditch in 2009 was much more than had been observed in any previous surveys. A large number of young-of-the-year and small juvenile westslope cutthroat trout were responsible for the majority of the increase.

In the Hawkes ditch (screened since October, 2008), the typical mix of fish captured includes juvenile westslope cutthroat trout, brook trout, and longnose sucker (Table 2). In some years, an incidental sculpin, rainbow trout, or rainbow-westslope hybrid has also been found. The total number of fish captured in the Hawkes ditch in 2009 was similar to previous years, which was disappointing because numbers should have been very low due to the screen on the headgate. Closer inspection of the fish screen revealed a small gap along the bottom of the screen that was wide enough for fish to swim through and enter the ditch. The ditch owner repaired the screen and blocked the gap. Hopefully, the screen will be more effective in 2010.

2010 is the last year that the Litchford and Hawkes ditches are scheduled to be electrofished. After the 2010 surveys are completed, Forest fisheries biologists will meet with the U.S. Fish and Wildlife Service and decide whether additional monitoring is needed. Tables 20 and 21 summarize the species, numbers, and sizes of fish captured in the Litchford and Hawkes ditches during the electro fishing surveys.

Table 19 - Litchford Ditch

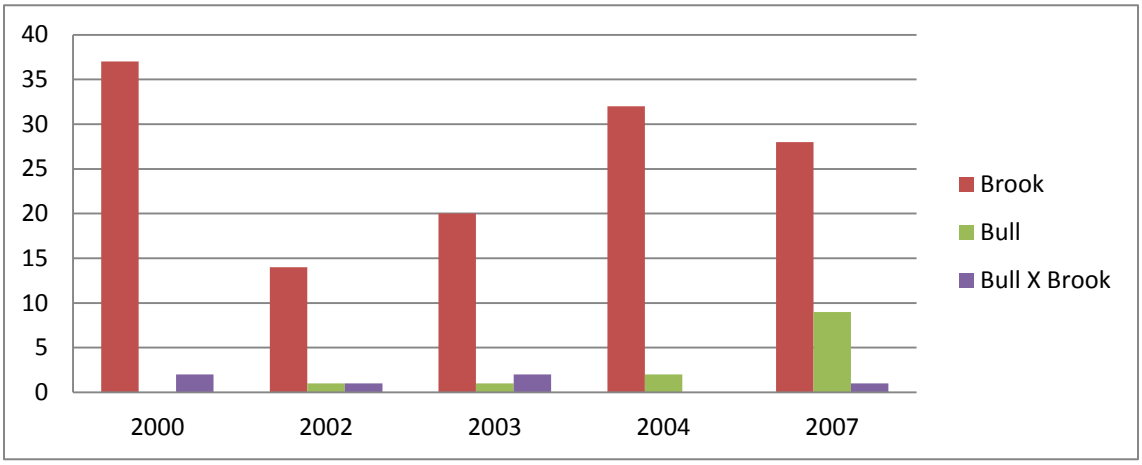
Date of survey	Length of survey	Fish species found	# of fish	Size range
August 23, 1999 (unscreened)	20 m	Westslope cutthroat Brook trout	4 1	1-4” 4-5”
July 19, 2005 (unscreened)	100 m	Westslope cutthroat Brook trout	3 1	3-6” 1-2”
June 28, 2006 (unscreened)	100 m	Westslope cutthroat	7	2-5”
August 2, 2007 (unscreened)	100 m	Westslope cutthroat Brook trout	6 10	1-3” 1-3”
July 23, 2008 (unscreened)	100 m	Westslope cutthroat Brook trout Longnose sucker	9 2 2	3-5” 1-9” 4-5”
August 13, 2009 (unscreened)	100 m	Westslope cutthroat Brook trout Bull trout Longnose sucker	23 5 1 2	1-9” 2-8” 7.2” 3-5”

Table 20 - Hawkes Ditch

Date of survey	Length of survey	Fish species found	# of fish	Size range
August 23, 1999 (unscreened)	77 m	Westslope cutthroat Brook trout Longnose sucker Slimy sculpin	1 3 1 2	2-3” 1-4” 4-5” 1-2”
July 19, 2005 (unscreened)	100 m	Westslope cutthroat Brook trout Rainbow trout Rainbow X westslope	13 1 3 3	2-9” 2-3” 3-5” 3-5”
June 28, 2006 (unscreened)	100 m	Westslope cutthroat Longnose sucker	7 2	3-5” 6-7”
August 2, 2007 (unscreened)	100 m	Westslope cutthroat Longnose sucker	7 5	3-9” 5-7”
July 23, 2008 (unscreened)	100 m	Westslope cutthroat Brook trout Longnose sucker	2 1 1	3-4” 2-3” 4-5”
August 13, 2009 (screened)	100 m	Westslope cutthroat Brook trout Bull trout	13 7 2	1-7” 2-3” 6.4-7.1”

To help answer TC3 and determine the trend of bull trout numbers in Chicken Creek, the Forest committed to electro fish the fish population monitoring reach in Chicken Creek two times between 2006 and 2010. The reach was electro fished in 2007, with the follow-up survey planned for 2010. The reach was previously electro fished in 2000, 2002, 2003, and 2004 to monitor post-2000 fire recovery. In 2007, more bull trout were found than in previous surveys, although the numbers are still far too low to calculate a statistically valid population estimate. The number of brook trout has not changed much since the fires of 2000.

Figure 14 - Bull trout, brook trout, and bull X brook hybrids captured in the Chicken Creek fish population monitoring reach since the fires of 2000



To help answer TC3 and determine the trend of bull trout spawning activity in Chicken Creek, the Forest made a commitment to establish and conduct a bull trout redd survey in Chicken Creek near the ditches for a period of five years, starting in 2006 and ending in 2010. The Forest has completed the first four years (2006, 2007, 2008, and 2009) of that commitment. An extra year was monitored in 2005, and 2010 will be the last year of the redd survey. The total number of redds counted in 2009 was similar to previous years. It appears that a few migratory bull trout still spawn in the lower end of Chicken Creek near the ditches, but not in large numbers. The majority of redds are small, and many could be made by brook trout. A couple of positive changes have occurred since the rock diversion for the Hawkes ditch was reconstructed in 2007. The number of redds observed upstream of the diversion has increased since reconstruction, and a 16-inch long migratory bull trout was observed (presumably spawning) about four miles upstream of the diversion in the fall of 2008. Those observations support the assertion that the Hawkes diversion no longer blocks the upstream movement of fish. Table 21 summarizes the results of the redd surveys.

Table 21 - Bull Trout Redd Surveys in Chicken Creek

Date of survey	Length of survey	# migratory redds	# resident redds
October 24, 2005	0.7 miles	1	12 *
October 13, 2006	0.7 miles	5	10 *
October 10, 2007	0.7 miles	2	14 *
October 3, 2008	0.7 miles	4	17 *
October 16, 2009	0.7 miles	4	11 *

** = We suspect that these are mostly brook trout redds, with possibly a few resident bull trout redds mixed in. Brook trout are more numerous than bull trout in Chicken Creek, so most of the smaller-sized redds were likely formed by brook trout.*

To summarize the results of the monitoring of TC3, young-of-the-year bull trout have not been found in the Litchford and Hawkes ditches, but three juvenile bull trout were found in the ditches for the first time in 2009 (two in the Hawkes ditch; one in the Litchford ditch). The appearance of the bull trout in the Hawkes ditch was particularly disappointing because the ditch was screened at the time, but the bull trout were apparently able to swim through a gap along the bottom of the

screen. The gap has since been closed and more positive results are expected in 2010. There have been no indications of fish being impinged on the screen on the Hawkes ditch. Because of the alignment of the screen, the risk of impingement appears to be low. All of the available evidence suggests that the reconstructed diversion structures for the Hawkes ditch are passable for fish.

Term and Condition #5 (TC5): Notify the U.S. Fish and Wildlife Service if any dead, injured or sick bull trout are found, or if observing destruction of redds.

Monitoring of TC5 is ongoing. Dead, injured, or sick bull trout, or destruction of redds have not been observed.

Twogood Irrigation Ditch (Sula Ranger District). The Twogood ditch exits the north bank of the East Fork Bitterroot River about 500 feet downstream of Jennings Campground. Forest fisheries biologists completed a formal section 7 consultation on the Twogood ditch in 2006. Through the consultation process, the Forest and U.S. Fish and Wildlife Service biologists agreed that the Twogood ditch is "likely to adversely affect" bull trout due to the potential for entrainment. The U.S. Fish and Wildlife Service issued a Biological Opinion in August 2006. The Biological Opinion contains two terms and conditions that require monitoring. These are listed below, along with our findings:

Term and Condition #1 (TC1): Monitor the condition and use of the 1/8th or 1/4th inch mesh fish screen to determine its effectiveness in reducing entrainment of juvenile and young-of-the-year fish.

Monitoring of TC1 is ongoing. The water right holder owner initially installed a 1/8th inch mesh fish screen on the headgate of the Twogood ditch in May 2007. The 1/8th inch mesh screen continually clogged with debris, and was replaced with a ¼ inch mesh screen about a week later. The ¼ inch mesh screen was used throughout the 2007, 2008, and 2009 irrigation seasons, and with daily cleaning, functioned reasonably effectively. Forest fisheries biologists monitored the Twogood ditch screen on seven different occasions during the 2009 irrigation season, which started on July 1st and ended on September 28th. The screen was properly installed and maintained in good working order throughout the 2009 irrigation season.

The Twogood ditch was electro fished for the first time in July and August 2005, prior to installation of the fish screen. No bull trout were found in either sample. The number of juvenile trout trapped in the ditch was considerably higher in late August than in mid July. In August 2007, the first summer with the screen installed, no trout were found in the ditch and the only fish captured was a 2-inch long juvenile mountain whitefish. In 2008, no fish were found in an August survey, but after the headgate was closed in mid-September, 54 young-of-the-year westslope cutthroat trout and two juvenile westslope cutthroat trout were rescued from an isolated pool of water directly below the headgate. The fish may have gotten into the ditch by squeezing through the 0.25" mesh in the screen or slipping around the outsides of the screen sometime after the August survey. In August 2009, no fish were found in the ditch. The ditch was not sampled after the headgate was closed in 2009 because no fish were seen in the shallow, isolated pool that forms below the headgate after the ditch is closed.

Table 22 summarizes the species, numbers, and sizes of fish captured in the Twogood ditch during the electro fishing surveys

Table 22 - Fish captured in the Twogood Ditch

Date of survey	Length of survey	Fish species found	# of fish	Size range
July 13, 2005 (unscreened)	100 m	Westslope cutthroat Mountain whitefish	1 3	3-4" 1-2"
August 24, 2005 (unscreened)	100 m	Westslope cutthroat Brook trout	21 3	1-4" 4-7"
August 6, 2007 (screened)	100 m	Mountain whitefish	1	2"
August 7, 2008 (screened)	100 m	No fish found	0	
September 23, 2008 (screened)	100 m	Westslope cutthroat	2 54	3-4" 1-1.5"
August 6, 2009 (screened)	100 m	No fish found	0	

The 1/8th inch mesh screen does not work on the Twogood ditch because it clogs too easily, but the ¼ inch mesh screen works reasonably well with daily cleaning. The biological assessment for the Twogood ditch project predicted that the ¼

inch mesh screen would not stop all juvenile and young-of-the-year fish from entering the ditch, but it would substantially reduce the number of fish entrained in the ditch. This prediction has held true in most years since the screen was installed. Bull trout have yet to be seen or found in the Twogood ditch. There have been no observations or reports of fish being pinned against the screen. Flows against the screen appear to be slow enough that impingement is not a significant risk.

Term and Condition #3 (TC3): Notify the U.S. Fish and Wildlife Service if any dead, injured or sick bull trout are found, or if observing destruction of redds.

Monitoring of TC3 is ongoing. Dead, injured, or sick bull trout, or destruction of redds have not been observed.

Ross #1 Irrigation Ditch, Nelson Creek (West Fork Ranger District). The Ross #1 ditch exits the east bank of Nelson Creek on National Forest land about 0.5 miles upstream from the Nez Perce Road crossing. The Ross #1 ditch is the largest and highest upstream of four irrigation ditches (Ross #1, Ross #2, Ross #3, and Hays ditches) that exit lower Nelson Creek. The Ross #1 ditch provides water for numerous homes in the Fox Lane area. It is not screened. Juvenile bull trout were initially found in the Ross #1 ditch in 1999. Another survey was conducted in August 2009, which also found several juvenile bull trout over a couple hundred feet of ditch. The Ross #1 ditch is a high priority for screening because it is capturing bull trout, and the point of diversion is ideally aligned so that any juvenile bull trout making their way downstream along the east bank of Nelson Creek have a good chance of getting funneled into the ditch. Once in the ditch, the fate of the trapped bull trout is unknown. There is water in the Ross #1 ditch year-round, but it gets really low in winter. Most of the bull trout that get trapped in the Ross #1 ditch are suspected to perish in winter. In 1999, juvenile bull trout were also found in the Ross #2, Ross #3, and Hays ditches. Forest fisheries biologists plan on re-surveying those ditches in 2010. They are also likely to be high priorities for screening.

Our key findings are:

- Very few of the irrigation ditches that exit the Forest are screened, but the Forest has been increasing its efforts in recent years to screen the ditches that have points of diversion on the Forest.
- The number of fish entrained in irrigation ditches across the Bitterroot River basin each summer numbers in the thousands. In the Lost Horse Creek ditch system, a research study estimated that 9,000 fish were entrained in ditches in 2005 and 2006. In the Tin Cup Creek ditch system, the estimate was about 3,000 fish entrained. The most common species entrained was the westslope cutthroat trout.
- Bull trout have been found in ten irrigation ditches. Bull trout are probably present in more ditches, but their densities are so low that their presence is difficult to detect. The ten ditches where bull trout have been found are:
    - ✓ Hawkes ditch, exits lower Chicken Creek (West Fork Ranger District)
    - ✓ Litchford ditch, exits lower Chicken Creek (West Fork Ranger District)
    - ✓ Sopher ditch, exits lower Hughes Creek (West Fork Ranger District)
    - ✓ Ross #1 ditch, exits lower Nelson Creek (West Fork Ranger District)
    - ✓ Ross #2 ditch, exits lower Nelson Creek (West Fork Ranger District)
    - ✓ Ross #3 ditch, exits lower Nelson Creek (West Fork Ranger District)
    - ✓ Hays ditch, exits lower Nelson Creek (West Fork Ranger District)
    - ✓ Bass ditch, exits lower Bass Creek (Stevensville Ranger District)
    - ✓ Two ditches that exit lower Lost Horse Creek (Darby Ranger District)
- Fish screens are expensive and high maintenance. The type of screen installed needs to be carefully assessed on a case-by-case basis. It is clearly not practical to install an expensive, self-cleaning 3/32nd inch screen on every ditch that exits the Forest. Our monitoring suggests that on small ditches, passive screens can be effective if they are cleaned regularly.

Grazing

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

1. Meadow Creek exclosure fence, constructed in 1996 and extended in 2004 (Meadow Tolan grazing allotment)
2. Waugh Creek exclosure fence, constructed in 1998 and extended in 2004-05 (Waugh Gulch grazing allotment)
3. Bugle Creek exclosure fence, constructed in 2000 (Meadow Tolan grazing allotment)
4. Reimel Creek exclosure fence, constructed in 2001 (Camp Reimel grazing allotment)
5. Paradise Campground jack-leg fence, constructed in 2000 (no allotment is associated with this fence)
6. Meadow Creek jack-leg drift fence, constructed in 2005 (Meadow Tolan grazing allotment)
7. Coal Creek jack-leg drift fence, constructed in 2007 (Coal Creek grazing allotment)

Each of these fences was monitored in 2009. The results are discussed in the following paragraphs.

Meadow Creek Exclosure Fence (Sula Ranger District). The Meadow Creek exclosure fence was constructed in 1996 as part of the INFISH action plan. In 2004, the exclosure was extended downstream by another 1750 feet. There are now three separate exclosures that total about 3850 linear feet of stream bank protection (roughly 1750 feet long + 1200 feet long + 900 feet long). The three exclosures are separated by two hardened cattle fords. 2009 was the 13th consecutive year that the exclosures were operational. 2009 was a successful season. No cows got inside the fences, and fisheries objectives were met. Since its construction in 1996, the Meadow Creek exclosure fence has been very effective. The riparian vegetation and stream banks inside the exclosures have recovered to near reference conditions.

Waugh Creek Exclosure Fence (Sula Ranger District). The Waugh Creek exclosure fence was constructed in 1998 as part of the Camp Reimel EA. In 2005, the Forest completed a 700-foot long extension on the upstream end of the 1998 exclosure fence. The Waugh Creek exclosure fence now consists of a 700-foot long exclosure and a 1400-foot long exclosure separated by a cattle ford. 2009 was the 11th consecutive year that the Waugh Creek exclosure fence was operational. The Waugh Gulch pasture did not receive scheduled grazing in 2009, and no cows got inside the exclosure fence. Trespass grazing, which has been a problem in past years, was negligible in 2009. The Waugh Creek stream channel inside the exclosure fence has narrowed and healed since 1998, which has produced much better fish habitat than what was present prior to fencing. In 2009, fisheries objectives were met inside the Waugh Creek exclosure fence.

Bugle Creek Exclosure Fence (Sula Ranger District). The Bugle Creek exclosure fence was constructed in 2000 as part of a fisheries improvement project. 2009 was the 9th consecutive year that the exclosure fence was operational. The exclosure fence functioned effectively in 2009. No cows got inside the fence. The riparian vegetation and stream banks inside the fence have shown excellent recovery since 2000. The stream channel has narrowed and healed, and the willow seedlings that were planted along the stream banks in 2000 and 2001 are growing well. The fence has not shifted livestock impacts to other unfenced areas, and has not concentrated grazing impacts above or below the fence to any great degree. The hardened livestock ford at the upper end of the fence has been effective in reducing bank trampling where livestock cross Bugle Creek. The livestock ford at the lower end of the exclosure has not been hardened, and it is erosive and a sediment source. However, because the channel has a sharp meander in the ford location, it would be difficult to harden at this time. The ford at the lower end of the fence is being monitored and will be hardened if channel conditions allow in the future. In 2009, fisheries objectives were met inside the Bugle Creek exclosure fence.

Reimel Creek Exclosure Fence (Sula Ranger District). In 2001, a five-mile long livestock exclosure fence was constructed around the burned riparian area of Reimel Creek. The upper end of the exclosure fence is located just below the mouth of Wallace Creek; the lower end is located where Reimel Creek exits the Forest. 2009 was the 9th consecutive year that the exclosure fence was operational. The Reimel Creek pasture was rested in 2009, and there was no livestock use inside or outside the exclosure.

Figure 15 - End-of-season conditions in the upper meadow below Wallace Creek. October 2009.

Figure 16 – End-of-season conditions in the lower meadow near the Road 727 crossing of Reimel Creek. October 2009.

The Reimel Creek exclosure fence has had mixed success since it was constructed in 2001. There have been mostly good years with minimal livestock trespass (e.g. 2001, 2002, 2004, 2006, 2008, and 2009), and poor years with widespread riparian impacts (2003, 2005, and 2007). In general, the poor years have been hotter and drier than the good years. Riparian conditions along Reimel Creek have substantially improved since the fence was constructed. The stream channel has narrowed, and numerous willow and alder shrubs have colonized the stream banks. Many of the shrubs originated from 2000-2001 plantings. The fish habitat structures that were constructed in 1999 are providing good pools and hiding cover. Most of the burned snags that were felled into Reimel Creek in May 2003 (BAR project) are providing decent hiding cover. Hundreds of new snags have fallen into or across Reimel Creek in the past couple of years. The short sections of Road 727 that were relocated further away from Reimel Creek in 2001-02 and 2005 are stable and have been effective in reducing road impacts on the stream channel. The Reimel Creek exclosure fence is the cornerstone that holds all of these riparian habitat improvements together.

Paradise Campground Jack-Leg Drift Fence (West Fork Ranger District). The Paradise Campground jack-leg drift fence was constructed in 2000 as part of a fisheries improvement project. 2009 was the 10th consecutive year that the fence was operational. The fence consists of a 0.25-mile long wooden jack-leg drift fence that runs along the north bank of Whitecap Creek adjacent to the Paradise Campground in two segments (separated by a gap of intact riparian vegetation). The fence has two goals: (1) keep stock off of the stream banks; and (2) restore the native riparian community of ponderosa pine trees and hawthorn shrubs to the stream banks. In 2009, goal #1 is being met, but goal #2 is not. The fence was successful in keeping stock off of the stream banks, as it has in all years since construction (goal #1). Previous years attempts to plant ponderosa pine and hawthorn seedlings on the stream banks, however, have been failures (goal #2). In 2009, only three ponderosa pine seedlings were alive and growing from the several hundred seedlings that were planted in 2001 and 2007. The rest were killed by droughty conditions. In 2009, Forest fisheries biologists took a different tack to restore hawthorn to the stream banks. 55 hawthorn shrubs in five-gallon containers (each shrub was about six feet tall) were planted on the banks. Most importantly, the newly planted shrubs were watered several times during the unusually warm September weather. Hopefully, most of these shrubs will survive and begin the restoration of the native pine/shrub community.

Figure 17 - Hawthorn shrubs planted on the stream banks inside the Paradise drift fence. September 2009.

Meadow Creek Jack-Leg Drift Fence (Sula Ranger District). The Meadow Creek jack-leg drift fence was constructed in 2005 along a grazed, upper reach of Meadow Creek. The purpose of the fence is to reduce livestock bank trampling (Meadow Tolan grazing allotment) along a chronically trampled quarter mile-long section of upper Meadow Creek that contains bull trout and westslope cutthroat trout spawning and rearing habitat. 2009 was the 5th consecutive year that the fence was operational. In most years, the fence has been successful in keeping livestock almost entirely out of Meadow Creek; however, 2009 was a marginal year with more livestock impacts occurring inside the fence than usual. It appeared that livestock were able to get inside the drift fence by going around the lower end of the fence and then walking upstream. Because of the increased use inside the fence, fisheries objectives were not met in 2009. In 2010, Forest fisheries biologists plan on fixing this problem by extending the drift fence further downstream by about 400 feet. The lower end of the fence extension will cross Meadow Creek and tie into the toe of a steep, rocky slope.

Coal Creek Jack-Leg Drift Fence (West Fork Ranger District). In 2007, a 1100-foot long, post and rail jack-leg drift fence was constructed along the north side of Coal Creek. The purpose of the fence is to protect westslope cutthroat trout spawning habitat from livestock bank trampling. 2009 was the 3rd year that the Coal Creek drift fence was operational. The fence functioned effectively in 2009. There were no signs of livestock use inside the fence, and use outside the fence was very light. The riparian vegetation and stream banks inside the drift fence looked good. In 2009, fisheries objectives were met inside the Coal Creek exclosure fence.

Meadow Tolan Grazing Allotment (Sula Ranger District). In October 2009, 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 11th consecutive year of post-grazing season monitoring (1999-2009). Results and trends are discussed in Item 17, Watershed Baseline Monitoring.

Waugh Gulch Grazing Allotment (Sula Ranger District). In August 2009, Forest fisheries, watershed, and range specialists established six long-term monitoring reaches in Waugh Creek and the West Fork of Camp Creek and several of its grazed tributaries. The purpose of these monitoring reaches is to track trends in bank trampling and channel cross-sections, similar to the monitoring that annually occurs in the Meadow Tolan grazing allotment. Results from this first year of monitoring are discussed in Item 17, Watershed Baseline Monitoring.

The Waugh Gulch allotment was grazed in 2009. Livestock were present in the West Fork Camp Creek pasture for most of the month of July. Westslope cutthroat trout redds are also present in the West Fork of Camp Creek at that time, so there is potential for livestock to walk in the stream and trample the redds. Forest fisheries biologists conducted a redd trampling study in the West Fork of Camp Creek in 2008 and 2009 in an attempt to estimate how much trampling of redds occurs by livestock and wildlife. In the study, 20 artificial redds were constructed in the West Fork of Camp Creek using clay pigeons. Ten of the redds were built between the Forest boundary and the Road 729 crossing; the other ten were built between the Road 729 crossing and the switchback where Road 8112 climbs out of the stream bottom. Each artificial redd consisted of a

group of four clay pigeons clustered together and buried in the spawning gravels. The clay pigeon redds were placed in areas where westslope cutthroat trout were likely to spawn, typically gravel-dominated pool tailouts. Redd placement occurred in the same locations in 2008 and 2009. The redds were left in the stream throughout the month of July, and then picked up at the end of the month. Redds which had more than one of their clay pigeons broken were considered to have been stepped on or "trampled". Redds with none or one of their clay pigeons broken were considered to have been not stepped on. This follows the methodology used on the Beaverhead-Deer Lodge National Forest, which has used artificial clay pigeon redds extensively to estimate redd trampling in their allotment streams.

In 2008, the Waugh Gulch allotment was rested and no livestock were present in the West Fork Camp Creek pasture. 2008 served as a control year to determine how much redd trampling occurred as a result of wildlife. In 2008, the redds were constructed on June 30th and picked up on July 30th. In 2009, the Waugh Gulch allotment was grazed and livestock were present in the West Fork Camp Creek pasture during most of the month of July. In 2009, the redds were constructed on June 29th and picked up on July 24th. Those dates match the time that livestock were present in the West Fork Camp Creek pasture.

In 2008, with no livestock present in the area, three of the 20 redds (or 15%) were trampled, presumably by wildlife. In 2009, with livestock present, four of the 20 redds (or 20%) were trampled. These results are somewhat preliminary because we only have two years of data for comparison, but they do suggest that livestock are probably not trampling a large number or percentage of the westslope cutthroat trout redds that are present in the West Fork of Camp Creek.

East Fork Grazing Allotment (Sula Ranger District). In June 2009, Forest fisheries biologists placed woody debris across three recontoured Road 13304 crossings on the North Fork of Lyman Creek. The purpose of the project was to protect three short segments of stream bank that were vulnerable to livestock bank trampling and stream channel widening. In October 2006, Road 13304 was recontoured and three fish barrier culverts on the North Fork of Lyman Creek were removed. Alder and dogwood seedlings were planted on the recontoured stream banks in the fall of 2006 and 2007. Good grass cover has returned to the recontoured road prisms, but at the three stream crossings where the culverts were removed, the shrubs are still only a foot or two tall, and there was no woody debris or obstacles to limit livestock movement. Thus, these areas were vulnerable to bank trampling and channel widening, and this project was implemented. The rest of the North Fork of Lyman Creek is well protected from livestock impacts by heavy accumulations of fire-killed snags. The alder and dogwood seedlings are alive and growing, and the woody debris is expected to protect them from grazing while they are small and vulnerable. Once the shrubs grow above the level of the woody debris, they should be large enough to survive any browsing. Along with covering the stream channels with woody debris, a livestock ford and watering area was designated at each crossing. This project is expected to protect the sensitive stream banks at the road crossings from trampling and widening, and allow the small shrubs enough protection to survive and grow to adulthood. Forest fisheries biologists will monitor the effectiveness of the woody debris in 2010.

Figure 18 – Recontoured crossing of Road 13304, before slashing. June 2009.

Figure 19 – Recontoured crossing of Road 13304, after slashing. June 2009.

Our key findings are:

- Riparian exclosure fences have proven to be a very effective tool for protecting riparian resources and the fishery within grazing allotments.
- Fenced riparian areas have shown that they respond quickly and positively to the absence of livestock grazing. Considerable recovery of the vegetation and stream banks occurs during the first year of livestock absence, and by year 3 to 5, riparian recovery is generally excellent.
- If they are regularly maintained, the fences essentially have a 100% chance of achieving recovery goals.
- The most negative aspect to riparian exclosure fences is the annual maintenance commitment; another is the lack of visual "naturalness" on the landscape (most of the fences are made out of conventional steel post and barbed wire) and a generally low potential for disrupting big game movement.
- If maintained, exclosure fences are good, reliable solutions for restoring localized riparian grazing problem areas and fish habitat.
- The results of two years of artificial redd monitoring in the West Fork of Camp Creek indicate that livestock are not trampling a large number or percentage of the westslope cutthroat trout redds in the West Fork of Camp Creek.

Weed Management

Magruder Corridor Roadside Herbicide Spraying (West Fork Ranger District). During summer 2009, Forest range personnel spot sprayed about 85 acres of road ditches along Road 468 (Deep Creek Road) and Road 6223 (Magruder-Paradise Road) in the Selway River drainage in Idaho. The ditches were sprayed with the herbicide aminopyralid (trade name Milestone) from a truck-mounted sprayer. Most of the ditches are located within 50 feet of live water. Forest fisheries biologists monitored the spraying to ensure compliance with aquatic protection mitigation measures. Based on their observations and follow-up conversations with the personnel who did the spraying, it appears that the aquatic protection mitigation measures were adequately followed. Spraying occurred during dry weather, and there were no heavy rains immediately after the herbicide applications.

Timber Management

In 2009, Forest fisheries biologists monitored the following timber sales:

- Gash Salvage (ongoing)
- Kerlee Bert (ongoing, part of the Middle East Fork project)
- Middle East Fork Recovery (ongoing, part of the Middle East Fork project)
- Lil' Lyman (completed in 2009)
- Halford Seed Production Area (ongoing)
- Burned Area Recovery (timber portion completed in 2007; watershed portion still ongoing)

The purpose of our monitoring was to: (1) verify protection of the RHCAs; (2) look for indications of sediment delivery to streams; (3) monitor log hauling conditions; (4) document the application and effectiveness of the fisheries mitigation measures; and (5) assess the effects analysis predictions made in project NEPA documents and biological assessments. The results of our monitoring were documented in individual unit logs for each visit, which are available upon request. The monitoring results for each of the sales are summarized below.

Gash Salvage Sale (Stevensville Ranger District). Forest fisheries biologists monitored the timber sale on November 3, 2009, following a report from the public that a wetland had been driven through. The review found the same amount of disturbed wetland that was present prior to the recent harvest. In other words, this disturbance was from several years ago, and was probably created during a previous harvest. The review included a check of the west and south boundaries of unit 8 and found all to fit the layout prescribed in INFISH and the NEPA document for the salvage sale.

Kerlee Bert Timber Sale (Sula Ranger District). In 2009, Forest fisheries biologists monitored the Kerlee Bert timber sale on January 8, January 27, February 9, February 20, April 22, May 11, October 23, and November 20. The following units were monitored: 14 and 15. Portions of units 14 and 15 were skyline yarded in autumn, 2009. The yarding systems in the Kerlee Bert timber sale consist of a mix of winter tractor and skyline. Harvest activity in 2009 was light and sporadic. The Kerlee Bert timber sale is ongoing and is scheduled to be completed by October 31, 2010.

Our monitoring findings indicate:

RHCAs: RHCAs are present in or adjacent to most of the Kerlee Bert harvest units. All of the RHCAs in the Kerlee Bert sale have been properly marked with one exception – in 2007, a wetland along the unit 17 boundary had its RHCA marked too narrow. The sale administrator adjusted the boundary to its proper width before harvest activities commenced. There has been no commercial harvest in the RHCAs, and yarding equipment has not entered into the RHCAs. No sediment has been seen leaving the harvest units, crossing into the RHCAs, and moving towards streams.

Haul road conditions: The primary haul roads are Roads 723 and 5785 in the Jennings Camp and Colvert Creek drainages, and Roads 5758 and 725 in the Meadow Creek drainage. Road 723 closely parallels Jennings Camp Creek for about 1.5 miles; Road 725 closely parallels Meadow Creek for about two miles. Most of the log haul on Road 723 has occurred in the wintertime with suitable winter hauling conditions. Fewer loads have been hauled on Roads 5758 and 725 in the Meadow Creek drainage. Most of the log hauling in the Meadow Creek drainage has occurred during October-December with dry and minimal ice conditions.

Whenever hauling has occurred on Roads 723 or 725, straw bale check dams have been installed as mitigation on the outlets of all of the ditch relief culverts along the road segments that closely parallel Jennings Camp Creek and Meadow Creek. Ten check dams have been installed on Road 723; 20 check dams have been installed on Road 725. The check dams have been monitored and cleaned out in the spring of 2008 and 2009.

On Road 723, four of the 10 check dams trapped sediment in 2008 and prevented it from entering Jennings Camp Creek. In 2009, five of the 10 check dams trapped sediment. The total amount of sediment trapped by the check dams was 32 gallons in 2008 and 11 gallons in 2009. Spring break-up occurred more gently in 2009 than it did in 2008, which resulted in less erosion of the Road 723 surface and less sediment entering the ditch system. Another key factor was the time of season that log truck traffic ceased. In 2009, log truck traffic ceased in mid February, which was about six weeks earlier than in 2008 (late March). This gave Road 723 six extra weeks to melt off slowly without any log truck traffic, which does make a difference in the amount of road surface erosion. Finally, there have been no indications of sediment escaping the check dams and entering directly into Jennings Camp Creek in any years.

On Road 725, only one of the 20 check dams trapped sediment in 2008, and that occurred in an insloped ditch leading into a ditch relief culvert. In 2009, none of the 20 check dams trapped any sediment. The total amount of sediment trapped by the check dams was 7 gallons in 2008 and 0 gallons in 2009. There have been no indications of sediment escaping the outlets of the ditch relief culverts and entering Meadow Creek.

Our monitoring indicates that the straw bale check dams have been effective in keeping sediment out of Jennings Camp and Meadow creeks. The check dam mitigation is a useful tool to prevent road sediment from entering nearby streams when winter hauling occurs along roads that closely parallel streams. With the straw bale check dams, road erosion and sediment contributions to Jennings Camp and Meadow creeks has been minimized to the greatest extent possible, given the poor locations of Roads 723 and 725. The road maintenance (grading and snow plowing) on the Kerlee Bert sale has been conducted in a manner consistent with the programmatic road maintenance biological assessment for bull trout and the mitigation measures in the Middle East Fork Record of Decision.

Consistency with mitigation measures: The fisheries mitigation measures are listed on pages C-9 and C-10 in the Middle East Fork Record of Decision. All of the fisheries mitigation measures have been properly followed.

Effects analysis predictions: In the Middle East Fork FEIS and bull trout biological assessment, it was predicted that there would be no detectable increase in sediment in fish habitat, no increases in water temperatures, and no reductions in stream shade, woody debris recruitment, and RHCA function. Based on the fact that no sediment has been seen crossing into the RHCAs, and no point source sediment inputs have been observed along haul roads, it is very unlikely that a detectable sediment increase has occurred as a result of the Kerlee Bert timber sale. Water temperature monitoring with continuously-recording HOBO-TEMP thermographs failed to detect any discernable temperature increases in Jennings Camp Creek (see Item 21 and 41 for more details), as would be expected because there was no reduction of shade in its RHCAs or those of its tributaries. No harvest of trees has occurred in the RHCAs. As a result, the sale has had no effect on

woody debris recruitment or RHCA function. In conclusion, our monitoring indicates that the predictions made in the Middle East Fork Record of Decision and bull trout biological assessment have been valid.

Middle East Fork Recovery Timber Sale (Sula Ranger District). In 2009, Forest fisheries biologists monitored the Middle East Fork Recovery timber sale (phases I and II) on September 1 and October 23. The following units were monitored: 2, 14, 45, 68R, 121, 124, 125, and 245. The yarding system in the Middle East Fork Recovery sale is 100% helicopter yarding. Harvest activity was heavy in summer and autumn, 2009. The Middle East Fork Recovery sale is ongoing and is scheduled to be completed by the end of 2010.

