United States
Department of
Agriculture

Forest Service

BEAVERHEAD-DEERLODGE NATIONAL FOREST

FOREST PLAN MONITORING AND EVALUATION REPORT

Fiscal Year 2011

Cover Photo: Dry Gulch Prescribed burning to treat conifer encroachment, Wise River Ranger District, 2011. See Item 10, page 71, for more information.

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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 2011 Monitoring and Evaluation Report is the third 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. The forest has been reporting on Soil Productivity every year for the last 3 years.

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. FY2011) 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 2011 Activities and Accomplishments

Beaverhead-Deerlodge Forest (acres) 3,357,826
Anaconda Pintler Wilderness (BDNF Portion) 113,839
Lee Metcalf Wilderness (BDNF Portion) 107,694

Budget $17,577,087

Payments to Counties (total 2009) $5,188,127
Beaverhead $1,496,901
Jefferson $391,775
Silverbow $140,273
Deer Lodge $274,557
Powell $1,314,573
Madison $660,200
Granite $909,848

Resource Advisory Committees (RAC)
Southwest Montana RAC Projects Funded $283,210
Tri-County RAC Projects Funded $173,788

Employees: Permanent 167
Volunteer hours 20,0230
Appraised value of volunteer hours $427,830

Recreation
Developed Campgrounds 78
Recreation Special Use Permits administered 100
Picnic areas 18
Rental Cabins 26
Developed Trailheads 28
Re-constructed Grasshopper campground and group area

Trails (Total miles) 3,193
Trail construction/reconstruction (miles) 42
Trail maintenance (miles) 1,425
Completed Milwaukie Railroad Rails to Trail (refurbishing 2 tunnels and one trestle at Thompson Park

Roads and Facilities
Miles of roads throughout Forest 4,700
Road Maintenance conducted ..... 790 miles
Roads reconstructed/improved ..... 4 miles
Culverts replace for improved aquatic passage 5
Facilities/buildings improved 111

Heritage Resources
New Sites Discovered (prehistoric & historic sites) 11
Acres surveyed 2,281
Sites rehabilitated 6
Volunteer hours 4,395

Fire
Number of wildfires 76
Area burned in wildfires (acres) 9,080
Prescribed fire application + Mechanical Thinning (acres) 7,336

Range
Rangeland monitored/evaluated (acres) ..... 1.2 MM
Grazing allotments administered 259
Total A.U.M.'s (Animal Unit Months) 226,900

Noxious Weeds
Number of Treatment Acres 9,141
Chemical Control 9,041
Biological Control 100

Soil and Water
Soil and watershed rehabilitation (acres) 300

Fisheries and Wildlife
Stream enhancements (miles) 30
Terrestrial habitat enhancements (acres) 10,3193

Lands
Special Use permits for land use administered 75
Road Right-of-Ways and Easements acquired 2
Trail Right-of-Ways and easements acquired 6
Lands Sold (acres) 5
Boundary maintained (miles) 3

Forest Management
Reforestation (acres planted) 125
Seedlings planted 35,000
Regeneration monitoring (acres) 1,010
Certification of Natural Regeneration 300
Mortality reduction actions w/various Pheromone treatments (acres)
MCH application for suppression of DF Beetle 175
Verbenone application for suppression of Mtn Pine Beetle 296
Carbaryl spraying for suppression of Mtn Pine Beetle 249
Total timber volume sold (mbf) 14,083
Christmas tree permits sold @ $5.00 each 1,352
Commercial Mushroom Permits 0
Personal Use Mushroom Permits 17
Personal use firewood permits sold 2,521
Personal use post and pole permits sold 71
Other personal use forest products permits 16

Minerals
Hazard Mine Openings closed for Public Safety 15
Mineral Plans Processed 13
Minerals Plans Administered to Standard 39

Law Enforcement Data
Warnings 125
Incidents 194
Violations 134

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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. The BDNF Green Team was formed and chartered in January, 2009. Between the Green Team projects and efforts already afoot, the team accomplished educational program development, energy use monitoring, vending machine energy use reduction, and collaborating with local recycling organizations to increase awareness and use of recycling programs. Accomplishments for FY11 are listed below by category.

INFLUENCING BEHAVIOR:

- The Green Team developed a monthly poster campaign geared toward changing behavior through internal education.
- Presentation of Food Inc. documentary as part of brown bag series promoting sustainable agriculture through shopping choices.
- The Dillon District/S.O. made recycling easier by encouraging use of Headwaters recycling bins for everything but shredded paper eliminating the need to transport recycling to Butte (except aluminum cans which provides cash for the green team).
- The team initiated an Instant Award forest wide for employees to instantly award people who support the recycling program and engage in other green activities.
- Butte District promoted a clean-up day with awards for participants.
- All reps made presentations at district summer crew orientations.
- The Green Team purchased, painted, and distributed festive clothes pins for districts with employee housing to promote use of clothes lines instead of dryers.

WASTE REDUCTION AND RECYCLING:

- Dillon Green team is collaborating with Beaverhead Recycling to bring plastic recycling to Dillon. Project still in the works.
- The "battery bucket" recycling campaign was expanded to include all districts. We anticipate the capture of twelve 5-gallon buckets of batteries that would otherwise go into landfills.
- VHS tapes are being collected for recycling through a collection box in the Supervisor's Office.
- The Kill-A-Watt monitors will be made available by check-out for employees to measure energy use in their homes.
- 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.
- Plastic Recycling continues on the Butte, Jefferson, Pintler, and Wisdom ranger districts.

ENERGY CONSERVATION AND GENERATION:

- The Beaverhead-Deerlodge NF participated in the R1 Energy Saving Performance Contract with Honeywell. This project completed energy conservation improvements in our FS-owned administrative buildings including upgrading incandescent and T12 fluorescent lighting to more energy efficient fluorescent lighting, replacing non-programmable thermostats with programmable thermostats, and installing water saving devices on faucets and showers. The project also replaced old inefficient furnaces in two of our bunkhouses with energy star rated heat pumps, installed occupancy sensor lighting controls in selected locations in five buildings, installed additional attic insulation in six buildings, installed foundation insulation in four buildings, and completed infiltration reduction improvements in nine buildings.
- The Green Team purchased five Vending misers to put on five pop machines. Wise River already has one.
- The Green Team also requested funding from the FLT to purchase Kill-A-Watt monitors to measure energy use by appliances at all offices.
- The Dillon District and SO energy use report was finalized and turned in with recommendations for energy use reduction.
- A heat pump water heater was installed in the Madison District Bunkhouse in December 2010.
- Dillon incorporated energy conservation measures in the new lease agreement. The lease requirements include replacing the existing heating and cooling system in the office building with a new energy star rated heating and cooling system, replacing existing lighting with more efficient lighting, and installing occupancy sensor lighting controls. The new lease also requires the building owner provide documentation of how proposed improvements meet LEED Silver level. However, commissioning of the building necessary to receive LEED certification is not required due to high cost.
- Dillon janitorial contract includes recycling disposal.
- Dillon office also purchased a locking bin for documents to be shredded and will hire Tear It Up to pick up shredded material.
- Dillon, Madison and Butte continue to use a Freecycle bulletin board. Madison has put in a Fleet Board for vehicle check-out which shows fuel efficiency for each vehicle.
- Pintler District replaced one remaining bunkhouse window for greater energy conservation, replaced a furnace in a employee housing unit increasing energy efficiency from 19% to 92% and repaired two window frames in the main office that were not sealed.
- Pintler District replaced three garage bay doors with more efficient materials, and replaced six refrigerators and two sets of washer/dryers at employee housing units with efficient energy star appliances.
- District Sustainable Operations Action Plans were developed and implemented for each unit. Along with facility improvements, Green Plans emphasized energy and fuel conservation.

- Monitoring of energy consumption data continue at each facility. The Forest Facilities Engineer provides data to units to monitor progress and aid in identifying opportunities for conservation. Data is incorporated into a spreadsheet for each unit.

FLEET and FUEL REDUCTION

- All districts are carpooling when possible and emphasizing the five mile-per-hour reduction in the posted highway speed limit.
- Video or teleconferencing has become a common practice Forestwide, when feasible.

WATER CONSERVATION

- Pintler District replaced a single, continuously running sewer pump with a dual, on demand system.
- Pintler District replaced a portion of lawn near the front office entrance with a pollinator garden using drought resistant plants.
- Butte District worked with the building owner to put in more native drought resistant plants this summer as well as a pollinator garden near the employee entrance.
- Jefferson District installed an underground automatic lawn watering system at bunkhouses/warehouse.

SUSTAINABLE AQUISITION/GREEN PURCHASING

- The Green Team ensured ACE considered purchasing green products.
- Janitorial contracts include using environmentally friendly products.

Beaverhead Settlement Agreement

The Beaverhead-Deerlodge National Forest (BDNF) amended riparian management direction within the Beaverhead Forest Plan in October of 1997 as a result of litigation by the National Wildlife Federation. 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 (115 of 152). Most allotments were inspected numerous times prior to, during, and after the grazing season. Table 1 displays compliance status for the Beaverhead zone allotments.

Table 1. Compliance with Grazing Standards by District for FY2011.

District	Total Allotments	Allotments That Met Standards	Allotments That Did Not Meet Standards	Unknown
Dillon	61	46	7	8
Wise River	17	8	3	6
Wisdom	19	14	3	2
Madison	55	34	0	21
Total	**152**	**102**	**13**	**37**

Table 2 displays the Forest Plan standards that were exceeded in FY2011. The majority of the allotments that exceeded Forest Plan standards exceeded the stream bank disturbance allowed, and/or the riparian stubble height standard. Permittees failed to follow their respective annual operating plan in six allotments.

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 they failed, and make a plan to correct the problem the next year. If they are out of compliance two 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 three 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 cattle be moved to the next pasture early or leave the allotment if necessary to avoid exceeding standards.

It appears meeting with permittees when they are out of compliance is effective, as 89% 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.

Table 2. Forest Plan Standards Exceeded on Noncompliance Allotments in 2011.

Forest Plan Standards Exceeded	Number of Allotments Exceeding Standard Total of 13*
1a – Upland Range Utilization	0
1b – Stream Bank Disturbance	10
1c – Riparian Stubble Height	9
1d – Winter Range	0
1e – Riparian sites on WCT streams	0
1f – failure to follow Annual Operating Plan	6

*Ten allotments exceeded more than one standard.

Of the 13 allotments where Forest Plan standards were not complied with, none were non-compliant two years in a row. All non-compliant allotments were non-compliant for the first time in the last three years. This was also the finding in 2010; in 2009, one allotment was non-compliant two years in a row. Generally, once allotments are found to not be in compliance with standards, it appears corrective actions are taken and are effective in addressing the issues; only one allotment has exceeded the standards two years in a row since monitoring the revised Forest Plan began in FY2009.

Wildfire Suppression or Management

The 2011 summer and fall were more active than the 2010 season for wildfires. Seventy-six wildfires burned over 9,000 acres. Wildfires on BDNF lands are summarized below in Table 3.

Table 3. Number of fires by size and class on the BDNF during 2011.

Class	Size	Number of Fires	Acres
A	<.25 acres	50	<12.5
B	.26-9.9 acres	16	<158
C	10-99 acres	7	62
D	100-299	0	
E	300-999	0	
F	1000-4999	3	7,028
G	5000+	0	
TOTAL		76	9,080

Three Class F fires burned in 2011. Two of these fires were managed for resource benefit. The Copper Mountain Fire on the Pintler Ranger District was caused by lightning on August 25. The 1,167 acre fire, located 27 miles southwest of Philipsburg, MT in the Anaconda Pintler Wilderness was managed to improve vegetation diversity and wildlife habitat. The 4,213 acre lightning-caused Stewart Fire on the Wisdom Ranger District was detected on August 24. The fire was managed to improve vegetation diversity and wildlife habitat.

The 3,982 acre Lutz fire on the Pintler Ranger District located 20 miles west of Philipsburg in the Sand Basin and Mount Emerine areas was lightning caused, and started August 6, 2011.

Project Decisions – National Environmental Policy Act (NEPA)

Decision makers on the BDNF issued 25 decisions in 2011: 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 FY11.

Fiscal Year	Record of Decision (EIS)	Decision Notice (EA)	Decision Memo (CE)	Project Analysis Underway[1]
2008	0	2	18	55
2009	2	7	13	30
2010	1	0	24	33
2011	0	4	21	48

[1]Project analysis numbers are from the BDNF Schedule of Proposed Actions

Table 5, below, displays the number of decisions made in FY11 by resource area.

Table 5. Number of decisions by resource area.

Resource Area	Number of Decisions
Special Uses	2
Timber/Veg/Fuels	3
Recreation	10
Road Management	2
Travel Management	1
Grazing Management	1
Minerals	5
Wildlife/Fish	1

Most decisions were made in recreation and minerals. Travel management, grazing management, and wildlife/fish had the fewest number of decisions.

Appeal and Litigation

Active litigation and legal action taken in FY11 is displayed in Table 6, below. Of the project decisions discussed in the previous section, two were appealed, including the North Butte Salvage and Aquatic Improvement Project, and The Designation of Summer Motorized Travel on the Madison Ranger District.

Three appeals were received on the North Butte Salvage and Aquatic Improvement Project. The decision was affirmed with instructions to complete additional analysis on soil mitigation measures to ensure compliance with Soil Quality Standards.

One appeal was received on the Designation of Summer Motorized Travel on the Madison Ranger District. The decision was affirmed.

Two appeals filed under 36 CFR 251 were processed in FY11. One concerned the Madison District Ranger's classification of onyx marble at the White Angel Quarry as a common variety mineral. This decision was affirmed by the Forest Supervisor, appealed to the Regional Forester and subsequently affirmed in FY12.

Table 6. Active Litigation in FY11, including Legal Action.

Project Name	Legal Action
Bradley/Noble Lake	Order filed in District Court finding in favor of BDNF, Plaintiffs appealed to Circuit Court. Opening briefs filed.
Forest Plan – Wildlands CPR, et al	Opening briefs filed in District Court. Montana Snowmobile Association and Idaho State Snowmobile Association intervene.
Rat Creek Timber Salvage	Motion to Dissolve is denied in District Court
Forest Plan — Beaverhead Co., et al	Complaint filed in District Court. Montana Wilderness Association and Greater Yellowstone Coalition intervene.
North Butte Salvage	Complaint filed. Decision withdrawn.
Whitetail Water Users	Complaint filed.

Lynx Monitoring on the BDNF

Background

The Canada lynx was listed as a threatened species in April, 2000. The Forest Service signed the Canada Lynx Conservation Agreement with the Fish and Wildlife Service shortly thereafter to promote the conservation of Canada lynx and its habitat on federal lands. In the 2000 Canada Lynx Conservation Agreement, the Forest Service agreed to use the Ecology and Conservation of Lynx in the United States (the "Science Report", Ruggiero et al. 1999) and the Canada Lynx Conservation Assessment and Strategy (the LCAS, Ruediger et al. 2000) as key components of lynx and lynx habitat management on National Forest System (NFS) lands.

The Canada Lynx Conservation Agreement, revised in May, 2005, included a commitment that the Forest Service and Fish and Wildlife Service would define lynx habitat, and a joint team defined the evidence necessary to consider habitat as occupied by lynx. This definition and supporting documentation was amended to the 2005 Canada Lynx Conservation Agreement in 2006.

The 2006 Occupied Mapped Lynx Habitat Amendment to the 2005 Conservation Agreement established criteria used to determine lynx occupancy. All mapped lynx habitat on an entire national forest is considered "occupied" by lynx when:

1) There are at least two verified lynx observations or records since 1999 on the national forest unless they are verified to be transient individuals, or
2) There is evidence of lynx reproduction on the national forest.

The Occupied Mapped Lynx Habitat Amendment also listed those federal land management units that were not considered occupied by Canada lynx. Under the 2005 Conservation Agreement, national forests or parts thereof that were identified as unoccupied in the Occupied Mapped Lynx Habitat Amendment were not subject to the requirements of the 2005 (or earlier) Conservation Agreement. The BDNF was listed as unoccupied by lynx in this amendment, and the Fish and Wildlife Service subsequently removed Canada lynx from the list of threatened and endangered species that occur or are expected to occur on the BDNF. The Montana Field Office of the Fish and Wildlife Service provides a quarterly T&E species list for the BDNF. All lists since the 2006 Occupied Mapped Lynx Habitat Amendment do not identify Canada lynx as occurring on the BDNF. Consequently, there is no Endangered Species Act requirement for the BDNF to consult with the Fish and Wildlife Service on this species at this time.

The Forest Service completed the Northern Rockies Lynx Management Direction in March, 2007. This direction was incorporated into all forest plans in the planning area, including the separate Beaverhead and Deerlodge forest plans in existence in 2007, and later the current Beaverhead-Deerlodge Forest Plan signed in 2009, but the management direction is applied only to those forests occupied by lynx. Term and Condition #4 of the corresponding Fish and Wildlife Service Biological Opinion states that "the Forest Service shall work with the Service to develop and complete an acceptable protocol to survey currently unoccupied lynx habitat in

secondary area (sic) within 18 months of the date of the Forest Service's record of decision for the amendments." To date, no single official protocol has been agreed upon; rather the unoccupied forests in the region have been monitoring using three different protocols including McKelvey et al. 1999, McDaniel et al. 2000, and Squires et al. 2004, depending on monitoring needs of the individual forest.

Past Monitoring Efforts

National Lynx Survey, 1999-2001

The National Lynx Detection Protocol (McKelvey et al. 1999) was used to determine occupancy during the National Lynx Survey conducted on the BDNF from 1999-2001. Locations of transects for the 1999-2001 National Lynx Survey are presented below in Figure 1. The survey focused on the Pioneer and North Flint mountain ranges as these areas support vegetation most closely aligned with lynx habitat as described in the Ecology and Conservation of Lynx in the United States (Ruggiero et al. 1999).

The Protocol involves using hair snare stations baited with beaver castorium and catnip lure. At a broad scale, the protocol requires placing no fewer than 25 transects at a density of one transect per every two miles for a period of two weeks to ensure that an area is adequately sampled. At the end of two weeks, the hair snares are examined for hair and either removed or rebaited for a second two-week period. Each transect has five stations placed 100 meters apart and perpendicular to the major slope to produce a structure that will be encountered by lynx moving through the country.

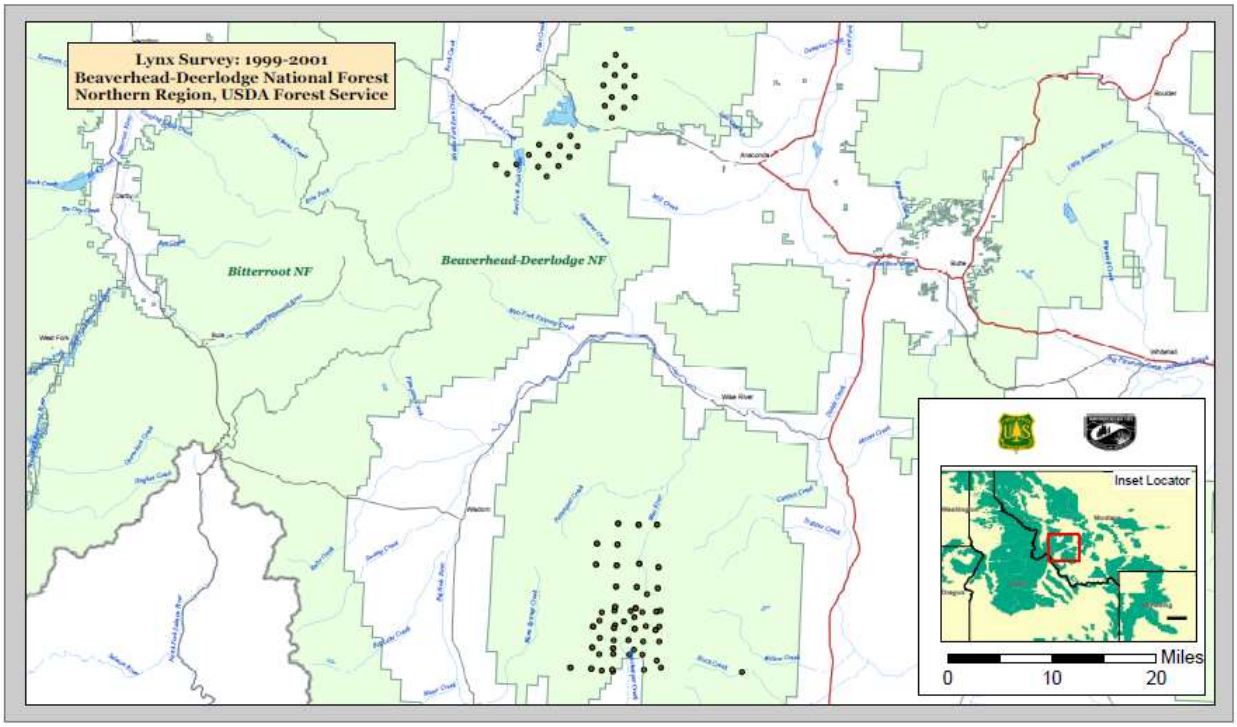

Figure 1. Transect locations for National Lynx Survey conducted from 1999-2001 on the Beaverhead-Deerlodge NF.

National Lynx Survey results are presented in Table 7. Lynx were not detected during this survey, maintaining the classification of the BDNF as "unoccupied" by Canada Lynx.

Table 7. National Lynx Survey BDNF, Summary DNA results, 1999- 2001.

Species	1999	2000	2001
Coyote	5	3	2
Black bear	8	2	24
Bobcat	7	0	4
Wolf/dog	1	1	0
Cougar	0	2	0
Domestic cat	0	0	1
Ungulate	0	0	3
Other*	12	0	2

*Other species is defined as a species that was not a cat (domestic or wild), bear, canid, or ungulate.

Beaverhead-Deerlodge NF, Tobacco Root Mountains, 2001-2002

The Madison RD surveyed the Tobacco Root Mountains for Canada lynx in 2001 using techniques from the National Lynx Survey. This survey incorporated track surveys conducted by snow machine and skis and hair snare surveys in each of three habitat types: subalpine fir, lodgepole pine and Douglas fir. The survey ran from December 2000 through March 2001, and additional track transects were conducted in 2002. No lynx tracks or other evidence of lynx were found during in 2001.

The BDNF Track surveys in the Tobacco Root Mountains were continued in January 2002. On January 25, 2002, a single series of tracks was observed in the subalpine fir zone in T4S R3W S 11 SESE, east of McKelvey Lake. The tracks were observed in snow for over 100 meters, and a photo of the track was taken. The photo is of two prints, possibly a fore foot due to size, and the track appears to be Snow Track Quality (STQ) 2 or 3. The track, though possibly from a lynx, is not definitive, and may have actually been a wolverine track. Hair and scat samples were not found and thus not collected.

Wildlife Conservation Society, 2005-2011

The Wildlife Conservation Society Wolverine program has worked on and around the BDNF since 2001. The BDNF has and continues to provide support to the WCS Wolverine Program through Challenge Cost Share agreement and other support. The WCS Wolverine Program has conducted extensive track surveys in the Tobacco Root, Beaverhead and Anaconda mountain ranges. The WCS and has worked over 8,000 trap nights for wolverine in the Greater Yellowstone Area, about 2/3 of which were in the Madison and Gravelly mountain ranges on the BDNF.

Track surveys were conducted both on the ground and with the use of aircraft. In 2006, the WCS Wolverine Program surveyed the Tobacco Root Mountains using snowmobiles, on skis and foot. No lynx tracks were identified by WCS biologists during this extensive survey. Figure 2 Identifies routes surveyed by WCS in the Tobacco Root Mountains in 2006.

