

MONITORING IMPLEMENTATION GUIDE

Black Hills National Forest Plan

June 2004

Monitoring may be performed by the Forest Service or other interested parties. The methods to be used are described in this document. Other techniques that are widely used by the scientific community may also be used if they are approved in advance by the Forest Service. All data collected is subject to field checks and verification before it is accepted.

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INTRODUCTION

This document provides guidance on how to implement the monitoring and evaluation requirements of the Black Hills Land and Resource Management Plan (Forest Plan). It contains the methodologies and protocols to be used in implementing Chapter Four of the Forest Plan.

The guide is intended to be flexible and may be changed as new methodologies and techniques are developed. It allows the principles of adaptive management to be applied: as monitoring techniques are implemented they can be evaluated for their effectiveness and efficiency.

The guide uses information in the Forest Plan but it is not part of the Forest Plan. Changes to this document are not considered to be an amendment to the Forest Plan.

FORMAT

This document contains a section on each of the monitoring items listed in the Forest Plan on pages IV-5 through IV-7. The following information is provided for each monitoring item. Some monitoring items are separated further into sub-items.

AUTHORITY - This section describes the legal basis for the monitoring requirement. There are three levels. If funding limits preclude the ability to perform all monitoring, items specifically required by law or regulation would be the last to be affected.

The authority levels are:

- 1 - Monitoring is required by law.
- 2 - Monitoring is required by regulation.
- 3 - All other monitoring required by the Forest Plan.

INDICATOR - One or more indicator is specified. Indicators are variables to be measured which represent the monitoring item.

METHODS - The approach used for monitoring is discussed. This includes the survey method, what equipment is used, and any analysis methods.

UNIT OF MEASURE - What measurements are used for the indicator.

SAMPLE DESIGN - The sample design includes the number of samples, how they are located, and the frequency of sampling. When possible, the statistical basis of the sample design is discussed.

PRECISION/RELIABILITY - Two classes of precision and reliability are indicated in the Forest Plan for each monitoring item and are repeated here because sub-items may vary.

The precision/reliability classes are:

Class A: These methods are generally well accepted for modeling or measuring the resource. The methods used produce repeatable results and are often statistically valid. Reliability, precision and accuracy are very good. The cost of conducting these measurements is higher than other methods. These methods are often quantitative in nature.

Class B: These methods of measurement are valuable tools that are based on a variety of techniques. These tools include project records, communications, on-site ocular estimates, and less formal measurements like pace transects, informal visitor surveys, air photo interpretation and other similar types of assessments. Reliability, accuracy, and precision are good but usually less than Class A. Class B methods are often qualitative in nature, but still provide valuable information on the status of resource conditions.

REPORTING FREQUENCY - The reporting frequency is indicated in the Forest Plan for each monitoring item and is repeated here because sub-items may vary. The reporting frequency (in years) should not be confused with the monitoring frequency described in the sample design. When scheduled for reporting, all Forest Plan monitoring and evaluation will be reported in the annual monitoring and evaluation report.

INFORMATION STORAGE - This describes where the data collected from monitoring can be found.

RESPONSIBILITY - This describes who will be doing the monitoring. This includes Forest Service personnel, other agencies, and opportunities for private citizens.

COST - Estimates of costs are provided. However, this is not a budget document, and actual implementation costs may vary considerably from year to year.

Monitoring Item 1: AIR - Air Quality

Authority: Level Three

Indicators: Any violation or near violations.

Method of Data Collection: Violations as recorded at Rapid City monitoring sites.

Unit of Measure: Number of violations.

Sample Design: Monitoring by the state through its Rapid City monitoring sites.

Data Precision and Reliability: Class A

Frequency of Reporting: Annually

Information Storage System: The annual "South Dakota Ambient Air Monitoring Network Review" and the quarterly "Rapid City PM10 Monitoring Report" by the South Dakota Department of Environment and Natural Resources.

Responsibility: Forest Air Quality Officer

Cost: Three weeks time of air quality officer, about \$3,000 per year

Monitoring Item 2: SOILS - Soil Productivity

Authority: [36 CFR 219.23(e)]

Level Two

Indicators: Physical condition of surface soils: level of erosion, compaction, disturbance.

Method of Data Collection:

Intensively monitor two timber sale cutting units per year. Monitor five other timber sale cutting units less intensively, i.e. using a tile spade.

Intensively monitor two rangeland sites using the same procedure; and monitor a minimum of five other rangeland sites less intensively to determine if excessive erosion is occurring.

Visual monitoring of new soil disturbing activity, e.g. road construction, trail construction.

Unit of Measure: Acres of Timber sale cutting units, Acres of rangeland sites, Acres of other soil disturbing activities.

Sample Design: See "Guidelines for Sampling Some Physical Conditions of Surface Soils", USFS 1985, based on a sample size analysis and indicators provided by the Rocky Mountain Station.

Data Precision and Reliability: Intensive Monitoring: Class A; Visual Monitoring: Class B

Frequency of Reporting: 5 Years

Information Storage System: SO soils monitoring files

Responsibility: Soil Scientist with assistance from District personnel, or Contract for collection and lab preparation of samples. R2 Regional Soil Scientist analyzes the data to determine results. Public can be involved in collection of the samples and lab processing of samples collected.

Cost: Four weeks of soils scientist's time. Four weeks total of district assistance. Total approximate cost \$6,000/year.

Monitoring Item 3: SOILS - Revegetation

Authority: Level Three

Indicators: Signs of erosion: rock or plant pedestalling; rills; gullies; stability of streambanks, or lack of acceptable ground cover.

Method of Data Collection: Forms from Contract administrators, Resource Management Reviews, field observation by district and SO personnel

Unit of Measure: Acres with each Project Area

Sample Design: Information collected from all timber sale projections. Sample review of disturbance from project or management activities as needed; Minimum of 2 districts annually to be reviewed.

Data Precision and Reliability: Class B

Frequency of Reporting: 5 years

Information Storage System: SO soils monitoring files

Responsibility: District and Supervisor's Office personnel. Public can be involved.

Cost: Two weeks of soil scientists's time. Two weeks per district. Approximate cost of \$10,000 per year.

Monitoring Item 4: WATER - Watershed Health

Sub-Item 4a: Watershed Assessment

Authority: [36 CFR 219.23(e)]

Level Two

Indicators: MAR classification:

Class I: REGIMEN ATTAINMENT. Robust health. No long-term changes result from even major storms. Risks of human-caused deterioration are very low. Dynamic equilibrium is shown by a stable stream network, and are so maintained by using preventive WCPs, BMPs, BMMPs, and Forest Standards and Guidelines.

Class II: SPECIAL EMPHASIS. The watershed does not meet Class I criteria. Some streams, upland soils, and riparian areas may need restoration but major capital investments are not needed to restore Class I conditions. The watershed may be sensitive to disturbance due to fragile streams and soils, or may not yet have reached a dynamic equilibrium following past damage. Class I condition can be restored by slowing the rate or changing the nature of management actions, or by applying WCPs, etc., more rigorously.

Class III: INVESTMENT EMPHASIS. The watershed requires capital investments to restore Class II conditions. Watersheds can be restored only if management is limited to actions that complement watershed recovery, and if watershed improvements are applied.

Methods of Data Collection: Based on existing knowledge; especially maps and the knowledge of field-going personnel. Will incorporate State information and stream classifications. Information will be mapped and watersheds assigned a MAR class of I, II, or III. Watersheds assigned a class II or III will be scheduled for additional monitoring. Watershed assessments will be updated with additional data gathered from project-level analysis.

Unit of Measure: 6th-level watershed.

Sample Design: All watersheds will be assessed at this level once during the planning period or as needed.