Our monitoring findings indicate:

RHCAs: RHCAs are present in or adjacent to most of the Middle East Fork Recovery harvest units. All of the RHCAs in the Middle East Fork Recovery sale have been properly marked. There has been no commercial harvest in the RHCAs, and yarding equipment has not entered into the RHCAs. No sediment has been seen leaving the harvest units, crossing into the RHCAs, and moving towards streams. Soil disturbance has been very minimal in the harvest units due to the helicopter yarding.

Haul road conditions: The only haul road that was used in 2009 was the East Fork Highway, which is paved county highway. There has been no hauling-caused road damage or increased sediment delivery to streams.

Consistency with mitigation measures: The fisheries mitigation measures are listed on pages C-9 and C-10 in the Middle East Fork Record of Decision. The fisheries mitigation measures have been properly followed.

Effects analysis predictions: In the Middle East Fork FEIS and bull trout biological assessment, it was predicted that there would be no detectable increase in sediment contributions to fish habitat, no increases in water temperatures, and no reductions in stream shade, woody debris recruitment, and RHCA function. Based on the fact that no sediment was seen crossing into the RHCAs from the harvest units, and no point source sediment inputs have occurred along the East Fork Highway haul road, it is highly unlikely that a detectable sediment increase has occurred as a result of the Middle East Fork Recovery timber sale. Water temperature monitoring with continuously-recording HOBO-TEMP thermographs failed to detect any discernable temperature increases in Guide Creek (see Item 21 and 41 for more details), as would be expected because there was no reduction of shade in the RHCA surrounding Guide Creek. There has been no commercial harvest of trees in the RHCAs, and where manual thinning has occurred in RHCAs, it has been conducted in a manner that meets the fisheries mitigation measures in the Middle East Fork Record of Decision and the programmatic timber sale improvement biological assessment for bull trout. Meeting those mitigations has adequately protected and maintained shade, woody debris recruitment, and RHCA function. In conclusion, our monitoring indicates that the effects of the Middle East Fork Recovery timber sale have been consistent with the predictions made in the Middle East Fork Record of Decision and bull trout biological assessment.

Lil' Lyman Timber Sale (Sula Ranger District). In 2009, Forest fisheries biologists monitored the Lil' Lyman timber sale on May 11 and May 19. The following units were monitored: 9a and 9d. The yarding system consisted of a mix of winter tractor and skyline. All of the timber harvest and log hauling in the Lil' Lyman sale was completed by December 31, 2008. In 2009, we concluded our monitoring of the Lil' Lyman sale by checking the RHCAs in units 9a and 9d and cleaning out the straw bale check dams along Road 311. The Lil' Lyman timber sale was closed in summer, 2009.

Our monitoring findings indicate:

RHCAs: RHCAs were properly marked in all of the units. No commercial harvest occurred in the RHCAs, and there was no entry of yarding equipment into the RHCAs. No erosion was seen leaving the harvest units, crossing into the RHCAs, and moving towards streams.

Haul road conditions: The primary haul roads were Roads 311, 717, and 1398 in the Lyman and Guide Creek drainages. Road 311 closely parallels Guide Creek for 2.4 miles between the East Fork Highway and Guide Saddle. Intermittent hauling occurred in November and December 2008 under mostly ice-free conditions. Log hauling was completed by December 31, 2008. During the log hauling on this sale, straw bale check dams were installed as mitigation on the outlets of all of the ditch relief culverts on Road 311 between the East Fork Highway and Guide Saddle. A total of 21 check dams were installed. The check dams were monitored and cleaned out following winter hauling in the springs of 2007, 2008, and 2009. Over the three winters that log hauling occurred, 7-12 of the 21 check dams trapped some sediment and prevented it from entering Guide Creek. Sediment tended to be trapped by the same check dams each year. By year, the total amount of sediment that was trapped by the check dams was: 44 gallons in 2007; 33 gallons in 2008; and 35 gallons in 2009. Our monitoring indicates that the straw bale check dams were effective in keeping sediment out of Guide Creek. The check

dam mitigation is a useful tool to prevent road sediment from entering nearby streams when winter hauling occurs along roads that closely parallel streams. With the straw bale check dams, road erosion and sediment contributions to Guide Creek were minimized to the greatest extent possible, given the poor location of Road 311. The road maintenance (grading and snow plowing) on the Lil' Lyman sale was conducted in a manner consistent with the programmatic road maintenance biological assessment for bull trout and the mitigation measures in the Lil' Lyman Decision Memo.

Consistency with mitigation measures: The fisheries mitigation measures are listed in the Lil' Lyman Decision Memo. All of the fisheries mitigation measures were properly followed in the Lil' Lyman sale.

Effects analysis predictions: The fisheries biological assessment predicted that the Lil' Lyman timber sale would have a negligible effect on bull trout and their habitat in the East Fork Bitterroot River because of the miniscule quantities of sediment that could potentially enter the East Fork from Guide Creek. Based on our monitoring of the log haul along Guide Creek, it is obvious that any sediment that came off the haul road, escaped the check dams, and managed to get routed downstream into the East Fork and enter bull trout habitat was very small and immeasurable. This indicates that the predictions made for bull trout were valid.

The fisheries biological evaluation predicted that the Lil' Lyman timber sale would impact individual westslope cutthroat trout, but not on the scale needed to reduce viability or contribute to federal listing. The main impact was predicted to be localized and short-term reductions in the quality of spawning and rearing habitat in the North Fork of Lyman Creek caused by sedimentation from removing culverts on Road 13304. The harvest activities themselves were predicted to cause immeasurable sediment contributions to westslope cutthroat trout habitat in all streams. Because of the protection of the RHCAs from harvest, no changes to water temperatures or woody debris recruitment were predicted to occur. The monitoring findings suggest that these predictions were valid. The amount and extent of sedimentation below the road crossings was consistent with the effects analysis. Water temperature monitoring with continuously-recording HOBO-TEMP thermographs failed to detect any discernable temperature increases in the North Fork of Lyman Creek (see Item 21 and 41 for more details), as would be expected because there was no reduction of shade in its RHCAs or those of its tributaries. No harvest of trees occurred in RHCAs. As a result, there was no effect on woody debris recruitment. By the summer of 2009, two high flows had occurred since the culverts had been removed from Road 13304, and the sediment that had been deposited below the road crossings was flushed from the area. This was consistent with the predictions made in the fisheries biological evaluation.

Halford Seed Production Area Timber Sale (West Fork Ranger District). In 2009, Forest fisheries biologists monitored the Halford Seed Production Area timber sale on March 2 and April 17. The sale consists of three small commercial thin units (units 8, 9, and 10) in the lower portion of the Gemmell and Halford Creek drainages. The yarding system is a mix of winter tractor and skyline. The sale is ongoing. Harvest activity was very light in 2009. It consisted of a couple of weeks of winter tractor yarding in unit 9.

Our monitoring findings indicate:

RHCAs: Only unit 9 contains RHCAs. The RHCAs were properly marked, and there has been no commercial harvest in the RHCAs. There has been no entry of yarding equipment in the RHCAs. No erosion has been seen leaving the harvest units, crossing into the RHCAs, and moving towards streams.

Haul road conditions: The haul roads are Forest Road 5633 and several of its spurs (5633-A, 74014, and 13487). This is an upland road system that switchbacks across the slope and crosses Gemmell Creek (a small westslope cutthroat trout stream) twice and Halford Creek (a non-fish bearing intermittent stream) three times. The Road 5633 system is steep and erosive. The most erosive segments were gravel surfaced in 2007, which has greatly reduced rilling and erosion from the road surface. Only a light amount of log hauling occurred in 2009, and it only affected a short segment of Road 5633 below the 74014 junction. Prior to the start of log hauling, straw bale check dams have been properly installed at the stream crossings. The straw bale check dams are required mitigation. Post-haul monitoring following spring break-up indicates that the straw bale check dams have been effective in trapping road sediment in the ditch system and preventing it from entering streams. Most of the check dams trapped at least some sediment in the road ditches, and no direct input of sediment to streams was observed in 2009. The straw bale check dams have been properly installed and maintained during hauling. While plowing snow in March 2009, the purchaser side-casted a small patch (10 feet X 12 feet) of gravel aggregate off of Road 5633 near the Road 74014 junction. The gravel was side-casted in a place where it posed no risk to streams. The gravel was shoveled by hand back onto the road prism. With the exception of that one small area of side-cast, the rest of the road use, log hauling, and snow plowing has been conducted in a manner that is consistent with the programmatic road maintenance biological assessment for bull trout.

Consistency with mitigation measures: The fisheries mitigation measures are listed in the Halford Seed Productions Areas Decision Memo. All of the fisheries mitigation measures have been properly followed.

Effects analysis predictions: The fisheries biological assessment and evaluation predicted that the Halford Seed Production Areas timber sale would result in insignificant sediment inputs to streams and would maintain water temperatures, water quality, woody debris recruitment, and fish habitat structure and complexity. No detectable changes would occur to fish populations. Our monitoring has validated these predictions. Because the RHCAs have been protected, all of the fish habitat elements have been maintained. Measurable sedimentation caused by sale activities has not been detected in any streams.

Burned Area Recovery Project (All Districts). There are three fisheries monitoring items in the Burned Area Recovery FEIS (Volume II, Appendix C, pages C-12 to C-16). Forest fisheries biologists started monitoring these items in February 2002, and they have been monitored and reported every year since. Monitoring of items #1 and #3 was completed in 2007 when the last of the Burned Area Recovery salvage sales closed. The results for items #1 and #3 were reported in our 2007 Forest Plan Monitoring Report, and will not be reiterated in this report. We only report the results of item #2 in this report. Monitoring of item #2 will continue until all of the Burned Area Recovery culvert replacements and road storage is completed.

FISHERIES MONITORING ITEM # 2

The objectives of item #2 are to:

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

In order to meet the objectives of Item #2, we focused our monitoring efforts to answer the following questions.

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

YES. In 2009, 12.4 miles of road were decommissioned, 1.7 miles of road were stored, and one fish culvert (East Piquett Creek, Road 731) was replaced. All of the road decommissioning in the Burned Area Recovery settlement agreement was completed in 2009. Monitoring of the decommissioning indicates that BMPs were properly applied to minimize sediment production during and after recontouring. The roads that were decommissioned in 2009 were predominantly upland roads with only a few wet areas or stream crossings on small, non-fish bearing headwater tributaries. None of the stream crossings were located near occupied fish habitat. We did not observe any significant erosion or sedimentation problems. Project effects were well within the bounds of the Burned Area Recovery FEIS effects analysis. So far, we have observed no problems with BMP application during road decommissioning or road storage activities.

Figure 20 – Recontoured stream crossing on Gilbert Creek (Road 73677) at the start of its first growing season. June 2009.

Figure 21 – Recontoured stream crossing on Medicine Tree Creek (Road 73213) at the start of its second growing season. June 2009.

The total number of fish culverts that have been replaced or removed in the Burned Area Recovery project is now 23. These are listed below:

1. Daly Creek tributary 5.1 (removal), Road 5783. August, 2001
2. Sand Creek, Road 362. July, 2003
3. Magpie Creek, Road 362. July, 2003
4. Took Creek, Road 362. July, 2003
5. Took Creek, Road 1303. July, 2003
6. Bugle Creek, Road 725. October, 2003
7. Crazy Creek, Road 370-A. October, 2003
8. West Fork Camp Creek, Road 729. October, 2003
9. West Fork Camp, unnamed tributary 0.9, Road 8112. October, 2003
10. West Fork Camp, unnamed tributary 1.0, Road 8112. October, 2003
11. Railroad Creek, Road 75, August 2005
12. Hog Trough Creek, Road 75, August 2005
13. Weasel Creek, Road 75, August 2005
14. Rye Creek, unnamed tributary 12.3, Road 75, September 2005
15. Rye Creek, unnamed tributary 12.3, Road 5607, September 2005
16. North Rye Creek, Road 321, August 2006
17. Moose Creek (new bridge), Road 726, August 2007
18. Coal Creek, Road 5662, September 2007
19. Hart Creek, Road 311, September 2008
20. Hart Creek, Road 73180, September 2008
21. Mink Creek, Road 5753, September 2008
22. Castle Creek, Road 49, October 2008
23. East Piquett Creek, Road 731, May 2009

Two BAR fish culverts (Two Bear Creek, County Road 85D; Mine Creek, Road 5688) are under contract to be replaced in 2010. When these are completed, there will be three Burned Area Recovery fish culverts left to replace or remove:

1. Rye Creek, Road 5612
2. North Rye Creek, Road 8111
3. Waugh Creek, Road 13334

An engineering design has been completed for the Rye Creek, Road 5612 culvert, but the replacement is currently on hold because of improved passage conditions at the site. The 2001 mudslides altered the stream channel at the site and deposited substrate throughout the culvert barrel. As a result, the existing culvert has been satisfactorily passing fish since that time. As long as the existing culvert is adequately passing fish, no action will be taken to replace the culvert.

An engineering design has been completed for the North Rye Creek, Road 8111 culvert. Once the design is approved by the Forest engineer and fisheries biologist, the culvert will be ready for contracting.

An engineering design has been completed for the Waugh Creek, Road 13334 culvert, but the replacement is currently on hold because Road 13334 is involved in the Forest's Travel Management EIS, which is scheduled to have a signed decision in 2010. Pending the outcome of the Travel Management EIS, it is possible that the culvert could be removed instead of replaced.

Nine of the original 37 Burned Area Recovery culverts have been dropped from consideration. These are listed below, along with the rationale for dropping the culvert.

1. North Rye Creek, Road 321 (upper crossing, Section 31): Dropped in 2001 because the culvert was replaced by the BAER teams in October, 2000. A negligible amount of suitable fish habitat is present above this crossing.
2. North Rye Creek, unnamed tributary 4.3, Road 62435: Dropped in 2002 because the culvert was located on private land. The section is now State owned. The Forest Service has no jurisdiction.
3. Daly Creek, unnamed tributary 3.2, State Highway 38: Dropped in 2003 because the culvert is under the jurisdiction of the Montana Department of Transportation.
4. Bugle Creek, Road 73609: Dropped in 2003 because surveys indicate that no fish are present above or below the culvert, and suitable fish habitat is not present due to high gradients.
5. Elk Creek, Road 13860: Dropped in 2006 because surveys indicate that no fish are present above or below the culvert, and suitable habitat is not present due to high gradients.
6. Taylor Creek, County Road 104-A: Dropped in 2007 because the culvert is located on a county road that accesses numerous private homes, and a temporary bridge would have to be constructed to allow vehicle access during the replacement. This makes the cost of replacement prohibitively expensive considering the minimal amount of habitat it would open up upstream of the road crossing.
7. Mill Gulch, County Road 104-A: Dropped in 2007 for the same reason as Taylor Creek.
8. Malloy Gulch, County Road 104-A: Dropped in 2007 for the same reason as Taylor Creek.
9. Spring Gulch, Road 75: Dropped in 2009 due to the stream drying up at base flows.

The Bitterroot Headwaters TMDL recommends that the Forest monitor any new culvert replacements to ensure that fish passage is being adequately maintained. In 2009, Forest fisheries biologists monitored all 23 of the Burned Area Recovery fish culvert replacements that have occurred so far. 19 of the 23 culvert replacements are maintaining year-round fish passage. The four that are not are: (1) Magpie Creek (Road 362); (2) lower Took Creek (Road 362), (3) upper Took Creek (Road 1303); and (4) Coal Creek (Road 5662). The Magpie and Took Creek culverts maintain fish passage for most of the year when stream flows are higher, but at base flows, they sometimes do not maintain passage because the stream water flows subsurface through the culvert barrels. When stream flows increase in late autumn, adequate surface flows return to the culvert barrels and fish passage is re-established. As more fines are deposited and seal the interstitial spaces in the coarser substrates, year-round surface flows are expected through the Magpie and Took Creek culvert barrels, which would maintain year-round fish passage at those sites. Most of the substrate in the Road 5662 culvert on Coal Creek was scoured out when a grade control structure upstream of the culvert inlet failed during high runoff flows in 2008. The Forest plans on repairing the failed grade control structure and adding substrate to the Road 5662 culvert barrel in 2010. Those repairs should re-establish year-round fish passage at that site.

Figure 22 - Looking downstream through the Road 5662 culvert on Coal Creek. Much of the substrate in the barrel was scoured out during 2008 high flows. October 2009

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

YES. The application of BMPs met State water quality standards during the replacement of the East Piquett Creek fish culvert and the decommissioning and storage of roads. None of the work produced unexpected or unusually high sediment inputs to streams. The replacement of the East Piquett Creek fish culvert and the road decommissioning and storage was consistent with the Forest Plan as amended by INFISH. The road decommissioning and storage was implemented in a manner that promotes the long-term health of watersheds (INFISH standard WR-1). The East Piquett Creek fish culvert was sized to pass the 100-year flood (INFISH standard RF-4), and installed in a stream simulation manner to maintain fish passage (INFISH standard RF-5).

Our key findings are:

- BMPs have been properly applied during culvert replacement, road decommissioning, and road storage activities. The application of BMPs has been consistent with meeting State water quality standards.
- Sediment contributions during the culvert replacements have been within the bounds of the effects analysis in the Burned Area Recovery FEIS. Water quality has been protected to the extent possible given that short-term sediment inputs are unavoidable while replacing culverts.
- Sediment contributions from the road decommissioning and storage activities have been negligible, essentially having no effect on fish habitat. Most of the ground disturbance has occurred away from live water, and where streams have been affected, the streams are small and do not contain fish.
- The culvert replacement, road decommissioning, and road storage activities have complied with the Forest Plan as amended by INFISH.

Water and Sediment Yield
Monitoring Item 17

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

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

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

REPORTING PERIOD: 2009.

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

EVALUATION - General

The 2001 and 2002 Forest Plan Monitoring and Evaluation Reports, Item 17, discuss the results of fourteen years of monitoring "streams representing major geologic types" as identified in the Forest Plan. In summary, results using the prescribed methodologies have been highly variable. While we may continue to collect this data for other purposes, it has provided limited usefulness in directly addressing the objectives of this monitoring item. Findings suggesting high sediment load variability and a need for research-level sampling programs have been consistent with recent literature. Additional monitoring methods, along with ongoing evaluation of relevant scientific literature, are now being used to better address this monitoring item's objectives. Focus of this item was shifted to tracking progress towards meeting TMDL goals, BMP compliance, and substrate monitoring to judge effectiveness of these practices.

EVALUATION – Compliance with Federal and State Water Quality Standards

This water resource monitoring component documents how the Bitterroot National Forest is minimizing non-point source pollution through implementation of watershed restoration plans and Best Management Practices (BMPs). Items tracked are the implementation and effectiveness of the recent *Water Quality Restoration Plan and Total Maximum Daily Loads for the Bitterroot Headwaters Planning Area* ("Headwaters TMDL", MT DEQ 2006) and of BMPs for on-going timber harvest and road projects.

The 2006 Bitterroot Headwaters TMDL provided a landscape-scale assessment of water quality and human impacts in the area upstream of the East and West Fork Bitterroot River confluence. Much of this study area is on the Bitterroot National Forest and the TMDL included sediment-reduction guidance for the Forest's road system.

The Bitterroot National Forest is not formally required to monitor stream conditions for the TMDL. However, East Fork Pebble counts will be performed annually, as budget allows, providing substrate trend information for both DEQ and the Forest. Other monitoring related to effectiveness of TMDL improvements would occur to document sediment reductions and completed watershed improvements to provide information that would support removal of streams from the State Impaired Waters (303(d)) List or the implementation of additional restoration efforts .

The Middle East Fork Hazardous Fuels Reduction Project is located wholly within the East Fork Bitterroot River watershed, and encompasses several streams listed in the Headwaters TMDL. The majority of this project was completed by the end of the 2008 field season, including its watershed restoration activities. The remainder of the work is ongoing in Kerlee Bert Stewardship, MEF Stewardship II, and Tepee Blend Stewardship projects with some of the funding to complete the MEF Stewardship II project coming from funds authorized in the America Recovery and Reinvestment Act. Ongoing mitigation, such as compliance with SMZ or RHCA regulations, would continue as the remaining vegetation management portions of

the project are completed.

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

IMPLEMENTATION MONITORING

Watershed Water Quality Restoration Plan

To support the Headwaters Water Quality Restoration Plan, as funding permits the Forest Service will locate and treat active sediment sources with the long-term goal of reducing the overall chronic sediment load and improving fish passage within the TMDL planning area. This plan includes crossing improvements, road and crossing decommissioning, riparian area fencing, and other applicable treatments to reduce connected disturbed areas. Sediment/erosion reduction projects accomplished in 2009 are listed below.

Table 23 – Watershed Projects in 2009 addressing Bitterroot Headwaters TMDL

Watershed/Projects - 2009	Treatment/area
Shrub Planting (various watersheds and culvert replacement or removal sites) – Other sites not accounted for here were planted with shrubs in the Mainstem TMDL area and in the Selway watershed.	Stabilize soils with native shrubs (7 sites)
Seeding and fertilizing of soil disturbed along during road and trailhead improvements on the Baker Lake Road, NFSR 5634.	4 acres (multiple sites)
Reseeding and fertilizing of excaliner pad in Painted Rocks West Timber Sale	1 site
Burn pile rehab, Middle East Fork area	Multiple sites, 5 Acres
Headwaters TMDL Road/stream crossing inventory. Bitterroot Water Forum Cooperative Project.	Multiple sites, 20 survey areas

In 2009, the Bitterroot National Forest worked with the Bitterroot Water Forum, a citizen-based non-profit watershed group, to inventory road/stream crossings in the Bitterroot Headwaters area. Over a 2 month time period, two one-half day sessions were held to train 13 volunteers to access road/stream crossing and other sediment sources. Twelve volunteers collected data, one completed data entry; a total of 20 different survey areas, a distance of 1956 miles of road were reviewed for sediment sources. Data will be used to guide road maintenance needs and gravel surface opportunities to reduce sediment contributions in the Bitterroot Headwaters Area.

Best Management Practices

The Bitterroot National Forest implemented numerous Best Management Practices to reduce road and activity-related sediment. Funding for the projects was provided by watershed, National Fire Plan, stewardship, and other program funds. **See Item 19 for a more complete list of 2009 improvements.** Projects implemented in 2009 to comply with BMP direction and reduce sediment sources, especially related to active forest management included:.

- Middle East Fork Hazardous Fuels Reduction Project – Placed & maintained straw bale check dams along timber sale haul routes to protect streams from haul-related sediment. Sites included cross drain pipes or roadside ditches accessing streams on FDR 725, 723 and 311..
- FR75 Rye Creek Road BMP upgrade – Improvements completed on Rye Creek Road, NFSR 75 and the North Fork Rye

Road, NFSR 32. In 2009 gravel was applied over 12 miles to reduce erosion of the road surface and sediment deposition in streams immediately adjacent to the roads. Approximately 3 miles of reconstructed roadside ditch was seeded to stabilize surfaces and reduce sediment.

No Montana State BMP audits occurred on the Bitterroot National Forest in 2009. State audits occur on even numbered years.

To fulfill our commitment to EMS, Environmental Management Systems, and as part of the Forest Plan monitoring effort, forest hydrologists participated in forest-wide monitoring trip. The intent of the monitoring was to determine if project implementation was followed analysis parameters and complied with the Clean Water Act (CWA), TMDLs, Executive Order (EO) 11988 protecting floodplains, and EO 11990 protecting wetlands, Forest Plan.

The following timber sales (TS) were monitored for Best Management Practices (BMP) application and effectiveness for FY2009 by Ed Snook (Hydrologist) and Marilyn Wildey (Hydrology Technician). The audits were completed between August 25 and September 15, 2009 (Table 24 – Timber Sale BMP Audits Conducted).

Table 24 – Timber Sale BMP Audits Conducted

Sale Name	Type of Sale	Period of Operation	Closed or Open?	Units/Roads Monitored/purpose
Frazier	Fuels Reduction	9/2004-11/15/2006	Closed	Prescribed Burn Units 64W, 64E, 4
Middle East Fork	Fuels Reduction		Open	Prescribed Burn Unit 64
Middle East Fork	Fuels Reduction	2006 – present time	Open	Analysis Validation: Cover reduction Unit 37, 12A, 13, 17, 19, 10A, 10B
Haacke Clarement	Vegetation Management	7/2008 present time	Open	Unit 14, wetlands protection
Painted Rocks West	Fuels Reduction		Closed	Review of excaliner landing Unit 1B
Gash Fire Salvage	Salvage	9/2007 - present	Open, but unit 1 closed	Unit 1 logging system change

Review of application of the Bitterroot National Forest Best Management Practices and their effectiveness was completed by reviewing the environmental analysis documents, unit logs (implementation monitoring documents) sale administrator's notes and recollections (verbal transfer of information), the Bitterroot NF BMP's, and a field review or Audit, of the sale area. The Audit focused on sales and units within those sales with riparian areas, unique mitigation requirements, and/or temporary roads. The prescribed fire units evaluated in 2009 were part of the Forest-wide EMS monitoring effort to evaluate the effects of prescribed fire and compare to analysis expectations. The landing in Unit 1B Painted Rocks West that was a revegetation concern in 2008 was reviewed in 2009 and a portion of it received additional treatment. Several units in the Middle East Fork project were reviewed to determine if crown cover removed meets analysis expectations.

For each the timber sale reviewed, the Audit was reported on the State of Montana Best Management Practices Review Worksheet. This form lists each State BMP and provides space for identification of Applicable to Site (Y/N), and numerical ratings for Application and Effectiveness. Other monitoring efforts were documented in field notebooks and in this report.

Frazier TS - The Frazier prescribed fire units 64W and 64E were part of the Forest EMS field trip, both burned in the spring of 2009. These units were commercially harvested using ground based equipment or skyline yarded with a track-line machine. The intent of the project was an understory thinning with approximately 20-30 percent of the ground disturbed or having vegetation removed. Since the prescribed fire, vegetation has recovered very well with sprouting vegetation present across the landscape. The effects of the fire were within what was analyzed.

In Frazier, we also looked at Unit 4, as the silvicultural prescription had been changed since the analysis was completed and

the fuels specialist wanted to make sure that the prescription was acceptable. The new prescription called for a stand replacing fire in the riparian area which is not analyzed in the EA. This activity would also disagree with the Streamside Management Zone act that prohibits broadcast burning (essentially causing a stand replacing fire in this case) in streamside zone. Discussion during the field trip identified these concerns and it was recommended this prescription not be implemented because the lack of analysis and potential SMZ violation.

Middle East Fork Project - The MEF prescribed fire Unit 64 was evaluated as part of the Forest EMS field trip. It was identified in the analysis as decreasing crown cover from 65% cover to 55% cover. The actual cover removed is within what was analyzed and is consistent with the analysis. The unit was located about 50 feet from the river and no lighting occurred outside of the unit. Modeling estimated about 1/3 ton of sediment could be contributed to the river following treatment. At the present time no observable erosion or transport of sediment to the river has occurred and the vegetated buffer is intact. A portion of the unit was thinned and piled by hand, then burned in 2007. The remainder of the unit was treated with prescribed fire and was burned in early October, 2008. Revegetation since that time is within what was expected and analyzed during project planning.

Several units in the Middle East Fork project were reviewed to determine if the crown cover removed during implementation was within what was analyzed during project planning efforts. This project was a fuels reduction and salvage project, removing dead and dying insect killed trees. At the time of analysis the silviculturist estimated existing crown cover and then estimated a range (40-60% for example) how much that would be reduced by removal of dead and dying trees. That range was averaged (50%) for watershed modeling purposes. Field review found that of the eight units reviewed, two were within what was analyzed – meaning that there was more crown cover remaining than was planned for; four were more open than was analyzed – either more trees were removed than expected or those that remained had smaller crowns; and two were more open than analyzed but analysis should have started at a lower crown cover as the pre-treatment units were more open than identified in analysis – a fewer number of trees were removed yet little crown cover remained. Several things may have happened: 1) Most likely, more trees were actually dead or dying at the time of harvest that was thought would be during analysis and so estimates of remaining live crown cover were higher than what actually occurred; or 2) The silviculturist incorrectly estimated what the crown cover would be either before or after implementation. In an ideal situation, it would be best to better estimate existing crown cover at the present time (existing condition) and better estimate how much cover would be removed but it is difficult in a salvage sale like MEF, to estimate actual insect mortality at some future date. Additional monitoring of crown cover after harvest by hydrologists and silviculturists should occur in 2010 to get a better sample of post-implementation crown cover and determine if it is necessary to develop a method for better estimating post-implementation crown cover.

Haacke – Claremont - In the Haacke Claremont Sale, Unit 14 was reviewed for water resources protection through suggestion of the timber sale administrator (TSA). A small, linear wetland was discovered in the bottom of an otherwise dry swale during layout, creating a need to alter the harvest pattern to protect the wetland. This wetland was discovered when the FS was laying out the corridors and landings before felling started in the harvest unit. Additional trees were marked for reserve to form a buffer around the wetland before the sawyers arrived. The wetland was quite small (less than 100' long and only 3-4' wide) but qualified as an "isolated wetland", deserving of protection from yarding impacts. During post-harvest inspection, it was evident no ground disturbance had occurred within 50' of the riparian vegetation. The unit prescription was a commercial thin with a suspended cable yarding system, leaving appropriate levels of stocking and large trees on the site. Documentation of the effects occurred on the Montana Forest Practices Review Worksheet that is part of the SMZ audit form. All applicable items received ratings of 4 or 5 (adequate or improved protection of SMZ). The majority of trees adjacent to the wetland, including the larger trees, was left uncut and currently provides shade to the wetland. The swale/drainage was not used as a corridor above or below the buffered wetland, protecting the swale bottom from soil disturbance and associated erosion. Evidence on the ground strongly suggests the TSA and layout crew acted promptly and appropriately to protect the small wetland and no damage to water resources occurred, or is likely to occur, at this site.

The haul route for Haacke-Claremont utilizes the Ambrose Creek Road (FR428) from Ambrose Saddle to the Eastside Highway. This road uses several BMP-related practices, such as gravel surface, pre-haul maintenance, and specified prism and drainage features to protect water quality, but is in a poor location for water resources; immediately adjacent to Ambrose Creek. Log-haul traffic has the potential to increases sediment loading to a creek already on the MTDEQ 303(d) list for sediment and nutrients, despite the compliance with BMPs. This summer, sediment catch boxes were constructed

at several culvert outlets to reduce sediment from these road segments. FY2010 monitoring will report on effectiveness of this treatment.

Painted Rocks West - A return visit to the track-line machine landing and temporary road in Painted Rocks West, Unit 1B found that the recontoured road/go-back trail had revegetated well since the 2007 visit and no additional work was needed. The landing area however did have limited revegetation and the West Fork fire crew completed a small project in September of 2009 to decompact the hardened surface, seed and fertilize the area needing additional treatment. The effectiveness of this treatment may be limited due to the presence of weeds and the fact that it was not possible to spray the area for weeds before additional seeding as there was no NEPA completed on this area for weed spraying.

Gash Fire Salvage – Unit 1 (a closed unit) was visited to review skid and skyline corridors. While the overall condition of ground cover in the unit was very good, a segment of skid trail had not revegetated well, likely due to gravelly soils, and possibly channelizing of surface flows. The EMS audit in 2008 determined that while some impacts beyond the environmental analysis had occurred, they were limited to minor and temporary impacts to the soil resource. Only localized erosion was noted and no streams were close enough to be affected. To increase the revegetation potential, an additional scarifying treatment was recommended for the wheel ruts. In fall, 2009, an excavator equipped with sub-soiler grapple rake was utilized to break up compaction and create a pattern that would promote infiltration of surface flows. The site was seeded, treated with organic fertilizer and mulched.

Monitoring confirmed that an unneeded spur road within the burned area had been put into a storage condition by shallow scarification and seeding with native grass species. This was a BMP that was not included in the contract and was rated as exceeding MT State BMP standards.

Observations: *(In particular, address the questions of "Are we doing what we said we would do?" and "Does the requirement, as implemented, appear effective?")*

1) Wetlands were appropriately protected during harvest operations at Haacke-Claremont timber sale. The sale administrator and/or contractor recognized the presence of a wetland during operations in Unit 14 and took appropriate action to protect the wetland and mitigate harvest effects as was planned in the EA.
2) Monitoring at Middle East Fork suggests it is difficult to estimate crown cover remaining after implementation for modeling purposes. Additional review and monitoring by those involved should help refine prescription and implementation estimates.
3) In Unit 4 of Frazier Interface, we found that the new silvicultural prescription did not represent what was planned and it was recommended that it be revised to reflect planning and analysis.
4) Recovery of vegetation on restored roads and landings is best monitored over an extended period. In Painted Rocks West, review one year following recontouring found vegetation recovery very limited; however the second year it was much better and acceptable. On the excaliner pad, recovery was still limited at year two and a small project was implemented to decompact, reseed and fertilize.
5) Gash Fire Salvage monitoring found that overall condition of the units was as predicted, but a segment of the skid trail in unit 1 had not revegetated well and was felt to be prone to further erosion.

Highlights (Good Findings) of the Audit:

Frazier Interface :

- Prescribed fire was implemented as planned. Limited mortality due to scorch and ground vegetation recovering as expected.
- The EMS field trip provided the opportunity for discussion related to the change in silvicultural prescription in Unit 4.

Middle East Fork Unit 64:

- Prescribed fire was implemented and planned. Limited mortality due to scorch and ground vegetation recovering as expected.

Haacke Claremont Sale:

- Sale Administrator/Operator discovered unmarked wetland and acted according to Best Management Practices by adjusting boundary and protecting wetland function.

- The temporary road in Unit 14 was blocked to prevent unauthorized access during period of inactivity of the sale.

Painted Rocks West Unit 1B:

- Vegetation recover on recontoured temporary road is much better the second year. No additional treatment necessary. Additional work needed on the excaliner pad that occurred late September and included decompaction by hand, seeding, mulching, and fertilizing by West Fork Fire Crew.

Gash Fire Salvage:

- Work above and beyond standard BMPs was accomplished by implementing a storage treatment on a spur road (FR76888). Ground conditions were acceptable within logging units.

Problem Areas:

Middle East Fork Crown Cover Review

Review of eight units found that estimates of crown cover removal were too low 50% of the time in insect mortality units; crown cover after implementation was less than was modeled. This is the first time the post-implementation crown cover has been reviewed so additional monitoring efforts are needed on bug-killed as well as green harvest units to determine if crown cover estimates need refinement.

Frazier Escaped Burn, Unit 64E

Review of the area where an escaped burn occurred found that transport of sediment outside of the burned area has not occurred but invasive weeds have populated the area.

Gash Fire Salvage

Unit 1 change in logging systems (skyline to tractor) may have needed a logging systems analysis before the change was approved, or scarification treatment could have been contractually attached to the change in method, preventing the need for treatment at FS cost. Probability of follow-up treatment success is high, based on previous similar situations.

Problem Summary, All Projects:

Ongoing timber harvest BMP monitoring suggests:

- Effects are generally within analysis predictions, with minor, localized exceptions;
- BMP audit results continue to support minor changes in effects analysis, implementation methods and administration, but no wholesale changes are currently needed.
- Communications between silviculture, TSA, timber shop, and resource specialists is good, but benefits are likely from increased efforts.
- BMP audits continue to find site issues worth remediating, further supporting the value of the monitoring program.

Follow-up: *The following actions will be accomplished as adaptive management:*

1) Plan for monitoring trip in 2010 with silviculture and hydrology to review completed timber sale and prescribed burn units to determine if crown cover after implementation is reflected in modeling efforts. Approximately 1-2 days needed. Needed: maps of sale areas, model tables

2) Discuss with Silviculture the need to review changes in prescription with environmental analysis documents and/or specialists to ensure we are doing what we'd said we'd do.

3) Determine if possible to spray weeds in escaped burn section of 64E of Frazier Interface to reduce effect of escaped fire.