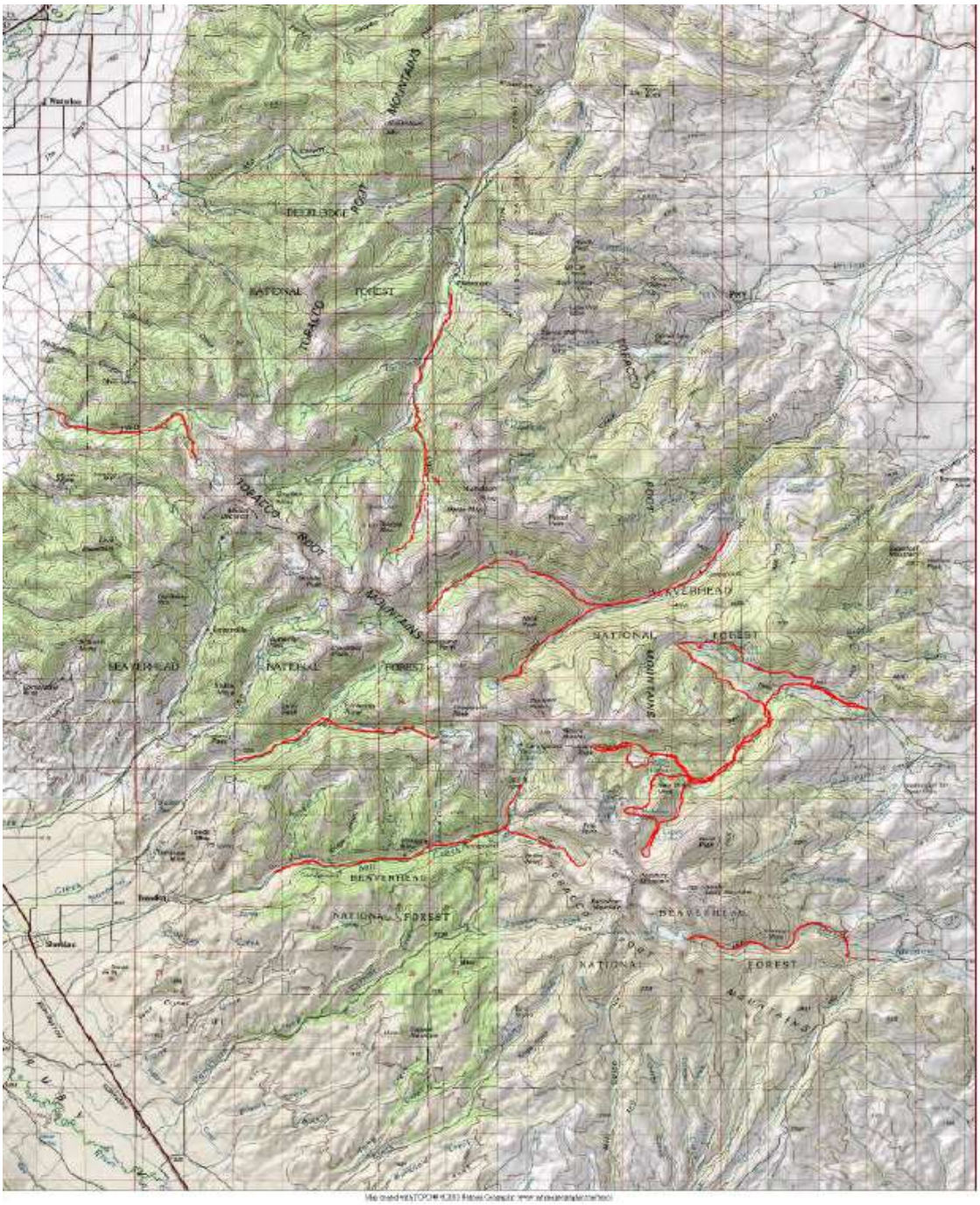

Figure 2. WCS Survey Routes in the Tobacco Root Mountains.

Aerial surveys conducted by WCS consisted of low-level flights that frequently identified wolverine tracks from the air. Flight areas on the BDNF in 2008 were the Tobacco Root, Beaverhead and Anaconda-Pintler mountains. Figure 3 illustrates the intensity of the aerial survey over the Beaverhead Mountains on the west side of the BDNF. The red line is the flight path of the aircraft as recorded by GPS. Black "X"s denotes locations of wolverine tracks identified from the air. Though lynx were not the target species of these surveys by WCS, lynx tracks would have been noted had they been observed by WCS scientists.

WCS aerial surveys of the Beaverhead, Anaconda and Tobacco Root mountains did not detect lynx in any of these mountain ranges.

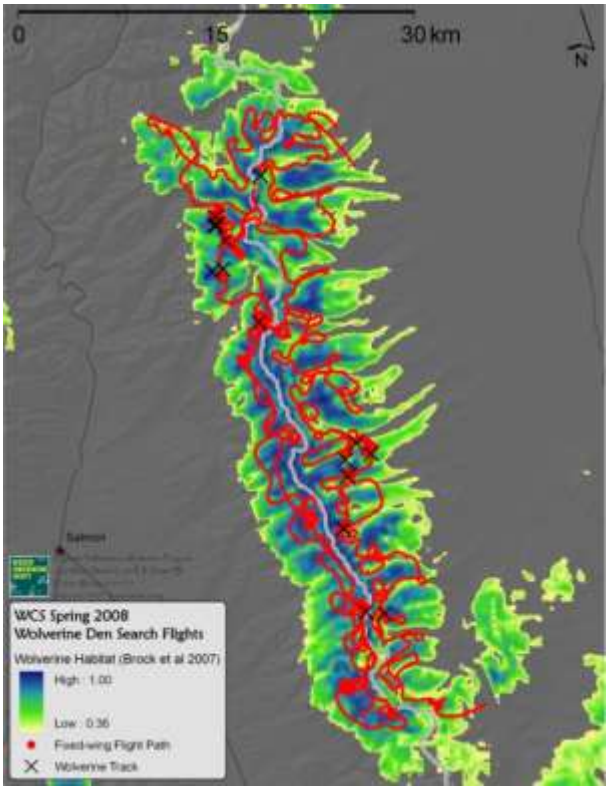

Figure 3. Red lines indicate WCS fixed-wing flight path over the Beaverhead Mountains in spring, 2008.

The WCS Wolverine Program has conducted 5,000 or more trap nights for wolverine in the Madison and Gravelly mountain ranges on the BDNF. Lynx have never been captured in wolverine traps on the Madison or Gravelly mountains, though the capture of lynx while attempting to capture wolverine has occurred in Glacier National Park. It is likely if lynx occurred on the Madison or Gravelly mountains, at least one would have been captured during the extensive WCS trapping operation.

Wild Things Unlimited Survey, 2009

In 2009, the BDNF facilitated a lynx survey effort on portions of the forest known to support subalpine fir habitat, and two of the three 2009 survey sites correspond with the National Lynx Survey conducted from 1999 through 2001. The 2009 survey was conducted by Wild Things

Unlimited (WTU). Hair snares were the primary means to detect lynx and were of the type described by McKelvey et al. (1999) in National Lynx Detection Protocol. Instead of using a randomly located grid of 25 survey sites with two mile spacing between sites, WTU located their sites selectively. In the Flint Creek and Pioneer ranges, selection was based on habitat characteristics, recommendations from local Forest Service employees, logistical conditions and historical lynx observations as documented by Montana Department of Fish, Wildlife and Parks and McKelvey et al. (2000). In the Boulder Mountains, site selection was based on habitat characteristics and proximity to current lynx habitat on the Helena National Forest documented by WTU during the winters of 2007 through 2009. As an alternative to using 400m transects with five stations per transect at each site, WTU placed one station at each site with 800m between stations. Each station was at least 50m from a trail or road.

Neither the lynx hair snares nor the remote camera stations resulted in the confirmation of lynx presence in the BDNF during the spring 2009 surveys.

Figure 4, below illustrates the proximity of BDNF 2009 lynx survey sites to national forests with known occupancy by Canada lynx. Under the 2006 Occupied Mapped Lynx Habitat Amendment, mapped lynx habitat on the entire national forest unit is considered occupied if any mapped lynx habitat on that unit is or was occupied by lynx at some time after 1999. Survey locations on the BDNF are proximate to mapped lynx habitat on other national forest units, not necessarily mapped lynx habitat that is actually occupied.

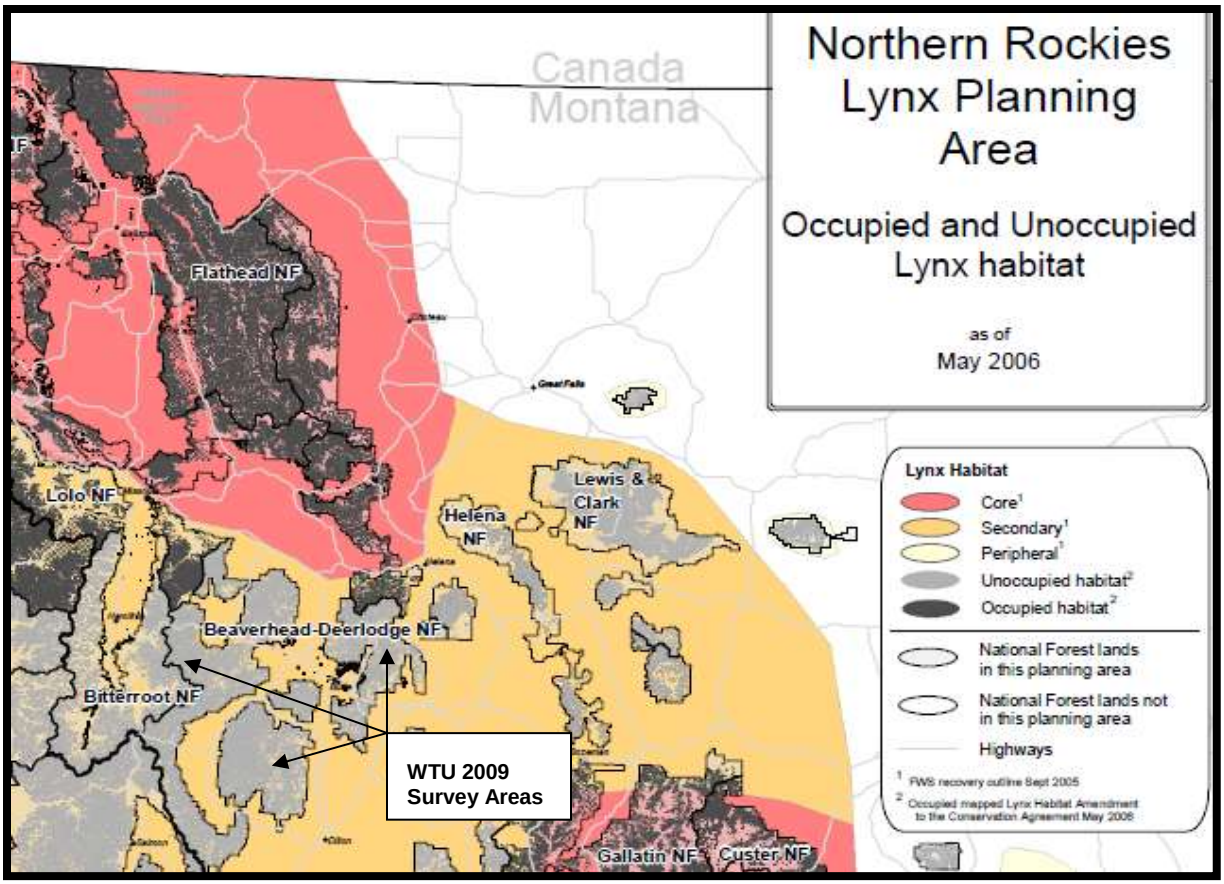

Figure 4. Wild Things, Unlimited 2009 surveys (black arrows) shown in proximity to occupied national forests.

Between May 18 and June 24, 2009, WTU operated 18 lynx hair snares for a total of 642 snare-nights (Table 8). Six hair snares for 214 snare-nights were established in three study areas of the BDNF: Odell Creek, Coal Creek, and Basin Creek. No hair samples from Canada lynx were collected from the snares.

Table 8. Description of sites where lynx hair snares were located on the BDNF during the WTU Lynx Survey, 2009.

Location	UTM e	UTM n	Operation Dates	Days
Pioneer Mountains				
Odell Creek	330314	5046128	5/18/08 - 6/23/09	36
Odell Creek	329176	5046624	5/18/08 - 6/23/09	36
Odell Creek	328391	5046916	5/18/08 - 6/23/09	36
Odell Creek	328002	5047531	5/18/08 - 6/23/09	36
Odell Creek	328618	5047862	5/18/08 - 6/23/09	36
Flint Creek Range				
Coal Creek	296711	5126094	5/19/09 - 6/23/09	35
Coal Creek	295859	5126768	5/19/09 - 6/23/09	35
Coal Creek	295944	5127144	5/19/09 - 6/23/09	35
Coal Creek	296651	5127546	5/19/09 - 6/23/09	35
Coal Creek	296978	5128063	5/19/09 - 6/23/09	35
Coal Creek	297332	5128445	5/19/09 - 6/23/09	35
Boulder Mountains				
Basin Creek	398091	5138371	5/20/09 - 6/24/09	36
Basin Creek	398625	5138635	5/20/09 - 6/24/09	36
Basin Creek	399449	5138981	5/20/09 - 6/24/09	36
Basin Creek	399921	5140220	5/20/09 - 6/24/09	36
Basin Creek	399902	5140576	5/20/09 - 6/24/09	36
Basin Creek	400254	5140299	5/20/09 - 6/24/09	36

Between May 18 and June 24, 2009, WTU operated nine remote camera stations on the BDNF, for a total of 321 camera-nights (Table 8). Two camera stations were placed in Odell Creek, three in Coal Creek, and four in Basin Creek. Photographs of lynx were not obtained from any camera station. Cameras did obtain photos of one mule deer and one black bear.

Future Monitoring Efforts

Further lynx surveys are planned for FY12. Priority areas for FY12 monitoring include Upper Rock Creek and the Boulder River landscapes. The National Lynx Detection Protocol (McKelvey et al. 1999) will be implemented. The Protocol involves using hair snare stations baited with beaver castorium and catnip lure. At a broad scale, the protocol requires placing no fewer than 25 transects at a density of 1 transect per every two miles for a period of 2-4 weeks to ensure an area is adequately sampled. Each transect has five stations placed 100 meters apart and perpendicular to the major slope to produce a structure that will be encountered by lynx moving through the country.

The FY12 Forest Monitoring and Evaluation Report will contain the results of these surveys.

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McKelvey, K. S., J. J. Claar, G. W. McDaniel, and G. Hanvey. 1999. National lynx detection protocol. Rocky Mountain Research Station, Missoula, Montana, USA.

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Squires, J.R., K.S. McKelvey, and L.F. Ruggiero. 2004. A snow-tracking protocol used to delineate local lynx, *Lynx Canadensis*, distributions. The Canadian Field-Naturalist 118(4): 583-589.

Fisher Monitoring on the BDNF

Objectives

The Rocky Mountain Research Station (RMRS) initiated a region wide fisher hair snare survey[1] in 2007 to: 1) delineate the geographic range of fisher within the Rocky Mountains; 2) determine which Rocky Mountain fisher populations have native genes and which fisher populations are comprised of reintroduced individuals; 3) index the abundance of fisher (e.g., minimum number of individuals alive) in each population through the use of DNA. This is the fourth year the BDNF has participated in this effort.

Methods

A five square mile grid was developed based on local fisher biology. The goal of the survey is not to detect all individual fishers, but rather detect populations of fisher. Assuming a non-overlapping home range, a small fisher population consisting of three females would occupy approximately five square miles. Only grids with 50% habitat were considered in order to maximize survey efficiency and prevent surveying areas with a low probability of containing fishers. The BDNF contains 136 potential survey grids (Figure 5).

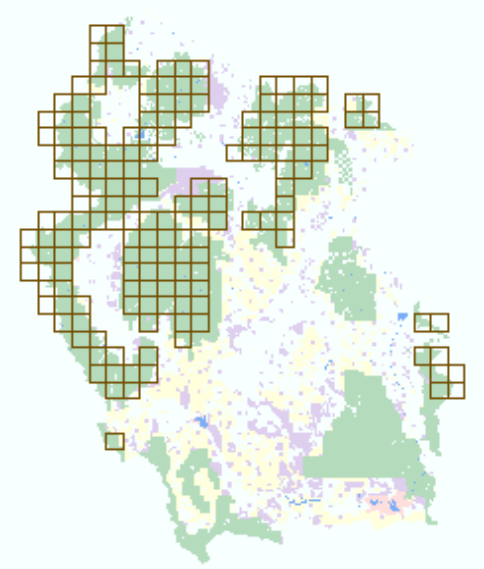

Figure 5. Fisher grid overlying a map of the BDNF.

[1] Schwartz, M. K., T. Ulizio, B. Jimenez. 2006. U.S. Rocky Mountain Fisher Survey. USFS Rocky Mountain Research Station, Missoula MT. http://www.fs.fed.us/rm/wildlife/genetics/pdfs/Fisher_Survey_Protocol.pdf

Based on preliminary data from the RMRS, where hair-snares were placed in known fisher locations for 21 days, single snare detectability was 0.39. That is, 39% of snares in known fisher locations detected a single fisher in a single session. Thus, running four sessions in a survey unit or placing four snares in a survey unit for one session could provide a 97.7% of detecting a fisher, if fishers are present. To spread effort within the survey block, snares were set 0.5 miles from each other.

Figure 6. Photograph of a fisher hair snare.

Hair snares consist of baited snare boxes (Figure 6) that lure a fisher into the box and capture tufts of hair on wire brushes. Species and individuals are identified by DNA collected from hairs. Additionally, the DNA information will be used to determine whether or not that individual is from a native or reintroduced population.

Hair snares were deployed for approximately 21 days on the BDNF during the summer and fall. Snares were placed in microhabitat appropriate for fisher (appropriate vegetative structure, cover, riparian areas etc.). Survey grids were not randomly selected; rather grids were selected by the area biologist responsible for deployment. Each hair snare deployed was considered to have a survey effort of 125 acres. A total of 56 snares on 14 grids were deployed in 2010 and 2011 (Figure 7). Table 9 displays the number of snares deployed by district during the 4-year survey effort. Collected hair samples were sent to the RMRS Genetics Lab for analysis.

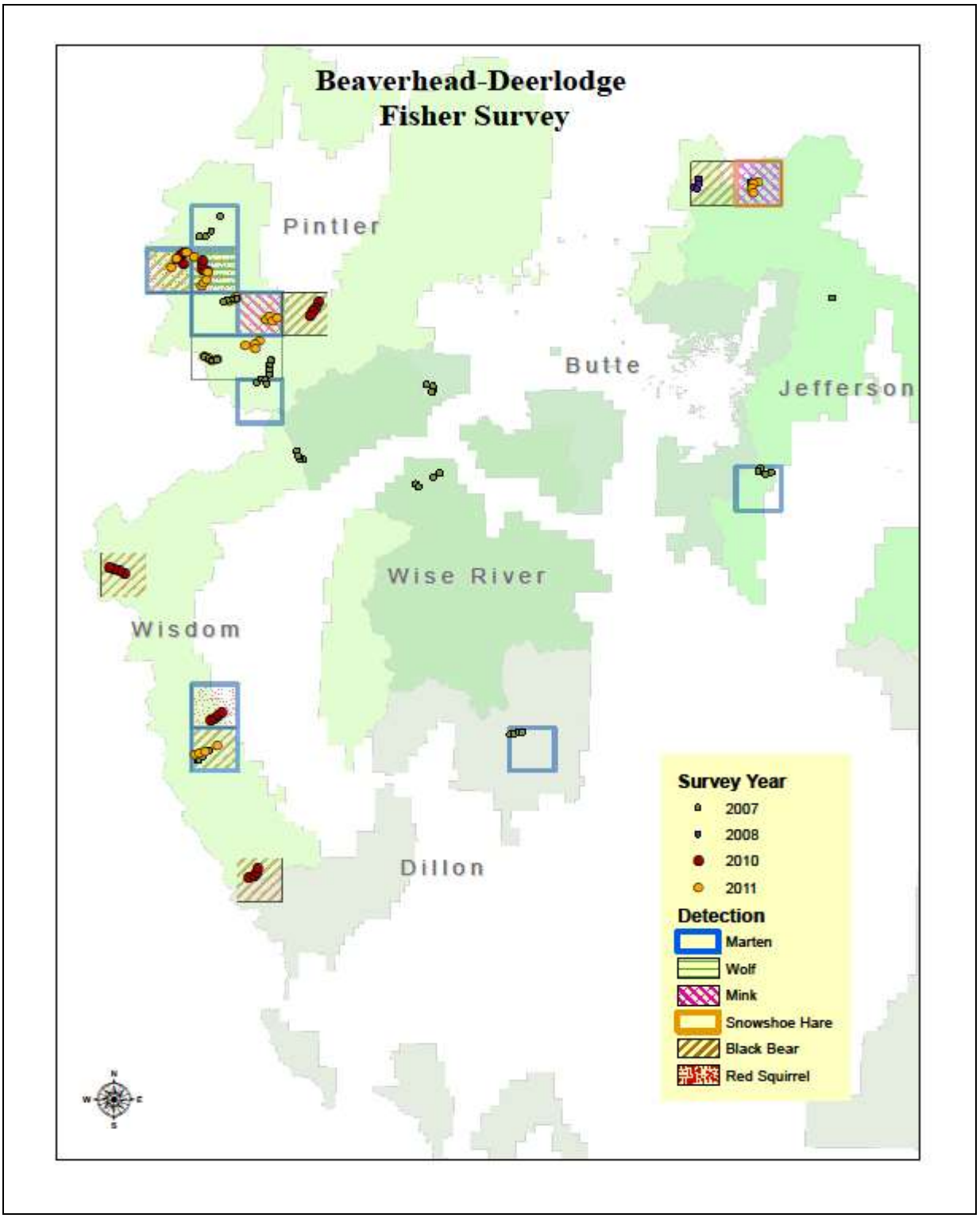

Figure 7. Fisher Hair Snare Survey Effort and Detections 2007-2011.

Table 9. Snares deployed by Ranger District and year.

District	Year				*Total*
	2007	2008	2010	2011	
Butte	4	--	--	--	*4*
Dillon	4	--	--	--	*4*
Jefferson	9	--	--	4	*13*
Pintler	20	12	12	24	*68*
Wisdom	4	--	12	4	*20*
Wise River	8	--	--	--	*8*
Total	*49*	*12*	*24*	*32*	*117*

Results

Hair was collected from 25 snares, representing all but two grids surveyed during 2010 and 2011. Species detected include black bear, marten, mink, red squirrel, snowshoe hare, and canine. Fisher have not been detected on the BDNF during any of the years of the hair snare survey effort. Snares deployed in 2007 and 2008 yielded only marten detections (Table 10). Table 10 summarizes species detected by year.

Table 10. Species detected by year.

Species	Year				*Total*
	2007	2008	2010	2011	
Black Bear	--	--	5	1	*6*
Marten	12	2	2	8	*24*
Mink	--	--	--	2	*2*
Red Squirrel	--	--	3	2	*5*
Snowshoe Hare	--	--	--	1	*1*
Wolf/dog	--	--	--	1	*1*
Total	*12*	*2*	*10*	*15*	*39*

Results of National Visitor Use Monitoring Survey for the BDNF

Background

The National Visitor Use Monitoring (NVUM) program provides reliable information about recreation visitors to national forest system managed lands at the national, regional, and forest level. Information about the quantity and quality of recreation visits is required for national forest plans, Executive Order 12862 (Setting Customer Service Standards), and implementation of the National Recreation Agenda. To improve public service, the agency's Strategic and Annual Performance Plans require measuring trends in user satisfaction and use levels. NVUM Information assists Congress, Forest Service leaders, and program managers in making sound decisions that best serve the public and protect valuable natural resources by providing science based, reliable information about the type, quantity, quality and location of recreation use on public lands. The information collected is also important to external customers including state agencies and private industry. NVUM methodology and analysis is explained in detail in the research paper entitled "Forest Service National Visitor Use Monitoring Process: Research Method Documentation" by English, Kocis, Zarnoch, and Arnold; Southern Research Station; May 2002 (http://www.fs.fed.us/recreation/programs/nvum).

In 1998 a team of research scientists and forest staff developed a recreation sampling system (NVUM) that provides statistical recreation use information at the forest, regional, and national level. From January 2000 through September 2003 every national forest implemented this methodology and collected visitor use information. This application served to test the method over the full range of forest conditions and provide a rough national estimate of visitation. Implementation of the improved method began in October 2004. Once every five years, each National Forest and Grassland has a year of field data collection. This NVUM data is useful for forest planning and decision making. The description of visitor characteristics (age, race, zip code, activity participation) can help forest staff identify their recreation niche. Satisfaction information can help management decide where best to place limited resources that would result in improved visitor satisfaction. Economic expenditure information can help forests show local communities the employment and income effects of tourism from forest visitors. In addition, visitation estimates can be helpful in considering visitor capacity issues.

In fiscal year 2010, NVUM data was collected on the BDNF. A summary of findings is presented here. The full report can be accessed at the following address:
http://apps.fs.usda.gov/nrm/nvum/results/ReportCache/Rnd3_A01002_Master_Report.pdf

Summary of Findings

Table 11, below, shows the number of visitors (and percentages) by zipcode.

Table 11. Top 15 most commonly reported ZIP codes, States, and Counties of National Forest Survey Respondents.

Zip Code	State	County	Percent of Respondents	Number of Survey Respondents
59701	Montana	Silver Bow	36.3	154
59725	Montana	Beaverhead	11.3	48
59711	Montana	Deer Lodge	11.3	48
59840	Montana	Ravalli	6.6	28
59801	Montana	Missoula	5.2	22
Unknown Origin[1]			4.5	19
59718	Montana	Gallatin	3.8	16
59858	Montana	Granite	3.5	15
59802	Montana	Missoula	3.3	14
59803	Montana	Missoula	3.1	13
59759	Montana	Jefferson	2.8	12
59715	Montana	Gallatin	2.6	11
59601	Montana	Lewis and Clark	2.1	9
59602	Montana	Lewis and Clark	1.9	8
59829	Montana	Ravalli	1.7	7

[1]Includes respondents reporting no ZIP code or an invalid ZIP code.

