

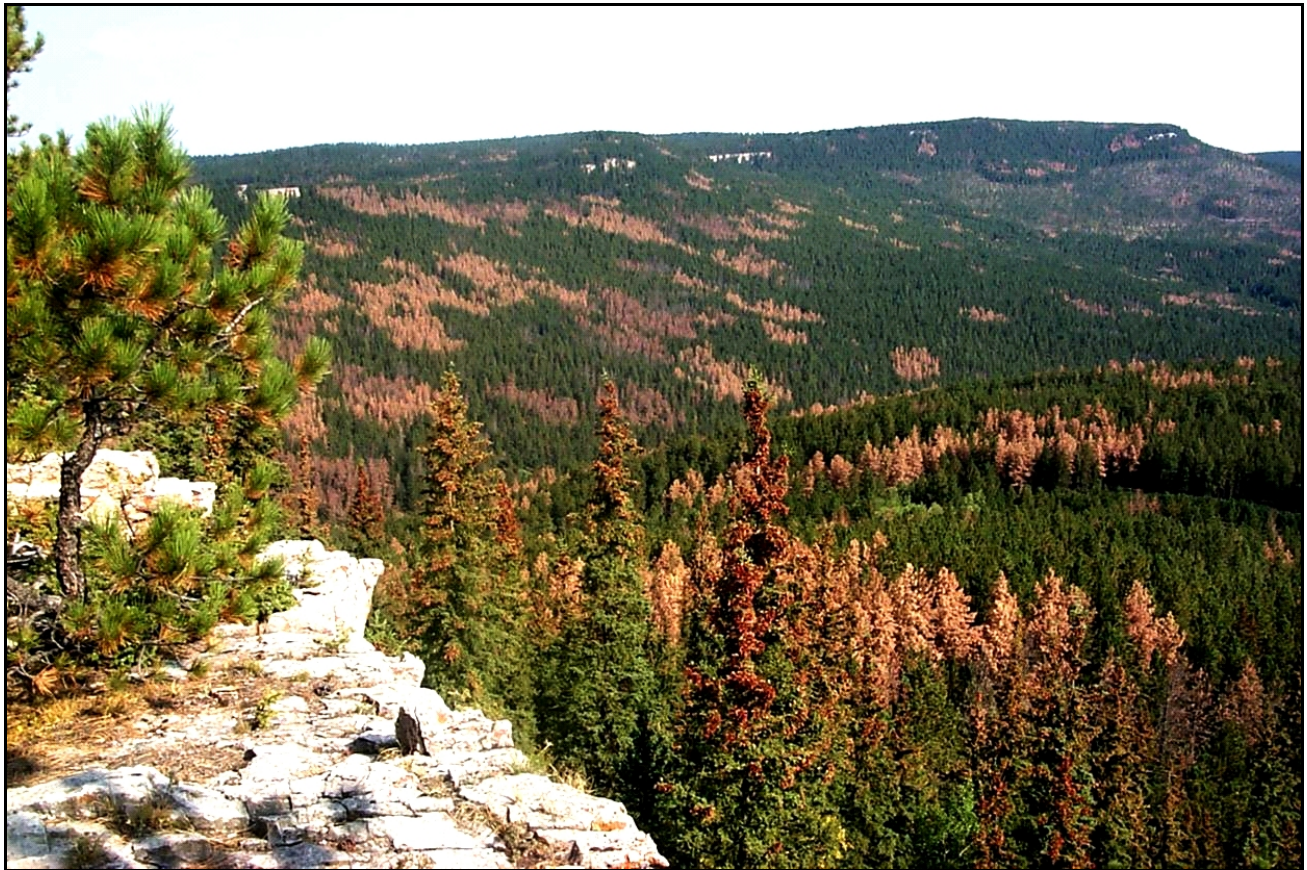
United States
Department of
Agriculture

Forest
Service

Black Hills
National
Forest

September 2006

BLACK HILLS NATIONAL FOREST



View from Grand Vista of mountain pine beetle killed trees. Odakota Mountain in right background.

FY2005 MONITORING AND EVALUATION REPORT

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Black Hills Forest Plan

Monitoring and Evaluation Report

Fiscal Year 2005

(October 2004 through September 2005)

This is the annual monitoring and evaluation report for the Black Hills Land and Resource Management Plan (Forest Plan). A revision of the Forest Plan was completed in June 1997. The first major amendment (Phase I) to this Forest Plan was completed in May 2001, and the second major amendment (Phase II) was completed in October 2005.

Phase II includes strategies to address risks from fire and insects, reviewing protections for a variety of plant and animal species, and evaluating and designating research natural areas as appropriate. Visit the Black Hills National Forest website at www.fs.fed.us/r2/blackhills to view the Phase II decision.

This report is a transition to the monitoring provisions of the Phase II Amendment.

The basis for the annual monitoring report is in Chapter Four of the Forest Plan. This report does not discuss the entire inventory and monitoring that occurs in the Black Hills but only monitoring information related to the Forest Plan. More detailed studies may occur in association with individual projects that implement the Forest Plan. When relevant to Forest-wide trends, information from these site-specific projects is incorporated into Forest-wide monitoring.

The Black Hills Monitoring and Evaluation Report focuses on monitoring effectiveness in meeting or moving toward established objectives set forth in the Forest Plan. Implementation monitoring or monitoring to insure standards and guidelines are implemented as directed in the Plan is a minor part of this monitoring report.

The Forest has developed a "Monitoring Implementation Guide" to describe methods to implement the monitoring and evaluation requirements of the Forest Plan; see <http://www.fs.fed.us/r2/blackhills/projects/planning/2001Monitor/MonGuide.pdf>

Several environmental factors are monitored each year; however not every item is scheduled for evaluation and reporting on an annual basis. Chapter Four of the Forest Plan indicates how often each item is reported.

Supporting documentation for this report is located in the Supervisor's Office, Black Hills National Forest.

1/s/ Craig Bobzien
CRAIG BOBZIEN
Forest Supervisor

9/30/06
Date

Monitoring Item 1: Air Quality

Objective 101: Maintain air quality standards in accordance with state implementation plans.

Monitoring:

The Black Hills National Forest continued to provide representation at the quarterly Pennington County Air Quality Board meetings during the year 2005.

There were no violations of the Clean Air Act on the Black Hills National Forest for the period year 2005 nor were there any air quality complaints from individuals or other entities attributed to National Forest project activities (South Dakota - Administrative Rules - Article 34:10; Wyoming – Air Quality Standards and Regulations - Chapter 10).

Prescribed burning on the Black Hills National Forest, including forest residue pile burns, remain the single greatest potential air degradation activities. The Forest saw a slight reduction in its prescribed burning activities in FY2005 from 6,807 to 6,220 acres. This decrease was due in large part to reduced burning opportunities in the fall of 2004 and spring of 2005. The revised Forest Plan establishes an annual objective of 8,000 acres of this type of activity. The Forest is making every effort to increase the amount of fire restoration treatments, however key to that effort is available funding. Increased emphasis here will likely result in reduction in the amount of other types of burning that occur, including wildfire and pile burning to dispose of forest residues.

The following mitigation actions are implemented on the Black Hills National Forest during prescribed burning activities to minimize air quality degradation:

Receptors such as subdivisions, roads, towns, and other air-quality sensitive areas are identified during the prescribed burning planning process.

Burning prescriptions are identified in the "prescribed burn plan" to ensure that the air quality standards are maintained in receptor areas.

Prior to implementation of an approved prescribed burn project, weather conditions (predicted and current), including smoke dispersal predictions, are assessed to insure smoke management criteria can be met.

Air quality is monitored on site and at receptor areas during burn implementation to insure that air quality remains within identified parameters.

The Black Hills region has no non-attainment areas identified at this time (EPA. 2003. Criteria Pollutant Area Summary Report. Green Book. URL: <http://www.epa.gov/air/oaqps/greenbk/anc12.html>. February 6). Rapid City, South Dakota remains the key area of concern in that it is close to being designated as a non-attainment area for PM-10, which is a pollutant often produced by smoke and dust. The concern for air quality in the Rapid City area has resulted in the Forest working jointly with the Rapid City Air Quality Office on guidelines for all National Forest burning activities. A 1995 guideline places restrictive measures for all forms of open burning planned on National Forest land in the Rapid City air shed. The Forest continues to work with the Pennington County Air Quality Office in mitigating all potential air-quality-impacting activities.

The State of South Dakota continues to add to and develop its long range Air Quality Monitoring Database that will assimilate air-monitoring data, air-quality-influencing events, and weather data from 1990 to the present. The Forest assists the State by providing information on the occurrence of wildfires and prescribed

fire activities on the Forest to keep the database current. In addition to activities on the National Forest, information from other area land management agencies including the Bureau of Land Management, Fish and Wildlife Service, Bureau of Indian Affairs, and State of South Dakota is entered in the database. Air monitoring data comes from the three area monitoring sites currently established at Rapid City, the Badlands, and Pine Ridge. This data base represents a comprehensive resource in monitoring air-quality trends and in determining air-quality links with various resource management activities and/or weather phenomena.

The State of South Dakota remains the key sounding board when it comes to air quality issues related to management activities conducted by the Forest. Every effort is made to address air quality concerns prior to project implementation and so that adjustments can be made as needed to mitigate air quality issues.

Evaluation:

The Black Hills National Forest management activities, primarily prescribed burning, have met state clean air standards over the last five years. The Forest has accomplished approximately 45% of the prescribed burning objective in the Forest Plan over the last six years, but has exceeded the historic annual level of wildfire acreage contributing to an above average level of emissions when considering combined effects of wildfire and management induced particulates.

Monitoring Item 4: Water – Watershed Health

Objective 102: Use a qualitative survey which emphasizes riparian conditions, such as Proper Functioning Condition methodology, to refine the preliminary watershed health assessments (1997 Forest Plan, Appendix J).

Objective 104. Maintain or enhance watershed conditions to foster favorable soil relationships and water quality.

a. Implement projects to improve watershed conditions on an average of at least 300 acres annually over the plan period.

Objective 108. Manage for sustained or improved water flows.

Objective 217. Maintain habitat for game and fish populations at the state objectives in effect in 1996.

Objective 219. Maintain or improve instream fisheries habitat. Cooperate with state agencies in aquatic ecosystem improvement to meet mutually agree-upon objectives.

Sub-Item: Watershed Assessment

Monitoring:

No watershed classes were reassessed in FY2005.

Evaluation:

The boundaries of some sixth-level watersheds have been redelineated since the 1997 Revised Forest Plan (Appendix M) was completed. At some point, the watershed classes for these watersheds are expected to be recalculated using the same methodology used in the 1997 Forest Plan Revision to maintain consistency or all watersheds could be reassessed with a methodology that would be expected to be useful for the next Forest Plan Revision.

Sub-Item: Stream Health

Monitoring:

From 2000-2002, quantitative data was collected on several physical stream attributes as part of the Integrated Resource Inventory – Common Water Unit (IRI-CWU) effort. Over 1,000 points were sampled along the stream drainage network at approximately one-mile intervals within the Black Hills. This included perennial, intermittent and ephemeral streams. Data collected included bankfull width, bankfull depth, substrate particle size, riparian width and plant species composition along with stream/valley classifications and photos. The IRI-CWU dataset is currently undergoing the Quality Assurance/ Quality Control (QA/QC) step as it is being entered into the Forest Service corporate database NRIS-Water through an agreement with the South Dakota School of Mines and Technology.

Stream reference reaches are expected to serve as the comparison point for determining stream health class per the Region 2 Watershed Conservation Practices Handbook (Forest Service Handbook 2509.25). Five reference reaches have been established on the Forest. The locations are on Spearfish Creek, Little Spearfish Creek, Boxelder Creek, Whitelaw Creek and Castle Creek. No new reference reaches were established in FY2005.

Aquatic habitat conditions in Rapid Creek below Pactola Reservoir are being affected by the diatom *Didymosphenia geminata* (Didymo) (Shearer and Erickson 2006). Since 2002, this diatom (single-celled algae) has displayed characteristics of an aquatic invasive species, spreading throughout a 20-mile reach of Rapid Creek between Pactola Dam and Rapid City. The stream reach of Rapid Creek from Pactola Reservoir downstream through Rapid City has traditionally been one of the two best brown trout (*Salmo trutta*) fisheries in the state of South Dakota. In recent years the brown trout population has displayed a sharp decline in adult (> 8-inch) fish concurrent with the presence of *Didymosphenia geminata* (didymo) in Rapid Creek. Didymo mats have exceeded 95% coverage of the stream substrate in some locations. Currently, the direct and indirect links between didymo and the trout fishery are unknown. Didymo has been detected upstream of Pactola Reservoir in Rapid Creek in the Silver City area.

In early June 2005, the South Dakota Department of Game, Fish and Parks (SDGFP) collected samples from most 3rd and 4th order streams in the Black Hills to screen for the presence of didymo (Shearer pers. comm. 2006). Sample sites were selected due to high use by anglers. Some 3rd order streams were not sampled due to the lack of an established fishery or lack of water. Didymo was not detected from any of the twelve sites that were sampled. These sites included Spearfish Creek (2), East Spearfish Creek, Castle Creek (walk-in fishery above Deerfield Reservoir), the North and South Forks of Rapid Creek, French Creek, Spring Creek, Cascade Creek (at the springs), Battle Creek, Whitewood Creek and Boxelder Creek.

Evaluation:

The IRI-CWU dataset provides a baseline to track the long-term trend related to stream health. It is anticipated that a subset of points on perennial and intermittent streams could be selected for follow-up monitoring in the next 3-5 years. The IRI-CWU protocol did not stratify site locations based on land ownership, subsequently some sites were located on private lands. These sites would need to be relocated onto National Forest System lands to better evaluate the effects of Forest Service management on stream and riparian habitat conditions.

The Forest plans to continue to work with our partners (Black Hills Flyfishers, SDGFP, South Dakota Department of Environment and Natural Resources) to control and in Rapid Creek and to prevent the spread of didymo to other Black Hills streams.

Sub-Item: Water Quality

Monitoring:

The status of surface water quality on the Forest is summarized in the biennial reports prepared by the states of South Dakota and Wyoming pursuant to sections 303(d) and 305(b) of the Clean Water Act. The Forest Plan Phase II Amendment Final Environmental Impact Statement (FEIS; USDA Forest Service 2005) disclosed water quality conditions based on the 2004 biennial reports. Both states have recently made available the 2006 biennial reports in either a final report (SD) or draft report (WY). This new information on water quality is provided below.

In the Belle Fourche River Basin of South Dakota, two waterbodies from the 2004 report are no longer impaired and are to be delisted (SD DENR 2006). These waterbodies are Iron Creek Lake and the reach of Whitewood Creek from Spruce Creek downstream to Sandy Creek. Iron Creek Lake now meets its assigned beneficial uses because of a change in the water quality standards assessment methodology. New information indicates that the water temperature parameter on Whitewood Creek is being fully supported.

Bear Butte Creek was not fully supporting the assigned beneficial use of coldwater permanent fish life to water temperatures. The source was unknown. In the past, Bear Butte had been fully supporting all assigned beneficial uses for the entire stream.

In the Cheyenne River Basin of South Dakota, Bismarck Lake and Lakota Lake and the reach of Battle Creek from Teepee Gulch downstream to Highway 79 are to be delisted (SD DENR 2006). Both lakes now meet their water quality standards because of a change in the assessment methodology. New information indicated that Battle Creek was no longer impaired due to pH levels.

Several streams that were fully supporting their designated beneficial uses during the 2004 assessment period were not meeting their fish-related use during this assessment period. Boxelder Creek, from the headwaters to near Bogus Jim Creek, was not meeting its assigned beneficial use of coldwater permanent fish life due to water temperature exceedance caused from an unknown source. French Creek from the headwaters to the town of Custer was not meeting its coldwater marginal fish life use due to low dissolved oxygen levels that were drought-related. Grizzly Bear Gulch near Keystone was not supporting its coldwater permanent fish life use due to drought-related water temperatures. Spring Creek from the headwaters to Sheridan Lake was not meeting its immersion recreation waters use due to fecal coliform from livestock and on-site treatment (septic) systems. Victoria Creek was not meeting its assigned beneficial use of coldwater permanent fish life due to water temperature exceedance caused from an unknown source.

Insufficient information was available to determine if Reno Gulch, Rhoades Fork or Sunday Gulch were meeting their assigned beneficial use of coldwater permanent fish life.

Sheridan Lake is now listed as not supporting the assigned beneficial use of coldwater permanent fish life due to dissolved oxygen levels. Previously, it was listed due to exceedance of the Trophic State Index (TSI). The TSI is being addressed through a Total Maximum Daily Load (TMDL) which is currently being developed. Many of the factors affecting water quality in Spring Creek and Sheridan Reservoir are not Forest Service activities.

Monitoring conducted in the Black Hills by the Wyoming Department of Environmental Quality (WY DEQ 2006) shows full support of designated 2AB aquatic life uses in Blacktail Creek within the Black Hills National Forest. Elevated water temperatures in Beaver Creek appear to be due primarily to historic channel widening caused by a combination of past grazing practices and changes in flow regime from Cook Lake. The system has since stabilized, and is considered to be supportive of its designated class 2AB aquatic life uses. A reach on Whitelaw Creek has been monitored by WY DEQ as a long term reference site since 1993. Extrapolation of those data and assessments to the remaining tributaries, indicate full aquatic life use support in the Beaver Creek watershed.

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Water quality was monitored indirectly by the Forest through the implementation and effectiveness monitoring of Forest Plan standards and guidelines, regional watershed conservation practices and State best management practices (BMPs). See the sub-item nonpoint source water pollution control discussion for BMP monitoring results.

Evaluation:

The Forest plans to continue to work cooperatively with state water resource protection agencies to address water quality and to promote the attainment of state-assigned beneficial uses.

The Black Hills region traditionally has some of the best surface water quality in the state (SD DENR 2006). This is due in large part to a cooler climate and higher rainfall than the surrounding plains as a result of greater elevation and forest cover. Also contributing to the water quality in this region is the nature of local bedrock formations which are much less erodible than the highly erosive and leachable marine shales and badlands on the surrounding plains. However, the Black Hills streams are vulnerable to losses of flow exacerbated by periodic droughts.

Sub-Item: Nonpoint Source Water Pollution Control

Monitoring:

The Forest uses Regional Watershed Conservation Practices (Forest Service Handbook 2509.25; WCPs) and Best Management Practices (BMPs) to control nonpoint source water pollution. The implementation and effectiveness of BMPs and WCPs was monitored at 23 previously harvested timber sales and 55 units (Thomas 2006a, 2006b).

Evaluation:

The 2005 field season monitoring results suggest that the effects of logging activities have had minimal negative impacts on soil, watersheds and/or streams (Thomas 2006a, 2006b). BMPs and WCPs are being implemented and are effective in the timber sale and units. For roads, BMPs and WCPs are generally being implemented and are generally effective but in several cases more drainage needs to be incorporated on some roads.

Monitoring Item 6: Riparian – Condition/Trend

Objective 104. Maintain or enhance watershed conditions to foster favorable soil relationships and water quality.

b. Achieve and maintain stable stream beds and banks, diverse riparian vegetation, and effective ground cover that controls runoff and erosion.

Objective 213. Maintain or enhance existing riparian area biodiversity, physical structure and size.

Monitoring:

Projects to maintain or enhance riparian habitat are generally completed by the following programs; Wildlife, Fish and Rare Plants (NFWF), Vegetation and Watershed Management (NFVW), Range Management (NFRG) or through Knutson-Vandenberg (KV) funds generated from timber sale receipts. The table below shows projects that have contributed to maintaining or enhancing riparian habitat in FY2005.

Project	District	Funding Source	Acres
Bear Spring Exclosure	Bearlodge	NFWF	0.5
Kokesh Spring Exclosure	Bearlodge	NFWF	0.5
Michelson Spring Exclosure	Bearlodge	NFWF	0.5

Castle Creek Stream Protection Fence	Hell Canyon	NFWF	1.0
Revelle Spring Exclosure	Hell Canyon	NFWF	0.5
Black Fox Wetland Protection	Mystic	NFWF	50.0
Smith Gulch Fen Restoration	Mystic	NFVW	1.5
Total:			54.5

Evaluation:

Multiple programs contribute to maintaining or enhancing riparian habitat. In addition to site-specific efforts, the implementation of Forest Plan standards and guidelines, Regional Watershed Conservation Practices and Best Management Practices contribute to maintaining or enhancing riparian habitat forestwide.

Monitoring Item 7: Riparian Wetlands

Objective 107. Restore degraded wetlands except where exemptions are allowed by a Clean Water Act Section 404 permit.

Objective 214. Restore riparian shrub communities across the forest by 500 acres during the Plan period on sites capable of supporting this community.

Objective 215. Manage for at least 5 stream reaches in a rehabilitated condition during the Plan period. Select reaches where the water table has receded and plant species composition has changed as a result of human activities. Coordinate planning and implementation with state game and fish agencies and downstream private landowners. Use Objective 215a through d in designing the projects.

- a. raise the water table to saturate historically inundated soils
- b. convert drier-site vegetation to native wet-meadow species.
- c. Reintroduce beaver into the drainage once suitable habitat is developed
- d. Design management to maintain wet-meadow conditions

Monitoring:

A project was done on Meeker Creek (Hell Canyon District) in FY 2005 to increase groundwater levels and soil moisture along the riparian zone. A number of instream structures, comprised of native materials, were installed in the stream channel to raise the water table.

Evaluation:

A variety of projects contribute to the protection of existing riparian/wetland habitat as noted in Monitoring Item 6, but the acres of true riparian shrub “restoration” is limited. An assessment to determine the acres and specific location of sites capable of being restored to a riparian shrub community could be expected to aid in restoration efforts, as well as to help in determining if the 500 acres of riparian shrub restoration is the appropriate target level.

Monitoring Item 8: Vegetative Diversity – Vegetation Species Composition

Black Hills National Forest

201: Manage for a minimum of 92,000 acres of aspen (double current aspen acres), and 16,000 acres of bur oak (approximately 33 percent increase) in current bur oak during the life of the Plan. The highest priority for hardwood restoration is where conifers (e.g., spruce and pine) have out-competed aspen adjacent to riparian systems that once supported beaver. Increases in bur oak will be focused away from the Bear Lodge Mountains.

Presently there are 46,172 acres of aspen by cover type, 12,477 acres of bur oak by cover type. See chart below. The increase in aspen or bur oak cover type is achieved generally by removing pine from mixed species stands.

The 1997 forest plan display of cover types is included following the year 2005 display.

202: Conserve and manage existing mountain mahogany stands.

Manage a minimum of 10 percent of the site in cover (mature and over mature shrubs).

There are 4,522 acres of mountain mahogany (SMS) by cover type in the vegetation database (2005). The vegetation database does not track the maturity of mountain mahogany.

Manage a minimum of 40 percent of the site in forage (young shrubs) by treating when root reserves are high or immediately prior to the growing season.

There are 170 acres of shrublands. The vegetation database does not track maturity of shrublands by any variable. Further on-the-ground survey is needed to record shrubland maturity.

203: Manage 30 to 50 percent of each bur oak stand for 100-plus year old trees.

The age of bur oak is recorded for bur oak stands within the vegetation database. The age is for the stand as a whole. Within each stand, age distribution is not tracked within the vegetation database. Individual stand data printouts displays within stand variations. The bur oak cover type is 12,477 acres (see cover type 2005 chart). There are 6,606 acres of bur oak with stand age determination. Of the 6,606 acres, there are 647 acres of bur oak that is 100 years or older.

204: Conserve and manage birch/hazelnut, lodgepole pine, limber pine, and Douglas-fir.

These cover types have the following acres:

Paper birch 3145

Lodgepole pine 87

Limber pine -0-

Douglas-fir 30

205: Manage for 122,000 acres of prairie grassland and 3,600 acres of meadow during the life of the Plan. Restored acres will not be considered suitable for timber production.

Generally, the cover types displayed below fall into the prairie grassland and meadow categories. However, there is not a definitive link from the database cover type scheme to ecologically classify grassland and meadow categories.

Prairie Grasslands

Black Hills National Forest

Needle-and-thread, needlegrass	857
Grasslands	66,825
Sideoats grama	149
Big & Sand bluestems	459
Planted grasslands	210
Little & silver bluestems	7,881
Oatgrass	509
Wheatgrass	6,669
Total =	83,559

Meadow

Blue grama	19,352
Bluegrass	6,737
Total =	26,089

239: Manage for 20,000 acres of spruce across the Forest using active management to achieve multiple-use objectives. Treat spruce within 200 feet of buildings where spruce has encroached into hardwoods and for emphasis species management.

Spruce cover type is 25,462 acres. To increase the acres of spruce cover type is to generally remove pine from a mixed spruce/pine stand.

Areas with trees are at least 10 percent occupied (based on crown cover) by tree species of any size or are sites that are not currently occupied by species but are still forest sites.

There has been 10 acres of spruce treatment within 200 feet of buildings in FY2005.

The vegetation species composition is measured by cover type. Cover type is one of the variables in the vegetation database. All the acres of the forest has been delineated into stands. Each stand has a cover type identified. The following is a summary of the cover types for the Black Hills National Forest:

Forest Cover Type - acres	1997	2005
Grasses	104,174	
Cattails		4
Blue grama		19,352
Big and sand bluestems		459
Planted grasslands		210
Little and Silver bluestems		7,881
Needle-and-thread, needlegrasses		857
Oatgrass		516
Bluegrass		6,739
Grasslands		67,009
Sideoats grama		149
Rush species, wet sedge species		43
Wheatgrasses		6,669
		109,888

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Non-vegetated sites	8,717	
Urban or buildup land		242
Nonvegetated sites		3,183
Strip mines, quarries, gravel pits		192
Rockland, talus, scree		686
Rights of way		68
Urban residential areas		1
		4,372
Shrublands	2,897	170
Mountain mahogany		4,522
Sagebrush		41
Snowberry		141
Willows		362
		5,236
Aspen	50,848	46,172
Bur oak	9,243	12,477
Douglas fir	24	30
Eastern Red Cedar		64
Lodgepole pine	129	130
Other hardwoods (plus green ash)	638	1,449
Paper birch		3,427
Ponderosa pine	1,041,801	1,033,380
Rocky Mountain juniper	494	188
White spruce	21,737	25,462
Water	2,012	88
Reservoirs and impoundments		1,846
Unknown		444
		1,125,157
TOTAL =	1,242,714	1,244,653

Monitoring item #8 Vegetative Diversity – Vegetation Species Composition was accomplished using NFTM and CWKV funds.

Monitoring Item 9: Vegetative Diversity – Structural Stages

Monitoring Item 9 displays vegetative diversity using structural stages. Structural stage is a variable for each forested stand on the forest. The structural stage scheme is a Region Two (Rocky Mountain Region) scheme used by all National Forests in Region Two. The following is the structural stage scheme:

Region 2								
Habitat Structural Stage Codes								
Code	Structural Stage	Tree Size Class		Diameter Range		Crown Cover %		
1	grass-forb	nonstocked				0-10		
2	shrub/seedling	established		less than 1 inch		11-100		
3A	sapling-pole	small, medium		trees mostly 1-9		11-40		
3B						41-70		
3C						71-100		
4A	mature	large, very large		trees mostly 9 inches		11-40		
4B				and larger		41-70		
4C						71-100		
5	old growth	large, very large		varies				

Reference Forest Plan Monitoring Objectives:

Objectives 4.1 – 203, 5.1 – 204, 5.4 – 206, 5.43 – 204, 5.6 – 204: Manage for certain percentages of structural stages in ponderosa pine across the management area in a variety of sizes and shapes.

Objective 3.7 – 201: Manage each contiguous unit within this management area as a late-successional landscape, so that late-successional structure is always present within some portion of each unit.

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Late succession is defined in the 1997 Forest Plan R.O.D. Appendix 3/97 glossary-29. The structural stage 5 within the Regional habitat structural stage code scheme is also used for late succession or old growth.

The Monitoring Implementation Plan identifies tracking acres of structural stage by cover type and management area. The following displays acres of structural stage by cover type and management area:

Acres of structural stage by cover type and by management area												
Mgmt	Area	Cover type	SS_1	SS_2	SS_3A	SS_3B	SS_3C	SS_4A	SS_4B	SS_4C	SS_5	Total
	1.1A	Aspen		36		10		117	60	175		398
		Bur Oak			10							10
		Ponderosa pine			308	213	405	500	2,682	8,440	397	12,944
		White spruce						127				127

	sum			36	317	223	405	744	2,741	8,614	397	13,478
	3.1	Grass	23									23
		Aspen		102	112	103	199	20	84	6		626
		Bur Oak		177								177
		Paper birch		25	9		20		52			106
		Ponderosa pine	27		196	118	391	919	2,908	2,038		6,597
		White spruce		9				132	371			511

	sum		50	313	317	221	610	1,071	3,415	2,045		8,041
	3.2A	Ponderosa pine						88	1,033			1,121

	sum							88	1,033			1,121
	3.31	Grass	114									114
		Aspen	163	143	68	64	98		30			566
		Bur Oak			85	268		90				442
		Other hardwoods		80								80
		Ponderosa pine	443	108	316	469	336	1,210	3,244	1,494		7,620

	sum		719	331	470	801	434	1,299	3,274	1,494		8,822

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3.32	Grass	55									55
	Willows	15									15
	Aspen	11	285	336	403	869	36	198	27		2,165
	Bur Oak			41	42	115		70			268
	Paper birch		3					34			37
	Ponderosa pine	116	33	116	215	661	425	2,019	3,622		7,206
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sum		197	321	492	659	1,645	461	2,321	3,649		9,746
3.7	Grass	7									7
	Aspen	29	8		403	159	128	230	13		970
	Bur Oak	3	54	16	79		75	15	74		316
	Other hardwoods		80		42			13			135
	Paper birch					18		14			32
	Ponderosa pine	2,171	178	600	1,556	871	4,531	7,492	4,496		21,896
	White spruce			24			350	100			474
*****		-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
sum		2,210	320	641	2,080	1,049	5,084	7,863	4,583		23,830
4.1	Grass	820									820
	Aspen	165	257	139	688	404	226	334	108		2,321
	Bur Oak			175	681	293	310	320	21		1,800
	Lodgepole pine						65		37		102
	Other hardwoods		18								18
	Paper birch	25			78	97		19			219
	Ponderosa pine	427	622	1,586	920	610	11,142	12,539	7,708	232	35,787
	White spruce	75	10	28	162	112	762	428	156		1,733
*****		-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
sum		1,513	907	1,928	2,530	1,516	12,506	13,640	8,029	232	42,800
4.2A	Grass	22									22
	Shrublands		29								29
	Willows	22									22
	Aspen	31	126	61			62	18		37	335
	Bur Oak		34	44							78
	Douglas fir							30			30

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	Other hardwoods			152							152
	Ponderosa pine	193	243	125	64	236	921	4,507	3,494	308	10,091
	White spruce	9			122		433	590	174	86	1,414
*****		-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
sum		277	432	382	186	236	1,417	5,146	3,667	431	12,173
4.2B	Aspen	20							2		23
	Bur Oak	5		31					8		45
	Ponderosa pine	27	12		67	3	218	719	285		1,331
	White spruce						60				60
*****		-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
sum		53	12	31	67	3	278	719	295		1,458
5.1	Oatgrass	6									6
	Grass	5,014					16				5,029
	Nonvegetated sites	66									66
	Shrublands		1								1
	Willows	44	88								131
	Aspen	1,781	5,991	4,146	4,235	1,810	3,456	1,949	153		23,520
	Bur Oak	69	101	110	241	243	19	242	24		1,048
	Lodgepole pine			28							28
	Other hardwoods		102	165	3	10	138	85	60		565
	Paper birch	42		160	145	55	349	243	317		1,311
	Ponderosa pine	39,499	10,865	16,995	26,632	13,967	167,673	150,591	49,361	467	476,050
	White spruce	204	419	531	322	41	11,173	5,196	1,726	151	19,763
*****		-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
sum		46,723	17,568	22,135	31,577	16,127	182,823	158,306	51,641	617	527,518
5.1A	Ponderosa pine	10,682	397	8,354	10,468	972	11,336	11,175	1,017	11	54,412
*****		-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
sum		10,682	397	8,354	10,468	972	11,351	11,175	1,017	11	54,427
5.2A	Aspen	21	30								51
	Bur Oak	5	39								44
	Other hardwoods						8				8
	Ponderosa pine		176	120	203	81	902	913	800		3,196
*****		-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

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sum		26	245	120	203	81	910	913	800		3,299
5.3A	Grass	84									84
	Aspen	52			14						66
	Ponderosa pine	84	56	127	758	329	351	1,323	194		3,221
	White spruce							42			42
*****		-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
sum		220	56	127	772	329	351	1,365	194		3,414
5.3B	Ponderosa pine				44	180	83	219	543		1,070
*****		-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
sum					44	180	83	219	543		1,070
5.4	Grass	1,024									1,024
		7									7
	Willows				51						51
	Aspen	1,065	1,939	913	1,488	1,187	1,300	1,510	340		9,743
	Bur Oak	191	797	893	1,953	1,163	1,381	1,149	289		7,817
								17	48		64
	Other hardwoods		15	69	55		13	34	109		296
	Paper birch		4	111	546	85	21	291			1,057
	Ponderosa pine	57,972	7,057	22,789	28,866	21,899	74,688	86,878	40,547	525	341,222
			100	35		20	18				174
	White spruce	7	31	112	57	21	534	180			941
*****		-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
sum		60,266	9,944	24,921	33,016	24,375	77,956	90,059	41,333	525	362,395
5.43	Aspen	27	89	84			42				243
	Paper birch			7							7
	Ponderosa pine	3,743	357	504	761	418	1,665	1,521	539	52	9,559
*****		-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
sum		3,770	446	596	761	418	1,708	1,521	539	52	9,810
5.4A	Aspen	31	33	25	19		138	41	31	7	325
	Bur Oak	24		44							68
	Ponderosa pine	247	80	69	325	419	1,702	5,665	2,281	338	11,125
	White spruce						19	9		40	68

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*****		-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
sum		302	113	138	344	419	1,860	5,715	2,311	384	11,585
5.6		3									3
		621									621
	Aspen	134	1,349	994	777	317	538	433	25		4,566
	Bur Oak		332				32				364
	Other hardwoods		15	174			6				195
	Paper birch	8	41	284	157	113	44	10			657
	Ponderosa pine	132	290	739	244	202	5,888	8,075	3,988	28	19,585
	White spruce		38				200	58			296
*****		-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
sum		899	2,065	2,191	1,178	632	6,708	8,574	4,012	28	26,287
8.2	Grass	24									24
	Aspen	1	10	46							57
	Ponderosa pine	351	113	644	250	110	3,767	2,660	927		8,820
	White spruce			16			11				26
*****		-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
sum		376	123	706	250	110	3,778	2,660	927		8,928
		-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	Total >>>	128,282	33,628	63,866	85,380	49,542	310,475	320,659	135,694	2,677	1,130,203

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Acres of Structural Stages of Ponderosa Pine within Management Areas 4.1, 5.1, 5.4, 5.43, 5.6

	VSS	1	2	3A	3B	3C	4A	4B	4C	5	Total
Desired percents >		5%	5%	10%	15%	5%	25%	25%	5%	5%	100%
Management Area											
4.1	acres >	427	622	1,586	920	610	11,142	12,539	7,708	232	35,787
	percent >	1.2%	1.7%	4.4%	2.6%	1.7%	31.1%	35.0%	21.5%	0.6%	100.0%
5.1	acres >	39,499	10,865	16,995	26,632	13,967	167,673	150,591	49,361	467	476,050
	percent >	8.3%	2.3%	3.6%	5.6%	2.9%	35.2%	31.6%	10.4%	0.1%	100.0%
5.4	acres >	57,972	7,057	22,789	28,866	21,899	74,688	86,878	40,547	525	341,222
	percent >	17.0%	2.1%	6.7%	8.5%	6.4%	21.9%	25.5%	11.9%	0.2%	100.0%
5.43	acres >	3,743	357	504	761	418	1,665	1,521	539	52	9,559

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	percent >	39.2%	3.7%	5.3%	8.0%	4.4%	17.4%	15.9%	5.6%	0.5%	100.0%
5.6	acres >	132	290	739	244	202	5,888	8,075	3,988	28	19,585
	percent >	0.7%	1.5%	3.8%	1.2%	1.0%	30.1%	41.2%	20.4%	0.1%	100.0%
Total >	acres >	101,773	19,191	42,613	57,423	37,096	261,056	259,604	102,143	1,304	882,203
	percent >	11.5%	2.2%	4.8%	6.5%	4.2%	29.6%	29.4%	11.6%	0.1%	100.0%

For the ponderosa pine covertime within the 5 management areas, generally there is too much structural stage 1, 4A, 4B and 4C, and not enough structural stage 2, 3A, 3B and 5. Structural stage 1 acres are attributable to the recent large wildfires. To achieve percents in some structural stage categories, the vegetative treatments may span decades to change to another structural stage category. For example, a 4A stand without an understory may take several decades to transition to a 4B stand. To achieve more structural stage 2 or 3A or 3B by tree harvesting, an understory must be present in a 4A/B/C stand. Structural stage 1 will grow into structural stage 2 and then on into structural stage 3's.