Data Precision and Reliability: Class B

Frequency of Reporting: Changes in watershed class due to project level analysis will be discussed in the Analysis of the Management Situation. Re-analysis of all 6th level watershed classes will occur during the next Forest Plan revision process.

Information Storage System: SO watershed files; ARC/INFO files on IBM system.

Responsibility: SO and District personnel.

Cost: 2 weeks for Forest Hydrologist, 3 weeks, GIS coordinator, 4 days for district personnel, approximately \$10,000 per year as needed.

Sub-Item 4b: Riparian-Wetland Assessment

Authority: Level Three

Indicators: Determining existing ecological status and management objectives for the area, as described in the Bureau of Land Management's "Process for Assessing Proper Functioning Condition" (BLM, TR 1757-9, 1993)

Methods of Data Collection: The Proper Functioning Condition (PFC) methodology will be used to further assess Class II and III watersheds. This is an interdisciplinary approach. The IDT looks at stream reaches and determines the capability and potential of the reach.

Unit of Measure: Miles of stream reach in proper functioning condition, at-risk, or non-functional.

Sample Design: Class III watersheds, or those with stream reaches which have been listed by the states as either non-supporting or partially supporting of state designated beneficial use, will be assessed first using the PFC process, followed by Class II watersheds. (2 weeks IDT annually)

Data Precision and Reliability: Class B

Frequency of Reporting: 5 years.

Information Storage System: RWSW PC Database

Responsibility: Forest Interdisciplinary Team

Cost: Approximately 2 weeks per year for Forest ID team, approximately \$8,000 per year.

Sub-Item 4c: Stream Health

Stream health includes chemical, physical and biologic integrity. Water Quality here refers to meeting State chemical water quality standards.

Sub-Item 4c(1): Water Quality

Authority: [State Law - Clean Water Act] Level 1

Indicators: Meeting State water quality standards

Methods of Data Collection: State standards are monitored by collecting grab samples at the 19 stations Forestwide. Some parameters are analyzed on site, some are analyzed in the Forest Soil and Water lab, and some are analyzed by private laboratory.

Unit of Measure: dependent upon parameter.

Sample Design: The nineteen stations scattered across the Forest were chosen to represent major drainages and give an overall view of Forest water quality. Certain special interest watersheds or situations are also sampled. Grab samples are collected at all 19 stations twice a year, in late spring/early summer and again in late summer/early fall. Two or three of these sites will be chosen for additional weekly, or bi-weekly monitoring during this period.

Data Precision and Reliability: Class A. (Standard methods applied as control for reliability. State certified labs are used.)

Frequency of Reporting: 2 years. (Reports of the results of water quality sampling are available as needed, and sent to the States as part of their biennial report.)

Information Storage System: Data from the last 13 years is currently stored in the RWSW PC Database. This database will be updated yearly. Data previous to this is on the STORET system.

Responsibility: SO personnel

Cost: Water Quality Sampling:

Hydrotech GS-1316-4/5 and water quality analysis \$10,000

Hydrotech GS-1315-11 results analysis and report: \$700

Sub-Item 4c(2): Stream Health Range – Stream Habitat Integrity

Authority: Level Three

Indicators: Changes to stream parameters over time.

Method of Data Collection:

- Monumented Cross-section
- Longitudinal Profile Measurement
- Bed and Bank Material Characterization
- Discharge Measurement
- See ‘Stream channel reference sites: an illustrated guide to field technique’, Harrelson 1994.

Unit of Measure: Number of Sites

Sample Design: Up to nineteen references (sites) reaches scattered across the Forest will be chosen. They represent the best stream conditions across the Forest. Also additional sites will be established as needed for project or program monitoring.

Data Precision and Reliability: Class A

Frequency of Reporting: 5 years

Information Storage System: NRIS

Responsibility: Forest Hydrologist with assistance from District personnel.

Cost: Set up: \$1,600 per site. Includes permanent setup, data collection and data processing.

Sub-Item 4d: Monitoring implementation and effectiveness of BMPs, BMMPs, Forest Plan Standards and Guidelines and Watershed Conservation Practices.

Authority: Level Three

Indicators: Attainment and effectiveness of BMPs.

Method of Data Collection: Implementation and effectiveness monitoring forms have been developed by a Forest team. These, or similar forms will be filled out by district personnel working at the project level.

Unit of Measure: Yes/No, with written explanation.

Sample Design: The forms will be collected and analyzed in the SO annually.

Data Precision and Reliability: Class B.

Frequency of Reporting: 5 years

Information Storage System: District Project files, S.O. watershed files, and RWSW PC Database.

Responsibility: Districts and S.O.

Cost: 3 district GS-4/5 seasonal employees for 4 weeks each and 1 S.O. GS-5 seasonal employee for 4 weeks.

One week of Forest Hydrologist's time. Total \$12,000 per year for effectiveness (\$7,000) and implementation (\$5,000) of monitoring.

Implementation monitoring by Timber Sale Administrators, approximately \$5,000 per year. (No additional cost for monitoring.)

Monitoring Item 5: WATER QUANTITY (Water Yield)

Authority: [36 CFR 219.23(c)]

Level Two

Indicators: Evaluation of water yield and comparison with Forest Plan projections.

Method of Data Collection: Calculations are based on the RIS database used in FORPLAN. The RIS sites and an isohyetal map are overlaid on the watershed maps using ARCINFO. Water yield can be calculated as a Forest average also.

Unit of Measure: Acre-feet; based on proposed changes in basal area and average watershed precipitation

Sample Design: All Sixth-level watersheds, reviewed every five years.

Data Precision and Reliability: Class A. (Reliable to the extent that the WRENNS model, based on data from the Sturgis Experimental Watershed, is transferable to other Forest watersheds.)

Frequency of Reporting: 5 years

Information Storage System: S.O. watershed files and RWSW PC Database

Responsibility: Forest Hydrologist

Cost: 2 weeks of hydrologist's time per year, approximately \$2,000. One week of Forest Plan Analyst's time, approximately \$1,000.

Monitoring Item 6: RIPARIAN/WETLANDS - Riparian Habitat Restoration

Authority: Level Three

Indicators: Restoration activities, as indicated in the Forest Plan, have been completed

Method of Data Collection: Yes/No, and how many. Documentation that restoration activities have been completed

Unit of Measure: Number of stream reaches

Sample Design: All projects sampled.

Data Precision and Reliability: Class B

Frequency of Reporting: 5 years

Information Storage System: District project files and Supervisor's Office riparian management files

Responsibility: Supervisor's Office with assistance from District personnel

Cost: Approximately \$500 per project

Monitoring Item 7: VEGETATIVE DIVERSITY - Species Composition and Structure

Sub-Item 7a - Species Composition:

Authority: [36 CFR 219.26]

Level Two

Indicators: Total acres and percent of landbase by cover type. Distribution across the forest on a map.

Method of Data Collection: 1. Photo interpretation and walk through surveys. 2. Collection of RIS database from recently treated areas and from sites with no data.

Unit of Measure: 1. Percent of landbase 2. Acres

Sample Design: 1. Low intensity. Walk through surveys. 2. Report from RIS database

Data Precision and Reliability: Low intensity walk through surveys: Class B; Information from RIS database from Stage II inventories: Class A

Frequency of Reporting: 5 years

Information Storage System: RIS Database using ORACLE software and ARC/INFO;

Responsibility: Districts responsible for database updates, SO responsible for synthesizing data for report.

Cost: Most costs associated with forest inventory program of work. Additional cost of \$500 per project to evaluate the data.

Sub-Item 7b - Structure:

Authority: Level Three

Indicators:

1. Within stand vertical diversity
2. Structural Stage distribution, extent and distribution

Method of Data Collection:

1. Photo interpretation; stand inventory; surveys; post treatment surveys
2. RIS Database and GIS link.

Unit of Measure: Acres

Sample Design: Report from RIS database of forest Stage II inventories.

