United States
Department of
Agriculture

Forest Service

BEAVERHEAD-DEERLODGE NATIONAL FOREST

FOREST PLAN MONITORING AND EVALUATION REPORT

Fiscal Year 2010

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Cover Photo by Russ Edelen: Aspen monitoring plot established after the 2009 Bielenburg Fire, Pintler Ranger District, 2010.

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INTRODUCTION

Forest Land and Resource Management Plans (Forest Plans) are intended to provide long-range management direction for each National Forest. Forest Plans provide guidance for balancing the physical, biological and social components of forest management in the form of goals, objectives, and standards.

The purpose of monitoring the Forest Plan is to evaluate, document and report how well the Forest Plan is applied (**Implementation Monitoring)**, how well it works (**Effectiveness Monitoring**), and if the purpose and direction remain appropriate (**Validation Monitoring**). For some resources, **baseline monitoring** establishes a basis for comparing current conditions to future conditions. Our integrated stream reach monitoring is one example of baseline monitoring. **Tracking** is also a useful way to report on activities we are engaged in, such as acres of noxious weed treatment or acres of aspen treated.

While the monitoring determines actual conditions and circumstances and compares them with assumptions and desired results, evaluation examines conditions as a result of management and identifies the reason desired conditions are not met and proposes alternative solutions.

The current Beaverhead-Deerlodge Forest Plan was approved by the Regional Forester in February 2009. The 2010 Monitoring and Evaluation Report is the second report based on new monitoring requirements described in Chapter 5 of the Forest Plan. Annual reporting is required by the Plan to monitor implementation of objectives and standards. Only those items which require an annual measurement and report are included in this year's report, with the exception of Item 7: Soil Productivity, which is required at 5-year intervals. We also reported on Soil Productivity in the 2008 and 2009 monitoring reports.

A Comprehensive Evaluation Report will be published in 2014, five years after implementation of the 2009 Forest Plan, to report on effectiveness of the goals and objectives and validate assumptions made by the Plan.

For each resource discussed in this report we present the objective of the monitoring, the data source, frequency, results and evaluation for the fiscal year (i.e. FY2010) which runs from October 1 through September 30th. The item number following most resource titles refers back to the Forest Plan monitoring item, found in Table 15 on page 274 of the Forest Plan.

The Monitoring and Activity Highlights section that precedes the actual report is additional information we provide as a matter of general interest but is not required Forest Plan monitoring.

Beaverhead-Deerlodge National Forest
Fiscal Year 2010 Activities and Accomplishments

Beaverhead-Deerlodge Forest (acres)	3,357,833
Anaconda Pintler Wilderness (BDNF Portion)	113,839
Lee Metcalf Wilderness (BDNF Portion)	107,694
Budget	$20,200,000
Payments to Counties (total 2009)	$3,625,359
Beaverhead	$1,498,701
Jefferson	$311,114
Silverbow	$148,215
Deer Lodge	$294,356
Powell	$184,710
Madison	$598,001
Granite	$590,262
Resource Advisory Committees (RAC)	
Southwest Montana RAC Projects Funded	$607,975
Tri-County RAC Projects Funded	$736,371
Employees: Permanent	167
Volunteer hours	22,265
Appraised value of volunteer hours	$464,448
Recreation	
Developed Campgrounds	78
Recreation Special Use Permits administered	64
Picnic areas	18
Rental Cabins	26
Developed Trailheads	28
Constructed Thompson Park Developed Recreation Facilities	
Trails (Total miles)	2,933
Trail construction/reconstruction (miles)	44
Trail maintenance (miles)	1,302
Roads and Facilities	
Miles of roads throughout Forest	4,700
Road Maintenance conducted	1,023 miles
Roads reconstructed/improved	122 miles
Roads decommissioned	108 miles
New road bridges constructed	3
Culverts replace for improved aquatic passage	11
Facilities/buildings improved	83
Heritage Resources	
New Sites Discovered (prehistoric & historic sites)	34
Acres surveyed	3,189
Sites rehabilitated	5
National Register Sites	3
Volunteer hours	4,395
Fire	
Number of wildfires	29
Area burned in wildfires (acres)	6.5
Prescribed fire application (acres)	1,738
Mechanical thinning (acres)	2,820
Range	
Rangeland monitored/evaluated (acres)	1.3 MM
Grazing allotments administered	259
Total A.U.M.'s (Animal Unit Months)	228,000
Noxious Weeds	
Number of Treatment Acres	9,141
Chemical Control	9,041
Biological Control	100
Soil and Water	
Soil and watershed rehabilitation (acres)	302
Water Quality Monitoring Stations	32
Fisheries and Wildlife	
Stream enhancements (miles)	24
Terrestrial habitat enhancements (acres)	11,323
Lands	
Special Use permits for land use administered	320
Road Right-of-Ways acquired	3
Trail Right-of-Ways acquired	1
Lands Acquired (acres)	58.6
Boundary maintained (miles)	2
Forest Management	
Reforestation (acres planted)	110
Seedlings planted	34,000
Regeneration monitoring (acres)	1,106
Mortality reduction actions w/various Pheromone treatments (acres)	
MCH application for suppression of DF Beetle	137
Verbenone application for suppression of Mtn Pine Beetle	163
Carbaryl spraying for suppression of Mtn Pine Beetle	151
Total timber volume sold (mmbf)	31,102
Christmas tree permits sold @ $5.00 each	1,426
Commercial Mushroom Permits	5
Personal Use Mushroom Permits	145
Personal use firewood permits sold	2,809
Personal use post and pole permits sold	68
Minerals	
Hazard Mine Openings closed for Public Safety	31
Mineral Plans Processed	11
Minerals Plans Administered to Standard	47
Law Enforcement Data	
Warnings	141
Incidents	399
Violations	271

SUSTAINABLE OPERATIONS: ACCOMPLISHMENTS

All government agencies are required to meet goals in the areas of energy efficiency and renewable energy under the Energy Policy Act of 2005 and the 2007 Executive Order 13423, "Strengthening Federal Environmental, Energy and Transportation Management". These policies are a reflection of general interest government wide in reducing costs, dependence on petroleum, and reducing greenhouse gas emissions. Between the Green Team projects and efforts already afoot, the Forest accomplished a wide range of activities from education to water conservation.

EDUCATION:

- Two Separate Challenges – a 1-week EARTH CHALLENGE and a 3-week GREEN CHALLENGE. Both were Forest-wide designed to encourage all employees to try various sustainable practices and increase knowledge. Thirty Six percent (52/144) of Forest employees participated in the Earth Challenge and 10 of them received awards. The Green Challenge included the seasonal workforce. Eight percent (16/188) of Forest employees participated and 5 of them received awards above the participation incentive. Wisdom received the travelling trophy for the Green Challenge with the most participation of 23% for the unit. Changes resulting from the challenges: a greater awareness of vehicle fuel usage, food packaging and energy use at home.
- Butte has installed a 'Green Board' in the break-room for green information and news. Dillon has installed a 'Freecycle' bulletin board. Madison has put in a 'Fleet Board' for vehicle check-out which shows fuel efficiency for each vehicle.
- Recycling/energy conservation presentation to 60 Anaconda Job Corp students by Pintler District.
- Recycling/energy conservation/fuel reduction presentations at District Orientations on all Districts across the Forest in June.
- The Dillon District/S.O. has increased participation of taking recycle materials to A&S Metals in Butte.

WASTE REDUCTION AND RECYCLING:

- 272# of batteries were captured from the waste stream through the "battery bucket" recycling campaign. Butte has begun collecting CD's as well.
- Over 20# of VHS tapes were recycled through a collection box in the Supervisors Office.
- Paper recycling is in place in all Beaverhead-Deerlodge facilities. Pintler District measured 42 cubic yards recycled for the last year. By using good-on-one-side (GOOS) paper and installing a 'draft printer', the Madison District may be near 100% recycling of paper and their purchase of paper has been significantly reduced. All districts working on GOOS paper as well as duplex printing and reducing the habit of printing everything; converting office mailing to electronic, printing one copy of instructions and placing in a central area. All districts have been increasing purchases of recycled paper.

- All Forest Units continue to recycle what they can where they can. This includes office and newspaper, magazines, steel and aluminum, plastics 1-5 (new), cardboard, glass, batteries, cds and vhs tapes and fluorescent light bulbs.
- The Dillon District/S.O. is working toward a 'Green Room' where most recycling materials can be centrally located.
- Plastic Recycling was initiated on the Butte, Wisdom and Pintler Ranger Districts.

ENERGY CONSERVATION AND GENERATION:

- The Madison District had designed and contracted for a heat pump water heater. The district is expecting a 50% reduction in energy use for heating water which will hopefully save $260 per year. This should be installed by the beginning of fiscal year 2011 for monitoring.
- All districts are actively saving energy by turning off lights and electronics when not in use. Madison replaced excess lights with a ceiling fan to help circulate air. Butte is working with the building owner to replace fluorescent bulbs with lower wattage bulbs.
- Pintler District replaced 70% or 13 windows of their bunkhouse with double paned gas filled windows as well as replaced two window frames in the main office that were not sealed well. Windows were also replaced on the east and north facing walls of the 'old' building in Sheridan.
- Butte replaced their break-room refrigerator with a more efficient, energy-star model. All districts are checking refrigerator and water heater temperatures and turning them to more energy efficient settings.
- Madison installed an energy saving hot water heater in their south bunkhouse. This was obtained through the R1 Mini Grant Program.
- Pintler replaced a furnace in one of their employee housing units to increase energy efficiency from 19 to 92%.
- Photo voltaic systems increased production of renewable energy by the BDNF. Three 4-kilowatt/hour installations were designed, contracted and installed for Wisdom, Wise River and Pintler Ranger Districts. Along with the existing 4-kilowatt system at Madison District, all FS owned District offices will now generate renewable energy. Generation is expected to provide about 5 -10% of the facility electrical needs. As of mid-April, 2010, the Forest has saved a total of 17,767 kWh of electricity. This equates to over $1,767 of Northwestern Energy's rates at the time. And according to EPA figures, this reduced emissions by 13.6 tons or the equivalent CO2 emissions produced by consuming 1,386 gallons of gasoline!
- District Green Action Plans were developed and implemented for each unit. Along with facility improvements, Green Plans emphasized energy and water conservation habits.
- Monitoring of energy consumption data continued at each facility. The Forest Facilities Engineer provided data to units to aid in identifying opportunities for conservation and monitor progress. These data are incorporated into a spreadsheet for each unit.

FLEET and FUEL REDUCTION

- All districts are working on carpooling whenever possible and are emphasizing the 5 mile-per-hour reduction from the posted highway speed limit.
- Video or teleconferencing is also being used across the Forest whenever feasible.
- Madison traded their Ranger's Chevy Trailblazer for a Ford Escape Hybrid.
- Jefferson tries to coordinate travel to worksites so more than one task can be performed at a time such as when checking a grazing allotment, maybe the gate can be closed for the season as well.

WATER CONSERVATION

- A xeriscape pollinator Garden which replaced lawn at the Madison Ranger District was improved with native drought resistant plants put in beds of wood chips. A drip watering system was also put in. Butte is working with the building owner to put in more native drought resistant plants next summer as well as a pollinator garden near the employee entrance.
- Rain water collection has been initiated at Wisdom and Pintler Districts.
- Pintler put in water shut off valves to the bunkhouse. This will reduce water use in the winter when part of the building is not being used. Showerheads were also replaced to low-flow types. The water faucet at the gas house was replaced to make the line frost free. The area was being dug up for another project so this was performed at the same time.
- Ongoing at Pintler district is the replacement of waterlines to the housing units. These lines have been leaking and clogging for years due to their age. One house was done this year with four others planned for out-years.
- Jefferson installed an automatic watering system at their bunkhouse/warehouse. This will reduce overwatering or having someone forget to shut off water before they leave.

SUSTAINABLE AQUISTION/GREEN PURCHASING

- New Janitorial contracts required use of green cleaning products at Pintler, Wisdom and Butte. Pintler and Wisdom contracts specify the Forest Service will provide those.

BEAVERHEAD SETTLEMENT AGREEMENT

The Beaverhead-Deerlodge National Forest amended riparian management direction within the Beaverhead Forest Plan in October of 1997. A subsequent lawsuit sponsored by the National Wildlife Federation was settled in collaboration with several parties. As part of the Beaverhead Livestock Grazing Settlement Agreement, compliance with grazing standards are monitored and reported annually. Actions taken to implement the Settlement Agreement have only applied to the Beaverhead Districts (South Zone) of the Beaverhead-Deerlodge National Forest. The

allotments were monitored for 12 years (1998-2009) for compliance with the Beaverhead Forest Plan standards and guidelines as amended in October of 1997.

Beginning in 2010, we monitored compliance with riparian standards and guidelines in the 2009 BDNF Forest Plan. The new Forest Plan incorporates all the direction from the riparian amendment and refined the direction for riparian standards in westslope cutthroat streams. This direction applies to the entire Forest. Unlike safety or quality standards, use that exceeds a grazing standard is undesirable. Conversely, use that is below the standard is desirable. For example, the Forest Plan may allow 50% forage use. If monitoring shows that actual use is 30%, the allotment is below the standard and therefore in compliance. The 2009 Forest Plan also formally closed allotments or vacated pastures analyzed in previous NEPA documents. This reduced allotment acreage forest-wide by 223,000 acres.

Results – Most allotments on the Beaverhead zone were inspected (129 of 149). Most allotments were inspected numerous times prior to, during, and after the grazing season. See Table 1, below, for inspection results.

Table 1. Compliance with Grazing Standards by District for FY2010.

District	Total Allotments	Allotments That Met Standards	Allotments That Did Not Meet Standards	Unknown
Dillon	60	51	5	4
Wise River	17	11	1	5
Wisdom	19	17	0	2
Madison	53	44	0	9
Total	**149**	**123**	**6**	**20**

Over ninety-five percent of the allotments inspected met standards (123/129). Meeting standards means that allotments were within (and met) Forest Plan standards. Exceeding standards means that allotments did not meet Forest Plan standards. Table 2, below, describes which Forest Plan standards were exceeded.

Table 2. Forest Plan Standards Exceeded on Noncompliance Allotments in 2010

FP Standards Exceeded	Number of Allotments Exceeding Standard Total of 6
1a – Upland Range Utilization	2
1b – Stream Bank Disturbance	3
1c – Riparian Stubble Height	2
1d – Winter Range	0
1e – Riparian Sites on WCT Streams	1

Of the 6 allotments where Forest Plan standards were exceeded, none were non-compliant two years in a row. All non-compliant allotments were non-compliant for the first time in the last 3 years. One of the non-compliant allotments is in a Fish Key watershed; it was non-compliant for not meeting the interim livestock grazing standard for riparian sites on streams that contain westslope cutthroat trout or listed species.

When allotments are out of compliance, a meeting is held with the permittee or permittees at the end of the season to make sure they know why actual grazing use exceeded allowable standards and where. The District Range and permittee then develop a plan to correct the problem the next year. If they are out of compliance 2 years in a row, it may trigger a suspension of 20% in numbers or season to help meet standards. If they are out of compliance 3 years in a row, a portion of the permit may be cancelled and additional suspensions made until standards are met on a regular basis. During the year, Forest Service personnel inspect allotments and request that cattle be moved early if needed to meet standards or that they leave the allotment early if it appears they need to be removed to meet standards.

It appears that meeting with permittees when they are out of compliance is effective, as ninety-five percent of allotments inspected met Forest Plan standards, and all of the non-compliant allotments were non-compliant for the first time in the past three years.

WILDFIRE SUPPRESSION OR MANAGEMENT

The 2010 summer and fall were not as active as previous years for wildfires. Wildfires on BDNF lands are summarized below in Table 3.

Table 3. Number of fires by size and class on the BDNF during 2010.

Class	Size	Number of Fires	Acres
A	<.25 acres	27	<10
B	.26-9.9 acres	2	<10
C	10-99 acres		
D	100-299		
E	300-999		
F	1000-4999		
G	5000+		
TOTAL		29	6.5

Twenty-nine wildfires burned, for a total of 6.5 acres. All fires were either Class A or Class B.

PROJECT DECISIONS – National Environmental Policy Act (NEPA)

Decision makers on the BDNF issued 25 decisions in 2010: Table 4, below, compares the project analysis and decisions made for the last four years, 2007-2010.

Table 4. Project decisions made on the BDNF in FY10.

Fiscal Year	Record of Decision (EIS)	Decision Notice (EA)	Decision Memo (CE)	Project Analysis Underway*
2007	1	6	20	28
2008	0	2	18	55
2009	2	7	13	30
2010	1	0	24	33

*Project analysis numbers are from the BDNF Schedule of Proposed Actions

Table 5, below, displays the number of decisions made in FY10 by resource area.

Table 5. Number of decisions by resource area.

Resource Area	Number of Decisions
Special Uses	8
Recreation	5
Road/Travel Management	2
Research	1
Grazing Management	2
Minerals	4

Most decisions were made in special uses, recreation, and minerals. Road/travel management, grazing management, and research had the fewest number of decisions.

APPEAL AND LITIGATION

Of the above project decisions, only the Record of Decision Enacting (ROD) Forest Plan Travel Management Direction for Certain Areas of the Beaverhead-Deerlodge National Forest was appealed in FY10. Seven appeals were filed. One appeal was dismissed due to untimely filing. The other six appeals were formally reviewed by the Regional Office per 36 CFR 215.18 and the decision documented in the above ROD was affirmed.

Two appeals were filed in FY09 on the Rat Creek Timber Salvage decision. Early in FY10, the Regional Office formally reviewed both appeals per 36 CFR 215.18 and affirmed the 2009 decision to salvage harvest timber in the Rat Creek project area.

Twelve appeals filed under 36 CFR 251 were processed in FY10. One appeal (filed in FY09) concerned a District Ranger's decision to seasonally restrict operations for mineral development. Another appeal was filed in FY10 concerning a District Ranger's decision to cancel a livestock grazing permit. Both of these decisions were affirmed by the Forest Supervisor, appealed to the Regional Forester and subsequently affirmed in FY10. Nine other appeals concerned the determination of appraised values for recreation residence fees (1 Forest Supervisor decision and 8 District Ranger decisions). Eight of these decisions were affirmed; one decision was remanded to the District Ranger for reconsideration of the appraised value. The remaining appeal concerned a District Ranger's decision to suspend outfitter/guide use based on performance issues. That decision was reversed by the Forest Supervisor.

The Chief of the Forest Service received 56 appeals of the Decision to Revise the Beaverhead-Deerlodge Forest Plan (Section 217 of NEPA) in 2009. All 56 appeals were reviewed by the Washington Office. In early FY10, the Washington Office affirmed the 2009 Decision to Revise the Beaverhead-Deerlodge Forest Plan with instructions associated with issues concerning bighorn sheep and livestock interactions, outstandingly remarkable values of potentially eligible wild and scenic river corridors and maps clearly identifying motorized routes.

Table 6 describes active litigation that was ongoing during FY10, including the legal action taken.

Table 6. Active Litigation in FY10, including Legal Action.

Project Name	Legal Action
Antelope Basin/Elk Lake AMPs	Petition for Rehearing Denied by 9th Circuit Court
Bradley/Noble Lake	Briefs filed in District Court
Forest Plan – Wildlands CPR, et al	Complaint filed in District Court
Rat Creek Timber Salvage	Preliminary Injunction Granted
West Pioneers Snowmobile Trail Grooming	Settlement Agreement Reached

REPORT BY MONITORING ITEM

Watershed Restoration: Item 3

Monitoring Question: Are restoration and conservation activities focused in key (priority) watersheds?

Performance Measure: Number of watershed plans completed, number and type of projects completed in key and other watersheds.

Data Sources: Forest annual accomplishment reports and project accomplishment reports

Measurement Period: Annual **Reporting Period:** Annual

Results:

Projects Completed in Key Watersheds:

In 2010, noxious weeds were treated in the Little Boulder Watershed, which is both a fish key watershed (upper half of the drainage) and a restoration key watershed (lower half of the drainage). Additional noxious weed treatment in 2010 focused in priority watersheds in German Gulch (a fish key watershed) and the Fleecers. No improvement projects were completed yet in the other areas with Watershed Assessments (East Deerlodge, Birch/Willow/Lost). A large scale vegetation project is proposed and currently under NEPA analysis in East Deerlodge watersheds. Another large scale vegetation project is under NEPA analysis in the Fleecer Mountains area. A large scale restoration project will begin analysis in FY11 in the Birch/Willow/Lost area.