Silver Bow County was the most commonly reported ZIP code, which is not surprising, as Butte and surrounding area is the most populated in close proximity to the BDNF. Beaverhead and Deer Lodge counties both had 48 respondents, representing communities and surrounding areas of Dillon and Deer Lodge, respectively. Ravalli and Missoula Counties also had a high number of respondents.

Eighty-six percent of respondents were from Montana (Table 12, below). Idaho, Washington, and Alaska residents together comprised 5% of respondents. All other states accounted for 5% of the visitors, foreign visitors accounted for less than 1%, and 3% of respondents did not list their state of residence.

Table 12. State of residence reported, obtained through ZIP codes of respondents.

State of Residence	Percent of Respondents
Montana	86%
Unknown	3%
Washington	2%
Idaho	2%
Alaska	1%
All other states	5%
Foreign	1%

Table 13, below, lists activities in order of their popularity, the percentage of respondents who reported the given activity was their main activity while visiting the forest, and the average hours spent engaging in the activity.

Table 13. Activity participation reported by respondents, by percentage. Percentage of respondents who listed the activity as their main activity as well as the average hours engaged in the activity are also displayed.

Activity	Percent Participation	Percent Main Activity	Average Hours Doing Main Activity
Hunting	33.3	32.1	9.2
Hiking/walking	33.0	7.0	3.6
Viewing wildlife	26.0	3.3	1.7
Relaxing	25.8	5.8	10.5
Viewing natural features	25.8	4.1	9.7
Driving for pleasure	21.9	4.7	2.9
Fishing	21.4	14.4	4.9
Cross-country skiing	12.2	10.9	2.3
Developed camping	10.3	3.4	48.7
Downhill skiing	8.8	8.5	4.4

Activity	Percent Participation	Percent Main Activity	Average Hours Doing Main Activity
Picnicking	8.2	1.4	9.3
Nature study	6.2	0.1	40
Motorized trail activity	6.1	1.7	2.9
Visiting historic sites	5.7	1.1	2.2
Resort use	3.3	0.2	39.4
Bicycling	2.8	0.0	0.0
OHV use	2.8	0.2	4.0
Backpacking	2.7	0.2	17.4
Primitive camping	2.6	0.1	116.6
Horseback riding	1.9	0.2	3.8
Other non-motorized	1.8	0.3	4.3
Snowmobiling	1.7	1.3	7.3
Motorized water activities	1.7	0.5	5.4
Some other activity	1.3	1.2	4.0
Non-motorized water	1.3	0.4	3.8
Gathering forest products	1.2	0.2	2.5
Nature center activities	1.0	0.0	0.0
Other motorized activity	0.2	0.0	0.0
No activity reported	0.1	0.1	--

Respondents were involved in a variety of activities on the forest; the most common activities were hunting, hiking/walking, viewing wildlife, relaxing, viewing natural features, driving for pleasure, and fishing. Skiing, both cross-country and downhill, as well as camping at developed sites, were also popular activities.

2011 Road Condition Survey Findings

Background

During the summer of 2011, hydrology crews utilized a newly developed protocol called the Road Condition Survey, or RCS. The RCS is designed to identify road sediment sources and delivery points to streams. We collected data from several watersheds on the BDNF utilizing the RCS in draft form. The protocol was reviewed at the end of the summer. This report summarizes changes and findings associated with collected data.

Four project areas were selected for data collection associated with project and program goals and objectives. The four project areas gave us representative coverage of the forest to fully test and develop the protocol through different geology types and road designs.

History and Methodology

The RCS protocol was produced using a scaled down version of the RCS protocol developed and implemented on the Tongass National Forest. The protocol for the BDNF eliminated a number of fields and codes and focused the survey on road-stream interactions. It was also simplified so it could be implemented with minimal training and supervision. The fields that were incorporated into the BDNF protocol were chosen with engineering, hydrology, and fisheries resources in mind so the data could be utilized to conduct sediment related analysis, identify road-stream crossing issues associated with condition and passage or structures and identify specific locations for maintenance, reconstruction, and decommissioning opportunities.

Project Areas

We selected Boulder River, Birch/Willow/Lost Creeks, Rock Creek, and Jerry Creek as described below, including the rationale for selection and a summary of survey results.

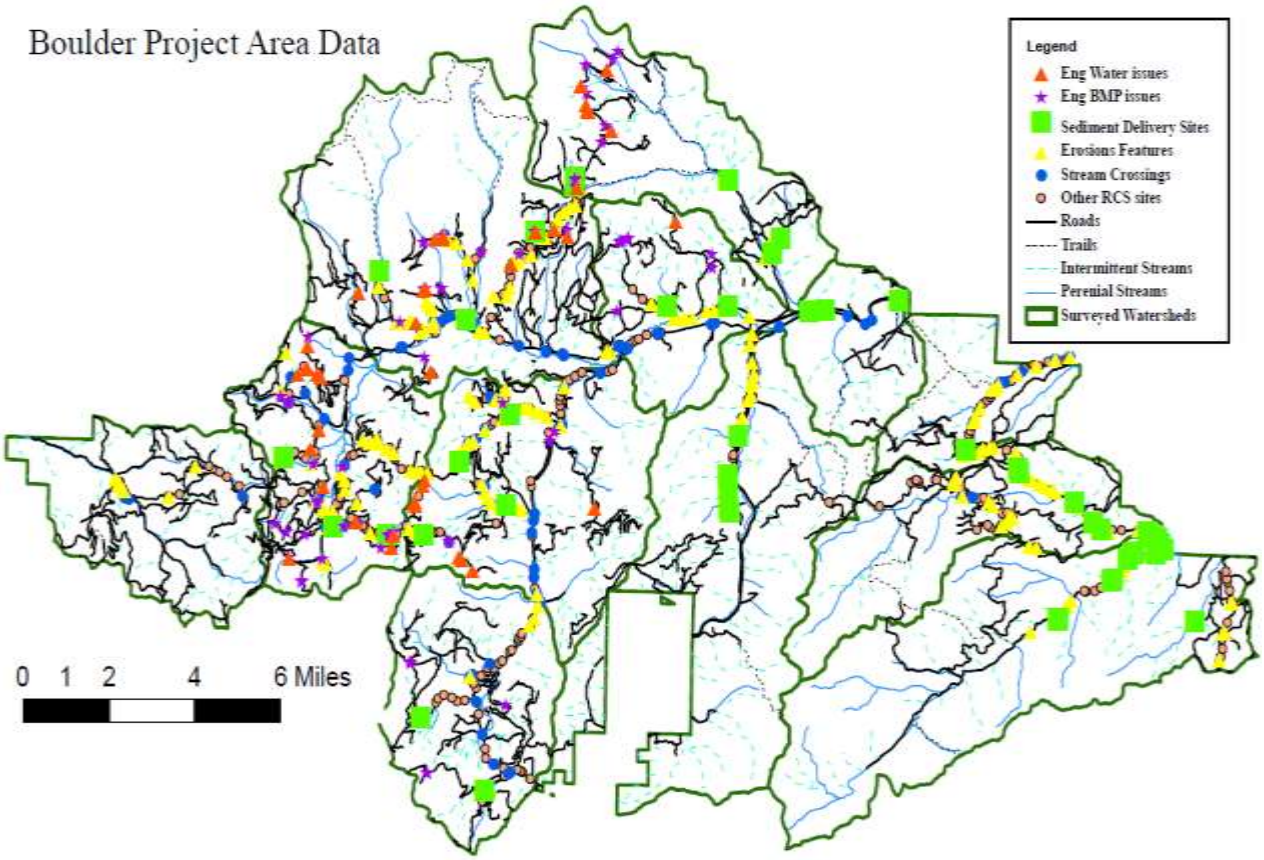

Figure 8. Boulder Project Area. Green squares indicate sediment delivery sites.

Boulder

The first area we surveyed was the Boulder EIS project area (Figure 8). The data we collected directly related to the sediment budget analysis needed for the EIS. Because the project area is very large and crews were traveling long distances to conduct surveys, roads were prioritized by proximity to water. By completing a quick GIS analysis we were able to create a list of routes that had segments of the road within close proximity of streams. The longer the road segment in close proximity to stream (less than 50' from a stream), the greater the priority it was given. Some road segments outside of 300 feet from streams were surveyed but were the lowest priority.

Spring runoff in 2011 was significantly higher than previous years and several road failures occurred in this project area. The first four roads that were prioritized on our list all washed out in at least one location giving positive feedback that our prioritization method worked well and should be utilized in future surveys if time constraints limit the amount of work that can be completed.

Data collected for the Boulder EIS was provided to Montana DEQ to assist with developing a Total Maximum Daily Load (TMDL) for the Boulder River Watershed. Using our data, DEQ developed a standardized sediment delivery at each crossing and for each road segment within

150’ of the stream. These delivery estimates could be further refined in the future with a more robust data set.

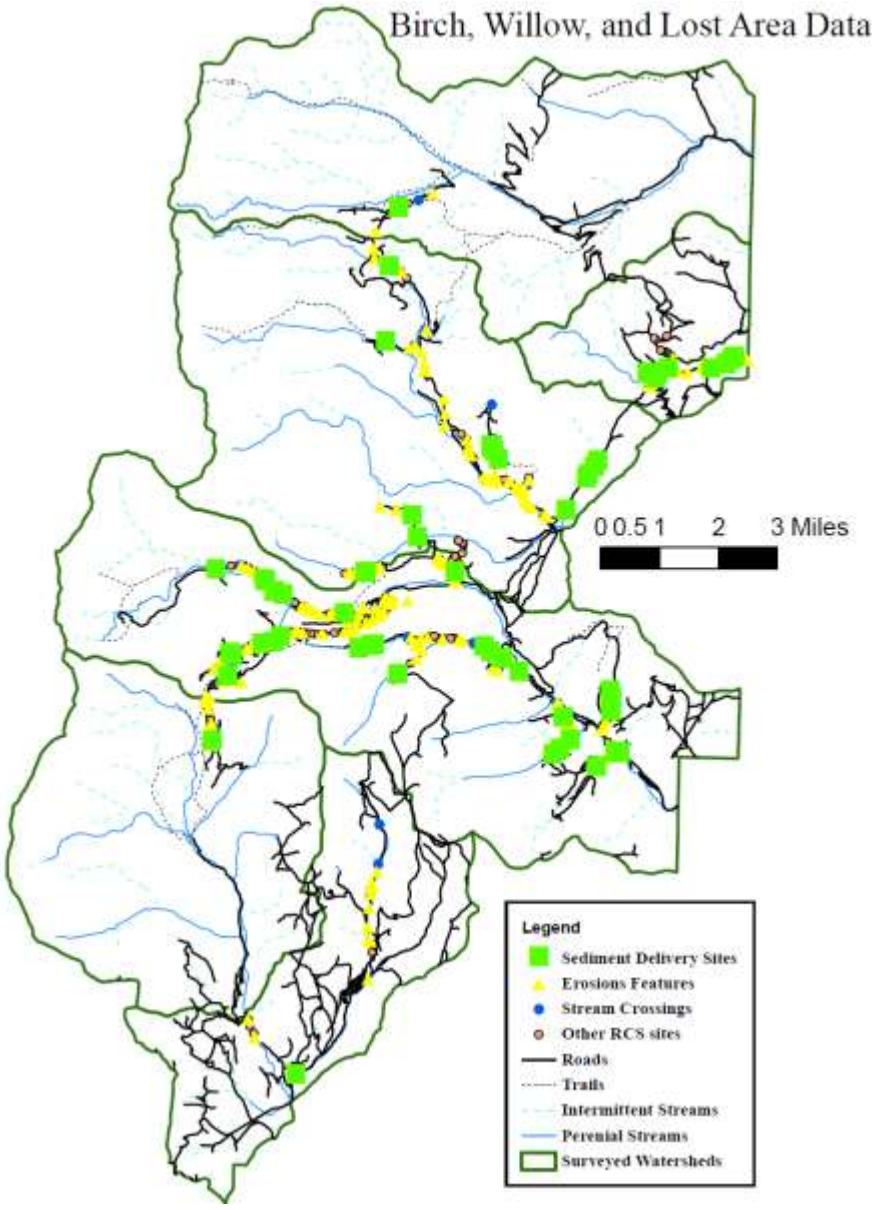

Figure 9. Birch, Willow, and Lost Project Area. Green squares denote sediment delivery sites.

Birch, Willow, and Lost

Next, we surveyed the Birch, Willow, Lost (BWL) Project area (Figure 9).

Because we had more familiarity with the roads in the BWL project area, roads were selected based on knowledge of existing problems. This project area, like the Boulder project area, is composed primarily of highly erosive decomposed granitic soils. The roads in both project areas have both designed and user created routes with a number of problems and associated TMDL listed streams for sediment.

Since high spring runoff also affected the BWL project area, we found timing our surveys during the runoff period was important to capture sediment movement.

Survey data concentrations decreased significantly following spring runoff and erosion sites were obscured and more difficult to capture without evidence of substantial erosion, especially in places where road crews were fixing erosion features from the spring runoff events.

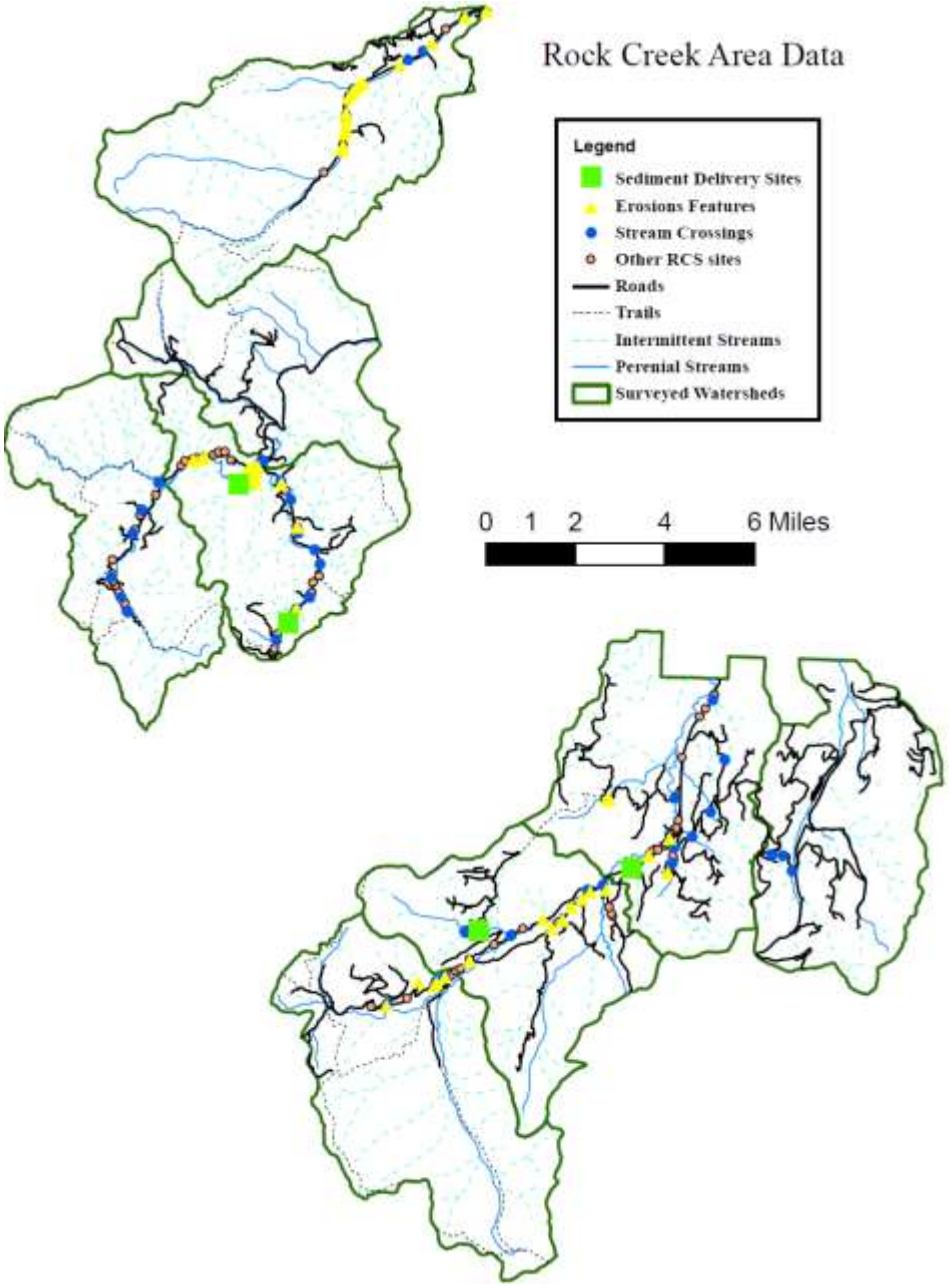

Figure 10. Rock Creek Project Area. Green squares denote sediment delivery sites.

Rock

The third area we conducted surveys was in the Rock Creek drainage (Figure 10). This area of data collection was tied to updating the Bull Trout Baselines which discussed increased sediment delivery to streams due to roads being located within 300 feet of streams in Riparian Conservation Areas (RCAs).

Roads sampled in this section of the Rock Creek drainage were primarily designed roads (rather than user created) and did not deliver sediment as readily as roads in the BWL or Boulder project areas. The geology types are less prone to erosion and road locations even in the RCA were typically far enough away from the streams to limit sediment delivery to streams. The road density was also lower in the sub-watersheds and survey point concentrations lower due to the proper design and location of roads in the watersheds.

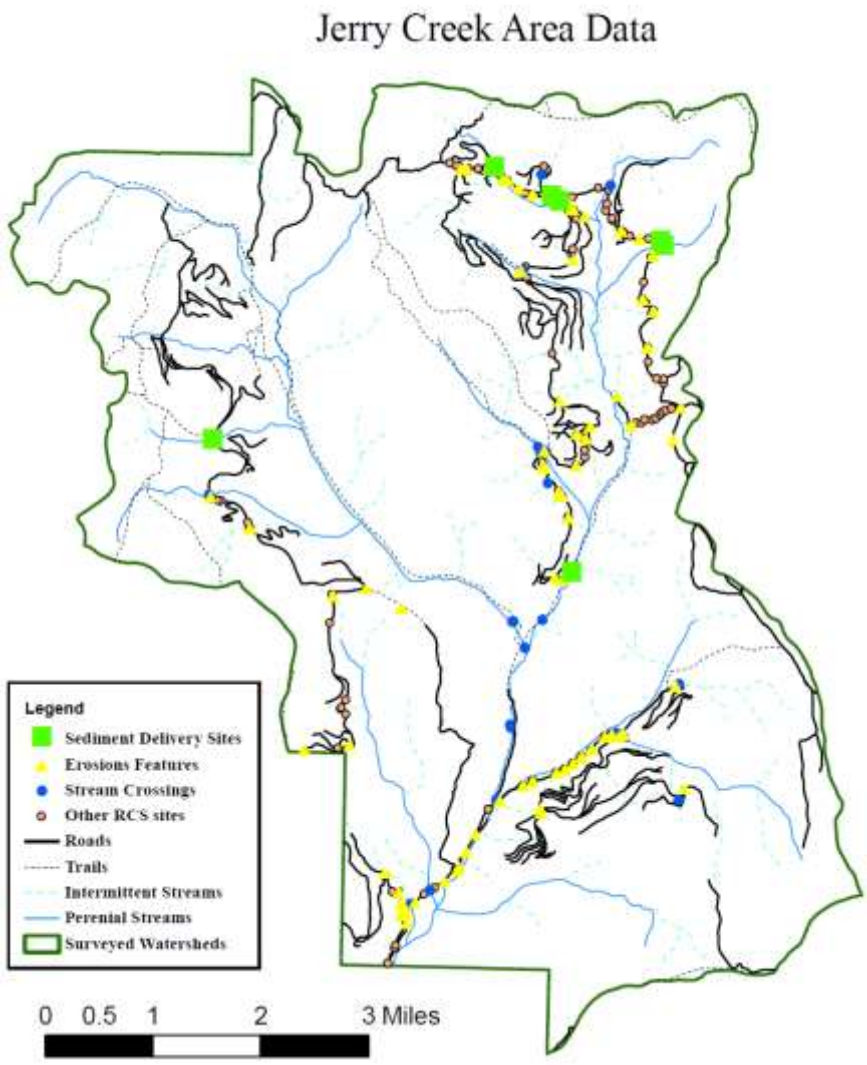

Figure 11. Jerry Creek Project Area. Green squares denote sediment delivery sites.

Jerry

The last place we surveyed in 2011 was the Jerry Creek drainage (Figure 11). This watershed was allocated as a Fish Key Watershed in the 2009 Forest Plan. Fifty-six Fish Key Watersheds were designated by the Forest Plan for focusing federal funds and personnel for the purpose of protecting, restoring, or maintaining viability of Threatened, Endangered, or Sensitive aquatic species. Jerry Creek has several projects identified to improve habitat for westslope cutthroat trout. A few potential projects were developed and included in the Fleecer Mountains Project EA.

Most of the roads in this watershed were designed roads for timber extraction in the upper watershed with a few motorized trails created along perennial streams in the project area. Several culverts were identified in the Fleecer Mountains project for replacement to re-connect upstream habitat cut off by culverts that did not provide adequate passage.

The goal for a Fish Key Watershed, as stated in the Forest Plan, is "populations of bull trout and westslope cutthroat trout exhibit numbers, life histories, age classes, recruitment levels, and reproductive characteristics representative of historic conditions." In order to accomplish this end and improve habitat conditions for cutthroat trout, this survey will be utilized to develop maintenance projects and prioritize roads for closure in the travel analysis process. In general, roads were in better condition than the BWL and Boulder project areas, but not as good as the Rock Creek drainage.

Data Interpretation and Analysis

Data

Road Condition Survey (RCS)

- 671 points collected in the Boulder EIS Project area
- 216 points collected in Rock Creek Watersheds
- 234 in the Jerry Creek Watershed (Fleecer Mountains Project area)
- 643 points collected in the Birch, Willow and Lost Creek Project area

Water Erosion Prediction Project (WEPP) Sheets Completed

- 46 sites collected in the Boulder EIS Project area
- 5 sites collected in Rock Creek Watersheds
- 7 sites collected in the Jerry Creek Watershed
- 63 sites collected in the Birch, Willow and Lost Creek Project area

Additional data analyzed (engineering crew data)

Sixty-seven sites in the Boulder EIS Project area collected by engineering staff that had indicated Best Management Practice (BMP) issues and an additional 45 water-related features. A total of 3,412 points were collected and mapped; a more qualitative data analysis may be used to access departures from the two data sets and identify problem spots on project roads.

Analysis

Data shows properly designed, located and maintained roads had significantly fewer issues than user-created unauthorized roads or historic roads that were improved before being incorporated into the road system. This is most applicable in the Rock Creek drainage where very few sediment delivery sites were found. The condition of roads designed for past timber sales were in very good condition compared to areas of the forest where user-created roads were built to access mining claims. In the Rock Creek Drainage, stream crossings appear to be the locations where sediment delivery was the greatest concern and should be addressed by disconnecting ditch lines and creating sediment traps or slash filters.

In the Boulder and BWL project areas, stream crossings accounted for more than half of the sediment delivery sites. The remaining sites were located where the road was adjacent to the stream. According to the data, nearly all of the sediment delivery sites (buffer distances/spatial analysis) were within 100 feet of the stream and 85% were within 50 feet of the stream.

This data shows that our measure of roads in the RCA or within 300 feet of a stream may be excessive when discussing sediment impacts to streams. This is especially important when evaluating our Bull Trout Baseline analysis, because not only are we evaluating roads within 300 feet of a stream, in the case of the Rock Creek drainage, we are also evaluating properly engineered roads in a stable geology where we are recording fewer erosion features and far

fewer sediment delivery sites. A measure of roads within 150 feet of streams would conservatively account for nearly all sediment delivery sites. For a watershed like Rock Creek it would be better to put more emphasis on stream crossings and the ability to hydrologically disconnect ditch lines and road beds at those locations to account for the majority of road sediment contributions and less emphasis on road segments beyond 150 feet from streams.

The data collected at the sediment delivery sites allow us to enter our data into the Water Erosion Prediction Project (WEPP) model (see http://forest.moscowfsl.wsu.edu/fswepp/) and predict sediment delivery at a location that can help us prioritize maintenance locations and determine a sediment budget associated with projects in the affected watersheds.

For large scale analysis purposes like the Boulder EIS, a possibility is to follow the same methodology DEQ used to determine sediment yields for stream crossings and road segments within a certain distance of the stream. The WEPP model could be used for all of the sediment delivery sites within the project area to determine an average sediment yield per site. The average sediment yield could then be extrapolated to all stream crossings. Stream crossings represent the locations where the highest amount of sediment delivery is seen and therefore would provide a fairly accurate sediment budget. This method may slightly overestimate sediment delivery, but the overestimation would likely account for additional sediment delivery sites not mapped, such as intermittent crossings. For adjacent road segments, a logical approach would be to break out roads within 50' and 50-150' of streams and develop a delivery amount per mile for those segments due to the wide range of expected values.