Monitoring item #9 Vegetative Diversity – Structural Stages was accomplished using NFTM & CWKV funds.

Monitoring Item 10: Vegetative Diversity – Large Trees

Reference forest plan objectives 4.1 – 203, 5.1 – 204, 5.4 – 206, 5.43 – 204, 5.6 – 204, 3.7 – 201.

10% of the structural stage 4 ponderosa pine acreage in the management area will have an average tree size of “very large”.

One measure of vegetative diversity is tree size. Tree size is a variable for each forested stand on the forest. The following is scheme used for Region Two:

Tree Size

Code	Description
N	Nonstocked. Site is currently not vegetated with the cover type but is expected to shortly develop seedlings of the cover type. If not, the cover type needs to be changed to reflect the seedling type or changed to barren if no restocking of vegetation is expected.
E	Established seedlings. The majority of trees stocking is in seedlings and saplings (trees up to 4.9 inches in diameter). Two-thirds of the stockable portions of the site have at least 200 seedlings and saplings per acre (15 sq. feet/seedling) or if aspen cover type, 300 seedlings and saplings per acre (12 sq. feet/seedling). Of that group, most of the trees are seedling size. Seedlings are 3 inches tall for softwoods, 12 inches tall for hardwoods, and less than 1.0 inch in diameter.
S	Small (sapling). The majority of tree stocking is in seedlings and saplings. Two-thirds of the stockable portions of the site have at least 200 seedlings and saplings per acre (15 sq. feet/seedling) or if aspen cover type, 300 seedlings and saplings per acre (12 sq. feet/seedling). Of that group, most of the trees are sapling size (1-4.9 inches in diameter).

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M	Medium. The majority of tree stocking based on basal area is in live trees 5.0 to 8.9 inches in diameter.
L	Large. The majority of stocking based on basal area is in trees 9.0 inches in diameter and larger, and within that group, the majority of the basal area is in live trees 9.0 to 15.9 inches in diameter.
V	Very large. The majority of tree stocking based on basal area is in live trees 9.0 inches in diameter and larger, and within that group, the majority of the basal area is in live trees 16.0 inches and larger in diameter.

Summary of acres of mature Ponderosa pine (4A/4B/4C/5) and tree size of very large (the majority of tree stocking based on basal area is in live trees 9.0 inches in diameter and larger, and within that group, the majority of the basal area is in live trees 16.0 inches and larger in diameter) by the 5 management areas:

Acreage of “Very Large” – mature Ponderosa pine

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Mgmt Area	SS_4A	SS_4B	SS_4C	SS_5	Total
-----	-----	-----	-----	-----	-----
4.1	2,035	2,802	916		5,753
5.1	25,501	11,907	3,228		40,636
5.4	7,856	6,908	2,741		17,505
5.43	169		72		241
5.6	2,146	1,833	839		4,819
	-----	-----	-----	-----	-----
	37,707	23,451	7,796		68,954

Total acreage of mature Ponderosa pine in structural stage 4A/4B/4C/5 is 728,299 acres.

Ten percent of 728,299 is 72,830 acres.

The above chart shows 68,954 acres of very large trees.

There is a shortage of 3,876 acres (5.3%) short of the desired total 10% level of 72,830 acres.

Monitoring item #10 Vegetative Diversity – Large Trees was accomplished by using NFTM & CWKV funds.

Monitoring Item 11: Vegetative Diversity and Snag Retention

Reference forest plan objective 211. Within a management area in conifer forested portions of the forest, provide an average of 3 hard snags greater than 9-inch dbh and 25 feet high per acre, well-dispersed across the forest, 25 percent of which are greater than 14-inch dbh.

One measure of vegetative diversity is snags. Number of snags per acre is an output for each forested stand on the forest where there is tree inventory data. Annually, approximately 5-10% of the Forest has field data collected. The year 2006 report will display two years of data, hence a yearly comparison starting next year.

From the vegetation database, the average number of standing dead trees per acre for diameter class 9 inch plus diameter trees by management area on conifer sites with a height 25 feet or greater is a range of 1.1 – 2.8 snags per acre with a forest average of 1.7 snags per acre. This is below the objective of 3 snags per acre.

From the vegetation database, the average number of standing dead trees per acre for diameter class 14 inch plus diameter trees by management area on conifer sites with a height 25 feet or greater is a range of 0.3 – 1.9 snags per acre with a forest average of 0.4 snags per acre.

From the vegetation database, the majority of standing dead trees are 10-25 feet in height. The average tree height on the Black Hills is around 60 feet. From natural windthrow, the majority of breakage or snap-offs occur slightly below 25 feet in height. The Forest will continue to monitor data on snag heights and the application of appropriate scientific literature.

FIA (Forest Inventory Analysis) data has not been provided to the Forest from the North Research Station for the annual re-measurement update for year 2005. FIA is another forest data source that hopefully will be displayed next year.

The above vegetation database summary numbers do not have the on-the-ground inventory data of post recent fires or large tree mortality areas due to insects. Hence, the large fires of Cicero Peak, Jasper, Elk Mountain II, Roger's Shack, Cement, Ricco, Battle Creek, Grizzly Gulch which have standing dead trees from fire and the Beaver Park, Deerfield and Bugtown areas which have standing dead trees from insect mortality do not contribute to the above standing dead trees per acre. Therefore, an estimate of standing dead from recent wildfires and recent tree mortality from insects is appropriate. Wildfires since year 2000 total approximately 175,127 acres. From the forest vegetation database a query of average number trees per acre that are 9 inches in diameter or greater resulted in an estimate of 150 trees per acre. Therefore, 150 trees per acre times 175,127 acres of wildfire 26,269,050 trees. Due to snag fall down from wind an estimate of $\frac{3}{4}$ of the 175,127 trees remains standing or 19,701,787 trees which is applied across the Forest of 1 million forested acres results in approximately 20 snags per acre from wildfire. Tree mortality from insects since year 2000 is estimated at 10% of the Forest or 1 million forested acres times 10% or 100,000 acres. Likewise, an estimate of 150 trees per acre times 100,000 acres results in 15 million snags times $\frac{3}{4}$ fall down rate equals 11.2 million divided by the Forest of 1 million forested acres results in 11 snags per acre. The 20 snags per acre estimate from wildfire and 11 snags per acre from insects is an average across the Forest. In reality, the snags are concentrated in the wildfire areas and the insect tree mortality areas. Snag density across the Forest ranges from 0-150 snags per acre.

The addition of recent wildfires and insect tree mortality results in above 3 snags per acre well dispersed across the Forest.

Monitoring item #11 Vegetative Diversity – Snags was accomplished by using NFTM & CWKV funds.

Monitoring Item 12: Burned Forest Habitat

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Reference forest plan objective 11-03. Following a wildfire, dead trees will be available for value recovery. Retain 50 percent of the recent (0-5 years) stand-replacing fire acreage up to 10,000 acres Forest-wide. Generally the highest priority areas to retain are those with greater than 70 percent pre-fire canopy closure. The following will be included in determining if the 10,000 acre figure has been met: stand-replacing fire and associated out-year fire/insect mortality, and relatively large blocks of stand-replacing insect outbreaks that can be combined into 1,000-acre areas. Standard 2301a does not apply to the salvaged area.

Burned forest habitat is acres of wildfire for the last 5 years. The following lists wildfires by year:

Year	Wildfire	Acres
2001	Elk Mt. II	14990
2001	Roger's Shack	11770
2001	West Hell Canyon	10547
2002	Grizzly Gulch	10771
2002	Little Elk	680
2002	Sheldon	690
2002	Battle Creek	13700
2003	Red Point	17500
2005	Ricco	4000
2005	Cement	4000

Total large wildfire acres (class C or 300+ acres) = 88,648 acres

Total small wildfire acres (class A & B acres) from 2001 – 2005 = 2,971 acres

Insect mortality for the past 5 years: see monitoring item #23, mortality, figure #1 is estimate of number of trees. For the past 5 years, an estimate of 10% of the Forest has tree mortality from insects or 100,000 acres.

Objective 11-03 references stand-replacing fire acreage. This condition is interpreted to be the high intensity acres from the wildfires. For the fires listed above, the high intensity acreage is 10,456 acres.

The total 5-year estimate of tree mortality from high intensity wildfire (10,456 acres) and insects (past 5 years estimate of 100,000 acres) is a Forest total mortality acreage of 110,456 acres or approximately 11% of the forested lands on the Forest.

This estimate exceeds the 10,000 acre threshold forest-wide.

Black Hills National Forest - Salvage
Harvest Acres (2001-2005)

Sale Name	Year	Salvage	Harvest acres
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Jewel Hazard 1	2001	fire	121
Redbird 1 Hazard	2001	fire	118
Antelope 1 Hazard	2001	fire	115
Mystic Wolf Hazard	2001	fire	124
Jewel Hazard 2	2001	fire	121
Jewel Hazard 3	2001	fire	122
Redbird 2 Hazard	2001	fire	188
Antelope 2 Hazard	2001	fire	188
Surveyors Hill Hazard	2001	fire	735
Wolf Draw Hazard	2001	fire	274
Deadhorse Salvage	2001	fire	84
Teemud Salvage	2001	fire	100
South Jewel Salvage	2001	fire	77
Sheldon Salvage	2004	fire	160
Red Point Salvage	2004	fire	248
Lookout Salvage	2004	fire	45
Cattle Salvage	2004	bugs	320
Ricco Salvage	2005	no bids	not counted
Buck Springs Hazard	2005	no bids	not counted
fire & insect salvage acres >>>>			3140
insect only salvage acres >>>>			320
fire only salvage acres >>>>			2820

Monitoring item #12 Vegetative Diversity – Burned Forest Habitat is accomplished by using NFTM & CWKV funds.

Monitoring Item 14: Regeneration

Regeneration is not specifically referenced forest plan objectives 303 – 305.

Regeneration is measured from field survey or walk through survey on forested lands. When stands are

stocked with a minimum of 150 trees per acre then stands are certified as regenerated. Stands are summarized annually by database query for a total number of acres certified for the forest.

The total certified acres in fiscal year 2005 = 3,924 acres

Monitoring item #14 Commodity Production – Regeneration is accomplished by using NFTM & CWKV funds.

Monitoring Item 15: Timber Production

Objectives:

303. Offer the following allowable sale quantity (ASQ) of timber on suitable and available timberlands in the next decade:

Allowable Sale Quantity From Suitable Lands: (Decade Total)	
Sawtimber	
Million Cubic Feet	181
(Million) Board Feet	838
Roundwood	
Million Cubic Feet	21
(Million) Board Feet	N/A
Total	
Million Cubic Feet	202
(Million) Board Feet	838

304. On lands not identified as suitable and available for timber harvest, timber volume may be offered as a by-product of other vegetation management objectives. This volume would be offered in addition to the ASQ.

305. The ASQ in Objective 303 includes the following non-interchangeable component in the Norbeck Wildlife Preserve. This portion of the ASQ is not interchangeable with the volume outside the Preserve.

Allowable Sale Quantity From Suitable Lands In Norbeck Wildlife Preserve: (Decade Total)	
Sawtimber	
Million Cubic Feet	5.4
(Million) Board Feet	27.0
Roundwood	
Million Cubic Feet	1.0
(Million) Board Feet	N/A
Total	
Million Cubic Feet	6.4

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(Million) Board Feet	27.0
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The 10-year allowable sale quantity expressed on an average annual basis:

Forest Plan	Million Cubic Feet (MMCF)	Hundred Cubic Feet (ccf)
Sawtimber	18.1	181,000
POL	2.1	21,000
Total ASQ	20.2	202,000

Monitoring:

The allowable sale quantity (ASQ) in the Forest Plan is from FY 1997 through FY 2006.

There are 865,890 acres suitable and available for timber production (Forest Plan 1997 ROD – 36).

The ASQ is a maximum level of timber that may be sold during the first decade after plan approval. A ceiling on the level of timber that can be sold, the ASQ takes into account available funding, other multiple-use values, and compliance with standards and guidelines that provide environmental protection. ASQ is not an absolute yield that must be achieved (1997 Forest Plan FEIS, page II-36).

Harvest acreage over the decade in the Forest Plan is an estimated 255,000 acres or average 25,500 acres per year at full funding level. (Forest Plan 1997 ROD; page 35).

Year 2005 Summary

Harvest acres from signed decisions (NEPA decisions) is 12,930 acres.

Timber Program Summary, FY98-05

(Source: PTSAR: Periodic Timber Sale Accomplishment Report)

Year	Funded Target		Offer	Sold	Cut	Harvested
	mmbf	ccf	mmbf	mmbf	mmbf	Acres
1998	73.4	146,800	77.0	78.6	62.0	14,307
1999	70.8	141,600	82.7	73.5	73.0	14,238
2000	70.0	140,000	2.8	36.2	65.7	13,567
2001	69.0	138,000	36.5	38.2	75.4	12,442
2002	60.0	120,000	49.5	52.3	62.4	15,123
2003	54.5	109,009	72.8	78.0	67.7	16,500
2004	61.1	122,200	74.5	80.0	70.0	17,795
2005	70.0	140,000	68.1	53.6	79.8	18,200

Norbeck Wildlife Preserve

For the forest plan period of 1997-2006 (decade) in the Norbeck Wildlife Preserve, there has been 2 timber sales sold, Needles #2 and Grizzly sales. The non-interchangeable component volume is 5.4 million cubic feet (54,000 ccf) of sawtimber (Objective 305). Needles #2 sold 14,379 ccf which is all in Norbeck. Needles #2 harvested 16,385 ccf. Grizzly sold 14,923 ccf. Approximately 61% of Grizzly is in Norbeck. As of end of fiscal year 2005, approximately one-half of the sale volume has been harvested. The Needles #2 volume plus Grizzly volume within Norbeck is approximately 25,488 ccf (16,385 ccf + 9103 ccf).

Monitoring item #15 Commodity Production – Timber Production is accomplished by using NFTM & CWKV funds.

Monitoring Item 17: Forage Utilization

Objective 301. (This objective did not change with Phase II)

Produce on a sustained basis and make available up to 233 million pounds of forage for livestock and wildlife use each year (weather permitting). The location and amount of forage produced under the forest canopy will vary with the density of the overstory. This may necessitate changes in where and how both livestock and wildlife grazing takes place on a local basis over the rotation of a stand of timber.

- a. **Livestock use will be up to 127 million pounds of forage per year or approximately 128,000 AUMs.**
- b. **Wildlife use will be up to 106 million pounds of forage per year or approximate population levels of 70,000 deer and 4,500 elk or other combinations that use the same amount of forage.**

Monitoring:

The objective listed above relates to annual projected livestock forage use. The Phase I Amendment to the 1997 Land and Resource Management Plan changed Guidelines 2505 and 2506 to standards. These two standards relate to proper use or residual levels in riparian and upland forest rangeland settings. Phase II has revisions of 2505 included.

Following direction in Standard 2506, districts continue to develop new Allotment Management Plans (AMPs) for allotments that have recently approved environmental assessments. The districts issue Annual Operating Instructions (AOIs) for each allotment on the Forest. Utilization or residual guidelines are included in the AMPs and/or AOIs.

In fiscal year 2005, actual grazing use on the Forest was 120,405 AUMs. This is approximately 94 percent of the annual projected Forest grazing capacity of 128,000 AUMs available for livestock utilization identified in the 1997 Forest Plan. Reasons for use being less than projected in the Forest Plan were some loss of forage in allotments because of the dry conditions and economic pressures in the cattle industry. Phase I Amendment did not, nor does the Phase II Amendment directly reduce the grazing capacity for livestock use.

Items Monitored	2003	2004	2005
Livestock AUMs Grazed	122,971	118,919	120,405

Districts monitored and evaluated approximately 739,571 acres of rangelands on range allotments to determine forage utilization. Following is a breakdown of acres and grazing allotments monitored by ranger district:

Items Monitored	Hell Canyon	Mystic	Northern Hills	Bearlodge
Acres Monitored and Evaluated for Livestock Forage Utilization	181,474	195,523	232,520	130,054
Grazing Allotments Evaluated	23	27	24	17

The monitoring is completed by both Forest Service range staffs and livestock permittees. The districts collected forage utilization data by ocular estimate, photos, and stubble height measurements on key areas throughout the allotments. Forage utilization on the allotments surveyed was within Forest Plan Standards.

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The use on a few areas in some allotments did exceed proper allowable use guidelines; however these areas represent a small percentage of the overall utilization on the Forest.

Findings and conclusions relevant to the evaluation follow:

1. Forage utilization throughout the allotments surveyed were within Forest Plan standards (2505 – Proper Allowable use Guidelines) and allotment management objectives. Measured forage utilization exceeded proper allowable use guidelines on a small amount of areas within certain allotments surveyed (less than 5 %). Corrective action was taken; these areas will continue to be monitored to see if management changes are needed. Due to dry and drought conditions, use was reduced on some allotments.
2. The Forest continues to promote more permittee assistance in monitoring grazing allotments with training sessions and using the Wyoming Range Guide and Black Hills Range Guide.

Monitoring Item 18a: Emphasis Species - Sensitive Species (Plants)

General Information:

The completion of monitoring is dependent on appropriated funding and availability of personnel. A Prioritization Strategy was developed to serve as a working guide to prioritize monitoring for sensitive plants in the event that funding/personnel are not adequate to complete the full monitoring plan. Since all monitoring was completed in 2005, it was not necessary to invoke the strategy. This working tool is expected to be updated on a periodic basis as new information becomes available and will be applied when needed in the future.

The year 2005 was considered a drought year for the State of South Dakota. This information was obtained by accessing US Drought Monitor at www.drought.unl.edu/dm/monitor.html.

Noxious weed information is discussed for various species. For information regarding the treatment of weeds on the Black Hills National Forest please refer to the following: Black Hills National Forest Land and Resource Management Plan (1997), Black Hills National Forest Noxious Weed Management Plan (2003), and Phase II Amendment to the Forest Plan (2005).

New direction on managing specific R2 sensitive plant species and Black Hills National Forest species of local concern relative to concerns of species persistence in the Phase II Amendment to the Forest Plan (2005) has resulted in modifications of some of the monitoring questions for 2006. See the 2006 Sensitive Plant Monitoring Guide.

BOTRYCHIUM MULTIFIDUM (LEATHERY GRAPEFERN)



Photo by BHNF staff at *Botrychium multifidum* site BOMU-7 on September 7, 2005.

Botrychium multifidum was designated a Region 2 sensitive species in December 2003. The majority of the occurrences on the Black Hills National Forest were discovered in 2003. Prior to the 2005 monitoring season, there were seven known occurrences, all of which were located in the Norbeck Wildlife Preserve and Black Elk Wilderness. There are similar associated habitat conditions elsewhere in the Black Elk Wilderness/Norbeck Wildlife Preserve (note: Black Elk Wilderness is entirely within the Norbeck Preserve but not all Norbeck Preserve is in the Black Elk Wilderness), and probably within Custer State Park and Mount Rushmore National Memorial; therefore, it is likely that additional occurrences are located in the general area.

2005 Monitoring Design and Results:

1. Gather baseline data on any new occurrences that may be discovered in adjacent habitat. Assess risks to those sites.

In 2005, one attempt was made to relocate an unverified *Botrychium multifidum* report from Butcher Gulch. No *Botrychium multifidum* individuals were located.

No new locations of *Botrychium multifidum* were discovered in 2005.

2. Annually check presence/absence and count individuals at the four annual monitoring sites. These include one site that is close to heavy trail traffic areas (site number BOMU-1), and BOMU-4, BOMU-5, and BOMU-7.

BOMU-1 (Lost Cabin Creek) – Located in the Black Elk Wilderness. 383 individuals were counted on September 8, 2005 (35 were counted in June 2004 and 65 were counted in June 2003). Large concentration areas from 2004 were relocated with many more individuals. Plants were found to make one large area of separate patches found in 2004. Thirteen plants with sporophores were counted. Dr. Farrar (Iowa State University) was consulted and he believes that monitoring in June vs. September should not have caused the great change in numbers. *Botrychium* spp. are known for high variability in aboveground expression between years. Future monitoring will provide more information on this question.

BOMU-4 (Iron Creek) – Located in the Norbeck Wildlife Preserve. 25 individuals were counted on September 1, 2005 (22 were counted in 2004).

BOMU-5 (Iron Creek Tributary) – Located in the Black Elk Wilderness. 14 individuals were counted on

September 7, 2005 (8 were counted in 2004).

BOMU-7 (Upper Iron Creek) – Located within the Black Elk Wilderness. 14 individuals were counted on September 7, 2005 (12 individuals counted in 2004). Subpopulation A was located in 2003 but not found in 2004 or 2005.

3. Every five years, revisit all known *Botrychium multifidum* locations within the same year and collect data (next time in 2009).

All *Botrychium multifidum* sites will be revisited in 2009.

4. Document any weeds designated as noxious by South Dakota or Wyoming or other invasive plant species. Document if the invaders are co-located with *Botrychium multifidum*, or at what distance they are located away from the occurrence site if they are occupying the same ecological type.

BOMU-1 (Lost Cabin Creek) – *Cirsium arvense* (Canada thistle) located 3 m away from *Botrychium multifidum* plants in the same ecotype. *Cynoglossum officinale* (houndstongue) located 15 m from *B. multifidum* plants in the same ecotype.

BOMU-4 (Iron Creek) – *Cirsium arvense* found in same ecotype within 5 m of *Botrychium multifidum* plants. *Cirsium vulgare* (bull thistle) found in same ecotype within 2 m of *B. multifidum* plants. *Phleum pratense* (timothy) co-located with *B. multifidum* and scattered in the floodplain area.

BOMU-5 (Iron Creek Tributary) – *Cirsium vulgare* found in same ecotype within 3 m of *Botrychium multifidum* plants. *Cirsium arvense* was not found in the site, but a large patch 10m upstream could become a source for invasion into the site.

BOMU-7 (Upper Iron Creek) – *Cirsium arvense* is common in the drainage and thick in areas – sometimes co-located with *Botrychium multifidum*. *Cirsium vulgare* scattered occasionally in the drainage in the same ecotype as *B. multifidum*, within 7 m of *B. multifidum* plants. *Phleum pratense* scattered in slightly drier areas, within 10 m of *B. multifidum* plants.

CAREX ALOPECOIDEA (FOXTAIL SEDGE)



Photographs by BHNH staff. Left: at *Carex alopecoidea* site CAAL8-30 on August 11, 2005 – *Cirsium arvense* (Canada thistle) to the left of *C. alopecoidea*. Right: CAAL8-31 site on August 23, 2005 – habitat impacts from livestock.

Based on confirmation of the identity of *Carex alopecoidea* on Black Hills National Forest in 2000, baseline data were gathered at occurrences in 2001. An estimate of linear extent, numbers of population patches and other baseline data were gathered at 14 known sites. With the likelihood that more occurrences of this species

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would be located, and in consultation with the Rocky Mountain Research Station (January 2002), additional quick reconnaissance surveys were conducted in 2002 in similar habitat on the Bearlodge and Northern Hills Ranger Districts. Reconnaissance surveys resulted in 15 additional occurrences in the northwestern Black Hills and the Bearlodge Mountains. Similar reconnaissance surveys and project surveys in 2003 resulted in two new occurrences. Based on the number of occurrences that have been located in the three preceding years, more occurrences are likely and this is reflected in the monitoring design.

Recent available data were used in developing monitoring guidelines for *Carex alopecoidea*. Occurrences for monitoring were primarily selected on the following criteria: size (estimated number of individuals), geographic distribution of the occurrences, and location of occurrences in different drainages. To incorporate geographic distribution, sites widely distributed from one another were selected over sites in close proximity. Based on these criteria, five occurrences were selected for a portion of the monitoring. Because of the recent number of occurrences that have been located, the second aspect of the monitoring design is to continue reconnaissance surveys to learn more about the species for future status assessments or to refine the monitoring design.

The Phase II Forest Plan Amendment decision was signed in October of 2005 and the Black Hills National Forest has begun implementing that Amendment. Standard 2505 f, in the amended plan and included below, relates directly to this species and the following observations are included as a baseline for species conservation under Phase II Amendment direction.

*2505 f. *NEW. Implement additional measures to assure avoidance of livestock use on Carex alopecoidea. Restrict livestock use of all or portions of 5 of the largest geographically spaced occurrences at site numbers: CAAL8-19, CAAL8-20, CAAL8-22, CAAL8-30, CAAL8-31.*

CAAL8-16 Livestock impacts observed included trampling and grazing on *Carex alopecoidea* and other species, as well as trampling/hummocking of riparian areas.

CAAL8-20 Livestock observed in enclosure at the south end. Hummocking/trampling impacts from livestock observed in *Carex alopecoidea* habitat in the drainage bottom and in seeps coming into the drainage bottom. Utilization appeared higher than 50% in several places along the riparian area/*Carex alopecoidea* habitat.

CAAL8-22 Livestock impacts observed in some parts of the drainage, vegetation utilization appeared greater than 50%. Trampling/hummocking was observed in many wet areas.

CAAL8-30 It did not appear that livestock had grazed the site yet in 2005, but impacts were observed from previous years (including streambank instability, hummocking, and shrub pruning).

CAAL8-31 Livestock impacts observed in some sections of the 2-mile long occurrence of Carex alopecoidea (see right-hand photo on page 34). Streambanks higher in the drainage appeared to have eroded side banks, while streambanks lower in the drainage (where a rocky streambed prevails) did not have eroded banks.

2005 Monitoring Design and Results:

1. Annually count individuals at sites CAAL8-16, CAAL8-20, CAAL8-22, CAAL8-30 and CAAL8-31. Document endpoints with a GPS system annually. If a contraction of the occurrence is noted, document the reason if it can be determined.

Only plants with reproductive structures present were counted. Therefore, all counts are expected to be a conservative reflection as to the actual abundance of plants at the monitoring locations.

CAAL8-16 (Dugout Gulch Botanical Area): On August 30, 2005, 74 plants were found. This is more than

found in 2004 (58 plants) but a larger area was searched.

CAAL8-20: On August 17, 2005, 249 plants were found. In 2004, 233 plants were found. Livestock grazing in the area made it difficult to accurately count the number of plants as inflorescences with diagnostic perigynia were trampled or chewed off.

CAAL8-22: On August 18, 2005, 1063 plants were found. In 2004, 1003 plants were found. Robust *C. alopecoidea* individuals were documented in an enclosure. Livestock grazing in the area made it difficult to accurately count the number of plants as inflorescences with diagnostic perigynia were trampled or chewed off.

CAAL8-30: On August 11, 2005, 530 plants were found. In 2004, 576 plants were found.

CAAL8-31: On August 23, 2005, 955 plants were found. In 2004, 895 plants were found.

2. Document any weeds designated as noxious by South Dakota or Wyoming. Document if the weeds are co-located with *Carex alopecoidea*, or at what distance the weed species is located away from the occurrence site if they are occupying the same ecological type.

CAAL8-16 – High abundance of invasive species (including noxious weeds) in site and along drainage bottom – *Cynoglossum officinale* (houndstongue), *Cirsium arvense* (Canada thistle), *Cirsium vulgare* (bull thistle), *Arctium minus* (lesser burdock), *Rhamnus cathartica* (common buckthorn; listed as noxious/invasive in 5 states), and *Verbascum thapsus* (common mullein) all found within one ft of *C. alopecoidea*.

CAAL8-20 – *Cirsium arvense*, *Cirsium vulgare*, and *Cynoglossum officinale* are all present in the same ecotype as *Carex alopecoidea*. *Cynoglossum officinale* is within 10 ft of *Carex alopecoidea* individuals, and *Cirsium arvense* and *Cirsium vulgare* are adjacent to *Carex alopecoidea* individuals.

CAAL8-22 – *Carduus nutans*, *Cirsium arvense*, *Cirsium vulgare*, *Tanacetum vulgare* (common tansy), *Verbascum thapsus*, and *Artemisia absinthum* (absinth wormwood – designated noxious in North Dakota and Colorado) are all co-located with *Carex alopecoidea* in the same ecotype.

CAAL8-30 – *Cirsium arvense*, *Cirsium vulgare*, *Cynoglossum officinale*, and *Verbascum thapsus* were present and co-located with *Carex alopecoidea* at this site.

CAAL8-31 – *Carduus nutans*, *Cirsium arvense*, *Cynoglossum officinale* and *Tanacetum vulgare* are all present at this site, in the same ecotype as *Carex alopecoidea*. All are within 10 ft. of *C. alopecoidea* individuals, some are found adjacent.

EPIPACTIS GIGANTEA (STREAM ORCHID; GIANT HELLEBORINE)



Photo by BHNF staff at *Epipactis gigantea* site EPGI-1 on July 5, 2005: measurements being taken along water transect #2.

The only known occurrence of *Epipactis gigantea* in South Dakota is located along Cascade Creek in the southern Black Hills. This occurrence extends from Cascade Springs (on Black Hills National Forest land) downstream on private land and on The Nature Conservancy's Whitney Preserve. The population appears to be stable or increasing, but there is insufficient data to demonstrate a trend at the present time.

The confinement of *Epipactis gigantea* to a single watershed in the Black Hills makes it vulnerable to random events such as extreme drought or a disease outbreak. However, the relatively constant water from springs with origins from a deep underground source increases the likelihood of persistence of the species. In addition, the existence of multiple suboccurrences of the species in the watershed will potentially help buffer against any catastrophic disturbances in the area.

Effects associated with ongoing recreational use and competition with, or treatment of, invasive plant species (including noxious weeds) are currently considered to be the most significant risks to *Epipactis gigantea* and its habitat on Black Hills National Forest. Footpaths and visitor-created "nick trails" (visitor created paths that have been or can be created simply by recreationists leaving the developed trail system to access sections of Cascade Creek), trampling of vegetation, and mowing near *Epipactis gigantea* patches have been identified as past or current impacts to the species and its habitat. Portions of the population occur in areas that are naturally restrictive to recreational access by dense vegetation or inaccessible slopes, and therefore are unlikely to be impacted by recreationists. *Cirsium arvense* (Canada thistle) is a SD state-listed noxious weed; *Elaeagnus angustifolia* (Russian olive) and *Tamarix* sp. (salt cedar) are non-native invasive species of concern. All of these currently occur in the Cascade Creek valley. *Lythrum salicaria* (purple loosestrife) is not known to occur within the Cascade Creek valley, or anywhere close by, but due to its aggressive nature, if it were to invade, it would have the potential to impact native riparian species such as *Epipactis gigantea*.

Additional potential risks to *Epipactis gigantea* could include alterations to the habitat by hydrologic or geologic modifications, or from erosion. Although no evidence of plant collection has been documented to date, it could also be a potential future risk to *E. gigantea* along Cascade Creek, since the area has been identified as a botanical attraction in local tourist information and other publications.