Twenty-four miles of stream were enhanced for fisheries in FY10 in fish key watersheds on the Pintler Ranger District. Projects included:

- Conifer encroachment reduction and willow planting in the riparian conservation area of 1 mile of the Middle Fork of Rock Creek to benefit threatened bull trout;
- Conifer encroachment reduction in the riparian conservation area along 1 mile of the West Fork Rock Creek to benefit threatened bull trout;
- Replacement of 4 fish passage structures on South Boulder Creek to benefit threatened bull trout and sensitive westslope cutthroat trout.

Evaluation:
It is premature to evaluate trend or effectiveness in the second year of implementing this monitoring requirement.

Mayfly Population Abundance: Item 5

Monitoring Question: Are management activities effectively maintaining conditions for native species reproduction?

Performance Measure: Changes in abundance of populations of the mayfly (*drunella dodsii*) as an indication of changing sediment levels.

Data Sources: Sampling points on response reaches of sub-watersheds selected to represent potential sediment producing activities or restoration activities.

Measurement Period: Annual **Reporting Period:** Annual

Background:

The mayfly *drunella doddsi* (DD) is an aquatic management indicator species (MIS) for the Beaverhead Deerlodge NF. It was selected because it commonly occurs in streams across the Forest; and because it is influenced by changes in water quality, including sedimentation. The analysis for the Revised Forest Plan recognized sedimentation as an impact common to aquatic systems from land management actions. High levels of fine sediment in aquatic systems are commonly synonymous with degraded habitat conditions and poor stream function. The reverse is so when fine sediment levels are low.

There are specific habitats with greater potential for hosting DD than others. Its preference is commonly for higher stream gradients with larger substrate size. It is also often present in lower gradient reaches, where we commonly survey to evaluate aquatic impacts from management. We expect to see abundances of DD decline in moderate to low gradient reaches if fine sediment is deposition is increasing, leaving the population centralized in higher gradient areas where sediment is transported through to downstream reaches. Thus, DD is probably more quickly influenced (and changes in abundance more observable) in lower gradient reaches than in its steeper more preferred habitats.

Based on its ecology, abundances of DD should decline or increase depending on the influence land management is having on sediment introduction. As such, its abundances should indicate whether management activities are effectively maintaining and/or improving conditions for desired aquatic species.

Abundances of DD will naturally vary in 4 ways:

1. Between stream segments within the same stream depending on abundance of preferred habitats

2. Between streams, depending on differences in thermal regimes and the abundance of preferred habitats
3. Between different periods within the year, depending on when adult emergence occurs and when newly deposited eggs hatch and become large enough to be captured during sampling
4. Between years, depending on favorability of weather and stream flow conditions for reproduction and recruitment

Over the last 8 years, we have sampled and counted DD in 106 samples from 71 streams across the Forest. Densities ranged from 1 to 715 (per square meter), however it is common for them to occur in relatively low densities. In 33% of the samples they occurred in densities of 10 or less. Fifty percent of the samples had densities of 25 or less and 77% of the samples had densities of 100 or less. Because DD was only identified as an aquatic MIS upon completion of the Forest Plan (2009), reliable trend information is not yet available. Sampling times, locations and equipment can influence comparability of data between years. Thus, adjustments to sampling procedures remain a possibility as we learn more about distribution and emergence patterns in streams we monitor. Any adjustments will be done with the intent to produce the most comparable data possible.

Drunella doddsi Sampling in 2010

In 2010, we sampled stream segments in 28 streams across the BDNF for presence and abundance of *Drunella doddsi*. It was present in 75% of the stream segments sampled (Table 7, next page). Overall, abundances were not substantially different than those observed in summarized data over the last 5 years. In 36% of the samples they occurred in densities of 10 or less. Fifty-seven percent of the samples had densities of 25 or less and 68% of the samples had densities of 100 or less.

Drunella doddsi's absence in a sample doesn't necessarily mean it is absent from the stream. It could be the product of sampling times and/or locations. We may reasonably infer DD is poorly represented or even absent from lower gradient, less preferred habitats, and that conditions are probably not ideal for conserving or recovering desired aquatic species. However, inferring management effects from single samples is less than desirable and can be misleading. Interpretation of MIS data will always be most defensible when results are available over longer periods of time. This allows the opportunity to correlate MIS data with management actions and habitat condition trends. Table 7, below, displays sample results for *Drunella doddsi* abundances by stream.

Table 7. 2010 sample results for *Drunella doddsi* abundances by stream.

STREAM	TRIB TO	*D. doddsi* density/sq. m	COLLECTION DATE
Alaska Gulch**	Browns Gulch	12	10/5/2010
Baggs Cr	Cottonwood Creek	128	10/21/2010
Basin Cr	Boulder River	0	9/20/2010
Beaver Cr	Boulder River	0	9/22/2010
Brays Canyon Cr	Buffalo Creek	327	10/4/2010
Browns Cr	Painter Creek	128	9/30/2010
Browns Gulch	Silver Bow Creek	12	10/5/2010
Buffalo Cr	Grasshopper Creek	584	10/4/2010
Cherry Cr	Big Hole River	90	10/13/2010
Farnham Cr	Boulder River	0	9/22/2010
Fish Cr	Jefferson River	58	10/20/2010
Fox Creek	Governor Creek	245	10/14/2010
French Cr	Rattlesnake Creek	7	9/16/2010
Hells Canyon	Jefferson River	12	10/20/2010
Indian Cr	Boulder River	6	9/23/2010
Jerry Cr	Big Hole River	164	10/13/2010
Middle Fk Rock Cr	Rock Creek	280	9/27/2010
Muskrat Cr	Boulder River	41	9/29/2010
N Dunn Cr	Dunn Creek	0	9/21/2010
NFk Dry Cottonwood Cr	Dry Cottonwood Creek	18	10/21/2010
NFk Little Boulder Cr	Boulder River	12	9/24/2010
Painter Cr	Dunlap Creek	350	9/30/2010
Ross Fork	Rock Creek	0	9/27/2010
SFK Boulder River	Boulder River	0	9/23/2010
Sullivan Gulch	Boulder River	0	9/20/2010
Thayer Cr	SFk Andrus Creek	164	10/14/2010
Torpy Gulch	Boulder River	6	9/24/2010
WFk Dry Cr	Dry Creek	23	9/21/2010

Six streams were sampled in 2010 that had been previously sampled. Cherry, Hells Canyon and Fish Creeks were sampled in the same locations that had been previously sampled. The 2010 samples from Thayer, Painter and Middle Fork of Rock Creeks were collected in different locations than in 2010. A comparison of abundances from samples collected in different years is presented in Table 8.

Table 8. *Drunella doddsi* abundances (# per square meter) from streams sampled in different years on the BDNF.

Year	Cherry Creek	Hells Canyon Creek	Fish Creek	Thayer Creek	Painter Creek	MF Rock Creek
2010	90	12	58	164[1]	350[1]	280[1]
2009	--	--	--	--	--	5
2008	261	34	37	--	90	--
2006	--	--	--	120	--	--
2004	--	--	--	--	--	4

[1]Samples collected in different location than previous year's sample.

Evaluation

At this point there is insufficient data to draw any conclusions. In all streams there was variability in the dates that sampling occurred between years. This can result in differences in abundance, depending on how those dates correspond with periods within its life cycle. For instance, if samples were collected shortly before emergence one year and shortly after in another year abundances would vary substantially. Sampling different locations within the same stream would also encourage different results. Finally, there is a natural range of variability that occurs with any population over time.

All of these examples are represented in the data above. As our data increases and we refine our sampling approach regarding sampling dates, we will begin to get a clearer picture of what to expect with regard to variations in abundances.

Soil and Water Conservation Practices: Item 6

Monitoring Question: Are soil and water conservation practices (also referred to as Best Management Practices or BMPs) being implemented during project work and are they resulting in protection of water quality and beneficial uses?

Performance Measure: BMPs implemented and percent rated effective.

Data Sources: Annual project review. Compare BMPs prescribed by EA, EIS or contract, to see if BMPs were followed and were effective.

Measurement Period: Annual **Reporting Period:** Annual

Introduction:

Soil and water mitigation measures are established to comply with the Forest Service Soil and Water Conservation Practices (SWCP) Handbook 2509.22. Those SWCPs are comparable to "best management practices" or BMPs. During environmental analysis, interdisciplinary teams select appropriate soil and water conservation practices based on water quality objectives, soils, topography, geology, vegetation and climate. These final selected practices are translated into project plan specifications, contract clauses, and other tools.

The BDNF annually conducts an integrated review of one project on the Forest to determine if practices or mitigation measures identified during environmental analysis by the ID Team are implemented on the ground and if those measures are effective in accomplishing the intended land management objective. On August 5, 2010, an interdisciplinary team of 27 Forest and District specialists, Staff Officers, three District Rangers and a Montana Fish (MTFWP) and Parks wildlife biologist reviewed the implementation and success of a prescribed burning project in the North Doolittle Creek drainage of the Pioneers on the Wisdom Ranger District (see Figure 1, below). This vegetation treatment project was an outcome of the **West Face Allotment Management Plan Decision Notice**, approved in April of 1998. A review of the environmental analysis was done in 2009 prior to implementation under section 18.1 of the National Environmental Policy Act to determine if this older decision met the requirements of the new 2009 Forest Plan. Two requirements were added to the subsequent Prescribed Burn Plan (2009) to bring the older project decision in compliance with the new Forest Plan.

The two soil and water protection requirements (SWCPs) associated with prescribed burning are presented here, along with the objective of the SWCP, results of implementing the SWCP, and in evaluation of the effectiveness of the SWCP. Following the SWCPs, requirements of the Decision Notice (DN), the 18.1 Review, the Prescribed Burn Plan, and a Memorandum of Understanding between the BDNF and MTFWP are evaluated.

Results*:*

(a) SWCP 18.02 – Formulation of Fire Prescriptions.

Objective: to provide for soil and water resource protection while achieving the management objective through the use of prescribed fire.

Finding: Fire prescriptions were developed based on field investigations adjusted to site specific conditions. Both optimum and tolerable limits (cold and hot) were established. Fire prescriptions were reviewed and complied with. Fires weather, soil moisture and fuel moisture during implementation were documented. The technical difficulty of protecting buffers on RCAs by hand crews may have been underestimated.

Effectiveness: Prescription ranges resulted in meeting most resource objectives and protection objectives. Burning within prescription resulted in close to the desired mosaic pattern. The largest burn unit (1200' across) was burned at the upper end of parameters. Alternative ignition patterns near RCAs may have made buffer protection less difficult.

(b) SWCP 18.03 – Protection of Soil and Water from Prescribed Burning Effects

Objective: To maintain soil productivity, minimize erosion, and prevent ash, sediments, nutrients, and debris from entering surface water.

Finding: Riparian areas were identified on the ground, protection parameters were identified in the DN, Silvicultural Prescription, Burn Plan and 18.1 Review. No specific soil issues were identified.

Buffers along perennial streams were maintained at > 300 meters, which is more restrictive than the DN requirement (500') or the 2009 Plan aquatic standard (300'), or the Silvicultural Prescription (1/10 mile).

The 100 foot buffer along Category 4 RCAs (springs and seeps) was violated in 4 instances. Two deviations were small patches of fire less than 100' wide, one came within 60' of a spring. The third deviation occurred because the seep was located within the black line designed to protect private property and a boundary fence. The seep was dry at the time, but apparent with presence of willows. Fire burned within 30 feet of the seep. The fourth deviation at Badger spring had fire burn within 60 feet.

Figure 1. Unit 3, finger of burn that crossed a willow seep (Category 4 RCA) along the Forest Boundary.

Effectiveness: Soil monitoring plots show all burned areas were low severity. Duff was retained in place, mineral soil was not affected, sediment did not move across slopes or into streams. Ground cover is still excellent and regrowth is vigorous (Figure 2, below). Biological integrity is intact.

The 300 meter buffer on perennial streams is unnecessary to protect riparian RCAs from impacts of spring burning. It was implemented as a requirement for sage grouse habitat retention near leks, not soil or sediment concerns.

Because of the low intensity fire in spring, no short or long term impacts are expected from burning closer to Category 4 RCAs than the Forest Plan and Prescribed Burn Plan required. This type of fire may be beneficial to a Category 4 RCA, but a desired future condition would have to be established and project NEPA would have to analyze effects to modify the Forest Plan standard at the project level.

Figure 2. Regrowth of vegetation one year post-burn.

REQUIREMENTS IN ADDITION TO SWCPS:

(a) Apply guidelines of the 1997 Sagebrush MOU with MTFWP (DN, page 5; Prescribed Burn Plan objectives).

Consultation and post-burn review: Wisdom District coordinated with MTFWP in 1998 to map a sagebrush strategy on aerial photos for the west face of the Pioneer mountains, which included this Doolittle area. This plan identifies sagebrush stands to retain in the long run, distinguished from stands to treat. The District Fire Management Officer and MTFWP biologist participating in the review report that having a strategic map in place for the West Face of the Pioneers enhances their ability to work together on sagebrush treatment proposals. The MTFWP biologist reports the MOU is successful at involving him in District projects and oversight.

***Retention of a 50% burn mosaic*:** The objective in the MOU for sagebrush conservation is to maintain a viable sagebrush community. The strategy for meeting this objective is to achieve and/or maintain a component (minimum of 50%) of mature and old growth (30 years and older) sagebrush/grassland habitat type. This means that at least 50% of a given area needs to remain unburned. Post-burn mapping is displayed in Figures 3 and 4 below. Results indicate a final mosaic of 30% burned stands and 70% unburned, which meets the MOU retention criteria of at least 50% unburned.

Unit 1 burned 225/811 acres = 28% mosaic
Unit 2 burned 0/12 acres = 0% mosaic
Unit 3 burned 95/281 acres = 34% mosaic

TOTAL burned = 320/1104 acres = 30% mosaic

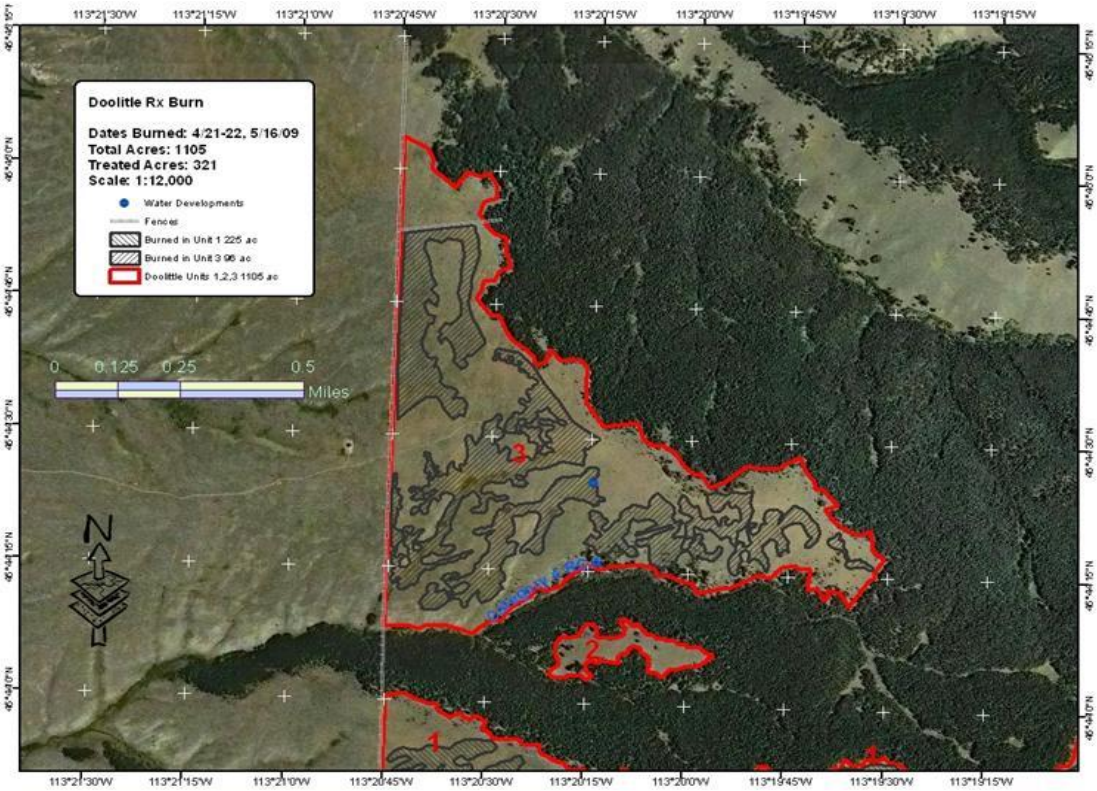

Figure 3. Mosaic effect of burned versus unburned patches in Unit 2 and 3.

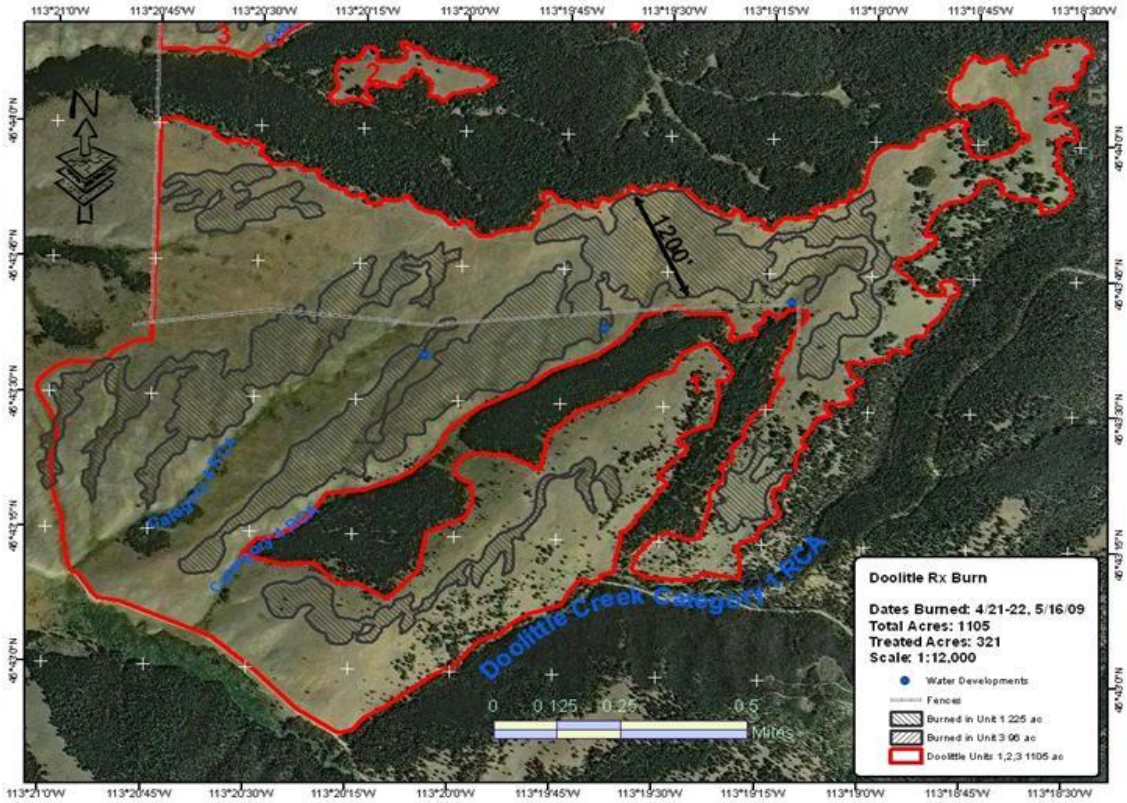

Figure 4. Distance between untreated patches in Unit 1.

Distance from unburned vegetation is less than 600 feet. The greatest distance measured across any unit was 1200 feet in the open basin of Unit 1 so no point was further than 600 feet, see Figure 4. The MOU distance requirement was not exceeded.

The large open basin in Unit 1 was more difficult to control fire and keep it contained. All other burn patches had a lot of "edge" in proportion to acres burned. This is the effect MTFWP is looking for to maximize habitat. Spring burning lends itself to a strong mosaic pattern with residual snow patches.

(b) Leave an unburned buffer within 1/10 mile of perennial streams and 500 feet on water developments to discourage grazing in riparian areas (EA page II-9 and Prescribe Burn Plan objective).

The Prescribed Burn Plan (2009) required a wider buffer of 300 meters along perennial streams than the EA requirement of 1/10 mile. Both requirements were met as the buffer was more than 300 meters.