The RCS data associated with sediment delivery sites can also be used to determine how much sediment has been delivered to the stream historically by allowing calculation of the volume associated with an individual sediment delivery erosion feature.

The data show that approximately 15-20% of the sediment delivery sites historically produced greater than 10 cubic yards of material or one dump truck load to surveyed streams (this percentage would probably be significantly higher without past maintenance). The other 80-85% of the historical delivery sites contributed approximately 1 cubic yard on average across our dataset. This provides perspective and highlights the need for this data. This is the first data set allowing us to look at the volume associated with individual erosion features.

There are some assumptions inherent to the data which could result in overestimation of the total amount of sediment delivery to the stream, such as unconnected erosion features and sediment trap storage. However, there are also erosion features that that produce considerable sediment delivery that were not captured because road crews repaired (and thus obscured evidence of) a location that washed out, became un-drivable, or was a safety hazard. The survey crews saw evidence of recent roadwork throughout the project areas during the summer of 2011. Accounting for the amount of material we use to repair sections of roads that contribute to sediment delivery would help quantify the total amount of historic sediment delivery.

Conclusions

We collected valuable data that can be used for a number of projects and by a number of entities, including Montana DEQ, which has been utilizing our data to determine TMDL recommendations for the Boulder and Rock Creek drainages. This ability to share data and have data for a myriad of analyses will continue to benefit engineering, hydrology, and fisheries resources. The lessons learned will further improve this dataset in the future and streamline the data collection process.

With the data we have collected this summer, it is possible to:

- Prioritize road maintenance
- Perform credible sediment budget and sediment delivery analysis
- Identify infrastructure problems
- Quantitatively assess historic sediment deliveries
- Compare and quantify existing engineering data
- Capture existing road condition for project analysis
- Spatially display and analyze all RCS and WEPP data
- Visually assess current road problems with photos
- Quantify most significant erosion features on surveyed roads

The ability to complete all of these tasks from one data set collected by a crew with only one day of training demonstrates the utility and efficiency of the protocol. Future improvements will add to the utility as we incorporate other agencies' input and analyses.

Item 3: Watershed Restoration

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:

(1) Watershed Assessments

Work began on a Watershed Assessment in the Seymour and Deep Creek watersheds on the Wisdom and Wise River Ranger Districts. The assessment area is about 55,000 acres, 67% of which is National Forest System lands, and includes Seymour Creek, Sullivan Creek, Deep Creek, the West Fork of Twelvemile Creek, Twelvemile Creek, Corral Creek, and Tenmile Creek. Seymour Creek watershed and the west half of Deep Creek watershed (formerly named Sullivan Creek) are restoration key watersheds, while the east half of Deep Creek is a fish key watershed. The assessment will be completed in FY12 and result in a comprehensive list of recommendations and opportunities for improving resource conditions in the Seymour-Deep Creek area.

(2) Projects Completed in key watersheds

In FY 2011, a total of 15 miles of stream and 16 acres of lake restoration were completed in three Fish Key watersheds. All projects were non-native trout removals, focused toward improving the viability of existing westslope cutthroat trout populations. Restoration occurred in Norton Creek (5.0 miles; German Gulch Key Watershed), Doolittle Creek (3.0 miles; Doolittle Key Watershed) and Cherry Creek (7.0 miles; Cherry Pioneers Key Watershed). The two lakes were treated were also in the Cherry Pioneers key watershed; Cherry Lake (8.0 acres) and Granite Lake (7.5 acres) lake.

Evaluation:

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

Item 5: Mayfly Population Abundance

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 BDNF. It was selected because it commonly occurs in streams across the Forest and is influenced by changes in water quality, including sedimentation. The analysis for the Forest Plan recognized sedimentation as an impact common to aquatic systems from land management actions, including vegetation management, road construction, vehicular use of roads and trails, livestock grazing and restoration activities. 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.

Specific habitats have a greater potential for hosting DD than others. Generally, DD prefers higher stream gradients with larger sized substrate. However, it is often present in lower gradient reaches, where we commonly survey to evaluate aquatic impacts from management; but in lower densities. We expect to see abundances of DD decline in moderate to low gradient reaches if fine sediment is deposition 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 naturally vary in four ways:

1. Between stream segments within the same stream depending on the quality and abundance of preferred habitats.
2. Between streams, depending on differences in thermal regimes and 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.

Thus, sampling times, locations and equipment can influence comparability of data between years. Because DD was only identified as an aquatic MIS upon completion of the Forest Plan (2009), adjustments to sampling procedures remain a possibility as we learn more about distribution and emergence patterns in streams we monitor. Adjustments will be done with the intention of producing the most comparable data possible.

Because DD was relatively recently identified as an aquatic MIS, reliable trend information is not currently available. Through 2011, we have sampled and counted DD in 111 samples from 75 streams across the Forest. Densities ranged from 1 to 714 (per square meter); it is common for them to occur in relatively low densities. Thirty percent of samples occurred in densities of 10 or less. Fifty-two percent of samples had densities of 25 or less and 79 percent of samples had densities of 100 or less.

Evaluation

At this point there is insufficient data to draw any conclusions. In all streams there was variability in the dates 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, samples collected shortly before emergence one year and shortly after in another year would vary substantially. Sampling different locations within the same stream would also encourage different results. Finally, a natural range of variability occurs with any population over time.

Low abundances do not necessarily suggest poor habitat conditions. Declining trends and a complete loss of this species in sampled habitats would warrant assessment of conditions and factors dictating declining habitats. However, inferring management effects from single samples can be misleading. Interpretation of this MIS data will be more reliable when results from repeat samples are available. There will be an opportunity to correlate MIS data with management actions and habitat condition trends in the future.

Our monitoring is designed to measure changes in abundance of DD over time as an indication of changing sediment levels. Effects of proposed management on this species will be assessed based on expected change in stream function. As conditions improve in streams that are not in properly functioning condition, sediment levels will decline and DD densities should increase.

Item 6: Soil and Water Conservation Practices

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. SWCPs are comparable to "best management practices" or BMPs. During environmental analysis, interdisciplinary teams select appropriate SWCPs 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 30, 2011, an interdisciplinary team of 26 Forest and District specialists, District Rangers and a Staff Officer reviewed the implementation and success of a hazardous fuels reduction project in the Georgetown Lake area on the Pintler Ranger District. This vegetation treatment project was an outcome of the Georgetown Lake Hazardous Fuels Reduction Decision Memo, approved March, 2006. On December 5, 2007, the Ninth Circuit Court ruling in *Sierra Club v. Bosworth* invalidated the use of Categorical Exclusion (CE) Category 10 as described in FSH 1905.15 31.2 and remanded the case back to the District Court. In November 2008, the U.S. District Court issued a ruling stating the use of the category related to hazardous fuels reduction projects could not be used until the effects of the category were further analyzed under NEPA. As of November 2008, approximately 25% of the project had been completed. Because of the invalidation of the CE category, the BDNF took the proposed action, public involvement, and environmental effects analysis used to support the 2006 Decision Memo and wrote a new environmental assessment (EA) and Decision Notice (signed February, 2009). The EA was based on the 1987 Deerlodge Forest Plan. Prior to implementation, a review of the environmental analysis was done under Section 18.1 of the National Environmental Policy Act Handbook (FSH 1909.15) to determine if the decision met the requirements of the new 2009 Forest Plan. Three mitigation measures were added to bring the decision in compliance with the 2009 Forest Plan.

The purpose and need, as outlined in the 2009 Decision, is to:

- reduce hazardous fuels in the wildland-urban interface;
- reduce the potential of damage to public and private values at risk within the project area from wildland fire;
- increase firefighter and public safety.

The interdisciplinary team reviewed Units 8 and 12b on August 30, 2011. Unit 8 was harvested in the summer of 2008 under the 2006 Decision Memo. Unit 12b was harvested in the winter of 2011 under the 2009 Decision Notice.

The entire SWCP Handbook (FSH 2509.22) was incorporated by reference in Appendix A in the 2006 Decision Memo. SWCPs were not included in the 2009 Decision Notice; however, soil and water requirements (mitigation measures) listed in the 2009 Decision are the means for achieving SWCP for this project.

Chapter 10 of the SWCP handbook documents the SWCP for eight general management categories. They are:

Section 11. Watershed Management

Section 12. Recreation

Section 13. Vegetation Manipulation

Section 14. Timber

Section 15. Road and Trails

Section 16. Minerals

Section 17. Range

Section 18. Fire Suppression and Fuels Management

Only Section 14, Timber, applies to this project. The SWCP in this section are presented for units 8 and 12b. The SWCP, the objective of the SWCP, the finding or results of implementation, and an evaluation of its effectiveness are presented below for both units. Following the SWCP, other requirements (mitigation measures) of the 2006 Decision Memo and the 2009 Decision Notice, and the 18.1 Review are evaluated.

Results:

(a) SWCP 14.01 – TIMBER SALE PLANNING.

Objective: To incorporate soil and water resource considerations into Timber Sale Planning.

Finding: Specific mitigation measures were developed for the project during the environmental analysis by interdisciplinary team members. See *Other Requirements* section below for review of these mitigation measures.

Effectiveness: See *Other Requirements* section below for review of these mitigation measures.

(b) SWCP 14.02 – TIMBER HARVEST UNIT DESIGN.

Objective: To insure that timber harvest unit design will secure favorable conditions of water flow, maintain water quality and soil productivity, and reduce soil erosion and sedimentation.

Finding: This SWCP was met. During the planning phase of the project, unit boundaries were adjusted as needed to address potential resource concerns brought forth by the interdisciplinary team.

Effectiveness: This particular SWCP was effective in avoiding potential resource problems by proper unit design.

(c) SWCP 14.03 – USE OF SALE AREA MAPS (SAM) FOR DESIGNATING SOIL AND WATER PROTECTION NEEDS.

Objective: To delineate the location of protected areas and available water sources and to insure their recognition, proper consideration, and protection on the ground.

Finding: This SWCP was met. The Streamside Management Zone (SMZ) for Echo Lake was delineated in the SAM for Unit 8.

Effectiveness: The SWCP was effective in making the SMZ for Echo Lake obvious on the SAM.

(d) SWCP 14.04 – LIMITING THE OPERATION PERIOD OF TIMBER SALE ACTIVITIES.

Objective: To minimize soil erosion and sedimentation and loss in soil productivity by insuring that the purchaser conducts his/her operations in a timely manner.

Finding: This SWCP was met. Both Decisions required soil water contents of less than 12% before summer harvest was permitted. Also, winter harvest, with 4 inches of frozen ground and 1 foot of snow, was required on some units. Unit 8 was harvested when dry, as evidenced by low amount of detrimental soil disturbance measured by the Forest soil scientist (see *Other Requirements* section below for review of specific soil mitigation measures). Additionally, daily inspection notes from the sale administrator indicate soil moisture was monitored in order to determine when logging operations could begin for Unit 8. For example, the sale administrator monitored soil moisture in Unit 8 on 7/22/08 and found soil moisture was still too high (greater than 12%) to begin harvest activities. Similarly, operations were shut down 9/2 – 9/14/08 and again 9/22 – 9/24/08 due to wet conditions and only began again once soils dried out to less than 12% moisture.

Effectiveness: This SWCP was effective at limiting soil disturbance, thereby protecting soil productivity and preventing erosion and sedimentation. See *Other Requirements* section below for review of specific soil mitigation measures.

(e) SWCP 14.05 – PROTECTION OF UNSTABLE AREAS.

Objective: To protect unstable areas and to avoid triggering mass movements of the soil mantle and resultant erosion and sedimentation.

Finding: No unstable areas exist within the harvest units; therefore, this SWCP is not applicable.

(f) SWCP 14.06 – RIPARIAN AREA DESIGNATION.

Objective: To minimize the adverse effects on riparian areas with prescriptions that manage nearby logging and related land disturbance activities.

Finding: This SWCP was met. Echo Lake was protected in Unit 8.

Effectiveness: This SWCP was effective because harvest operations were not conducted near the lake. Specifically, no ground disturbing equipment was operated within 50 feet of the edge of Echo Lake. For the distance 50-150 feet of the lake edge, ground-based equipment was not allowed to establish skid trails. No slash burning was allowed within 150 feet of the lake edge. These buffers protected the riparian areas associated with the lake.

(g) SWCP 14.07 – DETERMINING TRACTOR LOGGABLE GROUND.

Objective: To protect water quality from degradation caused by tractor logging ground disturbance.

Finding: This SWCP was met. This was part of the project design. Unit 8 and 12b had no slopes over 35%. Unit 8 slopes ranged from 15-20% and Unit 12b slopes ranged from 25-30%.

Effectiveness: This SWCP was effective because areas that are too steep for tractor harvest were avoided, thus preventing excessive soil disturbance associated with operating on ground that is too steep for tractor harvest.

(h) SWCP 14.08 – TRACTOR SKIDDING DESIGN.

Objective: To minimize erosion and sedimentation and protect soil productivity by designing skidding patterns to best fit the terrain.

Finding: This SWCP was met.

Effectiveness: This SWCP was effective; no skid trails in Units 8 and 12b had erosion. Additionally, slash was placed as needed to disperse water flow and prevent erosion.

(i) SWCP 14.09 – SUSPENDED LOG YARDING IN TIMBER HARVESTING.

Objective: To protect the soil from excessive disturbance and accelerated erosion and to maintain the integrity of the riparian areas and other sensitive areas.

Finding: Not applicable. This mitigation measure applies to steep ground that is cable harvested. All units in the Georgetown Lake Hazardous Fuels Reduction project are on slopes suitable for tractor harvest.

(j) SWCP 14.10 – LOG LANDING LOCATION AND DESIGN.

Objective: To locate in such a way as to avoid soil erosion and water quality degradation.

Finding: This SWCP was met. The location of the landing for all units is approved by the timber sale administrator. Landing locations for Units 8 and 12b are located on naturally flat

to gently sloping ground reducing the risk of erosion. All landings are distant from surface water reducing the risk of sediment impacts in the unlikely event erosion occurs.

Effectiveness: This SWCP is especially effective on these two units because topography permitted the landing locations on flat to gently sloping natural surfaces away from surface water.

(k) SWCP 14.11 – LOG LANDING EROSION PREVENTION AND CONTROL.

Objective: To reduce erosion and subsequent sedimentation from log landings through the use of mitigating measures.

Finding: This SWCP was met. The landing for Units 8 and 12b was seeded with native grass seed to establish vegetation and reduce the risk of erosion.

Effectiveness: This SWCP was effective in reducing erosion. Ensuring adequate ground cover reduces the energy of overland flow and plant roots hold the soil in place in the event of runoff.

(l) SWCP 14.12 – EROSION PREVENTION AND CONTROL MEASURES DURING THE TIMBER SALE OPERATION.

Objective: To ensure that the purchaser's operations shall be conducted reasonably to minimize soil erosion.

Finding: This SWCP was met. The timber sale contract contains the required provisions to prevent and control erosion, and the timber sale inspection reports document that the sale administrator enforced these contract provisions.

Effectiveness: This SWCP was effective. No erosion was noted in Units 8 and 12b. Vegetative recovery has occurred in Unit 8 and is progressing satisfactorily in Unit 12b. The combination of vegetative cover, slash placement, and drainage structures protect the ground from erosion.

(m) SWCP 14.13 SPECIAL EROSION PREVENTION MEAURES ON AREAS DISTURBED BY HARVEST ACTIVITIES.

Objective: To prevent erosion and sedimentation on disturbed areas.

Finding: This SWCP was not applicable. SWCP's 14.07, 14.08, 14.10, 14.11, and 14.12 were adequate to prevent erosion; no special erosion prevention measures were required.

(n) SWCP 14.14 REVEGETATION OF AREAS DISTURBED BY HARVEST ACTIVITIES.

Objective: To establish a vegetative cover on disturbed areas to prevent erosion and sedimentation.

Finding: The landing and exposed areas on skid trails lacking cover in Unit 8 were seeded in the fall of 2009 and Unit 12b in the summer of 2011. At the time of monitoring, seeded vegetation is progressing satisfactorily.

Evaluation: This SWCP was effective. Areas that needed vegetative cover were identified and seeding took place as needed. Seeded vegetation is progressing satisfactorily and will provide adequate cover to prevent erosion.

(o) SWCP 14.15 EROSION CONTROL ON SKID TRAILS.

Objective: To protect water quality by minimizing erosion and sedimentation derived from skid trails.

Finding: This SWCP was met. Meeting SWCPs 14.07, 14.08, and 14.11 also aid in meeting this SWCP. Slash was placed where needed on skid trails in Unit 8. Likewise, waterbars and kelly-humping skid trails was completed where needed. These activities were mentioned specifically for Unit 8 in the sale administrator's 10/16/08 inspection report, before the unit was accepted as completed.

Effectiveness: This SWCP was effective. No erosion was noted in Units 8 and 12b. Vegetative recovery has occurred in Unit 8 and is progressing in Unit 21b. Grasses and forbs are present in pre-harvest densities. The ground is protected from erosion.

(p) SWCP 14.16 MEADOW PROTECTION DURING TIMBER HARVESTING.

Objective: To avoid damage to the ground cover, soil and water in meadows.

Finding: Two sizeable wet meadows are within Unit 8. They were not affected at all by timber harvest activities in the unit around them. Unit 12b has no wet meadows.

Effectiveness: This SWCP was effective by not allowing any harvest activity within these sensitive areas.

(q) SWCP 14.17 STREAM CHANNEL PROTECTION (IMPLEMENTATION AND ENFORCEMENT).

Objective: To protect natural streamflows; to provide unobstructed passage of flows; reduce sediment input; and to restore flow if diverted by timber sale activity.

Finding: This SWCP was not applicable. There are no streams in Units 8 and 12b.

(r) SWCP 14.18 EROSION CONTROL STRUCTURE MAINTENANCE.

Objective: To insure that constructed erosion control structures are stabilized and working effectively.

Finding: All erosion control structures observed are stable and functioning.

Effectiveness: Not applicable, no maintenance needed.

(s) SWCP 14.19 ACCEPTANCE OF TIMBER SALE EROSION CONTROL MEASURES BEFORE SALE CLOSURE.

Objective: To assure the adequacy of required erosion control work on timber sales.

Finding: Slash was placed where needed on skid trails in Units 8 and 12b. Likewise, waterbars and kelly-humping skid trails was completed where needed. These activities were mentioned specifically for Unit 8 in the sale administrator's 10/16/08 inspection report, and likewise at various dates for Unit 12b before the units were accepted as completed.

Inspection reports document erosion control seeding completed in Unit 8 on 10/19/09 and Unit 12b on 7/7/11.

Effectiveness: This SWCP was effective. No erosion was noted in units 8 and 12b; the erosion control measures were functioning properly, and vegetative cover was progressing satisfactorily on seeded areas.

(t) SWCP 14.20 SLASH TREATMENT IN SENSITIVE AREAS.

Objective: To protect water quality by protecting sensitive tributary areas from degradation which would result from using mechanized equipment for slash disposal.

Finding: Not applicable. This SWCP was not needed as there are no sensitive tributary areas in Units 8 and 12b.

REQUIREMENTS IN ADDITION TO SWCPS:

A. Mitigation Common to all Units: these mitigation measures were included in both the 2006 and 2009 Decisions. Units 8 and 12b will be discussed for each mitigation measure. More detailed discussion of soil monitoring of the Georgetown Lake Hazardous Fuels Reduction Project is presented in Item 7, Soil Productivity.

(1) *Soils: Existing roads and trails will be used for skidding, landings, and for dropping logs at landings whenever possible.*

Objective: To protect soil productivity by preventing new areas of disturbance, whenever possible.

Finding: This mitigation measure is a standard operating procedure. It was specifically mentioned as being implemented in Unit 8 in the sale administrator's 8/27 and 9/17/08 inspection notes. Unit 12b was completed in the winter of 2011, so skidding was done over snow and frozen ground.

Effectiveness: This mitigation measure was effective as Unit 8 had no detrimental soil disturbance based on monitoring completed in the unit after harvest activities were completed. Had existing roads not been utilized for skidding, detrimental soil disturbance likely would have been higher. Unit 12b was harvested in the winter, so this mitigation measure was not as important.

(2) *Soils: Skid trails on undisturbed soil and used during the summer will be spaced appropriately to meet the 85% soil in satisfactory condition standard.*

Objective: To protect soil productivity by limiting new areas of disturbance.

Finding: The only identifiable skid trails appeared to be existing roads used for skidding and those near landings. Unit 12b was logged during the winter so this requirement is not applicable.

Effectiveness: This mitigation measure was effective as Unit 8 had no detrimental soil disturbance based on monitoring completed in the unit after harvest activities were completed. Some skid trails observed near landings had more disturbance but no random plots fell on them. More detrimental disturbance may have been identified if existing roads had not been used.

(3) *Soils: Disturbed areas at landings or elsewhere will be rehabilitated to shorten the recovery period for displaced, rutted, and compacted soils*.

Objective: To hasten recovery of disturbed soils.

Finding: All landings and skid trails in Units 8 and 12b were scarified as needed. Landings and skid trails in Unit 8 were seeded by September 2009 and in Unit 12b by July 2011.

Effectiveness: This mitigation measure was implemented; soil recovery will take place over time. Vegetative recovery is progressing acceptably. Slash at one landing observed in Unit 8 had not completely burned. Soil was observed in the unburned slash and may have been partly to blame. The pile was near an existing road which appeared to be the source for the soil as no other bare soil areas were noticed nearby.

At the time of the field review, slash had not been burned in Unit 12b. These slash piles were sold for firewood after the field review. Slash remaining after the firewood contract will be re-piled and burned. Soil effects from these burns will be greatly reduced because most of the heavier fuels will have been removed for firewood.

(4) *Soils: Skid trails with bare soil exposed will be seeded, have slash placed on them and/or be water barred as appropriate to prevent erosion*.

Objective: To prevent soil erosion on disturbed areas.

Finding: Sale administrator's daily inspection notes mention scarifying, providing drainage, and applying slash to skid trails to prevent erosion and 4-wheeler activity. Skid trails in Unit 8 were seeded by September 2009 and those in unit 12b were seeded by July 2011.

Effectiveness: This mitigation measure was effective. No detrimental erosion or other soil disturbance was noted on random plots taken in units 8 and 12b. All areas observed in Units 8 and 12b were satisfactorily treated.

(5) *Soils: Skid trails likely to be used by four wheelers will have slash placed on them to prevent this use.*

Objective: To protect soil productivity by allowing disturbed areas to recover.

Finding: This mitigation measure was met. Slash was placed on skid trails to prevent unauthorized use.

Effectiveness: This mitigation measure was implemented correctly and should be effective in eliminating unauthorized use by 4-wheelers, thereby allowing disturbed soils to recover.

(6) *Soils: Small slash piles will be burned in the fall when the soil is cool or frozen. Large slash piles will be chipped (most desirable), hauled to slash disposal areas and chipped or burned, burned in incinerators, burned on roads, or burned on soil (least desirable).*

Objective: To protect soil productivity by preventing severely burned soil during slash disposal.

Finding: One burned slash pile in Unit 8 was evaluated for severely burned soil. Almost all of the area burned was classified as low to moderate severity because charred litter and duff were present under the ash. Small areas were classified as high severity because the duff and litter were completely consumed and soil was discolored by heat at some of these locations.

One side of this slash pile did not completely burn. Soil was observed in the unburned slash and may have been partly to blame. The pile was near an existing road which appeared to be the source for the soil as no other bare soil areas were noticed nearby.

At the time of the field review, slash had not been burned in Unit 12b. These slash piles were sold for firewood after the field review. Slash remaining after the firewood contract will be re-piled and burned. Soil effects from these burns will be greatly reduced because most of the heavier fuels will have been removed for firewood.

Effectiveness: Because the slash pile monitored in Unit 8 had only small areas of severely burned (detrimental) soils, this mitigation measure was effective.

(7) *Soils: Temporary roads will be obliterated and revegetated.*

Objective: To hasten soil recovery in disturbed areas.

Finding: No temporary road construction occurred in Units 8 or in 12b.

Effectiveness: Not applicable—no temporary road construction occurred in Units 8 or in 12b.

(7) *Soils: Units 8 and 12b can be harvested during the summer after spring breakup when soil is drier than 12 percent water content. They can also be harvested during winter conditions when the soil is frozen to 4 inches with 12 inches of snow cover.*

Objective: To prevent soil displacement, compaction and rutting from mechanized cutting and skidding.

Finding: Unit 8 was harvested during the 2008 summer, and Unit 12b was harvested during the 2011 winter. All monitoring plots in Units 8 and 12b were free of detrimental soil disturbance. Soil disturbance was noted near landings in Unit 8 but none of the randomly located plots fell on them. Inspection reports document oil water contents were monitored, sale activity was not started until soil had dried sufficiently, and sale activity was suspended during periods when soil was too wet.