Quantitative monitoring is problematic as some areas at Cascade Springs and Cascade Falls are inaccessible or involve high risk of damage to the plants from trampling or dislodging them on steep slopes. Also, because the species reproduces clonally, it is not possible to determine the number of individual plants. Baseline monitoring began in June 2000 and ongoing annual monitoring is occurring. Monitoring includes verification of presence/absence of mapped patches and recording any new patches. Changes are documented on a baseline map diagram. Monitoring includes documenting “nick points” or trails that extended into *Epipactis gigantea* patches. Monitoring also includes documenting stream bank erosion, weeds or other disturbances in or near the occurrence. If the extent of the current year’s mapped patches is documented to decline by 10 percent or more relative to the year previous, consultation is triggered with ecologists, botanists and biometricians knowledgeable about the species, with the goal of developing a more rigorous monitoring strategy to determine if there truly has been a decline in the occurrence and what the reasons might be. Monitoring is most efficiently conducted during the *Epipactis gigantea*’s flowering period in June

As of 2001, the U. S. Geological Services (USGS) gauging station at the southern end of J. H. Keith Cascade Springs Picnic Ground is no longer monitored by the USGS. A water level monitor (piezometer) had been considered for installation for 2002, but it was determined that the methodology is not appropriate for this situation. In consultation with the Rocky Mountain Research Station on February 6, 2003, the monitoring design to measure water levels was revised and included permanently placing two water level measuring devices at two of the springs (one at each of two springs) in 2003, if possible. Because of heritage resource concerns, these two water measuring devices were not installed. Plans for the 2004 monitoring period included determining if permanent transects could be placed across the stream to measure water levels. Permanent transects were placed in 2004 and data collected from a one-time reading each in 2004 and 2005 when the phenology of *Epipactis gigantea* is appropriate for monitoring. This protocol is not rigorous enough to determine cause and effect relationships relative to changes in water level. It is only meant to coarsely document presence/absence of water in Cascade Creek.

2005 Monitoring Design and Results:

1. Monitor presence/absence of patches along stream transects on an annual basis. If the number of patches decline by 10% or more, consult on a more rigorous design with the Rocky Mountain Research Station.

In general, Cascade Springs appeared more lush than normal due to good spring/early summer moisture. *Epipactis gigantea* individuals were large and robust. A majority were in bloom (ca 85%). Approximately fifty-six patches of *E. gigantea* were located in 2005 at Cascade Springs. Fifty-five patches of *Epipactis gigantea* were located in 2004. Forty-six patches were counted in 2003. Forty patches were counted in 2002 and 2001. There is no decline in the number of patches from those documented in 2004.

2. Recreation nick point: document the number of nick points that actually extend into patches of *Epipactis gigantea*.

There is a nick point trail (observations indicate low use) that extends into an *Epipactis gigantea* patch at the uppermost headwater springs.

Recreation access through another nick point that was first documented during 2002 monitoring season has been limited by a fence that was constructed several years ago. In 2005, there was no evidence that the continuing recreational use on this nick point trail is extending into any *Epipactis gigantea* patches.

A third nick point trail (first documented in 2000), continues to overgrow with shrubs; the trail leads to a cement platform below the nick point. In 2004, the nick point did not extend into patches of *Epipactis gigantea*. In 2005, there was some trampling of *E. gigantea* observed at the end of the nick point trail near the platform.

A fourth historical trail leads from the picnic ground gazebo north to Cascade Creek and continues to be intensively used by recreationists. Two smaller, less intensively used nick point trails have developed off this

main trail and extend down to the creek. The end of the main trail is adjacent to several small clumps of *Epipactis gigantea*. Some trampling was observed in 2005 at the end of each of these trails to the creek.

A very short nick point trail is defined near the gazebo (west of point RP6) and extends into a patch of *Epipactis gigantea*. Some trampling was observed in 2005.

Another side trail extending west from the trail north of the gazebo (past the bridge) extends into a patch of *Epipactis gigantea*.

No *Epipactis gigantea* patches have disappeared in areas where nick point trails extend into them.

3. Evaluate the Cascade Springs site for the potential placement of permanent transects to measure water levels across the creek. If installation is possible, monitor water levels on an annual basis on the same calendar date from year to year.

Cascade Springs was evaluated in 2004 for the placement of permanent transects to record water levels and two transects established. On July 5, 2005 the two transects were reread - water levels were documented at 0.5 m intervals. The average stream depth on July 5, 2006 at Transect No. 1 (upstream transect) was 12.65 cm (on July 2, 2004: 11.9 cm) and the average stream depth at Transect No. 2 (downstream transect) was 27.6 cm (on July 2, 2004: 21.5 cm).

4. Document any weeds designated as noxious by South Dakota and Wyoming, and the following non-native invasive species of concern, *Elaeagnus angustifolia* (Russian olive), and *Tamarix* sp. (salt cedar). Document if the weeds are co-located with *Epipactis gigantea* or at what distance the weed species is located away from the occurrence site if they are occupying the same ecological type.

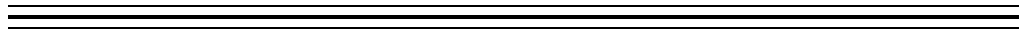
In 2005, *Cirsium arvense* (Canada thistle) continues to be present along the stream, including individuals located in patches of *Epipactis gigantea*. *Elaeagnus angustifolia* (Russian olive) continues to be present at Cascade Springs. *Tamarix* spp. (salt cedar) was not present.

5. Document erosion patches occurring at any *Epipactis gigantea* patch.

No new erosion patches were observed in 2005 at any *Epipactis gigantea* patch. Past documented erosion patches (erosion observed to be associated with stream movement dynamics) continue to be present.

6. Document any verifiable unauthorized collections of *Epipactis gigantea*.

There was no evidence of unauthorized collections of *Epipactis gigantea* at the time monitoring was completed in 2005.



LYCOPodium COMPLANATUM (GROUND CEDAR; TRAILING CLUBMOSS)



Photo by BHNH staff at *Lycopodium complanatum* site LYCO3-8 on September 21, 2005.

Prior to the 2004 monitoring season, there were four known occurrences of *Lycopodium complanatum* located on Black Hills National Forest, identified with the following site numbers: LYCO3-1, LYCO3-2, LYCO3-3 and LYCO3-4. Sites LYCO3-3 and LYCO3-4 were located in 2002. Site number LYCO3-4 was reported in an area burned by the Grizzly Gulch wildfire (2002), and it is unknown what long-term effects the fire will have on the persistence of the species at this site. LYCO3-5 and LYCO3-6 were discovered and baseline data collected in 2004. Since these occurrences are only about 200 m apart, they were combined into one site (LYCO3-5 with subpopulations) in 2005. LYCO3-7 was discovered and baseline data collected in 2004. LYCO3-8 was discovered and baseline data collected in 2005. Sites LYCO3-5, LYCO3-7, and LYCO3-8 occur in an area with a significant amount of similar habitat (north-facing spruce (*Picea glauca*) slopes above small streams) that may reveal more occurrences when comprehensively searched.

The greatest risk identified to *Lycopodium complanatum* based on baseline data gathered from sites on Black Hills National Forest is the small number and limited size of occurrences. There are currently few apparent or ongoing risks to the species at those locations, but those locations of this boreal remnant species are small enough that random events, such as drought or fire, could eradicate them. All of the more recent occurrences are located in active grazing allotments. There is risk to these occurrences from trampling that could occur if OHV trails or timber activities open up new pathways for cattle to move between forage areas, watering areas, salting areas, etc. that are through or adjacent to *L. complanatum* sites. Although invasive plant species are not currently an immediate risk to *L. complanatum* at known occurrences, there is potential for invasion because of the presence of invasive species in nearby surrounding areas.

Lycopodium complanatum is evergreen and can be monitored at any time during the growing season (May to September). However, it is best observed in the spring or fall when overstory or other understory vegetative cover is low, yet it is still possible to detect and identify invasive plant species. Monitoring in the fall as opposed to the spring allows documentation on reproductive effort (i.e. percentage of individuals with strobili/cones). Efforts to monitor occurrences have the potential to negatively impact the occurrence through physical trampling. The monitoring design has been modified to keep site disturbance at a minimum.

2005 Monitoring Design and Results:

- a. Monitor the following *Lycopodium complanatum* sites for presence/absence on an annual basis:
 - LYCO3-1 (Sand Creek site),

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- LYCO3-4 (Grizzly Gulch wildfire site)
- LYCO3-5 (Tilson Creek West site)
- LYCO3-6 (Tilson Creek East site)

Lycopodium complanatum was present at LYCO3-1 on September 14, 2005.

Lycopodium complanatum was present at LYCO3-4 on September 16, 2005.

Lycopodium complanatum was present at LYCO3-5 and LYCO3-6 on September 21, 2005. Because the sites are only 200 m apart, they were combined into one site (LYCO3-5 with four subpopulations) in 2005.

Although not part of the 2005 monitoring design for *Lycopodium complanatum*, baseline data were collected on a new site reported in 2005: LYCO3-8 (tributary to North Fork of Rapid Creek).

2. Once every five years, revisit all seven known *Lycopodium complanatum* occurrences.

All *Lycopodium complanatum* sites will be revisited in 2009.

3. Place a series of permanent markers at points along the boundary edges of the Sand Creek

Lycopodium complanatum occurrence (site number LYCO3-1). Place the markers in areas where it is considered likely contraction or expansion of the site can be detected and at locations where disturbances due to monitoring is expected to be minimal.

Based on what Black Hills National Forest has learned in previous years' monitoring regarding canopy cover monitoring issues (i.e. damage to plants from intensive survey; difference in canopy cover estimates with different observers, etc.) , a new monitoring protocol was developed in consultation with the Rocky Mountain Research Station for the 2005 monitoring season. The goal was to place a total of about ten stakes along the margin of and all the way around the occurrence. It was decided in the field not to place stakes on the downhill (northern) edge of the occurrence – the area is too steep, so the stakes would likely not stay in place over time and erosional impacts detrimental to the occurrence would likely be caused by observers. Ten stakes were placed on the east, south, and west margins of the occurrence. It was decided to document the margin of the occurrence at each stake by photographs and drawings. While the occurrence should be visited every year for a presence/absence check, it may not be useful to retake the photographs every year if there is as little change as has been observed over the last five years. An appropriate timeframe for retaking photographs should be determined based on several years of monitoring using this protocol. In addition, use of the protocol over several years will help determine if both photographs and drawings as completed in 2005 are needed to make good comparisons.

4. Document any weeds designated as noxious by South Dakota or Wyoming. Document if the weeds are co-located with *Lycopodium complanatum*, or at what distance the weed species is located away from the occurrence site if they are occupying the same ecological type.

No noxious weeds were observed to occur within any of the *Lycopodium complanatum* sites in 2005.

LYCO3-1 –Several noxious weeds are abundant in the drainage below the site in a different, more open-canopy ecological type : *Tanacetum vulgare* (common tansy), *Cynoglossum officinale* (houndstongue), *Hypericum perforatum* (St. Johnswort), and *Cirsium arvense* (Canada thistle).

LYCO3-4 – *Cirsium arvense*, *Cynoglossum officinale*, *Tanacetum vulgare*, and *Leucanthemum vulgare* (ox-eye daisy) are located in a different ecological type in the drainage below the occurrence. There are some very large patches of *Cirsium arvense* and *Leucanthemum vulgare*.

LYCO3-5 (now including LYCO3-6) – No noxious weeds were observed in this site.

LYCO3-8 – *Cynoglossum officinale* and *Leucanthemum vulgare* are scattered in the drainage bottom below the site and along the nearby road.

PLATANThERA ORBICULATA (LESSER ROUNDEAVED ORCHID; LARGE ROUNDEAVED ORCHID)



Photo by BBNF staff at *Platanthera orbiculata* site PLOR4-19 on July 28, 2005.

Platanthera orbiculata is relatively secure in the Black Hills based on the large number of occurrences (greater than 30) that are distributed in three geographically separated regions on Black Hills National Forest, each within a different geological area: 1) Bearlodge Mountains, 2) northwestern Black Hills (contains the largest cluster of sites), and 3) Black Elk Wilderness. The species is present in patchy, scattered occurrences on shady, northwest to northeast facing slopes and draws in strong association with *Betula papyrifera* (paper birch)/ *Corylus cornuta* (hazelnut) and *Picea glauca* (white spruce) forests. The species persistence in the Black Hills is primarily limited by the small extent of cool, moist boreal habitat, although it appears to be secure on Black Hills National Forest at this time. Long-term droughts or dramatic climate changes characterized by drier and warmer conditions may present the greatest risk to *P. orbiculata* and its habitat. Currently known occurrences are within active grazing allotments, with the exceptions of locations in the Black Elk Wilderness. Risks to most of the occurrences from this use are generally low because many of the sites are on steep slopes with dense shrub vegetation, both of which deter livestock. However, new OHV trails or timber activities could allow livestock to establish new trails through or adjacent to *P. orbiculata* occurrences that could result in trampling or browsing. Risks from other management activities (i.e. timber harvest) are generally low because known sites are reviewed and are avoided to the extent possible. No ongoing recreational impacts have been documented at the Black Elk Wilderness occurrences, in spite of the close proximity of an intensively used trail. Other potential future risk factors could include plant collection and invasion by noxious weeds.

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The most recent data available were used in designing monitoring for this species. Designated core occurrences of *Platanthera orbiculata* were identified using two criteria: geographic distribution of the occurrence and size (estimated number of individuals). Three occurrences from each of the three primary geographic areas listed above were designated as core occurrences for monitoring.

The monitoring was designed to assess the status of the nine core occurrences on an annual basis. The monitoring addresses three questions: 1) is the species present?; 2) is there evidence of plant collecting?; and 3) are noxious weeds and other invasive species established at the site? Although the proposed monitoring focuses on the presence or absence of a given occurrence, an estimated range of the number of individuals continues to be collected. If any of the core occurrences were not present, then the reason was to be documented if it could be determined and then randomly selected additional sites chosen to serve as core sites.

The second aspect of the monitoring as currently designed was to provide baseline data on the persistence of *Platanthera orbiculata* during dry conditions. During a drought, the design includes monitoring three additional sites for presence/absence and to census the number of individuals during the first and second consecutive drought years. High numbers of *P. orbiculata* observed in 2000 potentially reflect several years of above average precipitation in the mid to late 1990s. The nine core sites and three other sites were monitored for presence or absence during the recent past drought years and a census was also taken during the second non-drought year following the dry period. Data on *P. orbiculata* population persistence and numbers in both wet and dry years are important for reassessing the species and for re-examining, and potentially changing, the monitoring design.

Monitoring occurred on the additional drought year monitoring sites in 2002, 2003, and 2004 because these years were considered drought years. Declines were documented in 2002, and declines in numbers occurred to a much greater extent in 2003, with plant numbers dropping to less than 10 aboveground individuals on a number of sites. Numbers of plants found in 2004 were similar to numbers in 2003. Because snow pack and precipitation for calendar year 2005 was considered “below normal”, there was a likelihood that *Platanthera orbiculata* individuals could be absent from a number of the known occurrence sites. Therefore, Black Hills National Forest again elected to include drought year monitoring for the 2005 monitoring season.

Monitoring of *Platanthera orbiculata* is best conducted during the blooming period in late June to July. The plant is identifiable later in the season, and monitoring could take place in early August during a cool, moist year if a need arises. Plants with single leaves, two leaves, and plants with leaves and flowering stalks are counted as individual plants.

2005 Monitoring Design and Results:

1. Annually monitor presence/absence of known site locations in the Bearlodge Mountains: site numbers PLOR4-1, PLOR4-2 and PLOR4-3. If any of the key monitoring sites is not present (refer to discussion above regarding climatic ties), document reason if it can be determined (i.e. drought, fire, noxious weeds).

***Platanthera orbiculata* was present at all three sites in 2005.**

2. Annually monitor presence/absence of the Black Elk Wilderness site locations: site numbers PLOR4-23, PLOR4-24 and PLOR4-25. If any of the key monitoring sites is not present (refer to discussion above regarding climatic ties), document reason if it can be determined (i.e. drought, fire, noxious weeds).

***Platanthera orbiculata* was present at all three sites in 2005.**

3. Annually monitor presence/absence of three key monitoring occurrence sites in the northwestern Black Hills: site numbers PLOR4-6, PLOR4-12 and PLOR4-19. If any of the key monitoring occurrence sites is

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not present (refer to discussion above regarding climatic ties), document reason if it can be determined (i.e. drought, fire, noxious weeds).

Platanthera orbiculata was present at all three sites in 2005.

Hardwood restoration activities occurred at site number PLOR4-6 in 2004. Plants were still present within the general disturbance area in 2005, but only two plants were found. Neither plant was flowering and leaves were brown/withering. The canopy of the disturbed area is more open, with ground disturbance, and slash scattered over the ground. The other 5 plants found in 2005 were in adjacent habitat that was not treated. Continued monitoring would provide additional information on long-term effects, but preliminary results suggest the 2004 hardwood treatments were not beneficial to *P. orbiculata* in the short-term. Hardwood restoration could be designed to be more conservative of *P. orbiculata*.

4. If drought conditions persist, continue to monitor the three additional sites: PLOR4-4, PLOR4-21 and PLOR4-22 (these sites were chosen for variation in geographic distribution) and count individuals at all 12 locations. During the 2nd non-drought year, count individuals at the 12 sites. After the 2nd non-drought year reassess the monitoring design to determine future needs.

The year 2005 was classified as a drought year in western South Dakota and northeastern Wyoming (see General Information at beginning of this monitoring report). *Platanthera orbiculata* was present at the additional drought monitoring sites: PLOR4-4, PLOR4-21, PLOR4-22. Individuals were counted at the 12 sites. Relative to 2000 data, 2005 counts were lower on seven sites and higher on five sites. For six of the seven sites with declining numbers, evidence was not found of disturbances that could have affected the number of individuals except at site PLOR4-6, where canopy and soil disturbances associated with hardwood restoration activities were documented in 2004.

PLATANATHERA ORBICULATA COUNTS AT CORE MONITORING SITES DURING VARYING CLIMATIC CONDITIONS

Monitoring Years → <i>Platanthera orbiculata</i> Site Numbers:	2000 (Coming off a series of higher precipitation years)	2003 (Drought year)	2004 (Drought year)	2005 (Drought year)
PLOR4-1 (Bearlodge)	44 (2001)	6	9	7
PLOR4-2 “	37	11	15	19
PLOR4-3 “	51	1	2	2
PLOR4-6 (nw B Hills)	26	5	9	7
PLOR4-12 “	37	7	8	3
PLOR4-19 “	78	86	92	93
PLOR4-23 (Black Elk)	8	16	29	27
PLOR4-24 “	6	6	9	16
PLOR4-25 “	4	10	13	12
PLOR4-4*	14	1	3	5
PLOR4-21*	40	8	9	5
PLOR4-22*	1	1	3	3

*Additional sites monitored in drought years

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5. Document any weeds designated as noxious by South Dakota or Wyoming. Document if the weeds are co-located with *Platanthera orbiculata*, or at what distance the weed species is located away from the occurrence site if they are occupying the same ecological type.

PLOR4-1: No noxious weeds in the site.

PLOR4-2: No noxious weeds in the site.

PLOR4-3: No noxious weeds in the site; *Cirsium vulgare* (bull thistle) and *Phleum pretense* (timothy) on lower slope and in drainage bottom below site.

PLOR4-6: Invasive species scattered on newly disturbed skid trails; *Cirsium vulgare* and *Verbascum thapsus* (common mullein) within 5 m of *P. orbiculata* individuals. *Hypericum perforatum* (St. Johnswort) abundant in drainage bottom; *Cynoglossum officinale* (houndstongue) and *Carduus nutans* (musk thistle) scattered in bottom below site.

PLOR4-12: No noxious weeds in the site.

PLOR4-19: *Cynoglossum officinale* scattered in site and abundant in drainage below site.

PLOR4-23: No noxious weeds in the site.

PLOR4-24: No noxious weeds in the site.

PLOR4-25: No noxious weeds in the site.

PLOR4-4: No noxious weeds in the site. *Cirsium vulgare* and *Hypericum perforatum* present in the area, especially near the road above the site.

PLOR4-21: No noxious weeds in the site; *Cirsium arvense* (Canada thistle), *Cynoglossum officinale*, and *Verbascum thapsus* on road below site.

PLOR4-22: No noxious weeds in the site.

SALIX CANDIDA (SAGELEAF WILLOW; HOARY WILLOW)



Photo by BHNH staff at *Salix candida* site SACA4-1 on September 13, 2005. *Salix candida* shrubs have grayish/green leaves.

Salix candida was designated as a Region 2 sensitive species in December 2003. *S. candida* is currently

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known from the McIntosh Fen Botanical Area. The persistence of this species in the Black Hills is dependent on conserving this single occurrence.

A recent species assessment was completed in 2003 and baseline data were collected for *Salix candida* in 2002 and 2003. Monitoring data were collected for *S. candida* in 2004 and 2005. An obligate wetland species, the primary risk to its persistence and reproductive success is any lowering of the water table where it occurs, whether it is natural or human-induced. Noxious weeds or insect infestations have been identified as potential risks for this species. *Cirsium arvense* (Canada thistle) currently occurs within the McIntosh Fen Botanical Area. Although high soil moisture levels in the fen itself appear to exclude *C. arvense* from the wettest part of *S. candida* habitat, *C. arvense* and *S. candida* occur within a foot of each other in drier *S. candida* locations. *Lythrum salicaria* (purple loosestrife) is not known to occur at McIntosh Fen, or anywhere close by, but is very aggressive and has the potential to out compete riparian natives, including *S. candida*. Insect infestations (willow borer) have been documented, in *S. candida* as well as other *Salix* species in McIntosh Fen and elsewhere in the Black Hills. Fishing occurs along Castle Creek (near the fen) in the McIntosh Fen Botanical Area, and a designated snowmobile trail crosses the Botanical Area but does not extend into either of the two subpopulations of the *S. candida* occurrence. No impacts has been documented to *S. candida* from either activity to date. Although minimal impacts have been documented from wildlife use and none from livestock grazing (since designation of McIntosh Fen Botanical Area), both could be potential risks at the site.

Monitoring design is similar to that for *Salix serripima* to attempt to detect and respond in a timely manner to changes in extent and condition of *Salix candida* and its habitat. The protocol focuses on annually monitoring: 1) the extent of the population, 2) total number of individuals and number of reproductive plants, 3) number of plants infected by any damaging agents (i.e. insects, rust, wildlife grazing, livestock grazing, etc.), 4) water table level, and 5) presence of invasive plant species.

Plans for the 2004 monitoring period included determining if permanent transects could be placed across the stream to measure water levels. Permanent transects were placed in 2004 and data collected from a one-time reading each in 2004 and 2005 when the phenology of *Salix candida* is appropriate for monitoring. This protocol is not rigorous enough to determine cause and effect relationships relative to changes in water level. It is only meant to coarsely document presence/absence of water in McIntosh Fen.

Monitoring of *Salix candida* occurred June 10, 2005. A revisit was made in September 2005 to assess the extent of rust infection.

2005 Monitoring Design and Results:

On an annual basis:

1. At McIntosh Fen, GPS new endpoints of the occurrence if site size has changed. Place multiple (a minimum of 10) PVC posts (or other type of post markers) around the perimeter of the largest dense patches of *Salix candida*. Mark each post with an assigned patch (subpopulation) label and date.
 - Select the five closest plants to each perimeter marker and note whether they are reproductive or vegetative.
 - Assess the condition of these closest five plants to each perimeter marker and document the number of plants at each location that is observed to be affected by some agent (e.g. rust, stem borer, wildlife grazing, livestock grazing, etc.). Specify the agent that is observed.

There was no expansion or contraction of the site detected in 2005 at McIntosh Fen. Comparing GPS points from previous years to those collected at the site in 2005, there was no change in the general site boundary from the previous year.

A total of twelve large plastic stakes were installed at McIntosh Fen (ten at the southern subpopulation and

two at the northern subpopulation). Stakes were also GPSd and marked with pink flagging.

Five individuals near each stake were loosely tagged with numbered metal tags on plastic zip ties. Notes were taken on each individual on June 10, 2005. While this date was later than optimum, flowering was still very evident and sex could be determined on most individuals. All tags were hung on live branches unless otherwise noted. Details such as percent of shrub with suckering growth and percent of dead branches were recorded. Notes were taken on a total of 60 *S. candida* plants. There were 8 vegetative, 20 male, and 32 female individuals recorded.

Many branches were seen that had produced leaves earlier in the season but which were now withered and dying. Botanists were able to observe some willow borer grubs in some of the dead/dying stems we broke off. A few individuals were observed that had been browsed by wildlife. No rust was observed on *S. candida* in June 2005. In September 2005, a few *S. candida* individuals were observed with orange rust that was found on the majority of *S. serissima* individuals. However, most *S. candida* plants were rust-free.

2. Measure aboveground water levels along the permanent depth point water measurement transects at McIntosh Fen described under monitoring design for *Salix serissima*. Install a third permanent depth point measurement transect at McIntosh Fen, permanently mark transect ends, and measure water levels at least every meter. This monitoring needs to occur on the same calendar date from year to year.

Two permanent transects were installed at McIntosh Fen on May 20, 2004 and above ground water was recorded. The McIntosh Fen transects were reread on May 20, 2005 and on June 10, 2005. The transect will be read in 2006 when the phenology of *Salix candida* is appropriate for monitoring (this will generally be in early to mid June).

In 2005 at the southern subpopulation at McIntosh Fen, there were five points with measurable aboveground water and five points were documented with trace for water - out of a total of 125 depth point measurements collected along a transect length of 109 m. In 2004, nine points had measurable above-ground water along the same transect (125 total depth point measurements collected along same transect length of 109 m).

In 2004 at the northern subpopulation at McIntosh Fen, nine points had measurable aboveground water and four points were documented with trace water – out of a total of 62 depth point measurements collected along a transect length of 61 m. In 2004, three points had measurable aboveground water (62 depth point measurements collected along same transect length of 61 m). Part of the northern transect intersects a depression feature (most likely man-made) that was holding water in 2005; the feature was dry in 2004).

It was determined in the field that there were no additional locations for water transects at McIntosh Fen that could be considered more representative than the two already chosen. In addition, this protocol measuring surface water at just one point in time provides an extremely coarse indication of hydrological conditions. It was decided that investing more time in collecting water transect data would not result in better understanding or documentation of hydrologic conditions. Consequently, a third transect was not established in 2005.

3. Document any weeds designated as noxious by South Dakota or Wyoming or other invasive plant species. Document if the weeds are co-located with *Salix candida*, or at what distance they are from the occurrence site if they are occupying the same ecological type.

McIntosh Fen occurrence – *Cirsium arvense* (Canada thistle) is present in the same ecotype as *Salix candida*, within one foot of plants. It occurs in slightly drier areas where *S. candida* is at the edge of suitable habitat.

SALIX SERISSIMA (AUTUMN WILLOW)



Photo by BHNF staff at *Salix serissima* site SASE2-2 on July 7, 2005.

Prior to the 2004 monitoring season, two occurrences of *Salix serissima* were known to occur on land administered by the Black Hills National Forest. Until 2002, a single occurrence of *S. serissima* was known to occur at McIntosh Fen Botanical Area. A second occurrence was discovered in 2002 within a fenced enclosure along Middle Boxelder Creek. In 2004, botanical survey for range management discovered two new occurrences of *S. serissima* – near Nahant and on Silver Creek. Both sites were visited and baseline data collected in 2005.

Because *Salix serissima* is an obligate wetland species, the primary risk to its persistence and reproductive success is any lowering of the water table where it occurs, whether it is natural or human-induced. Noxious weeds, invading woody species (conifer encroachment), fungal infections or insect infestations have been identified as concerns for this species. *Cirsium arvense* (Canada thistle) currently occurs within the McIntosh Fen Botanical Area. Although high soil moisture levels in the fen itself appear to exclude *C. arvense* from the wettest part of *S. serissima* habitat, *C. arvense* and *S. serissima* occur within a foot of each other in drier *S. serissima* locations. *Lythrum salicaria* (purple loosestrife) is not known to occur at any of the sites, or anywhere close by, but is very aggressive and has the potential to out-compete native riparian species, including *S. serissima*. A fungal infection was noted on the leaves of *S. serissima* at McIntosh Fen in 2001 through 2005 and willow borer has been documented at both McIntosh Fen and Middle Boxelder Creek occurrences. Fishing occurs along Castle Creek (near the fen) in the McIntosh Fen Botanical Area. A designated snowmobile trail crosses the Botanical Area but does not extend into the *S. serissima* occurrence. At this time, no impacts have been documented to *S. serissima* from either activity. Wildlife use and cattle use are a potential risk at all *S. serissima* sites. Minimal impacts were documented from wildlife use and no impacts from livestock grazing at McIntosh Fen in 2005. Cattle accessed *S. serissima* in the enclosure at Middle Box Elder Creek in 2005 and negatively impacted *S. serissima* and its habitat. Cattle accessed *S. serissima* at Silver Creek in 2005 and negatively impacted *S. serissima* and its habitat. The occurrence near Nahant is in a low area bounded by a paved road and a steep rocky outcrop. There is no evidence of recent or current livestock use of the low area and it appears the occurrence location is restricted from livestock by these physical boundaries.

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A rigorous monitoring strategy was designed and implemented in 2000 for the occurrence at McIntosh Fen. It was revised to add data collection at the second *Salix serissima* occurrence and to continue to refine detection of concerns in a timely manner to changes in extent and condition of *S. serissima* and its habitat and allow appropriate/effective responses. The protocol focused on annually monitoring: 1) the extent of the population, 2) total number of individuals and number of reproductive plants, 3) number of plants infected with rust fungus or other damaging agents, 4) water table level, and 5) presence of invasive plant species.

A difference of greater than 10% was documented in numbers of *S. serissima* at McIntosh Fen from 2004 compared to 2003 (462 in 2004 compared to 764 in 2003). It was determined that there may have been an issue with inaccurate identification, but monitoring botanists also agreed that it is very difficult to accurately count the large number of individuals over the large area they are found in at the fen, with one of several confusing factors being the difficulty of determining number of individuals in a large clump. In addition, monitoring botanists felt the intense survey was damaging to *Salix* species in the fen, particularly in more densely vegetated areas. Consultation with RMRS in the spring of 2005 led to the development of a revised protocol.

The revised monitoring design for 2005 involves assessing the status of the four Black Hills National Forest occurrences on an annual basis. The monitoring was designed to address four questions: 1) is the species present?; 2) is there contraction or expansion occurring?; 3) are hydrological changes occurring?; and 4) have invasive plant species invaded the site?

The revised design for 2005 focuses on annually monitoring: 1) contraction or expansion extent of subpopulations at the McIntosh Fen occurrence; 2) the extent of the Middle Boxelder Creek occurrence; 3) estimated percent of reproductive individuals at both locations; 4) the condition of *Salix* species and providing an estimated percentage of plants infected with rust fungus or other damaging agents; 5) water table levels; and 6) presence of invasive plant species. A seventh monitoring item specific to 2005 is: 7) gather baseline data at the Nahant and Silver Creek occurrences discovered in 2004. This data will be used in consultation with RMRS in 2006 to determine whether the additional two occurrences should be included in the annual protocol for *S. serissima*.

In 2005, an assessment of the contraction or expansion of the *Salix serissima* occurrence at McIntosh Fen is based on GPS documentation of the subpopulation endpoints. In addition, markers were placed at a number of locations around the perimeters of both subpopulations of *S. serissima*. These permanent markers can be used for future assessments in detecting any contraction or expansion that may occur at this location, in determining an estimated percentage of stems with reproduction capability, and in determining an estimated percentage of the occurrence that may be affected by damaging agents, such as a rust fungus or insect predation.

Two piezometers were installed at McIntosh Fen in 2001 to annually monitor water levels. However, the piezometers may have destabilized, possibly because of freezing/thawing conditions, or because the fen is a floating mat of organic material. Because the water level had been observed to occur above ground level during higher precipitation years, an above ground water level sampling method was determined appropriate and more reliable than using piezometers. Two permanent transects were established in 2004 and data collected from a one-time reading each in 2004 and 2005 when the phenology of *Salix candida* was appropriate for monitoring (mid to late June; *S. serissima* is generally at phenology for monitoring in mid June to mid July). This protocol is not rigorous enough to determine cause and effect relationships relative to changes in water level. It is only meant to coarsely document presence/absence of water in McIntosh Fen.

Monitoring of *Salix serissima* occurs primarily during the blooming period (mid June to mid July) when that the total number of reproductive individuals can best be determined.

2005 Monitoring Design and Results:

1. At McIntosh Fen, GPS new endpoints of subpopulations if site size has changed. Place multiple (a minimum of 10) PVC posts (or other type of post markers) around the perimeter of the largest dense patches of *Salix serissima* at both subpopulations. Mark each post with the subpopulation and date.
 - Select the five closest plants to each perimeter marker and note whether they are reproductive or vegetative.
 - Assess the condition of these closest five plants to each perimeter marker and document the number of plants at each location that is observed to be affected by some agent (e.g. rust, stem borer, etc.). Specify the agent that is observed.

There was no expansion or contraction of the site detected in 2005 at McIntosh Fen. Comparing GPS points from previous years to those collected at the site in 2005, there was no change in the general site boundary from the previous year.

A total of twelve large plastic stakes were installed at McIntosh Fen (ten at the southern subpopulation and two at the northern subpopulation). Stakes were also GPSd and marked with pink flagging.

Two to six individuals near each stake were loosely tagged with numbered metal tags on plastic zip ties. Notes were taken on each individual on July 11, 2005. All tags were hung on live branches unless otherwise noted. Details such as percent of shrub with suckering growth and percent of leaves with rust present were recorded. Notes were taken on a total of 50 *S. serissima* plants. There were 29 vegetative, 7 male, and 14 female individuals recorded. The site was visited at a later date than last year and it appeared a little late for optimum observation of male catkins on the plants. Consequently, some of the observations of vegetative individuals may actually have been males.

Many branches were seen that had produced leaves earlier in the season but which were now withered and dying. Botanists were able to observe some willow borer grubs in dead/dying stems we broke off. Many of the dead/dying branches showed willow borer damage at the base. Botanists also noted many plants with rust. It was decided a visit in the fall would be a better time to make a final estimate on impacts to *S. serissima* from willow borer and rust.

McIntosh Fen was visited again in September 2005. Some rust was present on every *S. serissima* individual examined. Other *Salix* species had some rust, but *S. serissima* seemed to be the most affected (some *S. candida* individuals had rust but most were rust-free). Dead branches, appearing to be largely the result of willow borer damage, were most obvious on *S. serissima* and *S. candida* individuals, but other *Salix* species had dead branches as well.

2. At Middle Boxelder Creek, GPS new endpoints if the *Salix serissima* site boundaries have changed. Count individuals during the blooming period (documenting total number of individuals and total number of reproductive individuals). If the number of individuals declines by more than 10%, consult on monitoring design with the Rocky Mountain Research Station.