Data Precision and Reliability: Class A

Frequency of Reporting: 5 years

Information Storage System: RIS Database (using ORACLE software) and ARC/INFO

Responsible Person/Group: Districts responsible for database updates, SO responsible for synthesizing data for report.

Cost: Most costs associated with forest inventory program of work. Additional cost of \$500 per project to evaluate the data.

Monitoring Item 8: VEGETATIVE DIVERSITY - Late Succession

Authority: Level Three

Indicators: Changes in the condition of areas identified for late succession

Method of Data Collection: RIS, GIS, field surveys

Unit of Measure: Acres

Sample Design: Field surveys in areas identified as being impacted.

Data Precision and Reliability: Class A

Frequency of Reporting: 5 years, unless natural disturbance warrants earlier reporting

Information Storage System: RIS database (using ORACLE software) and ARC/INFO

Responsibility: Districts responsible for database updates, SO responsible for synthesizing data for report.

Cost:

\$2/acres disturbed each year.

One week of forest wildlife biologist and GIS technician's time (Approximately \$2,000 per year)

Monitoring Item 9: VEGETATIVE DIVERSITY - Snag Retention

Authority: [36 CFR 219.19]

Level Two

Indicators: Snag densities

Method of Data Collection: Snag transects; Stage 2 data analysis.

Unit of Measure: Snags per acre meeting Forest Plan criteria.

Sample Design: Snag density estimates are conducted for each planning unit. Each planning unit uses transects or Stage 2 analysis to provide an accurate snag density estimate per project area.

Data Precision and Reliability: Class B

Frequency of Reporting: Annually

Information Storage System: RWSW PC Database

Responsibility: SO in coordination with Districts.

Cost:

Analysis and reporting, approximately one week of forest biologist's time per year, approximately \$1,000 per year.

Monitoring Item 10: VEGETATIVE DIVERSITY - Thermal Cover

Authority: Level Three

Indicators: Forested stands meeting thermal cover definition.

Method of Data Collection: Photo interpretation; stand inventory with ground truthing

Unit of Measure: Acres

Sample Design: Review of Report from RIS database (using stands which have been inventoried through project planning)

Data Precision and Reliability: Class B

Frequency of Reporting: 3 years

Information Storage System: RIS database (using ORACLE software) and ARC/INFO

Responsibility: SO in coordination with Districts.

Cost: Most costs associated with forest inventory program of work. Additional cost of \$1,000 per year to evaluate the data.

Monitoring Item 11: VEGETATIVE DIVERSITY - Down/Dead Woody Material

Authority: Level Three

Indicators: Dead woody material on forest floor.

Method of Data Collection: Post treatment fuels transects

Unit of Measure: Tons per acre material; greater than three inches in diameter

Sample Design:

1. Low intensity walk through using photo series fuel interpretation, or transect sampling method proposed by the Rocky Mountain Research Station or Intermountain Research Station; or
2. Ten percent of treated acres per year sampled with fuel transects as part of prescribed burn plan development and monitoring or post sale evaluation

Data Precision and Reliability: Class B

Frequency of Reporting: Annually

Information Storage System: District project files and SO soils/ecology files

Responsibility: Districts with assistance from Supervisor's Office

Cost:

Walk-throughs are approximately \$1.50 per acre.

Fuel transects will cost \$2.00 per acre (total acres is ten percent of the treated acres each year.)

Monitoring Item 12: COMMODITY PRODUCTION - Growth Rate

Authority: Level Three

Indicators: Yield of merchantable wood fiber

Method of Data Collection: Stand inventory surveys (permanent plot surveys - Stage I).

Unit of Measure: Cubic feet per acre per year

Sample Design: High intensity plot surveys.

Data Precision and Reliability: Class A

Frequency of Reporting: 10 years

Information Storage System: Stage 1 Inventory Report

Responsibility: Forest Silviculturist

Cost: Most costs associated with forest inventory program of work. Additional cost of \$1,000 to evaluate the data.

Monitoring Item 13: COMMODITY PRODUCTION - Regeneration

Authority: [36 CFR 219.27(c)(3)]

Level Two

Indicators: Trees per acre

Method of Data Collection: Regeneration Surveys (post treatment surveys)

Unit of Measure: Trees per acre.

Sample Design: High intensity plot surveys of all regeneration harvests (walk through in some areas)

Data Precision and Reliability: Class A

Frequency of Reporting: Annually

Information Storage System: RIS database (using ORACLE software)

Responsibility: Districts

Costs:

\$2,000 per timber sale.

Monitoring Item 14: COMMODITY PRODUCTION - Timber Production

Authority: Level One - National Forest Management Act

Indicators: Yield of forest products.

Method of Data Collection: Timber sale accounting and reports.

Unit of Measure: 100 cubic feet.

Sample Design: Timber cruises, very high intensity.

Data Precision and Reliability: Class A

Frequency of Reporting: Annually

Information Storage System: Timber Sale Statement of Accounts (TSSA).

Responsibility: S.O. and districts

Cost: No additional cost above normal program of work.

Monitoring Item 15: COMMODITY PRODUCTION - Forage Production

Authority: [36 CFR 219.20(a)]

Level Two

Indicators: Yield of forest products

Method of Data Collection: Through RIS database. Acres of each structural stage will be obtained from RIS database. Changes in canopy cover/stem basal area will be used in calculating total forage production.

Unit of Measure: Outputs are measured in total pounds of understory production per year. The total pounds are generated by applying the formulae of Uresk and Severson, and Pase for the two different soil parent materials of the Black Hills. These equations relate understory production to overstory basal area.

Sample Design: No field data taken.

Data Precision and Reliability: Class B

Frequency of Reporting: 10 years.

Information Storage System: Structural stage acres are in the RIS database.

Responsibility: S.O. interdisciplinary team.

Cost: Approximately three weeks of Forest Planner's time (approximately \$3,000)

Monitoring Item 16: COMMODITY PRODUCTION - Rangeland Trend

Authority: [36 CFR 219.20(a)]

Level Two

Indicators: Variation from desired conditions

Method of Data Collection: Cover-frequency analysis, repeat photography, other acceptable techniques determined by Forest Supervisor

Unit of Measure: Acres meeting or moving towards desired condition

Sample Design: Follow accepted procedures and methodologies for determining trend. Compare them with reference sites (desired condition locations). Repeat methodology five years after initial readings to determine trend of vegetation under management as compared to the first readings. If repeat photography is used, repeat photographs every year from fixed photo points.

Data Precision and Reliability: Class B

Frequency of Reporting: 10 years

Information Storage System: Allotment Management Project file

Responsibility: Monitoring may be performed by the Forest Service, permittees, or other interested parties. Methods that will be used by the permittees or interested parties are to be approved prior to data collection. The Rangeland Analysis and Management Training Guide (USDA FS R2, 1996) provide a variety of acceptable techniques for trend monitoring. Other techniques that are widely used by the scientific community may also be used if they are approved by the Forest Service. All data collected is subject to field checks and verification before it is accepted.

Cost:

Costs associated with routine Allotment permit administration. Additional cost of \$4,000 to evaluate the data.

Monitoring Item 17: COMMODITY PRODUCTION - Forage Utilization/Residual

Authority: Level Three

Indicators: Percent utilization or stubble height.

Method of Data Collection: Forest Service Range Specialists, permittees, or other interested parties in cooperation with the Forest Service.

Unit of Measure: Percent of annual production, or stubble height to date.

Sample design: To follow accepted procedures of the methodologies listed in the Rangeland Analysis and Management Training Guide or other widely accepted scientific methodologies. Permittee performs analysis on each pasture every year. Forest Service performs the analysis on allotments which in the Range Specialist's opinion are showing signs of excess use. Forest Service verifies permittee or other interested party monitoring.