Soil disturbance was also noted in Unit 12b, but again, none of the randomly located plots fell on them. Local areas of detrimental rutting, compaction and soil displacement observed in Unit 12b were not consistent with operations over snow and frozen ground. Inspection reports indicate localized soft spots had been crossed with machinery on skid trails. It is likely warmer weather after harvesting began was partly responsible by thawing snow covered trails preventing deep soil freezing. Inspection reports also note that the main skid trail was moved upslope to get around the soft spots and other soft spots were avoided by machinery and later trails remained snow packed. The disturbances observed covered small areas and little could be done to effectively rehabilitate them, especially during winter. Re-entering the area during summer would likely cause additional disturbance, so natural recovery is preferred.

Effectiveness: Both measures are effective. Summer operations with soil water content below 12% were effective and successful in Unit 8. Winter operations over snow and frozen ground are normally more effective than observed in Unit 12b. However, Unit 12b meets soil quality standards, so the mitigation measure was effective.

(8) *Scenery: Avoid straight treatment unit boundaries in favor of meandering, curvilinear boundary lines.*

Objective: To help visually blend timber harvest units with the surrounding environment.

Finding: This mitigation measure was met in both Units 8 and 12b.

Effectiveness: This mitigation measure was effective.

(9) *Scenery: Flush cut stumps visible from the lake, roads, trails, and rec sites. Where possible, locate slash piles so as not to be visible from these locations. Visible slash piles and landing debris will be removed or burned promptly.*

Objective: To help visually blend timber harvest units with the surrounding environment.

Finding: A landing was missed and not burned in Unit 8. Stumps in Unit 12b were cut as close as possible. Slash piles from Unit 12b were not burned at the time of the field review.

Effectiveness: This mitigation measure was not fully effective in Unit 8 because a slash pile was left unburned at one landing. Stumps in Unit 12 were cut as close to the ground as possible. Slash piles from Unit 12b were not burned at the time of monitoring.

(10) *Scenery: Locate landings in less dense portion of stands or on the edges of natural openings to minimize the number of trees removed.*

Objective: To help visually blend timber harvest units with the surrounding environment.

Finding: Not applicable to the units we monitored. Unit 8 was a dense stand with no natural openings and the landing for Unit 12b was in a sagebrush/grass park next to the unit.

(11) *Scenery: Areas within 50-100 feet of parking spurs and camping pads will be considered areas of special concern and marking and layout within these areas will be accomplished with the input of an agency landscape architect and district recreation forester.*

Objective: To protect developed sites.

Finding: Coordination during layout occurred for Unit 8, which is adjacent to the Echo Lake Picnic Area. This mitigation measure was not applicable for Unit 12b.

Effectiveness: The access road to the Echo Lake Picnic Area is about 60 feet from the south boundary of Unit 8. The nearest parking spur in the Picnic Area is about 170 feet from the south boundary of Unit 8. Canopy cover within Unit 8 along the south boundary is much higher than the rest of Unit 8. Coordination resulted in successfully reducing visual impacts of Unit 8 when viewed from the Picnic Area.

(12) *Scenery: When laying out units in close proximity to permittee residences, work with permittee to identify trees for removal.*

Objective: To take residences into consideration with unit design.

Finding: Coordination with permittees occurred during layout of Unit 8, with the exception of one permittee who was not interested. This mitigation measure was not applicable for Unit 12b.

Effectiveness: This mitigation measure was effective for Unit 8; permittees were included in unit design.

(13) *Scenery: Along road 406, 8686, 65, 672, and the campground access roads, treatment should result in the creation of areas of the stand which allow longer views into the stand in some places and restrict views in other areas.*

Objective: To protect the scenic integrity of concern level 1 scenic roads. Concern level 1 is defined as a travel route or site where use is high, and/or concern for the scenery is high.

Finding: Beetle activity limited the ability to implement this mitigation measure in both units. Dead, dying, and structurally unsound trees were removed per the Decision. In Unit 12b, blowdown was especially problematic.

Effectiveness: This mitigation measure was not effective because it was not possible to implement fully while meeting the purpose and need.

(14) *Heritage: All identified heritage properties will be flagged with a 50 meter buffer area surrounding them and protected from project impacts. Recreation residences will be the exception to the 50 meter buffer.*

Objective: To protect cultural resources.

Finding: The sale area did not have any sites, nor were any found during implementation; therefore, this mitigation measure was not applicable.

(15) *Sensitive Plants: All equipment must be washed prior to entering the project area.*

Objective: To protect sensitive plant populations by preventing the introduction of invasive plants and noxious weeds.

Finding: The sale administrator's 8/8 and 8/15/08 notes document vehicle washing of the bobcat clipper, skidder, and dozer for Unit 8. The sale administrator's 1/25/11 notes document communication from the district weed specialist that vehicle washing was not necessary for operations in Unit 12b.

Effectiveness: This mitigation measure was implemented. Effectiveness is difficult to measure.

(16) *Wildlife: A goshawk nest protection clause will be added to the sale contract which states: if a new (previously unknown) active goshawk nest is discovered during marking or treatment operations, a 40-acre no treatment buffer will be established around the nest to conserve the nest area, and no treatment related activities will occur within a 170-ha area from April 1 – August 15.*

Objective: To mitigate management actions around known active goshawk nest sites.

Finding: No goshawk nests were found in Units 8 and 12b.

Effectiveness: No nests occurred in the units we monitored, so effectiveness cannot be determined.

(17) *Wildlife: Snags greater than 10" DBH will not be cut except as necessary to maintain safety of treatment crews, operators, or the public.*

Objective: To provide wildlife habitat through maintaining snags.

Finding: No stand exams were completed prior to project implementation; therefore, determination of whether this mitigation measure was met is not possible.

B. Mitigation prescribed for Unit 8: these mitigation measures were included in the 2006 Decision. Unit 8 will be discussed for each mitigation measure. More detailed discussion of soil monitoring of the Georgetown Lake Hazardous Fuels Reduction Project is presented in Item 7, Soil Productivity.

(1) *Recreation: No operations December 15 to April 1, coordinate from May 15- September 15.*

Objective: To provide for safe recreation opportunities year-round.

Finding: Timber sale administrator's daily inspection notes show harvest activities occurred from August to October, 2008.

Effectiveness: This mitigation measure was effective because harvest activities occurred from August to October, and coordination between the recreation forester and sale administrator occurred to ensure safety and recreation opportunities were provided (Bob Johns, personal communication, 2/5/12).

(2) *Soils: Unit can be harvested during the summer after spring breakup when soil is drier than 12%. Can also be harvested under frozen conditions as described for unit 3.*

Objective: To protect soil productivity by preventing or minimizing detrimental soil disturbance.

Finding: Unit 8 was harvested August to October, 2008. Sale administrator's 7/22/08 inspection notes show soil was too wet to begin harvest. Harvest did not begin until August. Daily inspection notes also documented harvest activities were shut down 9/2- 9/14/08, and again from 9/22-9/24/08, due to wet conditions. It snowed on 10/14/08, but the snow packed well and there was no need to shut down operations.

Effectiveness: This mitigation measure was effective in limiting detrimental soil disturbance. Soil disturbance data collected in Unit 8 found no detrimental soil disturbance. See Item 7, Soil Productivity, for more information.

(3) *Fisheries: No ground disturbing equipment will be operated within 50' of the edge of Echo Lake, or the full pool elevation of Georgetown Lake. For the distance 50-150' of the lake edge, ground-based equipment will not be allowed to establish skid trails. No slash burning will occur within the 150' buffer between the lake edge and the outer edge of the RHCA.*

Objective: To protect aquatic resources by limiting ground disturbance near Echo and Georgetown Lakes.

Finding: This mitigation measure was included in the timber sale contract under provision C6.4#. Timber sale administrator daily inspection notes indicate the provision was reviewed with the purchaser on 8/5/08.

Effectiveness: This practice was effective. Unit 8 had no detrimental soil disturbance. Additionally, the prescribed buffers were adhered to. No evidence of negative effects to Echo Lake as a result of the harvest activities was observed.

(4) *Scenery: Maintain the same degree of vegetative screening between the residences and the shoreline. This should not preclude removal between the residences and the lake, but may be achieved by removing trees which duplicate the screening effect of other trees.*

Objective: To maintain the same degree of vegetative screening near residences.

Finding: The first 50' from the lake up was already a no-cut buffer. This mitigation measure was met to the degree possible while still meeting the primary objective for treatment (hazardous fuel reduction).

Effectiveness: The mitigation measure appeared to be effective; residences still have a fair amount of vegetative screening.

(5) *Wildlife: Ground disturbing activities will not occur from April 15 through July 1 to remove potential for impacts to denning and nesting mammals and birds (i.e. lynx, fisher, blackbacked, three toed and hairy woodpecker).*

Objective: To eliminate potential for impacting denning and nesting mammals and birds.

Finding: This mitigation measure was included in the timber sale contract under provision C6.316. Daily inspection notes indicate harvest activities for Unit 8 occurred August - October, 2008. Therefore, the mitigation measure was followed.

Effectiveness: The mitigation measure was effective because harvest occurred outside the time frame where denning and nesting mammals would be impacted.

C. Mitigation prescribed for Unit 12b: these mitigation measures were included in the 2009 Decision. Unit 12b will be discussed for each mitigation measure. More detailed discussion of soil monitoring of the Georgetown Lake Hazardous Fuels Reduction Project is presented in Item 7, Soil Productivity.

(1) *Soils: Unit can be harvested during the summer after spring breakup when soil is drier than 12%. Can also be harvested under frozen conditions as described for unit 3.*

Objective: To protect soil productivity by preventing or minimizing detrimental soil disturbance.

Finding: Unit 12b was harvested in February of 2011 over snow and frozen ground. The main skid trail was moved because soft spots developed on the trail being used. This was a case where the BMP failed and corrective action was taken. Corrective action was taken quickly enough to limit the extent of detrimental disturbance. No randomly located soil disturbance plots fell on the detrimental disturbance.

Effectiveness: This mitigation measure was effective in limiting detrimental soil disturbance. Soil disturbance data collected in Unit 12b found no detrimental soil disturbance. See Item 7, Soil Productivity, for more information.

(2) *Wildlife: No treatment related activities will occur from April 1 through August 15 to remove the potential for any added disturbances to breeding goshawks within a 170-ha area (PFA) centered on four known goshawk nests near Piney Point. On August 16, treatment related activities may commence within the 170-ha area. No treatment or treatment related activities will occur within the 40 acre protected nest area centered on each of the four known nests.*

Objective: To mitigate management actions around known active goshawk nest sites.

Finding: Timing restrictions were met. Unit 12b was harvested in February, 2011.

Effectiveness: This mitigation measure was effective because timing restrictions were met. Goshawk nests were not disturbed during breeding.

(3) *Wildlife: Mitigation measures that prohibit ground disturbing activities and prescribed fire inside 50-150 foot buffer zones in the portions of the unit that abut Echo Lake, Georgetown Lake or Blodgett Gulch will remove the potential for impacts to forest/riparian ecotones and remove the potential for effects to bog lemming.*

Objective: To prevent impacts to bog lemming populations.

Finding: Not applicable to Unit 12b. No water or riparian areas exist within 150’ of this unit.

D. This section describes additional mitigation measures that were prescribed for Unit 12b as a result of the 18.1 review to ensure the decision was compliant with the 2009 Forest Plan.

(1) *Air Quality: Prescribed burning and slash pile burning will comply with smoke management requirements in the Idaho/Montana Airshed Group Operating Guide (Air Quality-1).*

Objective: To comply with smoke management requirements.

Finding: Not applicable to Unit 12b. Slash piles had not been burned yet.

(2) *Project related fuels and toxicants will not be stored within Riparian Conservation Areas. Refueling in RCAs is prohibited except for emergency situations, in which case refueling sites must have an approved spill containment plan (Aquatic Resources-25).*

Objective: To prevent fuel and toxicant spills in RCAs.

Finding: Not applicable to Unit 12b; no riparian areas in unit.

(3) *Unplanned discoveries of heritage resources during project operations shall cause project operations in the area of the discovery to cease until analysis and evaluation of the heritage resources are completed, including consultation with the Montana SHPO and appropriate Indian tribes (Heritage Resources-2).*

Objective: To protect heritage resources from damage possible with harvest operations.

Finding: Not applicable to Unit 12b; no heritage resources present in unit.

Item 7: Soil Productivity

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:

Location of Project and Activity Monitored

The Georgetown Hazardous Fuel Reduction (HFR) project is located in the Georgetown Lake area on the Pintler Ranger District. Soils in the project area have developed in metasedimentary (Belt) rock and glacial moraine parent materials. They are resistant to erosion, mass wasting, compaction and rutting.

Timber harvest Units 3a, 8, 12b, and 12c were monitored to 1) determine the effects of the project on soil quality as defined by Region 1 Soil Quality Standards (SQS) , and 2) to evaluate whether BMPs were implemented and how effectively they protected soil productivity. Monitoring was completed August 25, 2011.

Sampling Methods

SQS state that 85% of activity areas (individual timber harvest units) must have soil in satisfactory condition, thus meeting the intent of the National Forest Management Act. Conversely, areas of detrimental soil disturbance are not in satisfactory condition. SQS define detrimental soil disturbance thresholds for compaction, rutting, displacement, severely-burned soil, erosion and mass movement.

Howes' method (Howes, 2000) was used to monitor soil disturbance until 2007. In 2007 the Forest Soil Disturbance Monitoring Protocol was introduced, evaluated, revised and in 2009 finalized and published (USDA Forest Service 2009). This method has been used since 2007.

All treatment units proposed by the year 2003 were sampled for existing soil disturbance during the summer and fall of 2003 using Howes' soil disturbance monitoring method (Howes, 2000). In addition, penetrometer measurements were taken at the mineral soil surface and 6 inches below the surface at each plot to monitor for soil compaction. Soil water content at the surface and 6 inches below the surface was measured using a Speedy Moisture Meter at least once in each unit and again whenever a change in soil water content indicated the need. Sixty plots were measured in each unit by technicians trained and directed by the Forest Soil Scientists.

Units added after 2003 were monitored by the Forest Soil Scientist in 2004, 2005 and 2006 with Howe's method only and a reduced number of plots because little evidence of soil disturbance was apparent on site and little detrimental disturbance was identified with the more intensive method described above.

Four units, 3a, 8, 12b and 12c, were monitored in August, 2012 for soil disturbance after timber harvest was completed. 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 to assess soil disturbance. Attributes evaluated are forest floor impacts, surface soil displacement, mixed surface soil/subsoil, rutting, burning (only management prescribed burning is assessed), compaction, and platy or massive structure.

Unit 3a was logged during the 2008 winter. Winter logging was authorized when 4 inches of frozen soil *and* 12 inches of snow occurred on-site. Two slash burn areas were the only locations with visible soil disturbance. The Region 1 Technical Guide (USDA Forest Service 2011) allows certification without plot data for units that obviously meet SQS because little soil disturbance is present. Ten plots were taken at locations with apparent surface disturbance, and outside of the slash burns, to document that no detrimental soil effects were present. Areas affected by slash burning were 0.63 acres or about 1 percent of the 56 acre unit. A very small part of the burned area met the criteria for detrimental soil disturbance in the form of severely burned soil.

Thirty random plots were taken along transects through each of Units 8, 12b and 12c following the 2009 protocol discussed above.

Measurements of coarse woody debris (wood 3 inches in diameter or larger) were made using methods described in Brown, 1974. Measurements were obtained along transects with random azimuths at six random locations in each of the four units.

Monitoring Results

See *Location of Project and Activity Monitored* and *Sampling Methods* sections above for information on how and where data were collected.

Monitoring Question 1: Are management actions maintaining soil quality?

All units monitored pre and post timber harvest meet SQS (see Tables 14 and 15 below). Pre-timber harvest monitoring for Unit 12b identified three plots (out of 65) with detrimental soil disturbance (4.7%) because they fell on animal trails. No other detrimental soil disturbance was observed on any other pre or post timber harvest monitoring plots.

Coarse woody debris (CWD) requirements were not included among the soil mitigation measures for these four units because the purpose was hazardous fuel reduction near residences and private property and a residual stand remained to provide future downed woody debris. A residual stand remains in Units 3a and 8. Units 12b and 12c are much more open with only scattered trees remaining because mortality from mountain pine beetle required more trees be removed to meet the project fuels reduction purpose. Normally 10 - 15 tons of down woody debris after harvest is required to meet SQS.

Table 14. Georgetown Lake HFR pre-harvest monitoring results , including number of plots taken, number of detrimental plots, the percentage of the plots that had detrimental soil disturbance and coarse woody debris amounts (tons/acre).

Unit #	Old Unit* #	# Plots	Detrimental	% Detrimental	CWD T/A**
3a	None	11	0	0	NA
8	081	60	0	0	10.54
12b	044/045	64	3	4.7***	5.67
12c	046/047	60	0	0	8.81

* Unit number designation up to year 2003.
** CWD T/A is Coarse (wood 3 inches or larger) Woody Debris in tons/acre.
*** Three plots landed on animal trails and were classified as detrimental.

Table 15. Georgetown Lake HFR post-harvest monitoring results, including number of plots taken, number of detrimental plots, the percentage of the plots that had detrimental soil disturbance and the amount of coarse woody debris (tons/acre).

Unit #	Old Unit* #	# Plots	Detrimental	% Detrimental	CWD T/A**
3a	None	10	0	0	4.6
8	081	30	0	0	1.3
12b	044/045	30	0	0	5.9
12c	046/047	30	0	0	6.2

* Unit number designation up to year 2003.
** CWD T/A is Coarse (wood 3 inches or larger) Woody Debris in tons/acre.

CWD monitoring results for these four units are presented in Tables 14 and 15, above for pre and post timber harvest respectively. None of the units fall within the 10 to 15 tons per acre normally desired. Units 12b and 12c had 5.9 and 6.2 tons of CWD per acre, respectively. Although this is less than the desired 10- 15 tons per acre, residual trees within the unit and trees in adjacent stands are falling and providing additional CWD. Fuel loading for these two units would likely have been too high to meet hazardous fuel reduction objectives of this project if the CWD requirements had been imposed.

The soil BMPs effectively maintained soil quality because no detrimental soil disturbance was found on any plots, as evidenced in Table 15 above.

Monitoring Question 2: Are soil and water conservation practices (BMP's) implemented during project work and are they resulting in soil protection?

Soil mitigation measures are established to comply with the Soil and Water Conservation Practices (SWCP) Handbook (Forest Service Handbook 2509.22). SWCPs are comparable to

"Best Management Practices" or BMPs. During environmental analysis, interdisciplinary teams select appropriate soil conservation practices based on water quality objectives, soils, topography, geology, vegetation and climate. Environmental impacts and soil protection options are evaluated and a mix of practices selected to not only protect soil productivity and meet other resource needs. Final selected practices are translated into project plan specifications, contract clauses, and other tools.

Performance Measure:

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 bold, numbered statements below are mitigation measures for the soil resource included in the Georgetown HFR project record.

Background Information

The 2006 CE project file and Appendix A in the 2009 EA list the following soil mitigation measures (numbered and in bold type) for the Georgetown HFR project. The performance measures for each are discussed and evaluated.

1. Units 3, 3a, 4a, 5, 9a, 14, and 26 will be harvested when the soil is frozen and snow covered (4 inches frost and 1 foot of snow, minimum) if full size logging equipment is used. Equipment such as 4 wheelers can operate with frozen soils (2 inches frost, minimum) and 6 inches of snow. These conditions can be expected from December 1 to the end of February (SWCP #14.04, 15.23).

Three monitored units, 3a, 12b and 12c, were harvested under these conditions although it was only required for unit 3a. Detrimental soil disturbance was not identified on plots in any of these units. Supplemental information for each of the units is listed below:

A. Unit 3a: No soil disturbance from machinery operation was observed in this unit.
    1) 2/27/06, Pre-harvest monitoring. Snow depths varied from 8 to 24 inches and soil is frozen, at one location deeper than 12 inches. A small opening in the timber has 21 inches of snow. Duff is frozen but soil is not.
    2) 1/15/08, Pre-harvest monitoring. Snow depth is 9 inches and soil is frozen to 5 inches.
    3) 1/25/08, Logging has begun in the unit. Soil is frozen to 8 inches at the same location observed on 1/15/08. Soil is frozen very hard more than 4 inches deep on the snow road to the landing, almost impossible to dig.
    4) 3/7/08, Snow depth is 12 inches and soil is frozen to 14 inches and very hard below at the same location observed twice in January (see 2 and 3 above). Timber Sale Inspection Report (TSIR) dated 3/21/08 states cutting is finished and skidding and processing will be completed by 3/28/08.
B. Unit 12b: Rutting and soil displacement, some detrimental, was observed in the unit although not widespread and not captured by plot data. The TSIR states the main skid trail was moved because soft spots developed on the trail being used. This was a case where the BMP failed and corrective action was taken.

C. Unit 12c: No soil disturbance from machinery was observed in this unit other than two small areas with rutted soil on the original skid trail. See discussion below.
   1) 2/17/11. The soil scientist reviewed a small spot of soft, exposed soil in a main skid trail at the request of the sale administrator. One day of skidding was needed to remove the remaining logs in the east side of the cutting unit. The operator suggested moving the trail to the ridge above the existing trail. This location had about 2 feet of snow, more rock in the soil, and dry soil. This option was approved and followed.
   2) 2/18/11. TSIR states new trail has snowpack.
   3) 2/22/11. TSIR states the upper trail held up to skidding the remaining logs.
   4) 2/23/11. Soil scientist reviewed the new skid trail after skidding was completed. The trail has 13 inches of packed snow and ice over frozen soil. No obvious soil impacts.
   5) 8/24/11. During monitoring two small rutted areas (less than 20 square feet) were observed on the original skid trail. No soil impacts are apparent on the new skid trail.

Evaluation

Seasonal restrictions for all three monitored units were implemented and effective. Units 12b and 12c developed areas of bare soil in skid trails due to warm temperatures and a shortage of new snow. Corrective action moved the skid trail to adjacent locations with enough snow. Small areas of rutted and displaced soil, some of it detrimental, resulted from this departure.

2. Unit 14 is a special case. Summer yarding over dry soils will be allowed if yarding can be dispersed by skidding through adjoining private land.

Evaluation

Unit 14 was not monitored.

3. Units 1, 2, 7a, 8, 8a, 9, 9b, 10, 11, 12b, 12c, 12d, 12e, 12f, and 25 can be harvested during the summer after spring breakup when soil is drier than 12 percent water content. These conditions can be expected from July 15 to September 15 and beyond, assuming no extended periods of heavy rain. These units can also be harvested under frozen conditions as described above (SWCP #14.04, 15.23).

Unit 8 was monitored. It was harvested during the summer with dry soil conditions. Detrimental soil disturbance was not identified on plots in this unit. Supplemental information is listed below:

A. 7/22/08. TSIR states soil moisture is 12% but it is raining lightly. Will need more time for ground conditions to dry out before starting operations.
B. 8/21/08. TSIR states it rained last night and today. Moisture soaking in about ¼ inch. Below, the ground is dry.

C. 9/2/08. TSIR states wet weather over the weekend and 1 inch of fresh snow. Speedy reading is 12%. All agree it is too wet to work.
D. 9/4- 9/10/08. TSIR states it is still too wet to operate equipment.
E. 9/22/08. TSIR states rain has caused soil moisture to exceed specs, operation shut down.
F. 10/20/08. TSIR states operator's crew suspended skidding in the west end for moisture conditions.
G. 8/25/12. Noted during soil monitoring: Almost all new disturbance is concentrated near the landings and much of it is not detrimental.

Evaluation

Seasonal restrictions for summer logging were implemented and effective. The sale administrator delayed logging startup and halted logging when soil conditions were too wet. All monitoring plots are on soil in satisfactory condition. Soil disturbance was noted near landings but much of it was not detrimental.

4. Existing roads and trails will be used for skidding, landings, and for dropping logs at landings whenever possible.

A. Units 3a, 12b and 12c. Not feasible or necessary in these winter logged units.
B. Unit 8. TSIR's have statements on various dates where existing roads are used for skidding and where part of a landing was located on an old road.

Evaluation

Use of existing roads for skidding and landings reduces new soil disturbance. This measure was implemented and effective.

5. Skid trails on undisturbed soil and used during the summer will be spaced appropriately to meet the 85 percent soil in satisfactory condition standard.

A. Units 3a, 12b and 12c – not applicable.
B. Unit 8. The measure was effectively accomplished since no detrimental disturbance was measured during monitoring. Overall appearance of the unit indicates the same.

Evaluation

Skid trails were difficult to identify except near the landings. Spacing could not be determined which means this measure may have not been needed as skid trails caused little soil disturbance.

6. Disturbed areas at landings or elsewhere will be rehabilitated to shorten the recovery period for displaced, rutted, and compacted soils (SWCP #14.10, 14.11, 14.13).

A. Unit 3a. Landing appears naturally restored.
B. Unit 8. TSIR's state landings and other disturbed soil areas have been scarified and seeded.
C. Unit 12b. TSIR states landing has been seeded.
D. Unit 12c. TSIR states landing is in an existing borrow pit.