Findings:
CWA – Survey results suggest BMPs were appropriately applied and sufficiently effective.
EO 11988 – this Executive Order was fully supported, no detrimental activities in floodplains.
EO 11990 – this Executive Order was fully supported, no loss or lasting effects to wetlands

EFFECTIVENESS MONITORING – Water Quality Restoration Plan Projects and BMP implementation

Five sites on the East Fork Bitterroot River, in the Bitterroot Headwaters TMDL planning area, were surveyed for substrate/sediment composition in 2009. These sites have been surveyed several times since 2000 to monitor changes in the river following the fires and also to provide data for the TMDL analysis. Trend results continue to be variable. Pebble counts have inherent variability and may have limited use in determining sediment transport and deposition trends, especially in steeper, cobble-dominated rivers such as the East Fork Bitterroot (Archer et al. 2004; Roper et al. 2002). On the other hand, the information collected can be used to evaluate broad-scale river condition especially when used in context with other habitat parameters.

In the Headwaters TMDL analysis, water quality targets derived from reference or minimally managed streams were used to compare to listed streams.

Table 25 - The Bitterroot Headwaters TMDL Reference Stream Thresholds for the East Fork Bitterroot River

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

Table 26, below, displays 2009 survey results for the five sites located on the East Fork Bitterroot River.

Table 26 - Summary of Pebble Count Results, East Fork Bitterroot River, Years 2000-2009

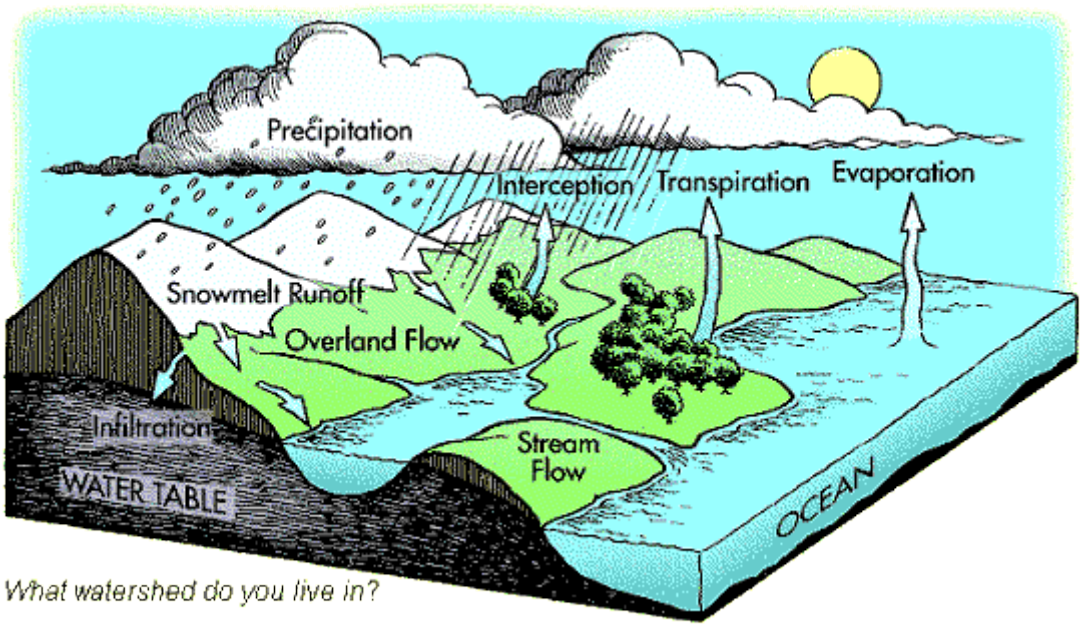
Site Name	Range % fines <2mm	Range % fines <6mm	Comments about 2009 Data
East Fork at Indian Tree (Lowest Site on EF Bitterroot) C4	2-11%	4-14%	Particles sampled in 2009 were at the lower end of the range of those measured over the eight year sample period. Percent less than 2mm at 4%, less than 6mm at 4%. Within the threshold in the TMDL.
East Fork at Spring Gulch, C4	3-11%	4-15%	Particle collected in 2009 were at the lower end of the range of those sampled over an eight year period. Percent less than 2mm at 5%, less than 6mm at 6%. Within the threshold in the TMDL.
East Fork above Sula Bridge C4	6-15%	7-18%	Similar to previous surveys. Percent less than 2mm at 14%, less than 6mm at 15%. Within the threshold in the TMDL.
East Fork below Mink Bridge B3	8-23%	9-23%	Similar to previous surveys. Percent less than 2mm at 11%, less than 6mm at 12%. Within the threshold in the TMDL.
East Fork below Meadow Bridge B3 (Upper most site)	7-15%	8-19%	Particles sampled in 2009 were at the lower end of the range of those measured over the eight year sample period. Percent less than 2mm at 5%, less than 6mm at 5%. Values were within the threshold level for the TMDL.

Based upon monitoring conducted in 2009, all locations on the East Fork, have substrates suitable for their stream types as described in the TMDL. East Fork River pebble count results continue to suggest that this stream reach has appropriate channel substrate and is not sediment-impaired. The current dominant influences of ongoing land management do not appear to be increasing fine sediment at these sites. Monitoring will continue at these sites to provide trend information for the Forest and TMDL status as funding allows.

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

Citations:

MT DEQ 2006. Water Quality Restoration Plan and Total Maximum Daily Loads for the Bitterroot Headwaters Planning Area. Montana Department of Environmental Quality, Helena, MT.
http://www.deq.state.mt.us/wqinfo/TMDL/finalReports.asp



Cumulative Watershed Effects Monitoring Item 19

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

DATA SOURCE: Monitoring of cumulative watershed effects is done indirectly through the evaluation of existing conditions for specific projects, TMDL-oriented monitoring and the effectiveness of the Forest watershed improvement program. Direct and indirect watershed effects are also measured directly through river stream reach monitoring. Cumulative watershed effects are estimated with WEPP (erosion) and ECA (water yield) model results produced during environmental analysis and verified with stream reach surveys and project monitoring.

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

REPORTING PERIOD: 2009

VARIABILITY: Exceeding geomorphic threshold of concern.

EVALUATION:

Cumulative Effects Modeling

There were no timber sales with new permanent road construction implemented or proposed on the BNF during 2009. Instead, analysis was completed on the proposed Lower West Fork timber sale, which has no new specified roads.

Updates and changes to the Lower West Fork proposal were modeled for cumulative watershed effects. Project design minimized proposed treatments that could exceed water yield or sediment guidelines. This included changes in existing conditions that resulted from the 2007 Rombo Fire and improved information following review of aerial photos taken after the Rombo Fire. The Lower West Fork Draft EIS is scheduled for public review in 2009.

During planning of the Lower West Fork project, the project silviculturist and hydrologist made plans to monitor recently harvested units recently to determine if the model estimates were similar to what occurred on the ground. During project planning, silviculturists provide estimates that hydrologists use to estimate equivalent clearcut area or ECA. Monitoring of post-harvest crown cover in the Middle East Fork project area occurred in 2009 in an effort to determine if model estimates represented post-harvest results. Monitoring of nine units found that in all but one unit, the amount of crown cover remaining was greater or equal to what was planned. In other words, the outcome represented the model efforts. In one unit, less crown cover remained after planning than was estimated; from the stumps present it appeared that the crown cover prior to harvest was lower than was initially estimated and the post-harvest results were also lower than estimated.

Other cumulative effects monitoring focused on watershed improvement accomplishment, effectiveness, and future needs. Watershed condition inventories focused on potential for road-related sediment contribution and areas of high road density. During the summer and fall of 2009, 150 miles of road in the Martin Sleeping Child and other areas of the East Fork Bitterroot River were walked to determine their existing condition. These roads are included in the “undetermined” road category in the forest database and were identified as closed in the mid-1990s but the exact condition was not well documented. In the early to mid-1990’s two small projects treated some of these roads but they didn’t receive the multi-resource roads analysis that occur today; they were identified as “closed” but the long-term need for the road was not identified. Inventory found that 116 miles had already been treated with decompaction or recontouring or were re-vegetated and recovering naturally, another 34 miles of road would need some level of treatment. A project analysis is planned for 2010 that would complete a roads analysis on these 150 miles of road to determine which are needed for the future (storage category), which roads could be decommissioned and removed from the system, and which roads would need some level of treatment to stabilize, improve vegetation recovery, reduce runoff and reduce road contributed sediment to streams.

The remaining roads identified for obliteration in the Burned Area Recovery Project were treated in 2009, completing the obliteration portion of the watershed work. FDR 62540, in the headwaters of Burke Gulch was one of the roads treated in

2009. Figure 23 below is FDR 62540 following treatment, this road, was seeded, fertilized, mulched with weed seed free straw and slashed following re-contour. This treatment occurred on 5.3 miles of road, with the remaining roads identified in BAR receiving limited or no treatment due to vegetation recovery on the road surface, also called natural recovery. A total of 15.2 miles of road was decommissioned in 2009. This work was accomplished using a rented excavator, operated by a forest employee with materials spread by a crew comprised of two Trapper Creek Job Corps Students.

Figure 23 – Forest Road 62540 following treatment.

Roads in Ditch and Buck Creeks, identified as sediment impaired in the Bitterroot Headwaters TMDL, were reviewed and funded for crossing gravel placement and installation of drive through dips. Five sites were improved using funding from appropriated dollars and a $5400 grant from the Bitterroot Water Forum, a citizen-based non-profit watershed group. In the TMDL, 42 sites in these watersheds were identified as contributing sediment. Of these, 10 were estimated during the TMDL process to contribute sediment only to upland sites, 9 were estimated to contribute less than one ton/year, 6 sites between one and five tons/year, 8 sites between 5 and 10 tons/year and another 11 were estimated to contribute more than 10 tons/year to Ditch or Buck Creeks. Site review, by the Bitterroot Road Maintenance Supervisor when planning for the sediment reduction project (described above), found fewer sites than those identified in the TMDL contributing sediment and only five of those warranted treatment due to their location on a stream and level of contribution.

The Bitter Root Water Forum (BRWF) worked in partnership with the Bitterroot National Forest to conduct a stream crossing inventory on roads in the Bitterroot Headwaters TMDL planning area. The goal of this project was to visit stream crossings not evaluated during the analysis period of the Bitterroot Headwaters area and identify those that were contributing sediment to streams and document conditions. The program involved two ½ day training sessions for 13 volunteers to teach methodology and safety. The volunteers received a small stipend and mileage from the Bitterroot Water Forum using funds from a 319 grant. Twenty different routes (single or groups of roads) were traveled and each crossing was inventoried. Other observed sediment contributing sites were also reviewed and documented. This effort will provide information that can be used to identify road maintenance needs and sediment reductions to streams.

Areas Included in the BRWF Crossing Inventory:

- Robbins Gulch
- Medicine Tree
- Overwhich (6 routes)
- Tough Creek
- Ditch Creek
- Gemmel Creek
- Bonnie Blue Area (3 routes)
- French Basin
- Little West Fork
- Slate Creek (2 routes)
- Moonshine Gulch
- Wheeler Creek

Recent analysis and monitoring suggests that sediment from hauling on roads that are within sediment contributing distance from streams is the biggest risk to water quality. As in past years, silt traps/filters have been installed where needed to mitigate effects from winter hauling on stream channel condition. Sediment trap maintenance in 2008 occurred on FDR 723 (Jennings Camp), 725 (Meadow Creek), 5758 (Tepee), and 311 (Guide) to protect these streams from potential sediment contributions from winter log haul operations.

MONITORING:

Existing Condition Surveys and Watershed Improvement Projects

Table 27 - Summary Table of Existing Condition Surveys and Watershed Improvement Projects

Activity	Units Accomplished	Location
Watershed Improvement Projects	95 acres watershed funding only, 429 acres unified (total) target	Numerous sites – see narrative below.
Road Improvement Needs Inventory	150 Miles	Martin, Cameron, Bugle, Kerlee, Dowling, Sleeping Child Creeks and scattered East Fork Bitterroot watershed area

Stream Reach Inventory

Channel conditions surveys were conducted on 21 survey reaches in the Sula Peak-East Fork Allotments. Surveys included channel stability ratings and/or evaluation of wetland conditions and some of the surveys occurred on sites previously surveyed. The purpose of the inventory was to determine existing conditions for a grazing allotment analysis. Overall, conditions surveyed were improved over conditions found during previous surveys. Post-fire recovery and reduction in grazing the past ten years has led to these improvements.

The PACFISH/INFISH Biological Opinion (PIBO) monitoring group sampled multiple stream reaches on the BNF during 2009 as part of their Effectiveness Monitoring Program for Streams and Riparian Areas within the Upper Columbia River Basin (www.fs.fed.us/biology/fishecology/index.html). In total, there are 33 sites located on the BNF monitored between 2001 and 2009. This project is also providing data on monitoring protocol repeatability and sensitivity to detect change. As the program continues and additional data are collected at these sites, trends may be discernible.

Watershed Improvement Projects

Watershed improvement projects are implemented to reduce cumulative watershed effects. In 2009, 429 acres of site improvements that benefit watershed and reduce sediment were implemented. Another watershed focus was on reduction of sediment into streams from active surface erosion and/or mass failure associated with roadbeds no longer maintained for public travel. Roads storage/stabilization treatments included surface decompaction, recontouring, building waterbars, culvert removal, associated channel reshaping, seeding and mulching.

The following watershed improvement projects were completed in 2009:

- Burn Pile Rehab. Slash piles left after timber harvest are burned to eliminate excess materials. These hot burning piles result in patches difficult to revegetate. About 50 piles, ranging in size from small (10 x10') to large greater than 40' in diameter burned prior to 2009 were seeded and fertilized with organic fertilizer to improve re-vegetation success.
- Plant native shrubs at 29 sites across the forest. Including such locations as culvert or bridge replacements, sections of recontoured road. Shrub species planted included woods rose, dogwood, alder, spirea.
- Reseeding at the Stansbury Mine area took place in the fall 2008 (Fiscal Year 2009) and a tree planting project was completed in September 2009.
- Slashing, seeding and fertilizing of a user-made ATV trail in the Lake Como burned occurred in October of 2008. The trail formed after prescribed fire opened up the stand sufficiently to allow ATV's to travel cross country. The intent of the seeding was to allow vegetation to re-colonize the site and make the trail disappear to ATV users.

- Seeding and fertilizing of soils disturbed during road improvements on the Baker Lake Trailhead and access road occurred in the fall of 2008. More than 20 drive-through dips were installed in the road and in the process vegetation on either side of the road were disturbed. The seeding was an effort to reduce colonization by noxious weeds and stabilize soils.
- A slump on Forest Road 5612 (Robbins Gulch) and a quarry location in Spring Gulch (Rye Creek) were seeded, fertilized and mulched to stabilize soils and reduce weeds.
- Monitoring and maintenance work of drainage structures in the McClain Slide area to reduce sedimentation.
- Unauthorized roads in the McClain Creek watershed were closed. The roads were blocked, seeded with native grasses and fertilized with organic fertilizer.
- Burned Area Recovery project road obliteration was completed. A total of 15.2 miles were decommissioned with just over five miles of road recontoured, seeded, fertilized, mulched and slashed. These roads were located in the Rye Creek drainage.
- Seeding and miscellaneous stabilization treatments occurred on the Ambrose area and on the Skalkaho-Rye Road, FR 75, and also FR5607 during fall 2008.
- Sub-soiling was completed in the Waddell Soil Rehabilitation Project. The objective of the project was to improve soil conditions in fuel reduction units where recent and past logging had created compacted soil conditions. A sub-soiling grapple rake was sued to break up the compacted soils with minimal surface disturbance.
- A skid trail in the Gash Fire Salvage area was decompacted, seeded, fertilized and mulched. Rehabilitation work on this trail was needed because it received more use than expected and soil disturbance covered an area large enough to warrant extra treatment.
- Forest Plan Monitoring in 2008 identified a temporary road and excaliner pad in Painted Rocks West Timber Sale that hadn't recovered as expected. Decompaction by hand, seeding, and fertilizing occurred on the excaliner pad the Fall of 2009, review in 2009 found that the temporary road had recovered sufficiently and needed no additional treatment.
- 8.1 miles of FR 75 (Rye Creek) and FR 321 (North Rye) were graveled as prescribed in the Burned Area Recovery Project.

Watershed Improvement Needs Inventory

Inventories were conducted on stream crossing in the Bitterroot Headwaters TMDL area that was not evaluated during the planning process. The work was completed using volunteers coordinated by the Bitter Root Water Forum with help from the Bitterroot National Forest. Volunteers were assigned survey routes that consisted of approximately one work day and trained to locate and describe stream crossing or other sediment contributing points on roads. Surveys were completed on twenty routes.

Abandoned, undetermined roads in Martin, Bertie Lord, Sleeping Child Creeks and scattered across the East Fork Bitterroot River watershed were reviewed for existing condition and accessibility. A total of approximately 150 miles of road were walked and data collected. The information will be used to develop a project that will identify which roads are needed for the future, which may be obliterated, and identify sediment sources for subsequent treatment.

Several hundred miles of road associated with the former Darby Lumber Co Lands in the upper Rye Creek and upper Sleeping Child drainages were surveyed by Ravalli County Off-Road Users Association volunteers and by USFS engineers. Surveys included general road condition, drainage issues, recreational potential, and watershed improvement details.

Project Monitoring

Table 28 - Summary of Project Monitoringhighlights the past or on-going projects that were monitored for compliance, implementation, and effectiveness during 2009. Individual monitoring reports are available from Forest hydrologists.

Table 28 - Summary of Project Monitoring

Activity	Item	Location and Findings
Completed Watershed Improvement (WI) projects inventoried for effectiveness and maintenance needs	Project Areas Visited	Bear Creek Channel Stabilization (2004). This small stream located that burned at high severity in 2000 had several large flow events that threatened to divert the channel and abandon a new 100 yr flow culvert. Banks were stabilized to resist migration using logs and rocks from the vicinity. Monitoring in 2009 found that vegetation has recovered well and that some migration may occur, the channel is unlikely to abandon the culvert. Waugh Gulch Aspen Exclosure (2001). Monitoring in 2009 found that the majority of aspen are greater than eight feet tall, growth isn't as dramatic as earlier years. Most are small diameter whip-like trees. Recommend the fence remain until aspen are large enough browsing by livestock or wildlife, still several years from now. Middle East Fork roads FR 73259, 73260, 73261, (2007). Placed into storage using stewardship money are effective in restricting OHV use. Review in mid-summer 2009 found vegetation more dense upon the decompacted roads. Additional treatment not needed.
BMP, implementation, effectiveness, and validation monitoring	2 Projects Monitored	Forest EMS Audits were conducted in August 2008: Gash and Painted Rocks Timber Sale. Results described in Item 17. Straw bale sediment traps were also monitored and replaced as needed along the FR 725, FR 723, and FR 311. These were initially installed as watershed mitigation to protect streams from sediment that may be produced during log haul operations in the winter.
BAR Road Decommissioning Project Monitoring	2 sites visited on the south end of the forest	FR 73655 BAR Road storage (2003). This road was partially recontoured with a trail left along the outside edge. Granitic soils and south aspect result in harsh, dry growing conditions. Monitoring in 2004 found mostly knapweed growing on the disturbed soils but in 2009 a number of native plants are established and growing well. Gilbert Road Decommissioning (2008), A large system of roads recontoured and decommissioned late in 2008. Seed, fertilizer, slash and straw was spread, some germination had occurred and grasses were starting to grow. Residual or transplanted shrubs and forbs were budding out and beginning to grow. Several crossings had been recontoured. No evidence of rilling from the disturbed areas into the stream, small streams were adjusting channel geometry to spring flows.

Activity	Item	Location and Findings
Completed Watershed Improvement (WI) projects inventoried for effectiveness and maintenance needs	Project Areas Visited	Bear Creek Channel Stabilization (2004). This small stream located that burned at high severity in 2000 had several large flow events that threatened to divert the channel and abandon a new 100 yr flow culvert. Banks were stabilized to resist migration using logs and rocks from the vicinity. Monitoring in 2009 found that vegetation has recovered well and that some migration may occur, the channel is unlikely to abandon the culvert. Waugh Gulch Aspen Exclosure (2001). Monitoring in 2009 found that the majority of aspen are greater than eight feet tall, growth isn't as dramatic as earlier years. Most are small diameter whip-like trees. Recommend the fence remain until aspen are large enough browsing by livestock or wildlife, still several years from now. Middle East Fork roads FR 73259, 73260, 73261, (2007). Placed into storage using stewardship money are effective in restricting OHV use. Review in mid-summer 2009 found vegetation more dense upon the decompacted roads. Additional treatment not needed.
Other Project Monitoring	2 allotments, 20 sites	Meadow Tolan Allotment Monitoring Sites (Bunch Gulch, Springer, Bugle Exclosure, Bugle Below Exclosure, Tributary to Meadow Site #6, Tributary to Meadow Site #10, Meadow Balsam Reach, Meadow Sagebrush Reach, Meadow Old Exclosure, Meadow 2004 Exclosure, Tolan, Swift, Lodgepole, Tributary to Meadow Site #13). See below for a monitoring summary. Waugh Gulch Allotment Monitoring Sites (Waugh Gulch, West Fork Camp (4), 2 tributaries to West Fork Camp.

Figure 24 - 2008 Gilbert Road Decommissioning

Sseven months after implementation, crossing on unnumbered road south of FR 73667. Notice the small amount of seed beginning to germinate.

One on the better growing sites on FR 73655

Typical vegetation recovery conditions of FR 73655

Meadow Tolan AMP

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

Livestock use in 2009 was low throughout the allotment. In many places, it appeared that there was little livestock use, all monitoring sites were below trampling thresholds. One site, Reach 9, North Fork Springer was above utilization levels at 65% (recommended is 50%). A wet August allowed for vegetation regrowth relatively late in the season. At all sites, there was good residual vegetation present and limited trampling along the streambank.

Waugh Gulch AMP

Waugh Gulch allotment NEPA was completed in 2009, this season was the first year of monitoring. Six sites were selected for monitoring, based upon accessibility to livestock, and past conditions. At each site a 200 foot reach was selected, marked at either end with an orange stake, located using a GPS longitude/latitude, and flags hung for ease of re-location. A cross section location was identified within the reach, also marked and flagged to ensure measurements occurred at the same site each year. Each site was assigned a level of allowable bank trampling based upon streamtype and historical use. Trampling within the 200 foot reach and the cross section will be measured each year after livestock leave the allotment to monitor existing conditions and to track long-term trends. The information collected will be used to evaluate use on the allotment and effects to channel stability. Should monitoring indicate stability is on a downward trend, adaptive management policy would allow for changes to the annual operating plan so that conditions are maintained and improved.

Livestock use in 2009 was low throughout the allotment although one of the reaches was near the trampling threshold based upon stream sensitivity. Most of the allotment seemed to see moderate livestock use. Shrubs and grasses were not overgrazed and sufficient time was available for vegetation re-growth after livestock left the allotment in early August. August was a relatively wet month and that allowed for vegetation re-growth relatively late in the season. At all sites, there was good residual vegetation present and limited trampling along the streambank.

Figure 25- Lower West Fork Camp Allotment Monitoring Site #3

Watershed Modeling and Assumptions Monitoring 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: 2009

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.

Bitterroot National Forest hydrologists conducted a literature review on the state of knowledge related to stream flow modeling and hydrologic recovery. The report found that there is sufficient literature to address the issue of timber harvest effects on late season flows without the Forest undertaking research level studies. In summary, the literature review found that changes in stream flow are mostly dependent upon precipitation, with a smaller influence contributed by vegetation management. Wildfire creates a different scenario by removing extensive ground cover and creating hydrophobic soils. More complete information on findings is published in the 2004 Bitterroot Forest Plan Monitoring Report. The complete report is available in the Bitterroot National Forest Supervisor's Office.

The Bitterroot National Forest hydrology staff continues to monitor the published literature pertaining to water yield increases and timber harvest. If sufficient evidence contrary to the well-documented trends in water yield increases and logging is published, this monitoring item will be revisited. No literature was released in 2009 that contradicted conclusions from earlier literature reviews.

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

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

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

FREQUENCY: Annually.

REPORTING PERIOD: 2009.

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

INTRODUCTION:
Forest monitoring of the fisheries and aquatic environment in 2009 again far exceeded the minimum requirements set in the 1987 Forest Plan. Research and analysis of fisheries and fish populations since the Forest Plan was signed have shown that the ten percent annual variability noted above is too narrow given the natural annual variation in fish populations. Based on our ongoing long-term monitoring, westslope cutthroat trout populations are stable on the Bitterroot National Forest, while bull trout populations have declined in some streams in recent years. Habitat quality is either being maintained or improving. Individual measures and evaluations are discussed further in the following sections.
The current emphasis of the Bitterroot National Forest's fisheries monitoring program is to:

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

MONITORING RESULTS AND EVALUATION:
The following monitoring was accomplished in 2008 and is discussed and **evaluated** in this section:

- Fish Habitat Inventories (page 96)
- Fish Population Monitoring (page 98)
- Mountain Lake Surveys (page 103)
- Viability of Bull Trout and Westslope Cutthroat Trout Populations (page 105)
- Water Temperature Monitoring (page 108)
- Bull Trout Redd Surveys (page 116)
- Bull Trout Movement and Genetic Research (page 118)
- Culvert Inventories and Replacements (page 120)
- Project Level Monitoring of Fisheries/Watershed Improvement Projects (page 124)

FISH HABITAT INVENTORIES:

Table 29 lists the fisheries habitat inventories that were conducted by Forest fisheries biologists in support of project planning and monitoring efforts in 2009. The inventories supply information used at a variety of scales to address short-term and long-term aquatic issues on and off the Forest.

Table 29 - Fish Habitat Inventories Conducted in 2009

Stream	District	Inventory Length (mi.)	Inventory Method[2]
Reimel Creek	Sula	1.9	I-walk
Cameron Creek	Sula	0.3	I-walk
Laird Creek	Sula	0.4	I-walk
Gilbert Creek	Sula	0.8	I-walk
Hughes Creek	West Fork	2.6	I-walk
Soda Springs Creek	West Fork	0.7	I-walk
Buck Creek	West Fork	0.2	I-walk
Total		**6.9**	

On the Sula and West Fork Ranger Districts, fish habitat inventories were conducted using the I-walk methodology in several streams (Table 29). The Cameron Creek inventory was conducted to collect baseline habitat data in support of the Sula Peak East Fork Grazing Allotments NEPA project. The Soda Springs Creek inventory was conducted to collect baseline habitat data in a stream that lacked information. The inventories in Reimel, Laird, Gilbert, Hughes, and Buck creeks were conducted to monitor the pool and large woody debris (LWD) supplemental targets in the Bitterroot Headwaters TMDL. In addition to designating sediment and water temperature impairments, the Bitterroot Headwaters TMDL also directed the Forest to periodically monitor pool and LWD frequencies in designated monitoring reaches in each of the sediment-impaired streams. A reach in each stream was initially established and inventoried in 2004 during the data collection phase of the TMDL. The Monitoring Strategy in the Headwaters TMDL recommends the reaches be re-surveyed at least once every five years, which was done in 2009. Figures 26 and 27 compare the results of the 2004 and 2009 surveys.

[2] I-walk: A survey method that looks at pool quality, substrate composition, large wood, and pools per mile to quantify fish habitat as described by INFISH.

Figure 26 – Pool Frequencies in Bitterroot Headwater TMDL Monitoring Reaches

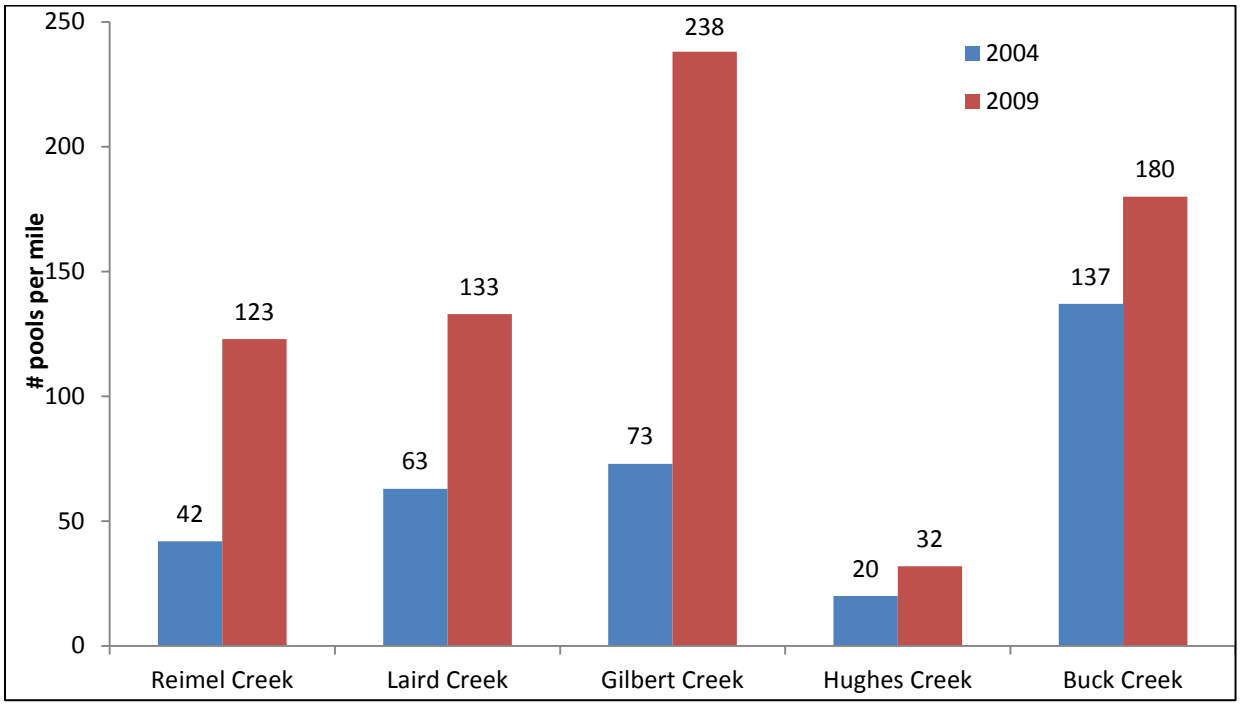
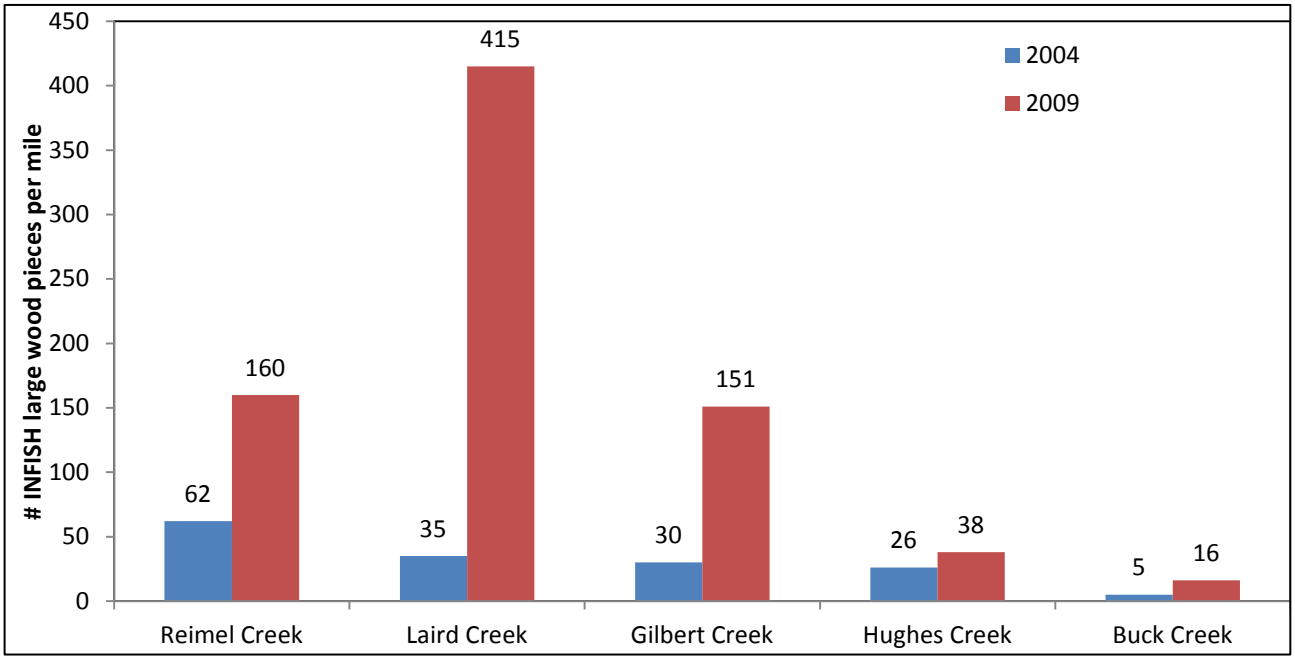


Figure 27 – Large Wood Frequencies in Bitterroot Headwater TMDL Monitoring Reaches



The data in Figures 26 and 27 indicates that pools and large wood increased in all of the TMDL monitoring reaches between 2004 and 2009. However, the increases that occurred in the burned streams (Reimel, Laird, and Gilbert) were much larger than those that occurred in the unburned streams (Hughes and Buck). This was caused by large numbers of fire-killed snags (2000 fires) that were recruited to the burned stream channels over the past five years. The smaller increases in pools and large wood that occurred in Hughes and Buck creeks appear to be caused by the recruitment of lower numbers of beetle-killed snags.

FISH POPULATION MONITORING:
The Forest Plan recommends monitoring fish populations in six streams annually to meet the Forest objectives. In 2009, fish populations were monitored in 17 streams at 18 monitoring reaches.

At each monitoring reach, we have set a goal of monitoring trout populations for at least three years to serve as a baseline for future population studies. This "pulsed" monitoring technique is necessary for assessing long-term changes in fish populations (Bryant, 1995). Complete methods are described in Clancy (1998). As displayed in Table 30, most of the reaches monitored in 2009 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 MFWP biologists.

Table 30 summarizes the fish population estimates that were conducted on the Forest between 1989 and 2009. Years in which a population estimate was conducted in a monitoring reach are denoted with **X**.