No grazing notes were available from the first year post-burn to ascertain whether the wider buffer of 300 meters was more effective in discouraging grazing near the

perennial stream. The buffer was likely much wider than necessary to protect riparian vegetation and water quality (see SWCP 18.03).

(c) Protect Category 4 RCA with a 100 foot buffer in fish key watersheds (18.1 review required adding this to the Prescribed Burn Plan).

Success of implementing the buffer was mixed. The 100 foot buffer along Category 4 RCAs (springs and seeps) was violated in 4 instances. See discussion of implementation and effectiveness under SWCP 18.03 three pages earlier.

(d) Regulate water drafting from streams to control aquatic nuisance species (18.1 review required adding this to the Prescribed Burn Plan).

The 18.1 review of the original DN required the addition an aquatic nuisance standard to comply with the 2009 Forest Plan. This requirement was included in the Prescribed Burn Plan but not applicable on the Doolittle Burn. No water drafting took place.

(e) Increase forage production by reducing conifer encroachment (Prescribed Burn Plan Objective)

Conifer encroachment was reduced through a hand slashing project in 2008, prior to implementing the prescribed burn. A number of small Douglas-fir trees over 6" are still evident as seed sources for further encroachment so this treatments effectiveness may be short term. Some projects on the Forest are using 8" or 10" to define the upper end of treated encroachment. The decision on diameter tends to balance the science (being more aggressive about removing conifers lengthens the life expectancy of the benefits to sage/grasslands) with public interest and tolerance and perhaps wildlife concerns. The review team recommends including return treatments like reburns as a 2nd stage when we analyze alternative treatments. The MTFWP biologist would like to see these secondary treatments address deciduous tree and shrub restoration. We may need to be more specific and aggressive setting encroachment treatment objectives to meet the Forest Plan encroachment objectives. The team estimates an 8" limit would result in another 10% of the conifers being eliminated.

(f) Kill 50-80% of Douglas-fir and lodgepole colonization less than 6 inches diameter. Mortality should be less than 20% in trees greater than 6 inches diameter (Prescribed Burn Plan Objective).

This objective was achieved. Holding the fire to controllable areas kept from killing many small trees through fire alone. Most of the colonization mortality was from hand crew slashing and girdling.

Conifers were slashed the year prior to burning. A number of small Douglas-fir trees over 6" are still evident as seed sources for further encroachment. See item (e) above discussion for effectiveness and recommendations.

(g) Use fire alongside aspen stands to reduce conifer colonization but don't allow fire within stands (Prescribed Burn Plan Objective).

No fire was lit or burned against aspen patches. Conifers in and against aspen stands were slashed. Mature aspen trees remain.

Sprouting is already evident. This approach of releasing competition from conifer colonization works well on the Wisdom District where aspen patches are so small there is a high risk of losing clones with stand replacement treatments.

(h) If active nest sites are found for T, E, and Sensitive bird species, notify the wildlife biologist and follow recommendations (Prescribed Burn Plan Objective).

No active nest sites were found.

(i) If heritage sites are found, every effort will be made to protect the site and notify the Forest heritage specialist.

No heritage sites were found. Spring burning resulted in low intensity fires which removed little duff and litter. No ground disturbing activity took place.

(j) Protect wooden braces in the Forest Service boundary fence along the western edge of units 1 and 3 and through the center of Unit 1 from the west to east side.

Wooden braces were protected on the boundary and Unit 1 fences. This requirement complicated protection of an RCA 4 in close proximity to the black line.

Evaluation: Soil and Water Conservation Practice evaluation is based on (a) was the SWCP implemented, (b) was it effective (c) did a departure from the SWCP occur, (d) was corrective action needed.

(a). SWCP18.02 - This SWCP was fully implemented on the North Doolittle Prescribed Burn Project. Application of the fire prescriptions was effective. No departure from this SWCP occurred.

(b) SWCP 18.03-. This SWCP was implemented through application of spring burning to achieve mosaics and through application of RCA buffers. Buffers along perennial streams were excessive for soil and water conservation protection.

Buffers along springs and seeps were difficult to protect and failed in 4 instances. Riparian habitat and riparian function were protected regardless of fire encroaching on these buffers. Low intensity fire in spring conditions resulted in no disturbance of duff or mineral soil. Sediment did not move across slopes or into seep areas. Revegetation was immediate and responsive. No corrective action was required.

From the standpoint of limiting soil disturbance and protecting riparian areas it appears that application of burn plan objectives, Forest Plan standards, and MOU requirements have protected water quality and beneficial uses over the vast majority of the project area.

Soil Productivity (Doolittle Prescribed Burn): Item 7

Monitoring Question: Are management actions maintaining soil quality?

Performance Measure: Effects of treatments on areas treated.

Data Sources: Inspection reports, daily diaries, resource compliance monitoring, BMP monitoring and evaluation.

Measurement Period: 5 years **Reporting Period:** 5 years

Introduction:
The Doolittle prescribed burning project was monitored in June of 2010 for effects to the soil resource as determined by burn severity and condition of litter and duff layers.

The goal for the soil resource under the Beaverhead-Deerlodge Forest Plan is that "soil productivity is maintained or restored" (USDA Forest Service, 2009). The plan also states that the most current Northern Region Soil Quality Standards (SQS) are adopted as Forest Plan soil standards.

Northern Region SQS address NFMA by requiring that new activities do not create detrimental soil conditions on more than 15 percent of an activity area following project implementation and restoration activities (USDA Forest Service, 1999). Activity areas are defined as individual treatment units. There are seven different types of detrimental disturbance: compaction, rutting, displacement, loss of surface organic matter, severely-burned soils, surface erosion, and mass movement.

Since the Doolittle project did not involve the use of heavy equipment and existing soil disturbance levels are low, compaction, rutting, displacement, and mass movement are not discussed further. Prescribed burning has the potential to affect soils and surface organic matter if the severity is high (see definition below). Also, prescribed burning can remove surface cover, which could result in subsequent erosion.

Definitions for severely burned soils and surface erosion from the SQS are:

- Severely-burned soils: Physical and biological changes to soil resulting from high intensity burns of long duration are detrimental. This standard is used when evaluating prescribed fire. Guidelines for assessing fire intensity are contained in the Burned-Area Emergency Rehabilitation Handbook FSH 2509.13 (USDA Forest Service, 1995).
- Surface Erosion: Rills, gullies, pedestals, and soil deposition are all indicators of detrimental surface erosion. Minimum amounts of ground cover necessary to keep soil

loss to within tolerable limits (generally less than 1 to 2 tons per acre per year) should be established locally depending on site characteristics.

Subsequent to the 1999 SQS, new, interim direction assessing burn severity on soils has been developed. The BAER Handbook, FSH 2509.13 (USDA Forest Service, 1995) describes burn effects in terms of burn or fire intensity. The interim direction, however, recognizes that burn intensity is not a good indicator of the degree of chemical, physical, and biological changes to the soil or other resources. Instead, the interim direction proposes the use of the fire severity definitions set forth in Debano and others (1998), which are the definitions that are used in this report. To determine the effects of the Doolittle prescribed burning project on soils, sixty-one data points were collected in the north-central (Figure 5) and southeastern portions of unit 1.

Figure 5. Doolittle broadcast burning completed in the spring of 2009. This photo was taken in June, 2010. The burned areas (middle of photo) appear bright green and contain grasses and forbs, while the unburned areas (left edge and background) appear as a duller green and have sagebrush, grasses, and forbs.

Effects of fire on soil are described in terms of fire or burn severity. There are four main classes to describe fire or burn severity at any given location (DeBano and others, 1998):

1. *Unburned*: litter, duff, and soil are unaffected by fire.
2. *Low fire severity*: Low soil heating, or light ground char, occurs where litter is scorched, charred, or consumed, but the duff is left largely intact, although it can be charred on the surface. Woody debris accumulations are partially consumed or charred. Mineral soil is not changed. Fire severity in forest ecosystems is low if the litter and duff layers are scorched but not altered over the entire depth. The surface is mostly black in a shrubland or grassland ecosystem, although gray ash can be present for a short time. Soil temperatures at 1cm are less than 50°C. Lethal temperatures for soil organisms occur down to depths of about 1cm.

3. *Moderate fire severity*: Moderate soil heating, or moderate ground char, occurs where the litter on forest sites is consumed and the duff is deeply charred or consumed, but the underlying mineral soil surface is not visibly altered. Light colored ash is present. Woody debris is mostly consumed, except for logs, which are deeply charred. Soil temperatures at the 1-cm depth can reach 100 to 200°C. Lethal temperatures for soil organisms occur down to depths of 3 to 5 cm.
4. *High fire severity*: High soil heating, or deep ground char, occurs where the duff is completely consumed and the top of the mineral soil is visibly reddish or orange on severely burned sites. Color of the soil below 1cm is darker or charred from organic material. The char layer can extend to a depth of 10cm or more. Logs can be consumed or deeply charred, and deep ground char can occur under slash concentrations or burned-out logs. Soil texture in the surface layers is changed and fusion evident by clinkers can be observed locally. Soil temperatures at 2cm are greater than 250°C. Lethal temperatures for soil organisms occur down to depths of 9 to 16 cm.

Sampling Methods

The Doolittle prescribed burning project was monitored in June of 2010 for effects to the soil resource as determined by burn severity and condition of the litter and duff layers. Attributes recorded are listed below in Table 9.

Table 9. Attributes recorded while monitoring Doolittle broadcast burns. Litter scorched, charred, and consumed, as well as red soil and char greater than 1cm were used in classifying burn severity (defined above).

Attribute Monitored	Unit of Measure
Basal vegetation[1]	Percent of plot
Litter	Percent of plot
Rock	Percent of plot
Bare soil	Percent of plot
Moss	Percent of plot
Erosion	Yes/No
Litter scorched	Yes/No
Litter charred	Yes/No
Litter consumed	Yes/No
Litter depth	Centimeters
Red soil (indicator of severely burned soil)	Yes/No
Char greater than 1cm deep (indicator of severely burned soil)	Yes/No

Attribute Monitored	Unit of Measure
Detrimental soil disturbance	Yes/No

[1]Basal vegetation is defined as the percentage cover of the plant, measured at the soil surface, which contrasts with canopy cover, which measures the outermost perimeter of the natural spread of foliage.

Figure 6. Photo of ground cover typical in the Doolittle prescribed burn, one year following burning. Dark material underneath the yellow pen is litter, not bare soil.

Figure 7. Photo of litter and duff taken from underneath a burned sagebrush plant in the Doolittle project. Note that the litter and duff is entirely intact, with scorched litter barely evident one year after burning.

Monitoring Results:
Severely burned soil is characterized by physical and biological changes resulting from high intensity burns of long duration. Monitoring data from broadcast burn treatments for the Doolittle project on the Wisdom Ranger District indicate burning in the spring resulted in a low severity burn. See Figures 6 and 7 for representative pictures of the surface condition one year after burning.

No plots were classified as moderate or severely burned, only the very surficial layer of litter was found to be scorched; therefore, no detrimental soil disturbance due to the prescribed burning was found (Table 10). One year later, evidence of surficial litter scorching was found only intermittently (Figure 7). No litter was consumed, and mineral soils were not altered. This is consistent with the "low severity" definition set forth in DeBano and others (1998); see definitions of the different burn classes above.

Table 10. Results from broadcast burn monitoring completed in June, 2010. The year each area was burned, the number of plots taken, average basal vegetation (%), average bare soil (%), and burn severity are reported. Note that all plots had a low burn severity rating.

Number of plots taken	Average basal vegetation (%)[1]	Average bare soil (%)	Average soil cover (%)	Number of plots with evidence of erosion	Number of plots with detrimental soil disturbance	% Plots with LOW Burn severity
61	2.3%	4%	96%	0	0	100%

[1]Basal vegetation is defined as the percentage cover of the plant, measured at the soil surface, which contrasts with canopy cover, which measures the outermost perimeter of the natural spread of foliage.

Bare soil averaged only 4%. Grasses and forbs have completely recovered one year following the burn (Figures 5 and 6).

Rills, gullies, pedestals, and soil deposition are all indicators of detrimental surface erosion (USDA Forest Service, 1999). No plots had evidence of erosion, likely due to the very high (96%) percent ground cover. Cover is an important attribute in determining a soil's susceptibility to erosion. Packer (1963) found that 70% cover is necessary to stabilize the soil and prevent accelerated erosion. Similarly, previous work in burned forest soils by Noble (1965) and Orr (1970), as cited in Robichaud and others (2000) found that 30% cover reduces erosion by half compared to bare soil, and 60% cover reduced sediment movement to negligible amounts. Dadkhah and Gifford (1980) found that adequate watershed protection was provided by maintaining at least 50% cover. Considering these general guidelines, the 96% average cover present post-prescribed burn as shown in Table 10, more than adequately prevented accelerated erosion.

Evaluation:

Sixty-one plots were evaluated for burn/fire severity and condition of the litter and duff layers to determine effects to the soil resource. All plots had low burn severity; no detrimental soil burning was found, and no soil erosion was noted. Surface organic matter was not negatively affected. An average of 96% ground cover was noted. No litter was consumed, and mineral soils were not altered. Based on this data, the Northern Region Soil Quality Standards were met, with no detrimental effects noted to the soil resource. Therefore, the Doolittle project met the Forest Plan goal of maintaining soil productivity.

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Soil Productivity (Sheep Creek Fire Salvage): Item 7

Monitoring Question: Are management actions maintaining soil quality?

Performance Measure: Effects of treatments on areas treated.

Data Sources: Inspection reports, daily diaries, resource compliance monitoring, BMP (Best Management Practices) monitoring and evaluation.

Measurement Period: 5 years **Reporting Period:** 5 years

Monitoring Results

Location of Project and Activity Monitored

Sheep Creek is a fire salvage project located on the Wisdom Ranger District. Logging was completed in March of 2007. To 1) determine the effects of the project on soil quality as measured through detrimental soil disturbance, and 2) to evaluate whether BMPs were implemented and their effectiveness, we monitored harvest units 2 (Figure 8), 5, and 6 (Figure 9). Monitoring was completed on August 19, 2010.

Figure 8. Sheep Creek Salvage Sale Unit 2; photo taken facing west.

Figure 9. Sheep Creek Salvage Sale Unit 6; photo taken facing north.

Sampling Methods

Soil disturbance was recorded in 3 harvest units. Indicators recorded included erosion, compaction, rutting, and displacement. These indicators are identified in the Northern Region Soil Quality Standards (SQS), which set limits to the degree and aerial extent of soil disturbance to maintain soil productivity, thus meeting the intent of NFMA. The Forest Soil Disturbance Monitoring Protocol (USDA Forest Service, 2009) was followed to assess soil disturbance in the harvest units. The protocol is applied to areas disturbed by management activities, and is a presence/absence (1=present, 0=absent) method of collecting visual attribute data in order to assess soil disturbance. Attributes evaluated include forest floor impacts, surface soil displacement, mixed surface soil/subsoil, rutting, burning (only management prescribed burning is assessed), compaction, and platy or massive structure. Samples were taken every 50 feet along random transects placed through harvest units, to adequately cover the units. Coarse woody debris (pieces greater than 3” in diameter) measurements were also taken (Brown, 1974).

Results

All units monitored met the SQS (see Table 11). Two units had no detrimental soil disturbance (DSD), while one unit had 3.2% DSD. Post-harvest detrimental soil conditions for each unit are well below the 15% SQS and the projected rates disclosed in the Final Sheep Creek Salvage EIS

(pg 173). Units 2 and 6 were projected to have 13% DSD, while Unit 5 was projected to have 14% DSD. The DSD found in unit 6 was detrimentally compacted and near a landing that served multiple harvest units.

Table 11. Locations of soil disturbance monitoring, including geology and soil texture, total number of plots taken, number of detrimental plots, and the percentage of the plots that were detrimental.

Location	Geology, dominant soil texture	Number of plots taken	Number of Detrimental Plots	*Predicted* Detrimental Disturbance[b]	*Actual* Detrimental Disturbance Measured
Unit 2	Granite, sandy loam	32	0	13%	0
Unit 5	Granite, sandy loam	32	0	14%	0
Unit 6	Granite, sandy loam	31	1[a]	13%	3.2%

[a]Detrimental plot located adjacent to landing which served units 2 and 6.
[b]As disclosed on page 173 of the Sheep Creek Salvage FEIS.

Soil BMPs prescribed for this project effectively reduced detrimental soil disturbance associated with the Sheep Creek Salvage Sale as evidenced in Table 11 above.

Monitoring Question: Are soil and water conservation practices (BMPs) being implemented during project work and are they resulting in protection of water quality and beneficial uses?

Soil and water mitigation measures are established to comply with the Soil and Water Conservation Practices (SWCP) Handbook (Forest Service Handbook 2509.22). Those SWCPs are comparable to "Best Management Practices" or BMPs. During environmental analysis, interdisciplinary teams select appropriate soil and water conservation practices based on water quality objectives, soils, topography, geology, vegetation and climate. Environmental impacts and water quality protection options are evaluated and a mix of practices is selected to not only protect water quality but meet other resource needs. These final selected practices are translated into project plan specifications, contract clauses, and other tools.

Evaluation:
Evaluation of BMPs is based on (a) was it implemented, (b) was it effective, (c) did a departure from the BMP occur, (d) was corrective action needed. The numbered statements are mitigation measures for the soil resource included in the Sheep Creek Salvage ROD (pg 31-32).

<u>Monitoring Results</u>
See *Location of Project and Activity Monitored* and *Sampling Methods* sections above for information on how and where data were collected.

Background Information
The ROD dated February, 2005 outlined the following soil mitigation measures to be followed for the Sheep Creek Salvage project.

1. **For cable logging systems, yarded logs would be either partially or fully suspended (SWCP 14.09).**

OBJECTIVE: To protect the soil from excessive disturbance and accelerated erosion and to maintain the integrity of the Riparian Area and other sensitive watershed areas.

EVALUATION: This mitigation measure is not applicable. All units monitored were tractor logged in the winter.

2. **Tractor logging would be limited to slopes less than 35 percent (SWCP 13.02, 14.07).**

OBJECTIVE: To reduce gully and sheet erosion and associated sediment production.

EVALUATION: No slopes greater than 35% were included within the unit boundaries of units 2, 5, and 6. No evidence of erosion exceeding background levels of erosion caused by the wildfire were noted, so this practice was effective. No corrective action is necessary.

3. **Contract standards for logging operations would require:**
    - **12 inches of snow between machinery wheels and the ground, or**
    - **6 inches of snow between machinery wheel and ground and 2 inches of frozen ground, or**
    - **4 inches of frozen ground.**

OBJECTIVE: minimize soil compaction, puddling, and rutting which affect soil productivity.

EVALUATION: A review of daily inspection reports indicated the harvest activity within the units occurred from January to March of 2007. Adequate snowpack and frozen ground were consistently monitored and documented within the daily inspection reports. Additionally, the forest soil scientist reviewed units 2 and 6 on March 15, 2007, after harvest activities were complete. Both units had far more snow than the minimums prescribed in the FEIS. In unit 2, 16 inches of snow and two inches of frozen soil was measured in a skid trail (Figure 10).

Figure 10. Skid trail in Unit 2, Sheep Creek salvage sale, after harvest activities were completed. Snow and ice depth in skid trail is 16 inches, with 2 inches of frozen soil below the snow.

Similarly, 17 inches of snow and 2 inches of frozen soil was measured in unit 6 (Figure 11). Snow depths in undisturbed terrain were deeper. Twenty-eight inches of snow was measured in an undisturbed area in unit 6 (Figure 12).

Figure 11. Skid trail in Unit 6, Sheep Creek Salvage Sale. Note top of 16 inch shovel blade. Snow and ice depth in skid trail is 17 inches, with 2 inches of frozen soil below the snow.

Figure 12. Undisturbed snow depth in Unit 6, Sheep Creek Salvage Sale. Note top of 16 inch shovel blade. Snow depth 28 inches .

On the ground monitoring results from units 2, 5, and 6 indicate logging over snow-covered and/or frozen ground was effective in protecting the soil from detrimental compaction, rutting, and puddling. Units 2 and 5 did not have any detrimental disturbance, while unit 6 had 3.2%, associated with the landing in the unit. No corrective action is necessary.

4. **Contract standards would allow dispersed skidding leading to a primary skid trail as long as snow or frozen ground conditions adequately buffer the soil. If skidding breaks through causing detrimental soil disturbance then skidders would be restricted to skid trails 80 feet apart.**

OBJECTIVE: To minimize detrimental soil disturbance.