Evaluation

This measure was not applicable to the landing in the active borrow pit in Unit 12c. Landing in unit 3a is restored. The landing in Unit 12b is still actively being used by the firewood contractors working on slash piles. Landings observed in Unit 8 show signs of advanced vegetative recovery from seeding. This measure was implemented in all units and has been effective based on observations in Units 3a and 8.

7. Skid trails with bare soil exposed will be seeded, have slash placed on them and/or be water barred as appropriate to prevent erosion (SWCP #14.13, 14.14, 14.15).

A. Unit 3a. No bare soil associated with skid trails was observed in this unit.
B. Unit 8. Very little bare soil associated with skid trails was observed in this unit with the exception of those near landings. TSIR's state multiple times that skid trails have slash placed on them and/or drainage structures are in place. TSIR on 7/7/09 states erosion control seeding has been completed on all landings and main skid trails.
C. Unit 12b. Soil disturbance on skid trails consists of small areas of rutting or displacement at scattered locations where machinery broke through snow cover. TSIR on 7/7/11 states seed mix has been applied to landings and skid trails.
D. Unit 12c. Two very small areas of rutted soil, less than 20 square feet, are the only disturbances observed in this unit. TSIR's state skid trails have slash placed on them and have been seeded.

Evaluation

This measure has been implemented and effective. All skid trails observed appear to be adequately treated to prevent erosion. Most have adequate natural vegetative cover.

8. Skid trails likely to be used by four wheelers will have slash placed on them to prevent this use.

A. Unit 8 is the unit most likely to be accessed by 4-wheelers or other ORV's because residences are located on Echo Lake within the unit. TSIR's for this unit have multiple statements about placing slash or other impediments to 4-wheelers on skid trails. The same is true for the other three units although the risk of 4-wheeler use is much less and skid trails are not as visible because they were used under winter conditions.

Evaluation

This measure has been implemented and has been effective as no evidence of 4-wheeler activity was observed in any of the units.

9. Small slash piles will be burned in the fall when the soil is cool or frozen. Large slash piles will be chipped (most desirable), hauled to slash disposal areas and chipped or burned, burned in incinerators, burned on roads or burned on soil (least desirable).

This measure was included because slash pile chipping was more common at the time and areas had been identified where slash could be hauled to and chipped or burned without affecting soil surfaces and air quality near Georgetown Lake. However, demand for chips has

dropped and burning within the Georgetown Lake area is not as problematic as it once was. Therefore burning slash within the units is more of a necessity and more acceptable than it once was.

Monitoring of slash pile burning in the interim has demonstrated that reducing the footprint of slash piles by increasing their height and burning during periods when the soil is frozen or cool and moist effectively reduces the potential for severely burned soil. Increased height not only reduces the footprint of the pile but also increases the distance between the soil and much of the burning material and increases the ash layer at the soil surface which insulates the soil during burning. These attributes combined with a frozen or cool and moist soil surface seem to effectively reduce detrimental soil heating. These recommendations have been incorporated into this mitigation measure on an informal basis.

Evaluation

A. Unit 3a. The footprint of slash piles in this unit totals about 0.63 acres (1% of the unit). Most of the affected area does not have detrimentally burned soil since charred litter and duff is present under the ashes. Chemical effects from the ash layer are expected to diminish more quickly than the physical effects of severely burned soil because some ash is redistributed by the wind and precipitation leaches chemicals from the ash through the soil. No vegetation had sprouted when this unit was monitored in August, 2011 and a fringe of unburned material borders the south end of the site.
B. Unit 8. Slash from this unit is spread over more landings and piles are generally smaller. Effects similar to those described above are expected from slash piles burned in this unit. One pile was noted with soil material in the pile on the side next to the road. The soil must have come from the road because no scalped areas were noted around the pile. The 9/15/08 TSIR states the bobcat will be used to push tops into the pile instead of the skidder because too much “dirt” is getting into the pile. The “dirt” may have hindered the pile from burning completely.
C. Unit 12b. Slash from this unit is piled in a grassy park next to road 78347. These slash piles are a concern because they are in a grassland/shrubland park and seem quite spread out. The piles have been sold for firewood. Slash remaining after firewood has been removed will be piled and burned. The smaller slash volume should have little effect on the soil when it is burned under the conditions described above.
D. Unit 12c. Most of the slash from this unit is piled in the existing gravel pit west of the unit and will not have any soil effects when it is burned. A large slash pile above the road to Rainbow Bay Picnic Area has a footprint of 0.15 acres and is 12 feet tall. It was not burned as of 8/24/08 and is not expected to cause much detrimental soil heating as discussed above and because of the monitoring results for Unit 3a.

To summarize, Units 12b and 12c have piles not yet burned. Piles observed in Units 3a and 8 did not completely burn. The burned area had little severely burned soil but had little vegetative recovery as of August, 2011.

10. Temporary roads will be obliterated and revegetated (SWCP #15.25).

A. Unit 3a. Less than 400 feet of temporary road was constructed from Road 65 into the landing. Construction involved crossing the ditch and a small road cut, less than 2 feet high, next to Road 65 and blading the flat lying surface into the landing. The road appeared completely obliterated and revegetated on August 24, 2011.
B. Unit 8. Multiple short spur roads, 80 to about 300 feet, were built into landings in this unit. None of these were observed during monitoring but the TSIR state temporary roads were scarified and seeded on various dates.
C. Units 12b and 12c. No temporary roads were required for these units.

SUMMARY

Detrimental soil disturbance was well within the Northern Region Soil Quality Standards (Table 15). All monitored plots in all units were free of post timber harvest detrimental soil disturbance. The general appearance of the units supports this finding, though small localized areas of detrimental disturbance were observed in Units 12b and 12c. All skid trails seen while monitoring 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 over the area monitored.

The monitoring results in Unit 8, logged during the summer, show soils developed in metasedimentary parent material are resistant to erosion, mass wasting, rutting and compaction when BMPs are followed as prescribed.

Fuel loading in the monitored units would likely have exceeded the expected results of this hazardous fuel reduction project if CWD requirements had been imposed. All units were below the 10-15 tons per acre desired for soil quality purposes but falling residual trees and additions from adjacent stands are already adding to the amount measured.

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USDA Forest Service. 2011. Region 1 Approach to Soils NEPA Analysis Regarding Detrimental Soil Disturbance In Forested Areas - A Technical Guide. USDA Forest Service, Northern Region. Missoula, Montana.

Item 9: Aspen Restoration

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:

Aspen restoration continues to be a critical issue for the Forest. An objective of the 2009 Forest Plan is to restore aspen habitat on 67,000 acres over the planning period. Two assumptions were made in developing this aggressive objective. First, much of this objective must be accomplished by wildfire stimulating dormant clones since Forest budgets and NEPA assessment capabilities limit how many acres we can treat. Second, aspen sprouts responding to wildfire and landscape scale treatments stand a better chance of surviving browse pressure than the small acreage treatments we have accomplished in the past.

Monitoring continues to be critical to answer the primary question highlighted in bold type above regarding the success of our management *treatments*, but also:

- How well do existing aspen stands respond to wildfire?
- Will dormant clones respond when wildfire passes through conifer stands as well as being released by fuel treatment or timber harvest?
- Are aspen sprouts on wildfires surviving browse pressure in the long term?

No monitoring plots were established or revisited in FY2011; this report will be limited to treatment acres.

Evaluation:

ACRES TREATED IN 2011

Aspen stands were treated on 468 acres in FY2011. This is up from FY2010 (329 acres) and FY2009 (201 acres). Treatments were primarily accomplished by hand crews slashing conifers competing along the edge and within mature aspen stands. The majority of treatment acres (453 acres) occurred on the Madison Ranger District in the southern end of the Tobacco Root Mountains and the Gravelly Range. Fifteen acres of aspen release was accomplished through timber sales removing competing coniferous vegetation.

Even though treatment acres have increased over the last few years, the scale of aspen treatment on the Forest is insignificant in terms of the need for restoration. The Forest Plan FEIS assumption that the aspen 67,000 Forest Plan Objective for aspen restoration will be met through wildfire stand conversions rather than scheduled treatments appears valid.

Item 10: Grassland/Shrubland Restoration

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 651 acres across the Forest in 2011. This number is down from FY2010 (1,790 acres treated). Projects included Dry Gulch on the Wise River Ranger District, and Arnold on Wisdom Ranger District. Treatment data was extracted from the FACTS data base. See Item 10 in the FY10 Monitoring Report; the Doolittle grassland/shrubland restoration project is reviewed there.

Figure 12. Dry Gulch prescribed burn of conifer encroachment in sagebrush, Wise River Ranger District, 2011.

Evaluation:

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. 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 FEIS assumption that

grassland/shrubland restoration will be met primarily through wildfire stand conversions rather than scheduled treatments appears valid. Reduction in acres treated is due to the forest accomplishing treatment on most of the acres that have been cleared through environmental analysis (NEPA). The forest has not been successful in getting new fuels treatment projects through the NEPA process.

Item 12: Sage Grouse Habitat

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 (MFWP). (2) Acres treated from accomplishment reports or FACTS data base.

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

Results:

Sixty-five active sage grouse leks are confirmed in southwest Montana in proximity to the BDNF. None are located on National Forest land. The two maps in Figure 13 identify lek locations as well as the habitat within 18 kilometers of active leks.

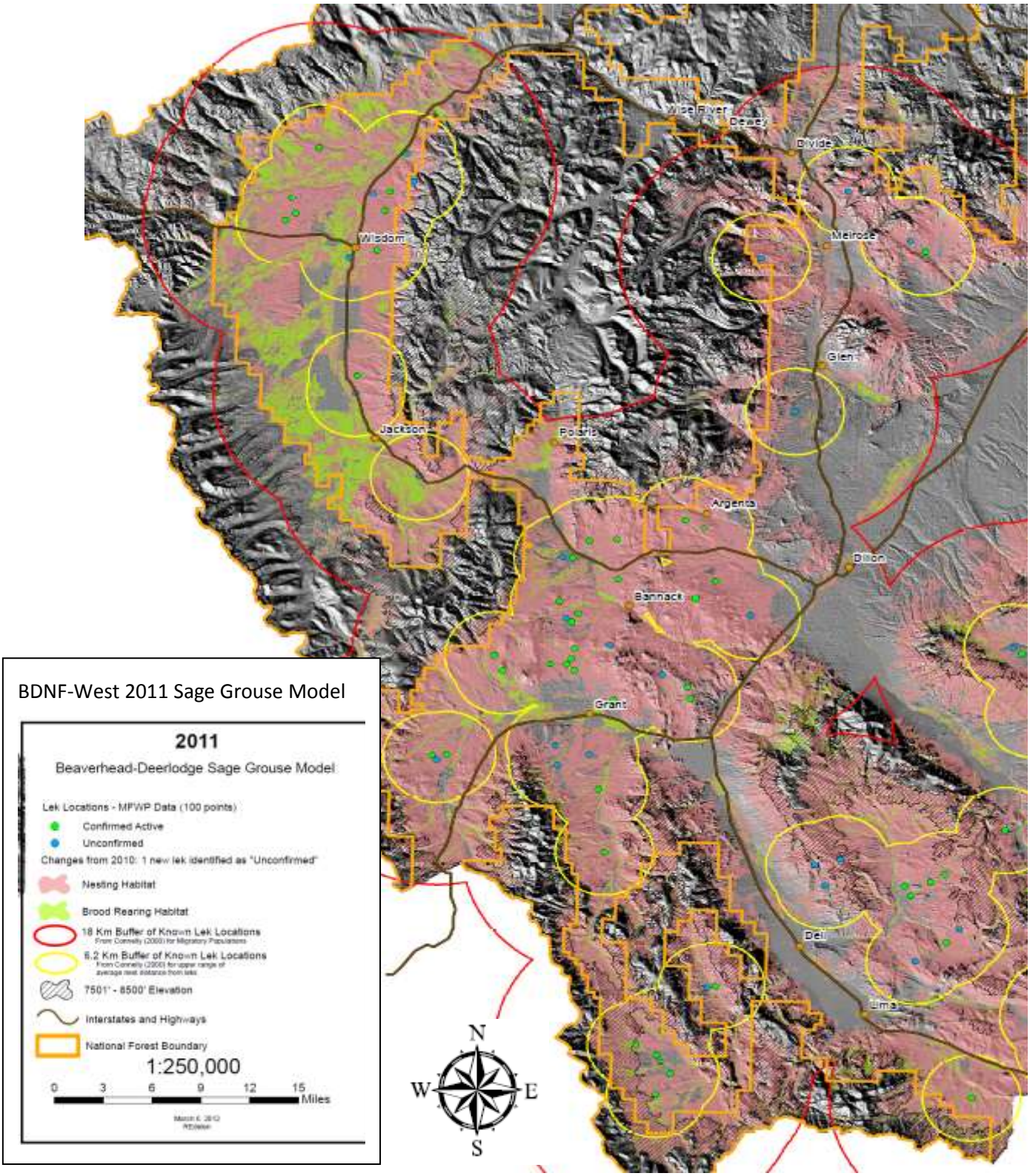
Conifer encroachment was treated on 136 acres by burning in a sagebrush park in Dry Gulch on the Wise River Ranger District. A forest plan consistency review (18.1 review) was completed on the Dry Gulch project in April, 2009. The project was expected to meet wildlife standard #8, which states:

> *Within 18 kilometers of documented active or inactive sage grouse leks, do not remove sagebrush within 300 meters of riparian zones, meadows, lakebeds or farmland, unless site specific analysis indicates such removal promotes achievement of the sagebrush habitat goal. Springs developed for livestock water in these areas must be designed to maintain free water and wet meadows.*

The 18.1 review states proposed treatment is expected to improve sagebrush health through the reduction of conifer encroachment.

Evaluation:

The Dry Gulch project was not field reviewed; however the 2010 Forest Monitoring and Evaluation Report describes the field review of the Doolittle Project, a similar prescribed burning project designed to reduce conifer encroachment. In summary, the sage grouse MOU was met in the North Doolittle Project. The local MFWP area biologist was actively consulted in the burn design and follow-up evaluation with no concerns identified.



BDNF-West 2011 Sage Grouse Model

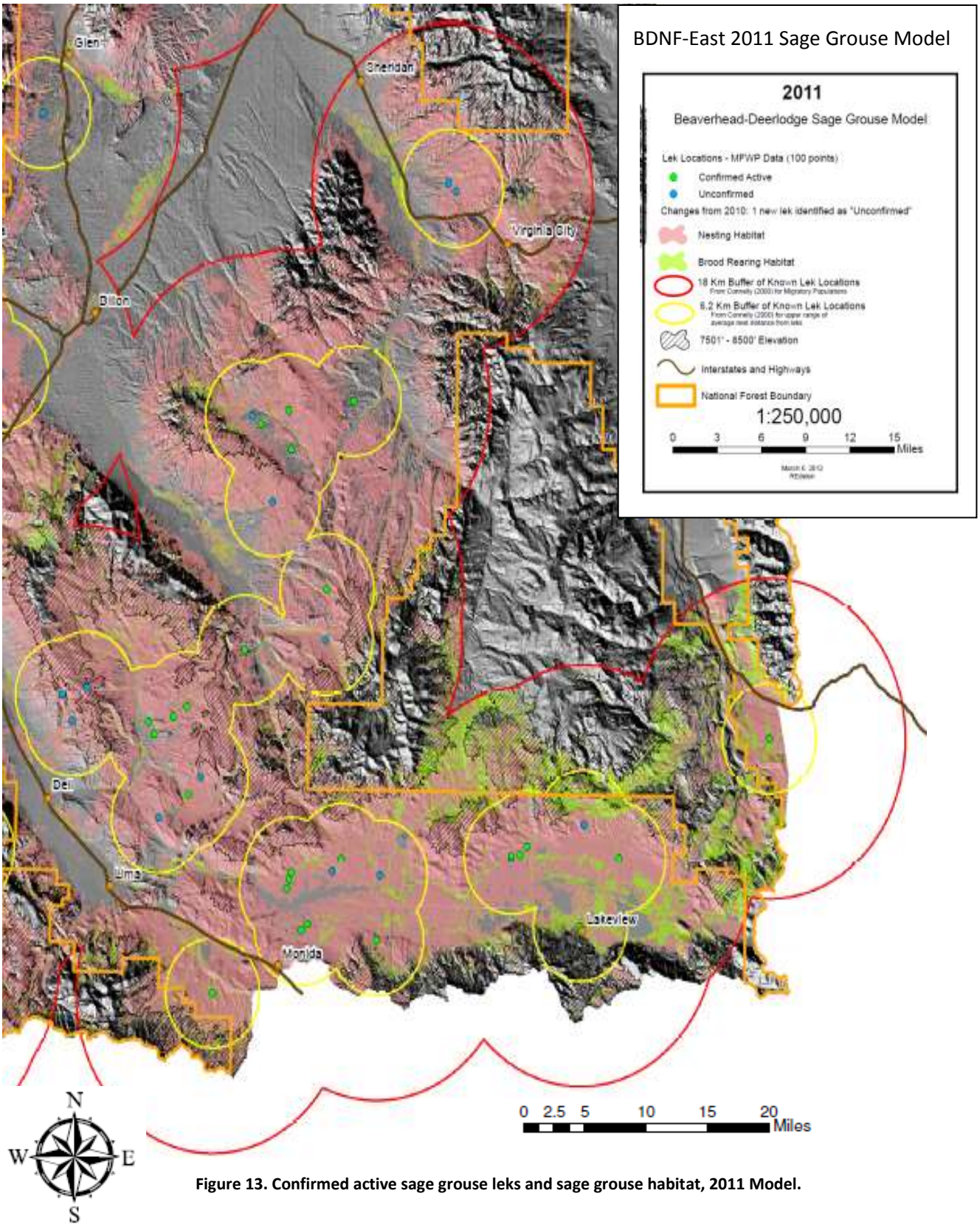


Figure 13. Confirmed active sage grouse leks and sage grouse habitat, 2011 Model.

Item 13: Elk Populations

Monitoring Question: How are elk populations changing?

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

Data Sources: Annual MFWP 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 an indicator of winter habitat integrity (Forest Plan, pg 47). 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 (MFWP) and the populace in general. Elk populations are monitored annually in relationship to population objectives set by MFWP.

Results:

Table 16 below presents the most currently available MFWP data from both the website listed above and the State Elk Plan.

Table 16. Montana Fish Wildlife and Parks Elk Objectives compared to Population Estimates.

BDNF Hunting Districts	Elk Plan Objective Point Estimate (Observed Elk)	FWP 2003 Population Estimates ± 10%	FWP 2006 Population Estimates ± 10%	FWP 2007 Population Estimates ± 10%	FWP 2008 Population Estimates	FWP 2010 Population Estimates	FWP 2011 Population Estimates
210	1,450	1043	952	1020	1391	1644	2683
211	600	679	485	262	135	1125	334
212	1,000	1100	1074	1494	1825	2504	2693
213	750	401	689	484	660	1325	1243
214	450	309	270	284	331	400	193
215	1400	736	1144	1234	1502	2145	2569
216	325	457	288	473	140	314	279
300	800	615	1137	1450	1883	806	2129
302	625	399	736	956	1195	783	1239

BDNF Hunting Districts	Elk Plan Objective Point Estimate (Observed Elk)	FWP 2003 Population Estimates ± 10%	FWP 2006 Population Estimates ± 10%	FWP 2007 Population Estimates ± 10%	FWP 2008 Population Estimates	FWP 2010 Population Estimates	FWP 2011 Population Estimates
311	2700	2096	3100	3000	2620	2620	2620
318	500	366	383	535	656	519	519
319	955	1515	936	819	911	854	1023
320 333	1000 for both	1130 549	942 470	745 477	954 859	1433 - at objective per FWP	1573
321	None	No winter elk	No winter elk	No winter elk	No estimate	No estimate at objective	No winter elk
323 324 327 330 Total	Gravelly EMU Total = 8000	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	No separate estimates – Over objective per FWP
328	625	574	650	635	620	643	1008
329	830	582	683	727	766	(273 partial survey)at objective	1190
331	1290	1250	896	1085	773	869	930
332	830	506	600	376	588	568	494
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	1164 713 370=see 340
341	525	669	494	272	166	416	370
360	2200	4555	1914	1661	2494	1090	1396

BDNF Hunting Districts	Elk Plan Objective Point Estimate (Observed Elk)	FWP 2003 Population Estimates ± 10%	FWP 2006 Population Estimates ± 10%	FWP 2007 Population Estimates ± 10%	FWP 2008 Population Estimates	FWP 2010 Population Estimates	FWP 2011 Population Estimates
362	2500	1159	3629	3845	3524	4203	4029
TOTAL	30,575	28,074	28,803 stable	28,482 stable	31,925 (increasing)	31,305 stable to increasing (above total objective)	42,457 (139%+ of State Objective in 2005 Plan at SW Montana scale)

Evaluation: Southwest Montana elk populations are stable to increasing overall, and meet or exceed the State elk plan objectives at the forest scale (Table 16). With widespread distribution, elk constitute a robust presence on the BDNF.

Item 14: Mountain Goat and Wolverine Winter Security

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

Performance Measure: (1) Populations of mountain goats from MFWP. (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 MFWP 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 MFWP 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 an indicator of winter habitat integrity (Forest Plan, pg 47). 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 MFWP. MFWP collects population data and reports numbers on their website: http://fwp.mt.gov/hunting/planahunt/. 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 FY2011.

Results: (2) Snowmobile entries into high elevation non-motorized allocations (ALSO SEE 14a, page 61, A SPECIAL REPORT ON MT JEFFERSON RECOMMENDED WILDERNESS BOUNDARY)

The 2009 Forest Plan allocated a number of high elevation habitats to winter non-motorized uses, in part to secure habitat for mountain goats and wolverine. Many of these winter non-motorized units were flown in FY2010; see the FY2010 Forest Monitoring and Evaluation Report for results.

In FY2011, the BDNF had an agreement with the Wildlife Conservation Society (WCS) to perform winter use monitoring flights. Five recommended wilderness areas as well as the Sapphire Wilderness Study Area were flown in February, 2011.

Most of the Recommended Wilderness Areas monitored (Hellroaring, Torrey Mountain, and Table Mountain) had very minor snowmobile incursions, consisting of a track or two originating 0.25 to 0.33 mile, on average, from a winter motorized area into the non-motorized area. No incursions were recorded in the Quigg Recommended Wilderness Area. Stony Mountain

Recommended Wilderness Area had more incursions than other recommended wilderness areas, all concentrated along the far southwest boundary. These incursions appear to originate from the Bitterroot NF in the Skalkaho Pass area and from the motorized portion of the Sapphire Wilderness Study Area. The winter non-motorized portion of the Sapphire Wilderness Study Area also had multiple incursions, primarily along the western boundary with the Bitterroot NF.

Results: (3) Presence or absence of wolverine in high elevation habitats

Data on presence or absence of wolverine in high elevation habitats is acquired through research partners working in southwest Montana: the Wildlife Conservation Society (WCS) Greater Yellowstone Wolverine Program. WCS works with the BDNF under a Challenge Cost Share Agreement and provides direct reports to the Forest on an annual basis. No report was published by WCS for 2011 or 2010; the FY2009 Forest Monitoring and Evaluation Report contains information from the WCS 2009 Report.

Evaluation:

Compliance with winter non-motorized designations in the Stony Recommended Wilderness Area and the southernmost part of the Sapphire Wilderness Study Area appear problematic, based on flight data collected in February, 2011. At the time this monitoring was done, however, the 2010 Addendum Map was in use. This map erroneously displayed the entire Sapphire Wilderness Study Area as winter motorized, which may explain some of the intrusions seen there. Stony Recommended Wilderness was mapped correctly as winter non-motorized. The map has since been corrected.

While both mountain goats and wolverines are found at low densities, observations indicate both species are secure from disturbance on the BDNF where monitoring occurred in 2011, with a few exceptions. Overall, however, human incursions into monitored winter habitat do not appear to be a concern at this time.

Item 14a: Mount Jefferson Wolverine Habitat Closure

Monitoring Question: Are snowmobiles intruding into the wolverine habitat closure 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, MFWP, 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 portion of the Mt. Jefferson/Hellroaring Creek area in the Centennial Mountains as wilderness and left the south portion open to snowmobiling (Figure 14). The decision provides access for snowmobilers on the Idaho side of Mt. Jefferson while providing greater protection for wolverine habitat and other wilderness values in Hellroaring Creek. The boundary line between winter snowmobiling in Mt Jefferson Management Area and the snowmobiling closure for Centennial Recommended Wilderness Management area is drawn along the 2001 wolverine habitat closure.