Table 30 - Fish Population Estimates Conducted Between 1989 and 2009

Monitoring Site	89	90	91	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09
Ambrose 8.4&8.6																				X	
Andrews 0.5													X	X	X						
Bear 6.0			X																		
Beaver 0.3			X	X																X	
Bertie Lord 0.2		X	X								X		X	X	X	X	X	X	X		
Big 6.5				X																	
Blue Joint 5.9						X	X														
Boulder 2.0				X														X			
Bunkhouse 1.3																	X				
Burnt Fork 19.7						X		X				X						X	X	X	
Cameron 6.1					X						X								X		
Cameron 10.1		X									X		X	X	X	X				X	
Camp 2.3															X	X	X	X	X		X
Camp 3.2										X											
Camp 6.6									X												
Castle 0.1																		X			
Chaffin 3.1		X	X														X		X		
Chicken 1.0												X	X	X	X	X			X		
Coal 1.3		X												X	X	X	X				
Daly 0.7	X	X						X			X		X	X	X			X	X		
Deer 0.3																					X
Divide 0.1	X	X	X					X					X	X	X						
Doran 0.1					X																
EF Bitterroot 2.5										X		X	X		X	X	X	X	X		
EF Bitterroot12.0		X					X		X			X	X	X	X	X	X	X	X		X
EF Bitterroot 19.1				X																	
EF Bitterroot 25.6				X													X				X
EF Bitterroot 28.4		X																			
EF Bitterroot 31.4				X		X				X		X	X	X	X					X	
EF Camp 0.4																					X
East Piquett 0.2																		X	X	X	
Fred Burr 9.0										X											
Gilbert 0.1														X	X	X					
Gold 0.3		X	X					X													
Guide 0.1																	X	X	X		
Hart 2.8													X	X	X					X	
Hughes 1.6										X	X										
Hughes 9.0								X			X										
Jennings Camp0.5																	X	X	X		
Johnson 0.7			X																	X	
Kootenai 0.3										X											
Laird 1.4		X	X									X		X	X	X	X				X

Monitoring Site	89	90	91	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09
Laird 2.3												X		X	X	X	X				
Lavene 0.2																		X	X	X	
Lick 1.9		X	X	X			X		X		X		X		X		X				
Lick 2.1							X		X				X								
L. Blue Joint 1.4												X	X	X	X	X	X				
L. Sleep Child 4.2													X	X		X					
Little Tin Cup 1.3					X																
L. West Fork 1.3				X												X	X	X			
L. West Fork 3.1				X																	X
Martin 1.3			X	X	X	X			X		X		X	X	X						
Martin 7.5				X	X	X	X						X		X						
Maynard 0.1													X	X	X	X					
Meadow 5.2		X	X																		
Meadow 5.6	X	X	X			X	X	X				X	X	X	X	X		X	X	X	
Meadow 7.3	X	X	X										X	X	X						
Medicine Tree 1.5													X	X	X	X	X				X
Mine 0.2										X	X		X	X	X						
Moose 1.4			X	X	X				X		X		X	X	X			X			
Moose 3.6				X	X	X												X	X	X	
NF Sheephead 0.5					X																X
North Rye 1.9	X	X	X					X	X			X	X	X	X	X	X	X			
Nez Perce 1.2												X	X								
Nez Perce 9.8				X								X	X	X	X						
Nez Perce 11.8				X																	X
Overwhich 2.0					X	X	X			X	X							X			
Overwhich 8.9					X																
Pierce 0.5																		X	X	X	
Piquett 1.3		X	X										X	X	X		X	X	X	X	
Praine 1.0							X					X	X	X	X	X					X
Railroad 1.4				X																	
Reimel 2.6		X	X	X								X	X	X	X	X				X	
Reimel 2.9		X	X	X																	
Reimel 3.8		X	X	X								X	X	X	X						
Rye 6.6													X	X	X	X	X				
Rye 12.4	X	X	X					X	X			X	X	X	X	X	X	X			X
Salt 0.2								X	X												
Sheep 0.2			X																	X	
Sheephead 0.2																X	X	X			
Sheephead 2.5					X																X
Skalkaho 0.4		X																			
Skalkaho 5.8								X													
Skalkaho 8.1	X																				
Skalkaho 12.5									X												
Skalkaho 13.1			X	X		X				X	X		X		X						
Skalkaho 16.8	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Skalkaho 17.2												X									
Skalkaho 20.6			X	X	X	X							X		X						
Slate 1.6			X	X	X						X		X	X	X						X
Sleeping Child 1.9					X																
Sleeping Child 4.5									X												
Sleep. Child 10.2	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Sleep. Child 14.5	X	X	X					X					X	X	X						
Sleep. Child 16.9	X	X	X																		
Soda Springs 0.3																X	X	X			
Sweathouse 5.7			X																		
Swift 0.7							X						X	X	X						
Tepee 0.9																	X	X	X		

Monitoring Site	89	90	91	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09
Threemile 2.6			X																		
Threemile 3.9				X																	
Threemile 6.3			X																		
Threemile 8.3			X													X					
Threemile 10.0																X					
Threemile 12.6																		X			
Threemile 15.3								X		X			X								
Tin Cup 7.2				X																	
Tolan 2.1		X	X										X	X	X			X			
Tolan 5.1	X	X	X					X	X				X	X	X	X			X		
Tolan 7.3	X												X	X	X						
Trapper 1.7				X																	
Trapper 3.5				X													X				
Two Bear 0.8			X										X	X	X	X					
Ward 0.7																		X	X		
Warm Springs 3.5				X	X	X	X					X	X	X	X	X					X
Warm Springs 5.6		X		X																	
Warm Springs 7.4				X		X	X											X	X	X	
Watchtower 0.1																X	X	X			
Watchtower 0.8				X																	X
Waugh 0.7		X	X										X	X	X	X	X				
WF Bitterroot 1.2							X		X	X				X					X		
WF Bitterroot22.2										X											
WF Bitterroot34.0			X	X			X			X	X										
WF Bitterroot40.0			X										X	X	X						
WF Camp 0.3					X								X	X	X				X		
Willow 12.1		X																		X	
Woods 0.3			X																		
Woods 0.9								X	X				X	X	X					X	

The following narratives summarize our most current knowledge of the fish populations in the monitoring reaches that were sampled in 2009.

- Camp Creek 2.3 This reach is located in the portion of Camp Creek upstream of the Sula Ranger Station that was reconstructed in 2002. It was sampled in 2003-07 and 2009. The reach was also sampled in 1999 when Camp Creek was still located in the east ditch of U.S. Highway 93. Due to widespread hybridization between westslope cutthroat trout and rainbow trout, the two species are combined in the population estimates. Cutthroat trout have recolonized the reconstructed channel in healthy numbers, and the reconstructed channel provides better habitat for adult cutthroat trout than the highway ditch did. In 1999, there were 10 cutthroat > 9 inches in the highway ditch. In 2007 and 2009, there were 51 and 44 cutthroat > 9 inches, respectively, in the reconstructed reach. Due to the increased length of stream in the new channel, there has likely been a significant increase in the number of trout in the reach. Bull trout were rare in the reach prior to the reconstruction and have not been captured since. Brook trout are present in the reach in large enough numbers to calculate statistically valid estimates in some years, but not all. Rainbow trout and brown trout are incidental and uncommon in the reach.

- Deer Creek 0.3 This reach is located about 0.3 miles upstream from the West Fork Bitterroot River. It was sampled for the first time in 2009. The fish species present in the reach include westslope cutthroat trout (common), bull trout (uncommon), brook trout (uncommon), bull X brook hybrids (uncommon), mountain whitefish (uncommon), longnose sucker (uncommon), and slimy sculpin (common). Bull trout and brook trout occur at roughly equal numbers. A 17-inch migratory bull trout spawner was captured in the reach.

- East Fork Bitterroot River 12.0 This reach is located in the U.S. Highway 93 canyon. It starts below Maynard Creek and extends downstream for 0.5 miles. It has been sampled in 1990, 1995, 1997, 2000-07, and 2009. The reach has traditionally been dominated by rainbow trout, but the fish community has been changing over the past decade as rainbow trout have declined and brown trout have increased. In 2009 population estimate of rainbow trout indicated a continuing decline of rainbow trout. The brown trout population estimate was similar to past years. Whirling disease is believed to be responsible for the rainbow trout decline. Westslope cutthroat trout are present in the reach, but at

numbers too small to calculate a statistically valid estimate. A few juvenile bull trout are captured in the reach each year, but never in large numbers, and all are usually < 12 inches in length.

- East Fork Bitterroot River 25.6 This reach starts near Colvert Creek and ends at the USFS Jennings Campground. It has been sampled in 1992, 2005, and 2009. In 2005 and 2009, the number of westslope cutthroat trout was significantly higher than in 1992. This increase may be due to more restrictive fishing regulations. Current levels of other species were similar between 1992, 2005, and 2009.

- East Fork Camp Creek 0.4 This reach starts at the Forest boundary above the Lost Trail Hot Springs resort. It was sampled for the first time in 2009. Westslope cutthroat trout, brook trout, and slimy sculpin were the only fish species found in the reach. Westslope cutthroat trout outnumbered brook trout by about a 7 to 1 ratio.

- Laird Creek 1.4 This reach starts at the Forest boundary. It has been sampled in 1990-91, 2000, 2002-05, and 2009. The reach was severely burned in 2000, and the 2001 mudslides killed all of the fish in this reach. The cutthroat population in Laird Creek consists of a hybrid swarm of westslope cutthroat trout, westslope X rainbow hybrids, and rainbow trout; therefore, the two species are combined in the population estimates. The cutthroat population has strongly rebounded since the fires and mudslides. By 2003-05, numbers were similar to pre-fire levels, and 2009 numbers were the highest found in any years that sampling has occurred. Some of the rainbow trout and westslope X rainbow hybrids show clinical signs of whirling disease, but sentinel cage tests have failed to confirm the presence of whirling disease in Laird Creek (i.e. infection rates are high in the nearby East Fork). Brook, brown, and bull trout have remained incidental in the reach. None have been captured in large enough numbers to calculate a statistically valid estimate. In 2009, four brook trout and one brown trout were captured, but no bull trout or bull trout X brook trout hybrids.

- Little West Fork 3.1 This reach is located about a half mile upstream from the Forest Road 13482 bridge. It has been sampled in 1992 and 2009. Westslope cutthroat trout and bull trout were the only fish species found in the reach. In 2009, westslope cutthroat trout numbers were higher than those in 1992, while bull trout numbers were similar in both years. Not enough bull trout were captured in either year to calculate a statistically valid estimate.

- Medicine Tree Creek 1.5 This reach starts at the Forest boundary. The 2000 fires and 2001 mudslides killed most of the fish in this stream. Since then, the westslope cutthroat trout population has exhibited a strong recovery, despite being at least partially isolated from the East Fork Bitterroot River by several culvert barriers on private land. The estimated number of westslope cutthroat trout (> 4 inches) per 1000 feet has increased from one (2001) to two (2002) to 14 (2003) to 78 (2004) to 71 (2005) to 101 fish in 2009. Non-native trout have not been found in the reach with the exception of one rainbow trout in 2004.

- Nez Perce Fork 11.8 This reach is located about 300 feet upstream of the Sheephead Creek confluence. It has been sampled in 1992 and 2009. Westslope cutthroat trout, bull trout, brook trout, and bull X brook hybrids are present in the reach. The estimated number of westslope cutthroat trout (> 4 inches) per 1000 feet was similar in 1992 (45) and 2009 (41). A few more bull trout and brook trout were found in the reach in 2009 than in 1992, but not enough individuals were captured in either year to calculate a statistically valid estimate. In 2009, the number of bull trout and brook trout captured was roughly equal. Genetic testing indicates that bull trout and brook trout have been hybridizing in this reach since at least 1992.

- North Fork Sheephead Creek 0.5 This reach is located about 0.5 miles upstream from the Sheephead Creek confluence. It has been sampled in 1993 and 2009. Westslope cutthroat trout, bull trout, brook trout, bull X brook hybrids, and slimy sculpin are present in the reach. More westslope cutthroat trout and bull trout were captured in the reach in 2009 than in 1993. In 2009, enough individuals of both species were captured to calculate a statistically valid estimate. That did not occur in 1993, but could have been due to high water and poor sampling efficiency at the time of the 1993 electrofishing survey. One 3-inch long brook trout was found in the reach in 2009, which was the first documented occurrence of brook trout in the North Fork. Bull X brook hybrids were found in 2009; none were reported in the 1993 survey (they may have been present but misidentified?). A 17-inch long migratory adult bull trout spawner was seen in the reach in 2009.

- Praine Creek 1.0 This reach is located on State land. It has been sampled in 1995, 2000-04, and 2009. The reach was severely burned in 2000, and probably experienced a fish kill. Westslope cutthroat trout and brook trout are the two fish species that occur in the reach. In 1995, westslope cutthroat trout outnumbered brook trout by about a 5 to 1 ratio. In 2009, the ratio was about 12 to 1. Brook trout numbers in 2009 were similar to those of 1995, while westslope cutthroat trout numbers were higher. Since the 2000 fires, the estimated number of cutthroat > 4 inches

per 1000 feet has increased from 46 (2001), to 88 (2002), to 118 (2003), to 188 (2004), to 256 (2009). Only a few juvenile and young-of-the-year brook trout were found in the 2000-04 surveys, but in 2009, enough adult brook trout were captured to calculate a statistically valid estimate (8 brook > 5 inches per 1000 feet).

- Rye Creek 12.4 This reach is located in upper Rye Creek above the Forest Road 75 bridge. It has been sampled in 1989-1991, 1996-97, 2000-06, and 2009. The reach was burned at moderate-to-high severity in 2000, but was generally spared from mudslide effects. Following the fires, the westslope cutthroat trout population declined in 2001, but rebounded to just below its pre-fire level in 2003. The westslope cutthroat trout population has been declining in the past few years. Bull trout were present in low numbers before and immediately after the fires, but have not been found since 2000. Over the same time period, brook trout numbers have increased, and in 2003-2006, they made up almost 20% of the fish captured in the reach. In 2009, more brook trout were captured than in 2006; however, not enough recaptures were caught to estimate the population. This is the one reach in the burned area where brook trout have clearly increased since the 2000 fires.
- Sheephead Creek 2.5 This reach is located in the roadless middle portion of the Sheephead Creek canyon, about 0.8. miles upstream of the North Fork Sheephead Creek confluence. It has been sampled in 1993 and 2009. Westslope cutthroat trout, bull trout, and bull X brook hybrids are present in the reach. More westslope cutthroat trout and bull trout were captured in the reach in 2009 than in 1993. In 2009, enough individuals of both species were captured to calculate a statistically valid estimate. That did not occur in 1993, but could have been due to high water and poor sampling efficiency at the time of the 1993 electrofishing survey. Bull X brook hybrids were found in 2009; none were reported in the 1993 survey (they may have been present but misidentified?). Three migratory adult bull trout spawners (13-17-inches) were present in the reach in 2009.
- Skalkaho Creek 16.8 This reach is located near the Railroad Creek confluence. It has been sampled every year since 1989. Bull trout and westslope cutthroat trout population numbers are similar to pre-2000 fire levels. The number of larger westslope cutthroat trout and bull trout increased between 2000-09 with the implementation of catch and release fishing regulations. Brook trout are incidental in this reach, and bull trout appear to be hybridizing with brook trout.
- Slate Creek 1.6 This reach is located along Forest Road 1133 downstream of Elk Creek. It has been sampled in 1991-93, 1999, 2001-03, and 2009. Numbers of westslope cutthroat trout were similar in 2009 to the early 1990's. Bull trout numbers have remained low since the early 1990's. Brook trout and bull trout X brook trout hybrids are also present in the reach. Bull trout were slightly more abundant than brook trout in 1991-2003, however in 2009, brook trout outnumbered bull trout.
- Sleeping Child Creek 10.2 This reach is located near the Sleeping Child Hot Springs. It has been sampled every year since 1989. In 2001, post-fire mudslides killed most of the fish in the reach. The westslope cutthroat trout population recovered to its pre-mudslide level in 2004-05. In 2009, westslope cutthroat trout population numbers were within the long-term range, but bull trout numbers were below the long-term range. Brown trout are becoming more common in this reach.
- Warm Springs Creek 3.5 This reach is located along Forest Road 370 downstream of Lupine Creek. It has been sampled in 1992-95, 2000-04, and 2009. The fish populations in this reach have not changed much as a result of the 2000 fires. Current numbers of westslope cutthroat trout are similar to pre-fire levels. The number of bull trout captured has declined in recent years. Brook trout, brown trout, and rainbow trout are incidental and rare in the reach.
- Watchtower Creek 0.8 This reach is located a short distance upstream of the Watchtower Creek trailhead. It has been sampled in 1992 and 2009. Westslope cutthroat trout, bull trout, brook trout, bull X brook hybrids, brown trout, mountain whitefish, and slimy sculpin are present in the reach. In 2009, the estimated number of westslope cutthroat trout > 4 inches was roughly half that of 1992. A few more bull trout were captured in 2009 than in 1992, but not enough individuals were captured in either year to calculate a statistically valid estimate. Numbers of brook trout and bull X brook hybrids were similar in 1992 and 2009. No brown trout were captured in 1992; three were captured in 2009. Genetic testing indicates that bull trout and brook trout have been hybridizing in this reach since at least 1992.

In addition to the population estimates described above, numerous presence/absence electrofishing and snorkel surveys were conducted across the Forest in 2009. In addition to the Bitterroot National Forest and MFWP surveys, researchers from the University of Montana and the Rocky Mountain Research Station also conducted presence/absence electrofishing and snorkel surveys on the Forest in 2009. Species presence/absence and relative abundance levels were recorded in a

Forest-wide database maintained by MFWP biologists in Hamilton. Forest-wide presence/absence of bull trout and westslope cutthroat trout has also been mapped on GIS.
These are the key findings of the Forest's fish population monitoring

- Westslope cutthroat trout populations across the Forest appear to be stable and strong in most streams. Westslope cutthroat trout are present in nearly every fish-bearing reach on the Forest, and are the most common species by far and away. At least at this time, there is no evidence that climate-driven water temperature increases are causing declines in westslope cutthroat trout populations.
- Bull trout populations have declined in several core area streams in recent years. The sharpest declines have occurred in the East Fork Bitterroot River and Warm Springs Creek. Both of these streams rely on migratory bull trout to maintain production and recruitment, and the number of migratory bull trout in the East Fork drainage has declined in our samples since 2000. Over the same time period, resident bull trout populations in Skalkaho and Daly Creeks have remained stable with good numbers of all size classes, while declines have occurred in Sleeping Child Creek. Water temperatures have been increasing in Forest streams since 1993 due to climatic warming. If temperatures continue to rise in future years, modeling predicts that bull trout distribution on the Forest will shrink, with the lowest elevations losing their bull trout first.
- Westslope cutthroat trout and bull trout populations in the upper Nez Perce Fork and its larger tributaries (Sheephead, North Fork Sheephead, Watchtower, Little West Fork creeks) showed little change between 1992-93 and 2009. Numbers of bull trout captured in 2009 were similar or slightly more than those found in 1992 and 1993. Brook trout numbers were similar between 1992-93 and 2009. The main change detected in 2009 was the presence of a lone brook trout (3-inch fish) and several bull X brook hybrids in North Fork Sheephead Creek. Genetic testing indicates that bull trout and brook trout have been hybridizing in the Nez Perce Fork and lower Watchtower Creek since at least 1992. In most of the sampled reaches, the estimated number of westslope cutthroat trout in 2009 exceeded the 1992-93 estimates.
- Westslope cutthroat trout populations in streams burned by the 2000 fires appear to be stable and strong. In 2009, brook trout numbers remained well below pre-fire levels in Laird Creek, and but had recovered to pre-fire levels (which were low) in Praine Creek. Upper Rye Creek is the one area burned in 2000 where brook trout numbers have increased sharply since the 2000 fires.
- For the past couple of decades, Forest and FWP biologists have considered brook trout to be the biggest non-native fish threat to bull trout. In recent years, however, our thinking has changed somewhat. Brown trout have increased their numbers and distribution in several streams in recent years, and may pose more of a long-term threat to bull trout than brook trout do. Warmer water caused by climatic warming is expected to favor brown trout over bull trout. In many streams where they occur together with native trout, brook trout do not appear to be expanding their numbers or distribution.

MOUNTAIN LAKE SURVEYS:

Mountain lakes surveyed in 2009 include Trout and Kent Lakes in the Sapphire Mountains on the Darby Ranger District, and Boulder, Crystal, and Turbid Lakes in the Bitterroot Mountains on the West Fork Ranger District.

On July 7-9, 2009, Forest and MFWP biologists surveyed Boulder, Crystal, and Turbid Lakes. These lakes are located in the headwaters of the Boulder Creek drainage in the Selway-Bitterroot Wilderness Area near the Montana/Idaho divide. The lakes are located within ½ mile of each other, and their elevations range from 7,000 to 7,800 feet. The lakes lie in glacially scoured cirque basins. Cutthroat trout of undetermined genetic origin are common in Boulder and Turbid Lakes. Crystal Lake appears to be fishless. All three lakes were stocked with cutthroat trout in 1969 (Boulder, Turbid) or 1977 (Crystal). Natural reproduction is occurring in Boulder and Turbid Lakes. A limited amount of suitable spawning habitat in available in several small inlet streams and in the outlets of both lakes. Amphibians were not observed at Boulder, Crystal, or Turbid Lakes, but the weather was cold which made detection difficult.

On September 1-2, 2009, Forest biologists surveyed Trout and Kent Lakes. These lakes lie in the headwaters of the Skalkaho Creek drainage near the crest of the Sapphire Mountains, east of Hamilton. The lakes are located within at ½ mile of each other, and sit at the base of high glacially scoured slopes. Findings at Trout and Kent Lakes in 2009 were similar to those of surveys conducted thirty years earlier. No fish were observed in either lake. There are historical records of stocking Kent

Lake (1952). Columbia spotted frogs (*Rana luteiventris*) were common. The area around the lakes was intensively burned in 2000, and the decade-old snags made hiking and camping in the area a little risky.

Tables 31 and 32 summarize the physical and biological data collected during the mountain lake surveys.

Table 31 - Summary of physical data collected during mountain lake surveys.

Lake	Elevation (feet)	Max Depth (feet)	Secchi Depth (ft)	TDS	Cond. (uS/cm)	pH	Surface Temp (°F) at time	Temp at Max Depth (°F)
Boulder	7085	62	n/m	n/m	n/m	n/m	48° @ 5 ft	39° @ 60 ft
Crystal	7680	20	n/m	n/m	n/m	n/m	50° @ 5 ft	44° @ 20 ft
Turbid	7712	22	n/m	n/m	n/m	n/m	45° @ surface	44° @ 15 ft
Kent	7790	45.1	8.6	1	3	8.15	56.7° @ 0945	39.9° @ 45.1 ft
Trout	7740	12.7	7.5	3	6	7.5	65.9° @ 1445	56.1° @ 12.7 ft

n/m = not measured

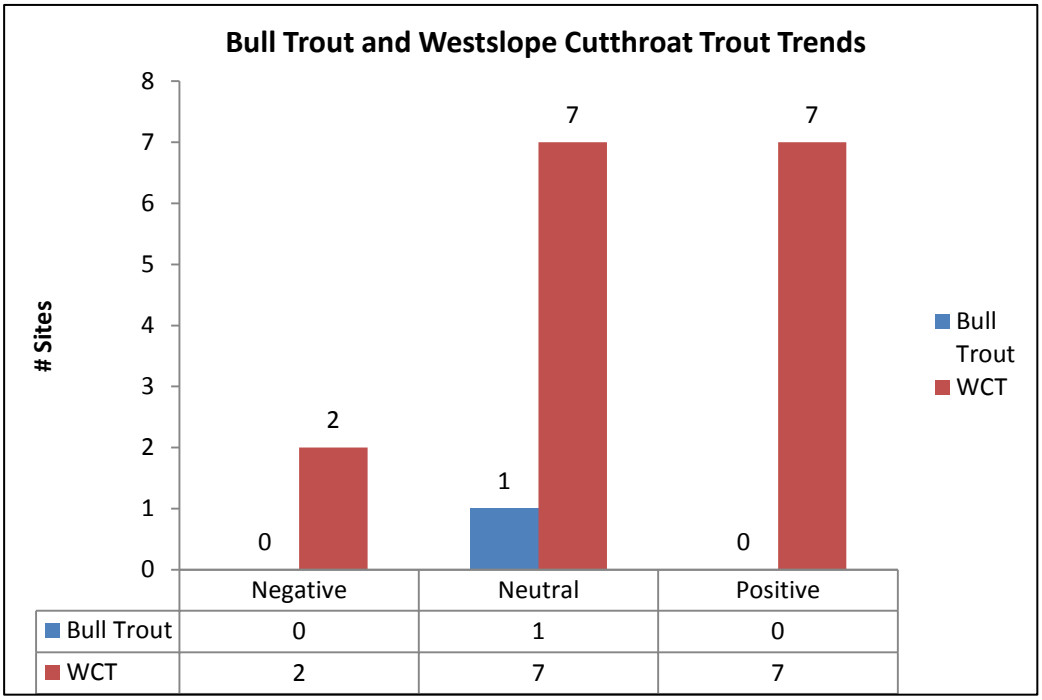
Table 32 - Summary of biological data collected during mountain lake surveys.

Lake	Fish Present	Catch per Angler Hour	Most Recent Fish Stocking	Trout Life Stages Observed or Limiting Factors	Amphibians in or Near Lake
Boulder	Cutthroat Trout	4 fish/hour, from 4.5-10.0 inches long	1969 Cutthroat Trout	A few redds were observed in the inlet and outlet	None observed
Crystal	None	0 fish in 1.5 hours of fishing	1977 Cutthroat Trout	n/a	None observed
Turbid	Cutthroat Trout	9 fish/hour, from 6-12 inches	1969 Cutthroat Trout	Several cutthroat trout observed spawning in outlet	None observed
Kent	None	n/a	1952 Cutthroat Trout	n/a	Columbia spotted frogs, 1 long-toed salamander
Trout	None	n/a	No Record of Stocking	n/a	Columbia spotted frogs

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 two decades on the Forest has shown the Forest Plan viability stated above is too narrow given the natural variation that occurs in fish populations. We have learned that the only way to define the upper and lower bounds of the natural variation in fish populations is through numerous years of population monitoring.

In 2009, we sampled 16 long-term fish population monitoring reaches where enough westslope cutthroat trout were captured to calculate a statistically-valid population estimate. Westslope cutthroat trout numbers were up by more than 10% of the long-term average in seven sites, within 10% of the long-term average in seven sites, and down by more than 10% of the long-term average in two sites (Rye Creek 12.4 and Watchtower Creek 0.8) (Figure 3). We only sampled one long-term fish population monitoring reach that had an estimatable bull trout population (Skalkaho Creek 16.8), and the bull trout population at that site was within 10% of the long-term average (Figure 3). Most of the sites we sampled in 2009 did not contain enough bull trout to calculate a statistically-valid population estimate. The data in Figure 28 affirms our belief that westslope cutthroat trout populations are stable and strong in most streams on the Forest. For bull trout, a declining trend has been observed in most streams in recent years.

Figure 28 – Bull Trout and Westslope Cutthroat Trout Population Trends on the Bitterroot National Forest in 2009



Bull trout populations have declined in several core area streams on the Forest in recent years. The most noticeable declines have occurred in Warm Springs Creek (Figure 29) and the East Fork Bitterroot River (Figures 29-33). Both of those populations rely on migratory bull trout to maintain production and recruitment, and the number of migratory bull trout in the East Fork drainage has declined since 2000.

Figure 29 – Population estimates for Bull Trout in the upper Warm Springs Creek monitoring reach. In 2008, not enough bull trout were captured to calculate an estimate.

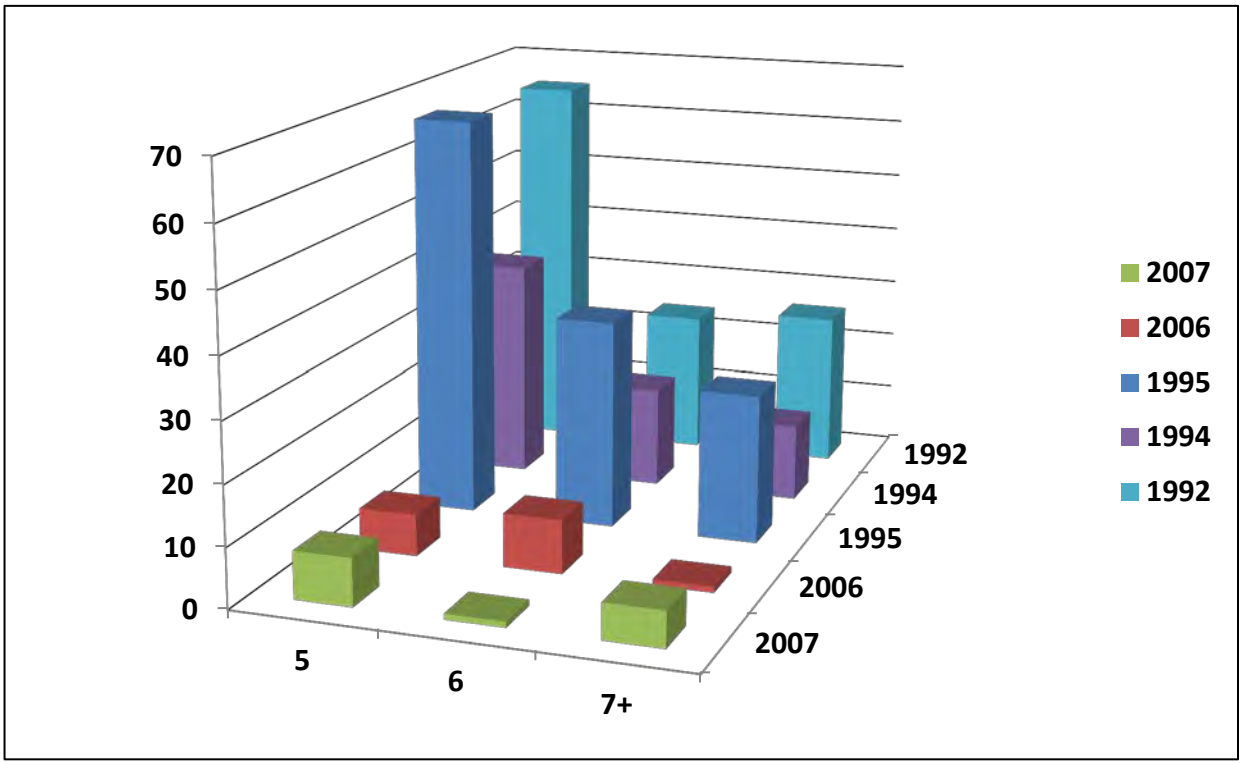


Figure 30 – Number of Bull Trout (DV) and > 12 inches (DV > 12) captured in the East Fork Bitterroot River monitoring reach near Conner between 1998 and 2007

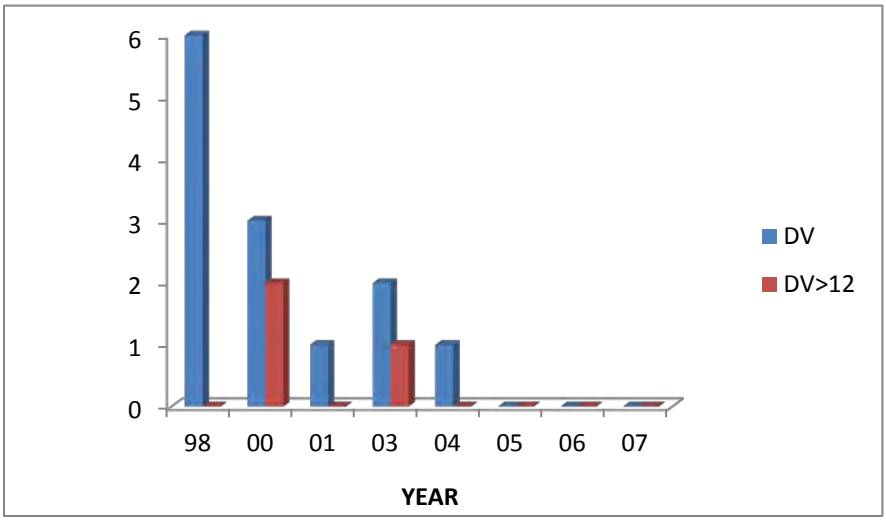


Figure 31 – Number of Bull Trout (DV) and > 12 inches (DV > 12) captured in the East Fork Bitterroot River monitoring reach near Maynard Creek between 1990 and 2009

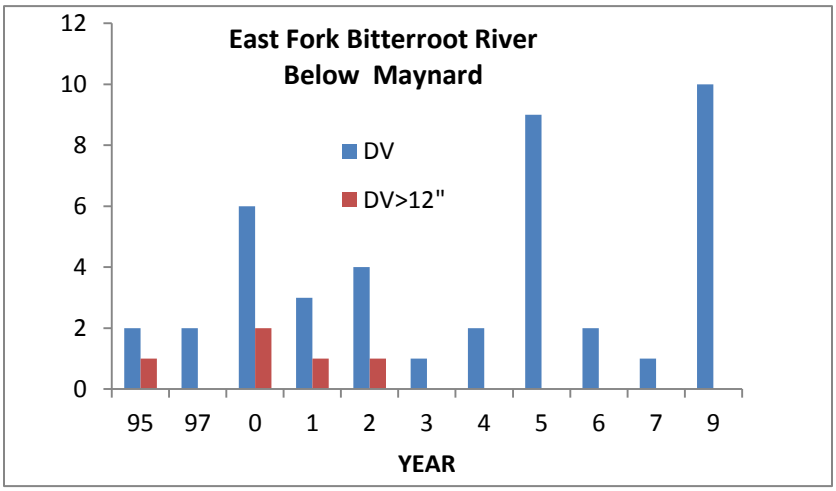


Figure 32 – Number of Bull Trout < 12 inches (DV) and > 12 inches (DV > 12) captured in the East Fork Bitterroot River monitoring reach near Colvert Creek between 1992 and 2009

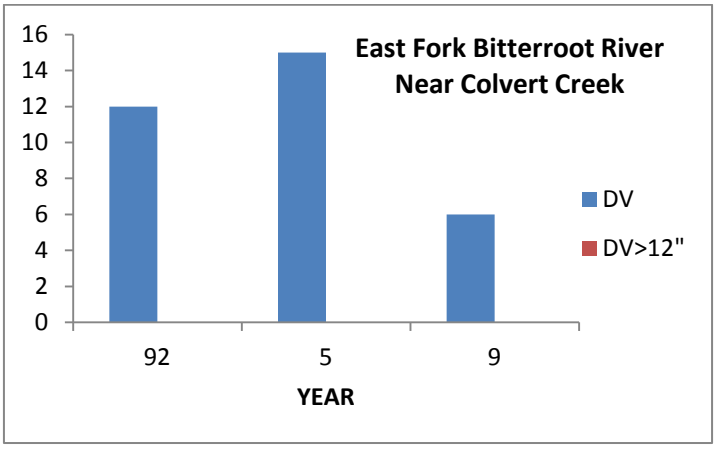
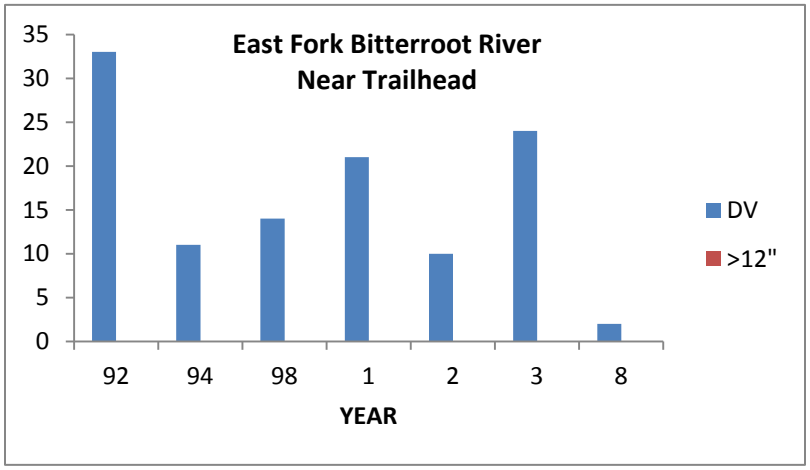


Figure 33 – Number of Bull Trout (DV) and > 12 inches (DV > 12) captured in the East Fork Bitterroot River monitoring reach near the East Fork Trailhead between 1992 and 2009



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

An estimated 63% of the westslope cutthroat populations that have been tested on the Forest are genetically unaltered. In general, hybridized populations are more prevalent in the westside canyon streams and the larger rivers (East Fork, West Fork, and main stem Bitterroot), while genetically unaltered populations tend to occur on the eastside of the valley and in the headwaters on the south half of the Forest.