EVALUATION: As mentioned above, snowpack and frozen ground were consistently monitored by sale administrators and documented within their daily inspection reports. Skid trails were noted as being 85-100 feet apart in unit 5 on 2/6/2007. Detrimental disturbance was not found in skid trails in any of the units (2,5, or 6) monitored; operating on frozen/snow covered ground was effective in protecting the soil from detrimental disturbance. No corrective action is necessary.

5. **Logs would be oriented perpendicular across the slope for rainfall interception and increased soil infiltration on skid trails (SWCP 14.14).**

OBJECTIVE: To prevent erosion and sedimentation.

EVALUATION: This mitigation measure increases ground cover on bare soils and dissipates the energy of any concentrated flow of water over bare ground. Since these units were harvested in the winter, ground cover was not negatively affected (Figure 13). Slash was placed on skid trails and was accepted by the sale administrator in March, 2007. No corrective action is necessary.

Figure 13. Sheep Creek Salvage Sale Unit 2; photo taken facing north. Shovel in photo is in a main skid trail, note adequate vegetative cover.

6. **Skid trails and landings would be mulched with compost, wood chips or scattered slash. To control erosion in skidding corridors for cable and tractor logging, slash would be concentrated on skid trails on the gentle downhill side of slope breaks to slow overland flow velocities and to trap sediment. After burning landing piles, landings would be rehabilitated with winged subsoiling, seeding, and scattering slash (SWCP 13.04, 14.11). In addition, skid trails crossing past harvest units would be ripped and seeded.**

OBJECTIVE: To protect soil productivity and water quality by minimizing erosion and sedimentation.

EVALUATION: See response to number 5 above. Skid trails were largely unaffected by harvest activities due to winter operations. Vegetation is intact (Figure 13). Additionally, slash was added to skid trails after skidding was complete in March of 2007. Adequate existing vegetation and the addition of slash effectively limited erosion. Landing piles had not been burned at the time of monitoring in August, 2010. No skid trails for units 2, 5, or 6 crossed past harvest units.

7. **Harvest units would be reclaimed with native vegetation seeding in detrimentally disturbed soil areas. The timber sale administrator cooperating with the forest soil scientist will designate seed mixes and areas for seeding (SWCP 13.04, 14.14).**

OBJECTIVE: To protect soil productivity and water quality by minimizing erosion and sedimentation. To reduce the impacts of erosion and subsequent sedimentation from log landings through the use of mitigating measures.

EVALUATION: At the time of monitoring (August, 2010), slash piles had not been burned. These areas are the only areas noted that may need seeding. Skid trails in the units, as described above (Figure 13) are well vegetated and do not need seeding.

8. **A performance based contract provision shall require that harvest operations shall not result in detrimental soil conditions in excess of 15%, within each cutting unit. Forest Service staff would monitor detrimental soil conditions within each cutting unit during harvest activities. If harvest activities exceed 15% detrimental disturbance within a specific cutting unit, the purchaser would be required to modify operation techniques or perform rehabilitation activities to reduce the detrimental soil condition to a compliance level (SWCP 14.21).**

OBJECTIVE: To protect soil resources.

EVALUATION: Snow and frozen soil conditions were continually monitored by the sale administrator during harvest of units 2, 5, and 6 in January-March of 2007. The only detrimental soil disturbance found during monitoring was associated with the landing serving units 2 and 6 and resulted in 3.2%DSD in unit 6, well below the 15% SQS limit. Therefore, the intent of the mitigation measure was met and was effective in protecting the soil from detrimental disturbance. No corrective action is necessary.

9. **Temporary roads would be decommissioned by winged subsoiling or recontouring, seeding with native or desired species, and spreading available debris over the road surface to an extent that would adequately discourage vehicular travel. This would be done as soon as possible after logging operations are complete using an excavator. During construction of the temporary roads, topsoil would be retained to the extent possible and would be replaced after use to encourage faster recovery of vegetation. If fill slopes remain in place, they would be stabilized with native seed and mulch along with wood debris for runoff interception. Mulch may consist of compost, chipped and/or scattered slash (SWCP 15.25).**

OBJECTIVE: To protect soil resources.

EVALUATION: No temporary roads were constructed for units 2, 5, or 6; therefore, this mitigation measure was not monitored.

10. Regional soil guidelines for hazard tree removal would be maintained along Road #1085.

OBJECTIVE: To protect soil resources.

EVALUATION: The forest soil scientist reviewed some of the roadside units along road 1085 and found that the Regional Soil Quality Standards were met and effective in protecting soil from detrimental disturbance. No corrective action is necessary.

11. Slash piles, except landing piles should generally be 15 feet in diameter or less.

OBJECTIVE: To protect the soil from high burn severity when slash is burned.

EVALUATION: No slash piles other than the landing pile in unit 6 were observed while monitoring units 2, 5, and 6.

12. To restore skid trails used for this project that travel across past harvest units, the forest soil scientist would assess and direct soil restoration activities. These activities may include:

- **Obliterating the skid trails,**
- **Installing erosion control measures,**
- **Decompacting detrimentally compacted areas with disc or subsoiler,**
- **Seeding/transplanting native grasses/shrubs only in viable planting areas, and**
- **Placing 10-15 tons/acre of coarse woody debris.**

OBJECTIVE: To prevent erosion and sedimentation on disturbed areas. To protect soil productivity.

EVALUATION:

- Skid trails in units 2, 5, and 6 were not constructed nor detrimentally disturbed; therefore, no skid trails needed to be obliterated.
- The only erosion control measures implemented within the harvest units included placing slash on the skid trails which was effective (along with good existing vegetative cover, see Figure 13, above) in limiting erosion. No corrective action is necessary.
- The only areas that may need to be decompacted and seeded are associated with the landing in unit 6, which at the date of monitoring, had not yet had slash disposal and were therefore not ready for restoration activities.
- Coarse woody debris was measured in units 2, 5, and 6. Unit 2 had 17.4 tons/acre, unit 5 had 13.9 tons/acre, and unit 6 had 8.8 tons/acre. Unit 6 is below the minimum 10 tons/acre of course woody debris; however, as Figure 9 demonstrates, this amount is expected to increase in the next few years as dead trees currently standing blow down. No corrective action is necessary.

SUMMARY:

Detrimental soil disturbance was well within the Northern Region Soil Quality Standards (Table 10). Units 2 and 5 had no detrimental soil disturbance, while unit 6 had only 3.2%. All skid trails monitored had vegetative cover sufficient to protect soil from erosion. From the standpoint of limiting soil disturbance and protecting disturbed areas such as skid trails from erosion, BMPs have protected water quality and beneficial uses.

Monitoring of other timber sales where harvest over frozen and/or snow-covered ground was performed has also shown about 3% detrimental disturbance. In the FY2009 Forest Monitoring Report (p. 42), a roadside safety hazard removal unit that was harvested in the winter was found to have 3% DSD. Similarly, the FY2008 Forest Monitoring Report details monitoring of the Basin Fuels Project (otherwise known as the South Butte Timber Sale), where a unit that was logged in the winter over snow and frozen ground had 3.2% DSD (p. 55). These monitoring results over time covering different projects show that 3.2% DSD is a reasonable figure to use when predicting future DSD for winter harvest over frozen and/or snow covered soils in environmental assessments and impact statements.

A departure from the coarse woody debris requirement of leaving at least 10 tons/acre was noted in unit 6. No corrective actions such as dropping and leaving residual trees now standing is needed, as currently standing dead trees (see Figure 9) are expected to fall down and add to the coarse woody debris on the ground.

References

Brown, J.K. 1974. Handbook for inventorying down woody material. Gen. Tech. Rep. INT- 16. Ogden, UT: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 24p.

Page-Dumroese, D.S., A.M. Abbott, and T.M. Rice. 2009. Forest Soil Disturbance Monitoring Protocol, Volume 1: Rapid Assessment. 34p.

Aspen Restoration: Item 9

Monitoring Question: Are management activities restoring aspen at the rate projected in the Forest Plan?

Performance Measure: Acres of aspen treated or converted by wildfire.

Data Sources: Forest accomplishment reports, FACTS data base, FIA data base

Measurement Period: Annual **Reporting Period:** Annual

Background:

Forest Plan vegetation objectives include increasing the aspen component within lodgepole pine and other vegetation types on 67,000 acres across the Beaverhead-Deerlodge Forest.

A 10-year forest wide aspen monitoring project begun in 1998 established 80 permanent monitoring plots on aspen treatment sites distributed across all 7 Districts. Field personnel recorded sprout height and intensity, browse levels, site descriptions and treatment type. Results and recommendations were published in both the 1999 Aspen Handbook for the Forest and the 2008 Forest Monitoring and Evaluation Report. Forest wide, the treatment methods used prior to 1998 resulted in only a 40% success rate, though areas of the Forest like the Gravelly Range showed much higher success rates. Success is defined as the majority of the aspen sapling canopy being above the browse line (4.5-5 feet high).

The Forest initiated a second 10-year aspen monitoring effort in 2009. Field personnel established 66 new permanent plots in aspen sites treated since 2001 with a variety of modified treatment methods on a range of sites. In addition, 24 plots have been established in 2000 and 2007 wildfires on sites where aspen sprouts have been found (Mussigbrod, Rat Creek, Stony Creek, Sand Basin, and Medicine Lake fires).

In 2010, field personnel added 2 more plots within the 2009 Bielenburg wildfire on the Pintler Ranger District. We will continue to add plots within new wildfire perimeters each year, returning to previously established plots either on a 3-5 year return interval. By the time the Comprehensive Evaluation Report is written in 2014, we hope to expand our knowledge on which treatments or conditions lead to successful stand restoration as well as if wildfires result in healthy viable aspen stands. See the 2009 Forest Monitoring and Evaluation Report for baseline data for the second 10-year aspen monitoring effort.

The results below summarize the aspen treatment accomplishments for FY10.

Results: ACRES TREATED in FY10

Aspen stands were treated on 100 acres across the Forest in 2010. This is down from 2009 treatments (201 acres). Treatments took place on the Madison Ranger District and were accomplished by hand crews slashing conifers competing along the edge and within mature aspen stands. An additional 54 acres of aspen release was accomplished through timber sales removing competing conifers. Treatment data was extracted from the FACTS data base.

Evaluation:

(A) ACRES TREATED IN 2010

The scale of aspen treatment on the Forest is insignificant in terms of the need for restoration. The Forest Plan FEIS assumption that restoring 67,000 acres of aspen will be met through wildfire stand conversions rather than scheduled treatments appears valid. Additional plots will be installed in wildfire areas as practicable next year.

(B) LONG TERM MONITORING DATA

It is too soon to reach conclusions about the success of treatments or wildfire in restoring aspen stands.

Grassland/Shrubland Restoration: Item 10

Monitoring Question: Are management activities restoring grassland/shrublands at the rate projected in the Forest Plan?

Performance Measure: Acres of encroachment species treated or converted by wildfire.

Data Sources: Forest annual accomplishment reports and project accomplishment reports

Measurement Period: Annual **Reporting Period:** Annual

Results:

Conifer encroachment on sagebrush grasslands was reduced or removed from 954 acres across the Forest in 2010. This is down from 2009 (1,945 acres). Projects included Basin Creek, Grasshopper, Cat Creek, Moffett, Baggs Creek, and McVey (pictured below, Figure 14). Treatment data was extracted from the FACTS data base.

Figure 14 . McVey prescribed burn of conifer encroachment in sagebrush stands, Wisdom Ranger District, 2010

Evaluation:

While prescribed burns and conifer slashing are effective in restoring grasslands and shrublands, the scale of encroachment treatment on the Forest is insignificant in terms of the need for restoration. The Forest Plan objective for grassland/shrubland and riparian areas is to reduce conifer encroachment on 74,000 acres. The Forest Plan FEIS assumption that grassland/shrubland restoration will be met primarily through wildfire stand conversions rather than scheduled treatments appears valid.

Sage Grouse Habitat: Item 12

Monitoring Question: Are management activities affecting sage grouse brood rearing habitat?

Performance Measure: Acres of sagebrush cover affected by scheduled vegetation treatments on BDNF lands within 18 kilometers of historic or active leks.

Data Sources: (1) Annual lek location reports from partners (local sage grouse working groups) and Montana Fish Wildlife and Parks (MTFWP). (2) Acres treated from accomplishment reports or FACTS data base.

Measurement Period: Annual **Reporting Period:** Annual

Results:

Sixty-two active sage grouse leks are confirmed in southwest Montana in proximity to the BDNF; 3 more than 2009. None are located on National Forest land. The two maps in Figure 15 below indicate the location of those leks as well as the habitat within 18 kilometers (11 miles) of historic or active leks.

Broadcast burning occurred in 2010 on the McVey project on the Wisdom Ranger District which altered sagebrush cover on 198 acres within 18 kilometers of historic or active leks. See Figure 15 below for the location of the project area.

In 2009, the North Doolittle Prescribed Burn project, West Pioneer Mountains, took place within 18 km of active leks on the Wisdom Ranger District. Three units were treated with a total of 320 acres burned within 18km of active leks (see Figures 3 and 4 on page 23 above). See Figure 15 below for the location of the project area.

On August 5, 2010, an interdisciplinary team of 27 Forest and District specialists, Staff Officers, three District Rangers and a Montana Fish (MTFWP) and Parks wildlife biologist reviewed the implementation and success of the North Doolittle Creek project. The burn was designed in cooperation with MTFWP. The MTFWP biologist's priority in this area is the habitat condition of deer/elk winter range.

Evaluation:

Consultation and post-burn review: The Wisdom District coordinated with MTFWP in 1998 to map a sagebrush strategy on aerial photos for the west face of the Pioneer Mountains, including the North Doolittle project area. This plan identifies sagebrush stands to retain in the long run, distinguished from stands to treat. The District Fire Management Officer and MTFWP biologist participating in the review report that having a strategic map in place for the West

Face of the Pioneers enhances their ability to work together on sagebrush treatment proposals. The MTFWP biologist reports the MOU is successful at involving him in District projects and oversight.

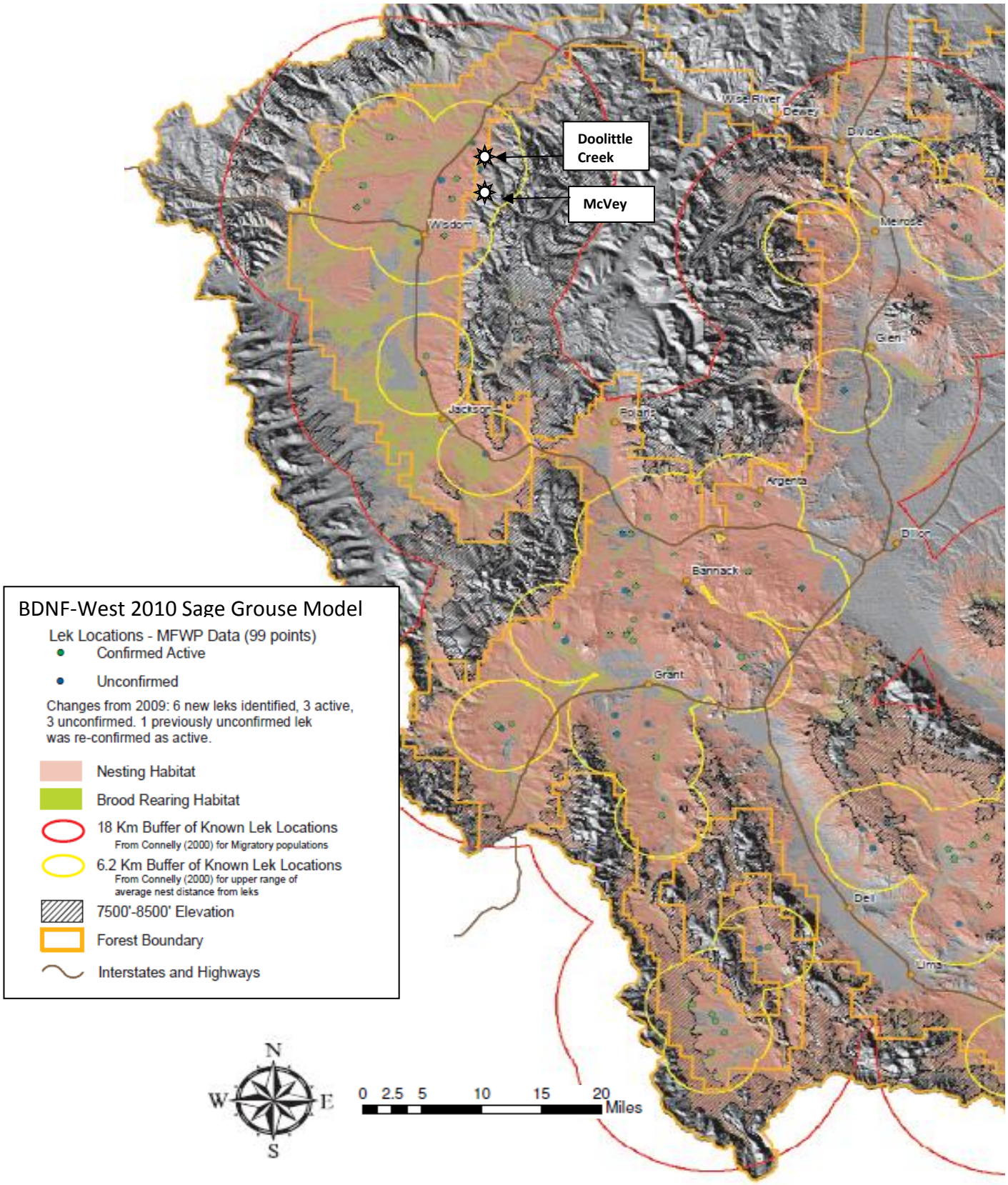
The Prescribed Burn Plan, 2009, (Element 5: B. Objectives, page 7) complied with Standard 8 in the Forest Plan which requires sagebrush be protected "within 300 meters of riparian zones, meadows, lakebeds or farmland unless site specific analysis indicates such removal promotes achievement of the sagebrush habitat goal".
Retention of a 50% burn mosaic: Post-burn mapping is displayed in Figures 3 and 4 on page 23 above. Results indicate a final mosaic of 30% burned stands, which meets the MOU retention criteria.

Unit 1 burned 225/811 acres = 28% mosaic
Unit 2 burned 0/12 acres = 0% mosaic
Unit 3 burned 95/281 acres = 34% mosaic

TOTAL burned = 320/1104 acres = 30% mosaic

Requirements of the sagebrush MOU was met in the North Doolittle Project. The local MTFWP area biologist was actively consulted in the burn design and follow-up evaluation with no concerns identified. The 31 individuals reviewing the results of the North Doolittle projects did not identify any concerns with management of sagebrush habitat following implementation.

See Item 6, Soil and Water Conservation Practices, beginning on page 22, for a complete review of the North Doolittle Prescribed burn project.