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. "

Winter use in Mount Jefferson has been monitored every year since 2001 when the first partial area (emergency) closure was implemented. Illegal intrusions into the closed areas have been documented in each successive year. Initially, closure boundaries were not adequately marked due to a scarcity of trees suitable for posting boundary markers. To adequately mark the boundary, ten foot long treated posts were hand carried in and set. Marking efforts were completed in the fall of 2009 and clearly identify the closure. There are 24 signs along the 1.25 mile long closure boundary between Hellroaring Creek and the north flank of Mount Jefferson. The closures east of Lillian Lake and south of Cole Creek are also clearly identified with bright orange closure signs. The density of marking is such it is unlikely a snowmobiler will unknowingly enter the closed area. Monitoring includes ski patrols conducted by Madison Ranger District personnel, snowmobile patrols conducted by Forest Service Snow Rangers and Forest Service and BLM Law Enforcement Officers, citizen reports generated primarily from

skiers using the Hellroaring Ski Hut, and occasional air patrols sponsored by the Winter Wildland Alliance, Wildlife Conservation Society (WCS), BLM and Forest Service.

2011 Monitoring Results

During the winter of 2010/2011, reports of violations in Mount Jefferson were documented and filed at the Madison Ranger District Office for nine different dates. Monitoring efforts in 2011 include the use of a remote sensing camera. The camera was set up within the BNDF closure area where evidence of violations is frequently observed. Figure 10 shows a map with violations observed by Forest Service Forest Protection Officers (FPOs) in January.

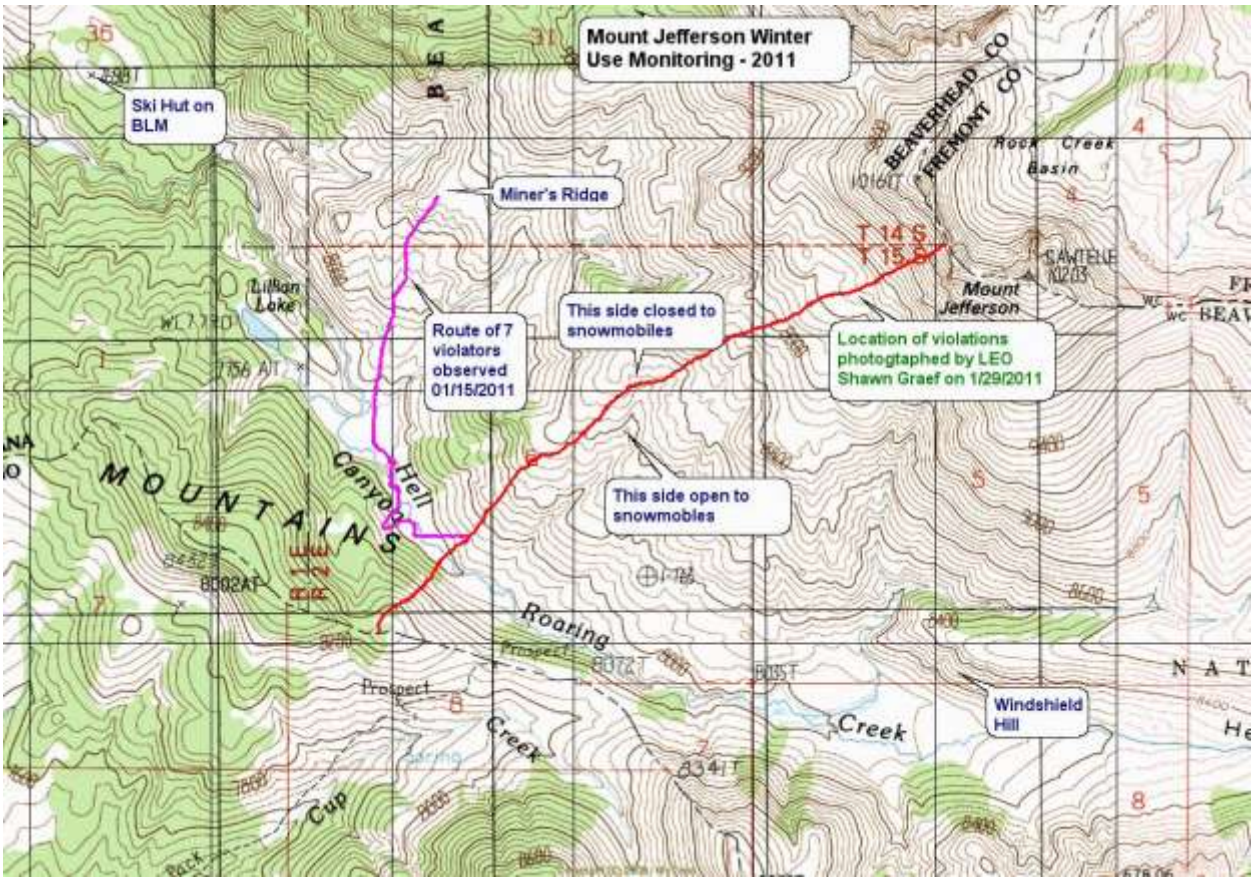


Figure 14. Map showing Mt. Jefferson Winter Use Monitoring for winter 2010-2011.

The next four figures are examples of violations observed during the 2010/2011 winter.

Figure 15. Fresh snowmobile tracks entering the Hellroaring closure below Tin Cup Divide. Note the clearly observable orange snowmobile closure sign on the tree.

Figure 16. Photo taken by Reconyx motion-triggered camera deployed inside the BDNF Recommended Wilderness portion of Hellroaring drainage, within the winter non-motorized allocation.

Figure 17. Photo taken by Forest Service Law Enforcement Officer January, 29, 2011 showing snowmobile tracks entering the winter non-motorized closure. Photo was taken along upper end of closure boundary, T15S R2E Section 5.

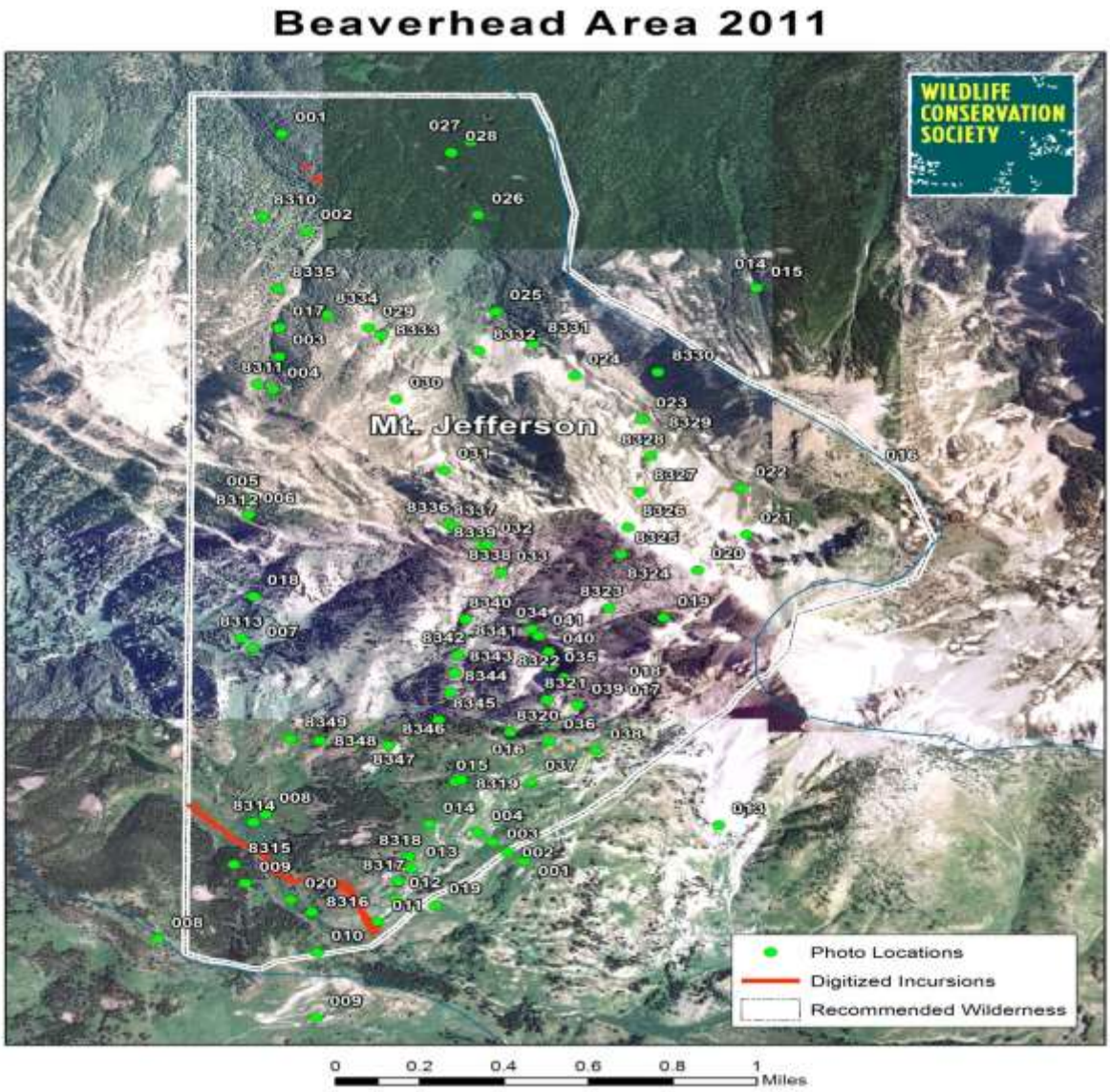


Figure 18. Aerial photograph provided by WCS with photograph points from their flights on 2/27 and 4/13/2011 shown in green. Red lines are incursions digitized based on the photos taken. The digitized incursions seen on the southern end of the image are consistent with snowmobile tracks.

During the winter of 2010/2011, reports of violations in Mount Jefferson were documented and filed at the Madison Ranger District Office for nine different dates. The type of observation, type of violation and extent are noted in Table 17 and mapped in Figure 14.

Table 17. Violations in Mount Jefferson, by date, location, and comments.

Date	Cole Creek	Hellroaring Closure	BLM/WSA	Comments
Jan 15	Not monitored	7 violators observed well into closure	Not monitored	Riders passed with 40' of law enforcement personnel

Date	Cole Creek	Hellroaring Closure	BLM/WSA	Comments
Jan 20	Not monitored	4 violators recorded on camera	Not monitored	Rode right by closure signs
Jan 29	Not monitored	2-3 tracks observed	Not monitored	Rode right by closure signs
Feb 12	Not monitored	Faint tracks observed	0 tracks observed	Tracks were est. @ 1 wk old
Feb 20 Feb 21	Not monitored	0 violations observed 0 violations observed	Not monitored	Little use in area over past 7 – 10 days
Feb 27	See Figure 18, above	See Figure 18, above	See Figure 18, above	WCS Flight
Mar 13	Not monitored	0 violations observed	2-3 tracks observed Did not cross creek	Visibility poor due to clouds and flat light
Apr 13	0 violations	2-3 tracks upper end of closure 2+ tracks along Hellroaring Cr 2+ tracks to Miner's Ridge	Not Monitored	Old tracks – blown in Tracks about 1 week old Likely same as above
Apr 13	Not monitored	Same as above	Not Monitored	Independently verifies report above for same day

Observations and Recommendations:

Monitoring indicates motorized use in the Hellroaring drainage is not compliant with the Forest Plan (signed January 2009). Monitoring conducted in 2009, 2010, and 2011 confirm:

- Illegal intrusions were extant, common and pervasive throughout the closure period;
- Illegal intrusions penetrated well within the closure area;
- Illegal intrusions extended into the BLM WSA.

Monitoring reveals a consistent record of violation into Recommended Wilderness and the BLM WSA. Despite clear boundary marking, intentional trespass is common, as evidenced by tracks, and direct observations of riders entering the closure in direct proximity to signs. As indicated by the findings, it is uncommon to patrol the area and find no evidence of violation. Of the 25 monitoring days documented for the years 2009 – 2011, only three days can be identified as days when no violations were observed.

Item 16: Noxious Weeds

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:

Past Forest Plan monitoring reports tracked acres of noxious weeds treated from year to year. Monitoring requirements of the 2009 Forest Plan focus on 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. Because District weed specialists were continuing data entry and reconciling Geographic Information Systems (GIS) to track changes, this 2011 report is confined to treatment status.

Results:

Noxious weeds were treated on 8,672 acres spread across all Ranger Districts (Table 18), including 100 acres of biological control and acres treated through partnerships agreements with other agencies or non-profit organizations. The bulk of the targets were accomplished as part of annual District weed maintenance work.

Table 18. Acres of Noxious Weed Treatment on the BDNF, 2007-2011.

Forest Outputs and Accomplishments	2007	2008	2009	2010	2011
Noxious Weed Treatment (acres)	5,001	8,570	8,088	9,542	8,672

Evaluation:

While not as high as FY2010, treatment acres are at the high end of the last five year average. An evaluation of whether treatment is successfully keeping noxious weed infestations controlled cannot be made until all Districts successfully enter baseline infestation locations and acres into the data base. Annual variations in acres treated are more closely tied to funding levels and agreements for weed treatment with counties, etc. rather than changes in weed populations, which remain relatively constant between years.

Item 17: Insect and Disease Infestations

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 – 2011", Report 12-1, Compiled by Chris Hayes. 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 20.5 million acres of mixed ownership, including State and private land, nine national forests, two national parks, and six Indian reservations.

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. Table 19 extracts the mortality and damage data for each Ranger District on the BDNF by threat.

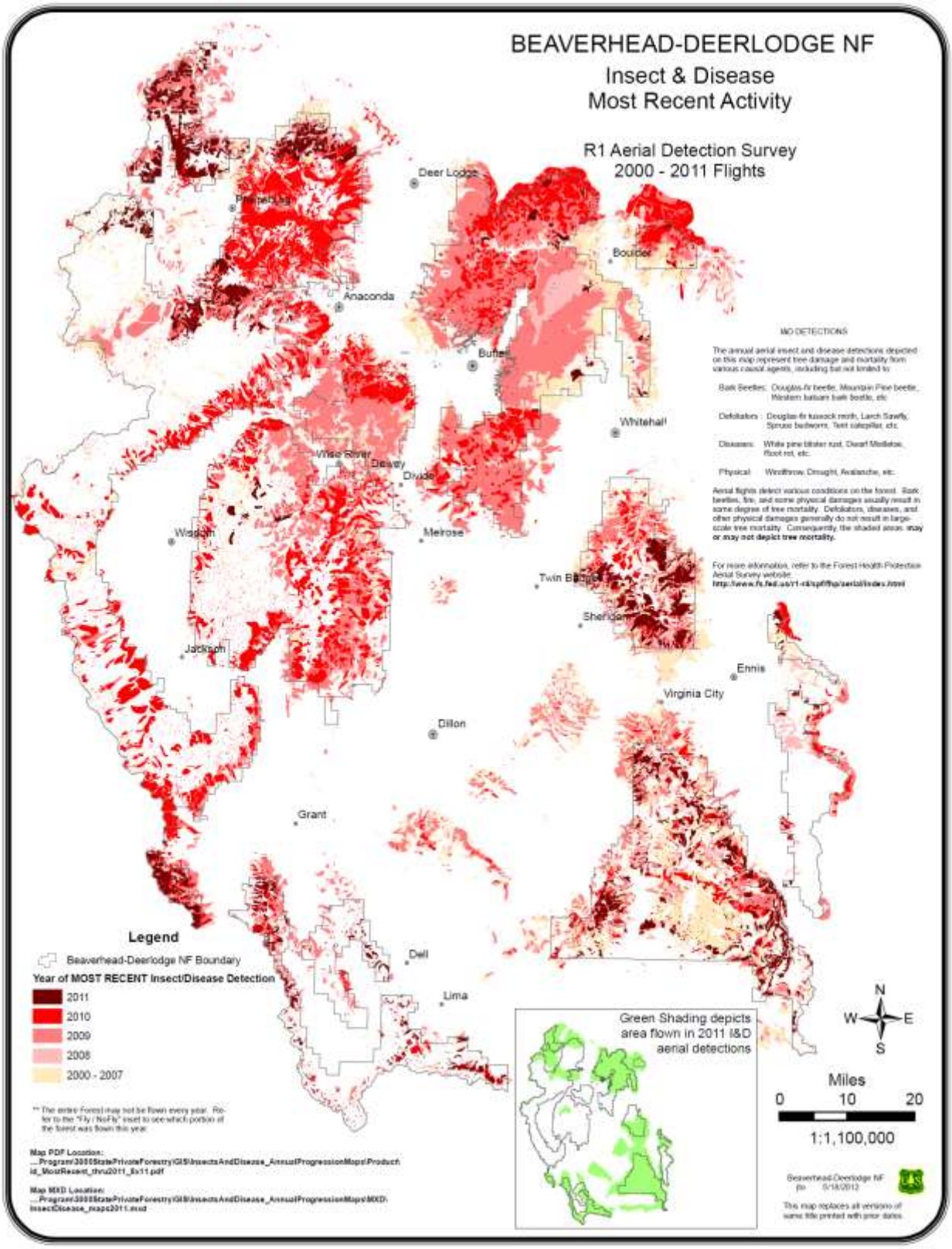

BEAVERHEAD-DEERLODGE NF
Insect & Disease
Most Recent Activity
R1 Aerial Detection Survey
2000 - 2011 Flights
Deer Lodge
Philipsburg
Anaconda
Boulder
Butte
Whitehall
White River
Dewey
Divide
Wisdom
Melrose
Twin Bridges
Sheridan
Jackson
Ehnis
Virginia City
Dillon
Grant
Dell
Lima
I&D DETECTIONS
The annual aerial insect and disease detections depicted on this map represent tree damage and mortality from various causal agents, including but not limited to:
Bark Beetles: Douglas-fir beetle, Mountain Pine beetle, Western balsam bark beetle, etc.
Defoliators: Douglas-fir tussock moth, Larch Sawfly, Spruce budworm, Tent caterpillar, etc.
Diseases: White pine blister rust, Dwarf Mistletoe, Root rot, etc.
Physical: Windthrow, Drought, Avalanche, etc.
Aerial flights detect various conditions on the forest. Bark beetles, fire, and some physical damages usually result in some degree of tree mortality. Defoliators, diseases, and other physical damages generally do not result in large-scale tree mortality. Consequently, the shaded areas may or may not depict tree mortality.
For more information, refer to the Forest Health Protection Aerial Survey website:
http://www.fs.fed.us/r1-r4/spf/fhp/aerial/index.html
Legend
Beaverhead-Deerlodge NF Boundary
Year of MOST RECENT Insect/Disease Detection
2011
2010
2009
2008
2000 - 2007
** The entire Forest may not be flown every year. Refer to the "Fly / No Fly" inset to see which portion of the forest was flown this year.
Map PDF Location:
...Program\3000StatePrivateForestry\GIS\InsectsAndDisease_AnnualProgressionMaps\Products\id_MostRecent_thru2011_8x11.pdf
Map MXD Location:
...Program\3000StatePrivateForestry\GIS\InsectsAndDisease_AnnualProgressionMaps\MXD\InsectDisease_maps2011.mxd
Green Shading depicts area flown in 2011 I&D aerial detections
N
W
E
S
Miles
0 10 20
1:1,100,000
Beaverhead-Deerlodge NF
jlo 5/18/2012
This map replaces all versions of same title printed with prior dates.

Table 19. Mortality, Defoliation and Other Damage on the Beaverhead National Forest during 2011.

Dillon RD	**Acres**	**Trees**
Douglas-fir Beetle	4	0
Mountain Pine Beetle (LPP)	17,648	28,127
Subalpine Fir Mortality	542	826
MPB (High elevation 5-needle pines)	8,936	11,594
Western Spruce Budworm	8,312	n/a
Madison RD	**Acres**	**Trees**
Douglas-fir Beetle	43	72
Engelmann Spruce Beetle	2,167	909
Mountain Pine Beetle (PP)	35	29
Mountain Pine Beetle (LPP)	34,323	55,314
Subalpine Fir Mortality	4,837	2,945
MPB (High elevation 5-needle pines)	4,305	2,725
Western Spruce Budworm	21,996	n/a
Windthrow	24	24
Sheridan RD	**Acres**	**Trees**
Douglas-fir Beetle	175	37
Engelmann Spruce Beetle	873	179
Mountain Pine Beetle (PP)	6	4
Mountain Pine Beetle (LPP)	27,935	26,982
Subalpine Fir Mortality	12,725	8,038
MPB (High elevation 5-needle pines)	18,096	17,021
Western Spruce Budworm	1,329	0
Avalanche	34	34
Dieback	2	n/a
Wisdom RD	**Acres**	**Trees**
Mountain Pine Beetle (LPP)	809	2,794

Wise River RD	**Acres**	**Trees**
Mountain Pine Beetle (LPP)	3,575	7,260
MPB (High Elevation 5-needle Pines)	93	652
Western Spruce Budworm	236	n/a
Butte RD	**Acres**	**Trees**
Mountain Pine Beetle (LPP)	38,887	120,572
Western Spruce Budworm	5,128	0
Unidentified Defoliator	84	0
Deerlodge RD	**Acres**	**Trees**
Douglas-fir Beetle	40	60
Mountain Pine Beetle (PP)	85	175
Mountain Pine Beetle (LPP)	16,781	68,845
MPB (High Elevation 5-needle Pines)	60	30
Western Spruce Budworm	1398	0
Jefferson RD	**Acres**	**Trees**
Douglas-fir Beetle	4	8
Mountain Pine Beetle (LPP)	3,960	11,035
Subalpine Fir Mortality	2	5
MPB (High Elevation 5-needle Pines)	20	63
Western Spruce Budworm	5,553	0
Pintler RD	**Acres**	**Trees**
Douglas-fir Beetle	91	170
Mountain Pine Beetle (PP)	2,383	1,409
Mountain Pine Beetle (LPP)	64,690	200,673
Subalpine Fir Mortality	6	10
MPB (High Elevation 5-needle Pines)	66	57
Western Spruce Budworm	3,506	0
Unidentified Defoliator	111	0

INSECT AND DISEASE CONDITIONS BY COUNTY

County summaries are excerpted from the 2011 Montana Condition Report. 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:

BWA = Balsam woolly adelgid

DFB = Douglas-fir beetle

ESB = Spruce beetle

FE = Fir engraver

MPB = Mountain pine beetle

WPB = Western pine beetle

WSBW=Western spruce budworm

PP = Ponderosa pine

DF = Douglas-fir

SAF = Subalpine fir

GF= Grand fir

LP= Limber pine

LPP = Lodgepole pine

WBP= Whitebark pine

Beaverhead County

Acres of Forestland, Mortality, and Defoliation by Ownership for Beaverhead County is displayed in Table 20 below (**797,487 acres surveyed**).

Table 20. Acres of Forestland, Mortality, and Defoliation by Ownership for Beaverhead County (797,487 acres surveyed).

	National Forest	Other Federal	Private	State	Total
Forestland	1,072,813	131,357	16,607	41,141	1,261,918
Dieback	0	3	8	0	11
DFB	39	6	0	0	45
ESB	406	4	2	0	412
MPB-LPP	23,531	3,702	579	1,398	29,210

	National Forest	Other Federal	Private	State	Total
MPB-High Elevation	9,455	813	122	375	10,765
SAF Mortality	2,293	120	44	32	2,489
WSBW	12,116	14,605	3,059	3,660	33,439

The area surveyed in 2011 in Beaverhead County was significantly less than surveyed in 2010. Surveys were largely restricted to the southern portion of the county within the Beaverhead and Tendoy Mountains, and a small portion of the Pioneer Mountains in the northern portion of the county. MPB activity declined substantially within these areas but continued to cause damage in LPP and 5-needled pines. MPB-caused mortality was mapped over areas of 200 to 400 acres at low levels (less than 5 TPA). WSBW activity increased to cause severe DF defoliation (greater than 50 percent crown defoliated) throughout the southern portion of the county. Over 30,000 acres were detected with WSBW activity which increased in many new locations. Avalanche damage (10 acres) was mapped on national forest in the Snowcrest Mountains, northeast of Peterson Basin. White pine blister rust is common in WBP in Beaverhead County. A site visit to Medicine Lodge Peak documented infection levels of 65 to 76 percent in overstory WBP, and approximately 44 percent in understory WBP (MFO-TR-11-33). Schweinitzii root and butt rot is common in DF, causing decay in the butt logs but not acting as an aggressive root pathogen. Schweinitzii was noted as a significant butt decayer and tomentosus root disease was causing butt and root decay in ES in the Centennial Valley area (MFO-TR-11-33). Lodgepole pine dwarf mistletoe and limber pine dwarf mistletoe are present in Beaverhead County.

Deer Lodge County

Acres of Forestland, Mortality, and Defoliation by Ownership for Deer Lodge County is listed in Table 21 below (**109,154 acres surveyed**).

Table 21. Acres of Forestland, Mortality, and Defoliation by Ownership for Deer Lodge County (109,154 acres surveyed).

	National Forest	Other Federal	Private	State	Total
Forestland	211,103	8,678	44,188	32,285	296,254
DFB	2	0	8	0	10
MPB-LPP	3,897	0	4,624	389	8,910
MPB-PP	0	0	2	0	2
MPB-High Elevation	2	0	426	4	432

	National Forest	Other Federal	Private	State	Total
WSBW	56	0	128	110	294

Significantly fewer and different areas were surveyed in Deer Lodge County in 2011 relative to areas surveyed in 2010. The area surveyed was primarily within the Flint Creek Range, west of Anaconda in the western portion of the county. In this area, MPB activity generally declined, although mortality continued in LPP and high elevation 5-needled pines. Low levels of WSBW were detected in DF.