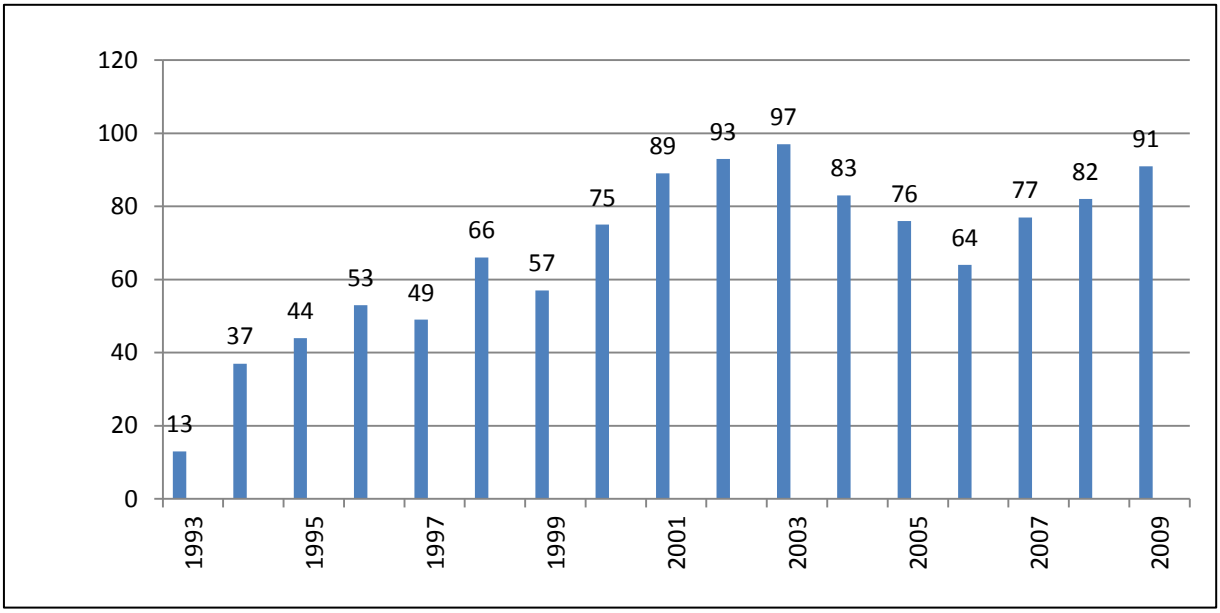
Westslope cutthroat trout occur at reduced numbers in the Bitterroot River and the private reaches of tributaries on the valley floor. However, the population of migratory westslope cutthroat trout has been increasing in the Bitterroot River and the East and West Forks since the mid 1990's. The implementation of catch-and-release regulations has been a positive factor fueling the increase. The genetic make-up of the migratory westslope cutthroat trout populations in the rivers consists of a mix of some pure fish and some hybridized fish.

The overall viability of westslope cutthroat trout in the Bitterroot River basin is considered to be "depressed", primarily because of the habitat fragmentation that occurs on private land between the Bitterroot River and its tributaries, and the reduced numbers of migratory adult fish in the river. A key problem is the lack of year-round connectivity between the Bitterroot River and its spawning and rearing tributaries on the east and west sides of the valley. Considerable efforts and funds have been expended in recent years to screen irrigation ditches, eliminate fish passage barriers, and secure instream flows in Skalkaho Creek, a key spawning and rearing tributary near Hamilton.

WATER TEMPERATURE MONITORING:

The Forest Plan does not contain water temperature monitoring requirements. Nevertheless, since 1993 the Bitterroot National Forest and the MFWP have cooperatively developed an extensive system of water temperature monitoring sites in streams across the Forest. The number of monitoring sites has grown considerably since monitoring began in 1993, as displayed in Figure 34.

Figure 34 - Number of Water Temperature Monitoring Sites on the Bitterroot National Forest



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

The unit of measure used to compare sites is the degree-day. Degree-days are calculated by summing the mean daily temperature that occurs at each site for every day between July 18th and October 1st (a 76-day monitoring period). For

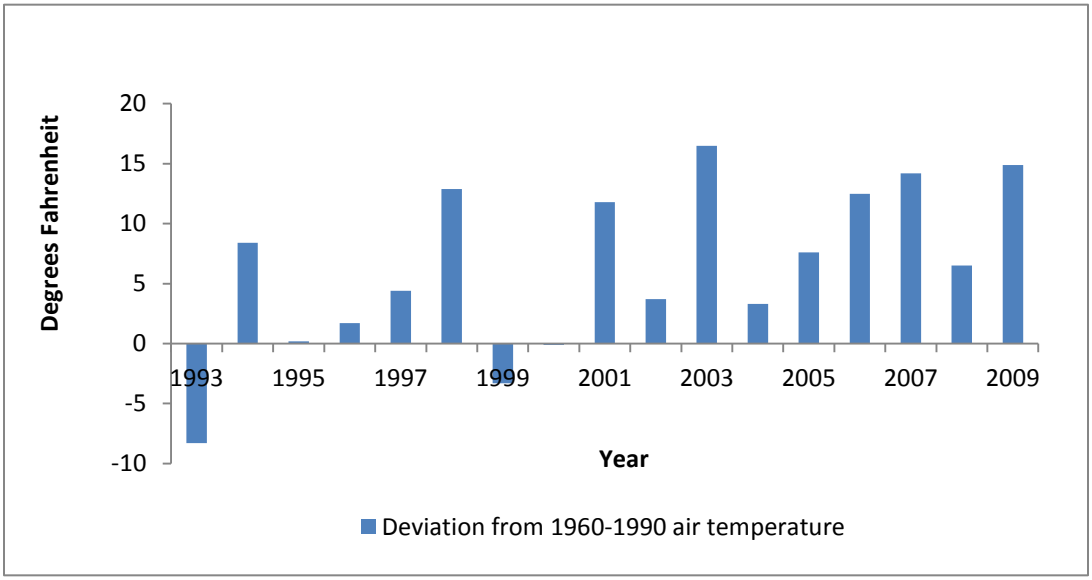
example, summing the 76 mean daily temperatures that occur at a given site between July 18th and October 1st gives you the total number of degree-days that were accumulated at that site. The higher the number of degree-days, the warmer the site. Degree-days are a useful variable because they standardize temperature data and allow comparisons between different years and different size streams.

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

Figure 35 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.

The trend in air temperatures over the past 17 years indicates that summers are getting warmer on the Bitterroot National Forest. Another trend that we have seen in some of the years since 2000 is that hot (100° F) temperatures have been arriving earlier in July, sometimes prior to the start of our July 18th monitoring period.

Figure 35 - Deviations from the mean 30-year July-September air temperatures at the Stevensville Ranger Station Weather Station, 1993-2009



Summer 2009 turned out to be much warmer-than-average when compared to the 30 year average of mean air temperatures (Figure 35). However, it was really a tale of two summers – July and August were relatively cool compared to recent years (even slightly cooler than 2008), while September broke records for heat, particularly during the latter part of the month. The hot September really skewed the data upward in Figure 35. Despite the hot weather in September, the

warmest consecutive 7-day period of stream temperatures still occurred during its usual window, which is from about July 24th through August 10th.

In 2009, the emphasis of our water temperature monitoring consisted of a mix of index site monitoring, timber sale monitoring, TMDL monitoring, and post-fire monitoring (2000 fires and 2007 Rombo Fire). Our results are discussed below.

Index Site Temperature Monitoring.

Index sites are unburned or lightly burned reference sites that are monitored every year. They function as control sites, and allow us to sort out some of the year-to-year variability that occurs as a result of weather. In 2009, we monitored temperatures at 16 index sites. Eleven of the sites were located on the Montana portion of the Forest; five of the sites were located on the Idaho portion of the Forest. The index sites have been monitored nearly every year since the early 1990's. In 2009, all of the index sites recorded degree day readings that were higher than their 1993-2008 average (Figure 36). Two of the index sites in Montana (Sleeping Child Creek 10.2 and Warm Springs Creek 3.5) recorded their highest degree day reading on record. Figure 36 compares the 2009 degree day readings at the index sites to their 1993-2008 average. Figure 37 displays the degree days that have been recorded at the Montana index sites since 1993.

Figure 36 – Index site degree days in 2009 compared to their 1993-2008 average degree days

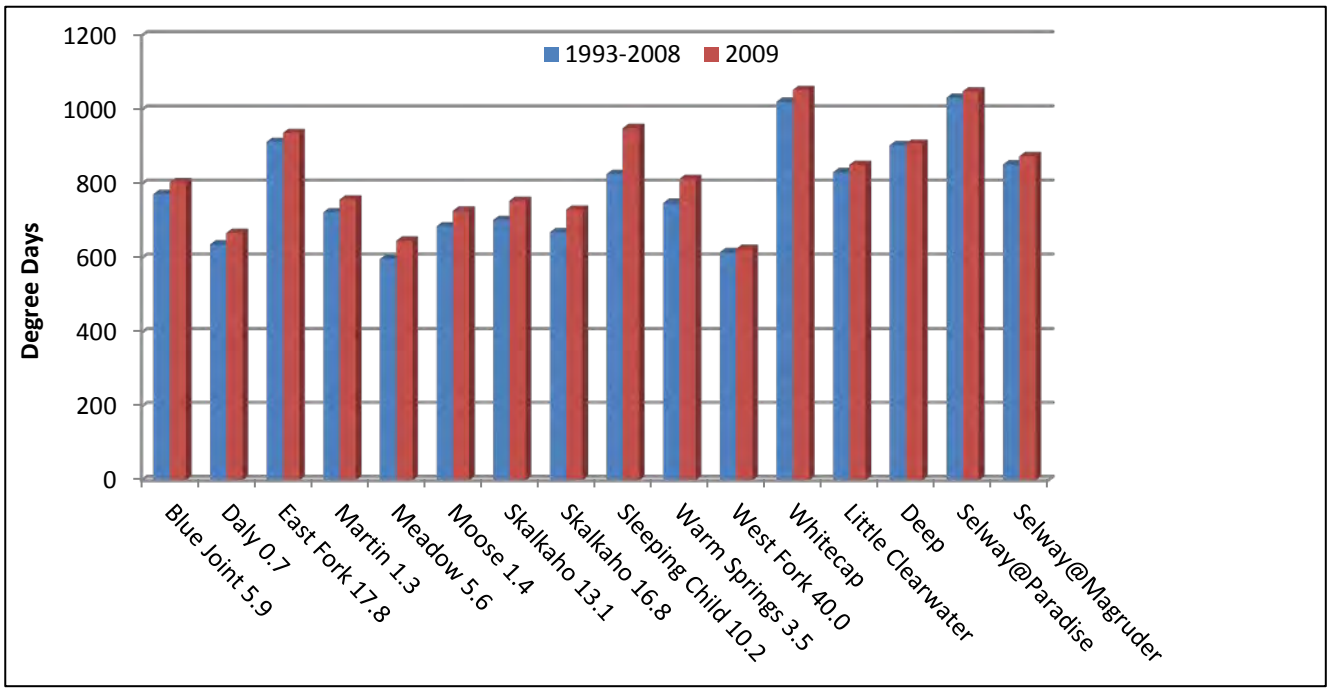
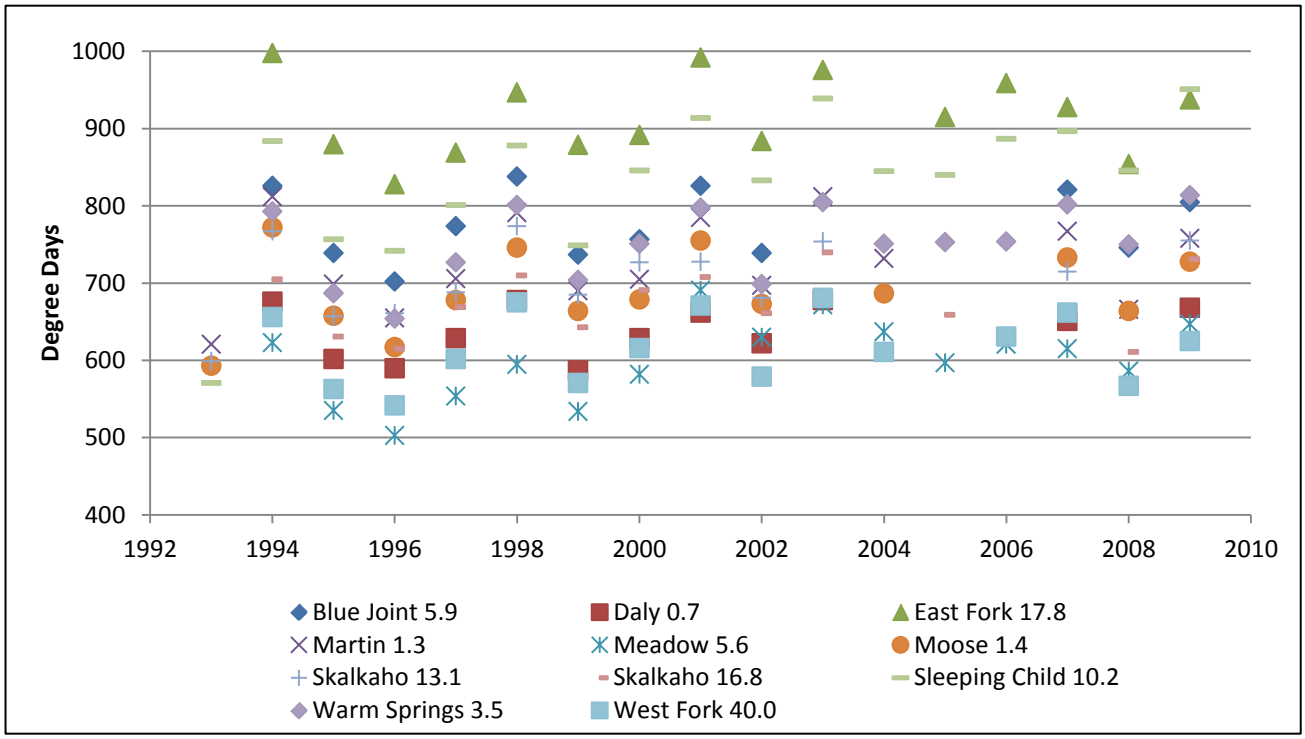


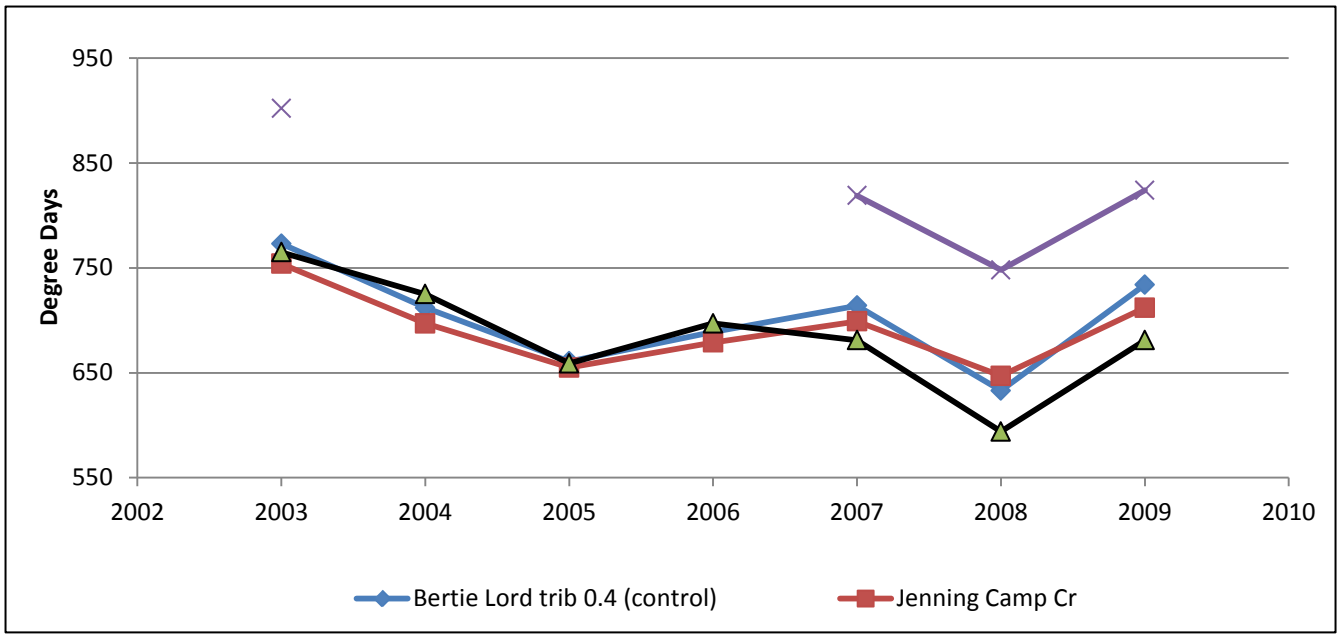
Figure 37 – Degree days recorded at the Montana index sites since 1993



Project Level Temperature Monitoring

Kerlee Bert and Lil Lyman Timber Sales. Timber harvest occurred in the Jennings Camp Creek (Kerlee Bert timber sale, part of the Middle East Fork project) and Lyman Creek (Lil' Lyman timber sale) drainages in 2007-09. The main log haul routes for these sales were Forest Road 723 along Jennings Camp Creek (Kerlee Bert timber sale) and Forest Road 311 along Guide Creek (Lil' Lyman timber sale). Water temperature monitoring sites were established in Jennings Camp Creek (milepost 1.1), Guide Creek (milepost 0.1, Forest boundary), and the North Fork of Lyman Creek (milepost 0.7, Forest boundary) to monitor potential effects of these timber sales on stream temperatures. A control site was established in an unnamed tributary to Bertie Lord Creek (unnamed tributary 0.4) that is of similar size and discharge as Jennings Camp, Guide, and North Fork Lyman creeks. The control site has had timber harvest occur in its watershed in the past, but none in recent decades. Water temperatures were monitored in the treatment and control sites for four years pre-harvest (2003-2006), and for three years while harvest and log hauling was occurring (2007-09). Temperatures were monitored in North Fork Lyman Creek in 2003, but not in 2004-06. Figure 38 displays the degree days that we measured at the control site (Bertie Lord trib 0.4) and the treatment sites (Jennings Camp, Guide, and North Fork Lyman creeks) between 2003 and 2009.

Figure 38 – Degree days measured in Bertie Lord trib 0.4 (control site) and three treatment sites (Jennings Camp, Guide, and North Fork Lyman Creeks) before and during the Kerlee Bert and Lil' Lyman timber sales



The Middle East Fork Final EIS predicted that timber harvest and log hauling would maintain the existing water temperature regimes in streams (FEIS, pg 3.4-29). A similar prediction was made in the Lil' Lyman fisheries biological assessment and evaluation. The monitoring data in Figure 38 validates those predictions. The pattern of degree days in the treatment streams closely tracked the pattern in the control stream. Temperatures in Guide Creek actually cooled a bit during the period of active log hauling (2007-09) as compared to the control site, probably as a result of ongoing shade recovery from the 2000 fires.

TMDL Temperature Monitoring. The Bitterroot Headwaters TMDL designated five water bodies as thermally impaired (East Fork Bitterroot River; West Fork Bitterroot River; Hughes Creek; Overwhich Creek; and the Nez Perce Fork). In the TMDL Monitoring Plan, a total of 12 sites were assigned for water temperature monitoring in those five streams, with specific water temperature targets for each site.

Table **33** lists the thermally impaired water bodies, their specific monitoring sites and targets, and how the 2009 temperatures compared to the targets.

Table 33 - Bitterroot Headwaters TMDL Water Temperature Monitoring Results

Thermally Impaired Streams	TMDL Monitoring Sites	TMDL Target (warmest 7-day mean-maximum temp)	2009 Temperature (warmest 7-day mean-maximum temp)
East Fork Bitterroot River	River mile 0.5	< 15.0° C	19.5° C
	River mile 17.8	< 15.0° C	18.0° C
	River mile 31.4	< 12.0° C	15.5° C
West Fork Bitterroot River	River mile 1.2	< 15.0° C	19.5° C
	River mile 22.2	< 15.0° C	14.8° C
	River mile 40.0	< 12.0° C	11.3° C
Hughes Creek	Stream mile 1.4	< 15.0° C	17.1° C
	Stream mile 9.0	< 15.0° C	14.3° C
Overwhich Creek	Stream mile 2.0	< 15.0° C	17.4° C
	Stream mile 7.0	< 12.0° C	14.4° C
Nez Perce Fork	Stream mile 1.0	< 15.0° C	17.5° C
	Stream mile 11.0	< 12.0° C	14.1° C

Three of the TMDL monitoring sites met their target in 2009. Those were:

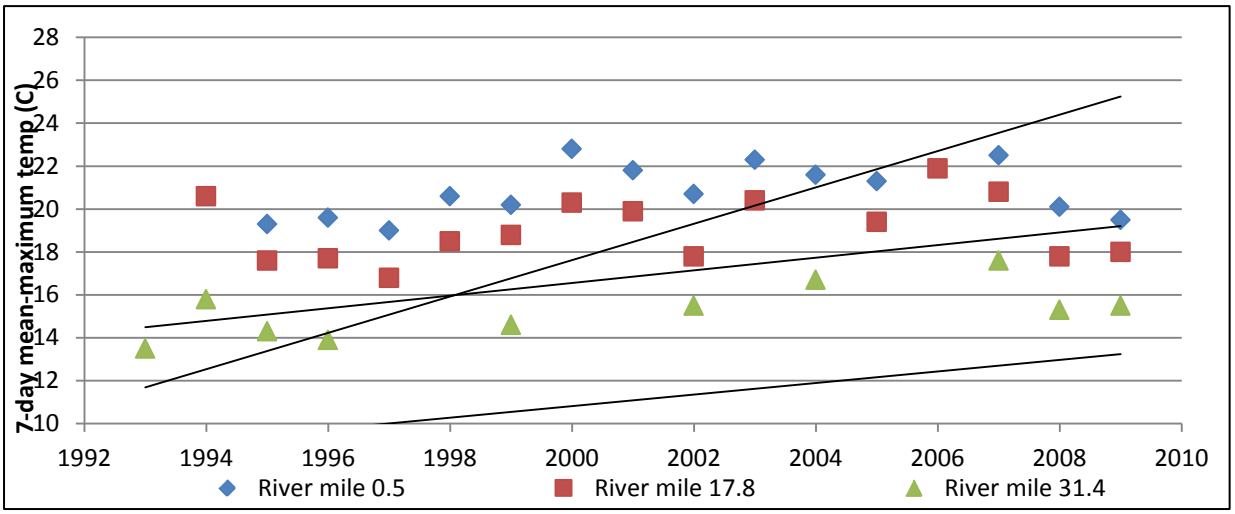
- West Fork Bitterroot River 22.2 (directly below Painted Rocks Dam)
- West Fork Bitterroot River 40.0 (headwaters above Sheep Creek)
- Hughes Creek 9.0 (above Mine Creek)

In 2008, only the West Fork 40.0 site met its target; the Hughes Creek 9.0 site came close to meeting its target in 2008, but fell a few decimal points short. When the Headwaters TMDL was being written in 2004-05, there was considerable discussion between the Montana Department of Environmental Quality (DEQ) and our Forest fisheries biologists about the feasibility of the water temperature targets. Specifically, the Forest fisheries biologists felt that the 15° C target was not naturally attainable and thus infeasible for large stream systems such as the East Fork, West Fork, and the lower reaches of Hughes Creek, Overwhich Creek, and the Nez Perce Fork. Forest fisheries biologists wanted an 18° C target for the middle and lower reaches of the East and West Forks, and a 17° C target for the lower reaches of Hughes, Overwhich, and the Nez Perce Fork. At the upper sites, the biologists wanted a target of 15° C because the monitoring data shows that temperatures in large, unmanaged streams on the Forest will usually exceed 12° C regardless of the type of summer. After much discussion, DEQ decided for the sake of consistency to adopt the INFISH Riparian Management Objective water temperature standards for their TMDL targets.

In 2008, four of the TMDL monitoring sites (East Fork 17.8; Hughes Creek 1.4; Hughes Creek 9.0; and Overwhich Creek 7.0) recorded their lowest degree day readings on record, yet none of them met their TMDL targets. Four other TMDL monitoring sites (West Fork 1.2; West Fork 22.2; West Fork 40.0; and Nez Perce Fork 11.0) came within a few degree days of recording their lowest readings on record. The monitoring data that the Forest has collected over the past 17 years suggests that the TMDL water temperature targets are too low, and are unlikely to be attained by the majority of sites in any given year, even during the cooler summers.

Figure 39 displays the trend in mean-maximum temperatures at the three TMDL monitoring sites in the East Fork Bitterroot River. Following the 2000 fires, mean-maximum temperatures increased by about 1° C at river mile 0.5 and 17.8, and by about 2° C at river mile 31.4. The trend lines in Figure 39 suggest that the 2000 fires are not the only reason for the temperature increases that have occurred in the East Fork. Temperatures were gradually increasing at all of the monitoring sites prior to the 2000 fires, which suggests that the warming climate is also contributing to warmer river temperatures.

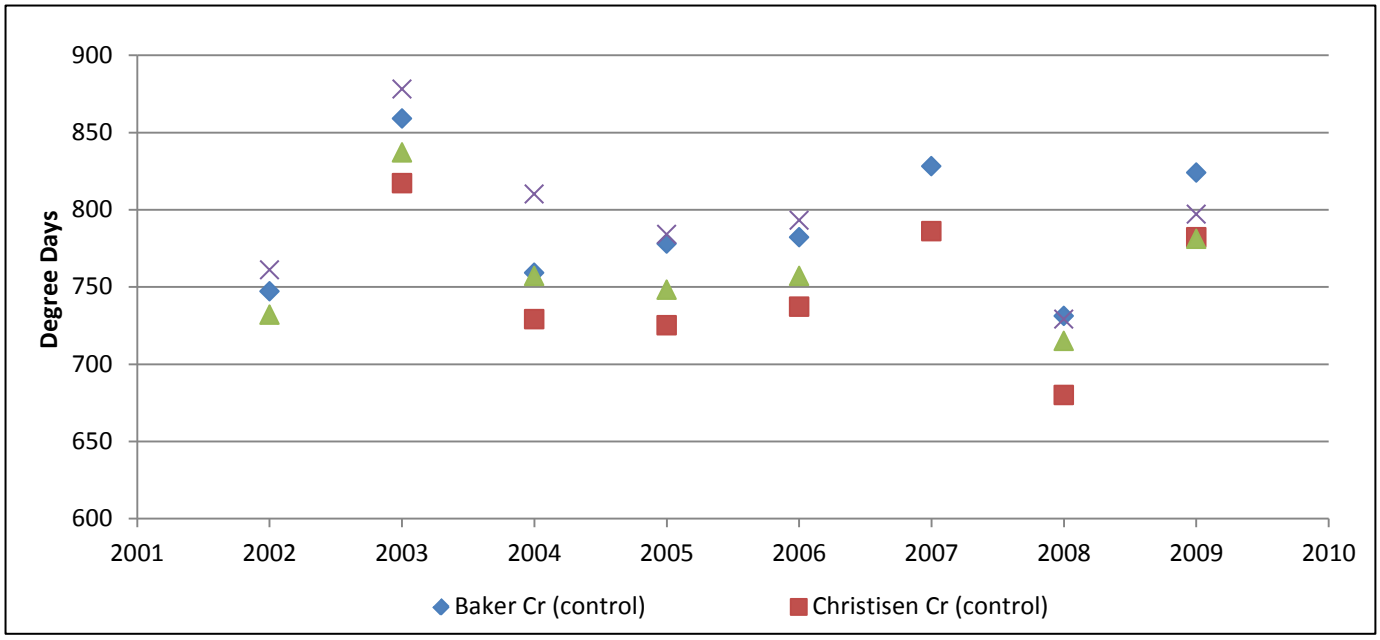
Figure 39 – Mean-maximum temperatures at the TMDL monitoring sites in the East Fork Bitterroot River



Post-Fire Temperature Monitoring

In August 2007, the Rombo Fire burned about 40% of the fish-bearing riparian areas in the Piquett Creek drainage. In 2008 and 2009, water temperatures were monitored in Piquett and East Piquett Creeks to discern potential temperature effects from the Rombo fire. An established temperature monitoring site was present in each stream near where the stream exits the Forest (milepost 1.3 on Piquett Creek; milepost 0.3 on East Piquett Creek). Several years of pre-fire temperature data was available at both sites, so they lended themselves well to a "before-after" comparison. Also, water temperature data from the pre- and post-fire period was also available for two nearby unburned control sites (Baker Creek and Christisen Creek). The control sites have had their water temperatures monitored nearly every year since 2001. Figure 40 displays the degree days that we measured at the control sites (Baker Creek and Christisen Creek) and the fire-affected sites (Piquett and East Piquett Creeks) between 2001 and 2009.

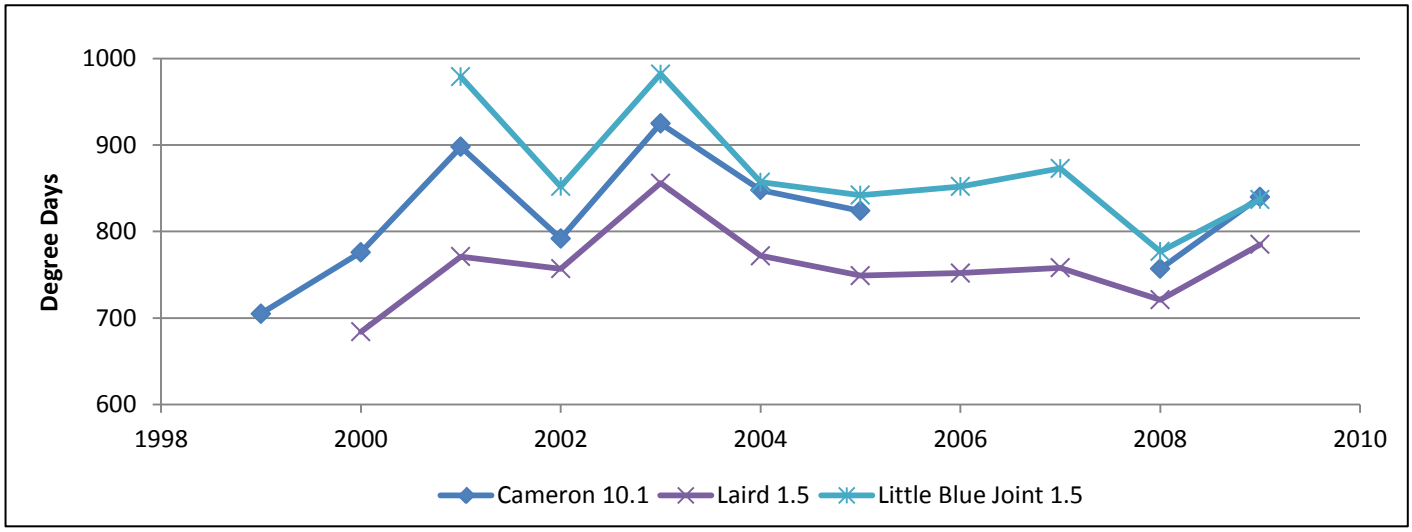
Figure 40 – Degree days measured in two control streams (Baker and Christisen Creeks) and two streams affected by the 2007 Rombo Fire (Piquett and East Piquett Creeks)



The pattern of degree days in the fire-affected streams was similar to the pattern in the control streams both before and after the Rombo fire in 2007. If the fire increased water temperatures in Piquett and East Piquett Creeks to any significant degree, the cluster of degree day readings in 2008 and 2009 should have a wider spread. However, this did not occur, which suggests that we have been unable to distinguish fire-related water temperature increases in Piquett and East Piquett creeks where those streams exit Forest Service land.

Water temperatures have been monitored in Laird Creek (milepost 1.5), Little Blue Joint Creek (milepost 1.5), and Cameron Creek (milepost 10.1) nearly every summer since the 2000 fires. These streams were severely burned by the fires. Figure 41 displays the degree days in Laird, Little Blue, and Cameron Creeks since the 2000 fires.

Figure 41 – Degree days in three streams severely burned by the 2000 fires



The data in Figure 41 suggests that some recovery of stream temperatures has occurred in these streams since 2000, but temperatures are not fully recovered. Post-fire temperature increases in these streams appears to have peaked in 2003. In 2006, a University of Montana research project (Mahlum et al. 2007) investigated the post-fire water temperature situation on the Bitterroot National Forest. Mahlum et al. (2007) concluded that in the burned streams, temperatures were trending towards recovery by 2005 in the months of August and September, but not in July. In the unburned streams that were located downstream of the burned area, temperatures had recovered to approximate their unburned conditions by 2002.

Mahlum, S.K., L. Eby, M.K. Young, C.G. Clancy, and M.J. Jakober. 2007. Effects of fire on stream temperatures in the Bitterroot River basin, Montana. Presentation submitted to the Wild Trout Symposium. October, 2007.

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

- Stream temperatures have been increasing across the Forest in response to the warming climate. A similar magnitude of increase has been observed in the wilderness streams in Idaho and the key bull trout streams in Montana. Degree days have increased by 50 to 100 units in most streams since 1993, which roughly correlates to around a 1º C increase in the mean daily water temperature.
- The decline of bull trout populations observed in some streams since 2006 could be related to stream temperature increases. The most vulnerable reaches occur at the lower elevations where the lower limit of bull trout distribution currently exists and non-native trout competitors are more numerous. If water temperatures continue to rise in future years, bull trout distribution will shrink across the Forest, with the populations at the lowest elevations disappearing first. The most conservative climate models suggest warming in the range of 1.6º C over the next 50 years, which could result in suitable bull trout habitat being reduced by 30-40% on the Forest. Some of the more liberal models suggest warming in the range of 6º C over the next 50 years, which could eliminate suitable bull trout habitat from all but the highest elevations.
- We were unable to measure stream temperature increases as a result of the Kerlee Bert and Lil' Lyman timber sales. The protection of RHCA buffers from harvest is believed to be the key mitigation measure for maintaining stream temperatures.

- The majority of TMDL monitoring sites in the East Fork Bitterroot River, West Fork Bitterroot River, Hughes Creek, Overwhich Creek, and Nez Perce Fork failed to meet their water temperature targets in 2008 and 2009. River temperatures in the East Fork have been gradually increasing at all three monitoring sites since 1993.
- We have been unable to distinguish stream temperature increases in Piquett and East Piquett Creeks since the 2007 Rombo Fire.
- Some recovery of stream temperatures has occurred in Laird, Little Blue Joint, and Cameron Creeks since the 2000 fires, but temperatures have not fully recovered a decade post-fire. Recovery of temperatures has been most noticeable in the smallest burned streams such as Guide Creek where the recovery of shrub shade has been extensive.

BULL TROUT REDD SURVEYS:

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

Meadow Creek Redd Survey (Sula Ranger District). The "Meadow reach" is a two-mile long section of Meadow Creek that the Forest has monitored each autumn for bull trout redds since 1994. In October 2009, Forest fisheries biologists counted seven bull trout redds in the Meadow reach. This was similar to the 2008 count (6), and on the lower end of the range (1 to 21 redds) counted between 1994 and 2008. Over the years, there has not been a correlation between the number of redds counted and the number of juvenile bull trout captured in electrofishing mark/recapture estimates. Redd counts have fluctuated at low numbers, while juvenile bull trout have remained generally common. Either we cannot reliably count bull trout redds in Meadow Creek (i.e. most of the bull trout may be resident fish whose small redds are difficult to see), or the bull trout are spawning in areas where we are not looking for them.

Upper East Fork Bitterroot River Redd Survey (Sula Ranger District). This reach was established by MFWP biologists in 2000 in response to several radio-tagged bull trout moving in this reach to spawn from the lower East Fork. Due to the lack of redds found in previous years, MFWP biologists did not survey this reach in 2009.