Data Precision and Reliability: Class B

Frequency of Reporting: Annually

Information Storage System: Allotment Management Project file.

Responsibility: Monitoring may be performed by the Forest Service, permittees, or other interested parties. Methods that will be used by the permittees or interested parties are to be approved prior to data collection. The Rangeland Analysis and Management Training Guide (USDA FS R2, 1996) provides a variety of acceptable techniques for trend monitoring. Other techniques that are widely used by the scientific community may also be used if they are approved by the Forest Service. All data collected by other than Forest Service employees or contractors is subject to field checks and verification before it is accepted.

Cost:

Costs associated with routine Allotment permit administration. Additional cost of \$3,000 per year to evaluate the data.

Monitoring Item 18: SENSITIVE SPECIES

Monitoring Item 18a: SENSITIVE PLANT SPECIES

(Revised April 15, 2004; RMRS Consultation Occurred June 12, 2004)

Authority: Forest Plan

Indicators: Individual species monitoring. Population persistence.

Method of Data Collection: Field monitoring using the Black Hills National Forest Rare Plant Survey/Monitoring Form, Species Specific Monitoring Forms or Global Positioning System with Data Recording Capabilities.

Unit of Measure: Populations or occurrences (sites)

Sample Design: (Indicated by species below)

General: The monitoring described for each species is based on recent assessments prepared for a number of the species in 2002 and 2003, state heritage database information, survey and/or monitoring information for individual species, the number of currently known occurrences, or the number of individuals at single occurrences, and recognition that numbers of individuals may largely be influenced by fluctuations in climatic conditions (i.e. several wet years in a row; several drought years) or changes in canopy closure. In addition, various exotic species and/or noxious weeds have potential to invade some of the occurrence sites. These influences, along with other disturbances that could impact portions of occurrences, served as factors driving the monitoring design for each of the species below. Abundance of occurrences (single occurrences versus multiple occurrences), how species occur geographically (i.e. multiple drainages) across the Forest, species habitats (i.e. riparian habitats with flooding characteristics that can remove and/or result in re-colonization of species) and potential of risks that could affect the long-term persistence of the species were also used as factors in the design of the monitoring. For the species that are more widely distributed throughout the Black Hills and have a larger number of sites and many individuals per site, the monitoring design included the selection of key monitoring sites.

Consultation with the Rocky Mountain Research Station occurs on monitoring design for the plant species listed below. Monitoring data, along with additional new occurrence and site information are used to annually reassess the adequacy of the monitoring design.

If monitoring indicates that populations are absent, severely degraded, or noxious weeds are present, active measures are to be taken in accordance with the Black Hills National Forest Land and Resource Management Plan, along with any current amendments to the Plan

Site numbers are assigned to occurrences of the sensitive plants. Site numbers are composed of a nationally accepted species code (refer to the Natural Resources Conservation Service PLANTS Database) followed by a number. An example of a site number for a *Platanthera orbiculata* occurrence would be PLOR4-2.

Viola selkirkii (Great Spurred Violet)

Eighteen occurrences of *Viola selkirkii* are currently known to occur within the Black Elk Wilderness, Norbeck Wildlife Preserve and Custer State Park in the Black Hills, including one new occurrence recorded in 2003 in the lower elevations of the Norbeck Wildlife Preserve. Eleven of the occurrences are located within four distinct watersheds on lands administered by the Black Hills National Forest. A 2003 late summer

observation was made of a likely *Viola selkirkii* occurrence (individuals estimated in the 500-1000 range) in the Upper Pine Creek Research Natural Area. If the site is returned to and confirmed during the 2004 flowering period, this would increase the number to 19 occurrences. Because additional potential habitat is believed to occur in relatively remote areas of the Black Elk Wilderness, there may be additional occurrences that have not yet been documented.

On the Forest, *Viola selkirkii* is relatively secure from most potential risks, with the potential exception of an extreme climatic change. The 10 previously known occurrences on Black Hills National Forest lands are not currently at risk from management activities (i.e. timber management and grazing is not currently occurring at known occurrences) but may be vulnerable to impacts from hikers and rock climbers in the future. In addition, invasion by noxious weeds or other exotic 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. The new occurrence found in 2003 is made up of two primary sub-populations. One of the sub-populations is located along a small creek approximately 30 meters from a permitted summer cabin in the Norbeck Wildlife Preserve. The other sub-population is located upstream near the Custer State Park boundary and near the Sunday Gulch Trail. There was no observed trampling effects to the occurrence documented at the time baseline data were collected; however it is recognized as a potential risk because of the proximity to the cabin and the trail. In addition, a portion of the population is under an electric utility line, and maintenance activities have occurred (tree trimming below). Some of the *Viola selkirkii* plants occur in among the slash created by trimming trees along the utility line.

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 and included in the 2004, annual monitoring of the new 2003 occurrence that may have risks associated with powerline activities and human trampling. 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 need to occur during the violet's flowering period, which is generally from May 10 to May 30, when the species can most easily be identified.

The monitoring design includes re-inventory of known 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 and following a drought cycle (or at least two consecutive years of below average precipitation). Occurrence numbers collected in 2000 and 2001 may be a reflection of a series of relatively wet years since 1996 (NOAA 1996-2001). Documenting relative occurrence levels and extent of great-spurred violet during dry years will hopefully provide insights into the role that precipitation plays in the distribution and abundance of this species. Finally, the monitoring design includes monitoring great-spurred violet sites that are affected by a fire or significant flood event.

The current protocol design includes annual monitoring of "Violet Valley" in Norbeck Wildlife Preserve. The "Violet Valley" site was selected because it is one of the three largest occurrences of great-spurred violet 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 exotic plant (includes noxious weeds) invasion. Annual monitoring of the new 2003 Sunday Gulch occurrence is included into the current protocol design because of the combination of potential risks associated with powerline activities and human trampling. Although no weeds were observed at the site in 2003, there is potential for exotic plant invasion. Further, because these are two of the lower elevation sites, it is likely that declines associated with drought conditions would occur here before they occur at higher elevations. The Violet Valley and Sunday Gulch locations will be used as an indicator of whether other sites need to be monitored. The current trigger for additional monitoring would be the absence of one or more of the four largest patches (there are nine distinct patches) at the Violet Valley site, or the absence of one of the two sub-populations at the Sunday Gulch site. If this occurs, an effort will be made to document the reason (that is, drought, elk, weeds) and select two

additional *Viola selkirkii* occurrences to monitor based on the cause of the disruption and current information on known risks to other sites.

Monitoring Design:

1. On an annual basis, monitor presence/absence of the four largest sub-populations at site number VISE2-2, “Violet Valley” and the two sub-populations at VISE2-11, Sunday Gulch. If one or more of the four largest sub-populations at “Violet Valley” or one of the two sub-populations 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.
2. Document any weeds designated as noxious by South Dakota and Wyoming. Document if the weeds are co-located with *Viola selkirkii* or at what distance the weed species is located away from the occurrence site.
3. On any currently known violet site that is affected by a flood or fire event, monitor for presence/absence.



***Epipactis gigantea* (Giant Helloborine)**

The only known occurrence of *Epipactis gigantea* is located along Cascade Creek in the southern Black Hills. The species is located on land administered by the Black Hills National Forest at Cascade Springs. This occurrence is a small portion of a much larger population, of which the majority occurs downstream on The Nature Conservancy’s Whitney Preserve. Recent data (2000-2002) document increased extent of the orchid in comparison to earlier reports. However, the current size of the orchid population could be in response to several recent years of higher than average moisture in the Black Hills (NOAA 1996-2001), as well as recent conservation activities taking place in the Cascade Creek valley. The population appears to be stable or increasing, but there is insufficient data to demonstrate a trend at the present time.