A new eastern GPS endpoint was taken in 2005. Botanists could not locate the eastern outlier (single plant) noted in 2004 as being near the water transect line. The plant was searched for in July and September 2005, but not found. Fourteen individuals were counted in on July 7, 2005 (7 vegetative, 1 male, and 6 female), but it was unclear at one flag if there were one or two individuals present. The site was visited at a later date than last year (June 30, 2004) and it appeared a little late for optimum observation of male catkins on plants. Consequently, some of the observations of vegetative individuals may actually have been males. Sixteen individuals were counted in 2004 (4 vegetative, 6 male, 6 female). Rocky Mountain Research Station will be consulted in May 2006 regarding the need to revise the monitoring design. The site was treated for conifer encroachment in spring 2005. Encroaching individuals of *Picea glauca* (spruce) were hand-felled and left on-site.

3. Measure aboveground water levels along the permanent depth point water measurement transects at McIntosh Fen (one permanent transect at each subpopulation) and at Middle Fork Boxelder Creek (one permanent transect) occurrences. Install a third permanent depth point measurement transect at McIntosh

Fen, permanently mark transect ends, and measure water levels at least every meter. This monitoring needs to occur on the same calendar date from year to year.

Two permanent transects were installed at McIntosh Fen on May 20, 2004 and one transect was installed at Middle Fork Boxelder Creek on June 30, 2004 and above ground water was recorded. The McIntosh Fen transects were reread on May 20, 2005 and June 10, 2005 and the Middle Fork Boxelder transect was read on July 7, 2005. In 2006, the McIntosh Fen transects will be read when the phenology of *Salix candida* is appropriate for monitoring (early to mid June).

In 2005 at the southern subpopulation at McIntosh Fen, there were five points with measurable aboveground water and five points were documented with trace for water - out of a total of 125 depth point measurements collected along a transect length of 109 m. In 2004, nine points had measurable above-ground water along the same transect (125 total depth point measurements collected along same transect length of 109 m).

In 2004 at the northern subpopulation at McIntosh Fen, nine points had measurable aboveground water and four points were documented for trace water – out of a total of 62 depth point measurements collected along a transect length of 61 m. In 2004, three points had measurable aboveground water (62 depth point measurements collected along same transect length of 61 m). Part of the northern transect intersects a depression feature (most likely man-made) that was holding water in 2005; the feature was dry in 2004).

In 2005 at the Middle Fork Boxelder Creek site, five points had measurable aboveground water out of a total of 38 depth point measurements collected along a transect of 19.55 m. In 2004, four points had measurable aboveground water out of a total 38 depth point measurements collected along the same transect of 19.55 m.

It was determined in the field that there were no additional locations for water transects at McIntosh Fen that could be considered more representative than the two already chosen. In addition, this protocol measuring surface water at just one point in time provides an extremely coarse indication of hydrological conditions. It was decided that investing more time in collecting water transect data would not result in any better understanding or documentation of hydrologic conditions. Consequently, a third transect was not established in 2005.

4. Gather baseline data at the two *Salix serissima* occurrences discovered in 2004 (Nahant and Silver Creek locations).

Baseline data was collected at the two *Salix serissima* occurrences discovered in 2004 – on June 29, 2005 for the Nahant occurrence and on July 7, 2005 for the Silver Creek occurrence.

The Nahant occurrence is comprised of two male plants growing side-by-side. The plants are in a mossy, water-saturated sedge/willow area separated from the main drainage bottom by a paved road. The suitable habitat area is small – bounded by roads on two sides and steep rocky outcrops/slopes on the other two. Part of the suitable habitat area is on private land.

The Silver Creek occurrence is comprised of six individuals – one large (ca 15 ft tall) male plant and one large (ca 15 ft tall) female plant, three small female plants, and one medium female plant. The habitat area includes about 10 acres of wetland – possibly an iron fen. There is evidence of old fences around the wetland (the area is sandwiched between 2 parcels of private land along Silver Creek) but it is not now fenced. Some treatment for conifer encroachment (*Picea glauca* and *Pinus ponderosa*) was accomplished in the occurrence area in October 2005. Encroaching trees were hand-felled and left on-site.

5. Document any weeds designated as noxious by South Dakota or Wyoming or other invasive plant species. Document if the weeds are co-located with *Salix serissima*, or at what distance the weed species is located away from the occurrence site if they are occupying the same ecological type.

McIntosh Fen occurrence – *Cirsium arvense* (Canada thistle) is present in the same ecotype as *Salix serissima*, within one foot of plants. It occurs in slightly drier areas where *S. serissima* is at the edge of suitable habitat.

Middle Boxelder Creek occurrence – very weedy on upland (west) side of wetland within enclosure. *Cirsium arvense* (Canada thistle), *Linaria vulgaris* (yellow toadflax), *Cynoglossum officinale* (houndstongue), and *Carduus nutans* (musk thistle) are all present in close proximity to *S. serissima* plants (within 3 m). *Linaria vulgaris* is present in abundance in the east end of the enclosure. Some of the weedy species are more common in the same ecological type as *S. serissima* (*Cirsium arvense* and *Cynoglossum officinale*) while the others are more common in slightly drier areas.

Nahant occurrence – *Leucanthemum vulgare* (ox-eye daisy) is thick above the drainage bottom (approximately 10 m from *S. serissima* plants). *Linaria vulgaris* is found further away from *S. serissima* plants, scattered below the road. Spraying for weeds by county weed crews could impact the *S. serissima* occurrence.

Silver Creek occurrence – *Linaria vulgaris* is present at the north end of the occurrence area in small amounts.

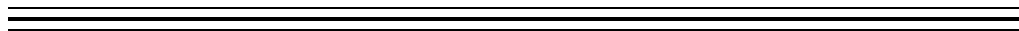
6. Document the number of plants infected with rust fungus or other damaging agents (i.e. willow borer).

McIntosh Fen occurrence – two forms of rust were observed in July 2005: raised red bumps and orange dots. In September 2005, at least some orange rust spots were present on every *S. serissima* individual examined. None of the red bumps observed earlier in the season were present; it appears the red bump is another form of the same orange rust. A few *S. candida* individuals were noted with orange rust, but most were rust-free. Other *Salix* species also had some rust, but *S. serissima* appeared to be the most affected. Many branches of *S. serissima* were observed in July 2005 that had started the season with living leaves that were now dead. Willow borer larvae were observed in freshly broken off stems of *S. serissima* and *S. candida* individuals. In September 2005, dead branches were most obvious on *S. serissima* and *S. candida*, but other *Salix* species also had dead branches.

Middle Boxelder Creek occurrence – The majority of *Salix* spp. individuals, including *S. serissima*, did not look healthy in July 2005. There were many dead stems (willow borer larvae visible in the bases of some dead branches) that looked like they had been alive earlier this season (i.e. branches had reddish bark and were still pliable). In September 2005, there was very little rust present on *Salix* spp., including *S. serissima*. There were a couple *S. serissima* individuals with heavy rust but the rest had very little. Also in September 2005, livestock were observed in and around the wetland. Trampling and browsing of *Salix serissima* plants as well as habitat was observed.

Nahant occurrence – No rust, willow borer, livestock grazing, or other damaging agent appeared to impact *S. serissima* individuals or other *Salix* spp. in the occurrence.

Silver Creek occurrence – No rust was observed on *S. serissima* or other *Salix* spp. in July 2005 or September 2005. One of the 6 individuals had about 50% bare branches, some obviously dead. Branches with leaves appeared to have healthy fruit. A willow borer hole was visible at the base of one of the dead branches. Livestock were in and around *S. serissima* in September 2005. Trampling and browsing of *Salix* spp, including *S. serissima*, was observed. Livestock trails were evident, new since July, and some areas were trampled to bare ground.



SANGUINARIA CANADENSIS (BLOODROOT)



Photo by BHNF staff at *Sanguinaria canadensis* site SACA13-2 on May 19, 2005. Individual coming up in part of site burned by Camp 5 Fire in April 2005.

Sanguinaria canadensis, occurring in the northern/northeastern Black Hills, is one of the most abundant R2 sensitive plant species on Black Hills National Forest. There were 22 known occurrences of bloodroot on Black Hills National Forest lands at the time that a recent species assessment was written (Hornbeck et al. 2003). *Sanguinaria canadensis* occurs in hardwood forests, shrub thickets and floodplain habitats. The species is considered secure on the forest at this time. However, due to limited potential habitat and the situation that a number of sites have characteristics lending themselves to an increase in invasive plant species, weeds and their treatment have been identified as a risk to *S. canadensis*. Persistence of *S. canadensis* on Black Hills National Forest is not currently considered at risk from livestock grazing because nine sites are currently not grazed and one site is not accessible to livestock. Timber harvest is generally not deemed a persistence risk to *S. canadensis* because occurrences are currently being avoided or mitigated, or vegetative treatments may be designed to benefit the species. Collection (or illegal *S. canadensis* harvest) is not currently an issue in the Black Hills. However, due to the value of *S. canadensis* as a medicinal herb and experiences with over-collection in other parts of the country, harvesting is a risk. If it were to occur, collection of *S. canadensis* could be detrimental to the population in the Black Hills.

Black Hills National Forest's approach for monitoring *Sanguinaria canadensis* to answer questions on species persistence involved selecting core occurrences using four criteria: size (estimated number of individuals), geographic distribution of the occurrence, potential risk from livestock grazing, and community type. The largest estimated number of individuals observed at a given site was a primary factor used in delineating potential core occurrences. To incorporate geographic distribution, sites widely distributed from one another were selected over sites in close proximity to other occurrences. Sites in allotments currently not being grazed were selected over sites grazed by livestock. Finally, the selection of core sites included at least one in each vegetative community type that is associated with occurrences of *S. canadensis*. Based on these criteria, 10 core occurrences were selected. Of these 10 occurrences, four were designated as key, that is, occurrences of over 1,000 individuals deemed most critical to maintaining the metapopulation of *S. canadensis* on the Black Hills National Forest. Based on what Black Hills National Forest has learned regarding persistence of *Sanguinaria canadensis* from monitoring during the recent series of dry years (for example, a number of occurrences have been determined to be larger than originally documented; in one case, an occurrence was determined to be on private land), the monitoring design was modified to include nine core occurrences for monitoring rather than 10. The original four key occurrence locations for monitoring were retained.

The second aspect of the original monitoring design is to provide data on the extent of occurrences of

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Sanguinaria canadensis on all nine designated core sites and a reassessment of the status of each occurrence during a drought year. The assumption was that the high numbers of plants (recorded as categorical estimates) observed in 2001 were partially the result of several years of above-average precipitation. By documenting the size and extent of *S. canadensis* occurrences during dry years, it is hoped that data to support a better understanding of the role precipitation levels play in the distribution and abundance of *S. canadensis* will be generated. Any changes in the occurrence boundaries, evidence of plant collection or the presence of invasive or noxious plant species is documented during site revisits.

The third aspect of the monitoring design is to assess any additional changes in the extent of occurrences of *Sanguinaria canadensis* following a second consecutive dry, or below-average, precipitation year. Information on the extent and change of occurrences of *S. canadensis* following two drought years is critical to consider in reassessing the current monitoring strategy. Information on the extent of occurrences in both wet and dry years is expected to provide valuable data for re-examining, and potentially changing, the monitoring plan.

As in recent years, the 2005 monitoring design involved assessing the status of the four key occurrences. The monitoring was designed to address three questions: 1) is the species present?; 2) is there evidence of plant collecting?; and 3) are there invasive plant species present in occurrences? Although the monitoring focuses on the presence or absence of a given occurrence, a categorical estimate of each occurrence is recorded.

Key monitoring sites for *Sanguinaria canadensis*:

1. *S. canadensis* site # SACA13-1 (District number 99004; False Bottom site)
2. *S. canadensis* site # SACA13-2 (District numbers 99007 & 99008; Lost Gulch/Pillar Peak Allotment site)
3. *S. canadensis* site # SACA13-3 (District numbers 94011 & 94018; Meadow Creek site)
4. *S. canadensis* site # SACA13-14 (Park Creek site)

Core monitoring sites for *Sanguinaria canadensis*:

5. SACA13-4 (District number 93003)
6. SACA13-5 (District number 93004)
7. SACA13-6 (District number 95022) – [see below: joined in 2005 with SACA13-2 and monitored as one site]
8. SACA13-7 (District number 94BC1) – [see below: not on BBNF land, dropped from monitoring in 2004 and 2005]
9. SACA13-9 (District number 93002)
10. SACA13-10 (District number 94BC3)

2005 Monitoring Design and Results:

1. ***Annually monitor presence/absence of the 4 key sites. If relocated, collect data (5-page form) and gather GPS data at the endpoints if the site is large (over ½ acre) or collect GPS points if the site is less than ½ acre.***

Sanguinaria canadensis was present at all four key monitoring sites in 2005 (SACA13-1, SACA13-2, SACA13-3, SACA13-14). It will be informative to gather data in coming years on site SACA13-2 relative to response of SACA13 to fire. Some occupied habitat was burned by the Camp 5 Fire in April 2005, with SACA13 found sprouting in the burned area in May 2005. It is uncertain how factors like increased erosion due to lack of ground cover may impact SACA13 plants before post-fire vegetation establishes.

2. ***During a drought year, collect GPS data of the endpoints of all key and core sites. If any key or core sites are absent, select another known site to monitor. During the second drought year and beyond, monitor presence/absence at all key and core sites. During the second non-drought year gather GPS***

data of the endpoints of all key and core sites. After the second non-drought year reassess the monitoring plan to determine future needs.

2004 was a drought year. Core sites SACA13-4, -5, -6, -9 and -10 were monitored during 2004 and were present. GPS endpoints were collected

2005 was a drought year. Core sites SACA13-4, -5, -6, -9 and -10 were monitored during 2005 and were present. SACA13-6 was joined to SACA13-2 in 2005 as the sites were determined to be a continuous occurrence (i.e., SACA13-6 no longer exists). GPS endpoints were collected.

A new site (SACA13-8) was located in 2005 and baseline data collected.

Revisit in RMRS consultation for 2006 protocols if range of key and core sites is still adequate, considering two core sites have been changed/dropped (SACA13-6 absorbed into SACA13-2 and SACA13-7 not on BHNF land).

3. Document any weeds designated as noxious by South Dakota or Wyoming at the key monitoring sites. Document if the weeds are co-located with *Sanguinaria canadensis*, or at what distance the weed species is located away from the occurrence site if they are occupying the same ecological type.

SACA13-1 – *Tanacetum vulgare* (common tansy) and *Hypericum perforatum* (St. Johnswort) are very abundant in the drainage bottom and often extend up onto the benches where SACA13 occurs. Thick patches are scattered in the same ecotype as SACA13, within a couple feet of SACA13 plants. *Cynoglossum officinale* (houndstongue) is also present at the site.

SACA13-2 – *Centaurea maculosa* (spotted knapweed) present along the road; *Cynoglossum officinale* present within 1 ft of SACA13 plants; *Linaria dalmatica* (dalmation toadflax) occasional on road; *Tanacetum vulgare* present at the site.

SACA13-3 – *Tanacetum vulgare* abundant in the bottoms, also extending occasionally up onto the benches where SACA13 occurs. *Cynoglossum officinale* is scattered frequently throughout the site, found within one ft of SACA13 individuals.

SACA13-14 - *Cynoglossum officinale* and *Cirsium arvense* (Canada thistle) present at the site and co-located with SACA13. *Centaurea maculosa* present in the vicinity near roads and on beaver dams.

Noxious weeds are a growing concern in the key SACA13 sites. Phase II Amendment to the Black Hills LRMP directs through standards and guidelines that the forest noxious weed management program put a priority on controlling noxious weeds in R2 sensitive plant occurrences, treating R2 sensitive plant occurrences with the method of least risk to the R2 sensitive species (Standard 4304) and monitoring treatments as needed, particularly to determine if re-treatment is needed during the same season to be effective (Standard 4309).

Black Hills National Forest plant monitoring personnel will develop a prioritization plan for weed treatment in R2 sensitive plant occurrences in 2006 and interact with Black Hills National Forest district weed management personnel to design and implement noxious weed treatment in R2 sensitive plant occurrences, including the key SACA13 monitoring sites. Weed treatment itself will be an added risk to SACA13 individuals, so monitoring the success of weed treatment as well as possible impacts to the health/vigor of SACA13 sites will be critical to successfully developing an effective treatment that is conservative of SACA13 while reducing weed populations/sources. Possible impacts include direct effects from the tools chosen (i.e., handpulling (proper ID skills needed), chemical application, etc.) as well as the indirect effects from delivering the treatments (i.e., added trampling in and around the sites by personnel on foot and in vehicles, etc.).

4. Document any evidence of *Sanguinaria canadensis* collection at the four key monitoring sites.

There was no evidence of collection at any of the four key monitoring sites in 2005.

VIOLA SELKIRKII (SELKIRK'S VIOLET; GREAT-SPURRED VIOLET)



Photos by BHNH staff at *Viola selkirkii* site VISE2-13 on June 1, 2005. *Viola selkirkii* at left; burned habitat at VISE2-13 site at right (*V. selkirkii* plants growing by yellow bag).

At the end of the 2005 monitoring season, thirteen occurrences of *Viola selkirkii* are known to occur in four distinct watersheds in the Black Hills National Forest, within the Black Elk Wilderness and Norbeck Wildlife Preserve. Additional occurrences are known from Custer State Park and Mt. Rushmore National Memorial in the Black Hills. A 2003 late summer observation was made of a likely *V. selkirkii* occurrence (individuals estimated in the 500-1000 range) in the Upper Pine Creek Research Natural Area. The identification was confirmed in 2004 and it was noted that part of the occurrence was inside the Elkhorn Mountain Fire area. The occurrence was revisited in 2005 to begin observing longer-term impacts from the fire (if any). Because additional potential habitat is believed to occur in relatively remote areas of the Black Elk Wilderness, there may be additional occurrences of *V. selkirkii* yet to be discovered and documented.

On Black Hills National Forest, *Viola selkirkii* is relatively secure from most potential risks, with the potential exception of extreme climatic change. As of the end of the 2005 monitoring season, most of the known occurrences on Black Hills National Forest lands were not considered to be at risk from management activities (i.e. timber management and grazing is not currently occurring at known occurrences). However, one site was in an active zone of fuel reduction activity in 2005, with some individuals covered by slash piles. Due to expected severe impacts from pile burning to the ground and immediate vegetation, several of these piles were scattered and will not be burned. Other occurrences may be vulnerable to impacts from hikers and rock climbers in the future. In addition, invasion by noxious weeds or other invasive plant species and efforts to control them, and trampling or browsing by elk or mountain goats, or future fire suppression efforts, are potential risks at some sites. Naturally occurring periodic flooding may reduce the size and extent of some patches, but may create habitat for others.

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The monitoring strategy for this species on Forest Service land currently includes: 1) surveys for additional occurrences, 2) inventory of new and currently known occurrences on a periodic basis, and 3) annual monitoring of one of the three largest occurrences. The 2005 monitoring design included annual monitoring of the new Sunday Gulch occurrence. Potential survey sites include watersheds where the species is known to occur, as well as other high elevation watersheds with deep canyons and boreal vegetation. Surveys and monitoring occur during *Viola selkirkii*'s flowering period, which is generally from May 10 to May 30, when the species can most easily be identified.

The current monitoring design includes re-inventory of known Black Hills National Forest occurrences at least every five years (last done in 2003). In addition to periodic inventories, monitoring includes obtaining baseline data on known Black Hills National Forest occurrences during and following a drought cycle (or at least two consecutive years of below average precipitation). Occurrence numbers (recorded as categorical estimates) collected in 2000 and 2001 may be a reflection of a series of relatively wet years since 1996 (NOAA 1996-2001). Documenting relative number of individuals at the occurrences and extent of *Viola selkirkii* during dry years may provide insights into the role that precipitation plays in the distribution and abundance of this species. Finally, the monitoring design includes monitoring *V. selkirkii* sites that are affected by a fire or significant flood event.

The current protocol design included annual monitoring of "Violet Valley" in the Norbeck Wildlife Preserve. The "Violet Valley" site was selected because it is one of the three largest occurrences of *Viola selkirkii* on Black Hills National Forest lands, it is relatively accessible, and it has the largest combination of potential risks from hikers, elk, random stochastic events (i.e. wildfire, flooding), and invasive plant species (includes noxious weeds). Annual monitoring of the Sunday Gulch occurrence was included in the 2005 protocol design because of the combination of potential risks associated with powerline activities and potential human trampling disturbances. Although no weeds were observed at the Sunday Gulch site, there is potential for increase in invasive plant species. Further, because these are two of the lowest elevation sites, it is likely that any declines associated with drought conditions would occur here before they would occur at higher elevations. For the 2005 monitoring design, "Violet Valley" and Sunday Gulch locations were to be used as triggers for determining if additional occurrences should be monitored. The decision for additional monitoring was based on whether there was an absence of one or more of the four largest sub-occurrences (there are nine distinct sub-occurrences) at the "Violet Valley" site, or the absence of one of the two sub-occurrences at the Sunday Gulch site. If any were absent, an effort was to be made to document the reason (that is, drought, elk, weeds, etc.) and two additional *V. selkirkii* occurrences selected to monitor based on the cause of the disruption and current information on known risks to other sites.

2005 Monitoring Design and Results:

1. On an annual basis, monitor presence/absence of the four largest sub-occurrences at site number VISE2-2, "Violet Valley" and the two sub-occurrences at VISE2-11, Sunday Gulch. If one or more of the four largest sub-occurrences at "Violet Valley" or one of the two sub-occurrences at Sunday Gulch are not present, document the reason (i.e. drought, elk, noxious weeds) if it can be determined. Select two other sites in other drainages to monitor presence/absence to determine if other populations are being affected in the same way.

[The Monitoring Design also includes re-inventory of known Black Hills National Forest occurrences at least every five years, and to sample all known sites in the same year. In addition to periodic inventories, monitoring includes obtaining baseline data on known Black Hills National Forest occurrences during a drought cycle. The five year re-inventory and drought year baseline data collection occurred during the 2003 monitoring season.]

Monitoring of *Viola selkirkii* at site number VISE2-2, "Violet Valley" occurred on May 18, 2005. The four largest sub-occurrences were present.

Monitoring of *Viola selkirkii* at site number VISE2-11 (Sunday Gulch) occurred on May 27, 2005. Both sub-occurrences were present as well as individuals and patches between the sub-occurrences, extending into Custer State Park.

2. Document any weed designated as noxious by South Dakota or Wyoming. Document if the weeds are co-located with *Viola selkirkii* or at what distance the weed species is found from the occurrence site.

In the VISE2-2 site, *Cirsium arvense* (Canada thistle; SD and WY noxious weed) was observed on May 18, 2005 to occur in small patches approximately 10 ft from *Viola selkirkii* individuals (based on identification of weed material left from last year). Other invasive plant species observed occurring in the same ecotype were *Cirsium vulgare* (bull thistle; within 5 ft of *V. selkirkii* plants) and *Caragana arborescens* (Caragana; adult plants scattered throughout the drainage; new plants becoming established). The Caragana was reported to Hell Canyon Ranger District staff in 2004 and treatment is on their list of projects, but it didn't appear in 2005 that any work had been accomplished.

In the VISE2-11 site, no noxious weed species (SD or WY) were observed May 27, 2005. Invasive plant species observed included *Taraxacum* spp. (dandelion) and *Trifolium* spp. (red and/or white clover). These species were more abundant on the east side of the creek near the cabin than on the west side of the creek.

In the VISE2-13 site, several invasive plant species were observed on June 1, 2005 in the same ecotype as *V. selkirkii*, including:

- a) *Cirsium arvense* (Canada thistle; SD and WY noxious weed). A few *C. arvense* were found on the edge of the burned area, some intermingled with *V. selkirkii* individuals. *Cirsium arvense* occurs upslope from the large *V. selkirkii* patches, so there is high potential for the species to spread down-drainage into the site. Observers spent time handpulling all the small *C. arvense* plants that could be spotted.
 - b) *Verbascum thapsus* (common mullein; invasive species). Several plants were observed approximately 20 ft from *V. selkirkii* plants. Dense patches of *V. thapsus* were observed in the fire area, which will provide a ready seed source to the occurrence site.
- and
- c) *Cirsium vulgare* (bull thistle; invasive species). A few rosettes were found in the occurrence area, approximately 20 ft from *V. selkirkii* plants.
3. On any currently known *Viola selkirkii* site that is affected by a flood or fire event, monitor for presence/absence.

Site VISE2-13 (which was partially burned in the Elkhorn Mountain Fire of October 9, 2003) was revisited and observed on June 1, 2005. *Viola selkirkii* is very dense in areas. It does not appear that the site was adversely affected by the direct effects of the fire. Most plants occur out of the actual burned area, but several plants were observed coming up in the burned area (> 50 plants). No abnormal flooding was apparent, but the nature of the site (e.g., loose soil, burned area, lots of gullies for runoff) appears conducive to a possible flooding event. Several invasive plant species (discussed above) were found in the same ecotype as *V. selkirkii*, appeared likely to be an indirect effect of the disturbance caused by the fire due to the frequent patches of these species in the surrounding burned area.

No other occurrences were known to be affected by a flood or fire event prior to the monitoring period. No flood or fire disturbances were observed at any of the *V. selkirkii* sites monitored in 2005.

Species in preparation for protocol development: collecting baseline data

In general, as identified in the designs, the main focus for the 2005 monitoring season was to attempt to relocate a number of the previously reported locations of the following species. Plans included the gathering of baseline data and assessing risks at occurrences that were relocated.

Botrychium campestre (PRAIRIE MOONWORT; IOWA MOONWORT)



Photographs by BHNF staff of *Botrychium campestre* at BOCA5-1 site on left; site view of BOCA5-1 on right (both taken May 26, 2005).

Botrychium campestre was confirmed in March 2006 (through genetic analysis by Dr. Don Farrar, Iowa State University) to occur on the Black Hills National Forest at two locations (one in previously known *B. lineare* site BOLI7-1 in the Bearlodge Ranger District in Wyoming and one at new location in Hell Canyon Ranger District in South Dakota). Two locations were also found and confirmed by Dr. Farrar in Wind Cave National Park (one location with *B. lineare* as well as *B. campestre*). Baseline data were gathered at sites in 2005. As with other *Botrychium* species, dry conditions are expected to limit the emergence of aboveground stems and individuals may not emerge during a succession of dry or drought years.

2005 Monitoring Design and Results:

1. Continue to gather annual data at occurrences on Black Hills National Forest. Gather baseline data on any new occurrences that may be located. Assess risks to those sites.

BOCA5-1: The site was discovered and baseline data collected on May 26, 2005. Genetic analysis confirmed in March 2006 that *Botrychium campestre* is present at this site as well as *B. lineare*. It is unknown what percentage of the individuals present is *B. campestre* and what percentage is *B. lineare*. The site is in a small meadow with *Schizachyrium scoparium* (little bluestem) and *Symphoricarpos occidentalis* (western snowberry). Part of the site is on Black Hills National Forest and part is on private land. The site has experienced little to no grazing by livestock in recent years since it is isolated from the rest of the allotment by steep, rocky topography.

BOLI7-1: The site was visited on May 28, 2005. Genetic analysis confirmed in March 2006 that *Botrychium campestre* is present at this site which has been known on Black Hills National Forest since 2003 an occurrence of *B. lineare*. The site is on an old, native surface roadbed with low canopy cover. Livestock grazing occurs at the site.

Two additional sites with *Botrychium campestre* were discovered in Wind Cave National Park in 2005. One site is large (approximately 1,000 individuals) and was confirmed to include both *B. campestre* and *B. lineare* individuals.

Potential risks to *B. campestre*/*B. lineare* at the known locations on Black Hills National Forest, as determined through discussion with Dr. Farrar, could include succession of the sites to later vegetative successional stages, changes to the hydrology of the sites, noxious weed invasion, or alterations from the small amounts of

low level of disturbances currently existing at the sites.

2. Document any weeds designated as noxious by South Dakota or Wyoming. Document if the weeds are co-located with *Botrychium campestre* or at what distance the weed species is located away from the occurrence site if they are occupying the same ecological type.

BOCA5-1: No noxious weeds present in the site; *Bromus inermis* (smooth brome) is present along the roadside but decreasing into the site.

BOLI7-1: *Cynoglossum officinale* (houndstongue) and *Tanacetum vulgare* (common tansy) were observed to be occasional in the same ecological type as *Botrychium campestre*. It is difficult to identify and characterize weed presence accurately at the early date this site was visited in 2005.

BOTRYCHIUM LINEARE (NARROWLEAF GRAPEFERN; SLENDER MOONWORT)



Photographs by BHNH staff of *Botrychium lineare* at BOCA5-1 site on left; site BOLI7-2 on July 28, 2005 after Cement Fire on right.

Botrychium lineare was determined in December 2003 to occur on the Black Hills National Forest at a single location in the Bearlodge Ranger District in Wyoming. Three new locations were found in 2005 – one in Bearlodge Ranger District in Wyoming, one in Hell Canyon Ranger District in South Dakota, and one in Wind Cave National Park (South Dakota). (Note: all identifications have been confirmed by genetic analysis by Dr. Don Farrar, Iowa State University).

Baseline data were gathered at sites in 2003, 2004, and 2005. As with other *Botrychium* species, dry conditions are expected to limit the emergence of aboveground stems and individuals may not emerge during a succession of dry or drought years.

2005 Monitoring Design and Results:

1. Continue to gather annual data at the occurrence on Black Hills National Forest. Gather baseline data on any new occurrences that may be located. Assess risks to those sites.

BOLI7-1: Baseline data were collected on June 7, 2004. A revisit was made and data collected on May 28, 2005. Eleven plants were found in 2005 compared to 31 in 2004. The plants and site in general appeared much earlier phenologically in 2005. One benefit of the early visit was confirmation that some of the

Botrychium spp. at the site are *Botrychium campestre* (see discussion above).

BOLI7-2: The site was discovered and baseline data collected on May 29, 2005. A sterile hybrid of *Botrychium lineare* and an unknown *Botrychium* species was discovered near the drainage bottom below the BOLI7-2 site in 2004. The *B. lineare* individuals were found in 2005 up an old, native-surface roadbed about 20 yds. When the Cement Fire occurred in late July 2005, the old roadbed was bulldozed for a fireline. Pin flags left at the location of individuals were still visible, but considerable change has occurred to the immediate site (due to vehicle use on the roadbed) and the surrounding habitat (fire burned the ponderosa pine communities on both sides of the road. The road was not seeded and barriers put back in place at top and bottom of the road to close off vehicle traffic. The site will be revisited in 2006 to try and determine if *B. lineare* has persisted.

BOCA5-1: The site was discovered and baseline data collected on May 26, 2005. Genetic analysis confirmed in March 2006 that *Botrychium lineare* is present at this site as well as *B. campestre*. See site description above under *B. campestre* discussion. It is unknown what percentage of the individuals present is *B. campestre* and what percentage is *B. lineare*.

One additional site with *Botrychium lineare* were discovered in Wind Cave National Park in 2005. The site is large (approximately 1,000 individuals) and was confirmed to include both *B. campestre* and *B. lineare* individuals. It is unknown what percentage of the individuals present is *B. campestre* and what percentage is *B. lineare*.

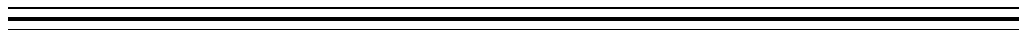
Potential risks to the *Botrychium lineare/B. campestre* at the known locations on Black Hills National Forest, as determined through discussion with Dr. Farrar, could include succession of the sites to later vegetative successional stages, changes to the hydrology of the sites, noxious weed invasion, or alterations from the small amounts of low level disturbances currently existing at the sites.

3. Document any weeds designated as noxious by South Dakota or Wyoming. Document if the weeds are co-located with *Botrychium lineare* or at what distance the weed species is located away from the occurrence site if they are occupying the same ecological type.

BOLI7-1: *Cynoglossum officinale* (houndstongue) and *Tanacetum vulgare* (common tansy) were observed to be occasional in the same ecological type as *Botrychium lineare*. It is difficult to identify and characterize weed presence accurately at the early date this site was visited in 2005.

BOLI7-2: Occasional *Cynoglossum officinale* in the site, located 7 ft. from *B. lineare* individuals.

BOCA5-1: No noxious weeds present in the site; *Bromus inermis* (smooth brome) is present along the roadside but decreasing into the site.



CYPRIPEDIUM PARVIFLORUM (LESSER YELLOW LADY'S SLIPPER)



Photo by BHNF staff at *Cypripedium parviflorum* site CYPA19-17 on June 20, 2005.

Cypripedium parviflorum was designated as a Region 2 sensitive species in December 2003. A minimum of 50 occurrences are located on the Black Hills. Based on an assessment in 2003 and some recent evaluations completed for this species, the total number of sites reported varies widely from greater than 50 to approximately 100 occurrences. The variability in numbers is largely the result of different ways sites have been documented in the field. It may be that a number of adjacent smaller sites are actually portions of larger occurrences.

Reports prior to the 2005 monitoring season indicate that *Cypripedium parviflorum* is primarily associated with mesic conditions on limestone rock outcrop areas, often on north-facing slopes, and on mesic to saturated conditions in and adjacent to riparian areas. The species is widely dispersed geographically across the northern and central Black Hills and is likely under-reported because it has not been targeted for survey until recently.

Cypripedium parviflorum is easily identifiable during its flowering period. Individuals flower as early as late May at lower elevations, and in early July at higher elevations. Seed structures and leaves can also be used to identify this species, primarily during July and August.

2005 Monitoring Design and Results:

1. Relocate at least ten geographically spaced occurrences of the previously reported locations (or a combination of previously located sites and newly located sites) when the plant is most identifiable (primarily during the flowering period) and gather baseline data. Assess risks to those sites.

Baseline data were collected for eight sites in 2005. These sites are a combination of previously reported sites and new locations.

Occurrences ranged in size from 5 to 189 individuals. The only risk common to all occurrences was invasive plant species. Several sites were observed to have noxious weeds co-located with *Cypripedium parviflorum* – mainly *Cynoglossum officinale* (houndstongue). See Item 3 below for more details.

Two occurrences are in Dugout Gulch Botanical Area. Livestock were observed grazing in the botanical area during survey. One occurrence is not accessible to livestock due to a rock ledge below the occurrence. The second occurrence is not in preferred habitat for livestock, but is accessible and in the drainage bottom.

Two occurrences are near recreational trails (Centennial Trail and Dugout Gulch Botanical Trail). However, the thick vegetation of the occurrences discourages any off-trail exploration in the occurrence areas. The risk from recreation impacts is low.

Other risks observed as low include: ATV use; proximity to roads; nearby dumpsite for household materials used in the recent past; and steep slopes/erosive soils (making site impacts from even simple monitoring unavoidable).