Doolittle Creek
McVey
Wisdom
Jackson
Wise River
Dewey
Divide
Melrose
Glen
Polaris
Argenta
Dillon
Bannack
Grant
Dell
Lima
BDNF-West 2010 Sage Grouse Model
Lek Locations - MFWP Data (99 points)
Confirmed Active
Unconfirmed
Changes from 2009: 6 new leks identified, 3 active, 3 unconfirmed. 1 previously unconfirmed lek was re-confirmed as active.
Nesting Habitat
Brood Rearing Habitat
18 Km Buffer of Known Lek Locations
From Connelly (2000) for Migratory populations
6.2 Km Buffer of Known Lek Locations
From Connelly (2000) for upper range of average nest distance from leks
7500'-8500' Elevation
Forest Boundary
Interstates and Highways
N
W
E
S
0 2.5 5 10 15 20
Miles

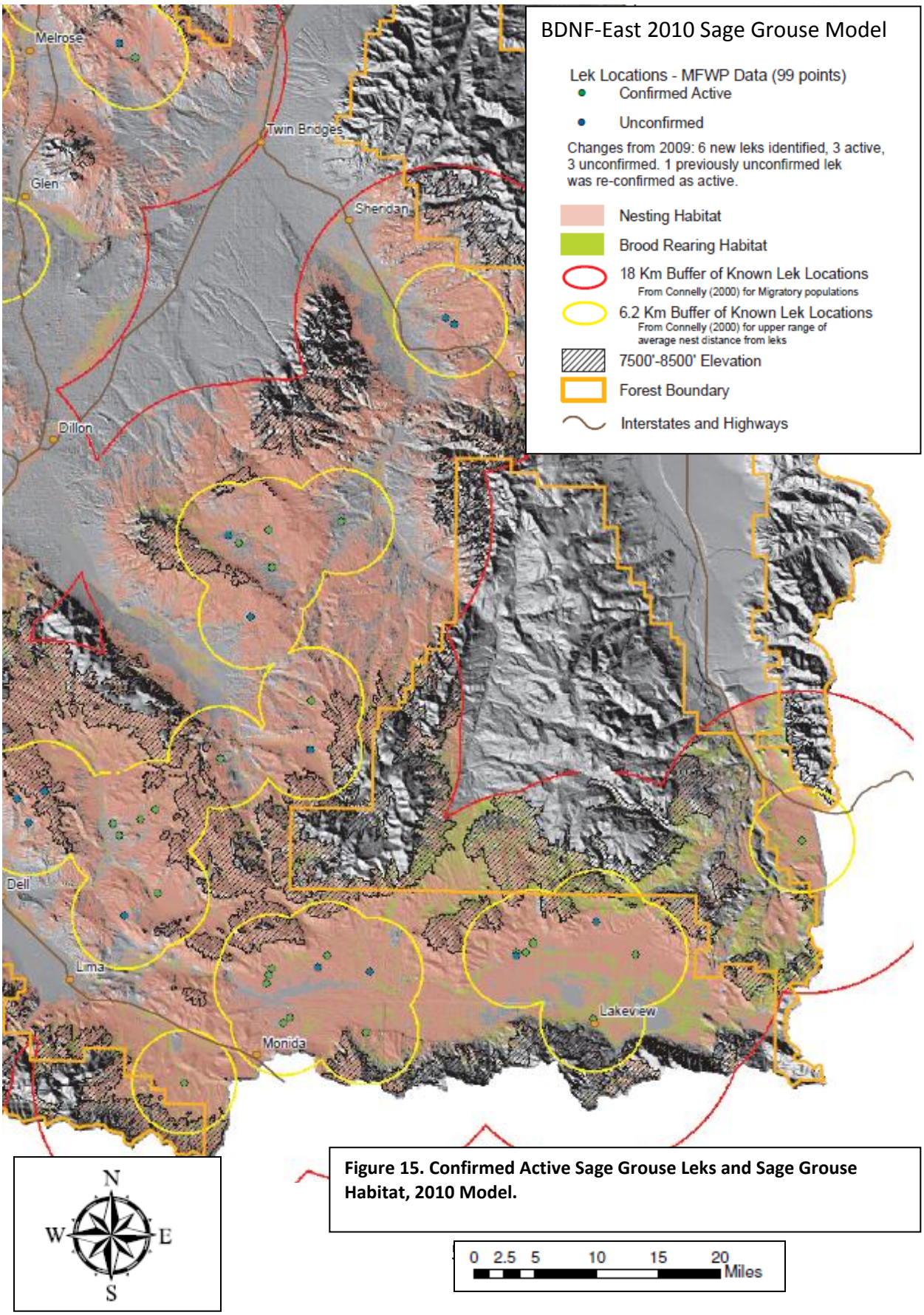


Figure 15. Confirmed Active Sage Grouse Leks and Sage Grouse Habitat, 2010 Model.

Elk Populations: Item 13

Monitoring Question: How are elk populations changing?

Performance Measure: Population data from Montana Fish Wildlife & Parks.

Data Sources: Annual MTFWP reports on animal numbers and licenses issued.

Measurement Period: Annual **Reporting Period:** Annual

Background: Elk, mountain goats, wolverine and mayfly were selected as MIS because these species can be monitored and a connection between population trends, habitat conditions, and management activities can be established. Mountain goats and wolverines were selected as the best indicator of the effects of disturbance on high elevation winter range and denning habitat. Note that designation of a species as MIS does not infer a special degree of protection.

Elk are a commonly hunted species important to Montana Fish Wildlife and Parks (MTFWP) and the populace in general. Elk populations are monitored annually in relationship to population objectives set by Montana Fish Wildlife and Parks.

Results:

The 2009 elk population data is not published. Table 12 below presents the most currently MTFWP data and the population objectives from the 2005 State Elk Plan. The estimates are based on annual winter range monitoring (aerial surveys) by MTFWP area biologists. Population estimates are extracted from the survey data on an annual basis. Areas showing one population estimate for multiple hunting districts (e.g. 320 and 333) may be due to animals from more than one hunting district wintering in the same area.

Table 12. Montana Fish Wildlife and Parks Elk Objectives compared to Population Estimates

BDNF Hunting Districts	2005 FWP State Elk Plan Objective ± 20%	FWP 2003 Population Estimates ± 10%	FWP 2006 Population Estimates ± 10%	FWP 2007 Population Estimates ± 10%	FWP 2008 Population Estimates ± 10%	FWP 2010 Population Estimates ± 10%
210	2500	1043	952	1020	1391	1644
211	600	679	485	262	135	1125
212	850	1100	1074	1494	1825	2504
213	650	401	689	484	660	1325
214	200	309	270	284	331	400
215	1000	736	1144	1234	1502	2145
216	325	457	288	473	140	314
300	700-900	615	1137	1450	1883	806
302	550-700	399	736	956	1195	783

BDNF Hunting Districts	2005 FWP State Elk Plan Objective ± 20%	FWP 2003 Population Estimates ± 10%	FWP 2006 Population Estimates ± 10%	FWP 2007 Population Estimates ± 10%	FWP 2008 Population Estimates ± 10%	FWP 2010 Population Estimates ± 10%
311	2700	2096	3100	3000	2620	2620
318	500	366	383	535	656	519
319	1100 Max	1515	936	819	911	854
320 333	1000 for both	1130 549	942 470	745 477	954 859	1433 - at objective per FWP
321	None	No winter elk	No winter elk	No winter elk	No estimate	No estimate at objective
323 324 327 330 Total	Gravelly EMU Total = 7000	3119 3114 No winter elk 1830 (8063)	2682 2500 No winter elk 1132 (6314)	2265 1928 No winter elk 1116 (5309)	2268 2608 No estimate 1328 (6204)	No separate estimates – At objective per FWP
328	550-700	574	650	635	620	643
329	900 Max	582	683	727	766	(273 partial survey) at objective per FWP
331	1400 Max	1250	896	1085	773	869
332	900 Max	506	600	376	588	568
340 350 370	1600 combined for all	219 602 330 (1151)	557 268 192 (1017)	839 500 (1339)	423 529 529 (1481)	1915 for all at objective per FWP
341	600 Max	669	494	272	166	416
360	2200	4555	1914	1661	2494	1090
362	2500	1159	3629	3845	3524	4203
TOTAL	30,575	28,074	28,803 stable	28,482 stable	31,925(increasing)	31,305 stable to increasing (above total objective)

Evaluation: Southwest Montana elk populations are stable to increasing overall, and meet the 2005 State Elk Plan objectives at the forest scale and at virtually all of the hunting districts for project analysis (Table 12). With widespread distribution and no population deficiencies related to State objectives, elk constitute a robust presence on the BDNF.

Mountain Goat and Wolverine Winter Security: Item 14

Monitoring Question: Are management activities effectively protecting high elevation winter habitats for mountain goats and wolverines?

Performance Measure: (1) Populations of mountain goats from MTFWP.
(2) Number of snowmobile entries into non-motorized high elevation units protected for wolverine and mountain goats. (3) Presence or absence of wolverine in high elevation habitats.

Data Sources: (1) Annual MTFWP reports on animal numbers and licenses issued.
(2) Results of aerial observation flights and field observations.
(3) Bait stations, DNA testing, and track surveys obtained from MTFWP and other partners

Measurement Period: Annual **Reporting Period:** Annual

Background: Mountain goats, along with elk, wolverine and mayfly were selected as MIS because these species can be monitored and a connection between population trends, habitat conditions, and management activities can be established. Mountain goats and wolverines were selected as the best indicator of the effects of disturbance on high elevation winter range and denning habitat. Designation of a species as MIS does not infer a special degree of protection.

Results: (1) Populations of mountain goats

Mountain goats are a management indicator species for secure high elevation winter habitats in the 2009 Forest Plan (p. 47). The species is not classified as a Montana Species of Concern; it has a Natural Heritage ranking of S4 (apparently secure). Data on populations of mountain goats on the Forest are acquired through the Montana Department of Fish Wildlife and Parks (MTFWP). MTFWP collects population data and reports numbers on their website: http://fwp.mt.gov/hunting/planahunt/. MTFWP has not updated mountain goat population data since 2007. Population data from 2003-2007 can be found the FY2008 Forest Monitoring and Evaluation Report. See the FY2009 Forest Monitoring and Evaluation Report for population survey data for the Flint Creek Range (Goat Hunting Districts 212 and 213) and the Anaconda-Pintler Range (Goat Hunting Districts 222 and 223). No new information is available for FY2010.

Results: (2) Snowmobile entries into high elevation non-motorized allocations (ALSO SEE 14a, page 62, A SPECIAL REPORT ON MT JEFFERSON RECOMMENDED WILDERNESS BOUNDARY)

Winter non-motorized allocations in the Clark Fork Flint, Big Hole, Lima Tendoy, Upper Clark Fork, Jefferson River, and Tobacco Root Landscapes were flown in 2010 (Table 13). Each landscape had incursions into winter non-motorized allocations. The incursions were typically

at lower elevation on roads and trails at the edges of the new winter non-motorized allocations. The Record of Decision Enacting Forest Plan Travel Management Direction for Certain Areas of the Beaverhead-Deerlodge National Forest was signed February 12, 2010. Appeals of this decision were subsequently administratively processed and the decision was affirmed May 13, 2010. On July 6, 2010, the Forest Supervisor signed a special order closing areas allocated to winter, non-motorized uses from December 2 through May 15 to motorized vehicles. As a result, the winter, non-motorized allocations were not legally closed to snowmobiles at the time of the 2010 survey which was completed through flights flown in February and March, 2010. However, monitoring points to areas where winter motorized use is occurring in non-motorized allocations so the agency can begin emphasizing education and enforcement activities in 2011. Specific observations by landscape and management area are summarized in Table 13 below.

Table 13. Results of 2010 aerial observation flights of winter non-motorized allocations. Areas monitored are displayed by landscape, management area, and drainage/specific location.

Landscape	Management Area	Drainage/specific location	Use in Winter Non-Motorized Allocations (None, Low, Moderate, or High)
Clark Fork Flint	Flint Foothills	Dunkleberg Ridge	ATV/4x4 use on roads-spotty snow
Clark Fork Flint	Flint Foothills	West Flint Creek, Pickett Gulch, Powell Lake	ATV/4x4 use on roads in West Flint Creek and Pickett Gulch; Low snowmobile use near Powell Lake
Clark Fork Flint	Flint Uplands	Big Park	Low snowmobile use in Big Park, otherwise None
Clark Fork Flint	Flint Uplands	Pikes Peak	None
Clark Fork Flint	Flint Uplands	Lost Creek	None
Clark Fork Flint	Georgetown Lake	Echo Lake, power lines, Sawmill Creek road	Low snowmobile use; ski area not surveyed
Big Hole	Trail Creek	Trail Creek	Low-Short snowmobile incursions into non-motorized
Big Hole	Trail Creek	Shoofly and Sunshine Creeks	Moderate-High snowmobile use
Big Hole	Anderson Mountain	All winter non-motorized	None except one short snowmobile incursion into the non-motorized area in Nickel Bar Gulch
Big Hole	West Big Hole	Jumbo Mountain	None
Big Hole	West Big Hole	Berry Creek	Low snowmobile use
Big Hole	West Big Hole	Hamby, Miner, and Pioneer Creeks	Low-Moderate snowmobile use; None in Upper Miner Lakes
Big Hole	West Big Hole Flats	Jahnke Creek	Low snowmobile use
Lima Tendoy	Horse Prairie North	Brays Canyon	None
Lima Tendoy	Medicine Lodge-Tendoy	Rock Canyon, Cabin Creek road, Law, Kate, and Warm Springs Creeks	Low snowmobile use
Lima Tendoy	Medicine Lodge and Garfield Mountain Recommended Wilderness	Sheep Creek	Old ATV/4x4 tracks on roads.[1] Some snowmobile use

Landscape	Management Area	Drainage/specific location	Use (None, Low, Moderate, or High)
Lima Tendoy	Lima Peaks	Southeast edge of winter non-motorized, Nicholia Creek	Low snowmobile use
Lima Tendoy	Lima Peaks and Garfield Mountain Recommended Wilderness	Sawmill, Spring, Little Beaver, Shineberger, and Swamp Creeks	Low snowmobile use, mostly on roads and trails. Use extended into Recommended Wilderness.
Lima Tendoy	Lima Peaks	All other areas not mentioned above	None
Lima Tendoy	Italian Peak Recommended Wilderness	Northeast edge, state line	Low snowmobile use. No use in rest of management area.
Upper Clark Fork	Backyard Butte	China Gulch, Thompson Park, Two-Bit Creek	Low ATV/4x4 use
Upper Clark Fork	Backyard Butte	Blacktail Creek	One snowmobile entry in SE corner of non-motorized
Jefferson River	Pipestone	Little Pipestone Creek	None
Jefferson River	Pipestone	Radar Creek	ATV/4x4 use
Jefferson River	Table Mountain Recommended Wilderness	All winter non-motorized	None
Jefferson River	Hells Canyon	Sheep Mountain, road near Box Canyon	Low ATV/4x4 use
Jefferson River	Burton Park	Climax Gulch, Little Basin Creek	ATV/4x4 use along edges at Climax Gulch
Jefferson River	Burton Park	West Highland Road	Low ATV/4x4 use at south end
Tobacco Root	Brown Back	Bone Basin, Brownback Gulch	Older ATV/4x4 use[1]
Tobacco Root	Meadow Creek	North of Sureshot Lakes	Moderate-Low snowmobile use, coming from South Willow Creek
Tobacco Root	Tobacco Root Peaks	North Willow Creek	Low snowmobile use from parking area
Tobacco Root	Wisconsin Creek/Tobacco Root Peaks	Noble Fork	Moderate snowmobile use
Tobacco Root	South Willow Corridor/Tobacco Root Peaks	South Willow Creek	None
Tobacco Root	Ramshorn	Currant Creek	ATV/4x4 on ridge from Horse Creek
Tobacco Root	Wisconsin Creek/Tobacco Root Peaks	Indian Creek	ATV/4x4 use

[1]Some uncertainty in data. The tracks could be old and from fall use rather than winter use.

The monitoring results presented in Table 13 indicate an overall low use in winter non-motorized allocations. It is important to note that the winter, non-motorized allocations were not legally closed to snowmobiles at the time of the 2010 monitoring. One area receiving moderate to high snowmobile use is Shoofly and Sunshine Creeks in the Trail Creek Management Area in the Big Hole Landscape. Some level of ATV/4x4 use on designated roads and trails was noted across all landscapes monitored; however, some of this use may have

occurred in the fall before the winter closures were in effect. These results point to areas with where winter motorized use is occurring in non-motorized allocations so the agency can begin emphasizing education and enforcement activities in 2011.

While both mountain goats and wolverines are found at low densities, observations indicate winter habitat for both species is generally secure from potential disturbance caused by the presence of winter motorized recreation use in the management areas monitored, with the exceptions previously described. We expect improved winter habitat security in subsequent years when the winter non-motorized allocations are legally closed and education/enforcement activities are initiated.

Mount Jefferson Winter Non-Motorized Allocation: Item 14a

Monitoring Question: Are snowmobiles intruding into the Winter Non-Motorized Allocation from December 2-May 15 and any other time of the year snow conditions make snowmobiling possible?

Performance Measure: Number and distance of intrusions into the closed area.

Data Sources: Results of aerial flights observation and data recorders, field observations by employees of Forest Service, Bureau of Land Management, MTFWP, USFWS, or other partners. Law Enforcement violation notices.

Measurement Period: Annual **Reporting Period:** Annual

Background: The 2009 Record of Decision for the Beaverhead-Deerlodge National Forest Plan recommended the north half of the Mt. Jefferson/Hellroaring Creek area in the Centennial Mountains as wilderness and left the south half open to snowmobiling. The decision provides access for snowmobilers on the Idaho side of Mt. Jefferson while providing greater protection for wolverine habitat, quiet recreation opportunities, and other wilderness values in Hellroaring Creek. The boundary line between winter snowmobiling in the Mt Jefferson Management Area and the snowmobiling closure for Centennial Recommended Wilderness Management Area is drawn along the 2001 snowmobile closure.

As the Record of Decision states on page 21, "the combination of uses allowed on Mt Jefferson under the Forest Plan represents a management challenge, because the boundary between the motorized and non-motorized use areas does not follow an effective topographical barrier to illegal motorized entry. The success of this compromise decision relies heavily on voluntary compliance with recommended wilderness boundaries by over-snow vehicle users. The Forest Monitoring Plan specifically spells out monitoring requirements that address compliance with restrictions on motorized use in Mt. Jefferson. If monitoring reveals that non-compliance is an issue, the decision to allow snowmobiling on Mt. Jefferson will be re-evaluated. "

As previously described for Monitoring Item 14, on July 6, 2010 the Centennial Recommended Wilderness Management Area (along with other winter non-motorized allocations) was closed to motorized vehicles December 2 through May 15 for the foreseeable future. Due to previous recreation use management in this same area, the Centennial Recommended Wilderness Management Area was temporarily closed to all use and entry January 21, 2010 through January 21, 2011 (Special Order 2010-D6-011). Unlike the management areas monitored in Item 14, the Mount Jefferson Winter Non-Motorized Allocation was legally closed to snowmobile use when monitoring occurred in February and March, 2010.

Since 2001, snowmobile incursions into the snowmobile closure area have been monitored. Incursions occur annually. In the past 9 years, both Forest Service and BLM have improved

signage along the closure boundary. In 2009, BLM and FS employees and volunteers inspected signs on the BLM Wilderness Study Area (WSA) and Recommended Wilderness boundaries. Signs were still present at major entry locations. The crew installed an additional 6 signs along Section 36 of the WSA and 5 more signs to the closure boundary southeast of Lillian Lake. In 2010, FS Officers mapped 24 boundary closure signs along the 1.25 mile closure, all in good condition. The highest sign is posted 1,000 linear feet below the summit of Mount Jefferson. The closure boundary in Cole Creek drainage has six signs, checked on February 13, prominently displayed along the Continental Divide above Cole Creek.

Results:
During the winter of 2009/2010, reports of violations in Mount Jefferson were documented and filed at the Madison Ranger District Office for 11 different dates. The type of observation, type of violation and extent are noted in Table 14 below. Those same violations are mapped in Figure 16.

Table 14. 2010 Mt Jefferson Closure Violation Monitoring – Violation Reports

Date	Type of Monitoring	Unauthorized Use	Number and Extent
02/06/10	USFS snow Rangers	None	NA
02/6, 7, 16,19/10	Individual incident reports by skiers	2/6 – base of Miners Ridge 2/7 – 4 machines in BLM WSA 2/16 – 4 machines tracked up Miners Cabin area 2/19 – tracks in Cole Cr. Drainage to Mt Nemesis	1 mile into the closure ½ mile into WSA 1.5 miles into closure 3-4 machines well into Cole Creek
02/13/10	USFS, BLM, MTFWP Law Enforcement Officers Patrol	Made 60 general contacts. Documented 6 violations, on the west side of Mt Jefferson, and into Cole Creek Basin from Rock Creek.	2 machines backside of Mt Jefferson, 4 machines entered SW boundary~ ¼ mile in, in close proximity to posted closure signs
02/22/10	Winter Wildlands Alliance Flight	Multiple entries in same areas documented on 2/23 and 3/13-15	Multiple tracks penetrate a few 100 meters to ½ a mile
02/23/10	Contracted aerial flight under Challenge Cost Share Agreement	Tracks from Red Rock Pass up Cole Creek Tracks on North west ridge of Mt Jefferson Tracks on north west slope of Mt Jefferson Tracks on both sides of Hellroaring C. SE of Lillian Lake, coming from open area.	Moderate density, >1 mile in Moderate density, use coming from Rock Cr. Low density, access from open area. Moderate density, in ½ mile
03/13-15/10	USFS Recreation Manager and Forest Protection Officer, ski	High marking on both sides of Hellroaring Creek SE of Lillian Lake 6 riders high marking the NW slope of Mt Jefferson, 3 were contacted and cited	3 machine tracks high marking ~1/2 mile into closure 6 riders < ½ mile in on the NW slope Mt Jefferson

Date	Type of Monitoring	Unauthorized Use	Number and Extent
	patrol	Entry into BLM WSA from the south,	Sets of fresh tracks, distance into WSA unknown
03/27/10	Winter Wildlands Alliance ski patrol	Multiple entries in same locations noted above	Multiple tracks penetrate a few hundred meters into non-motorized allocation.