The confinement of this species 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 subpopulations of the species in the watershed will potentially help buffer against any potential catastrophic disturbances in the area.

Effects associated with ongoing recreational use and invasion by, or treatment of, exotic plant species (including noxious weeds) are currently considered to be the most significant risks to the fern and its habitat on the Black Hills National Forest administered lands. Footpaths and visitor created “nick trails” (visitor created paths that have been or can be created simply by recreationists leaving the developed established trail system to access sections of Cascade Creek), trampling of vegetation, or 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 State listed noxious weed and, *Elaeagnus angustifolia* (Russian olive), and *Tamarix* sp. (salt cedar), are non-native invasive species of concern, which 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 riparian natives such as *Epipactis gigantea*.

Additional potential risks to the species 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 *Epipactis 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 expands 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 along stream transects and recording any new occurrences. The current design includes documenting any changes to the population to be indicated on baseline map diagrams for both sites. Monitoring is to document “nick points or trails” that actually extend into *Epipactis gigantea* patches. Monitoring also includes documenting stream bank erosion, weeds or other disturbances in or near the populations. If the extent of the mapped patches declines by 10 percent or more, the monitoring design includes consultation with ecologists, botanists and biometricians knowledgeable about the species to develop a more rigorous monitoring strategy. Monitoring is most efficiently conducted during the orchid’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 being monitored by the USGS. A water level monitor (piezometer) had been considered for installation for 2002, but was then determined that the site does not lend itself to using this monitoring method. 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. The plans are to evaluate the Cascade Springs site in 2004 to see if permanent transects can be placed across the stream to measure water levels.

Monitoring Design:

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.
2. Recreation nick point: Document the number of nick points that actually extend into populations.
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.
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.
5. Document erosion patches occurring at any *Epipactis gigantea* patch.
6. Document any verifiable unauthorized collections of *Epipactis gigantea*.

***Salix serrisima* (Autumn Willow)**

Two occurrences of *Salix serrisima* are currently known to occur on land administered by the Black Hills National Forest. Until 2002, a single occurrence of *S. serrisima* was known to occur at McIntosh Fen Botanical Area. A second occurrence was discovered within a fenced enclosure along Middle Boxelder Creek in 2002. The persistence of this species in the Black Hills is dependent on conserving these two known

populations.

Because this 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 posing concern 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 Canada thistle from the autumn willow habitat. *Lythrum salicaria* (purple loosestrife) is not known to occur at either of the sites, or anywhere close by, but is very aggressive and has the potential to out compete riparian natives, including *Salix serrisima*. A fungal infection was noted on the leaves of autumn willow at McIntosh Fen in 2001 and willow borer has been documented at the Middle Boxelder Creek occurrence. 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 the autumn willow occurrence. At this time, no impacts have been documented to the willow from either activity. Although no impacts have been documented from wildlife use or trespass cattle at these sites, both could be a potential risk at either site.

A rigorous monitoring strategy was designed and implemented in 2000 for the occurrence at McIntosh Fen, and has been revised to add the second autumn willow occurrence and to continue to attempt to detect and respond in a timely manner to changes in extent and condition of autumn willow and it's 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 with rust fungus or other damaging agents, 4) water table level, and 5) presence of exotic invasive species.

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 has been observed above-ground during higher precipitation years, an above ground water level sampling method may be used. This method is included for the protocol for 2004.

Monitoring of *Salix serrisima* needs to occur in June during the blooming period so that the total number of reproductive individuals can be determined.

Monitoring Design:

On an annual basis at both *Salix serrisima* sites:

1. GPS new endpoints if site boundaries have changed.
2. Count individuals during the blooming period (documenting total number of individuals, and total reproductive individuals). If the number of individuals declines by more than 10%, consult on a more rigorous design with the Rocky Mountain Research Station.
3. Document the number of plants infected with rust fungus or other damaging agents (i.e. willow borer).
4. Measure aboveground water levels by bisecting the sub-populations (one permanent transect at each sub-population) at McIntosh Fen, and bisecting the Middle Fork Boxelder occurrence (one permanent transect). The transects need to extend into the dry area above where any surface water could be expected to expand. This monitoring needs to occur on the same calendar date from year to year.
5. Document any weeds designated as noxious by South Dakota or Wyoming. Document if the weeds are co-located with *Salix serrisima*, or at what distance the weed species is located away from the occurrence site if they are occupying the same ecological type.

Lycopodium complanatum (Trailing Clubmoss)

There are currently four known occurrences of *Lycopodium complanatum* located on Forest Service administered lands in the Black Hills identified with the following site numbers: (LYCO-1, LYCO-2, LYCO-3 and LYCO-4). Sites LYCO-3 and LYCO-4 were located late (September and October) in 2002. Site number LYCO-4 was a new occurrence located in an area burned by the Grizzly Gulch wildfire, and it is unknown what long-term effects the fire will have on the persistence of the species at this site.

The greatest risk identified to *Lycopodium complanatum* based on baseline data gathered from sites of LYCO-1, LYCO-2 and LYCO-3, is the small number and limited size of occurrences on Forest Service administered lands. There are currently no apparent or ongoing risks to the species, but the known locations of this boreal remnant species are small enough that random events, such as drought or fire, could eradicate an occurrence. Although exotic, invasive plants are not currently an immediate risk to the species, there is potential for invasion because of their proximity.

Because the persistence of this species is contingent on conserving occurrences on public land, the current monitoring protocol is designed to detect and respond in a timely manner to changes in the extent and condition of the species and its habitat. The species is an evergreen and can be monitored at any time during the growing season (May to September) but is best observed in the spring or fall when overstory or other understory vegetative cover is low, but it is still possible to detect and identify any exotic plants known to be invasive. Impacts associated with attempts to monitor populations at these sites may be the greatest risk to the species. The monitoring design has been modified to keep site disturbance at a minimum.

Monitoring Design:

1. Monitor the following *Lycopodium complanatum* sites for presence/absence on an annual basis:
 - LYCO3-1 (Sand Creek site),
 - LYCO3-2 (Custer Crossing site)
 - LYCO3-3 (Bear Butte Creek site)
 - LYCO3-4 (Grizzly Gulch wildfire site)
2. Install permanently placed PVC pipe along the edge of LYCO-1 at the easiest visual observation point. The PVC pipe will act as a visual linear transect dividing the site into segments. If 10% from any one of the segments is missing, then the rest of the site will be examined. This allows monitoring of the site with minimal human impact. If the extent declines by 10% or more, consult on a more rigorous design with the Rocky Mountain Research Station.
3. 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.

Platanthera orbiculata (Large Roundleaf Orchid)

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 administered land, each within a different geological type: 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 the forest at this time. Long-term droughts or dramatic climate changes characterized by drier and warmer conditions may present the greatest risk to the orchid and its habitat. All currently known occurrences are within grazing allotments, with the exceptions of locations in the Black Elk Wilderness. However, risks to most of the occurrences from this use are low because many of the sites are on steep slopes with dense shrub vegetation, both of which deter livestock. Risks from other management activities (i.e. timber harvest) are currently low because known sites are subject to NEPA analysis 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.

The most recent data available were used in designing monitoring for this species. Designated “core” orchid occurrences were identified using two criteria: geographic distribution of the occurrence and size (estimated number of individuals). Three occurrences from each of the 3 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) have noxious weeds and other exotic invasive species become established at the site? Although the proposed monitoring focuses on the presence or absence of a given occurrence, a categorical estimate of the number of individuals is to be collected. If any of the core occurrences is not present, then the reason is to be documented if it can be determined and then to randomly select additional sites to serve as core sites.