2. Document any evidence of collection at any of the sites.

There was no evidence of collection of *Cypripedium parviflorum* individuals at any sites observed in 2005.

3. Document any weeds designated as noxious by South Dakota or Wyoming or other exotic plants known to be invasive. Document if the invaders are co-located with *Cypripedium parviflorum*, or at what distance the weed species is located away from the occurrence site if they are occupying the same ecological type.

CYPA19-13 – No noxious weeds in the site. *Tanacetum vulgare* (common tansy) and *Cynoglossum officinale* (houndstongue) abundant in the drainage bottom.

CYPA19-14 – *Cynoglossum officinale* scattered in the vicinity, within 5 m in the same ecotype.

CYPA19-16 – *Cynoglossum officinale* and *Verbascum thapsus* (common mullein) scattered occasionally in bottom close to the same ecotype, within 7 m of *Cypripedium parviflorum* individuals.

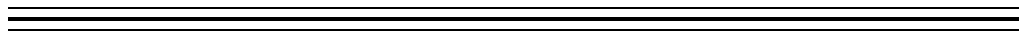
CYPA19-17 – No noxious weeds in the site. *Tanacetum vulgare* is common along the creek.

CYPA19-18 – *Cynoglossum officinale* is very abundant in the area and co-located with *Cypripedium parviflorum*. *Bromus inermis* (smooth brome) is in the same ecotype as *C. parviflorum*, within 3 m of plants.

CYPA19-19 – No noxious weeds in the site. *Cirsium arvense*, *Cirsium vulgare*, and *Cynoglossum officinale* are scattered up the drainage from the site, within 50 m in the same ecotype as *Cypripedium parviflorum*.

CYPA19-20 – *Cynoglossum officinale* is scattered in the same ecotype as *Cypripedium parviflorum*. *Cirsium arvense*, *Arctium minus* (lesser burdock), *Leucanthemum vulgare* (ox-eye daisy), *Linaria vulgaris* (yellow toadflax), *Tanacetum vulgare*, and *Verbascum thapsus* in the drainage bottom in different ecotype.

CYPA19-21 – *Cynoglossum officinale* is abundant in the drainage bottom and co-located with *Cypripedium parviflorum*. *Arctium minus* is in same ecotype within 7 m of *C. parviflorum* plants.



VIBURNUM OPULUS VAR. *AMERICANUM* (AMERICAN CRANBERRYBUSH; Highbush Cranberry)



Photo by BHNF staff at *Viburnum opulus* var. *americanum* site VIOPA2-15 on June 22, 2005.

Prior to the 2005 season, there were more than 30 occurrences of *Viburnum opulus* var. *americanum* reported on the Black Hills National Forest. Approximately 80 percent of the Black Hills National Forest occurrences were reported in 2002 and 2003. Known locations are geographically dispersed and are located in at least ten sixth level watersheds in the Northern Hills in South Dakota and Wyoming (Lawrence, Meade, Pennington and Crook counties). There are reports of this species from private land in the Black Hills as well. Van Bruggen (1996) stated that *V. opulus* var. *americanum* was frequent in rich wooded ravines in the Black Hills, but this has not been substantiated to date in Black Hills National Forest monitoring. This shrub species is often intermingled with a number of other shrub species in dense thickets. Unless the species is specifically targeted during surveys, there are times when it would likely not be noticed in high density thickets. Many thickets are so dense they are basically impenetrable; it is likely that the numbers of individuals reported at occurrences is a conservative number.

2005 Monitoring Design and Results:

1. Relocate at least ten geographically spaced occurrences of the previously reported locations (or a combination of previously located sites and newly located sites) when the plant is most identifiable (during the flowering period) and gather baseline data. Assess risks to those sites.

Baseline data were collected for five locations: VIOPA2-15, VIOPA2-17, VIOPA2-19, VIOPA2-21, VIOPA2-23. These sites were previously located in botanical surveys. Thirty individuals were found in one site (VIOPA2-23), but the other sites contained very small numbers of plants (VIOPA2-15: 1 plant; VIOPA2-17: 3 plants; VIOPA2-19: 2 plants; VIOPA2-21: 3 plants).

Insect predation (holes in the leaves) was observed at four of the five occurrences. Greater percentages of leaf damage were reported at sites visited in middle and late July, compared to sites visited in late June or early July.

Noxious weeds were documented in three of the five sites. See Item 2 below for more information.

One occurrence is in Dugout Gulch Botanical Area and one occurrence is in Higgins Gulch Botanical Area. Livestock were observed grazing in Dugout Gulch botanical area during survey. The occurrence is not in preferred habitat for livestock, but it is accessible. The occurrence in Higgins Gulch Botanical Area is near the edge of the botanical area. The occurrence is not in preferred habitat for livestock; foot travel is difficult in the drainage due to high density of shrubs and downed trees. Risk of livestock grazing to these occurrences is currently low.

Risks documented at other sites include: individuals located below a powerline and potentially subject to thinning

activities, and wildlife and livestock trails adjacent to plants.

2. Document any weeds designated as noxious by South Dakota or Wyoming or other exotic plants known to be invasive. Document if the invaders are co-located with, *Viburnum opulus* var. *americanum* or at what distance they are located away from the occurrence site if they are occupying the same ecological type.

VIOPA2-15 -- No noxious weeds in the site.

VIOPA2-17 -- *Cynoglossum officinale* (houndstongue) in same ecotype within 20 m of *Viburnum opulus* var. *americanum* plants. *Leucanthemum vulgare* (ox-eye daisy) and *Verbascum thapsus* (common mullein) scattered in same ecotype but across the drainage (ca 50 m from *V. opulus* var. *americanum*).

VIOPA2-19 – *Cynoglossum officinale* is in the same ecotype within 5 m of *Viburnum opulus* var. *americanum* plants.

VIOPA2-21 – No noxious weeds in the site.

VIOPA2-23 – One *Verbascum thapsus* plant was present in the site (and removed).

Monitoring Item 18b: Emphasis Species - Sensitive Species (Wildlife)

Objective 221. Conserve or enhance habitat for R2 sensitive species and species of local concern (SOLC). Monitoring will be conducted at a Forest-wide level, not at the project level, and will be done for habitats or populations.

Objective 221 is applicable to all sensitive species. There are two other types of objectives that are relevant to some, but not all, sensitive species. The first types are species-specific objectives that are directly applicable to one or more species (e.g., Objective 237 for prairie dogs). These are evaluated below under the appropriate species headings. The second type of objectives are not specific to or in direct reference to sensitive species (e.g., vegetation Objectives 201 and 239-LVD), but are relevant habitat considerations for some sensitive species. Full evaluations of this last type of objectives are found under other monitoring items, but a summary may be provided below when appropriate.

Mammals -- American Marten

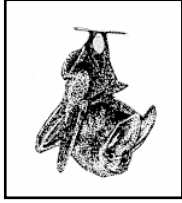


The American marten monitoring protocol focuses on the amount of preferred habitat. In the Black Hills, marten are highly associated with white spruce forests, and this is considered preferred habitat.

Amount of Preferred Habitat: As disclosed in monitoring item 8, the spruce covertime is found on 25,462 acres of the Forest. This is greater than what is called for in Objective 239-LVD (20,000 acres). In 1995, there were 21,737 acres of spruce, and in 1899, it was estimated at 15,000 acres (USDA Forest Service 1996). This indicates a long-term increase in spruce. Fire suppression during the last century has allowed spruce to increase in abundance and density in the Black Hills. Relative to ponderosa pine, spruce is patchily distributed and in low abundance (USDA Forest Service 2005 p. III-24).

It appears that the Forest is conserving habitat for the American marten.

Mammals -- Townsend's Big-eared Bat and Fringe-tailed Myotis



The sensitive bats monitoring protocol focuses on three items: protective measures, disturbance, and snags. Roost protection measures stem from Standards 3208 and 3209. Snag data are found in monitoring item 11, and correspond to Objective 211.

Protective Measures: There are three types of protective measures that are reported here: pre-closure mine evaluations, bat passage devices installed, and bat passage devices maintained. In 2005, six underground mines were closed, and all (100%) were evaluated for bat habitat prior to closure. Evaluations found that three of these (Juniper, Rubin, and Safe Investment #2) provided bat habitat. Bat passage devices (e.g., gates and grates) were installed at all of these, although more work remains at Juniper Mine. Bat passage devices were also installed at 2 other mines (Robin's Mine, Hutchin's Mine), but are reported separately because they were evaluated for closure in a previous year. Two passage devices were maintained (Erskine and Davenport caves); see disturbance section for more information.

Disturbance: Eight bat roosts and/or bat passage devices were monitored for signs of vandalism, incompatible uses, and non-compliance with established closure dates. Four showed varying levels of disturbance. One gate (Erskine Cave) had been dug under; this was repaired with a concrete plug. The lock at the Davenport Cave gate was destroyed and subsequently replaced with a better design. The gate at Runkle Cave had sticks and trees wedged through it, but there was no major damage to the structure. There is a high level of human use and disturbance inside the Juniper Mine. This mine has several portals, including one that had a bat passage device installed in FY05. More work is scheduled for the other portals, and until this is completed, bat habitat at this site remains at risk from human disturbance. The new bat grate had not been compromised when disturbance inside the other portals was noted.

The four sites monitored that showed no signs of disturbance were Igloo Cave, Aspen Sink, Bad Luck Cave, and Red Deer Mine. All of these are protected with bat passage devices.

Snags: If the Forest moves towards Objective 211, the fringe-tailed bat would likely benefit because this species uses snags for maternity roosts. Monitoring item 11 displays that in FY05, there were 1.8 snags per acre >9" dbh, and 0.4 snags per acre >14" dbh across the Forest (excluding large burned areas). Both of these figures are lower than called for under Objective 211 (3 and 0.75 snags per acre, respectively). However, when large burned areas and insect outbreaks are included, snag densities exceed Objective 211 (see monitoring Item #11). Snag densities range from 0 to 150 snags per acre. This means habitat conditions exist for bats in forested portions of the Black Hills.

The Forest is conserving and enhancing habitat for the Townsend's big-eared bat and fringe-tailed myotis through cave, mine and snag management.

Mammals -- Black-tailed Prairie Dog



Objective 237 prompts the Forest to manage for 200-300 acres of prairie dog towns in at least 3 separate towns. There are currently 10 known prairie dog colonies on the Forest, covering approximately 386 acres of NFS land. Total acreage of the colonies is larger when private lands are considered. Of the 10 colonies, three (Clifton, Norbeck and Pleasant Valley) were newly discovered in 2005. Two of these probably existed (undiscovered) prior to 2005. The third (Clifton) was a brand new colony that did not exist when field work was conducted after the Red Point Fire burned the area in 2003. Also noteworthy this year was that one colony (Bennett) was newly re-occupied after having no prairie dogs present since the town

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was discovered in 2002. No NFS lands were subject to prairie dog poisoning efforts in 2005.

The Forest is exceeding Objective 237 in both number of colonies and number of acres. This indicates that the Forest is conserving habitat for the black-tailed prairie dog.

Birds -- American Three-toed Woodpecker



There are two components to the three-toed woodpecker monitoring protocol: relative density of woodpeckers in white spruce (preferred habitat), and the amount of white spruce.

Relative Density in Preferred

Habitat: Relative density of this species is monitored through the Monitoring Birds of the Black Hills (MBBH) program. See

monitoring item 21 (Emphasis Species – MIS, Non-game Birds section) for more information

on MBBH. White spruce habitat was sampled in the MBBH program during 2005, as well as in 2001, 2002, and 2003. Estimated woodpecker densities have ranged from approximately 2-4 birds/km² (see chart). The species has also been detected in several of the remaining habitats sampled by MBBH, but spruce trees were either present or in close proximity. The habitats were: late successional, montane riparian, pine north, and aspen. As expected, detections were too infrequent in these marginal habitats to allow density estimates to be calculated.

Habitat	Estimated Relative Densities of Three-toed Woodpecker (birds/km ²)				
	2001	2002	2003	2004	2005
White Spruce	ID	1.8	3.64	NM	2.66
ID = Insufficient Data, NM = Not Monitored					

Amount of Preferred Habitat: As disclosed in monitoring item 8, the spruce covertype is found on 25,462 acres of the Forest. This is greater than the amount called for in Objective 239-LVD (20,000 acres). In 1995, there were 21,737 acres of spruce, and in 1899, it was estimated at 15,000 acres (USDA Forest Service 1996). Fire suppression during the last century has allowed spruce to increase in abundance and density in the Black Hills. Relative to ponderosa pine, spruce is patchily distributed and in low abundance (USDA Forest Service 2005 p. III-24).

It appears that the Forest is conserving habitat for the American three-toed woodpecker.

Birds -- Northern Goshawk



There are three components to the goshawk monitoring protocol: nest stand habitat, overall habitat diversity, and territory occupancy.

Nest Stand Habitat: This monitoring component measures the amount and trend of structural stages 4B, 4C, and 5 within designated goshawk nest stands. It will not be evaluated in this monitoring report, because designated nest stands have not been

entered into the corporate wildlife database yet, and are therefore not available in a format necessary for this type of analysis. When funding becomes available, nest stand boundaries will be obtained from the administrative records of district-level projects, and entered into the corporate wildlife database. A GIS analysis can then be performed to provide information for this monitoring component.

Habitat Diversity: This component refers directly to monitoring item 9 (Vegetative Diversity – Structural Stages). It provides a structural stage comparison between the current condition and the desired condition in ponderosa pine forests as defined in Forest Plan Objectives 4.1-203, 5.1-204, 5.4-206, 5.43-204, and 5.6-204.

As displayed in item 9, there is an overall surplus in structural stages 1, 4A, 4B, and 4C. All four of these stages provide foraging habitat, but 4B and 4C are also very important for nesting habitat. Having a large amount of habitat in these structural stages is probably beneficial to goshawks, assuming that they are well-distributed across the landscape. Item 9 reports deficits in structural stages 2, 3A, 3B, and 5. Again, all of

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these provide foraging habitat. Structural stage 5 (late succession) provides nesting habitat as well. A diversity of structural stages not only provides nesting and foraging habitat, but also ensures a variety of stages are available through time as forests change through maturation and disturbance processes.

There are both surpluses and deficits in stages that provide foraging habitat. This does not mean that there are no consequences to goshawk foraging opportunities. The main differences between the individual stages primarily relate to the diversity and abundance of prey species that the stages support. Goshawks forage on a wide variety of prey, and the current paradigm is that a well-balanced mix of stages would support the highest prey diversity and abundance, which would then be most beneficial to goshawks. The Forest should design vegetation treatments to achieve the Forest Plan structural stage objectives.

Occupancy: This component measures the presence of territorial goshawks within known territories. If a territory has territorial birds within it, it is said to be occupied. Some signs of territorial behavior are aggressiveness (e.g., vocalizations and physical movement toward surveyors), prey remains around nest sites, and molted feathers around nests. Territoriality is a good indicator that an established (capable of breeding) pair exists in an area, and is easier to detect than breeding status or nest success (Woodbridge and Hargis 2005). Therefore, territory occupancy is what the Forest evaluates to demonstrate persistence of breeding goshawks on the Forest.

In 2005, 53 goshawk territories were monitored by Forest biologists, including one that was newly discovered in 2005. Three additional territories were monitored through a program administered by the SDGFP. Of the 56 total territories, 23 (41%) were occupied. Goshawks were found present in three additional territories, but no strong evidence of territoriality was recorded, so they are not included in any analysis below.

The territory occupancy rate of 41% was higher than in any year between 2000 and 2003 (see FY 2003 monitoring report). The rate was not determined in 2004. In 1999, the rate was 58%, but that was based on a very small sample size (12 territories), which is likely too small to be reliable. In fact, Reynolds et al. recommend that 60-100 territories be monitored in order to provide reliable estimates. Woodbridge and Hargis disclose territory occupancy rates between 39% and 100% in two Western study areas from 1992 to 1996. This may suggest that the recent rates on Black Hills NF may be relatively low. However, the frequency and intensity of monitoring in those studies were much higher than what is performed in the Black Hills, which would lead to higher (and more accurate) occupancy rates. Forest Service monitoring in the Black Hills is typified by one or two visits to a subsample of nests each season, with each visit lasting less than one full person-day. Furthermore, goshawk territoriality and nest attempts show high annual variation, and may be closely tied to annual precipitation fluxes that affect prey abundance (Salafsky and Reynolds 2005). Therefore, drought conditions over the past several years may also be affecting goshawks.

Nesting attempts were recorded when encountered in 2005. Active nesting was confirmed in 16 (29%) of the 56 territories. This figure may have been higher if more monitoring visits to had been conducted at the individual territories; however, the FS protocol does not require this level of information. The protocol does not require data on nest success, either. However, the SDGFP reported that at least one young fledged from 5 of the 6 active nests that they monitored.

The Forest is conserving habitat for the northern goshawk, but progress toward achieving structural stage objectives is still needed.

Birds -- Rare Birds (Peregrine Falcon, Burrowing Owl, Flammulated Owl, Lewis's Woodpecker, Loggerhead Shrike, Northern Harrier, Yellow-billed Cuckoo

Each of the species included in this monitoring item are considered uncommon, rare, casual or accidental to the Black Hills (Tallman et al. 2002). The Forest uses incidental observations to track them. Incidental observations include data collected by through the *Monitoring Birds of the Black Hills* (MBBH) program. See monitoring item 21 (Emphasis Species – MIS, Non-game Birds section) for more information on MBBH.

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There were only two sensitive bird species confirmed in 2005: the Lewis's woodpecker and northern harrier. There were a total of 14 woodpeckers observed; most were within burns in the southwestern portion of the Forest (e.g., Jasper, Elk Mountain). These burns occurred primarily in the 1990's and early 2000's. This is consistent with reports from other literature that this species prefers older burns (Anderson 2003). The harrier was also seen in a burn (Jasper). The observation was in late August, and probably does not represent a resident bird.

A Forest Service employee reported seeing a peregrine falcon in August 2005, but it was not confirmed. It is possible that this was a valid identification of a peregrine migrating through the Black Hills. The Black Hills does not support a breeding or wintering population of peregrines, probably due to the highly forested nature of the region.

None of the other rare sensitive birds (burrowing owl, flammulated owl, loggerhead shrike or yellow-billed cuckoo) were recorded on the Forest in 2005.

The Forest appears to be conserving habitat for the Lewis's Woodpecker. There is no data to support an assessment for the other rare species.

Reptiles -- Black Hills Redbelly Snake



There are two indicators for the redbelly snake: trend of riparian habitat condition, and amount of hardwood habitats on the Forest. These indicators are in direct reference to monitoring items 6 and 8, respectively.

The protocol for item 6 was not implemented in 2005. However, an indicator different than any of those disclosed in the monitoring implementation guide was reported under item 6 of this report: projects that maintain or enhance riparian condition. This can also be used to partially indicate trend of redbelly snake habitat. According to monitoring item 6, there were seven projects implemented that improved a total of 54.5 acres of riparian habitats across the Forest in FY05. These projects have a positive influence on the habitat trend for Black Hills redbelly snake.

According to monitoring item 8, stands dominated by aspen currently occupy approximately 46,172 acres on the Forest. In 1995, they occupied 48,224 acres (USDA Forest Service 1996). This is a decline of 2,052 acres, or four percent. Aspen stands have been replaced by pine and spruce in many areas of the Forest, and may have declined since pre-settlement times (USDA Forest Service 2005, p. 111-28). This may have resulted in a net loss of redbelly snake habitat. Objective 201 calls for the Forest to double the number of aspen acres. The Forest should strive toward that objective in order to improve habitat for the redbelly snake.

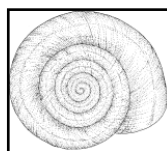
Amphibians -- Northern Leopard Frog



The leopard frog monitoring protocol calls for determining continued persistence at a rotating sample of 8 known occupied habitats (index sites) annually. The protocol was not funded in 2005. However, biologists did visit seven index sites (Ducks Unlimited Pond #1, Little Falls, Newton Lake, Roby Spring, Rudenvale, Slate Creek Dam, and Teepee Gulch). Leopard frogs were observed at all seven sites. An inspection was also conducted for the livestock enclosure fence at Rudenvale; the enclosure was functioning properly.

Limited data suggest that the Forest is conserving habitat for the leopard frog.

Invertebrates -- Cooper's Mountainsnail



The Cooper's mountainsnail monitoring protocol calls for monitoring 20% of all known (Frest and Johannes 2002) mountainsnail sites annually, and tracking newly discovered sites. The protocol was not funded in 2005. The following paragraphs represent the most current data as partly disclosed in the 2003 LMP monitoring report. Please see the 2003 report for

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additional details.

In 2002, the Forest received the final report from a contract to inventory and/or monitor 357 sites for land snails (Frest and Johannes 2002). Many of the sites had been surveyed in the early to mid 1990s, and some were re-visited in 1999 to help assess population changes. More than 100 new sites were inventoried for the first time. A total of 38 species were identified including 12 that were previously undocumented in South Dakota. The surveys also provided information on the Cooper's mountainsnail. Cooper's snail was found at 102 sites, including 61 sites that contain a morph of *Oreohelix* that Frest and Johannes (2002) propose be split from the Cooper's snail into its own species. Frest refers to this morph as *O. n. sp1*. However, because this proposal has not been accepted through a peer review process, and current taxonomic research does not support splitting the species (Anderson et al. 2006), the Black Hills National Forest currently recognizes only the one species (*Oreohelix strigosa cooperi*).

When comparing original survey data with data replicated in 1999, several noteworthy changes are revealed: (1) Cooper's snail was not resampled at five sites; (2) one site gained Cooper's snail; and (3) 42 sites surveyed for the first time in 1999 revealed Cooper's snail.

It appears the Forest is conserving snail habitat. Continued monitoring of known sites is needed. In particular, sites where the mountainsnail was not resampled in 1999 should be revisited to verify species absence.

Invertebrates – Regal Fritillary



The amount of grassland habitat on the Forest is the monitoring indicator for the regal fritillary. As disclosed in monitoring item 8, grassland covertypes are found on 109,841 acres of the Forest, excluding wetland graminoids such as sedges and rushes. Of this, 83,559 acres are considered prairie grasslands, which are more likely than the other category (meadows) to provide fritillary habitat. It is unlikely that all of the prairie grassland covertypes offer suitable habitat for the regal fritillary, but refined habitat associations are not known in the Black Hills. Due to differences in reporting methods, it is difficult to obtain a comparable estimate of grassland covertypes from previous years. The best fitting comparison is provided in monitoring item 8, where 104,174 acres of grasslands (all types, including meadows) were reported to be on the Forest in 1995. This five percent increase could be due to mapping and reporting differences, since the general perception among Forest employees is that grassland habitats have actually been declining due to pine encroachment. Projects across the Forest have been emphasizing meadow and grassland restoration through removal of pine encroachment. Some of this, particularly pine removal on the periphery of prairies, may contribute to habitat enhancement for the regal fritillary.

It appears that the Forest is conserving, and possibly enhancing habitat for the regal fritillary through meadow and grassland restoration projects. Better data on grassland associations, condition and trend is needed.

Sub-Item: Fish – Finescale Dace and Lake Chub

Monitoring:

Finescale Dace

No finescale dace populations historically or currently are documented on the South Dakota portion of the BBNF (Isaak et al. 2003). In the Wyoming Black Hills, finescale dace distribution is limited to the Redwater Drainage with the exception of Geis Irrigation Reservoir on Middle Fork Hay Creek.

The distribution and numbers of finescale dace in Wyoming have been influenced by past transplants (WGFD 1996). In June 1978, finescale dace were collected from Medicine Lake and from a beaver pond on the North Fork of Cow Creek and were transplanted to the following creeks in the Bear Lodge area (B. McDowell, WGFD 2004, pers. comm.). Numbers in parenthesis indicate the number of fish.

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Tent Canyon Creek (n = 74)
Ogden Creek (n = 49)

Richardson Creek (n = 24)
Lytle Creek (n = 124)

Cole Canyon Creek (n = 124)
North Fork Miller Creek (n = 303)

Follow-up sampling in 1979 recaptured finescale dace in Tent Canyon, Richardson, Cole Canyon, and both forks of Lytle Creek.

Finescale dace were first documented in Hemler Reservoir during a chemical treatment in 1976. A large population was found in the reservoir during sampling in 1979 (B. McDowell, WGFD 2004, pers. comm.). Finescale dace were transplanted from Ogden Creek into Hemler Reservoir in 1982 and have been recorded in sampling since that time. Finescale dace were transplanted from Ogden Creek to Sand Creek in 1982, but this transplant was unsuccessful. Geis Irrigation Reservoir, located on Middle Fork Hay Creek and immediately downstream of the BHNF boundary, was stocked in 1983 with finescale dace from Hemler Reservoir.

Surveys in 1990 found finescale dace in very marginal habitat of decadent beaver ponds on Ogden Creek. Based on 1997 observations, populations of finescale dace persist in Richardson, Tent Canyon, Ogden, Rocky Ford, Cow, Redwater, and Spotted Tail creeks and Hemler Reservoir (WYNDD 2002). The relative abundance of finescale dace at these sites is generally rare with the exception of Hemler Reservoir, where this species was classified as common (WGFD 1996). Olson (1998) collected finescale dace with little effort in Hemler Reservoir and estimated the population as sizeable but did not collect this species upstream or downstream of the reservoir.

The WGFD sampled several stream sites on Cow Creek and Redwater Creek in 2003 but only found finescale dace in Hemler Reservoir where the population is thriving (B. McDowell, WGFD 2004, pers. comm.).

Isaak et al. (2003) speculated a general negative trend in stream habitat has occurred due to land use practices that probably lowered water tables along streams. This in combination with a reduced beaver population compared to historic abundance has decreased the amount of boggy, pond-like habitat preferred by this species. Dams, such as at Hemler Reservoir, fragment stream habitat but also provide standing water habitats favorable to finescale dace. The amount of habitat in Hemler Reservoir is dependant on environmental conditions, such as drought as well as human activities. Hemler Reservoir and the associated water rights are held under private ownership. The reservoir is affected by sediment input, dewatering for irrigation and stockwater use, but current conditions appear adequate to sustain a finescale dace population.

No new distribution, abundance or habitat data was collected in FY2005.

Evaluation:

Current distribution is sporadic and has been influenced by past transplantation efforts. Abundance is affected by natural events such as drought and presence of standing water habitat. This species' distribution and abundance will likely be improved by management efforts that enhance or create standing water habitat, such as beaver ponds, within the stream network.

Lake Chub

Historic accounts suggest the lake chub was more widely distributed across the Black Hills (Isaak et al. 2003). The only population of lake chub know to occur on the Forest is currently restricted to Deerfield Reservoir (Isaak et al. 2003), which impounds upper Castle Creek on the Mystic Ranger District.

Lake chub monitoring data has been collected by SDGFP on Deerfield Reservoir since 1994. The table below shows the number of lake chub collected and the Catch per Unit Effort (CPUE) based on gillnet sampling.

Gillnet sampling	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
# caught	N/A	N/A	N/A	15	155	55	11	6	4	3	1	2

CPUE*	114.3	105.5	109.0	3.8	38.8	13.8	2.8	1.5	0.6	0.8	0.3	0.5
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*Catch Per Unit Effort equals the number of fish caught per gillnet set overnight.

Source: SDGFP 2001 and SDGFP unpublished data

Water quality conditions in the reservoir appear suitable for lake chub based on the TSI or Trophic State Index (Carlson 1977). The TSI includes measures of Secchi depth (water clarity), chlorophyll-*a* concentrations, and total phosphorus. Deerfield Reservoir is fully supporting its assigned beneficial uses based on its mean TSI value (Stueven et al. 2000).

The deposition of sediments and the natural process of eutrophication will gradually decrease the amount of habitat available for lake chub. A 0.3 percent annual loss in reservoir volume due to sedimentation has been estimated (Piroutek 1991). The low rate of sedimentation was attributed to the small, vegetated drainage area with underlying rock formations resistant to erosion and the absence of large-scale agricultural activities or extensive development in the drainage.

Evaluation:

The lake chub population in Deerfield Reservoir is in a downward trend, but it is certainly greater than when the reservoir was chemically renovated in 1982 to reduce the white sucker population (Isaak et al. 2003). Reservoir conditions appear stable and suitable for lake chub in relation to TSI values. The downward population trend may be due to other reservoir conditions and/or interactions with other native or non-native aquatic species, but these relationships have not been studied.

Monitoring Item 19: Emphasis Species - Species of Local Concern

Objective 221. Conserve or enhance habitat for R2 sensitive species and species of local concern (SOLC).

Monitoring will be conducted at a Forest-wide level, not at the project level, and will be done for habitats or populations.

Mammals – Bats (Long-eared Myotis, Long-Legged Myotis, Northern Myotis, Small-Footed Myotis)



There are two monitoring indicators for the SOLC bats: roost protection measures, and availability of snags. Roost protection measures stem from Standards 3208 and 3209. Snag data are found in monitoring item 11, and correspond to Objective 211.

Protective Measures: There are three types of protective measures that are reported here: pre-closure mine evaluations, bat passage devices installed, and bat passage devices maintained. In 2005, six underground mines were closed, and all (100%) were evaluated for bat habitat prior to closure. Evaluations found that three of these (Juniper, Rubin, and Safe Investment #2) provided bat habitat. Bat passage devices (e.g., gates, grates, and small openings) were installed at all of these, although more protection work remains at Juniper Mine. Bat passage devices were also installed at 2 other mines (Robin’s Mine, Hutchin’s Mine), but are reported separately because they were evaluated for closure in a previous year. Two passage devices were maintained (Erskine and Davenport caves); see disturbance section under Sensitive Bats (monitoring item 18) for more information.

Snags: If the Forest moves toward meeting Objective 211, these two sensitive bats would likely benefit. Monitoring item 11 displays that in FY05, there were 1.7 snags per acre >9” dbh (>25’ tall), and 0.4 snags per acre >14” dbh (>25’ tall) across the Forest (excluding large burned areas). Both of these figures are lower than called for under Objective 211 (3 and 0.75 snags per acre, respectively). However, when large burned areas and insect outbreaks are included, snag densities exceed Objective 211 (See Monitoring Item #11).

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Snag densities range from 0 to 150 snags per acre. This means habitat conditions exist for bats in forested portions of the Black Hills.

The Forest is conserving habitat for the SOLC bats through cave, mine and snag management.

Mammals – Meadow Jumping Mouse



The jumping mouse protocol tiers directly to monitoring item 6: Riparian – Condition and Trend. The protocol for item 6 was not implemented in 2005. However, an indicator different than any of those disclosed in the monitoring implementation guide was reported under item 6 of this report: projects that maintain or enhance riparian condition. This can also be used to partially indicate trend of meadow jumping mouse habitat. According to monitoring item 6, there were seven projects implemented that protected a total of 54.5 acres of riparian habitats across the Forest in FY05. These projects may have a small positive influence on the habitat trend for meadow jumping mouse.

Limited data suggest that the Forest is conserving habitat for the meadow jumping mouse, but additional monitoring is needed.

Mammals – Northern Flying Squirrel



The flying squirrel monitoring indicator is the amount of preferred habitat. Preferred habitat is quantified in three ways: Acres of spruce cover type; acres of ponderosa pine in structural stage 5; and acres of ponderosa pine with very large tree size in structural stage 4C. These components tier directly to monitoring items 8, 9, and 10, respectively.

Acres of Spruce Covertype: Item 8 shows there were 25,462 acres of white spruce on the Forest in 2005. This is greater than what is called for in Objective 239-LVD (20,000 acres). In 1995, there were 21,737 acres of spruce, and in 1899, it was estimated at 15,000 acres (USDA Forest Service 1996). This indicates a long-term increase in spruce. Fire suppression during the last century has allowed spruce to increase in abundance and density in the Black Hills. Relative to ponderosa pine, spruce is patchily distributed and in low abundance (USDA Forest Service 2005 p. III-24).

Acres of Structural Stage 5 Pine Stands: Forest Plan Objectives 4.1-203, 5.1-204, 5.4-206, 5.43-204, and 5.6-204 guide the Forest to providing 5% of the pine in the five corresponding management areas in structural stage 5. These objectives were partly developed to ensure habitat for the flying squirrel. According to monitoring item 9, approximately 1,304 acres of structural stage 5 existed in FY05. This equates to .01% of the five management areas, which is far short of what is called for in the structural stage objectives. Forest-wide, the amount of structural stage 5 pine stands is 2,357 acres, or 0.2% of the Forest.

Acres of Very Large Structural Stage 4C Pine Stands: Forest Plan Objectives 4.1-203, 5.1-204, 5.4-206, 5.43-204, and 5.6-204 guide the Forest to providing 10% of the combined structural stage 4 pine acreage (i.e., 4A, 4B and 4C) within the five corresponding management areas to have an average tree size of “very large” (i.e., ≥ 16 ” dbh). These objectives were partly developed to ensure habitat for the flying squirrel. According to monitoring item 10, 68,954 acres (11%) of very large 4 pine stands existed in the management areas in FY05. Almost 7,800 acres of very large tree size are in structural stage 4C, which is nearly 8% of all 4C in the five management areas.

The Forest is conserving habitat for the northern flying squirrel, but considerable progress toward meeting structural stage 5 objectives is still needed to enhance habitat.

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Mammals – Ungulates (Rocky Mountain Bighorn Sheep, Mountain Goat)



The monitoring indicator for bighorn sheep and mountain goat are population estimates provided by the SDGFP. Both species are classified as big game animals by the state wildlife agency, and are hunted through a limited permit system.

The bighorn sheep is native to the Black Hills, but the original subspecies (Audubon's race) is no longer present here. The animals inhabiting the Forest today descended from introductions of the Rocky Mountain race (Higgins et al. 2000). In 2004, the bighorn sheep population estimate for the Forest (excluding Custer State Park) was 270 sheep (Huxoll 2005). An estimate is not yet available for 2005. The estimate in 2000 was 175-200 animals (Smith 2001), indicating there has been a population increase. The recent bighorn die-off from pneumonia that was observed in Custer State has not been recorded on the Forest.