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. In October 2009, MFWP biologists counted five redds in Deer Creek, which was the same as the 2008 count (5) and about average for the period between 1994 and 2008 (range 0 to 16 redds). A large (24 inches long) adult bull trout spawner was observed in the redd survey reach in 2009 (Figure 42). Also, a smaller adult bull trout spawner (17 inches long) was captured in the reach during an August, 2009 mark-recapture electrofishing survey. Bull trout and brook trout occur at similar densities in lower Deer Creek. As a result, we are unable to accurately distinguish between the redds of the two species. We have reported the total number redds counted, but some of those could have been made by brook trout.

Figure 42 – Large Adult Bull Trout Spawner in Deer Creek

Chicken Creek Redd Survey (West Fork Ranger District). This reach was established by Forest fisheries biologists in 2005 in response to a consultation with the U.S. Fish and Wildlife Service. The reach was surveyed for the first time in October 2005. The number of redds counted has been 13 (2005), 15 (2006), 16

(2007), 21 (2008), and 15 (2009). Bull trout and brook trout are both present in Chicken Creek, with brook trout being the more common species. Because we are unable to accurately distinguish between the redds of the two species, we have reported the total number redds counted, with the assumption that most were probably made by brook trout. In 2007, the low-flow passage barrier at the Trollope-Hawkes ditch diversion was eliminated. This opened up access to about four miles of spawning and rearing habitat above the diversion for migratory bull trout from the West Fork Bitterroot River. Forest fisheries biologists will conduct the Chicken Creek redd survey in 2010, which will fulfill its monitoring requirement with the U.S. Fish and Wildlife Service. After the 2010 survey, the U.S. Fish and Wildlife Service will decide whether there is a need to continue counting redds in Chicken Creek.

Daly Creek Redd Survey (Darby Ranger District). The Forest has conducted a bull trout redd survey in a 1-mile long reach of Daly Creek since 1994. Thirty-two redds were observed in 2009, which is a similar to 2003 through 2008 (Figure 43 and Table 34). The redds were the size of those typically made by resident bull trout. In recent history, the drainage above the surveyed section has been relatively unaltered by fire, roads, or other obvious human activities. There are dispersed camping sites and illegal firewood cutting occurring, which degrades the riparian habitat quality of the upper end of the surveyed section. Forest fisheries biologists plan on continuing to survey redds in Daly Creek in 2010.

Figure 43 - Annual Bull Trout Redd Counts, 1994 to 2009

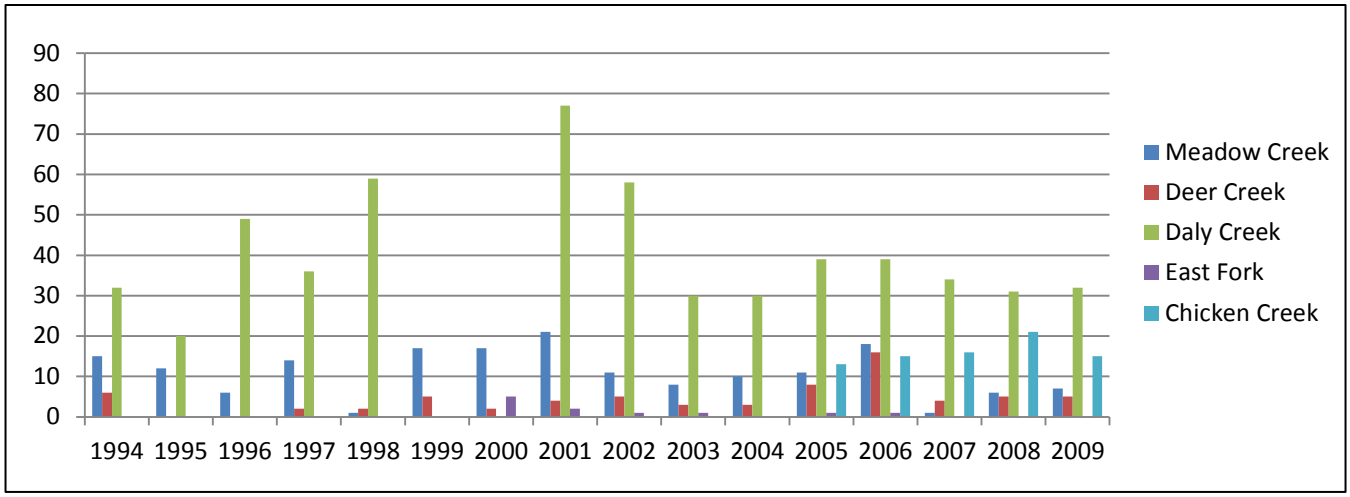


Table 34 – Annual Bull Trout Redd Counts, 1994 to 2009

	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Meadow Creek (D3)	15	12	6	14	1	17	17	21	11	8	10	11	18	1	6	7
East Fork (D3)	ND	ND	ND	ND	ND	ND	5	2	1	1	0	1	1	0	ND	ND
Deer Creek (D4)	6	0	0	2	2	5	2	4	5	3	3	8	16	4	5	5
Chicken Creek (D4)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	13	15	16	21	15
Daly Creek (D2)	32	20	49	36	59	ND	ND	77	58	30	30	39	39	34	31	32

ND = No data, not surveyed

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

- Redd counts have not been a reliable index of bull trout population trends on the Bittterroot National Forest. Either we are: (1) looking in the wrong places (e.g. what we think is good spawning habitat is not what most of the bull trout are using for spawning); (2) looking in the right places but cannot reliably identify the redds that are present (e.g. most of

the redds are small resident redds that are difficult to see); or (3) there are just very few migratory redds, and the redds that are present are widely scattered. Forest and MFWP biologists are reasonably certain that the poor correlation that occurs between redd counts and the electrofishing data is caused by a combination of (2) and (3).

- Redd counts are best used as an index of population trend after key spawning areas have been identified. Without knowing where the key spawning areas are, redd counts have very limited utility. In 2008, Leslie Nyce, a University of Montana graduate student, used radio-telemetry to identify that the East Fork Bitterroot River and its larger tributaries (Orphan and Clifford creeks) in the Anaconda-Pintlar Wilderness Area appear to be key spawning area for migratory bull trout. Unfortunately, the number of migratory bull trout in the East Fork appears to have declined to such low numbers that it is questionable whether doing more redd surveys would provide any additional information in monitoring population trends. Since 2000, MFWP biologists already had an established redd survey reach (the Upper East Fork redd survey, discussed above) located in the vicinity where the radio-tagged bull trout went. However, the number of redds counted between 2000 and 2007 was so low that MFWP biologists decided to not survey the reach in 2008 or 2009.
- Radio telemetry could be used to determine where the bull trout in Painted Rocks Lake go to spawn. Trapping data collected by researchers working in Slate Creek in 2003 indicate that migratory bull trout in Painted Rocks Reservoir may be more common than was originally believed, but little is known about where those bull trout spawn.

BULL TROUT MOVEMENT AND GENETIC RESEARCH:

East Fork Bitterroot River Drainage Bull Trout Genetic Study

Leslie Nyce, a graduate student at the University of Montana and MFWP biologist, started a research project in 2008 investigating the movement and population genetic structure of the bull trout population in the East Fork Bitterroot River drainage. Leslie continued sampling for bull trout in the East Fork Bitterroot River and 12 tributaries during 2009. A total of 16 fin samples were collected from the river and 77 fin samples were collected from seven tributaries. Five tributaries that were sampled yielded no bull trout captures. Bull trout fin samples were collected from fish ranging in size 59-422 mm. Leslie completed her course work in May 2010 and will continue working on genetic data analysis and thesis writing into fall 2010 with completion of the project by December 2010. In 2008, Leslie's activities consisted of capturing and surgically implanting radio transmitters in fluvial bull trout adults from the East Fork Bitterroot River, tracking their spawning movements, and collecting non-lethal fin samples for genetic analysis from bull trout in the East Fork and some of its spawning tributaries.

Determining the genetic population structure will involve investigating genetic differences within tributary bull trout populations and genetic variation among tributary bull trout populations. Studies in other areas have found relatively little genetic variation within bull trout populations but substantial divergence among populations, the same is expected for the East Fork. If such genetic structure exists, it will be possible to assign bull trout from the main stem East Fork to the tributaries where they originated, helping to determine where fluvial bull trout come from. This information would be very useful in identifying key spawning areas for fluvial bull trout.

It is important to determine the genetic population structure of bull trout in the East Fork because the findings can help determine the best conservation and management actions. For example, if all of the bull trout populations in the East Fork drainage are genetically identical, they can be managed as one population. However, if the bull trout populations are genetically distinct, they need to be managed as individual populations. This information will help direct the most efficient ways to allocate money for bull trout conservation and management in the East Fork Bitterroot River drainage.

West Fork Bitterroot River Drainage Bull Trout Genetic Analysis

During the 2009 field season, Forest and MFWP fisheries biologists collected fin clips from bull trout in 10 streams in the West Fork Bitterroot River drainage. The fins were sent to the University of Montana Conservation Genetics Laboratory for genetic analysis.

Table **35** lists the streams that were sampled, the number of fin clips analyzed, and summarizes the results.

Table 35 – Bull Trout Genetic Sampling, West Fork Bitterroot River Drainage

Stream	Date	Location	# Bull Trout Tested	Results
Chicken Creek	Aug 13, 2009	T3S, R22W, S4 N 45° 35’ 53.3” W 114° 19’ 28.4”	3	Pure bull trout, all were collected from Chicken Creek irrigation ditches
Deer Creek	Aug 18, 2009	T3S, R22W, S9 N 45° 35’ 31.3” W 114° 19’ 43.5”	12	Ten pure bull trout and two F1 hybrids between bull trout and brook trout. Both hybrids correctly identified in the field.
Hughes Creek	Jun 4, 2009	T3S, R22W, S2	1	Pure bull trout
Little West Fork	Aug 4, 2009	T1N, R22W, S31 N 45° 47’ 19.1” W 114° 22’ 51.2”	8	Pure bull trout
Nelson Creek	Aug 18, 2009	T1N, R22W, S35 N 45° 48’ 12.3” W 114° 17’ 47.6”	4	Pure bull trout, all were collected from Nelson Creek irrigation ditches
Nez Perce Fork	Aug 3, 2009	T1S, R23W, S16 N 45° 44’ 43.0” W 114° 26’ 53.7”	11	Eight pure bull trout and three F1 hybrids between bull trout and brook trout. The hybrids were misidentified in the field as being bull trout.
North Fork Sheephead Creek	Aug 5, 2009	T1S, R23W, S7 N 45° 45’ 44.0” W 114° 28’ 47.0”	20	15 pure bull trout, three F1 hybrids between bull trout and brook trout, one F1 backcross to a bull trout, and one brook trout. In the field, the brook trout was misidentified as a bull trout, and the F1 backcross as being a F1 hybrid. The three F1 hybrids were correctly identified in the field.
Sheephead Creek	Aug 5, 2009	T1S, R23W, S1 N 45° 45’ 20.9” W 114° 29’ 30.6”	19	18 pure bull trout and one F1 hybrid between bull trout and brook trout. The hybrid was correctly identified in the field.
Slate Creek	Jul 22, 2009	T2S, R22W, S1 N 45° 41’ 54.3” W 114° 15’ 50.3”	17	15 pure bull trout, one F1 backcross to a bull trout, and one brook trout. In the field, the brook trout was misidentified as a bull trout, and the F1 backcross as being a F1 hybrid.
Watchtower Creek	Aug 3, 2009	T1S, R23W, S15 N 45° 45’ 20.4” W 114° 25’ 18.5”	15	Eight pure bull trout, five F1 hybrids between bull trout and brook trout, and two F1 backcrosses to bull trout. In the field, all of the F1 hybrids and backcrosses were misidentified as being bull trout.

The key findings of the genetic and movement studies are:

- Bull trout genetic amples were previously collected from the Nez Perce Fork and Watchtower Creek sites in 1992. F1 hybrids between bull trout and brook trout and F1 backcrosses to bull trout were observed in 1992, which indicates that hybridization has been occurring in these streams since at least 1992.
- Bull trout genetic samples were previously collected from Slate Creek in 1991 and 1993. F1 hybrids were found in both years, indicating that hybridization has been occurring in Slate Creek since at least 1991.
- The observance of a single brook trout in North Fork Sheephead Creek was the first documented appearance of brook trout in that stream. The North Fork had only been sampled once before, and that occurred in 1993. It is possible that brook trout were present in the North Fork at low densities in 1993, but were either missed in the

electrofishing survey or misidentified as bull trout. The brook trout that was misidentified as a bull trout in 2009 was a 3-inch long fish. A small brook trout was also misidentified as a bull trout in Slate Creek in 2009.

- Our ability is correctly identify bull trout X brook trout hybrids is inconsistent. We do a better job of correctly identifying the F1 hybrids. The F1 backcrosses tend to be misidentified as pure bull trout.
-

CULVERT INVENTORIES AND REPLACEMENTS:

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

Culvert Inventories: During the 2003 field season, the majority (> 80%) of the fish-bearing culverts on the Bitterroot National Forest were surveyed with the Fish Crossing protocol to assess whether or not they function as a passage barrier to trout. The FishXing model predictions were checked and validated by Forest fisheries biologists. Nearly of the fish-bearing culverts that were not surveyed in 2003 were visited by Forest biologists in 2004-07.

During the 2007 field season, 43 fish-bearing culverts on five Forest highways were surveyed with the Fish Crossing protocol. The highways surveyed included: (1) U.S. Highway 93 between Darby and Lost Trail Pass; (2) the East Fork Highway; (3) the West Fork Highway; (4) the Skalkaho Highway; and (5) the paved portion of the Nez Perce Road. The results indicate that 58% of the highway culverts are an upstream barrier to juvenile trout during some time of the year, 21% are potential barriers, and 21% provide year-round passage. The results for adult trout were similar, with 51% of the culverts identified as barriers, 28% as potential barriers, and 21% providing year-round passage.

Table 36 summarizes our most current knowledge of fish culvert passage status on the Forest. The numbers in the table may differ from past reports because they get adjusted as new information becomes available, or as barriers are eliminated through replacement or removal.

Table 36 – Fish Passage Barriers at Culverts

Location	# of fish-bearing culverts	# known or suspected to be passage barriers	# unknown – not seen or surveyed	# likely to be offering suitable fish passage conditions
Sula and W. Fork R.D.	109	75 (69%)	0 (0%)	34 (31%)
Stevensville and Darby R.D.	60	47 (78%)	3 (5%)	10 (17%)
Montana DNRC land	6	1 (17%)	0 (0%)	5 (83%)

The elimination of fish passage barriers at culverts is a key objective for the Forest fisheries and engineering programs. Since 2000, 62 culverts have been replaced or removed to improve fish passage on Bitterroot National Forest and adjacent state and private lands. The Bitterroot National Forest has conducted the bulk of the culvert replacements and removals (53 of 62). The rest have occurred on Sula State Forest lands (5 culverts), U.S. Highway 93 (3 culverts during the Sula North/South reconstruction phase), or the West Fork Highway (1 culvert, Slate Creek).

In 2009, the Forest replaced one fish barrier culvert with a new bridge (Meadow Creek, Road 725) and one fish barrier culvert with an open-bottomed arch (East Piquett Creek, Road 731), and removed one fish barrier culvert (North Fork Willow Creek, Road 13131 (See Table 36).

Implementation Monitoring of Culvert Replacements: Bitterroot Headwaters TMDL recommends that the Forest monitor any new culvert replacements to ensure that fish passage is being adequately maintained. Table 37 lists the fish passage culvert replacements and removals that have occurred since 2000, and summarizes their current fish passage status based on our most recent monitoring visits. The current fish passage status of each culvert was classified as "fully functioning", "partially functioning", or "not functioning". These categories are defined as:

- *Fully functioning* = native material is stable and present throughout the culvert barrel; there are no prohibitive vertical drops on the inlet or outlet; all sizes and species of fish can pass through the culvert at high and low flows
- *Partially functioning* = since replacement, some of the native material has been flushed from the barrel and now less than half of the barrel is either bare or contains reduced amounts of substrate material; there are no prohibitive vertical drops on the inlet or outlet; most adult fish can still pass through the culvert at high and low flows, but passage of juvenile fish is probably restricted at the higher flows due to prohibitive water velocities inside of the barrel; culverts that also provide good fish passage at high flows but their flows go subsurface at low flows were also placed in this category
- *Not functioning* = since replacement, all or most of the native material has been scoured from the barrel or 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 37 – Status of culverts replaced or removed to eliminate fish passage barriers, 2000 to present

District[3]	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	
D4	Took Creek	362	Replaced, 2003 (BAR)		X	
D4	Took Creek	1303	Replaced, 2003 (BAR)		X	
D4	Gabe Creek	468	New bridge, 2004	X		
D4	Scimitar Creek	Non-syst	Removed, 2007	X		
D4	Coal Creek	5662	Replaced, 2007 (BAR)			X
D4	Castle Creek	49	Replaced, 2008 (BAR)	X		
D4	East Piquett Creek	731	Replaced, 2009 (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	West Fork Camp, trib 0.1	729-B	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 Creek	727	Replaced, 2003	X		
D3	Springer Creek	Non-syst	Removed, 2006	X		
D3	West Fork Camp, trib 0.1	13340	Removed, 2006	X		
D3	Lyman Creek, trib 1.8	13304	Removed, 2006	X		
D3	Lyman Creek, trib 1.8	13304	Removed, 2006	X		
D3	Moose Creek	726	New bridge, 2007 (BAR)	X		

D2 – Darby District, D3 – Sula District, D4 – West Fork District, DNRC – Montana Department of Natural Resources, MDOT – Montana Department of Transportation, FHA – Federal Highway Administration, BAR – Burned Area Recovery Project

District[3]	Stream	Road	Year replaced or removed?	Fully functioning	Partially functioning	Not functioning
D3	Hart Creek	311	Replaced, 2008	X		
D3	Hart Creek	73180	Replaced, 2008	X		
D3	Mink Creek	5753	Replaced, 2008	X		
D3	Meadow Creek	5758	New bridge, 2008	X		
D3	Meadow Creek	725	New bridge, 2009	X		
D2	North Rye Creek, trib 2.1	321	Replaced, 2000			X
D2	Rye Creek, trib 9.1 (lower)	311	Replaced, 2001	X		
D2	Rye Creek, trib 9.1 (upper)	311	Replaced, 2001	X		
D2	Gird Creek	1365	Replaced, 2001		X	
D2	Railroad Creek	75	Replaced, 2005 (BAR)	X		
D2	Hog Trough Creek	75	Replaced, 2005 (BAR)	X		
D2	Weasel Creek	75	Replaced, 2005 (BAR)	X		
D2	Rye Creek, trib 12.3	75	Replaced, 2005 (BAR)	X		
D2	Rye Creek, trib 12.3	5607	Replaced, 2005 (BAR)	X		
D2	Cathouse Creek	Non-syst	Removed, 2006	X		
D2	Cathouse Creek, trib 0.9	Non-syst	Removed, 2006	X		
D2	North Rye Creek	321	Replaced, 2006 (BAR)	X		
D2	Cathouse Creek	1126	Replaced, 2007	X		
D1	North Fork Willow Creek	13131	Removed, 2009	X		
DNRC	North Cameron Creek	1397	Replaced, 2000	X		
DNRC	North Cameron Creek	73160	Replaced, 2000	X		
DNRC	Lyman Creek	DNRC	Replaced, 2000	X		
DNRC	Praine Creek	DNRC	Replaced, 2001	X		
DNRC	Andrews Creek	DNRC	Replaced, 2007	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		

D1-Stevensville District, D2 – Darby District, D3 – Sula District, D4 – West Fork District, DNRC – Montana Department of Natural Resources, MDOT – Montana Department of Transportation, FHA – Federal Highway Administration

NEPA Backlog: There are currently 55 fish barrier culvert replacements or removals on the Forest that have NEPA analysis completed. Of those, two will be implemented in 2010 (designated with ** in Table 38), and three are contracted and could be implemented in 2010 or 2011 (designated with # in Table 38). About half of the culverts listed in Table 38 have survey and design completed. The Forest is pursuing opportunities to fund these backlog culverts as opportunities arise, but it is a slow process. Culverts that have NEPA completed but the Forest has dropped from consideration for various reasons are not listed in Table 38.

Table 38 lists the fish barrier culvert replacements or removals that have NEPA analysis completed, but have not been implemented.

Table 38 – Backlog of fish barrier culverts with completed NEPA analysis

Stream	Road #	NEPA Document and Date of Decision
Two Bear Creek **	County 85-D	Burned Area Recovery FEIS/ROD, 2001
Rye Creek	Road 5612	Burned Area Recovery FEIS/ROD, 2001
North Rye Creek	Road 8111	Burned Area Recovery FEIS/ROD, 2001
Waugh Creek	Road 13334	Burned Area Recovery FEIS/ROD, 2001
Mine Creek **	Road 5688	Burned Area Recovery FEIS/ROD, 2001
Pete Creek (Idaho) #	Road 468	Sentimental, Gabe, and Pete Creek Culvert Replacements EA/DN, 2003
Baker Creek, north channel	Road 5629	Frazier Interface EA/DN, 2003
Baker Creek, south channel	Road 5629	Frazier Interface EA/DN, 2003
Pierce Creek #	Road 5629	Frazier Interface EA/DN, 2003

Stream	Road #	NEPA Document and Date of Decision
Pierce Creek	Road 13466	Frazier Interface EA/DN, 2003
Pierce Creek	Road 363	Frazier Interface EA/DN, 2003
Warm Springs Creek #	Road 370	Warm Springs and Meadow Creek Culvert Replacements EA/DN, 2005
Threemile Creek	Road 640	Threemile Bridge and Culvert EA, 2005
Bertie Lord Creek	Road 5786	Middle East Fork FEIS/ROD, 2006
Bertie Lord Creek, trib 3.5	Road 5786	Middle East Fork FEIS/ROD, 2006
Springer Creek	FDR 13302	Middle East Fork FEIS/ROD, 2006
Scimitar Creek (Idaho)	Road 468	Deep Creek Culverts DM, 2007
Schumaker Creek (Idaho)	Road 468	Deep Creek Culverts DM, 2007
Halfway Creek (Idaho)	Road 468	Deep Creek Culverts DM, 2007
South Fork Chaffin Creek	Road 374-A	Trapper Bunkhouse FEIS/ROD, 2008
South Fork Chaffin Creek	Road 374	Trapper Bunkhouse FEIS/ROD, 2008
Spoon Creek	Road 13225	Trapper Bunkhouse FEIS/ROD, 2008
North Fork Willow Creek	Road 969-A	NF Willow Creek Culvert Replacements For Fish Passage DM, 2008
Beavertail Creek	Road 361-A	West Fork District Fish Culverts EA/DN, 2010
Beavertail Creek	Road 361	West Fork District Fish Culverts EA/DN
Beavertail Creek	Road 5719	West Fork District Fish Culverts EA/DN
Blue Joint Creek, trib 3.8	Road 362	West Fork District Fish Culverts EA/DN
Britts Creek	Road 49	West Fork District Fish Culverts EA/DN
Coal Creek, trib 2.1	Road 5660	West Fork District Fish Culverts EA/DN
Devil Creek	Road 91	West Fork District Fish Culverts EA/DN
Flat Creek	Road 468	West Fork District Fish Culverts EA/DN
Gemmell Creek (lower)	Road 5633	West Fork District Fish Culverts EA/DN
Gentile Creek	Road 5703	West Fork District Fish Culverts EA/DN
Johnson Creek	Road 91	West Fork District Fish Culverts EA/DN
Johnson Creek	Road 5685	West Fork District Fish Culverts EA/DN
Lavene Creek (lower)	Road 5630	West Fork District Fish Culverts EA/DN
Little Blue Joint Creek	Road 5658	West Fork District Fish Culverts EA/DN
Little Boulder Creek	Road 1130	West Fork District Fish Culverts EA/DN
Nez Perce Fork (lower)	Road 468	West Fork District Fish Culverts EA/DN
Nez Perce Fork (upper)	Road 468	West Fork District Fish Culverts EA/DN
Rombo Creek	Road 13462	West Fork District Fish Culverts EA/DN
Rombo Creek	Road 5715	West Fork District Fish Culverts EA/DN
Salt Creek	Road 5683	West Fork District Fish Culverts EA/DN
Sand Creek	Road 1307	West Fork District Fish Culverts EA/DN
Sheep Creek	Road 5677	West Fork District Fish Culverts EA/DN
Soldier Creek	Road 91	West Fork District Fish Culverts EA/DN
Thunder Creek	WF highway	West Fork District Fish Culverts EA/DN
Tough Creek	Road 13804	West Fork District Fish Culverts EA/DN
Two Creek	Road 732	West Fork District Fish Culverts EA/DN
Two Creek	Road 5650	West Fork District Fish Culverts EA/DN
West Creek, trib 2.0	Road 13410	West Fork District Fish Culverts EA/DN
Woods Creek	Road 5672	West Fork District Fish Culverts EA/DN
Woods Creek, trib 3.8	Road 5669	West Fork District Fish Culverts EA/DN
Woods Creek, trib 4.5	Road 5669	West Fork District Fish Culverts EA/DN
Woods Creek, trib 5.4	Road 5672	West Fork District Fish Culverts EA/DN

The key findings of our culvert monitoring are:

- The majority of the replacements have been successful at eliminating fish passage barriers.

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

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

PROJECT LEVEL MONITORING OF FISHERIES & WATERSHED IMPROVEMENT PROJECTS:

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

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

The fish culvert portion of the Burned Area Recovery project is ongoing. Twenty-three of the Burned Area Recovery culverts have been replaced (22) or removed (1), and two culverts (Two Bear Creek, County 85-D and Mine Creek, Road 5688) are scheduled for replacement in 2010. Nine of the 37 culverts have been dropped from treatment for various reasons (e.g. no fish present, stream dries up in summer, Forest Service does not have jurisdiction, etc.). That leaves three culverts left to replace or remove. Those are:

1. Rye Creek, Road 5612 (on hold due to site presently passing fish)
2. North Rye Creek, Road 8111
3. Waugh Creek, Road 13334

The Burned Area Recovery culvert replacements are well behind the schedule that was intended when the ROD was signed in 2001 (e.g. 20 were supposed to be completed by the end of 2003). This delay is the result of the majority of the Forest's post-fire restoration funds being taken away to address firefighting needs elsewhere in the nation. The Forest is continuing to chip away at the replacements as funding becomes available. One of the Burned Area Recovery culverts (East Piquett Creek, Road 731) was replaced in 2009. The new East Piquett fish passage structure (i.e. an open-bottomed arch) is shown in Figure 44 and Figure 45.

Figure 44 - Road 731 open-bottomed arch on East Piquett Creek. May 2009

Figure 45 – Road 731 open-bottomed arch on East Piquett Creek. October 2009

Item 2a of the Burned Area Recovery Fish-Water-Soils Full Scale Monitoring Plan directed the Forest to monitor three of the Burned Area Recovery fish culvert replacements over a four year period, starting in 2004 and ending in 2007. Monitoring of item 2a was completed in 2007. A monitoring report for item 2a has been written, and is available in electronic or hard copy format upon request from the Bitterroot National Forest Supervisor's Office.
The key findings were:

- ✓ The Bugle Creek and West Fork Camp Creek fish culverts were installed as designed, are providing adequate fish passage, and are functioning properly under high and low flow conditions.
- ✓ The Magpie Creek fish culvert was installed as designed, but was only providing adequate fish passage and functioning properly under high and moderate flow conditions. The Magpie culvert will not function properly until adequate surface flow occurs throughout its barrel at low flows.
- ✓ BMPs were properly implemented at all three culverts to minimize sedimentation.

Item 2b of the Burned Area Recovery Fish-Water-Soils Full Scale Monitoring Plan directed the Forest to monitor the felling of fire-killed snags in Rye Creek. Monitoring of item 2b commenced in 2002, and was completed in 2007. A monitoring report for item 2b has been written, and is available in electronic or hard copy format upon request from the Bitterroot National Forest Supervisor's Office. The key findings were:

- ✓ The goals of increasing fish hiding cover and rearing habitat were accomplished by 2007
- ✓ The goal of trapping sediments was progressing but not completely accomplished by 2007
- ✓ The goal of increasing spawning habitat had yet to be accomplished by 2007

Item 2c of the Burned Area Recovery Fish-Water-Soils Full Scale Monitoring Plan directed the Forest to monitor the planting of riparian conifers along Cow Creek and Little Blue Joint Creek. The planting occurred in 2004. Monitoring of seedling survival commenced in 2004, and was completed in 2009. A monitoring report for item 2c has been written, and is available in electronic or hard copy format upon request from the Bitterroot National Forest Supervisor's Office. The key findings were:

- ✓ The riparian plantings were successful. Seedling survival five years after planting exceeded goals and averaged 24% for spruce seedlings, 62% for ponderosa pine and western larch seedlings, and 67% for lodgepole pine seedlings
- ✓ Natural regeneration of aspen and lodgepole pine was strong at both sites

The Forest annually sends a Burned Area Recovery Fish Monitoring Report and Terms and Condition letter to the U.S. Fish and Wildlife Service which documents our progress in meeting the terms and conditions in the Burned Area Recovery Biological Opinion. The 2009 Burned Area Recovery Fish Monitoring Report and the Terms and Condition letter are

available in electronic or hard copy format upon request from the Bitterroot National Forest Supervisor's Office.

Springer Creek Culvert Removal (Sula Ranger District). In 2006, the Forest road crew removed a fish barrier culvert on a non-system road crossing of Springer Creek, which is a small tributary to the East Fork Bitterroot River. Springer Creek provides a couple of miles of spawning and rearing habitat for westslope cutthroat trout. Forest fisheries biologists monitored the culvert removal site in 2009. Fish passage is being maintained, and stream channel conditions are stable. Channel dimensions and grade are similar to natural conditions. Vegetation is satisfactorily returning to the disturbed areas. Forest fisheries biologists will no longer annually monitor the Springer Creek culvert removal site. Monitoring will occur if a need arises.

Moose Creek Bridge Installation (Sula Ranger District). In August 2007, the Forest removed an undersized fish barrier culvert on the Road 726 crossing of Moose Creek, and replaced it with a new bridge. Forest fisheries biologists monitored the bridge in 2009. The stream channel has adjusted to the bridge and is stable with proper dimensions and grade. There are no fish passage concerns. Most of the shrub seedlings that were planted in 2007 are alive and growing. Vegetation is satisfactorily returning to the disturbed areas. Forest fisheries biologists will no longer annually monitor the Moose Creek bridge. Monitoring will occur if a need arises.

Meadow Creek Bridge Installations (Sula Ranger District). In the last two years, the Forest has replaced two fish barrier culverts on Meadow Creek with new bridges. In May 2008, the fish barrier culvert at the Road 5758 crossing was replaced with a new bridge; in October 2009, the fish barrier culvert at the Road 725 culvert was replaced with a new bridge. Both projects were funded by partnership dollars contributed by the Forest Service and Montana Fish, Wildlife, and Parks. As a result of the two new bridges, there are no longer any barriers to aquatic species passage in the main stem of Meadow Creek. Forest fisheries biologists monitored both bridges in 2009. Sedimentation extent, duration, and effects caused by construction were consistent with the predictions made in NEPA (Warm Springs and Meadow Creek Culvert Replacements EA, 2005) and bull trout consultation (Road Management Activities Biological Opinion, 2008). The stream channels appear to have adjusted well to the new bridges, with dimensions and grades similar to natural conditions. Forest fisheries biologists will monitor both bridges in 2010.

Figure 46 - Road 5758 culvert inlet on Meadow Creek, before removal and installation of the new bridge. May 2008

Figure 47 – Same crossing, after culvert removal and installation of the new bridge. August 2008

Figure 48 – Road 725 culvert inlet on Meadow Creek, before removal and installation of the new bridge. October 2009

Figure 49 – Same crossing, after culvert removal and installation of the new bridge. October 2009

Scimitar Creek Culvert Removal (West Fork Ranger District). In 2007, the Forest road crew removed a fish barrier culvert on a non-system road crossing of Scimitar Creek, which is a small tributary to Deep Creek in the Selway River drainage. Scimitar Creek provides about half a mile of spawning and rearing habitat for westslope cutthroat trout. Forest fisheries biologists monitored the culvert removal site in 2009. Fish passage is being maintained. The stream channel has downcut and widened out some since removal, and the substrate at the crossing consists mostly of cobble. Channel width and dimensions at the crossing match the natural channel. Most of the shrub seedlings that were planted in 2007 are alive and growing. Vegetation has satisfactorily returned to the disturbed areas. Forest fisheries biologists will no longer annually monitor the Scimitar Creek culvert removal site. Monitoring will occur if a need arises.

Lavene Creek Woody Debris Addition (West Fork Ranger District). In July 2009, Forest fisheries biologists implemented a project to improve westslope cutthroat trout habitat in Lavene Creek, a small tributary to the lower West Fork Bitterroot River. The objective of the project was to increase woody hiding cover for westslope cutthroat trout. A hand crew placed a total of 25 large woody debris pieces (a piece consisted of a conifer rootball with about 5-6 feet of attached bole) throughout a 0.5 mile long reach of Lavene Creek. The reach was bounded by the FS boundary on the downstream end and the middle crossing of Road 5630 on the upstream end. Over the past seven years, the Forest has successfully implemented similar projects on other small streams (e.g. Taylor, Jennings Camp, and Pierce creeks). On small streams like Lavene Creek, adding wood by hand is an effective and low-cost way to improve fish habitat. Forest fisheries biologists will monitor the Lavene Creek woody debris addition project in 2010.

Figure 50 – Lavene Creek Woody Debris Addition

Slate Creek Culvert Bedload Removal and Channel Reconstruction (West Fork Ranger District). High flows in 2008 caused a large amount of cobble to be deposited directly in front of the inlet of the Slate Creek culvert under the West Fork Highway. The cobble bar redirected the stream channel and caused substantial scouring of the road fill surrounding the inlet. This scour threatened the integrity and functionality of the fish passage culvert under the highway, which was installed in 2003. In response to this issue, the Ravalli County Road and Bridge Department removed the cobble bar in November, 2009. The Slate Creek stream channel was reconstructed so that the stream enters the culvert at a perpendicular angle. Forest fisheries biologists assisted the County with project design, bull trout consultation, and follow-up monitoring. Project implementation was consistent with the mitigation measures in the 124 permit. Bull trout consultation was completed under the 2008 Road Management Activities Biological Opinion. The mitigation measures in the Biological Opinion were properly followed. Direct impacts to the fishery (sediment, disturbance) were insignificant. Bull trout spawning and rearing habitat is not present in or downstream of the site. The reconstructed stream channel matches natural channel dimensions, and there are no adverse or abrupt changes in stream grade. Forest fisheries biologists will monitor this project in 2010.

Figure 51 – Bedload deposited upstream of the Slate Creek culvert, West Fork Highway. September 2008

Figure 52 – Reconstructed channel of Slate Creek after removal of the bedload deposit. November 2009

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 2009.

VARIABILITY: Any change in the major planning issues.

EVALUATION & MONITORING RESULTS:

Fire, Fuels, and People: Since the inception of the Forest Service, there has been considerable policy, guidance and direction developed at the local, regional and national levels. Appendix M – Fire Management of the Bitterroot National Forest Land and Resource Management Plan (LMP) directs forest officials with some basic concepts that should be used when considering fire management options. Nationally, there is an Interagency Fire Policy that the Forest must use as well. In 2009, a revision was made and is described in the 2009 Guidance for Implementation of Federal Wildland Fire Management Policy. As stated in that policy:

> "Fire, as a critical natural process, will be integrated into land and resource management plans and activities on a landscape scale and across agency boundaries. Response to wildland fire is based on ecological, social, and legal consequences of fire. The circumstances under which a fire occurs, and the likely consequences on firefighter and public safety and welfare, natural and cultural resources, and values to be protected dictate the appropriate management response to fire."