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

Acres of Forestland, Mortality, and Defoliation by Ownership for Granite County is listed in Table 22 below (**432,603 acres surveyed**).

Table 22. Acres of Forestland, Mortality, and Defoliation by Ownership for Granite County (432,603 acres surveyed).

	National Forest	Other Federal	Private	State	Total
Forestland	585,795	26,809	190,740	42,302	845,646
DFB	104	9	103	4	220
MPB-LPP	66,367	4,641	9,126	838	80,972
MPB-PP	2,175	186	4,271	482	7,114
MPB-High Elevation	68	0	0	0	68
SAF Mortality	6	0	0	0	6
Unidentified Defoliator	111	0	21	0	132
WSBW	3,919	1,639	1,939	1	7,498

Similar numbers of acres, but in some cases different areas, were flown in Granite County in 2011 as in 2010. MPB activity remained at similar levels between 2010 and 2011.The intensity (TPA killed), however, declined in some areas. The decrease in these areas is due to host depletion. MPB activity also continued near Georgetown Lake and Philipsburg at similar levels as in 2010. Ground surveys confirm MPB is still active near East Fork Reservoir and plenty of host type is still available. MPB activity in PP increased in parts of the county. Weather patterns

in 2012 will, in part, determine if MPB continues to decline or increase again in 2012 in these areas.

WSBW activity continued in 2011 and the intensity of defoliation increased in most areas flown.

BWA was detected on SAF or GF through ground surveys in this county for the first time in 2011. BWA was detected southwest of Georgetown Lake, along Middle Fork Road, where Placer and Middle Fork Rock Creeks converge.

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 also present in Granite County.

Jefferson County

Acres of Forestland, Mortality, and Defoliation by Ownership for Jefferson County is displayed below in Table 23 (**688,669 acres surveyed**).

Table 23. Acres of Forestland, Mortality, and Defoliation by Ownership for Jefferson County (668,669 acres surveyed).

	National Forest	Other Federal	Private	State	Total
Forestland	430,785	60,017	118,707	16,380	625,889
DFB	6	2	4	0	12
MPB-LPP	18,900	1,337	1,611	10	21,858
MPB-PP	4,092	1,353	2,701	334	8,480
MPB-High Elevation	15	0	1	0	16
SAF	6	0	0	0	6
WSBW	23,868	7,327	20,464	726	52,385

Similar numbers of acres in Jefferson County were flown in 2010 and 2011. MPB activity decreased in the county in both acres affected and the number of TPA killed in both LPP and PP. Ground observations from areas around Park Lake show MPB has greatly depleted quality LPP host trees. Loss of host has likely contributed to overall declines in MPB activity. WSBW significantly increased in 2011 from just over 1,000 to 50,000 acres.

White pine blister rust has been found in LP.

Madison County

Acres of Forestland, Mortality, and Defoliation by Ownership is displayed below in Table 24 (**1,125,447 acres surveyed**).

Table 24. Acres of Forestland, Mortality, and Defoliation by Ownership for Madison County (1,125,447 acres surveyed).

	National Forest	Other Federal	Private	State	Total
Forestland	598,215	96,634	139,715	9,272	843,836
Avalanche	24	0	0	0	24
Dieback	2	0	4	0	6
DFB	183	2	12	0	197
ESB	2,595	26	40	2	2,663
MPB-LPP	64,185	5,866	3,336	722	74,109
MPB-PP	41	2	6	0	49
MPB-High Elevation	25,696	938	2,309	31	28,974
SAF	16,076	601	307	69	17,052
WSBW	25,631	2,893	4,843	928	34,295
Windthrow	24	0	0	0	24

Similar numbers of acres were flown in Madison County in 2010 and 2011. MPB was by far the most damaging insect agent recorded in 2011. In the county, approximately 100,000 acres of pines experienced mortality in each of 2010 and 2011. Most of the MPB-caused tree mortality was concentrated in the Gravelly, Snow Crest, and Tobacco Root Mountain Ranges.

WSBW also increased in areas flown. The most significant levels of defoliation occurred in the central and southern portions of the county. Subalpine fir mortality also appears to have increased. ESB activity continued in areas where susceptible, large-diameter spruce occurred in the southern Gravelly Range.

A 24-acre area of avalanche damage was mapped on national forest in the Snowcrest Range near Stonehouse Mountain, and a 24-acre area of wind throw was mapped in the Lee Metcalf Wilderness, east of Ennis Lake.

White pine blister rust is common in WBP and LP. Limber pine dwarf mistletoe is present in Madison County.

Powell County

Acres of Forestland, Mortality, and Defoliation by Ownership for Powell County is displayed below in Table 25 (**692,119 acres surveyed**).

Table 25. Acres of Forestland, Mortality, and Defoliation by Ownership for Powell County (692,119 acres surveyed).

	National Forest	Other Federal	Private	State	Total
Forestland	617,273	70,663	251,596	29,711	969,244
DFB	202	751	100	8	1,061
FE	0	0	0	2	2
Larch Needle Cast	0	0	1	0	1
MPB-LPP	72,355	33,809	15,986	2,814	124,963
MPB-PP	313	4,381	13,824	1,494	20,012
MPB-High Elevation	167	0	0	0	167
SAF Mortality	18	2	0	0	20
WPB	0	0	2	2	4
WSBW	34,609	26,009	45,253	6,143	112,014

Almost twice as many acres in Powell County were aerially surveyed in 2011 as in 2010. MPB activity continued across the county. The intensity of the outbreak appears to have decreased in the southeast portion of the county, but remained at similar levels in the central portion of the county. The intensity (TPA killed by MPB) decreased in PP.

WSBW significantly increased in the number of acres defoliated and the intensity of defoliation in areas flown in 2011. DFB increased between 2010 and 2011, possibly responding to trees that were weakened by heavy defoliation from WSBW.

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. Armillaria root disease was notable in PP east of Salmon Lake (MFO-TR-11-30). Significant schweinitzii root and butt rot has been responsible for DF tree failure at the Monture Campground. Armillaria root disease has been significant in DF and SAF in the Big Nelson Campground. Stem decay has been noteworthy in Monture Campground, including Indian Paint fungus in SAF, red belt fungus in spruce, and red ring rot in western larch.

White pine blister rust is common in WBP and LP. Lodgepole pine dwarf mistletoe is present in Powell County.

Silver Bow County

Acres of Forestland, Mortality, and Defoliation by Ownership for Silver Bow County is displayed below in Table 26 (**76,153 acres surveyed**).

Table 26. Acres of Forestland, Mortality, and Defoliation by Ownership for Silver Bow County (76,153 acres surveyed).

	National Forest	Other Federal	Private	State	Total
Forestland	181,514	20,857	50,180	3,486	256,038
DFB	0	0	4	0	4
MPB-LPP	94	0	34	0	128
Unidentified Defoliator	28	0	57	0	85
WSBW	12	0	85	0	97

In 2011, only a small area in the northern portion of Silver Bow County was surveyed. MPB activity continued at low rates within LPP host type within the areas surveyed. It is expected that MPB activity is declining in areas that previously had high rates of mortality within the county. WSBW activity was detected in the northern portion of the county in isolated locations. Defoliation of DF was recorded at low levels (less than 50 percent crown defoliation).

White pine blister rust is common in WBP and LP.

Summary:

Bark Beetles

According to aerial and ground survey data, bark beetle activity on the BDNF declined in some areas from levels reported in 2010 surveys. Mountain pine beetle activity decreased substantially but continued to cause damage in lodgepole pine and 5-needled pines in the Beaverhead and Tendoy Mountains, the Flint Creek Range west of Anaconda, the East Deer Lodge and North Butte areas, and the small portion of the Pioneer Mountains that was surveyed.

Mountain pine beetle activity was intense in the Gravelly, Snow Crest, and the southern portion of the Tobacco Root Ranges. The Georgetown Lake, Philipsburg, and East Fork Reservoir areas experienced a high amount of mountain pine beetle activity similar to 2010.

Defoliators

Western spruce budworm is the major cause of defoliation on the BDNF. Western spruce budworm activity was intense in southern Beaverhead County, causing greater than 50% crown defoliation in Douglas-fir. Increases in western spruce budworm activity were also seen in Granite County, in the Gravelly Range, and in Jefferson County. Low levels of western spruce budworm activity were detected in Deer Lodge and Silver Bow counties.

Whitebark Pine

White pine blister rust has been impacting whitebark pine ecosystems for many decades. In addition, recent outbreaks of mountain pine beetle have caused widespread mortality in many whitebark pine 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 whitebark pine ecosystems.

White pine blister rust is common in whitebark pine across the forest.

Limber Pine

White pine blister rust is common in limber pine across the forest; however, limber pine remains apparently free of the disease in the Gravelly Range, southwest of Ennis.

Evaluation:

While insects and diseases are common on the BDNF, insect and disease levels have increased primarily in areas on the Forest that are not currently being managed; there is not a link to management activities and insect and disease damage.

Item 18: Fuel Reduction in Wildland Urban Interface

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 4,014 acres of Forest Protection fuel treatments for the BDNF. The Forest accomplished 4,241 acres, of brush disposal, hazardous fuels and other fuels treatments, including wildfire. The Stewart Meadows fire accounts for 2,000 of the total WUI acres. The Forest exceeded the fuel reduction target by 106%. Specific projects included: Peterson Roadside Hazard Removal, Dry Gulch, Arnold, and Grasshopper Fuels.

Acres of Wildland Urban Interface (WUI) fuels treated	= 4,241
Acres non-WUI high priority hazardous fuels treated	=2,885
TOTAL	***= 7,126***

Table 27. Acres of WUI and Non-WUI Fuels Accomplishments, FY07-FY11

Forest Outputs and Accomplishments	2007	2008	2009	2010	2011
Fuel Reduction- WUI Acres only	1,038	1,586	3,365	1,988	4,241
TOTAL Acres Treated	12,360	6,101	13,443	5,387	7,126

Evaluation:

Fuel treatment accomplishments are up from last year, primarily due to the acres accomplished through the Stewart Meadows wildfire.

Item 22: Cultural Resource Protection

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 2011, forty-one previously recorded heritage properties (sites within previous project areas) were formally monitored on the forest (Table 28). 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 for archiving with BDNF site forms. This monitoring program has been in operation for more than 17 years.

Table 28. Historic Sites Monitored in FY2011.

Site	Date Visited	NRHP[1] Status	PHA[2]
24BE0240; Long John Vision Quest	9/16/2011	Unevaluated	YES*
24BE0419/24BE1664; Montana Southern RR	8/22/2011	Eligible	NO
24BE0641	8/19/2011	Unevaluated	NO
24BE0810; Lemhi Pass	9/1/2011	Listed	YES
24BE1194; Birch Creek CCC Camp	1/7/2011	Listed	NO
24BE1290; Bray's Canyon Complex	8/19/2011	Unevaluated	NO
24BE1389; Elk Lake Narrows Site	8/16/2011	Unevaluated	NO
24BE1429	8/15/2011	Not Eligible	NO
24BE1507	8/16/2011	Not Eligible	NO
24BE1533; Birch Creek Station	6/1/2011	Eligible	NO
24BE1535; Maurice Cemetery	7/29/2011	Unevaluated	YES
24BE1560; Grand Vista	8/22/2011	Not Eligible	NO
24BE1578; Pettengill Dam	8/26/2011	Unevaluated	NO

Site	Date Visited	NRHP[1] Status	PHA[2]
24BE1585; Farlin Townsite	8/1/2011	Unevaluated	YES
24BE1610; Upper Bridge Gulch Mine	9/30/2011	Unevaluated	NO
24BE1618; Gray Jockey Mine	6/21/2011	Unevaluated	NO
24BE1628; Wise River Meadow #2	8/22/2011	Unevaluated	NO
24BE1670	8/22/2011	Unevaluated	NO
24BE1671	8/29/2011	Unevaluated	NO
24BE1672	8/22/2011	Unevaluated	NO
24BE1673	8/29/2011	Unevaluated	NO
24BE1674	8/29/2011	Unevaluated	NO
24BE1675	8/29/2011	Not Eligible	NO
24BE1676	8/29/2011	Unevaluated	NO
24BE1677	8/29/2011	Unevaluated	NO
24BE1678	8/29/2011	Unevaluated	NO
24BE1680; Wise River – Polaris Road	8/22/2011	Unevaluated	NO
24BE1786; Elkhorn Bridge Cabin	8/22/2011	Unevaluated	NO
24BE2138; Canyon Creek Station	5/15/2011	Eligible	NO
24BE2250	9/16/2011	Unevaluated	NO
24DL0207/24GN0629; Warmsprings Creek Road	6/23/2011	Unevaluated	NO
24GN0521; West Fork Rock Creek Station	6/13/2011	Eligible	NO
24GN0626	10/14/2010	Eligible	NO
24JF0538	6/1/2011	Eligible	NO
24JF0904	9/14/2010	Unevaluated	NO
24JF0905	9/14/2010	Unevaluated	NO
24JF0964	6/21/2011	Unevaluated	NO
24JF1603	9/14/2010	Unevaluated	NO
24MA0572	8/14/2011	Unevaluated	NO
24MA1203	8/2/2011	Eligible	NO
24MA1205	10/18/2010	Eligible	NO
24MA1207	8/14/2011	Unevaluated	NO

[1]NRHP = National Register of Historic Preservation

[2]PHA = Priority Heritage Asset

Project Monitoring

Cultural sites are flagged for avoidance or mitigation measures, in consultation with the Montana SHPO, are developed to ensure sites are not affected adversely. Heritage personnel work with program leaders to ensure sites are avoided and we have noted this strategy is very effective for site protection. The mitigation is designed to allow project work to continue but in such a way the impacts are avoided or reduced.

Site monitoring indicates the above mitigation measures are being implemented and successfully ensure sites are not adversely affected by ground disturbing activities.

Evaluation

The type of survey the BDNF Heritage staff conducts is consistent with the Region 1 Programmatic Agreement between the MT SHPO and 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 for project areas exceeding 100-acre. Less than 100 acres project areas are intensively covered using a compass/GPS unit with transects spaced twenty meters apart.

Item 23: Quantities of Goods and Services

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 29 summarizes Forest Outputs and Accomplishments into a single table to simplify tracking. The brief discussions following the table compares FY11 accomplishments to the BDNF target, if there was one, and evaluates the trend.

Table 29. Summary of Forest Outputs and Actual Accomplishments for Fiscal Years 2007-2011.

Forest Outputs	2007	2008*	2009	2010	2011
Watershed Assessments (each)	1	2	1	1	0
Watershed Restoration (miles)	8	16	24	24	30
Noxious Weed Treatment (acres)	5,001	8,570	8,088	9,542	8,672

Timber offered for sale (MMBF)	10.8	14.13	23.0	20.3	14.2
Forest Outputs	**2007**	**2008***	**2009**	**2010**	**2011**
Timber Harvested (Acres)	920	1,358	668	2,039	713
Livestock grazing (AUMs)	161,129	204,561	174,764	161,145	151,398
Fuel Reduction: WUI Acres only	1,038	1,586	3,365	1,988	4,241
TOTAL Acres	12,360	6,101	13,443	5,387	7,126
Road Maintenance	961	934	962	1,023	790

*Source: BDNF Final Accomplishment Certification Report for 2009.

The following information compares targets to accomplishments. Data was extracted from the 2011 FACTS database and the Forest Accomplishment Excel spreadsheet.

(1) Watershed assessments

- One broadscale assessment was initiated on the Forest in 2011. Wise River Ranger District began work on the Seymour-Deep Creeks Watershed Assessment.
- The Forest's FY11 target of 1 broadscale assessment was begun, but not accomplished.

(2) Watershed Restoration

- In FY 2011, a total of 15 miles of stream and 16 acres of lake restoration were completed in three Fish Key watersheds. All projects were non-native trout removals, focused toward improving the viability of existing westslope cutthroat trout populations. Restoration occurred in Norton Creek (5.0 miles; German Gulch Key Watershed), Doolittle Creek (3.0 miles; Doolittle Key Watershed) and Cherry Creek (7.0 miles; Cherry Pioneers Key Watershed). The two lakes were treated were also in the Cherry Pioneers key watershed; Cherry Lake (8.0 acres) and Granite Lake (7.5 acres) lake.
- The trend continues to be up from FY09 and previous years. The target of 26 miles stream improvement was exceeded.

(3) Noxious weed treatment

- Noxious weed treatments amounted to 8,672 acres.
- This was 151% of the Forest target of 6,215 acres. The trend continues up from the five year average, in part because wildlife funding contributed to weed spraying accomplishments on big game winter range.

(4) Timber Offered and Sold

- Though not as high as 2009 or 2010, the trend continues up from a low of 7.6 MMBF offered in FY06 (Table 29). Timber sold was the second highest in the last five years and above the ten year average.
- The amount of timber sold was 51.8% of the targeted 60,850 CCF for FY11 (Table 30).

Table 30. Timber offered, sold and harvested in FY2011.

Category	MMBF For FY11	CCF For FY11
Timber Offered & Sold	5.5 (5,588.10 MBF)	11,312.26
Additional Volume (Not competitive)	5.9 (5,904.00 MBF)	14,914.18
Personal Permits	2.7 (2,748.99 MBF)	5,331.90
Total Sold	**14.2 (14,211.81 MBF)**	**31,558.44**
Timber Harvested	22.8 (22,845.14 MBF)	46,948.52

(5) Livestock Grazing, Actual Use in 2011, in Animal Unit Months

- Actual use by livestock on the Forest was 151,398 animal unit months (Table 31).
- Actual use is down from FY09 and FY10.

Table 31. Actual livestock use FY07-FY11 in Animal Unit Months.

Type of Use	FY07	FY08	FY09	FY10	FY11
Cattle or Bison	153,710	198,136	167,524	153,039	143,609
Horses	457	324	252	500	643
Sheep	6,962	6,101	6,988	7,606	7,145
TOTAL	161,129	204,561	174,764	161,145	151,398

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

(6) Fuel Reduction

- Acres of Wildland Urban Interface (WUI) fuels treated = 4,241
- Acres non-WUI high priority hazardous fuels treated =2,885

TOTAL = 7,126

(7) Road Maintenance and Obliteration

- There were 790 miles of Forest roads maintained in FY11 compared with 1,023 miles in FY10. This includes roads maintained with FS fund and with non-FS funds (such as by counties, permittees, timber purchasers, and other commercial operators).

- The Forest road maintenance target of 545 miles was exceeded by 145%.

(B) BUDGETS: COST OF PROVIDING GOODS AND SERVICES

The programmed budget for the BDNF ($18,728,000) was comparable to FY09 and FY10 (Table 32), but notably higher than FY08 due partly to increases for timber management and forest health protection.

Table 32. BDNF Actual Budget Expenditures by Budget Line Item 2008 to 2011.

Budget Line Item	DESCRIPTION	2008 Budget Expenditure ($000)	2009 Budget Expenditure ($000)	2010 Budget Expenditure ($000)	2011 Budget Expenditure ($000)
BDBD	Brush Disposal	13	11	2	21
CMFM	Facilities	269	327	251	214
CWFS	Cooperative Work	57	38	31	51
CMII	Infra Improvement—Deferred Maintenance	--	67	22	--
CMLG	Capital Maintenance—Legacy	--	396	955	432
CMRD	Road Construction and Maintenance	1,112	1,107	1,622	931
CMTL	Trail Construction and Maintenance	1,160	1,168	1,287	1,319

Budget Line Item	DESCRIPTION	2008 Budget Expenditure ($000)	2009 Budget Expenditure ($000)	2010 Budget Expenditure ($000)	2011 Budget Expenditure ($000)
CWKV	Knudtson/Vanderberg Fund	38	60	47	11
WFPR	Fire Protection/Preparedness	2,984	3,749	3,640	3,389
WFHF	Hazardous Fuels	1,004	635	1,054	761
NFIM	Inventory and Monitoring	357	430	450	384
NFLM	Land Ownership	211	452	118	149
NFMG	Minerals and Geology	440	510	345	526
NFPN	Land Management Plans (Plan Revision)	464	366	106	86
NFRG	Grazing Management	849	1,045	914	995
NFRW	Recreation, Heritage, Wilderness	1,059	1,174	1,192	67
NFTM	Timber Sale Management	1,248	2,513	2,749	2,315
NFVW	Vegetation and Watershed	857	931	1,375	1,031
NFWF	Wildlife and Fish	505	639	617	676
RBRB	Range Betterment	69	101	119	88
SSSS	Timber Salvage	342	60	384	374
TRTR	Road and Trail Restoration	30	--	--	--
SPSP	Forest Health Action Programs	51	626	472	563
WFEX	Grants/Agreements/COOP	154	384	50	25
FDFD	Fee Demo	78	207	209	395
WFSU	Unplanned Wildfire Suppression	623	1,848	440	4,529
Admin	Administration (Cost pool, computers, facilities) (CACA, CMFM, QMQM)	2,513	2,809	2,708	2,576
	TOTAL Programmed Expenditures	$15,864	$19,805	$20,946	$18,728
	TOTAL Including Fire Suppression	$16,487	$21,653	$21,386	$23,257

**Source of data: Unit Status of Funds Report, USDA FS, BDNF, 1/2012*)

(C) BUDGET: REVENUES FROM PROVIDING GOODS AND SERVICES

- Table 33, below, displays receipts collected by source.

Table 33. Revenues Collected for Goods and Service Provided by the BDNF.

Source Of Revenues Collected	Receipts ($)
Timber	12,883
Land Uses	46,333
Recreation Special Uses	297,778
Minerals	189
L&WCR Recreation User Fees	2,100
Grazing	178,178
TOTAL of National Forest Funds	**591,404**
Salvage Sale Fund	313,975
Knutdsen Vandenberg Fund	3,265
Specified Road Costs	20,288
TOTAL of ALL Funds	**928,932**

(D) EMPLOYMENT

The BDNF employed 164 permanent employees and 165 temporary employees in 2011 - three more permanent employees and two fewer temporary employees than in FY10.

Evaluation:

The BDNF met or exceeded most of the Forest's assigned targets related to product outputs in FY11. Targets for fuel reduction and noxious weed treatment were again far 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 not met. Environmental analysis was not completed on projects anticipated to generate FY11 sales.

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.

The number of positions employed by the BDNF increased slightly since 2008.

Item 25: Developed Recreation Facilities

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:

The BDNF has 202 developed recreation sites which range from campgrounds with paved access and water to day use sites and trailheads with few or no facilities. The BDNF also maintains 25 cabin rentals. 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 meeting current accessibility standards.

Recreation site reconstruction is funded primarily through the Capital Improvement Process (CIP), which in FY11 included the reconstruction of Thompson Park (Butte District, in cooperation with Butte Silver Bow County). From 2009 through 2011, collections from the Fee Demo project provided funding through the Recreation Site Improvement (RSI) program. These funds had been directed at the restoration of several rental cabins in FY11 and over preceding years, the design and installation of new toilets and water system at Lodgepole Campground (Pintler District, 2010-2012), and the design and reconstruction of Grasshopper Campground (Dillon District, 2010-2011).

Recreation Enhancement

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 completed or underway. See the FY10 Beaverhead-Deerlodge Forest Monitoring Report for details regarding these projects.

Evaluation:

With the number of sites improved in FY11 and project work anticipated over the next five years, the Forest is on track to accomplish reconstruction of valuable recreation assets over the 30 year life cycle.

LIST OF CONTRIBUTORS

Resource Topic	Name and Position
Accomplishments and Outputs	Pam Fletcher, Planner Doreen McLaughlin, Budget and Finance Officer
Appeals and Litigation	Jan Bowey, Litigation Coordinator
Aspen Restoration	Rob Gump, Forest Silviculturist Russ Edelen, Wildlife Technician
Budget and Economics	Pam Fletcher, Planner
Facilities, Transportation	Noelle Meier, Recreation Program Manager
Fire	Brian Anderson, Dillon District Assistant Fire Management Officer
Fuel Treatments	Brian Anderson, Dillon District Assistant Fire Management Officer
Geographic Information Systems	Tim O'Neil, GIS Coordinator
Heritage	Tammy Cherullo, Archaeologist
Insect and Disease	Rob Gump, Forest Silviculturist
Range	Tom Heintz, Range Management Specialist
Recreation	Noelle Meier, Recreation Program Manager Jonathan Klein, Madison Ranger District Recreation
Riparian and Watersheds	Jim Brammer, Forest Aquatics Program Manager
Soils	Dave Ruppert, Forest Soil Scientist
Sustainable Operations	Leaf Magnuson, Forest Green Team
Timber	Cathy Frey, Timber Resource Specialist
Wildlife	Art Rohrbacher, Wildlife Program Manager

COORDINATORS: Peri Suenram, Planning Staff Officer
Pam Fletcher, Planner

APPROVAL: Melany Glossa, Forest Supervisor