Mountain goats are not native to the Black Hills, but were introduced in 1924 (Higgins et al. 2000). In 2004, the population estimate for mountain goats in the Black Hills was 125 animals. In 2000, the estimate was 140-180 animals, indicating there has been a recent population decrease. Hunter harvest has been very low for this species (i.e., less than 5 animals per year; Huxoll 2005), so this is not likely the cause of the decline. Classic mountain goat habitat includes rocky subalpine and alpine zones above treeline, which does not exist in the Black Hills. Here, the species is associated primarily with rocky areas in the Harney Range (southern Hills), where it feeds on chokecherry and a tree lichen called old-man's beard (Higgins et al. 2000). Optimal habitat may be limited for this species in the Black Hills.

It appears that the Forest is conserving habitat for the bighorn sheep. For mountain goats, the cause of the population decline is unknown, but potential causes range from genetics to habitat issues. The Forest should work with South Dakota Game, Fish and Parks to determine if a change in habitat management is needed.

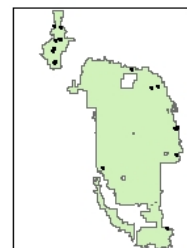
Birds – (American Dipper, Black-and-White Warbler, Broad-winged Hawk, Cooper's Hawk, Northern Saw-whet Owl, Pvgmy Nuthatch, Sharp-shinned Hawk)

All of these bird species are considered uncommon or rare in the Black Hills (Tallman et al. 2002), and are typically too difficult and/or expensive to effectively monitor. Because little data is better than no data, the Forest will monitor all of these species except the American dipper through incidental observations. Incidental observations include data collected through the MBBH program. See monitoring item 21 (Emphasis Species – MIS, Non-game Birds section) for more information on the MBBH program. Distribution maps provided below are a compilation of all incidental observations in the Forest's databases (i.e., MBBH and NRIS Fauna).



American Dipper: Although the dipper is uncommon, it is easier to monitor than the other SOLC birds because it has a limited distribution and is fairly conspicuous in its stream habitat. Its breeding distribution in the Black Hills (and all of South Dakota) is limited primarily to Spearfish and Whitewood Creeks. No breeding population exists in the Bearlodge Mountains. The SDGFP monitors dipper during the breeding season and during winter. In 2004, there were 31 known nesting attempts on Spearfish Creek, and 13 on Whitewood Creek. Nesting success was 38% and 69%, respectively. Breeding survey results are not available for 2005, but winter results are. Fifty dippers were observed along Spearfish Creek and its ice-free tributaries (Backlund 2006). Forest Service biologists participated in the winter surveys.

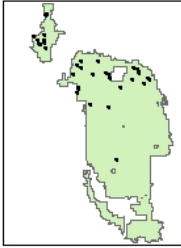
Black-and-White Warbler: This species has been observed on 26 occasions since the MBBH program began in 2001. Two additional records exist in the NRIS Fauna wildlife database. Approximately two-thirds of the warbler sites were within the Black Hills proper, and the remaining 1/3 were in the Bearlodge Mountains. The Black Hills observations were almost exclusively at low elevations near the periphery of the Hills; all were <4,700' asl (above sea level), and all but one were



Black-and-white Warbler Observations

Black Hills National Forest

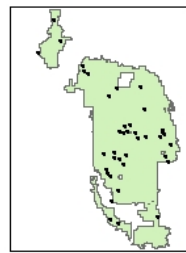
within two miles of the Forest boundary. The Bearlodge sites were typically higher in elevation (4400' to 5700' asl), and were not characteristically peripheral. Regardless of mountain range, most were in riparian zones and/or drainages. The vegetative composition of these habitats has not been analyzed, but it is suspected that bur oak, green ash, aspen, and other hardwoods are important, as is a dense understory of shrubs such as ninebark, chokecherry, hawthorn, and currants.



Broad-winged Hawk Observations

Broad-winged Hawk: This hawk is restricted primarily to the northern Black Hills and Bearlodge Mountains. It has been reported 52 times through the MBBH program, and there are three additional records in the NRIS Fauna wildlife database. Most (43 out of 52) of the MBBH detections occurred during 2004 and 2005. The MBBH observations have occurred most frequently in aspen (14) and riparian habitats (10), indicating that a deciduous tree component may be important. Late successional pine (13), pine north (6), white spruce (4), and burned habitats (2) also yielded broad-winged hawks. The only observations recorded in the southern Hills (2) were within the Jasper Burn.

Coopers Hawk: The Cooper's Hawk appears to be distributed through most of the Black Hills and Bearlodge Mountains, though it is fairly uncommon. There are 31 records of Coopers Hawk in the MBBH database, and 22 in the NRIS Fauna wildlife database. The MBBH program has recorded the species in all of the major habitat types, with no obvious affinity for any one. Other Forest records show a majority of observations in the central Hills, but this may be an artifact of data entry patterns into the corporate database.

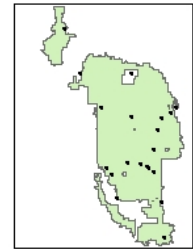


Cooper's Hawk Observations

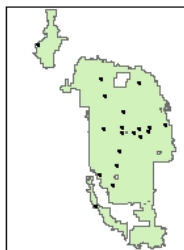


Northern Saw-whet Owl: There are few documented observations of the saw-whet owl on the Forest, mainly because of the bird's nocturnal habits. The saw-whet has been encountered four times by MBBH program surveyors, and two of these observations were not associated with any transect. However, according to Panjabi (2005), this species may be fairly common throughout most of the Black Hills forest types.

Pygmy Nuthatch: The pygmy nuthatch is a rare but regular and widespread resident in the Black Hills. There are a total of 23 pygmy nuthatch records in the MBBH and NRIS Fauna wildlife databases. The 10 MBBH observations occurred in pine north, pine south, shrubland, burned area, white spruce, and late successional habitats. There was no obvious preference for any one habitat.



Pygmy Nuthatch Observations



Sharp-shinned Hawk: The sharp-shinned hawk occurs throughout the Black Hills, but is perhaps the rarest of the three accipiters. There are a total of 31 records of the sharp-shinned hawk in the MBBH and NRIS Fauna wildlife databases. The 18 MBBH observations occurred in all habitat types except foothills riparian. There was no obvious preference for any one habitat.

Invertebrates – Butterflies (Atlantis Fritillary, Tawny Crescent)



The monitoring indicator for the Atlantis fritillary tiers directly to monitoring item 6, which is the trend of riparian condition. The protocol for item 6 was not implemented in 2005. However, an indicator different than any of those disclosed in the monitoring implementation guide was reported under item 6 of this report: projects that maintain or enhance riparian condition. This can also be used to partially indicate trend of Atlantis fritillary habitat. According to monitoring item 6, there were seven projects implemented that protected a

total of 54.5 acres of riparian habitats across the Forest in FY05. These projects may have a small positive influence on the habitat trend for the Atlantis fritillary.

Invertebrates – Snails (Callused Vertigo, Frigid Ambersnail, Mystery Vertigo, Striate Disc)

This monitoring protocol was not funded in 2005.

Monitoring Item 20: Emphasis Species – Threatened and Endangered Species

Objective 220. Conserve or enhance habitat for federally listed threatened, endangered and proposed species.

Threatened and Endangered Species



The bald eagle is the only threatened (T) or endangered (E) species with documented occurrence or suitable habitat in the Black Hills. Therefore, it is the only T or E species the Forest monitors.

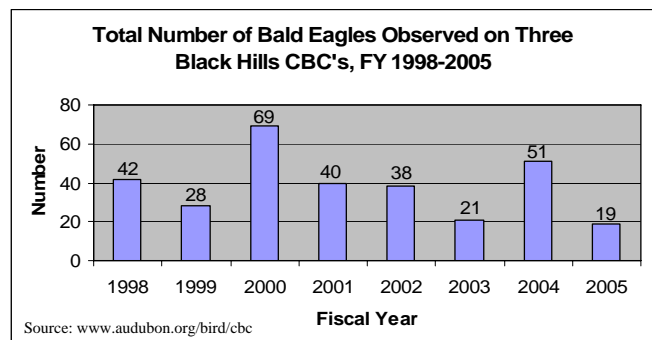
Bald eagles winter in and migrate through the Black Hills. From October through March, eagles can frequently be seen feeding on road-killed animals (carrion), perched near unfrozen lakes or streams, or soaring in the sky.

Prior to FY 2005, the Forest monitored wintering bald eagles by recording sightings during normal work activities (i.e., incidental observations). While this method showed that eagles consistently use the Black Hills in high numbers, it did not provide a standardized or consistent effort in quantifying eagle numbers. Therefore, beginning with the FY 2005 monitoring report, the Forest will use data collected through the Audubon Christmas Bird Count (CBC) program. This change is not reflected in the current monitoring guide; therefore a summary of the protocol is provided below.

The CBC program is coordinated by the National Audubon Society. Volunteers choose one day between December 14th and January 5th annually, and tally all individual and species of birds observed in their designated CBC circle on that day. The circles are 15 miles in diameter, with permanent center points. Although the location and general timing of the surveys remain constant, other factors do not, and are a source of variation to the data. This includes the number of participants, observer skill levels, and weather.

Three CBC circles have been consistently monitored in the Black Hills region since the current Forest Plan has been in place. These are Rapid City, Spearfish and Sturgis. The total number of eagles observed on these three CBCs during this time period is presented in the chart below.

The chart shows that the number of eagles observed varies from year to year, despite a reasonably consistent method of tracking them. In point, the last three years have produced among the highest and lowest numbers of observations recorded during the past 8 years. This could be interpreted as a varying (non-linear) trend, but could just be a reflection of other factors that affect eagle detection



or distribution, such as observer variability, the availability or distribution of carrion, or variability in weather conditions during the CBC counts.

In FY 2005, there were no known traditional (repeated use) or communal roost sites in the Black Hills. However, shortly after the year ended, a night roosting area was discovered at Pactola Reservoir. Approximately 18 – 22 eagles were observed at the roost on four separate occasions between late December 2005 and late January 2006. The roost covers at least 100 acres of mature to late-successional ponderosa pine forest on very steep slopes. Large trees and snags are abundant. Further monitoring of this roost is needed to clarify the full extent of the roost and its importance to bald eagles.

In addition to the roost described above, bald eagles are also known to use transitory roost sites on the Forest. These are roosts that are not used repeatedly or on a consistent basis, and may be chosen based on proximity to a temporary food supply (e.g., carrion). Mature ponderosa pine trees provide suitable roost sites, and they are abundant across the landscape. Therefore, transitory roost sites do not appear to be a limiting factor on the Forest.

No nesting attempts had been recorded in the Black Hills until 2004, when a pair of bald eagles tended a nest in the southern Black Hills (USDA Forest Service 2005). The eagles left the area later that spring without successfully nesting, and a subsequent attempt was not observed in 2005. Neither the contents of the 2004 nest nor the reasons for the failed attempt are known. The nest site was approximately ¼ mile outside the Forest boundary on a reservoir in Custer State Park. Due to the close proximity to the Forest and the unprecedented reproductive behavior, eagles observed on the Forest during spring will be evaluated for potential nesting activity.

Monitoring Item 21: Emphasis Species – Management Indicator Species

Objectives:

- 238. The following are objectives for management indicator species (MIS). MIS will be monitored using trends in habitat; however, when available, population trends may be used as a strong indicator of management response. Monitoring will be conducted at a Forest scale and not at the project level. Population monitoring will be discretionary as provided by 219.14f.**
- a. Maintain or enhance habitat for ruffed grouse, beaver, song sparrow, grasshopper sparrow, white-tailed deer and brown creeper; as outlined in specific direction pertaining to aspen, other hardwoods, riparian areas, grasslands, spruce and ponderosa pine (e.g., Objectives 201, 205, 211, 239-LVD, 5.1-204).**
 - b. Maintain habitat opportunities for black-backed woodpeckers across the Forest, as outlined in specific direction pertaining to conifer habitat, snags and recently burned habitat (e.g., Objectives 211, 11-03, 5.1-204, Standard 2301).**
 - c. Maintain habitat for golden-crowned kinglets, as outlined in specific direction pertaining to spruce habitat (e.g., Objective 239-LVD).**
 - d. Maintain or enhance habitat quality and connectivity for mountain suckers, as outlined in specific direction pertaining to aquatic resources (e.g., Objectives 103, 104, 215, Standards 1201, 1203, 1205, Guideline 1115).**

The MIS list was updated in the Phase II Forest Plan Amendment, and now includes nine species. These are: beaver, white-tailed deer, black-backed woodpecker, brown creeper, golden-crowned kinglet, grasshopper sparrow, ruffed grouse, song sparrow, and mountain sucker. Species-specific monitoring data follow below. Because some of these species have not been previously monitored, habitat and/or population trends may not

yet be available.

Monitoring:

Mammals -- Beaver



Beaver are found in suitable habitat throughout much of North America. They use riparian habitats dominated by stands of willow, aspen or cottonwood (Streubel 1989). Beaver are absent from areas lacking permanent water and an adequate supply of suitable woody vegetation. The beaver's strong association with hardwood riparian areas is the basis for its selection as an MIS.

As outlined in the 2005 Monitoring Implementation Guide, both a habitat and population indicator will be used to monitor beaver on the Forest. The amount of aspen stands within 600 feet of perennial waters was identified to indicate maintenance or enhancement of beaver habitat on the Forest (Objective 238a) and progress toward restoring hardwoods in potential beaver habitat (Objective 201). Beaver food caches are used as an indicator of abundance.

Historically, beaver were heavily trapped in the Black Hills. By the late 1880s, populations were low and restricted to remote areas (Parrish et al. 1996). Beaver have increased since then and are now widely distributed in both South Dakota (Higgins et al. 2000) and Wyoming (Cerovski et al. 2004). Beaver can be legally harvested in both states, but hunting regulations moderate the effect on populations.

Baseline beaver surveys were conducted on the Forest during September 2004 (see FY 2004 monitoring report). Beaver and their habitats were most common in the Bearlodge Mountains and in the central Black Hills, although they were present in other areas as well. A total of 74 active and 5 inactive beaver colonies were observed on National Forest System lands during aerial and ground-based surveys. The current monitoring protocol specifies that food caches, not beaver colonies, be monitored. However, there is typically one food cache per active colony per year, so it can be assumed that 74 food caches were present in 2004. Assuming an average of 3.5 to 5.3 beaver per colony (Payne 1981), the current estimated population size in these colonies is between 259 and 392 beaver. Food cache or other beaver population index monitoring did not occur in FY 2005, but is scheduled to be conducted in FY 2007.

The reduction in beaver activity that occurred from heavy trapping likely caused a lowering of water tables and a subsequent loss of willows and other riparian vegetation (Parrish et al. 1996). These native plant species have often been replaced by less desirable non-native species such as Kentucky bluegrass and smooth brome. This, in conjunction with other factors, has resulted in reduced riparian habitat quality in the Black Hills since pre-European settlement occurred. The amount of aspen and other hardwoods on the Forest has also declined (USDA Forest Service 2005).

The habitat monitoring protocol specifies that the acres of aspen stands within 600' of perennial water will be monitored. In FY05, this amounts to 9,656 acres. An overlay of known beaver colonies on top of the aspen stands revealed that less than ¼ of the colonies coincided with the aspen. This indicates that the combination of aspen and perennial water is not a good predictor of beaver habitat. Therefore, the monitoring protocol will require revision in order to provide a better indicator of beaver habitat. Until that is completed, we will also present data on the total amount of aspen, and riparian condition as indicators of beaver habitat trend.

Aspen stands have been replaced by pine and spruce in many areas, and may have declined on the Forest since the pre-settlement era (USDA Forest Service 2005, p. III-28). Stands dominated by aspen currently occupy approximately 46,172 acres on the Forest (see monitoring item 8), and in 1995 they occupied 48,224 acres (USDA Forest Service 1996). This is a decline of 2,052 acres, or four percent.

Monitoring item 6 measures riparian condition and trend, but it was not implemented in 2005. However, an indicator different than any of those disclosed in the monitoring implementation guide was reported under

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item 6 of this report: projects that maintain or enhance riparian condition. This can also be used to partially indicate trend of beaver habitat. According to monitoring item 6, there were seven projects implemented that protected a total of 54.5 acres of riparian habitats across the Forest in FY05. These projects may have a small positive influence on beaver habitat.

Evaluation:

The long-term beaver population trend has increased in the Black Hills since heavy trapping has been moderated by hunting regulations. Implementation of the new beaver monitoring protocol will serve as the basis for determining shorter-term trends.

Riparian habitats have decreased in quality since European settlement, and the total amount of aspen has decreased over at least the past 30 years. Both of these indicate a long-term declining habitat trend for beaver. More recent, shorter-term riparian trends are unknown but are important to determine through monitoring item 6. Small riparian protection projects that have improved riparian conditions in some areas may contribute to achievement of Objective 238, but additional monitoring and habitat restoration projects are warranted for a better assessment of benefits to beaver. The Forest will revise the habitat monitoring protocol, and provide shorter-term trends in future reports. According to USDA Forest Service (2005), changes in habitats and populations will likely be slow, and may take decades to distinguish.

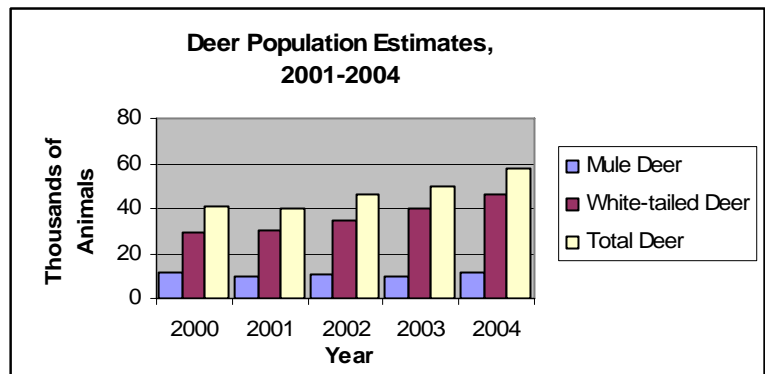
Mammals -- White-tailed Deer



Forest Plan Objective 217 supports habitat management for 60,000 white-tailed and mule deer combined in South Dakota. This figure matches the SDGFP

population objective for the Black Hills (USDA Forest Service 1996 p. 349). The WYGFD has not set a specific Black Hills population objective. Neither state agency has released 2005 population estimates;

therefore, 2004 is the latest data reported here. The South Dakota white-tailed deer population is almost four times larger than the mule deer population, and has increased 63 percent between 2000 and 2004 (see chart). In 2004, there were 12,000 mule deer, 46,000 white-tailed deer, and 58,000 total deer. The combined deer populations are now within 3% of achieving the state's objective.



The Arc Habitat Suitability Index (ArcHSI) model version 1.0 (Juntti and Rumble 2004) was used to provide an index to Forest-wide deer habitat conditions in 2005. This GIS model estimates the ability of an area to meet white-tailed deer requirements for food and cover during both summer and winter (i.e., two indices are generated). The model is spatially explicit in that it evaluates the distribution of vegetation (i.e., covertype and structural stage) and roads on the landscape in order to calculate the indices. The indices can then be compared across years in order to determine summer and winter habitat trends. The ArcHSI model evolved from, but is different than, the HABCAP model used and reported in previous years. Because this is the first year ArcHSI has been implemented, it cannot be used in trend assessment yet. Therefore, ArcHSI values generated this year are provided to set baseline conditions for future comparisons.

The white-tailed deer summer habitat suitability index for 2005 was 0.506157, and the winter index was 0.553432. Again, these values represent baseline conditions for future assessments using the same model.

The 2003 monitoring report provides the most recent habitat trend assessments (1997 to 2002) for white-tailed deer using the older HABCAP model. The summer index increased from 54 to 61 percent, and the

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winter index decreased slightly from 59 to 58 percent. Assuming these trends continue today, it would appear that summer habitat conditions are undergoing a moderate increase, and winter conditions are stable to slightly decreasing, although the decline may not be significant. This assumption is reasonable to make because Forest management has not changed substantially between 2002 and 2005, and because only three years have lapsed since that assessment was conducted.

Evaluation:

The Black Hills white-tailed deer population trend has increased between 2000 and 2004. The Forest-wide summer habitat trend is increasing, and winter habitat trend is stable to slightly decreasing. The Forest is almost fully meeting Objective 217. The Forest is meeting Objective 238a with respect to summer habitat, but may not be maintaining winter habitat, although the decline may not be significant.

NON-GAME BIRDS

In 2001 the Forest began funding the Rocky Mountain Bird Observatory (RMBO) to monitor long-term trends of bird populations through point-count transect surveys. The monitoring program is titled *Monitoring Birds of the Black Hills* (MBBH). Results are reported to the Forest annually (Panjabi 2001, 2003, 2004, and 2005; Beason et al. 2006). Ten habitats throughout the Forest are being monitored: white spruce, northern hills ponderosa pine, southern hills ponderosa pine, late-successional ponderosa pine, aspen, pine-juniper shrubland, mixed-grass prairie, montane riparian, foothill riparian, and burn area (mainly the Jasper fire of 2000). Not all habitats will be monitored in all years, and adjustments in habitat classifications and transect locations have been and may continue to be necessary as we refine the monitoring program. The monitoring is designed to provide rigorous population trend data on most regularly occurring diurnal (day active) breeding species in the Black Hills using a statistically sound sampling design. The species sampled include all of the non-game MIS birds (i.e., black-backed woodpecker, brown creeper, golden-crowned kinglet, grasshopper sparrow, and song sparrow). Trends in abundance may be less clear for rare species or those with highly variable occurrences; however, the monitoring program will provide insight into other population characteristics such as distribution and habitat associations.

In 2005, RMBO sampled 2,480 point-count stations along 173 transects in 6 habitats. The habitats were: burn area, foothills riparian, montane riparian, northern hills ponderosa pine, southern hills ponderosa pine, and white spruce. A total of 119 breeding bird species were detected, including four of the MIS species discussed below. Additional results are found in Beason et al. (2006). This was the fifth year of a long-term monitoring effort; continued monitoring is needed to detect long-term trends. However the Forest is obtaining valuable preliminary data on species densities and habitat associations crucial to long-term trend detection and evaluation of management effects.

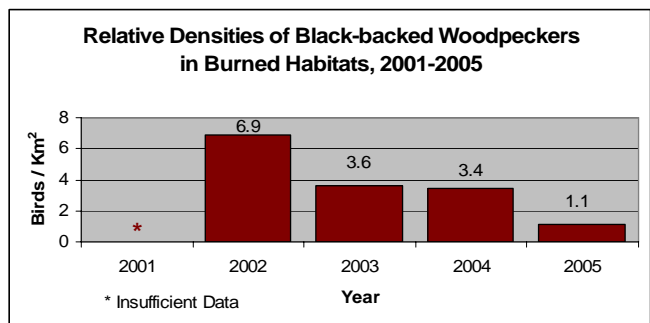
The MBBH program is the source of data for all of the non-game bird MIS accounts provided below, unless otherwise indicated. This includes the distribution maps displayed in each "Evaluation" section.

Non-Game Birds -- Black-backed Woodpecker



Relative Densities in Preferred Habitats: In the Black Hills, black-backed woodpeckers are highly associated with ponderosa pine forests that: 1) are recently burned (i.e., within 5 yrs), or 2) have high bark beetle populations. Another important habitat for this woodpecker is healthy ponderosa pine forests that have dense mature

or late successional structure (i.e., structural stages 4c and 5). This third habitat type is especially important when neither recently burned areas or



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high beetle populations are available.

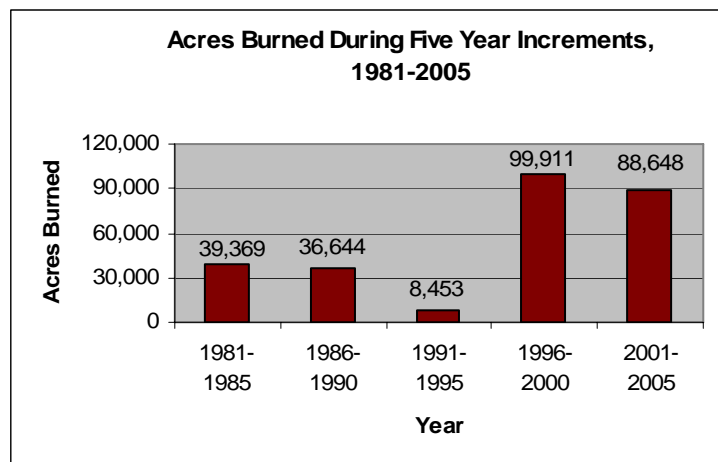
Burned areas have been monitored every year since the MBBH program began. Burned area transects are located almost exclusively within the Jasper Burn. This burn is now six years old, and exceeds the age preferred by black-backed woodpeckers. Also, because the Jasper Burn is limited to the southwestern Black Hills, the transects are not well-distributed across the Forest. Density data for burned habitat (Jasper Burn) are provided in the adjacent chart. Black-backed woodpecker observations were too infrequent in 2001 to calculate a reliable density estimate, but by 2002, populations soared to their all-time high of almost 7 birds per km². Each year since then, the density estimate has dropped, and in 2005, just over 1 bird per km² was recorded.

Structural stages 4c and 5 are both included in MBBH's late successional habitat. Although this is different than how the Forest defines late succession, it matches the third habitat definition given above for black-backed woodpeckers. Late succession by the MBBH definition was monitored in 2001, 2002, and 2004. The habitat was not monitored in 2003 or 2005. Of the years monitored, black-backed woodpecker observations were sufficient for density estimate calculations only in 2002. In that year, 1.3 birds per km² were estimated to occur in MBBH's late successional habitat.

The MBBH program does not specifically monitor areas with high mountain beetle populations, so no density estimates are available from this methodology. However, Rumble (2002) used Emlen transects to measure black-backed woodpecker densities in the heavily infested Beaver Park area of the Black Hills. He found approximately 9 birds per km² in the areas with the highest beetle activity. No subsequent estimates are available beyond this 2002 data.

Acres of Preferred Habitat – Burned Areas: According to monitoring item 12, a total of 88,648 acres of large wildfires (>300 acres) had burned in the preceding five years (i.e., 2001-2005), which is the time period considered to be 'recently burned' in Objective 11-03. Of this, 25,330 acres were in the ponderosa pine covertype that burned with moderate or high intensity (i.e., were stand replacing). Fires of this intensity, age and size have the best potential to provide preferred habitat for black-backed woodpeckers, especially where pre-fire live canopy cover and snag density were high. Item 12 discloses that timber was salvaged from 453 acres (2%) of the recently burned forests (all fire intensities included). Therefore, at least 24,877 acres of stand-replaced, recently burned pine stands remain unsalvaged across the Forest, and are available habitat for black-backed woodpeckers. This is approximately 2.5 times greater than the 10,000 acres called for under Objective 11-03.

The adjacent chart displays the number of acres affected by large wildfires over the past 25 years. The data were obtained from the corporate GIS fire coverage, and include all covertypes, fire intensities, and salvage status because more specific data were not available. Given the preponderance of ponderosa pine across the Forest, and the low salvage rate demonstrated over the past five years, it is assumed that most of these areas could have provided foraging habitat for black-backed woodpeckers.



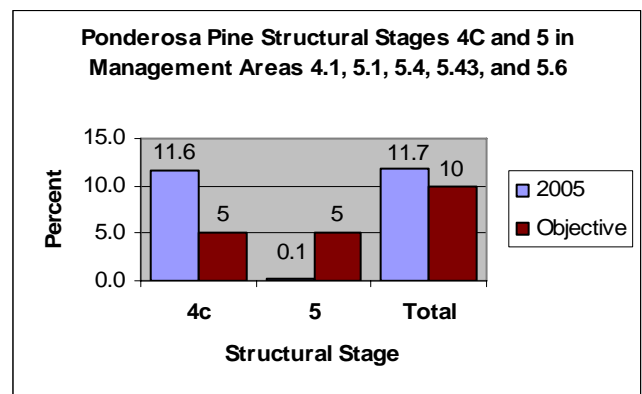
The very large (83,000 acre) Jasper Burn, which is heavily sampled in the MBBH program, is represented in the 1996-2000 dataset; it is no longer considered a recent burn. Despite the 'loss' of this important habitat, the chart shows that a relatively high amount of potential habitat is still available to woodpeckers when analyzed over the 25 year period.

Acres of Preferred Habitat – Bark Beetle Infestations: Bark beetles are a very important food source for black-backed woodpeckers, and their presence is strongly tied to suitable woodpecker habitat. According to monitoring item 23, an average of approximately 160,000 pine trees were killed by mountain pine beetles over the past three years. This includes trees in areas with elevated (epidemic) and normal (endemic) beetle populations. Item 23 shows this as a decrease from recent levels. No corresponding acreages were given, primarily due to the difficulty in determining an accurate figure; neither all stands or all trees within affected stands are attacked by beetles. The Phase II EIS (USDA Forest Service 2005 p. III-362) states that approximately 449,000 acres (37%) of the Forest was affected by mountain pine beetles from 2000-2004. The EIS acknowledges that not all trees on every acre were affected, and that mortality occurred in single trees as well as groups of trees. Therefore, it should not be interpreted to mean that 449,000 acres have had significant mortality from pine beetles. Instead, it can be assumed that a large portion of the Forest has recently experienced at least some mortality from mountain pine beetles. Although it would be very difficult to rate the quality of those acres to black-backed woodpeckers, it is likely that most or all of those acres do provide foraging opportunities for the bird.

Mountain pine beetles were not identified as an issue during Forest Plan revision planning in 1995 (USDA Forest Service 1996); therefore, no quantitative comparisons are available for that period. As shown in the graph in monitoring item 23, beetle-caused tree mortality became notable in 2001. Although the 2005 mortality average is less than the peak in 2003, it is still approximately 20% higher than it was during 2001.

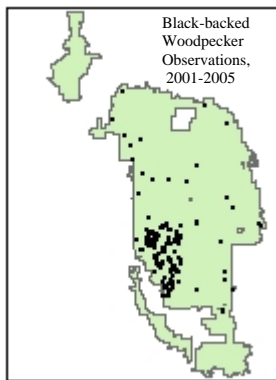
Acres of Preferred Habitat – Dense Mature and Late Successional Stands: Ponderosa pine forests that have dense mature or late successional structure (i.e., structural stages 4c and 5) provide habitat for black-backed woodpeckers, and are particularly important when neither recently burned areas or high beetle populations are available. Forest Plan Objectives 4.1-203, 5.1-204, 5.4-206, 5.43-204, and 5.6-204 guide the Forest to providing 5% of the pine in these management areas in both of these structural stages (i.e., 10% total), partly to ensure habitat for the woodpecker. Monitoring item 9 displays structural stage data, and pertinent parts of it are summarized in the subsequent text and chart. In 2005, there was almost twice as much 4c available (102,143 acres) than is desired by the Forest Plan objectives, and very little structural stage 5 exists (1,304 acres). The structural stages are not well balanced when judged against the objectives (see chart). However, when added together, 11.7% of the management areas provide woodpecker habitat. This is slightly more than the 10% specified by the Forest Plan. Assuming these structural stages are equal in habitat quality, there is currently 1.1% more woodpecker habitat available than called for by the Plan.

Structural stage data by covertypes and management area are not available for 1995, and therefore a direct comparison can not be made to that time period. However, structural stage data are available for all management areas combined (i.e., Forest-wide). In 1995, a total of 13.2% of the pine stands on the Forest were comprised of the 4c or 5 structural stages (USDA Forest Service 1996, p. III-134). In 2005, the Forest-wide total is 13% (see monitoring item 9). Therefore, the total Forest-wide change is less than 1%.



Evaluation:

The black-backed woodpecker is distributed widely in low densities throughout most of the Black Hills. In the southwestern portion of the Forest, where numerous wildfires have recently occurred, the species has been observed much more frequently, and in higher densities. The adjacent map, which was generated from MBBH data, does not show occurrences in the Bearlodge Mountains; however, other Forest records confirm species presence there as well (Stefanich 2006).



The MBBH program was designed to statistically detect population trends over a longer time period than the five years that it has been implemented. Natural variability in the data and other factors preclude a short-term, meaningful analysis. The first attempt at statistically analyzing trends is expected to occur in FY 2007, to coincide with the next five-year evaluation report. However, a less rigorous population trend analysis reveals a notable increase and subsequent decrease in black-backed woodpecker densities over the past five years. This pattern of rapid colonization and subsequent decline is consistent with findings of other studies (Anderson 2003), and is not a cause for alarm. As displayed under the burned habitat analysis above, the Jasper Burn is not a recent burn anymore, and it stands to reason that the sampled transects revealed low woodpecker densities this year.

The MBBH program will not monitor burned habitat in 2006. By the time it is re-visited (expected in 2007), there will likely be a new sampling scheme that will expand beyond the Jasper Burn boundaries. The intent will be to monitor black-backed woodpeckers on a Forest-wide scale rather than in one burn, and to include new recently burned areas that provide preferred habitat.

The amount of recently burned vegetation has been considerably higher in the past 10 years than it was in the 15 years preceding that time frame. This includes all covertypes and burn intensities, and is therefore more inclusive than what black-backed woodpeckers actually use. A more limited snapshot shows there are currently almost 25,000 acres of stand-replaced, unsalvaged burned pine forest across the Forest. This exceeds Objective 11-03, which would allow salvage to occur on everything over 10,000 acres. Presumably there is no demand for the surplus burned wood, with the net result that the dead trees remain on the landscape.

Habitat provided from mountain pine beetle is abundant when compared to 10 years ago, although it may be beginning to decrease. Forest-wide, dense mature and late successional habitats appear stable over the past decade. Structural stages 4C and 5 are considerably out of balance, but when combined, they slightly exceed the total amount called for in Objectives 4.1-203, 5.1-204, 5.4-206, 5.43-204, and 5.6-204.

Determining a Forest-wide trend that combines all three habitat types is difficult at best. However, given that all types are relatively abundant when compared to 10-25 years ago, and all are either stable or in slight decline over the past few years, it is appropriate to distinguish between short-term and long-term trends. The long-term (10-25 year) habitat trend has shown a large increase, but in the past few years, the trend is stable to slightly decreasing. Overall, habitat is relatively abundant, and Objective 238b is being met.