The second aspect of the monitoring as currently designed is to provide baseline data on the persistence of the orchid during dry conditions. During a drought, the design is to monitor three additional sites for presence/absence and census the number of individuals during the first and 2nd consecutive drought years. Our assumption is that the high numbers of orchids observed in 2000 were partially reflective of several years of above average precipitation. The nine core sites and 3 other sites are to be monitored for presence or absence, and a census taken during the second non-drought year following the dry period. Data on orchid 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 and 2003, 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 above-ground individuals on a number of sites. Because snow pack and precipitation for calendar year 2004 is already considered “below normal”, there is a likelihood that *Platanthera orbiculata* individuals could be absent from a number of the known occurrence sites.

Monitoring of this plant 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

Monitoring Design:

1. Annually monitor presence/absence of known site locations in the Bearlodge Mountains: site # PLOR4-1, site # PLOR4-2 and site # 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).
2. Annually monitor presence/absence Black Elk Wilderness locations: site #PLOR4-23, site # PLOR4 -24 and site # PLOR -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).
3. Annually monitor presence/absence of three key monitoring occurrence sites in the northwestern Black

Hills: site PLOR4-6, site PLOR4 -12, site PLOR4 -19. If any of the key monitoring occurrence sites is not present (refer to discussion above regarding climatic ties), document reason if it can be determined (i.e. drought, fire, noxious weeds).

4. If drought occurs, monitor 3 additional sites: PLOR4-4, -21 and -22 (these sites were chosen for variation in geographic distribution). During the first drought year count individuals at all 12 sites. During the 2nd drought year, monitor all 12 sites for presence/absence. During the 2nd non-drought year, count individuals at all 12 sites. After the 2nd non-drought year reassess the monitoring plan to determine future needs.

Sanguinaria canadensis (Bloodroot)

Sanguinaria canadensis, occurring in the northern/northeastern Black Hills, is the one of the most abundant R2 Sensitive Species on the Forest. There were 22 known occurrences of bloodroot on Black Hills National Forest lands at the time that a recent species assessment was written (completed 2003). Bloodroot occurs in hardwood forests, shrub thickets and floodplain habitats. The species is considered secure on the forest at this time, but due to limited potential habitat, and that a number of the sites have characteristics that lend themselves to invasion by noxious weeds and other invasive plants, weeds and their treatment have been identified as a risk to this species. The persistence of bloodroot on Forest Service administered land is not currently at risk from livestock grazing, as nine sites are currently not grazed and one site is not accessible to livestock. Timber harvest is not deemed a persistence risk to bloodroot because occurrences are currently being avoided, mitigated or vegetative treatments may be designed to benefit the species. Collection (or illegal bloodroot harvest) is not currently an issue in the Black Hills but due to its value as a medicinal herb, harvesting could be detrimental.

The Forest has taken a conservative approach for this species and monitoring. Recent data available were used in developing monitoring guidelines for the Black Hills National Forest. “Core” bloodroot occurrences were selected using four criteria: size (estimated number of individuals), geographic distribution of the occurrence, potential risk from livestock grazing, and community type. Thus, 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 bloodroot occurrences. 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 bloodroot metapopulation on the Black Hills National Forest.

The proposed monitoring design involves assessing the status of the four “key” core occurrences on an annual basis. The monitoring is designed to address three questions: 1) is the species present, 2) is there evidence of plant collecting, and 3) have invasive plant species invaded the site? Although the monitoring focuses on the presence or absence of a given occurrence, a categorical estimate of each occurrence is also to be recorded.

The second aspect of the following monitoring direction is to provide baseline data on the extent of bloodroot occurrences on all 10 designated “core” sites and a reassessment of the status of each occurrence during a drought year. Our assumption is that the high numbers of plants observed in 2001 were partially the result of several years of above-average precipitation. By documenting the size and extent of bloodroot occurrences during dry years, we hope to have a better understanding of the role that precipitation levels play in the distribution and abundance of bloodroot. Any changes in

the occurrence boundaries, evidence of plant collection or the presence of invasive or noxious plant species will be documented at the time of follow-up surveys.

The third aspect of this monitoring guide is to assess any additional changes in the extent of bloodroot occurrences following a second consecutive dry, or below-average precipitation year. Information on the extent and change of bloodroot occurrences 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.

Monitoring Design:

1. Annually monitor presence/absence of the 4 key sites. If relocated, gather baseline data 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.
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.
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.
4. Document any evidence of *Sanguinaria canadensis* collection at the 4 key monitoring sites.

Key Monitoring Sites for *Sanguinaria canadensis*:

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

Core Monitoring Sites for *Sanguinaria canadensis*:

- SACA13-4 (District number 93003)
- SACA13-5 (District number 93004)
- SACA13-6 (District number 95022)
- SACA13-7 (District number 94BC1)
- SACA13-9 (District number 93002)
- SACA13-10 (District number 94BC3)

Carex alopecoidea (Foxtail Sedge)

Based on recent confirmation (2000) of the identity of *Carex alopecoidea* and that it does occur on lands administered by the Black Hills National Forest, baseline data were gathered on this species 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 were likely to be identified in late August, 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 for *Carex alopecoidea* in the northwestern Black Hills and the Bearlodge Mountains. An additional limited number of quick reconnaissance surveys and project surveys in 2003 resulted in 2 new occurrences. Based on the number of occurrences that have been located in the three preceding years, the Forest suspects that more occurrences are likely and this is reflected in the monitoring design.

The most recent data available were used in developing monitoring guidelines for *Carex alopecoidea*. Occurrences were primarily selected on the following criteria: size (estimated number of individuals), geographic distribution of the occurrence, and if occurrences were located in different drainages. To incorporate geographic distribution, sites widely distributed from one another were selected over sites in close proximity to other occurrences. Based on these criteria, 5 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 continue to learn more about the species for future status assessments or to refine the monitoring protocols.

Monitoring Design:

1. Annually count individuals at sites CAAL8-20/20A, -22, -30 and 31. . Gather baseline data and assess risks at site CAAL8-16
2. Conduct quick reconnaissance surveys for *Carex alopecoidea* in similar habitat on the Bearlodge and Northern Hills Ranger Districts. If new sites are found gather GPS data to pinpoint the location.
3. 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.

Species Recently Added to the R2 Sensitive Species List (December 2003) or Recently Known to Occur on the Black Hills National Forest

In general, the main focus will be to attempt to relocate a number of the previously reported locations of these new species. Plans are to gather baseline data and assess risks at occurrences that are relocated.

Aquilegia brevistyla (Small-flowered columbine)

Aquilegia brevistyla was designated as a Region 2 Sensitive Species in December 2003. This species is reported to occur on all four Ranger Districts at more than 30 locations on the Black Hills National Forest. The species is widely dispersed geographically across the Black Hills and is likely under-reported because it has not been targeted for survey until recently, and because individuals are often scattered and do not bloom

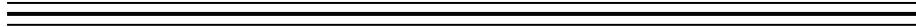
every year.

The species has been reported from a wide variety of habitats on the Black Hills: boreal communities, spruce forest, mesic drainage bottoms, dry streambeds, and moist limestone cliffs with some individuals occurring in moister riparian situations. Because of the broad ecological amplitude of this species, there are many areas that could have occurrences of *Aquilegia brevistyla*, both on Forest lands and lands in other ownerships.

Aquilegia brevistyla can be distinguished from the other native columbine (red columbine, *Aquilegia canadensis*) when in flower or with fruit. Baseline data collection for *Aquilegia brevistyla* should occur during June and July, when it is the most visible and identifiable.

Monitoring Design:

1. In 2004, attempt to relocate at least ten geographically spaced occurrences of the previously reported locations during the flowering period and gather baseline data on any relocated sites. Gather baseline data on new occurrences. Assess risks to those sites.
2. Document any weeds designated as noxious by South Dakota or Wyoming. Document if the weeds are co-located with *Aquilegia brevistyla*, or at what distance the weed species is located away from the occurrence site if they are occupying the same ecological type.