It also directs that:

- A wildland fire may be concurrently managed for one or more objectives and objectives can change as the fire spreads across the landscape. Objectives are affected by changes in fuels, weather, topography; varying social understanding and tolerance; and involvement of other governmental jurisdictions having different missions and objectives.
- Management response to a wildland fire in federal land is based on objectives established in the applicable Land/Resource Management Plan and/or the Fire Management Plan.
- Initial action on human-caused wildfire will be to suppress the fire at the lowest cost with the fewest negative consequences with respect to firefighter and public safety.
- Managers will use a decision support process to guide and document wildfire management decisions. The process will provide situational assessment, analyze hazards and risk, define implementation actions, and document decisions and rationale for those decisions.

To put these concepts, direction and policy into action, fire managers have divided the forest up into 4 areas called Fire Management Units (FMUs) based on some key differences between FMUs in order to simplify decision-making. Incorporating forest plan direction and interagency fire policy and direction, fire management objectives have been developed for each FMU. A description of each FMU and its fire management objectives are summarized below (see map, also). Fire managers use these objectives to help them determine the appropriate fire response to wildfires.

For all FMU's, firefighter and public safety is the first consideration and is always the priority during every response. All human-caused wildfires will be suppressed at the lowest cost with the fewest negative consequences with respect to firefighter and public safety.

On July 12, 2009 the Kootenai Creek Fire was started by lightning. Given the fire's location, it had the potential to move out of the canyon and threaten private land in the valley. The Forest's immediate decision was to suppress the fire and helicopter rappel crew was dispatched to the fire. The crew's initial size-up indicated the fire was burning in heavy fuels on the north slope of Kootenai Creek in steep terrain with no safety zones or suitable escape routes. Based on this information, the crew determined it would not be safe or effective to suppress this fire with ground forces.

Fire managers immediately developed a longer- term plan to suppress the fire. Over the course of the next two months helicopter bucket drops and ground resources were deployed to slow the fire's spread when it could be done safely and effectively. The suppression plan identified trigger points where the fire could safely and effectively be contained if it threatened private land. Pushed by strong west winds, the fire moved out onto the mountain faces and toward the valley on September 19. The plan was implemented, in coordination with the rural fire districts, and over 200 firefighters worked to secure the fire's edge and prevent it from reaching private land. The fire was successfully contained and private homes and property in the interface were protected all while ensuring all firefighters returned home safely at the end of their missions. The decisions during Kootenai Creek Fire were based on two principals – the safety of firefighters and the public and firefighting effectiveness.

What should the public expect when it comes to wildfires and the Bitterroot National Forest's response?

1. Nearly every year, the Bitterroot Valley will be impacted by wildfire and/or smoke.
2. Where significant values are not at risk, we may choose to manage some fires by allowing them to play their natural role in the ecosystem.
3. When our initial attack crews are not able to control fires that are identified for suppression, we will implement a fire suppression plan that provides for the safety of firefighters and the public, and effective use of firefighting resources.

Travel Planning. Over the past few decades, the availability and capability of OHVs has increased tremendously. More Americans are enjoying access and recreational opportunities on their national forests and grasslands, in keeping with the Forest Service's multiple use mandate. However, the increase in OHV use also affects soil, water, wildlife habitat, and other recreational visitors. Today unmanaged recreation, including impacts from off-highway vehicles, represents one of four key threats facing the nation's forests and grasslands.

In 2005, the Forest Service published a new rule for providing motor vehicle access to national forests and grasslands.

Highlights of the Rule

- The rule requires each national forest or ranger district to designate those roads, trails, and areas open to motor vehicles.
- Designation will include class of vehicle and, if appropriate, time of year for motor vehicle use. A given route, for example, could be designated for use by motorcycles, ATVs, or street-legal vehicles.
- Once designation is complete, the rule will prohibit motor vehicle use off the designated system or inconsistent with the designations.
- Designation decisions will be made locally, with public input and in coordination with state, local, and tribal governments.
- Designations will be shown on a motor vehicle use map. Use inconsistent with the designations will be prohibited.

The Bitterroot National Forest began its Travel Planning process in late 2007. More than 10,000 public comments were received on the starting point document that was released to the public.

Based on those comments and forest specialist input, four alternatives were developed and analyzed in a Draft Environmental Impact Statement (DEIS). The DEIS was released during the summer of 2009 and public comments were accepted for 90 days. The forest received 837 responses: - 297 form letters and 540 individual responses (letters/e-mails/faxes/public meeting comment forms) containing 3,426 individual comments. There were also 3 public meeting and numerous weekly drop-in sessions at the Supervisor's Office where interested parties could comment.

The Forest will analyze all comments received, develop any alternatives, if necessary, and issue a final EIS and ROD sometime in late 2010 or early 2011.

Law Enforcement Efforts on the Bitterroot National Forest

OBJECTIVE: To monitor law enforcement problems and trends.

DATA SOURCE: Law Enforcement & Investigations Management And Records System (LEIMARS).

FREQUENCY: Annually.

REPORTING PERIOD: 2009

EVALUATION AND MONITORING RESULTS:

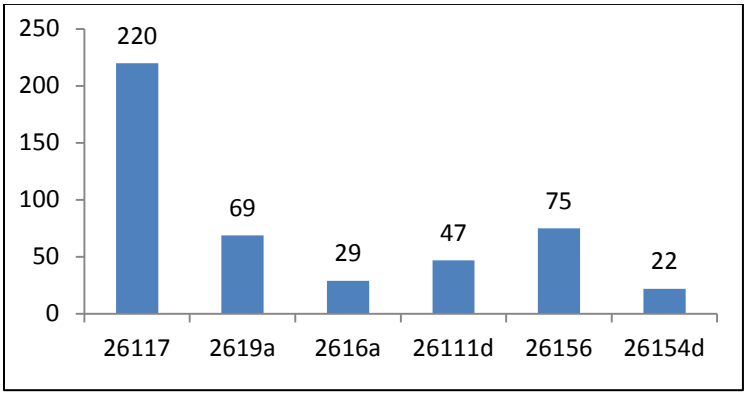
There were 604 recorded law enforcement incidents on the Bitterroot NF in 2009. Law Enforcement Officers wrote 173 warning notices, 302 incident reports and 129 violation notices. Many of the incidents occurred with no identifiable witnesses or too little information for a complete investigation. Figure 53 displays the most common incidents reported in 2009.

Failure to pay a recreation fee is the most common incident with 116 warning notices, 3 incident reports and 101 violation notices written.

Damage to resources by vehicle use off roads and dumping on the forest continue to be the major law enforcement problems. Use of vehicles off road has created new trails and caused erosion in some areas.

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

Figure 53 – Most Common Incidents on the Bitterroot National Forest in 2009



26117 – Failing to pay any fee.

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

2616A – Cutting or otherwise damaging any timber, tree or other Forest product except as authorized by special use authorization, timber sale contract Federal law or regulation.

26111d – Failing to dispose of all garbage, including any paper, can bottle, sewage,

waste water, or material.

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

26154d- Operating a vehicle in violation of speed, load, weight, height, length, width, or other limitations specified by the order .

Condition of Developed Recreation Sites
Item 2

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

DATA SOURCE: Meaningful Measures standards.

FREQUENCY: Annually.

REPORTING PERIOD: 2009

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

EVALUATION:

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

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

In 2009 the Forest Leadership Team discussed that the Recreation Facility Analysis should be a dynamic document to keep up with the ever changing recreation uses, needs and desires of our public.

MONITORING RESULTS:

Recreation Facilities Analysis

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

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

The Proposed Program of Work recommends the following actions, shown in Table 39, related to our 80 developed recreation sites over the next five years:

Table 39 –Proposed Program of Work

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

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

In 2007, we started a recreation CIP project to upgrade trailheads (Chaffin, Trapper, Baker, Overwhich, and Haley Cute Boat Launch) all projects approved in the RFA. No fees were changed in 2007. Partners were acquired for projects on Slate Creek Campground (RAC and Boy scouts), Spring Gulch accessible trail (RAC, Summit Independent living, Ravalli County People First), and East Fork Guard Station picnic shelter projects (RAC) planned for FY2008.

In 2008, day use fees at Lake Como were increased to $5.00. Recreation Site Improvement (RSI) projects included Woods Cabin Window repair, purchase materials for the East Fork Guard Station and the Lake Como Boat Launch reconstruction project. Forest Captial Improvement Projects (CIP) included improvements at Overwhich, West Fork Boat Launch and Baker Lake Trailheads. RAC projects accomplished in 2008 included Slate Creek Campground and purchase of materials for East Fork Guard Station. The Spring Gulch RAC project was postponed in 2008.

No new fees or increase of fees were implemented in 2009. The forest is working with Region 1 on a Business Plan for fee implementation to standardize the fee schedule across the region. Slate Creek Campground (RAC funding) was almost completed, utilizing volunteer workforce to complete the project. The forest received RAC funds for the Centennital Interpretive Trail, providing for installation of new trail interpretation and bulletin boards, trail repairs, painting the benches and fuels reduction project. This project was accomplished utilizing volunteer 4-H groups. Forest Captial Improvement Projects (CIP) reconstruction activites began in Schumaker Campground (gravel, site delineation, new restrooms, removal of old restrooms, site furniture), and Bear Pass, Bailey Lake, Bear Creek and and Twin Lakes Trailheads (new information boards). Most of the work was completed in these sites with the remainder to be completed in 2010. A fuels reduction project was implemented at Black Bear Campground. New cabin furniture was constructed for Gird, Woods, Lost Horse and Magruder rental facilities. The East Fork Cabin repairs included replacing the front step on the cabin porch and repairing the concrete/rock foundation. Recreation Site Improvement (RSI) projects included replacing the foundation and deck at Woods Cabin.

Off-Highway Vehicle Effects on Lands
Item 28

OBJECTIVE: Monitor OHV effects on land.

DATA SOURCE: Site inspection and interdisciplinary team reviews.

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

REPORTING PERIOD: 2009
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 developed trail systems have been created to avoid problem areas, users are mostly staying on the trails. When indicators of obvious trail maintenance are present, monitoring is showing trail visitors respond by being more careful in their use of the area. The highly visible presence of an OHV Ranger has enabled the Forest to educate OHV users and offset, to some degree, the impacts of increasing OHV use.

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

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

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

MONITORING RESULTS:

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

However, Forest personnel do watch for, take note of, and address OHV resource damage, illegal use, and user conflicts. These are recorded each year via trail condition surveys, law enforcement records, site-specific project planning inventories, and other resource monitoring reports and notes. OHV effects are also considered either directly or indirectly in these other Forest monitoring and evaluation items: Monitoring Items numbered 3, 7, 10, 17, 19, 21, 22, 24, 27, 28, 29, 38, 39, 40, 41 and additional monitoring headings Threatened and Endangered Wildlife Species, Sensitive Wildlife Species, Neotropical Migratory Birds, and Law Enforcement on the Bitterroot Forest. In an effort to compile this knowledge, we have

developed a list of areas that are currently being used by OHVs and where we have found some form of resource damage (see Table 40). This is not an all-inclusive inventory.

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

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

In 2007, the Forest again monitored the effectiveness of gate closures. All the gates associated with winter/spring seasonal closures were monitored once in the spring, and 75% were found to be effectively closed, compared with 82% in 2006. The percent of gates inspected that lacked travel management signs were down slightly from 2006, to 12%. In order to establish meaningful numbers and trends on closure effectiveness, monitoring needs to be continued and expanded to include year-round closures.

Table 40 displays areas of OHV resource damage that were identified in the 2006 Monitoring Report. Continued monitoring throughout 2006 and 2007 has shown improvement in all but a few areas. Illegal use in Larry Creek/Big Creek, Robbins Gulch, Brennan and Coffee Gulch off Gird Creek Road, the Butterfly mine rehab area and Coal Creek has declined as a result of increased OHV presence and education. Illegal use has also declined adjacent to legal routes listed in the table and impacts are healing.

Table 40 – Areas of Noted OHV Resource Damage by District

District	Areas of Noted Damage
Stevensville	Willow Creek, Butterfly, Burnt Fork Lake, Sharrott Creek, Cinnabar, Gash Creek, Smith Creek, Gold Cr CG.
Darby	Gird Point area, Lost Horse/Lick Creek area, Hart Bench, Skalkaho Daly dispersed campsites, Skalkaho Basin, Black Bear, Black Tail, Sawdust, Roaring Lion, Lost Horse Observation point, Trail 104
Sula	Johnson Cr, Meadow Creek, Andrews Creek, Piquett Creek, Guide Rye, Jennings Camp, Chain of Lakes
West Fork	Capri Lake Trail (ATV use in wet areas at start of trail), Salt Creek, Overwhich, Hughes Creek, Thunder Mountain, Woods Creek

We have areas in the forest that are very easy for users to go off road, they are flat areas and easy to access, through education and signs we do not have the problems like we used to have but we do get off road use once in a while. We also have our skilled motorcycle riders that like to high mark on road banks and we run into this in many areas on occasion.

In 2009, an OHV Ranger along with forest personnel monitored resource damage and the effectiveness of gate closures. All gates associated with winter/spring seasonal closures were monitored once in the spring and 80% were found to be effectively closed. The percentage of gates inspected that lacked travel management signs were down slightly from 2007. Monitoring of gate structures will need to be continued on a yearly basis to assess the effectiveness of closures.

Spring monitoring also indicated that a considerable amount of off road use occurred over the winter, including firewood gathering by OHVs and full-size vehicles. This use created unauthorized routes in Sweeney Creek and Gash Creek.

Education and Law Enforcement

Since 2002, the Bitterroot NF has received state grant funding through the Montana Fish, Wildlife and Parks motorized trail grant program. As a result if this funding the "Track the Tread" program was established which helps fund a seasonal OHV

Ranger. Each year the OHV Ranger focuses on educating OHV users through field contacts, posting signs so that users know where they can legally ride and works regularly with the local OHV dealers, Western Montana Trail Riders Association, and Ravalli County Off-Road Users Association. In 2007, one full-time & one part-time seasonal OHV Ranger again provided this critical field presence.

Signing areas and trails for appropriate uses and closures has been an important focus for several years. Many signs are damaged or removed through vandalism, so it is a constant battle to keep areas posted. In 2007, the OHV Ranger replaced about 25 vandalized signs and installed about 25 new signs, primarily in Burnt Fork, Chain of Lakes, Johnson Creek, Andrews Creek and Sleeping Child.

In 2005 the OHV Ranger wrote -220 incident reports, seven warning notices, and two violation notices related to illegal OHV use. For 2006 the OHV Ranger recorded 124 incidents and issued one warning notice. In 2007, a new OHV Ranger filed 13 incident reports, no warning or violation notices. In 2008 - 55 incident reports and 4 warning tickets were reported, 2009-147 incident reports 23 warnings and 1 violation notice.

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

In 2009 the Forest OHV Ranger received training to be an ASI (ATV Safety Institute) instructor teaching OHV classes to certify FS employees on ATV's.

The OHV Ranger also participated in Conservation Days and presented our "Track the Tread" program in cooperation with the Ravalli County Off-Road User Association to the local schools reaching over 300 sixth graders. This education program gives the opportunity to educate these students from the Bitterroot Valley on OHV rules, regulations and safety.

Some of the topics covered were:

- Personal safety and the different safety items available including helmets and the fact they need to be DOT or Snell approved, elbow protectors, chest protectors, shin protectors, goggles and footwear.
- different size ATV's & motorcycles for different size people,
- proper trail etiquette with various other trail users, what is the correct protocol when meeting horses, hikers, bikers & others on the trail,
- where is it legal and illegal to ride,
- respect for the land,
- legalities of riding such as needing a drivers license, wearing a helmet if under the age of 18, ATV licensing,
- the effects of riding off road, mucking and bogging on public lands,
- cost of fines that could be issued,
- safety classes available,
- the need for first aid kits while riding,
- discussed different ATV and motorcycle accidents,
- the need and requirement of spark arrestors and mufflers,
- riding responsibly and taking accountability for your own actions,
- cleaning up after yourself when out
- helping to keep our forests clean by picking up trash and making sure OHV's are clean and weed free
- respect areas you ride in or you may lose them,
- the proper loading and unloading ATV's from pickups,

We have been implementing our "Track the Tread" program now for seven years now and have seen vast improvements from our motorized community.

Ongoing Prevention and Restoration

Johnson Creek, one of three unauthorized trails closed in 2004, was monitored in 2007 and found to still be effective. In 2006 we physically closed unauthorized OHV trails at the following locations:

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

In 2006 a portion of the Bitterroot/Rock Creek Divide Trail #313 was closed to motorized use to protect heritage values in this area until travel management planning can be completed and an August 2007 site visit showed no use occurring.

2007 inspections showed that this work was successful in Hart Bench and Moonshine and there was increased compliance in Coal Creek. Use is still occurring in Gold Creek, Gird and Coffee Gulch and monitoring continues on all areas.

In 2008, education and law enforcement was successful with increased public contacts. The forest was successful in obtaining grant funding for the OHV Ranger. The forest continued to sign areas and trails for appropriate uses and closures. Vandalism continued to be problematic. Preservation and restoration activities are ongoing in the Hart Bench, Dam Lake, Butterfly, Gird and Lick Creek areas. Meadow Creek is starting to receive more use and patrols were increased to monitor use.

Again in 2009, education and enforcement were successful with increased public contacts. However, unauthorized use is still occurring. Violation Notices, Incident Reports and Warning Notices were issued (please refer to Law Enforcement Section). Rehabilitation of trails occurred in the following areas: Sweeney Cr., Lick Cr., Gash Cr., Gold Cr., Canyon, Sleeping Child, Roads 696, 273, and 75.

Monitoring of Past Rehabilitation:

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

Minor rehabilitation was completed on several sites during 2005, including Sawmill Creek, Reynolds Creek gate, Hart Bench, and Lost Horse, and in 2006 on three sites in the Brennan Gulch area. All show continued improvement.

The Forest also rehabilitated damage from “mud-bogging” at Dam Creek Lake, Railroad Creek, and Forest Road 720 in 2006. Site visits in 2007 showed that Dam Creek Lake & Railroad Creek rehabilitation was effective and no new mud-bogging had occurred. In addition, the OHV Ranger is monitoring God’s Little Acre, another area of mud-bogging.

In 2008, it appears that the rehabilitation of the mud-bogging areas at Dam Creek Lake, Railroad Creek and Forest Road 720 are still effective. Monitoring activities are ongoing in the Hart Bench, Dam Lake, Butterfly, Gird and Lick Creek areas. We are replacing fewer and seeing fewer signs torn down concerning motorized use. Meadow Creek is starting to receive more use, in 2008, patrols were increased to monitor use. Additional public contacts by the OHV Ranger are positive.

In 2009 the rehab of Dam Creek and Railroad Cr road #720 still seems to have been a success, these areas have not received any further abuse. Activity in Gods Little Acre has also ceased and no further abuse has occurred. Hart Bench and Butterfly still have intermittent activity and we try to make as many contacts as possible when in the areas. Sweeny Creek started out as a hot spot for firewood getters using ATV’s to skid firewood down a particular draw, slashing, rehab work and increased patrols handled the problem. Other problem areas included Gash, Gold, Lick Cr., Canyon, Willow and Gird. Individuals were caught in Lick, Gash and Gird Creek areas and the abuse quickly ceased.

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: 2009

VARIABILITY: Irreversible ecosystem damage.

EVALUATION:

We did not identify any irreversible ecosystem damage attributable to recreation site and trail use in 2009.

MONITORING RESULTS:

Condition surveys were completed on the following trails: Eakin Ridge 006 and 313.6 (Frogpond basin to AP). In addition walk-throughs were completed on Chain of Lakes system, Overwhich system, East Fork Trail, and all Wilderness trails on the west side of the Bitterroot Valley.

Table 41 displays recreation sites where condition surveys were conducted in 2007.

Table 41 – Areas receiving Condition Surveys in 2007.

Ranger District	Recreation Site
Stevensville	Gash Creek Trailhead
	Palisade Mountain trailhead
	Sheafman Trailhead
	Sweathouse trailhead
	Sweeney trailhead
	Bass Fishing access Hwy 93
Darby	Bear Creek Trailhead(lost horse)
	CHAFFIN CREEK TRAILHEAD
	Lost Horse Observation Point
	Skalkaho snow park
	South Lost Horse Trailhead
	Trapper Peak Observation Point
Sula	Gibbons Pass
	INDIAN TREES CAMPGROUND
	Nee-Mee-Poo trailhead
	SPRING GULCH CAMPGROUND
West Fork	Appleberry Boat launch
	Baker Lake Trailhead
	FALES FLAT GROUP CAMPGROUND
	Haly Chute Boat launch
	INDIAN CREEK CAMPGROUND
	PARADISE CAMPGROUND
	PARADISE FLAT/WHITE CAP CREEK TRAILHEAD
	Trapper peak Trailhead

	Alta Pine

A national recreation visitor use survey was completed in 2007. Results will be available fall of 2008 at http://www.fs.fed.us/recreation/programs/nvum or by contacting the Bitterroot NF Supervisor's Office.

In 2009 Trail class 1-4 condition surveys were conducted on required trails to meet minimum national reporting requirements including Divide Trail, Moose Creek, and Swift Creek.

Table 42 - Recreation sites receiving condition use surveys in 2009.

Ranger District	Recreation Site
Stevensville	Mill Canyon Trailhead
	Gold Creek Campground
	Fred Burr Trailhead
Darby	Gird Point Lookout
	Rock Creek Horse Campground
	Roarling Lion Trailhead
Sula	McCart Lookout
	East Fork Trailhead
West Fork	Magruder Cabin
	Little Blue Joint Trailhead
	Nez Perce Pass
	Little Boulder Bay Boat Launch
	Paradise Campground
	Fales Flat

Roadless Areas
Item 3

OBJECTIVES: Track the contribution of timber from roadless areas as projected by the Forest Plan. Monitor the change in the roadless inventory from project implementation.

DATA SOURCE: Roadless inventory and project documentation.

FREQUENCY: Annually.

REPORTING PERIOD: 1988 to 2008.

VARIABILITY: Change in roadless base different from projections in Appendix C of the Forest Plan EIS.

EVALUATION:

In FY2009 the Bitterroot NF did not harvest or construct roads in any roadless area on the Forest.

Between 1988 and 2009, the Forest has harvested 9.0 MMBF from roadless areas. This is less than 15 percent of the Forest Plan scheduled volume planned to come from roadless areas during the nineteen-year time period (Forest Plan Record of Decision, p. 6). Most of the volume was harvested from the Rock Creek fire salvage located in the Selway-Bitterroot Roadless Area.

Almost half of the roadless area component of the Forest Plan allowable sale quantity (ASQ) involves Montana Wilderness Study Act areas that are not available for harvest without legislative action. Combining this with the difficulty of entering other roadless areas that are available, it is clear that the Forest will not approach the roadless component of the ASQ (Forest Plan Record of Decision, p. 6).

Activities in roadless areas between 1988 and 2009 have not reduced the roadless inventory because no roads were constructed in connection with these projects. Timber harvest activity can be consistent with the natural integrity of the area, and is usually not an irreversible loss of the roadless resource. Through NEPA scoping over the last few years, the public raised an issue regarding portions of the Forest that do not have roads (i.e., "unroaded") but were not included in the roadless inventory completed for the Forest Plan. "Unroaded" as well as inventoried roadless areas are often analyzed in NEPA documents for site-specific projects. The Lower West Fork Project DEIS, completed in 2009, contained such an analysis.

Nationally, roadless areas have been a subject of public debate, concern and litigation for over 30 years. These National Forest System lands have remained unroaded for a variety of reasons--inaccessibility, rugged terrain or environmental sensitivity. Extensive controversy continues over management of these areas, including lawsuits, appeals, letters, and Congressional hearings. There is a strong need to come to agreement on the future management and protection of these lands.

MONITORING RESULTS:

Below is a discussion of the planned and completed activities in inventoried roadless areas on the Bitterroot NF from 1988 to 2009. Table 43 displays the acres of actual roading or harvesting once it has occurred on the ground.

Table 43 - Roadless Area (MA 1, 2, 3a, 3b, and 3c) Access and Harvest 1988 To 2009

Roadless Area & No.	Total Roadless Acres	Forest Plan MA 1-3c Acres (roaded emphasis)	Acres Planned for Development in Decade 1	Actual Acres Affected by Roads, 1988-2008	Actual Acres Affected by Harvest, 1988-2008	Change in Inventoried Roadless Acres
Allan Mountain (01946)	102,300	18,700	1,600	0	214	0
Blue Joint (01941)	65,400	16,700	6,200	0	0	0
Lolo Creek (01805)	587	0	0	0	0	0

Roadless Area & No.	Total Roadless Acres	Forest Plan MA 1-3c Acres (roaded emphasis)	Acres Planned for Development in Decade 1	Actual Acres Affected by Roads, 1988-2008	Actual Acres Affected by Harvest, 1988-2008	Change in Inventoried Roadless Acres
Needle Creek (01066)	1,100	1,100	0	0	0	0
North Big Hole (01001)	3,700	700	0	0	0	0
Sapphire (01421)	44,100	15,800	1,100	0	0	0
Selway-Bitterroot (01067)	115,100	18,700	3,000	0	1,677	0
Sleeping Child (X1074)	21,400	9,200	2,100	0	192	0
Stony Mountain (01808)	43,700	10,700	2,700	0	265	0
Swift Creek (01065)	700	700	0	0	0	0
Tolan Creek (X1070)	7,100	7,100	3,300	0	0	0
TOTAL	**405,187** [1/]	**99,400** [2/]	**20,000**	**0**	**2,348**[3/]	**0**

[1/] 25.7% of Bitterroot NF lands.
[2/] 24.5% of roadless acres.
[3/] 11.7% of acres planned in Decade 1.

Activities in the Allan Mountain Roadless Area (01946)

The Buck-Little Boulder Timber Sale was designed to restore the ponderosa pine type through improvement cuts followed by underburning. Two units of this sale fell entirely within the roadless area, and approximately one-half of a third unit was also in the roadless area. Three units were helicopter logged in the summer and fall of 1996. The inventoried roadless boundaries remained the same.

Activities in the Blue Joint Roadless Area (01941)

In the fall of 1992, Pegasus Gold Corporation performed exploration work on a block of mining claims in the Blue Joint Roadless Area. This was a core drilling operation using portable equipment they flew to the project site. Pegasus Gold Corporation drilled three holes and then shut the project down for hunting season. This project did not change the roadless character of the Blue Joint Roadless Area.

Activities in the Selway-Bitterroot Roadless Area (01067)

For the period 1988 through 1991 the only activity affecting this roadless area was the Rock Creek fire salvage. This was reported in the 1989-1990 Monitoring and Evaluation Report. In 1992, the St. Joseph's Timber Sale was sold. Approximately 20 acres of the sale was in the roadless area. The area was harvested using shelterwood silvicultural systems with over-the-snow tractor skidding. This roadless area harvest was reported in 1994. The harvest did not require any new system roads. The 1996 Ward Mountain Timber Sale was a fire salvage sale located entirely within this roadless area. All 137 acres of the sale were logged by helicopter.

The Stevensville Southwest Decision Notice was signed in 1994. This project planned to harvest 385 acres in the roadless area using a helicopter and ground-based skidding. The project had no new road construction planned. The Stevensville SW Timber Sale was advertised in 1995, but received no bids. The Forest has no further plans to pursue harvesting in the roadless portions of this timber sale.

The 1996 Stevensville West Central Decision Notice included 22 acres of group selection harvest in the roadless area. No roads were planned to be built into the roadless area and the logging was to be done by helicopter. This activity was determined to not preclude the area's consideration as part of the National Wilderness Preservation System. These 22 acres were not included in the Stevensville West Central Timber Sale due to the economic considerations of harvesting small groups with a helicopter. The Forest has no further plans to pursue harvesting in the roadless portions of this timber sale.

The roadless inventory acreage remains the same for the Selway-Bitterroot Roadless Area.

Activities in the Sleeping Child Roadless Area (X1074)

The White Stallion Timber Sale was sold to Darby Lumber Company in 1993. Approximately 67 acres were harvested in the roadless area.

The Decision Notice for the Bear Project on the Darby Ranger District was signed in 1994 and planned to harvest 113 acres within this roadless area. The Bear Timber Sale sold in FY1998 and logging began on these two units. The fires of 2000 burned a portion of these units and logging was not completed until 2004. The harvest prescription for these units required the removal of dead and dying trees with some areas to be regenerated leaving a sparse overstory. The final units appear as a mosaic of burned areas, areas with a sparse overstory, and more forested areas where limited harvesting occurred. No new or temporary roads were built. The final harvest acreage was 125 acres.

The roadless boundaries remain the same for the Sleeping Child Roadless Area.

Activities in the Stony Mountain Roadless Area (01808)

The Gird Point MA5 Heli-Salvage Timber Sale was sold in 1994. Two units totaling 265 acres fell within the roadless area. These units were harvested by helicopter in 1995. The inventoried boundaries remain the same.

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: 2009.

VARIABILITY: Deviation from Best Management Practices Standards.

EVALUATION:

The Bitterroot National Forest (BNF) uses Best Management Practices (BMPs) as a mechanism to help achieve water quality standards. The Forest incorporates BMPs as mitigation in all projects that may impact soil and water resources. In recent years new road construction has become a very minor part of the National Forest program of work, while maintenance, reconstruction, hydrological stabilization for long term storage and road decommissioning through obliteration have become more prominent.

For several years prior to 1999, this monitoring item was not reported as a separate item; however, the Forest has continued to conduct interdisciplinary team reviews of projects on a yearly basis. We have reported these reviews, including road impacts to soil and water, in the yearly monitoring report (see Items 19, 21, 22, and 31 in this and previous reports). However, what has not been covered in the other reports is the overall status of roads on the Forest and ongoing road maintenance, reconstruction, and decommissioning. These are the subjects that will be covered in this monitoring item for FY 2009.

MONITORING RESULTS:

Road Reconstruction

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

In FY 2009, the Bitterroot National Forest finished culvert installations, drainage improvement and gravel placement on 8.106 miles of Skalkaho Rye Road, NFSR 75. Work began at milepost 34.104 and ended at milepost 42.11, where road is under county jurisdiction. This work constitutes a complete BMP upgrade on this segment of road.

AOP Projects

AOP projects account for 0.10 miles of road improvement per project, there were two accomplished in 2009, East Piqutte Creek at MP2.34 on the 731 Road and Meadow Creek Bridge at MP 7.0 on the 725 road. Funding for these projects was with 2009 fiscal dollars. Three additional AOP projects were funded with 2009 dollars and scheduled for replacement in 2010. These projects are, Pete Creek Bridge, Mine Creek Culvert, and Two Bear Bridge. These projects will be constructed in 2010. The Two Bear and Mine Creek sites were identified as a fish barrier in the Burned Area Restoration (BAR) EIS, 2001. For a complete list of BAR fish barrier culverts that have been replaced see Item 22, Riparian Area Condition.

Figure 54- Mink Creek Culvert Installation 2008.

Road Storage and Obliteration

The Bitterroot National Forest has been hydrologically stabilizing future needed roads, and obliterating unneeded system and non-system roads in an effort to reduce sedimentation and to restore areas to pre-road conditions

Much of the work associated with road storage and obliteration in 2008 was identified in the Burned Area Record of Decision (ROD). In addition to work identified in various projects, the Forest has also been obliterating non-system, unauthorized roads that are within the scope of other ongoing projects. In 2009 the Fern Trap Huck Decommissioning Project was awarded and work started. This road decommissioning project treated approximately 12 miles of road with full road prism obliteration, partial road prism obliteration and road bed scarification. In addition to the road prism treatments, eight (8) 18" culverts were removed.

In 2009 The Bitterroot National Forest Watershed program began treating and field reviewing roads identified in the Burned Area Recovery Record of Decision (ROD) as well as other past NEPA decisions. The watershed program began treating those roads identified for decommissioning and road storage using a rented excavator and a force account crew. The crew also did field reviews on these roads in order to identify those road where treatment has been done in the past, or where natural recovery has mitigated resource risks. In 2009, a total of 15 miles of road identified in the Burned Area Recovery ROD have been obliterated, seeded and mulched, or reviewed on the ground and considered to be naturally recovered.

The majority of those roads considered to be naturally recovered, are at high elevation, near the top of the watershed

boundary, located on rocky soils, had been burned by the 2000 fires and also the Sleeping Child fire in the early 1960's. Review found these roads to be very stable, not erosive, and inaccessible to full size vehicle traffic. They were signed for no motorized access, and no evidence of violation of restrictions was evident.

Road Maintenance

The Bitterroot National Forest's road crew and timber sale operators maintained a total of 402.6 miles of road, the breakdown of road miles per maintenance level (ML) is as follows:

Maintenance Level	Number of Miles
ML 1	8.4
ML 2	61.7
ML 3	316.9
ML 4	0.8
ML 5	14.8

Figure 55 - Picture of rotro trimming machine reshaping subgrade on Rye Creek Road No. 75

Yearly routine maintenance items completed in FY 2009 may include spot gravelling, removing large rocks from road surfaces, culvert maintenance and repair, road surface grading and bridge maintenance. In 2009 the Forest's road crew placed gravel on the following roads:

49 – Piquette Creek – spot gravel placed, now road surface from MP 0.00 to 4.20 is all aggregate

321 – Burnt Fork – 3.23 miles from beginning of FS jurisdiction to Gold Creek Campground

321A – Gold Creek Campground – 0.30 miles, the entire length of 321A

370 – Warm Springs Laird – from MP 4.92 to MP 5.5 and from MP 5.6 to MP 6.6

429 – Lost Horse – 1.40 miles - from beginning of FS jurisdiction to forest boundary is now recycled asphalt aggregate, 2.00 miles – from forest boundary to old South Fork Lost Horse trailhead has aggregate surfacing

1321 – Smith Creek – 7.70 miles from beginning of FS jurisdiction to the Glen Lake Trailhead

738 – Big Creek – 1.65 miles from beginning of FS jurisdiction to just past junction with 1321

5621 – Lick Creek – 2.25 miles from junction with 429

5627 – Fishhook – 0.95 miles from junction with 374

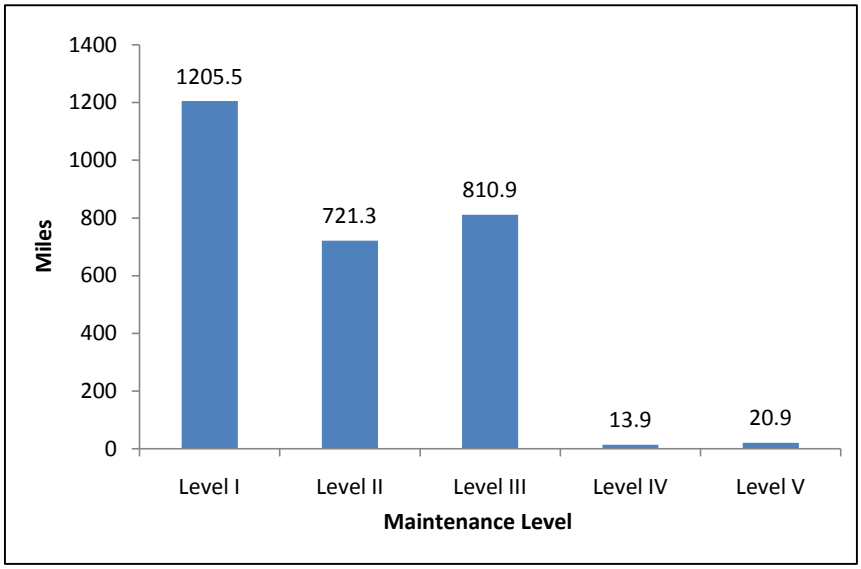
In addition to road maintenance, the road crew assisted with watershed and recreation projects in 2008. These projects include: Lake Como boat launch access road and riprap, Job Corp boat launch, Slate Creek Campground rehab, Baker Lake Trailhead and road reconditioning, and Trapper Creek Trailhead.