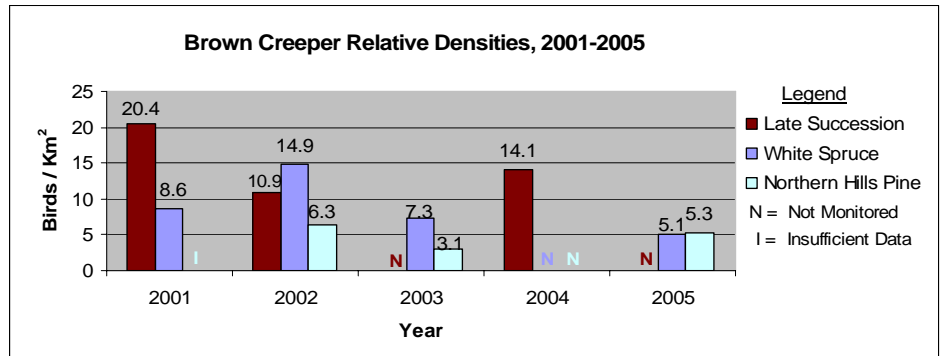
Non-Game Birds -- Brown Creeper

Relative Densities in Preferred Habitats: In the Black Hills, brown creepers are highly associated with late successional pine forests (structural stages 4C and 5) and spruce forests (Panjabi 2005). Of these, the 2005 MBBH effort monitored only spruce. The estimated density of creepers in this habitat was 5.1 birds/km². This is the lowest density



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estimate in spruce since the monitoring program began in 2001. FY 2005 is also the first year that densities in spruce were nearly identical to those in the pine north habitat (5.3 birds/ km²). In previous years, densities in spruce have been considerably higher than in pine north. See the chart below for annual density estimates for spruce, late successional pine, and pine north habitat types since 2001.

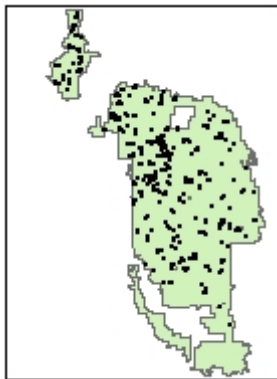


Brown creepers were also detected in the remaining four habitats sampled this year: pine south, montane riparian, foothills riparian, and burned areas. As expected, detections were not frequent enough in these marginal habitats to allow density estimates to be calculated.

Acres of Preferred Habitats: According to monitoring items 8 and 9, there are 25,462 acres of white spruce and 134,129 acres of late successional pine habitats on the Forest, respectively. This is a total of 159,591 acres of preferred brown creeper habitat, Forest-wide. In 1995, these acreages were 21,737 and 137, 207, respectively, for a total of 158,944 acres (see monitoring item 8 and USDA Forest Service 1996, p. III-134). The total Forest-wide change is less than one percent over the past 11 years.

Evaluation:

Five years of MBBH data suggests the brown creeper is well distributed throughout the Black Hills (see map). Overall, the species occurs in fairly low densities across the Forest, but it is most abundant in late successional pine forests and white spruce habitats.



The MBBH program was designed to statistically detect population trends over a longer time period than the five years that it has been implemented. Natural variability in the data and other factors preclude a short-term, meaningful analysis. The first attempt at statistically analyzing trends is expected to occur in FY 2007, to coincide with the next five-year evaluation report. However, a less rigorous analysis of the data presented in the chart above reveals varying densities across the years, with no obvious upward or downward Forest-wide population trend.

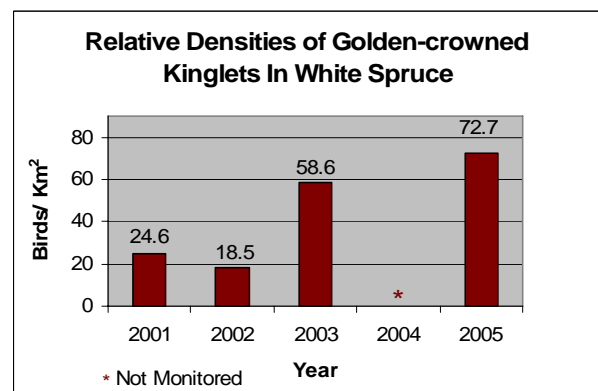
The Forest-wide habitat trend, as determined by comparing acres of preferred habitat available in 2005 with that in 1995, is stable. Objective 238a is being

met.

Non-Game Birds -- Golden-crowned Kinglet



Relative Densities in Preferred Habitats: In the Black Hills, the golden-crowned kinglet is highly associated with white spruce. This is the basis for its MIS status. Spruce was monitored this year in the MBBH program, as it has been every year since the program began except 2004. Kinglet densities were higher this year than in any other year,



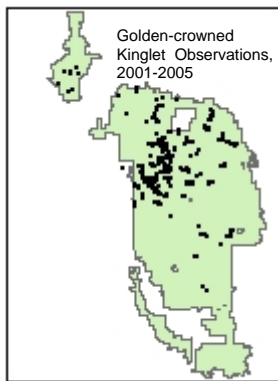
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with 72.7 birds detected per km². This is approximately four times higher than it was in 2002, which was the year with the lowest recorded density thus far.

For the first time since MBBH began, kinglets were numerous enough in 2005 to calculate density estimates in other habitats besides spruce or late successional pine. The habitats (and density estimates in birds/km²) were: pine north (19.3), foothills riparian (9.0), and montane riparian (5.2). Birds were also detected in pine south, but in insufficient density to calculate an estimate. In previous years, the birds have also been detected in low numbers in aspen habitats.

Acres of Preferred Habitat: As disclosed in monitoring item 8, the spruce coertype is found on 25,462 acres of the Forest. This exceeds the amount prompted by Objective 239-LVD (20,000 acres). In 1995, there were 21,737 acres of spruce, and in 1899, it was estimated at 15,000 acres (USDA Forest Service 1996). Fire suppression during the last century has allowed spruce to increase in abundance and density in the Black Hills. Relative to ponderosa pine, spruce is patchily distributed and in low abundance (USDA Forest Service 2005 p. III-24).

Evaluation:



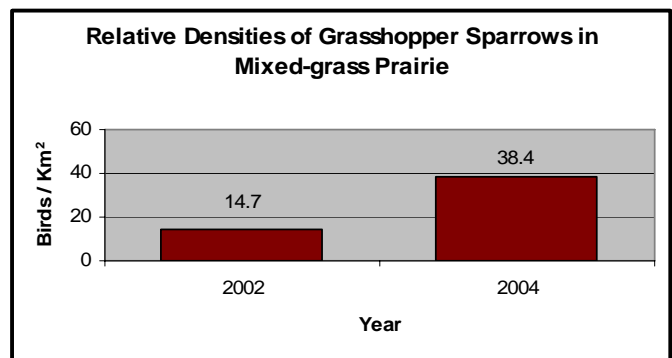
Four years of MBBH data suggests the golden-crowned kinglet is distributed primarily in the northern half of the Black Hills, although it is also found in more localized areas of the southern Hills and Bearlodge Mountains as well (see map). The MBBH program was designed to statistically detect population trends over a longer time period than the five years that it has been implemented. Natural variability in the data and other factors preclude a short-term, meaningful analysis. The first attempt at statistically analyzing Forest-wide trends is expected to occur in FY 2007, to coincide with the next five-year evaluation report. However, a less rigorous population trend analysis suggests an increase over the past five years. Habitat trend for the golden-crowned kinglet also appears to be increasing, based on the short- and long-term increases in spruce forests. The Forest is meeting objective 238a.

Non-Game Birds -- Grasshopper Sparrow



Relative Densities in Preferred Habitats: In the Black Hills, the grasshopper sparrow is highly associated with mixed-grass prairie. This is the basis for its MIS status. Mixed-grass prairie was not monitored

this year in the MBBH program, but it was fully monitored in 2002 and 2004. Results from those years are presented in the chart below. Density estimates were nearly twice as high in 2004 as they were in 2002. According to Panjabi (2003), this could be a temporary phenomenon attributable to the prolonged drought that has occurred over much of the western Great Plains, which normally provide better breeding habitat than the Black Hills. Refined and expanded sampling may also explain some of the change (Panjabi 2004).



In addition to being found in the mixed-grass prairie habitat, the grasshopper sparrow has also been recorded in small numbers within burned, foothills riparian, montane riparian, pine north, and shrub habitats. Density estimates cannot be calculated for those habitats due to the small number of individuals observed.

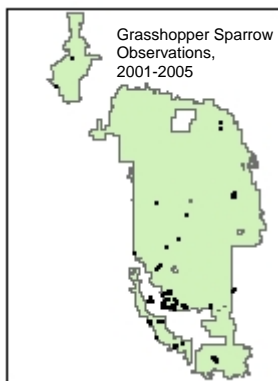
Acres of Preferred Habitat: As disclosed in monitoring item 8, grassland coetypes are found on 109,841 acres of the Forest, excluding wetland graminoids such as sedges and rushes. Of this, 83,559 acres are

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considered prairie grasslands, which are more likely than the other category (meadows) to provide sparrow habitat. It is unlikely that all of the prairie grassland covertypes offer suitable habitat for grasshopper sparrows, but refined habitat associations are not known in the Black Hills. Due to differences in reporting methods, it is difficult to obtain a comparable estimate of grassland covertypes from previous years. The best fitting comparison is provided in monitoring item 8, where 104,174 acres of grasslands (all types, including meadows) were reported to be on the Forest in 1995. This five percent increase could be due to mapping and reporting differences, since the general perception among Forest employees is that grassland habitats have actually been declining due to pine encroachment.

Evaluation:

The MBBH program shows that the grasshopper sparrow is well distributed in the native mixed-grass prairies of the southern Black Hills and Elk Mountains, and locally in the isolated prairies further north (see map).



The MBBH program was designed to statistically detect population trends over a longer time period than it has been implemented. Natural variability in the data and other factors preclude a short-term, meaningful analysis. The first attempt at statistically analyzing trends is expected to occur in FY 2007, to coincide with the next five-year evaluation report. However, a less rigorous analysis of the data presented in the table above suggests an upward Forest-wide population trend between 2002 and 2004. However, this may not be a trend, but instead a short-term phenomenon. According to Panjabi (2003), it is possible that numbers will decrease in future years as habitat becomes more suitable again on the Great Plains. Further monitoring through the MBBH program is expected to clarify trends.

The Forest's vegetation database shows increased acres of Black Hills grassland covertypes since 1995. Projects across the Forest have been emphasizing meadow and grassland restoration through removal of pine encroachment. Some of this, particularly pine removal on the periphery of prairies, is likely contributing to an increased habitat trend for the grasshopper sparrow. However, changes in mapping and reporting methods might contribute to at least some of the difference. More consistent habitat monitoring and mapping techniques are expected to provide clearer habitat trends in the future.

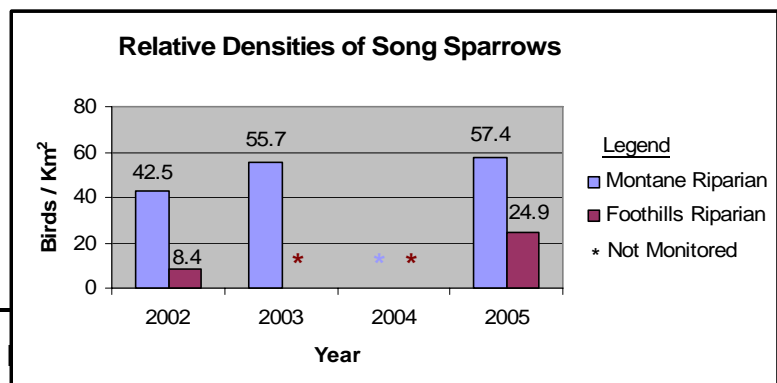
Non-Game Birds -- Song Sparrow



Relative Densities in Preferred Habitats: In the Black Hills, the song sparrow is strongly associated with riparian habitats. This is the basis for its MIS status. Both the foothills and montane riparian habitats were monitored in 2005. The number and placement of riparian transects were modified this year as they have been in other years, with the intent to better sample target habitats.

Density data from 2005 and other years in which monitoring occurred are presented in the chart below. Densities have been considerably (2 to 5 times) higher in montane riparian than in foothills riparian. Both habitats show increasing song sparrow densities between 2002 and 2005.

The song sparrow has also been detected within each of the remaining eight habitats sampled by the MBBH program since monitoring began in 2001. However, the sparrow's occurrence in these habitats is more likely an artifact of adjacent riparian vegetation than a preference for the sampled habitats. Furthermore,



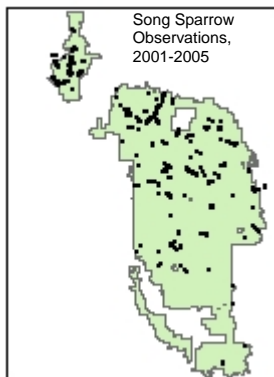
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observations are usually too infrequent to calculate a reliable density estimate. Therefore, no data on these habitats is presented here.

Trend in Condition of Preferred Habitat: This sub-item tiers directly to monitoring item 6: Riparian – Condition and Trend. The protocol for item 6 was not implemented in 2005. However, an indicator different than any of those disclosed in the monitoring implementation guide was reported under item 6 of this report: projects that maintain or enhance riparian condition. This can also be used to partially indicate trend of song sparrow habitat. According to monitoring item 6, there were seven projects implemented that protected a total of 54.5 acres of riparian habitats across the Forest in FY05. These projects may have a small positive influence on habitat for the song sparrow.

A long-term evaluation of riparian areas shows a decline in habitat quality compared to pre-settlement conditions (i.e., 120 years ago). Willows have decreased, and less desirable non-native species such as Kentucky bluegrass and smooth brome have increased. This, in conjunction with other factors, has resulted in reduced riparian habitat quality in the Black Hills since pre-European settlement occurred (Parrish et al. 1996; see beaver section in this monitoring item for more information).

Evaluation:



Data from the MBBH program show that the song sparrow is well distributed throughout the northern Black Hills and Bearlodge Mountains, with a more localized distribution in the central and southern Hills (see map).

The MBBH program was designed to statistically detect population trends over a longer time period than it has been implemented. Natural variability in the data and other factors preclude a short-term, meaningful analysis. The first attempt at statistically analyzing trends is expected to occur in FY 2007, to coincide with the next five-year evaluation report. However, a less rigorous analysis of the data presented in the chart above suggests an upward Forest-wide population trend between 2002 and 2004. Some of this apparent trend may be attributable to a better sampling scheme that is now present in the two riparian habitats. Further monitoring and subsequent statistical analyses are expected to clarify the

population trend. Riparian habitats have decreased in quality since the pre-European settlement era, indicating a long-term declining habitat trend. More recent, shorter-term riparian trends are unknown but are important to determine through monitoring item 6. Small riparian protection projects that have improved riparian conditions in some areas may contribute to achievement of Objective 238a, but additional monitoring and habitat restoration projects are warranted for a better assessment.

GAME BIRDS

Monitoring:

Game Birds – Ruffed Grouse



The ruffed grouse is a year-round resident in the Black Hills. It occurs widely but in low abundance (Panjabi 2003). The species may require a variety of aspen structural stages to thrive, including late successional aspen for drumming logs and most other stages for buds and catkins (SAIC 2005). The strong association between ruffed grouse and aspen is the basis for the bird's MIS status.

The SDGFP collected ruffed grouse data along transects in 2003 (Wrede 2004). These transects crossed a variety of habitat types in the northern and central Black Hills, and are presented in the adjacent table.

Ruffed Grouse	Estimated Density in 2003 (birds/lineal mile)
All Routes Combined	0.16
Routes - Grouse Detected	0.28

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The Forest is currently working with the SDGFP and the Rocky Mountain Research Station to develop a new monitoring protocol for ruffed grouse. The protocol is expected to be in working draft form by the end of FY06, and will be tested and refined in FY07. The data collected through this protocol will serve as baseline data for trend assessments.

Ruffed grouse are also detected through the MBBH program. However, because the peak period for detecting grouse occurs before the MBBH sampling season starts, it is a less accurate method for estimating densities. Therefore, no MBBH data are presented for ruffed grouse.

Aspen stands have been replaced by pine and spruce in many areas, and may have declined since the pre-settlement era (USDA Forest Service 2005, p. III-28). Stands dominated by aspen currently occupy approximately 46,172 acres on the Forest (see monitoring item 8), and in 1995 they occupied 48,224 acres (USDA Forest Service 1996). This is a decline of 2,052 acres, or four percent.

Evaluation:

The monitoring program for ruffed grouse is in its infancy, and information presented here are considered baseline data. Forest-wide population trend data are not yet available, but a monitoring protocol to collect the necessary information is currently being developed. The Forest-wide habitat trend over the past 11 years is slightly downward.

Sub-Item: Fish – Mountain Sucker

Objective 238d. Maintain or enhance habitat quality and connectivity for mountain suckers, as outlined in specific direction pertaining to aquatic resources (e.g. Objectives 103, 104, 215, Standards 1201, 1203, 1205, Guideline 1115).

Monitoring:

Quantitative habitat data was collected along the stream network as part of the Integrated Resource Inventory – Common Water Unit (IRI-CWU) effort from 2000-2002. Over 1,000 points were sampled forest-wide on perennial, intermittent and ephemeral streams. Data collected included bankfull width, bankfull depth, substrate particle size and riparian width along with photos. This data is currently in the Quality Assurance/Quality Control (QA/QC) stage as it is being entered into the Forest Service corporate database NRIS-Water.

No new population monitoring data was collected for mountain suckers in FY2005. The South Dakota Department of Game, Fish and Parks did survey Spearfish, Whitewood and Rapid creeks. None of these locations coincided with the mountain sucker monitoring sites identified for the Forest Plan Phase I Amendment, which was still in effect for FY2005.

Quantitative population trend data for the mountain sucker was presented in the Forest Plan Phase II Amendment Final Environmental Impact Statement (FEIS; USDA Forest Service 2005).

Evaluation:

The forestwide population trend for mountain sucker is one of decline when comparing data from 1959-1962, the mid-1980s, and 1992-present. This trend statement is based on the best available information, which is limited and is based on the continued presence of mountain suckers at survey reaches/sites identified in the Phase II FEIS (Tables 3-17 and 3-18). These reaches/sites were selected because data was available over a span of 40+ years and these sites were deemed to most accurately reflect the effects of Forest Service management activities on adjacent National Forest System lands. Twenty-seven reaches/sites were considered. Mountain suckers were still present at ten sites, but were absent at seventeen sites where they historically occurred based on the 1959-1962 survey data. The majority of sites where mountain suckers were absent are the reaches where fisheries management has or currently does promote a recreational trout fishery. The persistence of mountain suckers at some sites may be affected by natural events and activities outside of

the Forest Service's control.

Connectivity is affected by natural and human influences. Natural influences include geology (loss zones), precipitation (drought) and excessive gradients (e.g. waterfalls). Human influences are largely instream structures in the form of dams or undersized or "perched" culverts at road-stream crossings. It is likely that the current Forest Service dams will continue to exist, so the most practical approach to improving stream connectivity relates to the road network. A site-specific inventory of road-stream crossings to identify potential barriers to fish movement would be valuable in prioritizing the need to replace or remove those barriers. Forest Plan Standard 1203 avoids any new instream barriers to fish passage.

Monitoring Item 23: Insects And Diseases - Population, Damage Trend, and Hazard

Sub-Item: Population

Biological evaluations of mountain pine beetle-caused mortality were conducted in the Deerfield, Bugtown Gulch, Custer Peak, O'Neill Pass and Warren Peak areas. These evaluations consisted of ground surveys to estimate the level of infestations and how they have changed over the past three years. Based on the ground surveys, beetle-caused mortality is increasing at Deerfield, Bugtown Gulch, Custer Peak and O'Neill Pass. Beetle populations are static at Warren Peak. Beetle populations seem to be increasing at roughly a two-fold rate in the areas where an increase is noted.

Studies are looking at alternative control measures for mountain pine beetle. Testing the effectiveness of different preventative sprays against mountain pine beetle is ongoing. Two chemicals tested are effective, depending on dose, at protecting trees from attack for one season, and one may be effective for two seasons. These insecticides are effective for treating individual trees in isolated areas but are not practical for widespread use. Some of these chemicals may not be available for forestry uses in the near future, so there is a continued need for further evaluation of suitable replacement chemicals.

It does appear that the level of tree mortality caused by Ips beetles has declined from 2004 to 2005. There were not as many of the larger spot infestations noted in 2005. There still are trees dying in urban interface areas and in areas where more recent fires have occurred.

Initial findings in the study of fire and subsequent insect infestations has indicates that the majority of dead ponderosa pine trees sustained >75% crown damage (crown scorch + crown consumption). Of the areas being studied, the Black Hills had the highest rate of primary bark beetle infestation (generally Ips) at better than 51% of the trees infested. The majority of trees infested were those that had 75% or greater crown damage.

Other Insects and Diseases Of Interest:

Red Turpentine Beetle and Wood Borers.

Activity of red turpentine beetle (*Dendroctonus valens*) is going down. There was less incidence of this insect noted in 2005, although there are still some areas, particularly recent burns, which still have a fairly high level. Wood boring insects (beetles in the families Cerambycidae and Buprestidae) are still present in large numbers in burned areas and in mountain pine beetle killed trees. This high level of borer activity was noted this year in the Ricco Fire. Trees that were severely burned in the fire were heavily infested with borers very rapidly.

Boring insects play a large role in lumber quality. Since these insects actually bore into the wood of a tree as

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opposed to just living under the tree bark as do bark beetles, they cause serious degradation of lumber after they have attacked a tree. Over the past few years trees have died and become infested with borers so rapidly that in some cases, the trees did not hold lumber value for more than two to three months after they were killed.

Armillaria Root Disease:

Armillaria root disease is common throughout the Black Hills on all tree species found here, conifers and hardwoods alike. Typically, it is not considered a killer of large trees; however, it does kill seedlings and saplings regularly. In larger trees, it acts more to reduce growth rates and stress the trees, which can make them more susceptible to bark-beetle attack. In the general forest, it can be found almost anywhere; however, it appears that there are root disease centers or places where it may be more of a problem. Known areas of greater Armillaria activity or root disease centers include the Bearlodge Mountains, Medicine Mountain, and generally, the Limestone Plateau. Armillaria is a concern in areas that have experienced fires as the large quantity of weakened trees may lead to an increase in these areas. Armillaria could kill some trees that may have otherwise survived. A series of plots were established in the Jasper Fire area to look at how Armillaria responds to wildland fire.

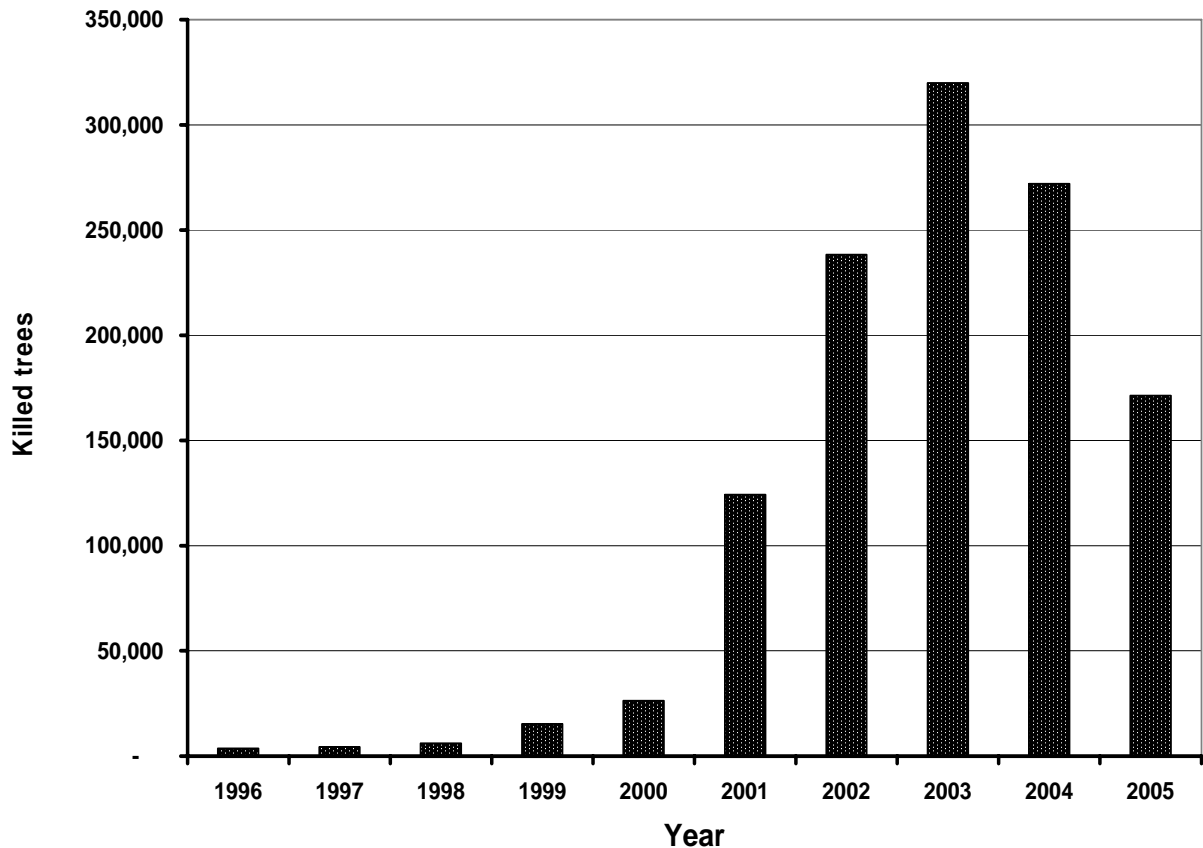
Overall, the above factors generally do not lead to large-scale tree mortality; however, conditions on the Forest over the past few years have led to concerns.

Evaluation:

Effective and economical pheromone or chemical treatments for widespread use on the Forest to reduce or eliminate pests have not been found. Some existing chemical methods that protect individual high-value trees may no longer be legal to use on the Forest in the future. The forest is currently experiencing large population increases in mountain pine beetle and woodborers. It does appear that populations of Ips and red turpentine beetle are down from the past few years. These trends could change rapidly if we have continued below normal precipitation or new areas burned in fires. Whether or not Armillaria is expanding in burned areas is unknown at this time. These mortality agents play a role in creating snags and providing other benefits for wildlife. They also can significantly change the look and function of the forest at a landscape level. What is apparent is that there are major changes taking place across the landscape of the Black Hills.

Sub-Item: Tree Mortality

Figure 1. Estimated amount of ponderosa pine mortality due to mountain pine beetle from 1996 to 2005, based on aerial surveys over the entire Black Hills of South Dakota and Wyoming.



The above graph shows the estimated number of trees killed based on aerial surveys for the past 10 years. There is an appearance that mortality declined this past year, however, that may be due to a number of factors, including removal of large numbers of green infested trees prior to beetle flight and differences in timing and mapping techniques employed by different mappers.

Evaluation:

The mountain pine beetle outbreak we have been experiencing the past few years has not subsided. It may be down in some areas, but it has increased in just as many or more areas. There were noted increases in the Northern Hills in the O’Neill Pass area and also in the Black Elk Wilderness. Other places such as Deerfield and Bear Mountain continue to suffer from high levels of beetle activity and tree mortality. It is likely that we are only about mid-point in the cycle of this current outbreak, and so higher levels of beetle mortality are likely to continue into the coming few years.

Sub-Item: Hazard

The vegetation database was used to rate the overall hazard of the forest this year. These ratings are based on structural stages and how susceptible they are to beetle attack. In this system all ponderosa pine stands are

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rated. Stands that are structural stage 1 and 2 and 3A are considered low susceptibility. Stands that are stage 3B and 4A are rated as medium susceptibility. Stands in stages 3C, 4B and 4C are rated as high.

Based on that data criteria, there is 177,000 acres or 17% rated as low hazard, 358,000 acres or 35% rated as medium hazard and 495,000 acres or 48% rated as high hazard to mountain pine beetle.

The most problematic of the categories is those stands that are in the medium range. The range is fairly narrow and where the cutoff should be between low and medium and medium and high is a changing number. In the future, breaking the rating down to just low and high and splitting the medium between them may make more sense. As more data is collected on the rating categories, what is considered as low and high may also change in the future.

Another data criteria is using variables such as quadratic mean diameter and basal area. This criteria relies upon tree inventory data. Where tree data is not available, the structural stage variable is used. This criteria set results in 440,000 acres or 42% rated as low hazard, 400,000 or 39% rated as medium hazard and 195,000 acres or 19% rated as high hazard to mountain pine beetle.

Finally, one should note that generally hazard is based solely on stand conditions, with no inference of beetle pressure or activity in the area. During times, such as now, when there are outbreak beetle populations in any number of areas throughout the Black Hills, almost any stand over 60 basal area can be susceptible to beetle mortality. To get a true risk factor, the stand conditions (as noted in hazard ratings above) and the beetle conditions both need to be considered. Based on this, the current situation is one of elevated risk over the coming year that beetle infestations will continue to be present and expand into almost any of the pine that is near infestations.

Monitoring item #23 Insects and Diseases – Population, Tree Mortality, and Hazard is accomplished by using NFTM, CWKV & SPS4 funds.

Monitoring Item 24: Exotics

Gypsy Moth

Detection surveys for the gypsy moth were continued at recreation and administrative sites on the Forest in 2005. No moths were caught in recreation sites on the National Forest, however 1 moth was caught at Mt. Rushmore National Monument. It is assumed that these are transient and there is no local population established at this time.

Monitoring item #24 Insects and Diseases – Exotics is accomplished by using NFTM, CWKV & SPS4 funds.

Monitoring Item 25: Fire Hazard in WUI and Forest Interior

Objective: 224. Reduce or otherwise treat fuels commensurate with risks (fire occurrence), hazard (fuel flammability), and land and resource values common to the area, using the criteria in Forestwide Standard 4110.

Monitoring:

The combination of all fuel profile influencing activities accounted for an estimated 381,000 tons of 3 inch

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and less diameter fuel residue being treated in accordance with Forest Plan required treatment standards.

All activities which generate fuels (reference Monitoring Item 23: FIRE - Fuel Treatment) require an assessment to determine appropriate fuel treatment as outlined by Land and Resource Management Plan (LRMP) Guideline 4110 (page II-55, LRMP). This assessment and prescribed treatment insure that on-site fuel hazards either remain at pretreatment levels or are reduced as necessary based on risk and/or values present.

Of the 56,822 acres of fuel reduction activities (see Chart - Monitoring Item 23), nearly 70 percent of it occurred in areas identified in the Black Hills National Forest Fire Protection Assessment (FPA) as having a high hazard index. Prescribed treatments in these areas reduced the hazard index to moderate or low levels. Less than five percent of fuel treatment activities occurred on areas of the Forest where the FPA rated existing fuel "hazards" low. Fuel treatment on the balance of the activity acres occurred on areas identified by the FPA as having a moderate hazard index. Prescribed treatment in these areas either reduced the hazard index or resulted in no change to the hazard index based on the fire "risk" or "values" present. Continuing drought conditions persisted over the Forest in 2005 contributing to wildland fire activity exceeding the average annual acres burned on the Forest. In all, 6991 acres of the Forest burned which is more than double the norm. This acreage is considered as being significant in terms of change within fuel hazard ratings in the burned over areas moving the overall hazard rating within the burned area to a low profile. Based on the combined effects of fuel treatment and wildland fire activity, an estimated 44,668 acres of the Forest moved from a high-hazard index to a moderate or lower-hazard fuel profile. In addition, approximately 19,145 acres of the Forest moved from a moderate-to-low or remained at a low hazard fuel index. In any given year, untreated or unburned areas of the Forest that are currently rated as being in a moderate or low fuel-loading index will move toward a high-hazard rating due to natural fuel deposition. The natural moderate to high hazard movement is estimated at 5% of the acreage currently existing at a moderate hazard level. Taking into consideration this natural change in fuel conditions, the net decrease of high-hazard fuel acres on the Forest as a direct result of wildfire and management activities in 2005 is estimated at approximately 7,826 acres.

High Hazard Acres

LRMP Baseline (Decade 1)	LRMP Baseline (Decade 2)	2000	2001	2002	2003	2004	2005
580,434	519,274	489,244	476,744	466,344	455,444	448,010	440,184

Evaluation:

The number of high fire-hazard acres on the Forest was reduced from 580,434 acres to 440,184 acres in 2005 through a combination of treatment and wildland fire events. Over the past 8 years there has been an approximate 24 percent reduction in high fire-hazard fuels conditions on the Forest. The Forest is not meeting prescribed burning objectives because of funding limitations, limited days when the weather is favorable for maintaining control of prescribed burn, smoke dispersal is acceptable, and due to wildland fire acreage.

Accomplished (Acres)	FY2000	FY2001	FY2002	FY2003	FY2004	FY2005
Objective 227: Fuel Treatment Activities	28,475	25,598	26,288	29,214	36,477	58,288
Objective 223: Prescribed Fire Activities	2,600	900	1,433	3,481	6,807	6,220

Monitoring Item 26: Fuel Treatment

Objectives:

- 223. Use management ignited fires and prescribed natural fires to achieve desirable vegetative diversity and fuel profiles on 8,000 acres per year for the next decade. Use natural fire on a limited basis under specifically prescribed conditions.
- 224. Reduce or otherwise treat fuels commensurate with risks (fire occurrence), hazard (fuel flammability), and land and resource values common to the area, using the criteria in Forestwide Standard 4110.
- 227. Manage 28,900 acres of activity fuels and 4,000 acres of natural fuels each year during the next decade, consistent with the need to protect life, property and natural resources from the threat of wildfire. This acreage includes acres specified in Objective 223.

Monitoring:

The Forest accomplished fuel-treatment-related activities on a total of 56,860 acres of the National Forest in FY2005. Included in this work were activities as listed below:

Fuel Treatments (Measured in Acres)	FY2000	FY2001	FY2002	FY2003	FY2004	FY2005
Pile Creation:	1,056	879	1,233	1,269	3609	451
Pile Burning:						
Natural Fuels	855	58	2,247	1,598	532	2389
Activity Fuels	1,116	1,444	303	500	734	3584
Prescribed Burning	2,600	1,073	1,433	3,481	6807	6220
Slash Removal	47	1,824	90	190	1089	0
Urban Interface Thinning and Piling	560	3,718	15	103	575	<i>*Included w/ Pre- commercial</i>
Lop/Scatter/Chip/Crush (force account)	1,456	25	692	6,464	5632	1,381
Pine Encroachment and Disposal	431	675	579	714	489	1,557
Pre-commercial Thinning/Interface Thinning and Associated Fuel Treatment	7,003	3,095	3,902	5,286	6815	9,664
Aspen/hardwood Regeneration	409	131	97	79	88	396
Purchaser Contribution - Lop and Scatter/Removal/Mech. Crush	12,967	12,515	15,697	9,331	10061	31,092
Fuel Break Construction - associated with and included in the above acres	384	161	0	199	46	126
Other treatments (categorized as FNOTHER in NFPORS - FY2005)	0	0	0	0	0	1466

(See NFPORS 2005 Summary).