Botrychium multifidum (Leathery grapefern)

Botrychium multifidum was designated as a Region 2 Sensitive Species in December 2003. The majority of occurrences were documented in 2003. There are seven currently known occurrences, all of which are located in the Norbeck Wildlife Preserve and Black Elk Wilderness.

Monitoring Design:

1. Attempt to relocate previously reported locations during the most identifiable time period of the season, approximately August or September, and gather baseline data on any relocated sites. Gather baseline data on any new occurrences. Assess risks to those sites.
2. Document any weeds designated as noxious by South Dakota or Wyoming. Document if the weeds are co-located with *Botrychium multifidum*, or at what distance the weed species is located away from the occurrence site if they are occupying the same ecological type.



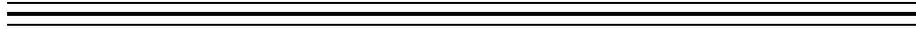
Botrychium lineare (Narrowleaf Grapefern/Slender Moonwort)

Botrychium lineare was recently determined (December 2003) to occur in Wyoming on the Bearlodge Ranger District.

Baseline data were gathered at the site in 2003. As with other *Botrychium* species, dry conditions are expected to limit the emergence of aboveground stems and the individuals may not emerge during a succession of dry or drought years. Plants were located on June 19, 2003 and periodic return visits during the following weeks documented that the plants wither soon after the spores are released. Based on a single year of data, it is currently anticipated that data collection needs to occur during mid-June at this location; however, this will likely depend upon temperatures associated with the current year's climatic conditions.

Monitoring Design:

1. Continue to gather annual baseline data at the recently documented 2003 occurrence from the Bearlodge Ranger District. Gather baseline data on any new occurrences that may be located. Assess risks to those sites.
2. 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.



Carex leptalea (Bristle-stalk sedge)

Carex leptalea was designated as a Region 2 Sensitive Species in December 2003. More than 35 sites have been reported on the Black Hills. Past reports indicate that the species is associated with bogs and marshy areas, as well as along streams. The species is widely dispersed geographically across the Black Hills and is likely under-reported because it has not been targeted for survey until recently.

Carex leptalea is most identifiable from mid-July to September.

Monitoring Design:

1. In 2004, attempt to relocate at least ten geographically spaced occurrences of the previously reported locations during the most identifiable time period of the season, usually mid-July to late August, and gather baseline data on any relocated sites. Gather baseline data on any new occurrences. Assess risks to those sites.
2. Document any weeds designated as noxious by South Dakota or Wyoming. Document if the weeds are co-located with *Carex leptalea*, or at what distance the weed species is located away from the occurrence site if they are occupying the same ecological type.



Cypripedium parviflorum (Yellow ladyslipper)

Cypripedium parviflorum was designated as a Region 2 Sensitive Species in December 2003. At minimum of 50 sites have been reported on the Black Hills. The total number of sites reported varies widely from greater than 50 to approximately 100 occurrences based on recent assessments and evaluations for this species (Mergen 2003). The number of occurrences is based on historic reports and how sites have been documented in the field. It may be that a number of adjacent smaller sites are actually portions of larger occurrences.

Currently known locations indicate that the species is associated 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 the flowering period. Plants flower as early as late May at lower elevations, and in early July at higher elevation occurrences. Seed structures and leaves can also be used to identify this species, primarily during July and August.

Monitoring Design:

1. In 2004, attempt to relocate at least ten geographically spaced occurrences of the previously reported

locations during the most identifiable (flowering) time period of the season and gather baseline data on any relocated sites. Gather baseline data on any new occurrences. Assess risks to those sites.

2. Document any weeds designated as noxious by South Dakota or Wyoming. Document if the weeds 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.

***Salix candida* (Hoary willow)**

Salix candida was designated as a Region 2 Sensitive Species in December 2003. *S. candida* is currently known on land administered by the Black Hills National Forest within 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 (2003) has been completed and recent baseline data (2002 and 2003) have been collected for *Salix candida*. 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 Canada thistle from the *S. candida* habitat. *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 *Salix candida*. No insect infestations have been documented, but other *Salix* species in the Black Hills have been infested with stem borers. 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 sub-populations of the *Salix candida* occurrence. At this time, no impacts have been documented to the willow from either activity. Although no impacts have been documented from wildlife use or trespass cattle, both could be a potential risk at the site.

Monitoring design is similar to that for *Salix serrisima* 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), 4) water table level, and 5) presence of exotic invasive plant species.

Monitoring of *Salix candida* needs to occur in May during the blooming period so that the total number of reproductive individuals can be determined.

Monitoring Design:

On an annual basis at the *Salix candida* site:

1. GPS new endpoints if site boundaries are expanded.
2. Count individuals during the blooming period (documenting total number of individuals, and total reproductive individuals). If the number of individuals declines by more than 10%, consult on a more rigorous design with the Rocky Mountain Research Station.
3. Document the number of plants infected with any damaging agents (i.e. willow stem borer).
4. Measure aboveground water levels using the transects used for *Salix serrisima*.
5. Document any weeds designated as noxious by South Dakota or Wyoming. Document if the weeds are co-located with *Salix candida*, or at what distance the weed species is located away from the occurrence

site if they are occupying the same ecological type.

***Viburnum opulus var. americana* (Highbush cranberry)**

There are more than 30 occurrences of this shrub reported on the Black Hills National Forest. Known locations are geographically dispersed and are located in a number of watersheds. It is considered to occur frequently by van Bruggen's publication, and may be under reported (it can occur in dense thickets with a number of other shrub species which can lead to difficulty in locating or observing individuals).

Monitoring Design:

1. In 2004, attempt to relocate at least ten geographically spaced occurrences of the previously reported locations when the plant is most identifiable (during the flowering period) and gather baseline data on any relocated sites. Gather baseline data on any new occurrences. Assess risks to those sites.
2. Document any weeds designated as noxious by South Dakota or Wyoming. Document if the weeds are co-located with, *Viburnum opulus var. americana* or at what distance the weed species is located away from the occurrence site if they are occupying the same ecological type.

Data Precision and Reliability: Class A (Quantitative)

Frequency of Reporting: Annually.

Information Storage System: Forest Database (potentially National Database system, when available), GIS system, Forest Plan Monitoring Files, the respective State Heritage Programs. Most herbarium vouchers have been sent to the Rocky Mountain Herbarium in Laramie, WY. Some vouchers have been sent to various other herbaria (i.e. *Botrychium* vouchers to Iowa State University). Data are currently stored in Forest access databases Baseline data is stored at:

J:\fsfiles\unit\rwsw\2600_wfrp\2670_plants\plant_database\bhnfplants.mdb.

A Forest Service nationwide database to support the tracking of data and monitoring of individual plant occurrences is planned for testing in 2004 that is expected to be compatible with State Heritage Program databases. If and when this occurs, the plan is to move Black Hills data into the nationwide database system.

Responsibility: Supervisor's Office and Districts

Cost: The combined monitoring cost estimate for sensitive plant monitoring in 2001 was \$98,000, annually, which included conducting surveys, compiling data, managing GIS layers and databases, revising monitoring strategies, and consulting with the Rocky Mountain Research Station. The R2 Sensitive Species list was revised and reissued in December 2003. The Forest is addressing a number of "new species" associated with the 2003 R2 Sensitive Species issuance. Survey and baseline data are needed on occurrences to support any quantitative monitoring that may be designed for those species. Because the cost estimate is from 2001, and there are additional costs associated with baseline data collection with the 2003 R2 Sensitive Species list, the total funding need for 2004 and subsequent years is expected to be higher than the \$98,000 estimated in 2001.