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 follow:[4]

Level I	Not maintained for public use. These are only maintained to preserve the road template. There are 1205.5 miles of Level I roads on the Forest, these roads are closed yearlong to full size motorized vehicle traffic.
Level II	Managed for high clearance vehicles, maintenance mainly focused on erosion control. There are 721.3 miles of Level II.
Level III	Native and gravel surface, low traffic volumes, maintained for template preservation and some user comfort. These roads are managed for use by standard highway vehicles. There are 810.9 miles of Level III.
Level IV	Higher traffic volumes, gravel surfaced arterial roads, maintenance at a higher standard. There are 13.9 miles of Level IV.
Level V	High traffic volumes, paved arterial roads. There are 20.9 miles of Level V roads.

Figure 56 – Miles of Road by Maintenance Level



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

In the winter of 2008/2009 the Bitterroot National Forest identified a fundamental error in the current data base used for tracking road information, (Iweb). Going back through the records we found approximately 600 miles of road were erroneously identified as decommissioned in the Iweb data base. This error related to coding in the old Road Management System (RMS) database. The RMS had a Maintenance Level code of historic, or HIST. The Bitterroot National Forest used this code to identify roads that were grown in, not being utilized by full size vehicle traffic, the actual situation on the ground. When Infra or now I-web was being developed, there was no HIST code available for use in the future. The roads coded with HIST for the Maintenance Level and a status of existing in RMS were then rolled into a decommissioned status in the new database I-web. Upon discovery of this error a decision was made to change the status of these roads from decommissioned to existing and change the system from not needed to undetermined. This action did not place these roads on the transportation system, but did uniquely identify this subset of roads so they can easily be identified during future planning efforts. In the future, the Bitterroot National Forest can make decisions to store or decommission these roads, project by project, based on the minimum transportation system needed to manage Forest Service lands.

Many of these roads were identified in the Burned Area Recovery ROD. Some were identified as not needed in the future, and many were identified as available for future use. This information can be found in the Burned Area Recovery ROD, page A-33, Description of Road Treatments. This updated information constitutes the change in road mileage for ML 1 roads from 2008 to 2009.

Schedule A Agreement with Ravalli County

The Forest Service has special authorities under the Forest Road and Trail Act to trade road maintenance equally with the counties where it is more efficient for the Forest Service to maintain some county roads and for the county to maintain some Forest Service roads. Under the most recent agreement with Ravalli County, the county will perform normal spring maintenance and grading on all or portions of the following Forest Service roads: Mill Creek, Blodgett Creek, Warm Springs-Laird, North Kootenai, Rye Creek, and Lost Horse. The Bitterroot NF will perform normal spring maintenance and grading on portions of the following county roads: Three Mile, Willow-St. Clair, Bitterroot-Big Hole, Hughes Creek, Fred Burr, and Pierce Creek. We will do joint maintenance on Nez Perce Road.

Timber Volume and Area Offered and Sold
Item 11

OBJECTIVE: Track timber harvest as a contribution to the local economy and as projected by the Forest Plan.

DATA SOURCE: Bitterroot NF Timber Information Management (TIM) database, and Timber Sale Reports.

FREQUENCY: Annually.

REPORTING PERIOD: 1988 to 2009

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

EVALUATION:

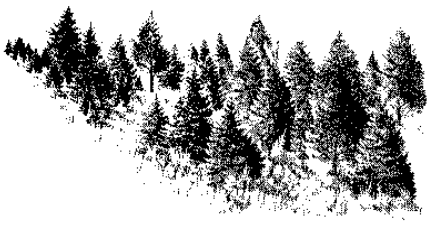
The 1987 Forest Plan projected a planned annual timber sale quantity (allowable sale quantity, or ASQ) of 33.37 million board feet (MMBF). The Plan predicted that this volume would be harvested each year from approximately 3,647 acres in Management Areas (MAs) 1, 2, 3a, 3b and 3c. Actual harvest volumes and acres cut would vary by year but the intent of the Forest Plan was to offer and award approximately 333.7 MMBF per decade after the Plan was signed.

Since 1988 annual harvest levels have been well below the ASQ predicted in the Plan. In 2009, the Forest offered and sold 31% of the planned annual ASQ and 34% of the planned annual harvest acres. Since 1988 the Forest has sold roughly 31% of the timber volume and 57% of the planned harvest acres predicted to be offered in the twenty-two year period since the Forest Plan was approved. More acres were sold in Management area 3a than anticipated in the Forest Plan. This is not unexpected since treating stands in the urban interface is a priority and many of these acres are in MA 3a.

As shown in Figure 1 below, actual volume harvested has been less than what was offered and sold during the last twenty two years. This is particularly true of sales sold since 2000 where the rapid deterioration of burned and bug-killed timber prevented all sold timber from being harvested.

In the past 22 years approximately 86% of the total volume offered was sold. All sales except one advertised in 2009 were awarded. Trapper Bunkhouse was not awarded as the prices were not within the variance of the government estimate.

The annual, 5-year, and 22-year harvest levels are outside the desired variability, as specified in the Forest Plan. In 22 years, 2002 was the only year the Forest met or exceeded the annual ASQ. Almost all National Forests have experienced similar declines. This is a national issue tied to low housing starts, loss of milling infrastructure, changing social values, declining budgets, and many other factors. When the Forest Plan Revision is finalized, we will update the predictions of timber outputs to reflect the current social and regulatory environment.



MONITORING RESULTS:

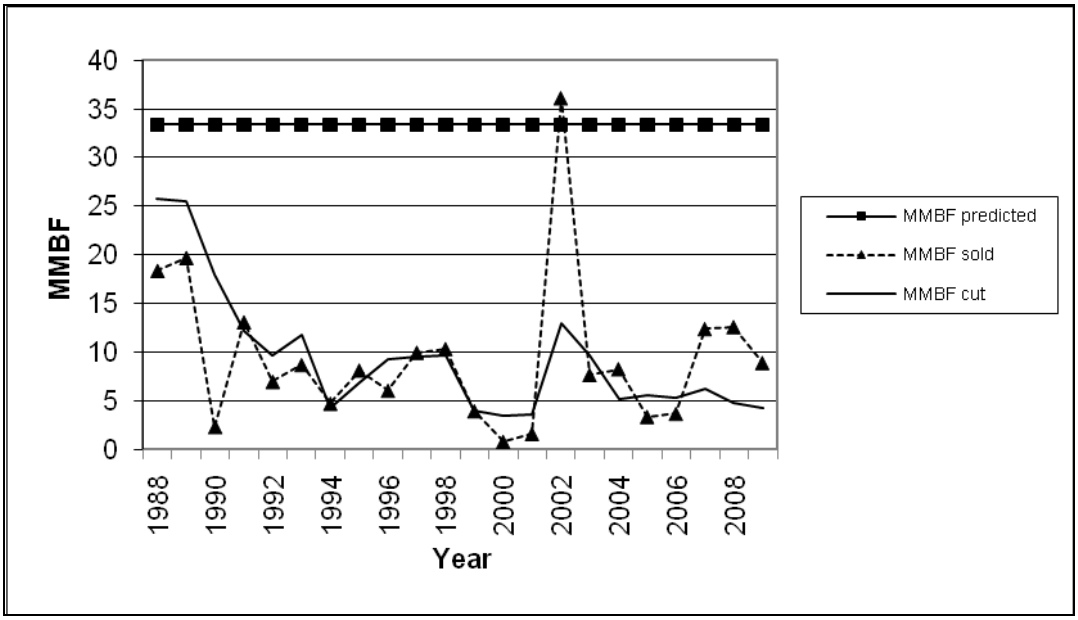
Table 44 – Timber Acres and Volume Sold By Management Area, Fiscal Year 2009 Compared to Forest Plan Predicted Annual Program

Forest Plan, p. III-80			Sold FY2009	
MA	Acres	Volume (MMBF)	Acres	Volume (MMBF)
1	1,528	14.57	0	0.00
2	1,439	12.01	341	2.86
3a	283	3.05	869	5.76
3b	385	3.62	48	0.30
3c	12	0.12	0	0.00
Total	**3,647**	**33.37**	**1258**	**8.92**

Table 45 - Timber Acres and Volume Sold By Management Area, Fiscal Years 1988 to 2009 (22 years) Compared to Forest Plan Predicted Program

Forest Plan, p. III-80			Sold 1988 - 2008			
					% of Forest Plan	
MA	Acres	Volume (MMBF)	Acres	Volume (MMBF)	Acres/Volume	
1	30,560	291.4	18048	85.2	59%	29%
2	28,780	240.2	13879	72.0	49%	30%
3a	5,660	61	9065	44.4	160%	73%
3b	7,700	72.4	326.44	1.6	4%	2%
3c	240	2.4	199	0.7	83%	29%
Total	**72,940**	**667.4**	**41517**	**203.8**	**57%**	**31%**

Figure 57 - Timber Volume Sold and Harvested, Fiscal Years 1988 to 2009 (22 years) Compared to Forest Plan Predicted Program [1/]



Timber Volume Offered by Logging System and Harvest Method
Item 13

OBJECTIVE: Track timber harvest as a contribution to the local economy and as projected by the Forest Plan. Validate Forest Plan assumptions on projected volumes by logging system and harvest method.

DATA SOURCE: Bitterroot NF Sale Tracking and Reporting System (STARS) Database and Timber Sale Reports

FREQUENCY: Every three years.

REPORTING PERIOD: 1988 to 2009.

VARIABILITY: Volume and acres offered by logging system are within +/- 20 percent of Forest Plan.

EVALUATION:

The Forest Plan requires that logging systems and harvest methods be prescribed for each project based on site-specific conditions. The logging methods are indicative of the land types associated with each sale. Therefore, timber volume offered by logging system and harvest method is likely to vary greatly from that anticipated in the programmatic Forest Plan. The monitoring results show that this is the case.

In the past 22 years, the most common method of logging has been to use tractors. This was anticipated in the Forest Plan since the majority of acres managed for timber are on gentle terrain. In recent years, cut-to-length and forwarding equipment has been used in lieu of tractors because this equipment results in less soil disturbance and less damage to residual standing trees. The extensive use of helicopter logging systems, in lieu of either ground-based or skyline/cable systems, was not anticipated in the Forest Plan. Helicopter logging has been required on approximately 26 percent of the acres offered for sale since 1988 compared to the Forest Plan estimate of 12 percent. Acres and volume removed via permit (firewood, poles, etc) are categorized as manual logging systems and were not included as part of the forest plan projections.

The Forest Plan expected that over 80% of the acres harvested would be regeneration harvests (clearcut, shelterwood, and seedtree harvest methods). Instead, over the last twenty two years, over half the acres harvested have been salvage removal of dead and dying trees. This has occurred either as selected trees from a forested area or (like many of the stands after the 2000 wildfires) the removal of almost all commercial trees from areas completely burned. Outside of salvage areas, about one quarter of the harvested stands have been regeneration harvests and approximately 22 percent selection cuts. Since 2000, almost all non-salvage harvest has been thinning (selection harvest) to improve stand vigor or remove smaller trees (ladder fuels). With the current emphasis on fuel reduction projects, the amount of selection cutting is expected to increase. Selection harvesting often provides the best alternative for addressing a variety of resource concerns and objectives including maintaining visual quality, protecting watershed and soil resources, providing enhanced wildlife habitat, reducing fuels, and improving forest health.

MONITORING RESULTS:

Table 46 - Timber Offered by Logging System [1/]

	FY 2009		FY 1988 to 2009 (22 years)	
	Acres Offered	Volume Offered (MMBF)	Acres Offered	Volume Offered (MMBF)
Tractor	298	0.82	15,294	79.6
Skyline	58	0.15	7,965	51.8
Cable	0	0	3,633	14.0
Manual[1]	220	3.87	6,425	28.5
Aerial	1283	4.07	13,435	60.5
Totals	**1859**	**8.91**	**46,752**	**234.3**

1/ Tractor - tracked or rubber-tired equipment is used to skid logs or trees over the ground. This category also includes cut-to-length and log forwarding equipment. Skyline / Cable - logs or trees are skidded to a road by cables. Manual - methods used to remove primarily small merchantable products and fuel wood. Some horse logging is included in this category. Aerial - logs are removed from harvest units by helicopters; this method does not require roads in the immediate area and does not disturb the soil.

Figure 58 – Comparison between Logging Methods Predicted in the Forest Plan and Actual Logging Systems (1988 – 2009)

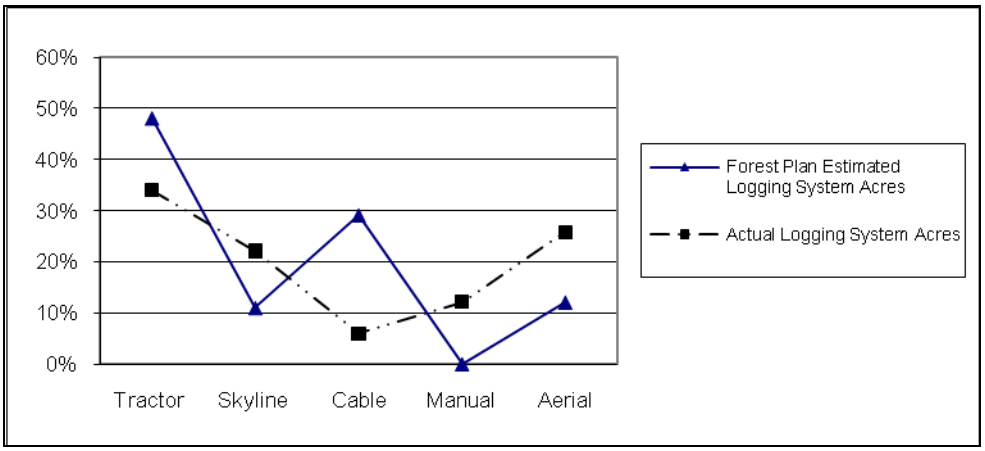


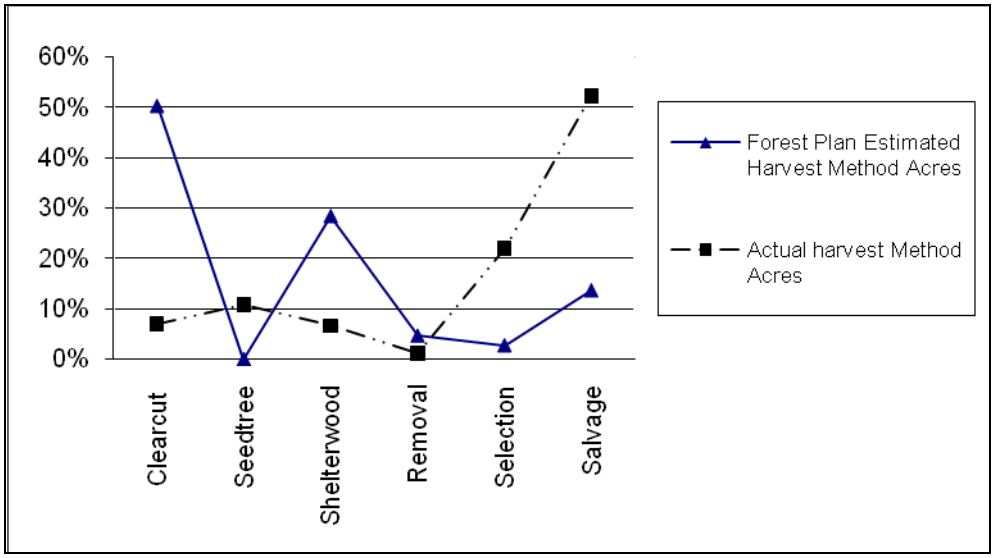
Table 47 - Timber Offered by Harvest Method

	FY 2009		FY 1988 to 2009 (22 years)	
	Acres Offered	Volume Offered (MMBF)	Acres Offered	Volume Offered (MMBF)
Clearcut[1]	73	0.10	3403	36.60
Seedtree[2]	0	0.00	5233	16.81
Shelterwood	8	0.06	3218	16.56
Removal[3]	0	0.00	538	4.20
Selection	988	5.74	10624	47.48
Salvage	414	1.64	25220	111.02
Totals	**1483**	**7.54**	**48236**	**232.67**

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

2/ Seed tree and shelterwood final removal harvests.

Figure 59 – Comparison between Harvest Methods Predicted in the Forest Planand Actual Harvest Methods (1988 – 2009)



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: 2009.

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

EVALUATION:

Although transitory range increases temporarily with fires, these are not calculated in any allotment's permanent carrying capacity. Therefore this does not affect the Forest Plan variability thresholds noted above. In 2009, the Forest completed and signed a NEPA decision to combine and continue grazing on the Waugh and Andrews grazing allotments with a reduced number of cattle. The quantity of monitoring in 2009 exceeded minimum Forest Plan annual requirements.

MONITORING RESULTS:

2009 Actual Use

Eighteen of the 21 grazing allotments hold active permits. Of these active allotments, four were rested in the 2009 grazing season. Eleven permittees grazed a total of 3,566 Animal Unit Months (AUMs)

Land Area Grazed

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

Transitory Forage Status From Large Fires

The loss of tree canopy in the moderate and high severity burned areas from large fires in recent years combined with harvest of burned timber from salvage sale units did not lead to an increase in permitted grazing animals. The Forest no longer includes transitory forage in the calculation of the carrying capacity of an allotment. The transitory forage produced by the opened canopy of a burned timber habitat type is classified as secondary or supplemental rather than part of the primary permanent forage base. The amount of transitory forage does not change the allowable stocking rate of an allotment (the number of animals and the duration of grazing) in most cases. Natural plant succession eventually returns these areas to a forested cover type and phases out any flush of palatable forage plant growth.

New transitory feeding areas may change established livestock foraging patterns. The amount of grazing that occurs in these areas is dependent on the forage production and palatability, distance to water, natural barriers, elevation, steepness of slope, noxious weed invasion, and availability of other forage. Many of the sites that experienced fire since 2000 and that are accessible by permitted livestock are not producing palatable herbaceous forage species. For example, pinegrass (Calamagrostis rubescens), an unpalatable grass that livestock generally avoid, dominates many acres of Douglas-fir habitat types. As tree roots and boles weaken from fire effects, the resulting downfall increasingly prevents livestock movement through burned areas.

Allotment Compliance Results Summary

Forest rangeland specialists inspected 14 active allotments during the 2009 grazing season. The Forest uses these inspections to determine range readiness, permit compliance, and utilization levels, as well as to collect data for the AMP revision process. In addition, range specialists inspect allotments to determine if they are in compliance with Forest Plan standards. These standards vary by management area, but generally require that forage use by livestock not exceed 50% on elk summer range or 35% on elk winter range. Rangeland monitoring work continues to focus strongly on grazing

impacts to riparian condition. Specialists also employ supplemental stream bank alteration standards prescribed for some drainages to address fisheries concerns.

Four allotments were rested in 2009. Fifteen allotments were monitored including some that were rested. 2009 spring was wet and cool with snow pack into summer in some areas. Summer temperatures were average resulting in good grass growth and adequate moisture throughout the season.

Ambrose Creek Allotment: This allotment was rested in 2009.

Andrews-Waugh, Warm Springs Allotments*:* Andrews and Waugh allotments were combined in 2009 and continue to be run in conjunction with Warm Springs. Standards were exceeded in West Fork of Camp Creek.

Bass Creek Allotment: This allotment was grazed within standards in 2009

Bertie Lord, Little Sleeping Child and Piquett Creek Allotments: These allotments are inactive and left open as reserve allotments to be used when another allotment needs rest.

Bunch Gulch and Shirley Mountain Allotments: These allotments were grazed in 2009 and met standards

Camp Reimel Allotment: This allotment was rested in 2009

Coal Creek Allotment: This allotment was grazed in 2009 and met standards.

Gold Creek Allotment: This allotment was rested in 2009.

Harlan Gulch: Grazing standards were met.

Meadow Creek Allotment: The allotments were grazed for a normal season. Standards were exceeded in a few sites.

Medicine Tree Allotment: This allotment was grazed within standards in 2009.

North Sleeping Child Allotment: This allotment was grazed within standards in 2009

Skalkaho Allotment: Coffee and Brennan Gulch's met riparian standards in 2009 with the five head reduction implemented in 2006. The uplands appear to be in good condition. Weeds were treated along the roadsides as were known patches of leafy spurge. This created good grass causing the cattle to hang out along the roads.

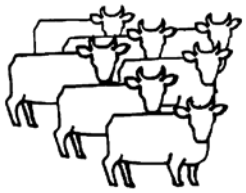
Sula Peak and East Fork Allotments: Sula Peak was grazed within standards in 2009 but East Fork was rested.

Sweathouse/Gash Allotment: This allotment was grazed within standards in 2009.

Trapper Peak Allotment: Most inspection sites exceeded standards in 2009. Cattle were grazed in Waddell until mid-summer and then moved to the Lost Horse Pasture as in the previous year. This prevented cattle from wondering in the Lake Como area late in the season.

Allotment Management NEPA and Plan Revision Status:

The **Waugh-Andrews Grazing Allotment Environmental Assessment** was completed and a NEPA decision was signed in February 2009. The decision combined the allotments to increase efficiency of management, reduce stocking levels and institute a more progressive management approach that incorporates principles of rest/deferment.



ADMINISTRATION

Administrative Appeals of Project Decisions

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

DATA SOURCE: Planning databases, Regional appeal records, project records.

FREQUENCY: As interest and data warrant.

REPORTING PERIOD: FY1991 - FY2009

INTRODUCTION:

Debate over forest management has increased interest in the rate and type of administrative appeals of Forest Service project decisions and the effects the Forest Service administrative appeal process has on Forest Plan implementation.

The Northern Region has maintained good records on the type, number, name, and disposition of appeals since the mid-1980s. These data alone provide useful, but limited, information. Additional data collected by the Bitterroot National Forest is reasonably complete and reliable from FY1998 to the present and provides information on how many decisions were not appealed and some additional insight into the types of decisions most likely to be appealed.

The monitoring results provided below are not meant to be a comprehensive study on the subject, and the information is clearly limited by both the type and amount of information available. The reader is advised not to draw conclusions beyond the face value of the data and keep the following in mind;

- In the broadest use, "decisions" include almost any project, activity, or action taken by the Forest Service.

- Not all decisions are subject to the National Environmental Policy Act (NEPA), and of those that are, the most routine do not require formal documentation (e.g. mowing a lawn, painting a building).

- Not all decisions are subject to the notice, comment, and appeal laws and regulations (35 CFR 215, 217, 218, 251). Except for the Regional data presented below, only decisions subject to notice, comment, and appeal under the Appeal Reform Act (36 CFR 215) and those subject to the pre-decision objection process of the Healthy Forest Restoration Act (36 CFR 218) are tracked here. Also, the appeal regulations themselves, as well as the types of activities subject to appeal, have changed over the years.

- Any grouping of this data, as done here, can easily lead to oversimplified conclusions. The types of activities and projects proposed by the Forest, and the choices made by groups and individuals to appeal those decisions, occur within a complex social, economic, and political environment. Only a few of those factors are discernable in the available data. For example, every project and activity has unique benefits and effects, which likely influence who appeals the decision. Similarly, the grouping by "type of activity" combines small projects with large ones and remote activities with those adjacent to private land or communities, both factors which might influence people's decisions to appeal, but which can't be distinguished here.

MONITORING RESULTS (36 CFR §215 and prior 36 CFR §217):

In fiscal year 2009, the Bitterroot National Forest signed nine project decisions, of which four were subject to the notice, comment, and appeal regulations at 36 CFR 215. These are listed in Table 48. Of the four decisions subject to appeal, none were appealed.

Table 48 – Appeal of 2009 project decisions subject to 36 CFR 215 requirements

Decision Name	Type	Appealed?
Bitterroot Forest-wide Timber Stand Improvement (TSI) Project	Vegetation management (other than forest products)	N
Waugh/Andrews EA	Range Management	N
Swift Creek Plantation Thinning	Vegetative treatment	N
Charles Waters Campground Vegetation Project	Vegetative treatment; Recreation Management	N

Northern Region Appeal Records for the Bitterroot National Forest, FY 1991 through FY 2009

During this eighteen-year period, 235 separate administrative appeals were filed challenging 54 individual project decisions.[5] Of those 54 decisions that were appealed, ten decisions were either withdrawn or reversed. The remaining 44 decisions were either affirmed after administrative review or the appellants withdrew their appeal.

Bitterroot National Forest Appeal Records, FY 1998 through FY 2009

From fiscal year 1998 through 2009 (eleven years), the Bitterroot National Forest issued 60 decisions that were subject to appeal (Table 49). Thirty-eight separate appeals were filed on sixteen of those decisions. Of the sixteen decisions that were appealed, thirteen were affirmed after administrative review or the appellants withdrew their appeal, one was reversed and the Forest withdrew the two remaining decisions. Of the eleven broad categories describing the types of project decisions made in this period, the appealed decisions fell into seven categories (Table 50). Within those seven categories, 27 percent of the project decisions were appealed (16 of 33).

Further refinement of the data shows that of the 38 total appeals received during the eleven year period, sixteen (42%) were appeals of decisions which included commercial timber harvest as a project activity (Table 51). The appeal rate of timber harvest related decisions averaged 53%. Conversely, the appeal rate on non-timber related decisions averaged 21%.

Twenty-four groups and ten individuals were party to the 38 appeals filed in this time period (Table 52). It is not uncommon for more than one group or individual to be party to a single appeal or to have more than one appeal on a single decision.

Table 49 – All BNF Project Decisions Subject to Appeal[6] and the Number of Appeals, FY 1998 through 2009

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[7]	07
2003	4	2	2
2004	2	1	16
2005	3	1	1
2006	6	3	3
2007	8	2	2
2008	8	0	0
2009	4	0	0
Total	60	16 (27%)	38

[5] Includes project and activity appeals under both 36 CFR §217 and 36 CFR §215 and changing regulations.
[6] Only decisions subject to appeal under 36 CFR §215 are included as these are the most prevalent and have been the focus of most data requests. The Forest Service has three other administrative review processes as well. These are defined at 36 CFR §217, 36 CFR §218, and 36 CFR §251.
[7] 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 50 – General Category of BNF Decisions and Appeals6, FY 1998 through 2009

General Category of BNF Decisions Subject to Appeal (1998-2009)	Decisions Subject to Appeal (#)	Decisions Appealed (#)	Appeal Rate (%)	Individual Appeals (#, some decisions had more than one)
Administrative Site	1	0	0%	0
Ecosystem Management	3	0	0%	0
Forest Plan Amendment (Wilderness Direction)	2	1	50%	16
Fuels Reduction	9	3	33%	2
Range Management	3	1	50%	1
Recreation / Wilderness	2	0	0%	0
Road Management	4	1	25%	1
Special Uses	6	1	17%	1
Vegetative Treatment	20	7	39%	13
Fish Habitat or Watershed Improvement	6	0	0%	0
Weed Management	4	2	50%	2
Total:	60	16	27%	36

Table 51 - BNF Decisions Subject to Appeal6 Which Included Timber Harvest as an Activity, FY 1998 through 2009

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[8]	0
2003	1	1	1
2004	0	0	0
2005	0	0	0
2006	3	3	3
2007	1	1	1
2008	3	0	0
2009	1	0	0
Total	17	9 (53%)	16

[8] 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 52 – Project Appellants**6**, FY 1998 through FY 2009[9]

Appellant	# of Appeals Party To
WildWest Institute[10]	8
Alliance for the Wild Rockies	7
Friends of the Bitterroot	6
Floyd E. Wood	4
Friends of the Clearwater	3
Wilderness Watch	3
American Wildlands	2
Action Whitewater Adventures	1
Aggipah River Trips	1
Aircraft Owners and Pilots Association	1
Bernie Kosolo	1
Bill Worf	1
Californians for Western Wilderness	1
Carlotta Grandstaff	1
Columbia Seaplane Pilots Association	1
Idaho Aviation Association, Inc.	1
Idaho Outfitters and Guides Association	1
Jennifer Callahan	1
John Lehrman	1
John Swanson	1
Kirby Erickson	1
Larry Campbell	1
National Organization for Rivers	1
Northwest Rafters Association	1
Paul Stanton	1
River Runners for Wilderness	1
State of Idaho, Dept of Transportation, Division of Aeronautics	1
Valley Co. Board of County Commissioners	1
West Fork Citizens Committee	1
Western Whitewater Association	1
Whitewater Expeditions	1
Wild Wilderness	1

[9] 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.
[10] WildWest Institute formed in 2006 from a merger of the Ecology Center (previously listed here) and the Native Forest Network (previously not an appellant).

Research Needs
Item 44

OBJECTIVE: To identify research needed to accomplish national forest management activities.

DATA SOURCE: Interdisciplinary and management team review of activities.

FREQUENCY: Every two years.

REPORTING PERIOD: 2009

VARIABILITY: Inability to accomplish Plan goals and objectives with existing research.

EVALUATION AND MONITORING RESULTS:

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. In 2009 the following research occurred on the Forest:

- **Fire Danger Prediction**

  Small temperature sensors nested inside 6 inch diameter x 5 inch high white plastic funnels will be hung from tree branches 6 feet off the ground for a period of 18 months. These sensors will removed from the forest after that time. The data from these sensors will be used to improve fire danger predictions.

- **Westslope cutthroat trout research**

  Westslope cutthroat trout embryos from four streams in the Bitterroot National Forest will be used to examine local thermal adaptations of populations. Specifically, broodstock from all streams will be collected in June 2009 using a backpack shocker.

- **Examining whether bull trout persistence and brown trout distribution are related to stream temperature (or other habitat variables)**

  Research included using an electrofisher to sample sites within 500m long study reaches spaced evenly over estimated suitable habitat. The first study reach will be located near the mouth of the stream. These 500m sites will be divided into 100m reaches. Sampling will occur at 30m of habitat in each 100m reach judged most likely to contain bull trout. If bull trout are found, then research will move onto the next stream. If none are found, the next 500m reach will be sampled. Up to three of these 500m reaches will be sampled per stream before bull trout will be considered absent. Coarse-level, categorical habitat information (gradient, stream width and depth, canopy cover, fine sediment, pool frequency, and large woody debris) will be sampled at these sites. Information will be gathered on fish captured, including – species, length, and taking a fin clip (a small sliver from the caudal fin) for genetic analyses.

  The second objective is to examine the impacts of wildfire on the distribution of (1) macroinvertebrates, and (2) brown

trout and bull trout longitudinally within tributaries. Reseachers examined whether the distribution of these fish species appears to be impacted by stream temperature. If there is distributional overlap between them, researchers will determine whether they appear to be competing. These longitudinal streams will be grouped into streams that burned and did not burn and those with and without brown trout. At each site, researchers plan to initially snorkel pools upstream to evaluate whether the stream has the fish species of interest present. If so, researchers will establish 200m sections and systematically sample in the upstream direction.

- **Development of a fire-forest succession model – Fire-BGCv2**

The objective of field sampling is to collect vegetation and fuel data for development of a fire-forest succession model, called Fire-BGCv2, which will be linked to a stream temperature model to make predictions about bull trout persistence and other native and nonnative fishes (Service, and Rocky Mountain Research Station).

- **Determine the impacts of different magnitudes of drought severity on growth rates of Douglas-fir and ponderosa pine**

Study is designed to determine the growth responses of DF and PP throughout the Northern Rockies and answer: 1) if radial growth rates are positively correlated with elevated atmospheric CO2 and increased water-use efficiency; 2) what are the radial growth rates of these species under sustained drought conditions and with warmer temperatures; and 3) are the differential responses between DF and PP to changing environmental conditions consistent among multiple sites that are topographically and climatologically diverse?

Because of changing atmospheric conditions, it is likely that in the forthcoming years one or more species may emerge as more competitive, thus altering the structure and composition of forests/woodlands. Given the extensive geographic range and value of DF and PP forests to US forestry, this would have both ecological (e.g., changing composition, density, biomass and evenness) and economic implications.

- **Broad-scale genetic monitoring of fish populations:**

Non-lethal tissue samples for genetic analyses will be collected from all aquatic vertebrates at specific sampling sites. The intent is to match fish sampling with ongoing habitat sampling, in which most streams are surveyed every 5 years and others are surveyed annually. All genetic analyses would be based on fin clips to avoid effects on fish populations.

Forest Plan Amendments

OBJECTIVE: Track formal changes to the Forest Plan.

DATA SOURCE: Amendments.

FREQUENCY: Annually.

REPORTING PERIOD: 1987 to 2009.

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-eight times between 1987 and 2009. Four of the amendments (numbers 11, 13, 14, and 25) were required to allow timber harvest on unsuitable lands for the purpose of restoring historic forest structures and reducing fuels. Current direction does not allow harvest on unsuitable lands, yet harvest is an important tool needed to sustain some forest communities in some areas. This indicates a need to look again at Forest Plan standards, guidelines, goals, and objectives related to unsuitable lands.

Four 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.

No plan amendments were made during FY 2009.

MONITORING RESULTS:

Table 53 lists all the amendments to the Forest Plan and the nature of each decision.

Table 53 - Forest Plan Amendments 1987 Through 2009

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.

Year	Amendment Number	Nature of Decision
1995	12.5	Inland Native Fish Strategy (INFISH); provides interim direction to protect habitat and populations of resident native fish.[11]
1995	13	Allowed timber harvest on 174 acres of unsuitable lands in the Beaver Woods Vegetation Management Project area.
1996	14	Allowed timber harvest on unsuitable lands in the Warm Springs Project area.
1997	15	Allowed disposal of winter range via land exchange for specific sites in MA 8a.
1997	16	Allowed two third-order drainages on the Sula District to be managed at Elk Habitat Effectiveness values less than the 50% standard.
1997	17	Changed management area boundaries in MA 3a, 5, and 10 to allow for expansion of Lost Trail Ski Area. Changed the visual quality objective for the ski area from retention to modification.
1998	18	Established the Salmon Mountain Research Natural Area
2000	19	Updated wilderness direction for the Anaconda Pintler Wilderness
2001	20	Restricts, yearlong, wheeled cross-country travel where it was not already restricted (with several exceptions) and directs the Forest to complete site-specific planning on priority areas.
2001	21	Established the East Fork Bitterroot River Research Natural Area
2001	22	Site-specific amendment for the Burned Area Recovery Project. Refined snag, coarse woody debris, and elk habitat effectiveness and thermal cover standards.
2002	23	Site-specific amendment for the Slate Hughes Watershed Restoration and Travel Management project. Allowed five third-order drainages on the West Fork District to be managed at Elk Habitat Effectiveness values less than the 50% standard.
2004	24	Replaces the 1985 Frank Church-River of No Return Wilderness Management Plan with a 2003 version. The 2003 version combines management direction in three different documents into one management plan.
2006	25	Site-specific amendment for the Middle East Fork Hazardous Fuel Reduction project. Refined snag, coarse woody debris, thermal cover and unsuitable land standards.
2007	26	Incorporate management direction in the Land Management Plan that conserves and promotes recovery of Canada lynx.
2008	27	Site-specific amendment for the Trapper Bunkhouse Land Stewardship Project. Refined snag, coarse woody debris and thermal cover.
2008	28	Site-specific amendment for the Haacke-Claremont Project. Allowed portions of third-order drainages within the project area to be managed at Elk Habitat Effectiveness values less than the 50% standard and refined coarse woody material standard.

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