Source: All memos, photos, incident reports, and maps cited here are filed at the Madison Ranger District and available on request.

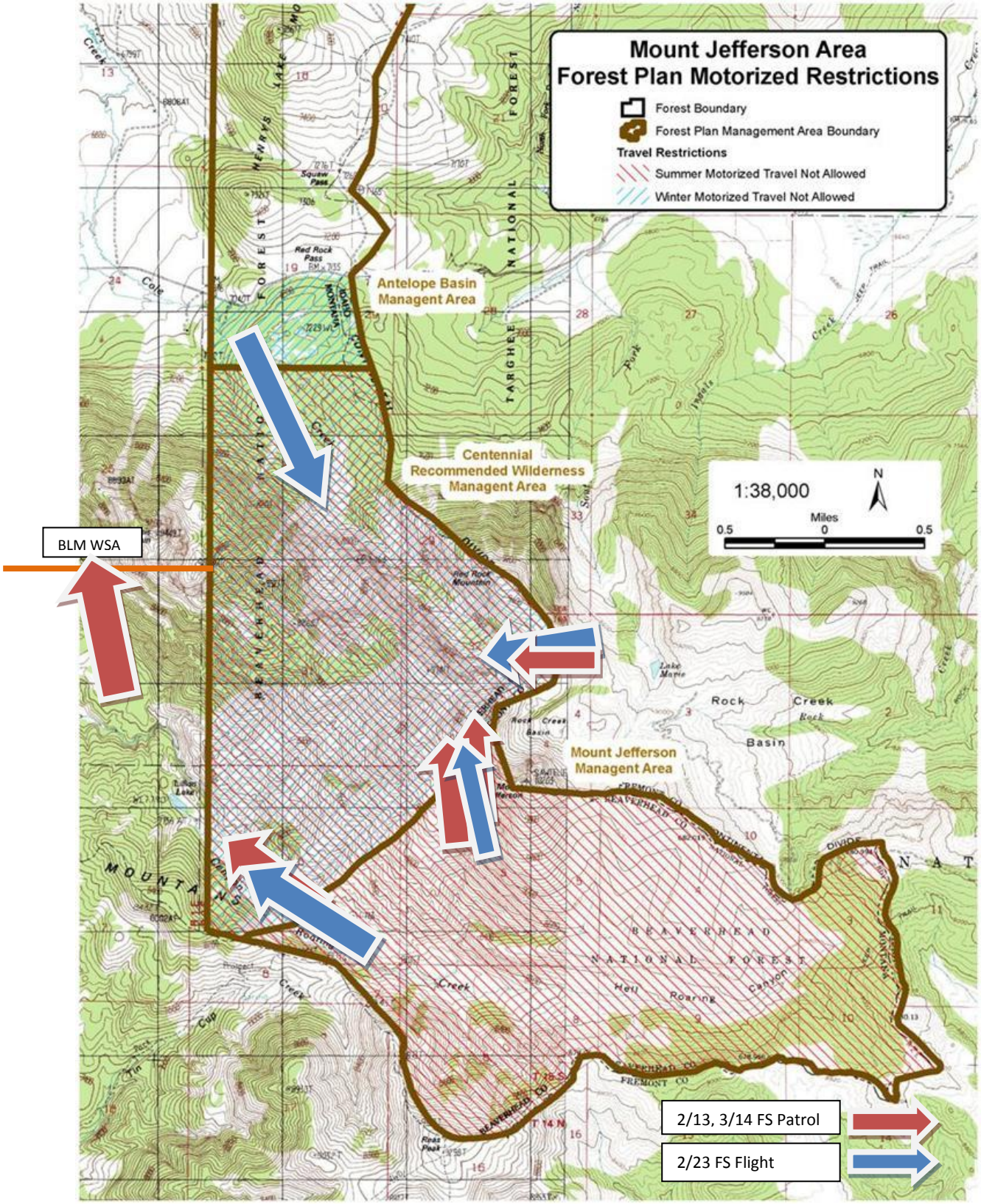


Figure 16. FY10 violations. Arrows indicate direction of entry by snowmobiles into Mt Jefferson Winter Non-Motorized Allocation.

Evaluation:

Motorized use violations of the closed area continue in spite of a trailhead notification campaign by Blue Ribbon Coalition and the Idaho Snowmobile Association. New violations in 2010 appeared on the north end of the Centennial Recommended Wilderness, in Cole Creek, coming off Red Rock Pass. Posting of closure boundaries is complete and well maintained.

Lack of compliance appears related to four main issues:

1) Disregard for the closure. Winter visitors to the Mt. Jefferson area are generally highly skilled snowmobile enthusiasts operating high performance machines. They seek fresh powder and challenging high marking opportunities. Due to the intensity of use, any fresh powder in the open area is quickly tracked out and the lure of untracked powder within the closed area is a temptation many motorized users find hard to resist.

2) The chance of being detected, caught and cited is low due to the remote location, difficult terrain, and infrequent presence of law enforcement.

3) The closure boundary is not well-defined geographically. It is a non-descript rolling break, carried forward from a 2001 attempt to resolve a resource conflict with a compromise solution. This boundary is difficult to enforce and frequently crossed by motorized users choosing to ignore closure signs.

4) Long-standing publicity of the area in national snowmobile enthusiast's magazines attracts snowmobilers to the area that are not familiar with closures.

Noxious Weeds: Item 16

Monitoring Question: Are management actions preventing or controlling new and existing weed infestations?

Performance Measure: (1) Change in acres of known noxious weed infestations.
(2) Number of sites of new species and their extent.

Data Sources: Forest NRIS data base, FACTS, eventually FIA, annual review of reports of known species and locations.

Measurement Period: Annual

Reporting Period: Annual

Background:

In the past, Forest Plan monitoring reports tracked acres of noxious weeds treated from year to year. Monitoring requirements of the 2009 Forest Plan focus on the acres occupied by noxious weed infestations. This information will give decision makers an accurate picture of whether weed treatment programs are achieving results. The Forest is building a noxious weed location data base with a spatial layer in order to do this. In 2010, District weed specialists were still entering data into the data base and reconciling Geographic Information Systems (GIS) to track changes. As a result, the 2010 report discloses only treatment status.

Results:

Noxious weeds were treated on 9,542 acres spread across all Ranger Districts (Table 15) including 100 acres of biological control and acres treated through partnership agreements with other agencies or non-profit organizations. The bulk of acres treated were accomplished as part of annual District weed maintenance work. Examples of areas treated include the Beal Mine and other mine sites, winter range in Trapper, Cherry, and Browns Creeks, Stucky Ridge, Grasshopper Creek, and biocontrol using goats at the duck ponds near Bernice. Species targeted with the goats included spotted knapweed, hoary alyssum, common and Dalmatian toadflax, and cheat grass.

Table 15. Acres of noxious weed treatment on the BDNF by fiscal year.

Forest Outputs and Accomplishments	2006	2007	2008	2009	2010
Noxious Weed Treatment (acres)	6,017	5,001	8,570	8,088	9,542

Evaluation:
Treatment acres are at the high end of the last 5 year average (Table 15). An evaluation of whether treatment is successfully keeping noxious weed infestations controlled cannot be made until all Districts have successfully entered their baseline infestation locations and acres into the database.

Insect and Disease Infestations: Item 17

Monitoring Question: Are levels of insect and disease increasing to damaging levels as a result of management activities?

Performance Measure: Changes in acres infested by landscape, percent change on the Forest compared to the Region.

Data Sources: USDA Northern Region Forest Health Protection Program conducted by State and Private Forestry department annually.

Measurement Period: Annual **Reporting Period:** Annual

Results:

A report summarizing the major forest insect and disease conditions in Montana during 2010 was jointly prepared by the Montana Department of Natural Resources and Conservation, Forestry Division (DNRC) and the USDA Forest Service, State and Private Forestry, Forest Health Protection, Northern Region (FHP). The survey is titled "Montana Forest Insect and Disease Conditions and Program Highlights – 2010", Report 11-01, A. Gannon, S. Sontag, 2010. This report can be downloaded at http://dnrc.mt.gov/forestry/assistance/pests/default.asp
The annual aerial detection survey in Montana, upon which the report is based, covered approximately 27.8 million acres of mixed ownership, forested lands, excluding most wilderness areas.

Much of the data summarized in this report is a product of the annual aerial detection surveys, as well as ground surveys and biological evaluations. The digital data files, data summaries, and aerial detection survey damage maps are available from the Missoula FHP Field Office, in both paper and digital GIS format. Data may also be downloaded at http://www.fs.usda.gov/goto/r14-ADS.

The Beaverhead-Deerlodge area data is drawn directly from this data and report. Tables 16 and 17 extract the mortality and damage data for each Ranger District on the BDNF by threat.

Table 16. Mortality, Defoliation and Other Damage on the Beaverhead National Forest during 2010.

Dillon RD	**Acres**	**Trees**
Douglas-fir Beetle	32	155
Engelmann Spruce Beetle	4	10
Mountain Pine Beetle (LPP)	78,091	340,997
Subalpine Fir Mortality	751	883
MPB (High elevation 5-needle pines)	30,221	108,246
Western Spruce Budworm	18,748	0
Dieback	33	0
Madison RD	**Acres**	**Trees**
Engelmann Spruce Beetle	4,263	34,023
Mountain Pine Beetle (LPP)	25,136	71,953
Subalpine Fir Mortality	1,494	2,499
MPB (High elevation 5-needle pines)	4,423	9,668
Western Spruce Budworm	2,411	0
Windthrow	14	150
Sheridan RD*	**Acres**	**Trees**
Douglas-fir Beetle	10	70
Engelmann Spruce Beetle	1,496	10,282
Mountain Pine Beetle (LPP)	13,725	43,914
Subalpine Fir Mortality	1,284	1,995
MPB (High elevation 5-needle pines)	9,723	36,594
Western Spruce Budworm	1,329	0
Wisdom RD	**Acres**	**Trees**
Mountain Pine Beetle (LPP)	60,492	167,861
Subalpine Fir Mortality	20	140
MPB (High elevation 5-needle pines)	4,304	5,380
Western Spruce Budworm	112	0
Wise River RD	**Acres**	**Trees**
Douglas-fir Beetle	8	35
Mountain Pine Beetle	46,234	172,847
Subalpine Fir Mortality	30	135
MPB (High Elevation 5-needle Pines)	5,554	18,956
Western Spruce Budworm	1,036	0

* The Sheridan RD has been consolidated with the Madison RD. In order to compare insect and disease mortality data collected in previous decades, current data continues to be collected along previous geography boundaries.

Table 17. Mortality, Defoliation and Other Damage on the Deerlodge National Forest during 2010.

Butte RD	**Acres**	**Trees**
Douglas-fir Beetle	36	70
Mountain Pine Beetle (PP)	2	1
Mountain Pine Beetle (LPP)	38,887	120,572
MPB (High Elevation 5-needle Pines)	822	4,945
Western Spruce Budworm	5,128	0
Deerlodge RD	**Acres**	**Trees**
Douglas-fir Beetle	16	35
Mountain Pine Beetle (PP)	335	3,332
Mountain Pine Beetle (LPP)	57,968	467,985
Subalpine Fir Mortality	28	30
MPB (High Elevation 5-needle Pines)	13,647	84,284
Western Spruce Budworm	380	0
Jefferson RD	**Acres**	**Trees**
Douglas-fir Beetle	10	22
Mountain Pine Beetle (PP)	281	434
Mountain Pine Beetle (LPP)	82,954	265,182
Subalpine Fir Mortality	4	40
MPB (High Elevation 5-needle Pines)	5,040	12,524
Western Spruce Budworm	563	0
Pintler RD	**Acres**	**Trees**
Douglas-fir Beetle	67	121
Mountain Pine Beetle (PP)	1,279	388
Mountain Pine Beetle (LPP)	61,520	654,339
Subalpine Fir Mortality	393	1,976

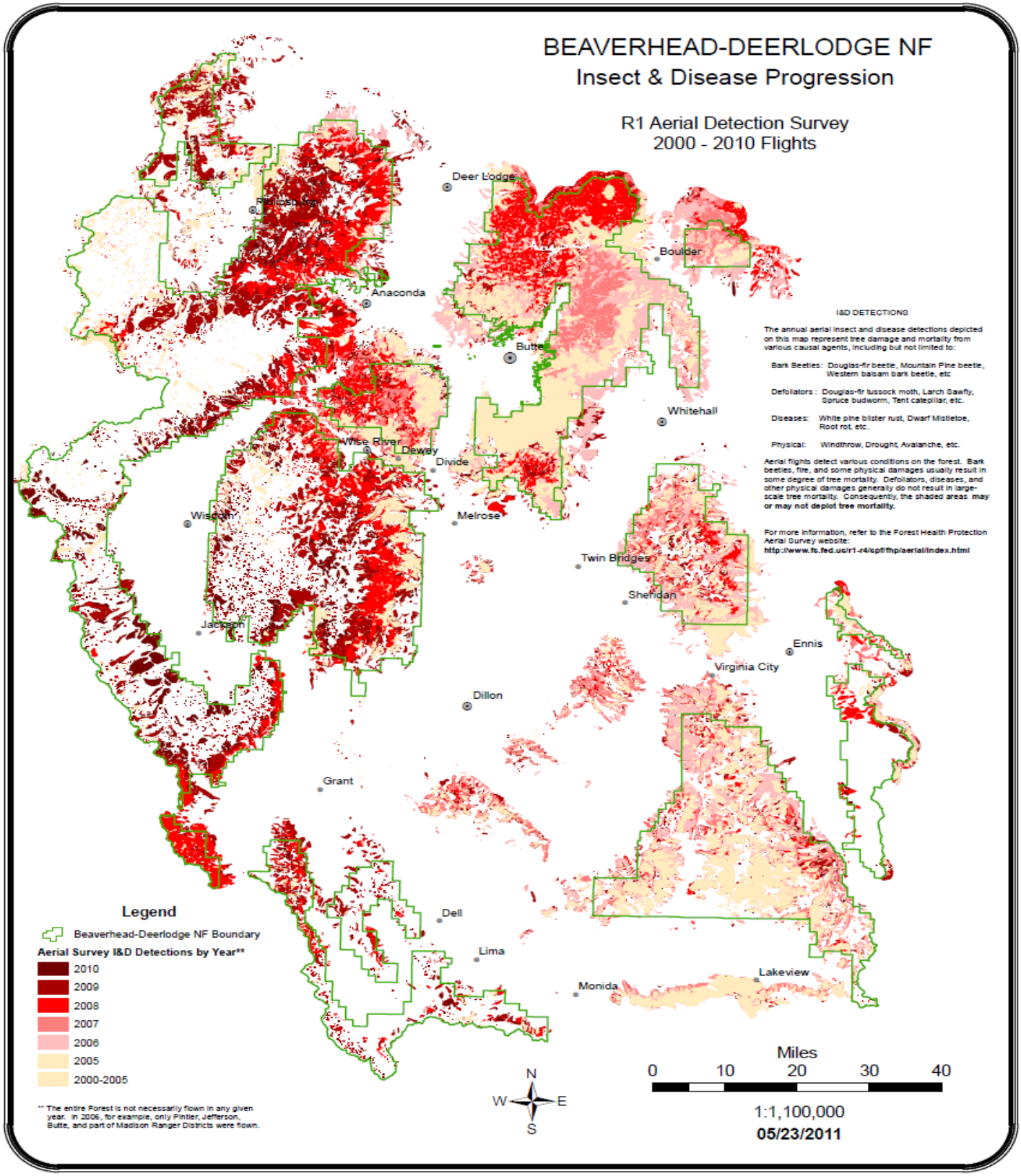


Figure 17. Insect and disease progression on the BDNF by year, 2000-2010.

INSECT AND DISEASE CONDITIONS BY COUNTY

County summaries are excerpted from the 2010 Montana Condition Report, available at www.fs.fed.us/r1-r4/spf/fhp/**conditions**/entry1.html. For each County, damage effects on their respective ownership are noted. To the extent possible, the summary indicates areas affected and an estimate of extent.

The following abbreviations are used in the table and discussion:

DFB = Douglas-fir beetle,
ESB = Spruce beetle
FE = Fir engraver
MPB = Mountain pine beetle
WPB = Western pine beetle
WSBW=Western spruce budworm
LPP = Lodgepole pine
PP = Ponderosa pine
DF = Douglas-fir
SAF = Subalpine fir

Beaverhead County

Table 18. Acres of Forestland, Mortality, and Defoliation by Ownership for Beaverhead County (1,772,254 acres surveyed).

	National Forest	Other Federal	Private	State	Total
Forestland	1,072,813	131,357	16,607	41,141	1,261,918
Dieback	33	0	0	0	33
DFB	38	6	0	0	44
ESB	303	8	0	0	311
MPB-LPP	163,132	9,801	5,910	2,643	181,486
MPB-High Elevation	39,845	367	353	88	40,653
SAF Mortality	1,164	0	0	0	1,164
WSBW	20,149	3,011	1,595	1,186	25,941

The same amount of area was surveyed in 2010 as in 2009 with the exception of an island of BLM land in the center of the county and a portion of the central Pioneer Mountain corridor. MPB in LPP significantly increased on both sides of the Big Hole valley (western Pioneers, and Beaverhead and Anaconda Ranges) in many areas where little to no previous activity was noted. MPB in 5-needle pines continues at levels similar to those detected in 2009. Most activity was noted in the eastern Pioneer Mountains, with significant patches between Lemhi

and Bannock Passes, and Maiden Peak area, although some activity can be found in most areas with host type.

Ground plots were installed within the Big Hole drainage, up the Pioneer By-Way and at Chief Joseph Pass in stands dominated by LPP. Ground surveys from the spring and previous fall suggested that the Big Hole and Pioneer Mountains experienced considerable mortality of larvae during the October 2009 cold snap (MFO-TR-10-10).

Whether due to this event alone or in combination with a cool, wet spring/summer and/or host depletion, ground surveys in the Big Hole and Pioneer Byway showed a significant decrease in 2010 MPB activity in many areas where MPB had been active in 2009. Interestingly, fading of 2009-attacked trees also appeared to be delayed, possibly affecting detection during aerial survey. Cumulative mortality numbers (>15%) also reflect the MPB-activity front radiating southwest from Butte with a second front moving east over the Continental Divide from Idaho and Chief Joseph Pass.

ESB activity, although still low, was detected in significant patches on the southern ends of the Snowcrest and Gravelly mountains. A large increase in acres with SAF mortality was noted in 2010, particularly at the south end of the Snowcrest Range. A few, small scattered spots were also noted at the north end of the Pioneers. DFB continued to be low, likely due to cooler, moister weather. Aspen dieback acres were lower, largely corresponding to no aerial survey of the Centennial Mountain area in 2010.

WSBW activity decreased throughout the county. The concentration of activity was still on the eastern side of the Pioneers, although some activity was noted in nearly all areas where host trees are prevalent.

White pine blister rust is common in WBP in this county. Schweinitzii root and butt rot is common in DF, causing decay in the butt logs but not acting as an aggressive root pathogen. Lodgepole pine dwarf mistletoe and limber pine dwarf mistletoe are present in the county.

Deer Lodge County

Table 19. Acres of Forestland, Mortality, and Defoliation by Ownership for Deer Lodge County (283,820 acres surveyed).