Much of the above acreage is associated with the Forest's active timber sale program.

Evaluation:

The Forest has accomplished the following:

- 151 percent (43,774) of all activities fuels treatment projected in the 1997 Plan (28,900 acres/year).
- 78 percent (6,220 acres) of management ignited prescribed fire fuel treatments projected in the 1997 Plan (8,000 acres/year).

- 171 percent (6,828 acres) of natural fuel treatments projected in the 1997 Plan (4,000 acres/year).

Monitoring Item 27: Fire - Prevention and Suppression

Sub Item: Suppression

Objective 225. Manage wildfires using the appropriate suppression response (confine, contain or control) based on management area emphasis, existing values, risk of ignition and fuel hazards within a given area.

Monitoring:

The Black Hills National Forest experienced a near average fire occurrence year in 2005 however acreage burned was above the 40 year average. There were 127 fires during the 2005 fire season which was slightly below the Forest average of 139. Of these, 102 were caused by lightning and 25 by humans. Annual norms for both ignition sources are 101 lightning and 38 human caused fires.

The drought conditions of the previous five years continued through 2005 causing control problems during initial attack suppression action contributing to 4 escapes of significance. In all, 6201 acres of the Forest burned in 2005. Fire and fire related issues continued to dominate the Forest scene in 2005. The most notable fire of record was the 3,959 acre Ricco fire located to the west of Interstate 90 approximately 11 miles north of Rapid City SD. The Ricco fire was caused by lightning. The fire was managed by a Type 1 Incident Management Team due to complexities associated with high value urban interface in proximity to the fire. The 2933 acre Cement fire was caused by lightning and was located approximately 18 miles southwest of Spearfish SD. This fire occurred in a more rural forest setting and was managed by a Type 2 Incident Management Team. The lightning caused, 124 acre Old Hill City Road fire occurred shortly after the Cement fire and subsequently was managed as a fire within the Cement Fire Complex. The Camp 5 fire, an early season 775 acre human caused fire located approximately 6 miles east of Deadwood SD was managed by a local Interagency Type 3 organization.

The Forest completed a revision of its National Fire Management Analysis System (NFMAS) data in 1999. That revised analysis and associated fire modeling places projected annual losses at 3,253 acres with a suppression budget funded at the Most Efficient Funding Level (MEL). The suppression program for FY 2005 was funded at approximately 70 percent of the revised MEL budget level (includes total program spending authority). Recorded acre and resource value losses in 2005 were significantly above the norm and above the NFMAS projections however the acreage burned does fall within the statistical variation of historical fire records/data. All fire reports have been submitted and entered into the FIRESTAT Database at Kansas City.

Evaluation:

All wildfires on the Black Hills National Forest in 2004 were suppressed through appropriate suppression responses in accordance with management area emphasis, existing values, and fuel hazards within the incident area.

Confined: All

Contained: All

Controlled: All

Sub Item: Prevention

Objective 226. Develop fuel management and protection strategies for intermixed land ownerships in partnership with private, state and other federal agencies.

Monitoring:

Indicators: Interagency involvement and or assessment of the following items:

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- Status of fire management agreements with partner agencies;

All cooperator agreements and annual operating plans were reviewed and signed as required in 2005 with the exception of the Annual Operating Plan with the state of South Dakota which tiers to the State and Federal Interagency Cooperative Fire Agreement. An Annual Operating Plan with the state of South Dakota was not signed due to lingering problems associated with the previous Governors unwillingness to sign such a document. The Forest was able to get a signed Annual Operating Plan in place for the 2006 season based on much improved relations among all cooperators.

- Involvement in interagency fire training exercises;

The Forest continues to play a lead role in interagency fire training by providing qualified instructors, financial support, and course coordination for much of the fire training offered in the Black Hills and surrounding areas each year.

A notable example was Forest participation in the Annual Custer State Park Interagency Fire Training Exercise. This exercise is developed around a Type 2 Incident scenario providing training for Team Cadre, engines, crews and aviation exercises.

The Forest continues its involvement and support in developing the Fire Science program at South Dakota Western Dakota Technical Institute at Rapid City. This program completed its first semester in 2005 and has a full slate of students scheduled to receive their Associates Fire Science Degree following the spring semester in 2007. This program is being developed with an interagency advisory and oversight board with the Forest Service as an integral player.

All fireline personnel on the Forest were appropriately tested for fireline duty based on their position requirements and all received fireline refresher training.

- Involvement in South Dakota Interagency Fire Council (SDIFC) meetings and other interagency activities;

The Forest is a member of the SDIFC and an ad hoc member of the Black Hills Fire Advisory Board (BHFAB). Both of these organizations provide interagency coordination of prevention, pre-suppression, and suppression activities in the Black Hills and surrounding areas. The Forest has representation at all meetings and participates in and provides representation to various committees and task groups of these two active organizations.

- Effectiveness of the Northern Great Plains Interagency Dispatch Center at Rapid City Regional Airport as assessed by fire management partners;

The Northern Great Plains Interagency Dispatch Center (GPC) continued to improve on the progress made during its first season of operation in 2003. Successes has included development of Standard Operating Procedures for; interagency communication, interagency Run Cards, Initial Attack and Move Up, Multi Agency Coordination protocol including standard coordination protocol with area 911 dispatch centers, a zone Interagency Aviation Plan, a zone Interagency Extended Attack Operations Plan and an interagency developed Incident Service and Supply Plan. The Center continues to improve services in meeting the demands of increasing expectations of the many cooperators.

The Forest FMO is a seated member of the center Board of Directors and attended all Board meetings.

The Center Manager and staff performed exceedingly well in 2005 given all the challenges they faced during the year.

- Assessment of suppression support afforded partners through Incident Command System (ICS) process and as might be identified through post fire reviews, reports, or exit conferences; and
- All other information, which might cast light on the Forest's record of performance related to efficiency of operation in the fire management arena through interagency cooperation and prevention activities.

The Forest completed reviews of various fire incidents during the course of the 2005 fire season in compliance with findings and abatement requirements of the Thirty-Mile incident.

The escaped fires on the Black Hills (four referenced above) were managed utilizing Type 1, Type 2 and local Type III Incident Management Teams. The teams were interagency in composition and performed admirably with no known controversy associated with interagency relationships.

Evaluation:

The Forest has extensively cooperated with private, state, and other federal agencies to develop joint fuel management and protection strategies for intermixed landownership in partnership with private, state, and other federal agencies and was proactively involved in development of Community Fire Plans during 2005.

Monitoring Item 29: Scenery – Scenic Integrity

Report not available, limited Forest Plan Monitoring funding was devoted to more critical monitoring items.

Monitoring Item 30: Heritage Resources

Objectives:

- 403. Improve the management of heritage resources and integrate them with recreation and education while providing for compliance with all applicable laws and regulations.**
 - a. Increase numbers and types of heritage resource interpretive sites and opportunities. Provide five projects per year during the plan period.**
 - b. Conduct six heritage resource stabilization and rehabilitation projects per year during the plan period.**
 - c. Nominate eligible sites (approximately five per year in the plan period) to the National Register of Historic places.**
 - d. Inventory 50,000 acres each year in the plan period for heritage resource sites.**
- 404. Conduct three research projects each year to support heritage resource management.**
- 405. Manage all heritage sites listed in the National Register of Historic Places in consultation with the State Historical Preservation Officer (SHPO) and the President's Advisory Council on Historic Preservation (ACHP).**
- 406. Provide opportunities for the public to participate in heritage management activities, including the monitoring, excavation, and protection of archeological sites.**

Monitoring:

Introduction.

Heritage monitoring efforts are used to measure the level of success in meeting management goals and objectives for heritage resources. The level of success can be measured each year and, more importantly, over a five-year period. For this report, the results of monitoring over a five-year period will be reviewed as a measure of movement toward heritage resource management goals and objectives.

Direction for management of heritage resources is provided in Goal 4 of the Forest Plan: “Heritage resources will be protected and interpreted so that visitors can better understand their environment and how heritage resources fit into the context of multiple use management” (Forest Plan, pp-I-23). Heritage objectives are listed above.

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FY-2005 Monitoring Accomplishments.

Monitoring items for heritage resources measure two areas of emphasis for the program. Monitoring Items 1 through 4 reflect our responsibility to comply with Federal law and regulation for the protection of heritage resources under Section 106 of the National Historic Preservation Act (NHPA) (See Table 1.) The relatively large numbers exhibited in Monitoring Items 1 through 4 are in themselves a reflection of the large number of undertakings conducted on the Black Hills National Forest each year and funded through the primary purpose philosophy by other resource programs such as timber and range. Completion of heritage compliance protocols is required before project implementation. In FY2005 an increased emphasis was placed on monitoring site avoidance plans (Item #2), and protection of previously recorded sites (Item #4). Increased accomplishments for both items were a result of using IDIQ contracts to conduct monitoring during field inventories (Item #4), and to some degree, by freeing up Forest personnel from survey to conduct avoidance plan monitoring (Item #2). Monitoring Items 5 through 7 reflect the agency's responsibility to preserve and interpret heritage resources for public benefit under Section 110 of the NHPA. These activities are funded directly by heritage program funds as the primary purpose function. The relatively low numbers exhibited in Monitoring Items 5 through 7 indicate a lack of adequate funding to meet proposed accomplishments in the Section 110 portion of the heritage resource program.

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Table 1. Heritage Monitoring Accomplishments.

Monitoring Items	FY2001	FY2002	FY2003	FY2004	FY2005
1. Heritage resources compliance process completed prior to signing of environmental decision document (comply with NEPA, NHPA, and Chiefs Direction).	51 projects	124 projects	177 Projects	173 Projects	231
2. Avoidance or mitigation requirements effectively implemented prior to, during, and after project (comply with NHPA/NEPA).	189 mitigation or avoidance projects were monitored.	51 mitigation or avoidance projects were monitored.	17 avoidance projects monitored	66 mitigation or avoidance projects monitored	126
3. Inventories conducted to comply with the Archaeological Resource Protection Act, as amended 1988.	137 projects covering 41,713 acres were completed.	92 projects covering 78,891 acres were completed.	81 projects covering 61,375 acres were completed.	71 Projects covering 59,758 acres were completed	93 projects covering 69,675 acres were completed
4. Protection of heritage resources listed in, or eligible for listing on the National Register of Historic Places. May or may not be associated with project specific activities (comply with NHPA).	248 sites were monitored.	36 sites were monitored.	29 sites were monitored	64 sites monitored	52 sites monitored
5. Number of heritage resource interpretive sites provided (including sites, signs, roadside pullouts, brochures, public participation opportunities, sponsorship of heritage activities, etc.).	34 interpretive programs were provided.	21 interpretive programs were provided.	29 interpretive programs were provided.	23 Interpretive programs or field public participation activities provided	24 Interpretive programs/field project public participation activities provided
6. Number of heritage resource stabilization and rehabilitation projects conducted (comply with NHPA).	2 projects were conducted	2 projects were conducted	2 projects were conducted.	4 projects conducted	2
7. Increase in heritage resources listed on the National Register of Historic Places (comply with NHPA).	0 sites were nominated to or listed on the NRHP.	0 sites were nominated to or listed on the NRHP.	1 site was nominated to or listed on the NRHP.	0	0

Evaluation:

403. Improve the management of heritage resources and integrate them with recreation and education while providing for compliance with all applicable laws and regulations.

403.a. Over twenty interpretive opportunities per year have been provided during the five-year monitoring period including 24 in FY2005. Many of the opportunities have involved interpretive programs such as school programs, interpretive pamphlets, public tours, moonwalks, and presentation of research papers at professional conferences. The Forest objective is being met, and in some cases, exceeded by utilizing off-site activities and programs. In 2005 interpretive site and educational opportunity goals were met through field tours of the Craven Canyon petroglyphs, papers presented at the Island In the Plains Conference which is co-sponsored by the Forest, school programs, and the successful implementation of three Passport In Time volunteer projects including the Miller Ranch restoration project, the Southern Hills Rock art project, and the Williams Spring Archaeology project.

403.b. Two stabilization and rehabilitation projects were conducted in 2005. The historic Miller Ranch House restoration project was completed by the Mystic District using the Passport in Time program under the Forest Section 110 program. Stabilization and protection measures were implemented by the Northern Hills ranger District at the historic Mount Roosevelt site which is listed on the National Register of Historic Places.

403.c. No new National Register nominations were initiated in FY2005. An increase in heritage program funding will be needed in order to meet Forest Plan objectives over the planning period.

403.d. During the previous five-year period, an average of 54,000 acres has been inventoried each year. A sharp increase in acres surveyed has occurred over the past four years. This trend is expected to continue over the remaining years of the planning period due to increased fire risk, insect epidemics, and the implementation of forest health and watershed restoration initiatives.

404. Conduct three research projects each year to support heritage resource management.

In FY-2005 the Forest, in partnership with the University of Wyoming and the Crook County Resource Advisory Committee continued field research and educational programs under a cost-share agreement, at the prehistoric Williams Spring site. The 2005 session constituted Phase III of a long term research project to document prehistoric settlement and resource use in the central Black Hills. Through the Passport In Time program and financial support from the Crook County Wyoming Resource Advisory Committee (RAC), a total of 10 volunteers contributed 640 hours of support to the Williams Spring project. The Hell Canyon District completed a field survey and recording project for sensitive rock art sites in the Southern Hills. The project was conducted as a cost-share partnership with leading rock art expert Dr. Linea Sundstrom. This project was implemented as a Passport In Time program through which 22 volunteers contributed 900 hours of labor to a greater understanding of prehistoric rock art and the testing of different photographic techniques to record rock art panels.

In order to meet the Forest objective of three research projects per year, an increase in heritage program funding is needed. The Forest is currently meeting this objective at a minimum level through cost-share agreements with individual scientists and institutions.

405. Manage all heritage sites listed in the National Register of Historic Places in consultation with the State Historic Preservation Officer (SHPO) and the President's Advisory Council on Historic Preservation (ACHP).

The Forest maintains a strong relationship with the South Dakota and Wyoming SHPOs, Advisory Council on Historic Preservation, and Tribal Historic Preservation Officers (THPO) on listed and eligible properties. The heritage program is meeting this objective.

406. Provide opportunities for the public to participate in heritage management activities, including the monitoring, excavation, and protection of archaeological sites.

The Forest successfully completed three Passport in Time projects including the Miller Ranch Restoration, Rock Art Survey, and Williams Spring excavation in 2005. A total of 43 volunteers who contributed 2,002 hours of labor participated in these three heritage preservation projects.

Table 2. 2005 Heritage Forest Plan Objectives Accomplishments

Accomplished	FY2000	FY2001	FY2002	FY2003	FY2004	FY2005
Obj 403a. Heritage Sites Interpreted	27	34	21	29	23	24
Obj 403c. Eligible Sites Nominated	0	0	0	1	0	0
Obj 403d. Heritage Inventory (Acres)	28,686	41,713	78,891	61,375	59,758	69,675

Monitoring Item 32: Recreation Opportunities

Objectives:

407. Provide the following Recreation Opportunity Spectrum (ROS):

Recreation Opportunity Spectrum (ROS) (Thousands of Acres)	
Primitive	11
Semi-Primitive Non-Motorized	18
Semi-Primitive Motorized	12
Roaded Natural	1107
Roaded Natural Non-Motorized	95
Rural	1

408. Manage recreation use to stay within the capacity for the ROS class:

ROS Class	Capacity Range Recreation Visitor Days (RVDs/Acre)		
	Low	Moderate	High
Primitive	0.25	0.5	0.75
Semi-Primitive Non-Motorized	1.00	2.0	3.00
Semi-Primitive Motorized	1.50	3.0	4.50
Roaded Natural Non-Motorized	1.50	3.0	4.50
Roaded Natural	3.00	6.0	9.00
Rural	<<<< Design Capacity >>>>		

Monitoring:

Recreation Activity: Recreation Opportunities across the Forest

The 1997 Forest Plan identified objectives for capacities of the ROS classes expressed in recreation visitor days (RVDs). No monitoring data or techniques concerning this data were conducted in FY2005 to determine the degree to which the Forest is meeting this objective.

Evaluation:

Recreation opportunity spectrum capacity objectives by ROS class have not been monitored.

General anecdotal evidence of how well the Forest is meeting these objectives may be evident through monitoring of developed recreation use, dispersed recreation activities, and trail counter data from wilderness use.

Monitoring:

Developed Recreation Discussion

The backlog of deferred maintenance needs for our developed sites continues to be a major concern related to meeting Forest Plan standards for maintaining developed recreation sites. Operation and maintenance funding from appropriated dollars has been historically insufficient to meet the needs. The Forest makes use of service partners wherever possible, such as our campground concessionaire. Forestwide, our fee sites are paying for day-to-day operation through the concession permit. Special-use fees paid to the Forest from the concessionaire are re-invested into our developed sites through the Granger-Thye fee offset program. In 2005, this fee system enabled the Forest to re-invest approximately \$50,000 in permit fees back into our developed sites. The Black Hills National Forest Visitor Center overlooking scenic Pactola Lake and satellite visitor information stations at our district offices provided significant developed-and-dispersed-recreation starting points for the visiting public.

Evaluation:

The success of the Forest's developed recreation management program could be considered an indication the Forest is meeting Forest Plan objectives in providing urban and roaded natural recreation opportunities within the capacity objective.

Monitoring:

Dispersed Recreation Discussion

The Black Hills National Forest continues to be a leader in providing dispersed recreation as evidenced by the following opportunities: Mickelson and Centennial Trails, snowmobiling, cross-country skiing, ATV and ORV routes, an established network of Forest roads and hiking trails, the Peter Norbeck Scenic Byway, a multitude of fishing opportunities at National Forest lakes, and some of the best elk and deer hunting in South Dakota and Wyoming.

The Black Hills National Forest is well roaded with over 6,000 miles of federal, state, county and Forest Service roads serving approximately 1.3 million acres of National Forest land.

Evaluation:

The dispersed recreation opportunities discussed here provide background information that the Forest is providing a wide range of ROS classes but with emphasis on roaded recreation opportunities, both roaded natural and/or semi-primitive motorized. How the Forest is doing in meeting the overall Forest Plan ROS objectives cannot be determined using the monitoring data currently gathered.

Monitoring Item 33: Recreation Use, Trends, and Demographics

Objectives:

- 413. Provide interpretation, information and environmental education as an important part of outdoor recreation. Use "Tread Lightly", "Leave No Trace" and other techniques.**
- 417. Coordinate trail development with the State Comprehensive Outdoor Recreation Plan (SCORP). Develop trail facilities in cooperation with other agencies and partners.**
- 419. Provide for the annual designation and management of 350 miles of snowmobile trail by the States of Wyoming and South Dakota. Annual changes to the trail system should be limited.**

Monitoring:

Objective 413

The Forest's interpretation information and environmental education efforts are monitored through the number of products offered. Recreation funding (NFRW) provided a target of 15 interpretation and environmental education products to standard, which was met and reported in the Forest's annual Management Attainment Report (MAR).

The Moon Walk program, offered by the Mystic Ranger District, presented six programs during the spring, summer, and fall across the Forest with participation by all districts. The Pactola Visitor Center, located along Highway 385, was open five days a week from the middle of May to the end of September and seven days during the week-long Sturgis Motorcycle Rally in August. The Visitor Center provided information, education, and interpretation exhibits, including "Tread Lightly" messages and literature, on the Forest and its environment to over 65,000 visitors.

Evaluation:

Through its visitor center, moon walks, wilderness education, and interpretive portal signs along with other information and education efforts, the Forest continues to meet this Forest Plan objective. The Forest's partnership with the Black Hills Parks and Forest Association also provided staffing assistance at the visitor center, publications and interpretive products at Forest outlets, and supplemental funding for interpretive exhibits at the visitor center.

Monitoring:

Objective 417

The Forest provided its share of management of the Centennial Trail, a designated National Recreation Trail (NRT) jointly managed by Custer State Park, Black Hills National Forest, Bureau of Land Management, and the National Park Service. Trail work included annual trail maintenance and trail reconstruction efforts on the trail portions located on National Forest System lands. The Forest supported the Game, Fish, and Parks Mickelson Trail rail trail by providing engineering expertise for tunnel portal reconstruction and bridge inspections.

Evaluation:

The Forest is meeting this Forest Plan objective through its cooperative management of the Mickelson Trail and the Centennial Trail, along with its input to the South Dakota State Comprehensive Outdoor Recreation Plan (SCORP).

Monitoring:

Objective 419

The Forest continued its participation in a Memorandum of Understanding (MOU) with the Wyoming and South Dakota Snowmobile Trail programs with snowmobile trails located, signed, managed, and groomed on the Bearlodge Ranger District by the State of Wyoming and on the Northern Hills, Mystic, and Hell Canyon Ranger Districts in South Dakota. The Forest issued its annual winter travel management special order, which provides for snowmobile and cross-country ski trails on the Forest.

Evaluation:

This Forest Plan objective is being met through the Forest's fulfillment of its responsibilities outlined in its MOUs with the Wyoming and South Dakota snowmobile programs.

Monitoring Item 34: Access and Road Mileage

Objectives:

309. Provide the following changes to the National Forest System roads in support of long-term sustainable production of commodities.

Road Construction	280 miles/decade
Road Reconstruction	870 miles/decade
Road Obliteration	140 miles/decade
Two-track Obliteration	270 miles/decade

420. Manage travel corridors for federal, state and county roads.

- a. Meet a scenic integrity objective of high.
- b. Provide recreation facilities, trailheads, trail crossings and other road corridor components to meet demand.
- c. Include opportunities for pedestrians and bicycle ways.
- d. Use cooperative opportunities for development of outdoor facilities, such as provided for in the Intermodal Surface Transportation Efficiency Act (ISTEA) as an integral part of corridor planning.

421. Provide the following road system:

Roads (By End of the First Decade)		
Suitable for Public Use		4,700 miles
Passenger Car	1,200 miles	
High Clearance Vehicles	3,500 miles	
Roads Closed to Vehicles		500 miles
TOTAL		5,200 miles

Monitoring:

Objective 309 and 421:

The following is the status of the National Forest System (NFS) roads in FY2005:

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	FY01 Miles	FY02 Miles	FY03 Miles	FY04 Miles	FY05 Miles
NFS Maintenance Levels 1,2,3,4,5	5,385.1	5,397.1	5,449.0	5,443.0	5503.1
NFS Miles Constructed	2.1	7.0	9.0	8.5	4.7
NFS Miles Reconstructed	21.3	75.7	87.0	102.0	27.1
NFS Miles Under Forest Service Jurisdiction	4,800.0	4,812.0	4,839.0	4,910.1	4951.2
NFS Miles Under Local Government Jurisdiction	585.1	585.1	610.0	538.9	527.0
NFS Miles Obliterated	19.9	0	3.7	0.0	28.6
NFS Miles Open Year Long, Seasonally For Low Clearance Vehicles	741.0	718.0	715.0	673.5	675.6
NFS Miles Open Year Long, Seasonally Which Are Accessible To High Clearance Vehicles Only	3261.0	3,258.0	3158.0	3,129.0	3086.9

	1997 Revised Forest Plan (Miles/decade)	Accomplished FY2001 (Miles)	Accomplished FY2002 (Miles)	Accomplished FY2003 (Miles)	Accomplished FY2004 (Miles)	Accomplished FY2005 (Miles)
Road Construction	280	2.1	7.0	9.0	8.5	4.7
Road Reconstruction	870	21.3	75.7	87.0	48.8	27.1
Road Obliteration	140	19.9	0	3.7	0	28.6
Two-track Obliteration	270	32.7	6.0	9.0	10.0	70.8

Evaluation:

Objectives 309 and 421

Forest Plan Activities (Miles)	Accomplished FY1998-FY2005	Percent of Annual Compliance FY1998 – FY2005	Current Level -Percent of Total Goal
Road Construction	7.8 miles/yr	28%	22%
Road Reconstruction	74.2 miles/yr	85%	68%
Road Obliteration	12.2 miles/yr	87%	70%
Two-track Obliteration	26.4 miles/yr	98%	78%
	Current Inventory		
Suitable for Public Use	4,115 miles		88%
Passenger Car	979 miles		82%
High Clearance Vehicles	3,136 miles		90%
Roads Closed To Vehicles	1,168 miles		223%

Monitoring Item 35: Access and Off-Road Vehicle Access

Objective 422. Provide the following off-road travel opportunities:

Category	Percentage of Forest
All Motorized Travel Allowed Yearlong	59.1%
Seasonal Restrictions Apply	22.8%
Seasonal Restrictions - No Off-road Travel	3.2%
Backcountry Motorized Recreation on Designated Trails	1.0%
Only OHV Travel Prohibited	11.4%
Motorized Travel Prohibited Except Snowmobiles	1.2%
All Motorized Travel Prohibited	1.3%

Monitoring:

Travel management maps were developed for the entire forest. The map for the Bearlodge Ranger District in Wyoming is also a travel order. The map for Northern Hills, Mystic, and Hell Canyon Ranger District in South Dakota depicts the effects of existing travel orders. These maps are available free to the public.

Evaluation:

The Forest is addressing the issue of unmanaged recreation that has been identified by the Chief as a national priority. The Forest has initiated travel management planning data collection and began identifying issues, interests, and partners. The National Forest Advisory Board (NFAB) provided recommendations for immediate closure of special botanical areas initiating public education efforts including a travel management map, and development of a Forest-wide travel management plan. The NFAB began holding public meetings and gathering information through a questionnaire. Additional recommendations directed at issues to be addressed in the Forest-wide travel management plan will be provided by the NFAB in FY06. The Forest is continuing to compile data and develop processes for analyzing travel management issues on both Forest-wide and project levels. Several projects included travel management data collection and analysis in FY05. Some decisions were made for specific resource protection, some decisions were deferred pending larger scale analysis to assure options for Forest-wide access and off-road vehicle use are available.

Monitoring Item 36: Access and Trail Opportunities

Objectives.

416. Maintain and construct trails as displayed in the following table:

Non-motorized Trails (1996)	293 miles
Motorized Trails (1996)	14 miles
Non-motorized Trail Construction	204 miles
Motorized Trail Construction or Conversion from Road to Motorized Trail	15 miles
Total Forest Trail System	526 miles
Reconstruction	100 miles

418. Enhance the trail system to disperse use away from the Black Elk Wilderness.

**Monitoring:
Objective 416**

<i>1997 Revised Forest Plan</i>		FY2001	FY2002	FY2003	FY2004	FY2005
Existing Trail Inventory:						
Non-motorized Trails (1996)	293 miles	318.6	318.6	332.8	332.8	332.8
Motorized Trails (1996)	14 miles	14.2	14.2	13.7	13.7	13.7
New Trail Construction:	~	~	~	~	~	
Non-motorized Trail Construction	204 miles ¹	0.00	0.0	0.0	0.0	0.0
Motorized Trail Construction or Conversion from Road to Motorized Trail	15 miles ¹	0.00	0.0	0.0	0.0	0.0
Total Forest Trail System	526 miles ²	332.8	332.8	346.5	346.5	346.5
Reconstruction	100 miles ¹	18.0	4.2	10.2	11.4	1.6

¹Per decade

²Total Miles at End of Decade

**Evaluation:
Objective 416**

Forest Plan Objective	Percent Compliance FY1998 – FY2003
Non-motorized Trail Construction	¹ 0%
Motorized Trail Construction or Conversion from Road to Motorized Trail	² 0%
Reconstruction	³ 114.0%

Figures are based on the following goals by the end of the first decade:

¹ increase of 20.4 miles per year

² increase of 1.5 miles per year

³ increase of 10 miles per year

Monitoring Item 37: Access and Right-Of-Way Acquisition

Objective 503. Acquire approximately 25 rights-of-way each year to improve Forest access.

Monitoring:

		FY2000			FY2001		
Type	Cases	Miles	Acres	Cases	Miles	Acres	
Acquired	8	1.73	13.15	12	6.2	24.6	
FLPMA*	~	~	~	~	~	~	
Forest Road Easements Conveyed	3	1.10	4.7	4	3.5	14.1	
Private Road Easements Conveyed	7	.95	4.9	3	6.7	26.7	

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FRTA** Easements ¹	0	0	0	0	0	0
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Type	FY2002			FY2003		
	Cases	Miles	Acres	Cases	Miles	Acres
Acquired	3	4.2	10.6	2	2.9	11.8
FLPMA*	~	~	~	~	~	~
Forest Road Easements Conveyed	1	.09	.69	6	2.5	20.08
Private Road Easements Conveyed	17	6.06	25.8	14	1.9	15.37
FRTA** Easements ¹	0	0	0	2	0.3	2.52

Type	FY2004			FY2005		
	Cases	Miles	Acres	Cases	Miles	Acres
Acquired	3	1.05	4.37	2	.38	3.04
FLPMA*	~	~	~			
Forest Road Easements Conveyed	7	13.8	57.51	8	2.91	23.36
Private Road Easements Conveyed	14	5.0	20.82	5	1.85	10.02
FRTA** Easements ¹	1	0.18	0.75	1	1.51	12.1

*FLPMA - Forest Land Policy Management Act

**FRTA - Forest Road and Trail Act

¹Previously under special use permit that was converted to easements in 1998

Evaluation:

The Forest has acquired 20 percent of the Forest Plan right-of-way objective in the 7 years of the 1997 Forest Plan.

Monitoring Item 38: Land Adjustment

Objectives:

501. Conduct approximately 500 to 1000 acres of land exchange each year over the decade, such as through purchase, exchange or donation, whenever lands meet land-adjustment criteria in Guidelines 8101 through 8104.
502. Provide timely response to landowner requests for access across the National Forest.
504. Actively seek local government and tribal government input and support for those exchanges that substantially change the balance of federal and private lands.
505. Work with conservation groups, state agencies and others to develop and implement cost-effective land and resource protection measures such as conservation easements, etc.

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Monitoring:

Land Acquired Through Acquisition

	FY2001	FY2002	FY2003	FY2004	FY2005
Land Adjustment Completed	Acres	Acres	Acres	Acres	Acres
Land Acquired through Purchase	~	259	966	282	69
Land Acquired through Exchange	170	330	433	0	0
Land Acquired through Donation	0	0	80	0	0
Total Acquired	170	589	1,479	0	69
LESS:	~	~	~	~	~
Land Conveyed Out	89	176	475	11	0
NET CHANGE	+81	+413	+1,004	+271	+69

Land Being Acquired Through Acquisition

	FY2001	FY2002	FY2003	FY2004	FY2005
Land Adjustment Being Processed	Acres	Acres	Acres	Acres	Acres
Land Acquiring through Purchase		1,156	280	0	2,434
Land Acquiring through Exchange	617	473	1,020	900	678
Land Acquiring through Donation	80	80	0	0	0
Total Acquiring	697	1,709	1,300	900	3,112
LESS:	~	~	~	~	~
Land Conveying Out	641	504	1,070	1,376	850
NET CHANGE	+56	+1,205	+230	-476	+2,262

Evaluation:

The Forest has continued to foster communication with several conservation groups and state agencies with the objective of completing land adjustment exchanges and/or conservation easements for everyone's benefit. The Forest is a member of the Black Hills Conservation Initiative, which is a partnership of private landowners, communities, state and federal agencies, and other conservation groups, to protect wildlife habitat and open space. The Forest has stressed land exchanges over conservation easements as the means to benefit the public. These exchanges can be time consuming (sometimes as long as three to ten years), but the outcome of a more efficient and manageable land pattern is worth the time and effort expended.

Landowner requests for access across the National Forest are acted on as quickly as possible. The Forest has also been delegated the authority to sign the permits authorizing this use.

The Forest actively seeks input and support from local and tribal governments with respect to land exchanges. The local and tribal governments are notified early in the exchange process and asked if they have any concerns or recommendations regarding the exchange proposal. Any concerns or recommendations related are considered and evaluated throughout the exchange process. The governments are again notified during the NEPA phase of the project and again at the time of a decision being made.

Monitoring Item 39: Economic Efficiency

Report not available, limited Forest Plan Monitoring funding was devoted to more critical monitoring items.

List of Preparers

Item Number	Monitoring Item	Preparers
Introduction	What This Document Is	Jeffrey Ulrich
	Forest Plan Amendments	Edward Fischer
1	Air Quality	Dean Berger
4	Water	Steve Hirtzel
6	Riparian – Condition and Trend	Steve Hirtzel
7	Riparian/Wetlands – Habitat Restoration	Steve Hirtzel
8	Vegetative Diversity – Vegetation Species Composition	Blaine Cook
9	Vegetative Diversity – Structural Stages	Blaine Cook
10	Vegetative Diversity – Large Trees	Blaine Cook
11	Vegetative Diversity – Snags	Blaine Cook
12	Vegetative Diversity – Burned Forest Habitat	Blaine Cook
13	Growth Rate	Blaine Cook
14	Regeneration	Blaine Cook
15	Timber Production	Blaine Cook
16	Rangeland Trend	Craig Beckner
17	Forage Utilization	Craig Beckner
18a	Sensitive Species: Plants	Beth Burkhart
18b	Sensitive Species: Wildlife	Cara Staab and Steve Hirtzel
19	Species of Local Concern	Cara Staab
20	Threatened and Endangered Species	Cara Staab
21	Management Indicator Species	Cara Staab and Steve Hirtzel
23	Insect and Disease – Population, Damanage, Trend, and Hazard	Blaine Cook
24	Exotics	Blaine Cook
25	Fire Hazard in WUI and Forest Interior	Dean Berger
26	Fuel Treatment	Dean Berger
27	Fire Prevention and Suppression	Dean Berger
29	Scenery	Steve Keegan
30	Heritage Resources	Dave McKee

Item Number	Monitoring Item	Preparers
31	Wilderness	Craig Kjar
32	Recreation Opportunities	Craig Kjar
33	Recreation Use, Trend, and Demographics	Craig Kjar
34	Access: Road Mileage	Alan Anderson
35	Access: Off-Road Vehicle Access	Craig Kjar
36	Access: Trail Opportunities	Craig Kjar
37	Access: Right-of-Way Acquisition	Mike Beale
38	Real Estate: Land Adjustment	Mike Beale
39	Economic Efficiency	Jeffrey L. Ulrich
	Compiling and Editing	Peggy Woodward and Jamie Appelhans

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