	National Forest	Other Federal	Private	State	Total
Forestland	211,103	8,678	44,188	32,285	296,254
Dieback	0	0	21	0	21
DFB	4	0	14	10	28
MPB-LPP	31,443	555	18,231	8,422	58,651
MPB-PP	0	0	41	0	41
MPB-High Elevation	1,584	0	6,492	2	8,078
SAF Mortality	4	0	0	0	4
WSBW	14	0	426	11	451

Slightly fewer acres were flown in 2010 (west end of the Fleecer mountains under FS management were excluded), although outside of wilderness and the I-90 corridor most of the county was surveyed. MPB in LPP dropped to less than half previous levels although some activity continued throughout the county where ever host was present. Three ground plots (FINDIT) in LPP were measured along the southeast edge of wilderness near Pintler and Seymour campgrounds. MPB activity greatly varied, with little new activity to spots of very intense, successful 2010 activity. Very little MPB activity in PP was noted, with a few patches mapped along the far southeast edge of the Flint Mountains on private lands. MPB in 5-needle pines more than doubled in acres affected despite no 2010 survey of 5-needle pine areas in the Fleecer Mountains with mortality in 2009; number of trees estimated dead increased more than 7-fold. Areas of greatest increase, especially in areas where mortality was not previously noted, include the Flint Mountains (Lost Creek) and Mt. Haggin areas, mostly on private lands. Little activity by DFB or ESB, or mortality in SAF was detected. WSBW was detected in the southeast Flint Mountains (mostly private lands) although at much lower levels.
New areas were noted northwest of Fairmont Hotsprings. White pine blister rust has been found in LP in this county. Schweinitzii root and butt rot is common in DF, causing decay in the butt logs but not acting as an aggressive root pathogen. Lodgepole pine dwarf mistletoe and limber pine dwarf mistletoe are present in the county.

Granite County

Table 20. Acres of Forestland, Mortality, and Defoliation by Ownership for Granite County (393,854 acres surveyed).

	National Forest	Other Federal	Private	State	Total
Forestland	585,795	26,809	190,740	42,302	845,646
DFB	57	10	33	5	105
MPB-LPP	65,206	5,258	13,591	730	84,785
MPB-PP	1,229	361	1,210	73	2,873
MPB-High Elevation	8,785	0	861	0	9,646
SAF Mortality	363	0	32	0	395
WSBW	1,879	2,317	4,055	509	8,760

About 1/3 of the county surveyed in 2009 was not resurveyed in 2010, resulting in the apparent decrease in activity of most insect pests. However, information on the numbers of trees killed by MPB shows an increase in the intensity of mortality detected in 2010. Three ground plots (FINDIT) around Georgetown Lake and one near Garnett Ghost Town suggest MPB activity spiked in 2009 (trees fading in 2010) with 2010 activity (green trees with current attack) dropping markedly. Although cool, wet weather favored tree survival, the noted drop in activity is most likely due to host depletion.
Although mortality in PP remained around 3 TPA, estimates more than doubled in LPP and 5-needle pine (WBP); increasing from 4.3 to 10, and from 2.1 to 5.7 TPA, respectively. Most 5-needle pine mortality occurred in the high elevations of the Flint Creek Range, expanding into host between Warm Springs and Foster Creeks.

Mortality of SAF also increased in intensity although less area was mapped. A drop in DFB activity was observed due to decreased survey area in host type. WSBW defoliation greatly decreased; however, this appears due principally to the lack of survey in much of the host type. In areas surveyed both years, WSBW defoliation continued at high levels (Garnet Range) or greatly increased (notably in the Long Mountains and near East Fork Reservoir).

Root diseases are common in counties west of the Continental Divide. The more common ones known to occur in this county are: s-type annosus root disease, armillaria root disease, and schweinitzii root and butt rot. The tree species most affected are DF and true firs. P-type annosus root disease is known to occur in PP. Elytroderma needle disease is a significant agent in PP in localized areas in this county. Lodgepole pine dwarf mistletoe and western larch dwarf mistletoe are present in this county.

Jefferson County

Table 21. Acres of Forestland, Mortality, and Defoliation by Ownership for Jefferson County (511,057 acres surveyed).

	National Forest	Other Federal	Private	State	Total
Forestland	430,785	60,017	118,707	16,380	625,889
DFB	8	10	10	0	28
MPB-LPP	121,223	3,999	6,880	297	132,399
MPB-PP	9,379	6,145	25,469	1,046	42,040
MPB-High Elevation	3,718	406	391	0	4,516
WSBW	876	8	173	0	1,057

Whereas most of the county was flown in 2009, lands between Boulder and Butte were not surveyed in 2010, resulting in only about half the total area surveyed from the previous year. Nevertheless, acres of MPB activity in all hosts and DFB activity in DF showed marked decreases usually greater than what might be expected with decreased survey area. This may be due in part to depletion of host in areas where MPB has been active for many years. Nearly all PP mortality was located south of Boulder along the Interstate. Mortality in 5-needle pines was almost entirely located in the Elkhorn Mountains in both 2009 and 2010. In 2010 a small polygon was also mapped in the Three Brothers area along the Powell County border.
Some of the drop in DFB activity was due to a reduction in the areas of host type being flown in 2010. A few spots were still mapped north of Basin and Boulder. WSBW greatly decreased with only a few spots of activity noted near Basin.

White pine blister rust has been found in LP.

Madison County

Table 22. Acres of Forestland, Mortality, and Defoliation by Ownership for Madison County (1,204,743 acres surveyed).

	National Forest	Other Federal	Private	State	Total
Forestland	598,215	96,634	139,715	9,272	843,836
Dieback	0	12	107	14	133
DFB	32	2	16	0	50
ESB	5,449	0	18	7	5,474
MPB-LPP	55,943	4,322	7,602	757	68,624
MPB-PP	8	0	0	0	8
MPB-High Elevation	23,382	141	2,508	49	26,080

	National Forest	Other Federal	Private	State	Total
SAF Mortality	2,440	0	4	0	2,444
WSBW	3,847	514	687	89	5,137
Windthrow	479	0	229	19	727

Nearly all the same areas were surveyed in both 2009 and 2010, thus changes in mapped activity are indicative of changes in actual pest activity. Of greatest significance was the detection of active ESB, mostly in the southern Gravelly Mountains along Standard Creek on FS managed lands. Nearly 5.5 thousand acres were detected. Ground assessment in the fall of 2010 indicated active, viable ESB populations with mortality occurring primarily in large-diameter ES trees (>20 inches diameter at breast height). Barring extreme winter weather, subsequent mortality in large-diameter host is anticipated in subsequent years.

MPB activity in all host types decreased to levels nearly half those of 2009 across all areas where it had been mapped. Ground survey (FINDIT) was limited to four islands of WBP in close proximity to each other. Results show increased MPB activity in WBP in 2010 over 2009 levels. SAF mortality was also down with small scattered patches in both the Gravelly and Tobacco Root Ranges. WSBW defoliation also decreased significantly everywhere it had been found, particularly at the north end of the Gravelly Range. Several small polygons of aspen decline were also noted northeast of the Lee Metcalf Wilderness, extending into Gallatin Gateway in Gallatin County.

Large and small polygons of windthrow, totaling over 700 acres, were mapped during the 2010 ADS. These are all located in the Lee Metcalf Wilderness area north of Big Sky, in Willow Swamp Creek, North Fork of Spanish Creek, and at the head of St. Joe Creek. It's quite probable these all resulted from the same wind event. White pine blister rust is common in WBP and LP. Limber pine dwarf mistletoe is present in this county.

Powell County

Table 23. Acres of Forestland, Mortality, and Defoliation by Ownership (1,092,343 acres surveyed).

	National Forest	Other Federal	Private	State	Total
Forestland	617,274	70,663	251,596	29,711	969,244
Dieback	0	0	66	0	66
DFB	223	8	8	12	251
ESB	4	0	0	0	4
MPB-LPP	131,838	42,632	20,535	3,102	198,107
MPB-PP	2,082	3,951	11,463	1,766	19,262
MPB-High Elevation	2,813	0	47	0	2,860
IPS	2	0	2	0	4
SAF Mortality	558	2	0	0	560
WPB	0	0	6	0	6
WSBW	3,721	161	5,119	905	9,906

Compared to the 2009 survey, approximately 1/5th less area was flown in 2010 (mostly parts of the Garnet Range and east side of Deer Lodge, as well as the wilderness was not flown). MPB-killed LPP was recorded on approximately 1.98 million acres in 2010 as compared to approximately 2.8 million acres in 2009. Although number of acres of MPB-killed PP and high elevation pines decreased, the intensity or number of TPA killed increased. Large groups of MPB-killed LPP were recorded in the Garnet Range, along the Continental Divide and northeast of Seeley Lake. Large groups of MPB-killed high elevation pines were found near Mt. Powell. Aerial detection also recorded an increase in acres of SAF mortality. WSBW caused defoliation significantly decreased across most of the county. Endemic levels of DFB, WPB and IPS were lightly scattered across the county.

Root diseases are common in counties west of the Continental Divide. The more common ones known to occur in this county are: s-type annosus root disease, Armillaria root disease, and schweinitzii root and butt rot. The tree species most affected are DF and true firs. P-type annosus root disease is known to occur in PP. Significant schweinitzii root and butt rot was responsible for a DF tree failure at the Monture Campground. Armillaria root disease was found to be significant in DF and SAF in the Big Nelson Campground (MFO-TR-10-31). Stem decay was also noteworthy in Monture Campground, including Indian paint fungus in SAF, red belt fungus in ES, and red ring rot in WL (MFO-TR-10-31).

White pine blister rust is common in WBP and LP. Lodgepole pine dwarf mistletoe is present in this county.

Silver Bow County

Table 24. Acres of Forestland, Mortality, and Defoliation by Ownership (265,109 acres surveyed).

	National Forest	Other Federal	Private	State	Total
Forestland	181,515	20,857	50,180	3,486	256,038
DFB	30	0	17	4	51
MPB-LPP	35,556	2,355	1,853	2,130	41,894
MPB-PP	2	0	2	0	4
MPB-High Elevation	1,435	0	0	64	1,499
WSBW	4,255	1,216	1,934	871	8,276

The same portions of forested lands south (Highland Mountains) and north (Browns Gulch) of Butte were flown in 2009 and 2010, but only 1/3 of the Fleecer Mountains within the county were flown (the NE 1/3). MPB activity in LPP decreased to approximately 1/3 the acres and 1/6 the trees, not all of which is explained by the decrease in survey area. Activity south of Butte showed a significant drop in activity, due in large part to depletion of suitable host. MPB in 5-needle pines show a significant decline. However, this is largely due to lack of survey in 2010 of areas in the Fleecer Mountains where mortality of 5-needle pine was high the previous year. Activity continues along the border with Madison County around Table Mountain.

Although still at low levels, DFB activity increased, with many small polygons newly mapped along the eastern edge of the Fleecer Mountains. Previous spots along the west edge of the Highland Mountains were not noted in 2010. WSBW defoliation continued at high levels along the northeast end of the Fleecer Mountains and southwest end of the Highland Mountains. Although some activity was again noted north of Butte, levels were significantly lower.

White pine blister rust is common in WBP and LP.

Evaluation:

Bark Beetles

According to aerial and ground survey data, bark beetle activity in Montana declined overall in 2010. This is based on aerial surveys of approximately 23 million acres of forested land in the state in 2010 compared with 27.8 million acres surveyed in 2009. The decrease in survey area as well as differences in recording techniques among aerial surveyors explains part of this decline in beetle activity. Mortality may have been slightly underestimated in some locations due to late-season crown discoloration (fading) occurring post-aerial survey flight. However, ground observations do indicate a decrease in levels of beetle activity in many areas, especially MPB, with depletion of susceptible host material. Table 14 provides a breakdown by insect and host type of the 2,205,971 acres mapped as infested by bark beetles in 2010.

For several years MPB has been most active in the west-central portion of Montana. In 2010 infested acreage declined around Helena, Butte, and Bozeman in both LPP and PP, attributable largely to lack of remaining live, susceptible host trees. Other areas of the state did see an increase, notably in LPP and PP on and around the Bitterroot and Flathead NFs. Fort Belknap IR and Rocky Boys IR continued to see MPB activity in PP with some increase in area infested. Activity in WBP and LP have decreased by about half in the state. Only the Flathead and Deerlodge NFs noted any sizeable increase in MPB activity in these hosts. The severity of MPB in 5-needle pines declined on average with a mortality rate of 4.5 trees per acre in 2009 compared with 3.8 trees per acre recorded in 2010.

Significant drops in temperature were recorded several times in winter 2009-2010 in much of western Montana. Weather is the principle mortality agent of MPB, with extreme drops in temperature during fall and spring being particularly detrimental to MPB. Temperature drops in October, November, and December 2009 may have contributed to mortality of overwintering larvae. Ground surveys in 2010 support the idea that larval mortality was high in some areas. In most areas surveyed, the ratio of 2010 / 2009 attacked-trees (green: red attack ratio) ranged from 0 to 0.5, indicating a > 2-fold reduction in MPB populations within these site-specific plots. Some degree of active 2010 MPB populations, even if declining, was usually found. On some sites populations significantly increased with green: red ratios suggesting 12- to 15-fold increases in activity. We suspect mortality was higher in thin-barked LPP than in the more insulated, thick-barked PP. Changes in activity levels were highly variable spatially. The long-term effect of this weather event on MPB is unknown, but it is likely that tree mortality in local areas will be reduced for several years. A resurgence in mortality is likely in areas where considerable host material remains, dependent partly on future weather conditions.

Douglas-fir beetle infested acres continued to decline in 2010 throughout most of Montana. State-wide area estimates for acres of DFB-caused mortality decreased from 22,459 acres in 2009 to 14,689 acres in 2010. Approximately 31,000 beetle-killed DF were recorded on these infested acres this year. Some increases were noted in the Bitterroot, Gallatin, and Lewis and Clark RAs, but most areas were at or near endemic levels. If cool, moist weather conditions continue, it is expected DFB will remain at low levels.

Engelmann spruce beetle remained at low levels across the state. However, an area of significant activity was identified on the Madison Ranger District of the Beaverhead-Deerlodge NF in the Gravelly Mountains. Most activity was detected along Standard Creek and Cottonwood Iron Creek near Black Butte Work Station. Another area of ESB activity was found along the Beartooth Highway outside of Red Lodge on the Custer NF. Spruce in several campgrounds along Rock Creek have been infested with ESB for several years, driven in part by windthrow. Ground surveys indicated active, viable ESB populations in both of these areas and tree mortality is expected to continue in subsequent years.

Defoliators
Western spruce budworm continues to be the most significant defoliator in Montana. In 2010, 325,548 acres were mapped as defoliated by WSBW, mainly in DF in northwestern and central Montana. This is a considerable decline from the nearly 2.6 million acres reported in 2009. Most of the 2010 defoliation was in Beaverhead, Flathead, Gallatin, Lewis and Clark, Lincoln, Park, and Sanders counties with each reporting over 15,000 acres.

Cooperative detection monitoring continued for GM in 2010 with USDA Animal and Plant Health Inspection Service, Montana Department of Agriculture, Montana Department of Natural Resources and Conservation, and USDA Forest Service. A network of more than 1,000 pheromone-baited traps were placed throughout Montana's forests and urban areas most frequented by travelers. No gypsy moths were detected in Montana in 2010.

Whitebark pine
White pine blister rust has been impacting WBP ecosystems for many decades. In addition, recent outbreaks of MPB have caused widespread mortality in many WBP stands already impacted by white pine blister rust. The combination of white pine blister rust, bark beetle outbreaks, and lack of natural regeneration due to fire suppression has raised concerns about the long-term viability of WBP ecosystems.

A recent survey by Forest Health Protection of WBP stands throughout Idaho and Montana found that of the 42 sampled stands, 69% have less WBP regeneration than that of other species such as SAF and ES. White pine blister rust infection varied from 0% to 81% in these stands, and 40% had infection levels greater than 20%. Taking into account the ongoing impacts of white pine blister rust and bark beetles, the report concludes that approximately 75% of these stands will convert to other species without active restoration efforts or the occurrence of wildfire.

Standardized methodology is now being used to establish monitoring plots in WBP stands throughout the West. These plots are designed to provide a statistically-based assessment of the incidence of white pine blister rust in the ecosystem and the condition of WBP. A database has been developed at http://www.fs.fed.us/r1-r4/spf/fhp/prog/programs2.html to compile and provide results of surveys in both WBP and LP. This database is scheduled for improvement and update in 2011, and will become web-accessed and updated via a password protected system.

Limber pine
Limber pine is found at elevations ranging from 2,700 feet near the community of Terry in far eastern Montana to around 9,000 feet in and around the Beaverhead-Deerlodge NF in southwestern Montana. West of the Continental Divide, LP is largely confined to limited areas adjacent to the Divide, while scattered populations of LP can be found across much of eastern Montana. An area not historically documented as including LP (through FIA or the LP-specific studies) is in the Little Rocky Mountains in north-central Montana. White pine blister rust is

found throughout the distribution of LP, but there are a few areas where LP remains apparently free of the disease including spots southwest of Ennis and south of Billings. More detailed information about the current amount, distribution, and condition of LP in Montana can be found in a recently published document, “Current Status of Limber Pine in Montana” (Jackson and others 2010).

Limber pine seeds were collected from one Montana site in 2010, the Logging Creek area of the Lewis and Clark National Forest, for inclusion in a west-wide collection being carried out for gene conservation, white pine blister rust resistance screening, and various research projects.

Fuel Reduction in Wildland Urban Interface: Item 18

Monitoring Question: Are fuels reduction projects being implemented in high risk urban interface areas?

Performance Measure: Acres in wildland urban interface (WUI) areas of reduced fuel loadings and crown fire risk.

Data Sources: Forest annual accomplishment reports (FACTS data base) and project accomplishment reports.

Measurement Period: Annual

Reporting Period: Annual

Background:

The 2009 Forest Plan fuel objective highlights fuel treatment in wildland urban interface. Treatment priorities are, in order:

1. Areas where a community wildfire protection plan has been developed.
2. High risk areas adjacent to communities
3. Other areas in Condition class 2 and 3 and fire regime 1, 2, &3.
4. Areas to be maintained in condition class 1.

Results:

The data base of record for fuels treatment (NFPORS) indicates a target of 5,057 acres of Forest Protection fuel treatments for both units of the BDNF. The Forest accomplished 5,387 acres. This includes brush disposal, hazardous fuels and other fuels treatments. The Forest achieved 107% of the fuel treatment target. This is in part due to integrated projects which also provide wildlife habitat benefits. Specific projects included: Basin Creek, Doolittle Creek, Cat Creek, Moffett Mtn., Grasshopper Valley, McVey, and Baggs Creek.

Acres of Wildland Urban Interface (WUI) fuels treated	= 1,988
Acres non-WUI high priority hazardous fuels treated	=3,399
TOTAL	***= 5,387***

Table 25. Fuel reduction acres on the BDNF, WUI only and total acres treated, listed by fiscal year.

Forest Outputs and Accomplishments	2006	2007	2008	2009	2010
Fuel Reduction- WUI Acres only	2,195	1,038	1,586	3,365	1,988
TOTAL Acres Treated	4,898	12,360	6,101	13,443	5,387

Evaluation:
Fuel treatment accomplishments are down from last year, but on par with 2006 and 2008.

Cultural Resource Protection: Item 22

Monitoring Question: Are cultural resources being protected as the Forest Plan is implemented? Are mitigation measures sufficient to prevent damage to cultural resources from project work?

Performance Measure: Number of projects that protect cultural resources.

Data Sources: Review up to 10% of projects in the field

Measurement Period: Annual

Reporting Period: Annual

Results:

Site Monitoring

In 2010, thirty previously recorded heritage properties, sites within previous project area, were formally monitored on the Forest (Table 26, next page). Formal monitoring includes a field inspection and usually comprehensive re-recordation and re-mapping, supplemented by new photographs and/or video tapes. Formal monitoring forms are completed for each site and these forms are filed in our site records and sent to the Montana State Historic Preservation Office (SHPO) and University of Montana Archaeological Records office for archiving with Beaverhead-Deerlodge National Forest site forms. Our monitoring program has been in operation for more than 16 years.

Project Monitoring:

In 2010, 3,026 acres were surveyed for cultural sites or artifacts as part of pre-implementation analysis and 34 new prehistoric or historic sites were discovered.

All cultural sites are flagged for avoidance or mitigation measures, in consultation with SHPO, are developed to ensure sites are not affected adversely. Heritage personnel work with program leaders to ensure sites are avoided. This strategy has been very effective for site protection.

Mitigation is designed to allow project work to continue but in such a way the impacts are reduced. Site monitoring indicates mitigation measures are being implemented and are successful ways to ensure sites are not adversely affected by ground disturbing activities.

Table 26. Historic Sites Monitored in FY 2010: 110 Site Monitoring

Site	Date Visited	NRHP Status	PHA
24BE0158 Kunselman Vision Quest	7/7/2010	Unevaluated	Y
24BE0240 Long John Vision Quest	7/7/2010	Unevaluated	Y
24BE0495 Lost Creek Mine	4/26/2010	Unevaluated	N
24BE1283 Haggerty Mine	4/27/2010	Unevaluated	N
24BE1538 Rosemont Mine	5/10/2010	Unevaluated	N
24BE1606 Farlin Townsite	4/27/2010	Unevaluated	Y
24DL0777 N. Fork Dry Cottonwood Lithic Scatter	06/30/2010	Unevaluated	N
24GN0521 West Fork Rock Creek Work Center	10/1/2010	Eligible	N
24GN0626 Stony Lake Dam and Flume	7/7/2009	Unevaluated	N
24JF0538 Whitehall Ranger Station	8/12/2010	Eligible	N
24JF0904 Brown Homestead	09/27/2010	Unevaluated	N
24JF0905 Chimney Site	09/27/2010	Unevaluated	N
24JF1315 Radar Creek Road	09/26/2010	Not Eligible	N
24JF1350/24SB0499/24DL0689 Browns and American Gulch Road #674	6/14/2010	Eligible	N
24JF1546 Halfway Creek Rd #222 Prehistoric Camp	06/28/2010	Evaluated	Y
24JF1547 Halfway Creek Prehistoric Site	7/1/2010	Unevaluated	N
24JF1580 Big Pipestone Trestle Pictograph	7/1/2010	Unevaluated	Y
24JF1581 Monolith Pictograph	7/1/2010	Unevaluated	Y
24JF1603 Homestake MGD Party Shaft	09/27/2010	Unevaluated	N
24MA0105 Vigilante Ranger Station	2/3/2010	Eligible	N
24MA0187 Sureshot Lakes	8/26/2010	Unevaluated	N
24MA0655 Smuggler Mine	7/7/2010	Eligible	Y
24MA1044 Rock Creek Basin Spring	6/1/2010	Unevaluated	N
24MA1207 Black Butte Ranger Station	2/3/2010	Eligible	N
24PW0005	8/17/2010	Unevaluated	N
24PW0249 Gustavus Wisner Cabin	8/16/2010	Unevaluated	N
24PW0840 Bielenberg 5,6,7	7/24/2009	Unevaluated	N
24SB0058 Lime Kiln Springs	7/6/2010	Unevaluated	Y
24SB0439/24DL0442	06/03/2010	Eligible	N
24SB0591/24DL0690 Dry Cottonwood – Browns Gulch Road	6/14/2010	Eligible	N

NRHP = National Register of Historic Preservation
PHA = Priority Heritage Asset

Evaluation:

The type of survey the Beaverhead-Deerlodge Heritage staff conducts is consistent with the Region 1 Programmatic Agreement between the MT State Historic Preservation Office and the Region 1 Forests. Heritage personnel use the Site Identification Strategy in which 100% of high probability areas, (locations where sites are more likely to occur), 30% of moderate probability areas, and 10% of low probability areas are surveyed.

Monitoring indicates cultural resources are being protected during Forest Plan implementation and mitigation measures are sufficiently preventing damage to cultural resources during site-specific project implementation.

Quantities of Goods and Services: Item 23

Monitoring Question: What is the status and trend of goods and services provided from the Forest?

Performance Measure: Quantities of goods and services and the cost of producing them compared to Plan predictions.

Data Sources: FACTS, INFRA, and other corporate budgeting databases.

Measurement Period: Annual **Reporting Period:** Annual

Results:
Annual data for Forest outputs, expenditures, revenues, and employment is required to generate employment and labor income contributions for the 5 year Comprehensive Evaluation Report (2014) using the IMPLAN tool for modeling economic impacts. Evaluation of this same data annually reveals trends in budgets and regional or national priorities.

(A) GOODS AND SERVICES:

Goods and services produced by the Forest Service are measured by resource outputs (timber sold, animal unit months grazed) or accomplishments (miles of stream restored). Table 27 summarizes Forest Outputs and Accomplishments into a single table to simplify tracking. The brief discussions following the table compares FY10 accomplishments to the BDNF target, if there was one, and evaluates the trend.

Table 27. Summary of Forest Outputs and Actual Accomplishments for Fiscal Years 2006-2010

Forest Outputs	2006	2007	2008*	2009	2010
Watershed Assessments (each)	0	1	2	1	0
Watershed Restoration (miles)	21	8	16	24	24
Noxious Weed Treatment (acres)	6,017	5,001	8,570	8,088	9,542
Timber offered for sale (MMBF)	7.24	10.8	14.13	23.0	20.3
Timber Harvested (Acres)	309	920	1,358	668	2,039
Livestock grazing (AUMs)	226,461	161,129	204,561	174,764	161,145
Fuel Reduction: WUI Acres only TOTAL Acres	2,195 4,898	1,038 12,360	1,586 6,101	3,365 13,443	1,988 5,387
Road Maintenance (miles)		961	934	962	1,023
Road Decommissioned (miles)		0.5	3	2	108

*Source: Beaverhead-Deerlodge National Forest Final Accomplishment Certification Report for 2009.

The following information compares targets to accomplishments. Data was extracted from the report "FY10_final_actual_accomplishments_110310.xlsx".

(1) Watershed assessments

- No watershed assessments were completed in FY10.

(2) Watershed Restoration

Twenty-four miles of stream were enhanced for fisheries in FY10. Projects included:

- Conifer encroachment reduction and willow planting in the riparian conservation area of 1 mile of the Middle Fork of Rock Creek to benefit threatened bull trout;
- Conifer encroachment reduction in the riparian conservation area along 1 mile of the West Fork Rock Creek to benefit threatened bull trout;
- Replacement of 4 fish passage structures on South Boulder Creek to benefit threatened bull trout and sensitive westslope cutthroat trout.

The trend continues to be up from FY08 and previous years. The target of 19 miles of stream improvement was exceeded.

(3) Noxious weed treatment

- Noxious weed treatments amounted to 9,542 acres, which includes 100 acres of biological control.
- The forest achieved 154% of the target of 6,215 acres. The trend continues up from the 5 year average, in part because wildlife funding contributed to weed spraying accomplishments on big game winter range.

(4) Timber Offered and Sold

Table 28 displays the category, MMBF and CCF for timber offered, sold, and harvested in FY2010.

Table 28. Timber offered, sold and harvested in FY2010.

Category	MMBF For FY10	CCF For FY10
Timber Offered & Sold	20.3	39,705
Additional Volume (Not competitive)	3.9	8,199
Personal Permits	6.4	16,346
Total Sold	**30.7**	**64,250**
Timber Harvested	22.0	47,680

- Though not as high as 2009, the trend continues up from a low of 7.6 MMBF offered in FY06. Timber sold was the second highest in the last 5 years and above the ten year average.

- The amount of timber sold was 102% of the targeted 63,150 CCF for FY10.

(5) Livestock Grazing, Actual Use in 2010, in Animal Unit Months

- Actual use by livestock on the Forest was 161,145 animal unit months.

Table 29. Actual livestock use in 2010 in Animal Unit Months

Type of Use	FY06	FY07	FY08	FY09	FY10
Cattle or Bison	217,917	153,710	198,136	167,524	153,039
Horses	917	457	324	252	500
Sheep	7,627	6,962	6,101	6,988	7,606
TOTAL	226,461	161,129	204,561	174,764	161,145

Source: USFS, INFRA data base, actual use by District

- Actual use is down from FY08 and FY09.

(6) Fuel Reduction

- Acres of Wildland Urban Interface (WUI) fuels treated = 1,988

  Acres non-WUI high priority hazardous fuels treated =3,399

  TOTAL = 5,387 acres
- The Forest target of 5,057 acres was exceeded by 107%.

(7) Road Maintenance and Obliteration

- There were 1,023 miles of Forest roads maintained in FY10 compared with 962 miles in FY09. This includes roads maintained with FS fund and with non-FS funds (such as by counties, permittees, timber purchasers, and other commercial operators).

- One hundred and eight miles of road were decommissioned (unauthorized roads). This is up from 2 miles in 2009.

- The Forest road maintenance target was 1,003 miles. The target was exceeded by 102%.

(B) BUDGETS: COST OF PROVIDING GOODS AND SERVICES

The programmed budget for the BDNF ($20,946,000) was comparable to 2009, but notably higher than FY07 and FY08 due partly to increases for timber management and forest health protection. Table 30, below, displays BDNF actual budget expenditures for fiscal years 2007-2010.

Table 30. Beaverhead-Deerlodge Actual Budget Expenditures by Budget Line Item for FY2007 through FY2010.

Budget Line Item	DESCRIPTION	2007 Budget Expenditure ($000)	2008 Budget Expenditure ($000)	2009 Budget Expenditure ($000)	2010 Budget Expenditure ($000)
BDBD	Brush Disposal	21	13	11	2
CMFM	Facilities	133	269	327	251
CWFS	Cooperative Work	300	57	38	31
CMII	Infra Improvement—Def. Mtce			67	22
CMLG	Capital Mtce – Legacy			396	955
CMRD	Rd Construction and Mtce	965	1,112	1,107	1,622
CMTL	Trail Construction & Mtce	1173	1,160	1,168	1,287
CWKV	Knutson-Vandenberg Fund	144	38	60	47
WFPR	Fire Protection/Preparedness	2,814	2,984	3,749	3,640
WFHF	Hazardous Fuels	459	1,004	635	1,054
NFIM	Inventory and Monitoring	337	357	430	450
NFLM	Land Ownership	167	211	452	118
NFMG	Minerals and Geology	634	440	510	345
NFPN	Land Mgt Plans (Plan Revision)	258	464	366	106
NFRG	Grazing Management	861	849	1,045	914
NFRW	Recreation, Heritage, Wilderness	1,108	1,059	1,174	1,192
NFTM	Timber Sales Management	1,667	1,248	2,513	2,749
NFVW	Vegetation and Watershed	858	857	931	1,375
NFWF	Wildlife and Fish	481	505	639	617
RBRB	Range Betterment	97	69	101	119
SSSS	Timber Salvage	3	342	60	384
TRTR	Road and Trail Restoration	69	30	-	-
SPSP	Forest Health Action Programs	53	51	626	472
WFEX	Grants/Agreements/coop	310	154	384	50
FDFD	Fee Demo	169	78	207	209
WFSU	Unplanned Wildfire Suppression	10,567	623	1,848	440
Admin	Administration (Cost pool, computers, facilities) (CACA, CMFM, QMQM)	2,735	2,513	2,809	2,708
	TOTAL Programmed Expenditures	$15,816	$15,864	$19,805	$20,946
	TOTAL Including Fire Suppression	$26,383	$16,487	$21,653	$21,386

**Source of data: Unit Status of Funds Report, USDA FS, BDNF, 10/2010*

(C) BUDGET: REVENUES FROM PROVIDING GOODS AND SERVICES

Table 31, below, lists the source of revenues and amounts collected for FY2010.

Table 31. Revenues Collected for Goods and Service Provided by the BDNF

Source Of Revenues Collected	Receipts ($)
Timber	35,911
Land Uses	22,595
Recreation Special Uses	297,701
Minerals	75
L&WCR Recreation User Fees	1,925
Grazing	184,691
TOTAL of National Forest Funds	**542,898**
Salvage Sale Fund	370,529
Knutson-Vandenberg Fund	19,065
TOTAL of ALL Funds	**932,492**

(D) EMPLOYMENT

The BDNF employed 161 permanent employees and 167 temporary employees in 2010. This is not comparable to previous years' data, as the method of measurement was FTE's (full time equivalents), by the type of position (temporary or permanent). Permanent employees can have full time appointments, or part-time appointments. In 2009, the BDNF employed 153 career FTE employees and 56 temporary or seasonal FTE employees.

Evaluation:

The BDNF met or exceeded most of the Forest's assigned targets related to product outputs in FY10. Targets for fuel reduction and noxious weed treatment were again exceeded. Economies of scale for both targets were achieved by integrating wildlife habitat targets on big game winter range with noxious weed targets and wildlife habitat improvement with fuel reduction targets.

Targets for timber offered and sold were exceeded.

Funding for forest health protection efforts and timber sales has increased with concerns about insect epidemics and the associated fire threat with large expanses of beetle killed trees.

Developed Recreation Facilities: Item 25

Monitoring Question: Are we maintaining and reconstructing campgrounds and developed sites on schedule?

Performance Measure: Number of developed sites reconstructed compared to the objective of 30% over the planning period.

Data Sources: Forest annual accomplishment reports and project accomplishment reports

Measurement Period: Annual

Reporting Period: Annual

Background:

Background: The BDNF has 297 developed recreation sites which range from campgrounds with paved access and water to day use sites and trailheads with few or no facilities. Assuming a 30 year life expectancy, ten sites a year would require reconstruction to maintain a 30-year schedule. Because these sites range widely in monetary value, not all of them warrant full capital improvement work. Many can be brought to standard by, for example, installing an accessible toilet. Priorities for the BDNF include addressing a deferred maintenance backlog (especially for historic cabins) and bringing sites to accessibility standards.

Recreation site reconstruction is funded primarily through the Capital Improvement Process (CIP), which in FY10 focused on the reconstruction of Thompson Park (Butte District, in cooperation with Butte Silver Bow County) to be completed in FY11. From 2009 through 2011, collections from the Fee Demo project provided funding through the Recreation Site Improvement (RSI) program. These funds were directed at the restoration of several rental cabins, the installation of a new toilet at Cliff Lake (Madison District, 2009), the design and installation of new toilets and water system at Lodgepole Campground (Pintler District, 2010-2011), and the design and reconstruction of Grasshopper Campground (Dillon District, 2010-2011).

All improvements are recorded through the National FS Infrastructure data base (INFRA), and a special module exists to record the status of RSI projects. Additional information for this monitoring item is captured through this annual report, produced by the Recreation Program Manager. There is no target assigned to the Forest for this type of work.

Results: Developed site rehabilitation and reconstruction was completed on rental cabins located throughout the Forest, the design and reconstruction work at Thompson Park,

Grasshopper Campground and Lodgepole Campground were underway. See details regarding these projects below.

Evaluation:
With the number of sites improved in FY10 and project work anticipated over the next 5 years, the Forest is on track to accomplish reconstruction of valuable recreation assets over the 30 year life cycle.

FY10 Heavy Maintenance and Reconstruction Project: Details and Highlights

Figure 18. AmeriCorps Crew on a campground fence building project.

Figure 19. Cleanup from beetle-killed hazard tree removal project.

Figure 20. New shingles on the Canyon Creek Cabin.

Figure 21. Retired smokejumpers after constructing new porch at Vigilante Station.

Figure 22. Replacing the chimney on the West Fork of Rock Creek Cabin—This project was achieved largely through a Passport-in-Time heritage project.

Federal Lands Recreation Enhancement Act (FLREA) Funding:

Rental Cabins:

Canyon Creek Cabin (Wise River District) and Hogan Cabin (Wisdom District):

- Upgraded, repaired and replaced items at cabins.
- Corrected all health and safety concerns.
- Replaced shingles on roof (Canyon Creek, Figure 20).
- Replaced fold-down beds with historic recreations of wooden bunk beds (Hogan).
- Installed fire ring (Hogan).
- Expanded corral to accommodate additional use for newly expanded rental season (Hogan).
- Constructed hitch rail to accommodate stock use (Hogan).

Vigilante Station (Madison District):

- Replaced porch and stairs on rental cabin and built new cellar door. Project was assisted by volunteers from the National Smoke Jumper Association (Figure 21).

West Fork Madison (Madison District):

- Replaced rail fence around the cabin.

West Fork Rock Creek Cabin (Pintler District)

- Restoration team did a large amount of excellent work in rebuilding the old Ranger Station cabin so that it will later provide increased occupancy for large groups to rent. (Figure 22).

Racetrack Cabin (Pintler District)

- Replaced replacement picnic table after a tree crushed the new one.
- Restoration team replaced rotted sill logs with new ones (Figure 23).

Doney Cabin (Pintler District)

- Hazard tree removal.
- Pallets under firewood in woodshed to mitigate water problems from spring run-off.
- New cook set.

Douglas Cabin (Pintler District)

- Hazard tree removal.

Stony Cabin (Pintler District)

- Re-position stove and adjust stovepipe.
- Some painting on interior.

Moose Lake Cabin (Pintler District)

- Restoration team re-shingled with new cedar shakes and installed device above door to divert snow melt from doorway stairs.
- Re-paint outhouse

High Rye Cabin (Butte District):

- Sanded and stained interior floors
- Oiled exterior of cabin (Figure 24).

Fleecer Cabin (Butte District):

- Misc. supplies for cabin rental

Campgrounds and Day-Use Sites:

Fee collections provided funding for a variety of mission-critical functions, including:

- Repaired/replaced fence at Miner Lake CG (Wisdom Ranger District).
- Replaced parking barriers at Twin Lakes Campground (Wisdom Ranger District).
- Replaced information board at Twin Lakes Campground (Wisdom Ranger District).
- Vegetative Management (Hazard Tree removal, Slash piling and burning, Firewood cutting) occurred at all Wise River and Wisdom Ranger District campgrounds.
- Repaired/Replaced picnic tables at several Campgrounds on Wisdom Ranger District.
- Fence replacement at Mono Creek campground (Wise River District).

Special Project Funding Recreation Site Improvement (RSI):

RSI Cabin Rehabilitation Project: Racetrack (Figure 23), High Rye (Figure 24), and Bloody Dick (Figure 25) rental cabins. Depending on cabin work included remediation of lead paint, applying new interior and exterior paint, patch wall and foundation, new door hardware, window screens, replacement of sill logs, roofs, floors, residing woodshed and storage shed.

Figure 23. Re-chinking the Racetrack Cabin.

Figure 24. Fresh oil on the High Rye Cabin.

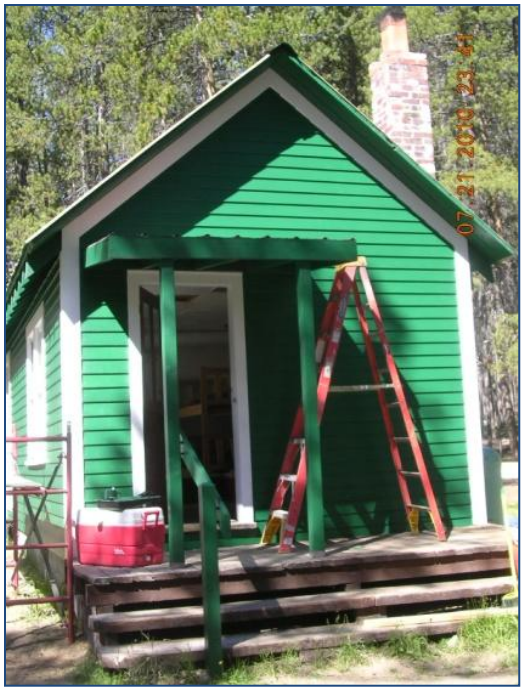


Figure 25. Restoring the green of the Bloody Dick Cabin.

RSI Developed Recreation Site Project: Complete rehabilitation and reconstruction of Grasshopper Campground (Figure 26), extending the life of this existing developed site, which was originally put in service in 1964. Grasshopper Campground is located near the south portal of the Pioneer Mountains Scenic Byway and is comprised of 24 camp units and a moderately-sized group area with serving tables, horseshoe pitch, and open area for other games. This project also replaces the existing water system for the campground. In addition, tent pads, camp sites, and new tables and fire-rings will be installed. Concrete barriers, currently deteriorated, would also be removed and replaced. Unit and spur expansion will be designed and reconstructed to meet current user needs.

Figure 26. Trenching a new waterline at Grasshopper Campground.

Developed Recreation Sites-Capital Improvement (CMFC funding):

Thompson Park Reconstruction (multi-site facility NFS and county ownership). Roads and site layout excavated and constructed in FY09; site furnishings, road and parking features, signs and toilets installed in FY10.

1. Nine Mile: Gateway to Thompson Park. Day use picnic site and visitor information (Figure 27).
2. Sagebrush Flats: Day use area picnic site with toilet and parking.
3. Eagles Nest Trailhead: Parking for cars, trucks and horse trailers and overflow parking for Frisbee golf area. Day use area picnic site with toilet.
4. Host site: On site supervision of Thompson Park, located near Eagle's Nest Trailhead.
5. Lower Eagles Nest: Day use area picnic site with toilet and parking (Figure 28).
6. Lion's Den: Trailhead parking and day-use picnic with toilet (Figure 29).
7. Blacktail Trailhead-located north of Thompson Park. Provides parking and trail access into Thompson Park.

Figure 27. Reconstruction of Nine Mile Recreation Site in Thompson Park.

Figure 28. Reconstruction of Lower Eagle's Nest Recreation Site in Thompson Park.

Figure 29. Reconstruction of Lion's Den Recreation Site in Thompson Park.

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