Periodically, the R2 Sensitive Species list is expected to change. It is anticipated that costs associated with baseline data collection and development of monitoring designs would change with any revisions of the R2 Sensitive Species list. Increases in noxious weed invasions (i.e. purple loosestrife) have the potential to occur within the Black Hills. Increasing noxious weeds also have the potential to contribute to higher costs

associated with monitoring.

Submitted to Peggy Woodward for the Forest Plan Monitoring Record on June 14, 2004.

Monitoring Item 18b-: SENSITIVE ANIMAL SPECIES

Sub-Item 18b: Reptiles and Amphibians

Authority: Forest Plan, Level 3

Indicators: Population Trends and occurrence of the Northern leopard frog. Sighting records of Tiger Salamanders, Black Hills red-bellied snakes, and milk snakes.

Method of Data Collection: Site evaluations at 25 percent of the 100-index sites forest wide. Documentation of species sightings records.

Unit of Measure: Abundance and distribution of northern leopard frogs, and habitat condition.

Sample Design: Approximately three annual visits to 25 percent of 100 forest wide locations containing populations of the northern leopard frog. Frog abundance and habitat conditions will be gathered and documented. Sighting records (including habitat condition documentation) for tiger salamander, Black Hills red-bellied snake, and milk snake will be maintained.

Data Precision and Reliability: Class A (northern leopard frog), Class B (tiger salamander, Black Hills red-bellied snake, and milk snake)

Frequency of Reporting: Four years

Information Storage System: Fauna Module of the NRIS database

Responsibility: Districts with synthesis of data by Supervisor's Office

Cost: Approximately \$24,000 set up costs associated with locating 100 sites and collecting baseline data. Yearly cost of \$6000 for annual monitoring of selected sites.

Set up Costs:

Data collection, Personnel cost	= \$14,000
Vehicle cost	= \$2000
Data synthesis, Personnel cost	= \$3000
Miscellaneous supplies	= \$1000
Overhead, 20% of total cost	= \$4000

Annual Costs:

Data collection, Personnel cost	= \$3000
Vehicle cost	= \$1000
Data synthesis, Personnel cost	= \$500
Miscellaneous supplies	= \$500
Overhead, 20% of total cost	= \$1000

Sub-Item 18c: Bats

Authority: [36 CFR 219.19], Level 2

Indicators: Trends of wintering bats.

Method of Data Collection: Counts at winter roosts.

Unit of Measure: Numbers of bats found at known hibernacula.

Sample Design: Counts of hibernating bats at known hibernacula. Individual hibernacula would be surveyed once in a two-year period.

Data Precision and Reliability: Class A.

Frequency of Reporting: Every two years.

Information Storage System: Fauna module of the NRIS database.

Responsibility: Districts with synthesis of data by the Supervisors Office.

Cost: Approximately \$6000 annually.

Data collection, Personnel cost	= \$3000
Vehicle cost	= \$500
Data synthesis, Personnel cost	= \$1000
Miscellaneous supplies	= \$500
Overhead, 20% of total cost	= \$1000

Sub-Item 18d: Management Indicator and Region 2 Sensitive Birds

Authority: Level 2.

Indicators: Population trends of individual bird species.

Method of Data Collection: Point transects, nocturnal transects, Forest wide surveys, colony counts, expert surveys

Unit of Measure: Density estimates

Sample Design: Sample distance-sampling techniques (Buckland et al. 1993) will be used during all transect surveys, and density estimates of bird species will be derived using program DISTANCE (Thomas et al. 1998). In the event that distance-sampling techniques do not prove to be useful, data will be analyzed using more traditional techniques (e.g., Fixed radii).

Data Precision and Reliability: Class A

Frequency of Reporting: Annually

Information Storage System: Project File and Fauna Module in NRIS Database.

Responsibility: Supervisors Office

Cost: Costs are associated with agreement. First year set up cost of \$117,000, and approximately \$90,000 annually thereafter.

Sub-Item 18e: Butterflies

Authority: Level 2

Indicators: Trends of Butterflies on Index sites, and vegetative composition at Index sites.

Method of Data Collection: Biannual transects at Index sites.

Unit of Measure: Numbers of butterflies caught at Index sites, and population density of host plants at Index sites.

Sample Design: One transect at each established Index site for the regal fritillary and the tawny crescent. Each transect will be used to collect data on plants and butterflies.

Data Precision and Reliability: Class A.

Frequency of Reporting: Biannually.

Information Storage System: Fauna module of the NRIS database.

Responsibility: Districts with data synthesis at the Supervisors Office.

Cost: Approximately \$12,000 biannually for data collection and synthesis.

Data collection, Personnel cost	= \$6500
Vehicle cost	= \$2000
Data synthesis, Personnel cost	= \$1000
Miscellaneous supplies	= \$500
Overhead, 20% of total cost	= \$2000

Sub-Item 18f: Management Indicator Species, Fish

Authority: [36 CFR 219.19], Level 2

Indicators: Trends of identified fish populations in selected stream segments.

Method of Data Collection: Every other year, electro fishing.

Unit of Measure: Numbers of fish species at electro fishing stations

Sample Design: 28 electro fishing stations, at least four stations per species.

Data Precision and Reliability: Class A

Frequency of Reporting: Every four years.

Information Storage System: Fauna module of the NRIS database.

Responsibility: Supervisors office, with occasional assistance from District personnel.

Cost: Every other year cost of \$36,000 for data gathering and synthesis.

Data collection, Personnel cost	= \$21,500
Vehicle cost	= \$3,500
Data synthesis, Personnel cost	= \$3,000
Miscellaneous supplies	= \$2,000
Overhead, 20% of total cost	= \$6,000

Sub-Item 18g: Marten

Authority: [36 CFR 219.19], Level 2

Indicators: Trends in population, and habitat use.

Method of Data Collection: (1) Track plate surveys in high potential habitat.

(2) Track plate surveys in randomly selected habitats.

Unit of Measure: Positive track plate occurrences.

Sample Design: (1) Approximately 117 track plates, located in high potential habitat, will be monitored between January and March every four to five years, to estimate trends in marten abundance.

(2) Approximately 25 random sites will be monitored between January and March each year to identify habitat usage of the American Marten.

Data Precision and Reliability: Class A for sample design #1 and Class B for sample design #2

Frequency of Reporting: Every four years.

Information Storage System: Fauna module of the NRIS database.

Responsibility: Districts with synthesis of data by the Supervisor's Office.

Cost: Cost of approximately \$60,000 every four years for population trend monitoring, and yearly cost of \$15,250 for random surveys.

Four-year costs:

Data collection, Personnel cost	= \$39,000
Vehicle cost	= \$5,000
Data synthesis, Personnel cost	= \$4,000
Miscellaneous supplies	= \$2,000
Overhead, 20% of total cost	= \$10,000

Annual Random Sampling costs:

Data collection, Personnel cost	= \$10,000
Vehicle cost	= \$1250
Data synthesis, Personnel cost	= \$1000
Miscellaneous supplies	= \$500
Overhead, 20% of total cost	= \$2500

Sub-Item 18h: Snails

Authority: [36 CFR 219.19], Level 2

Indicators: Habitat conditions and presence of specimens.

Method of Data Collection: Surveys of index sites

Unit of Measure: Vegetative diversity, site characteristics and percent ground disturbance at index sites.

Sample Design: Each “index” site identified in the Frest report(s) that could be affected by forest management will be monitored on a rotating basis, so that each site is monitored every four years. Data will be collected regarding vegetative composition, site characteristics and percent ground disturbance. Depending upon site conditions, or changes there of, samples may be taken and sent to qualified individuals for analysis of snail species composition.

Data Precision and Reliability: Class A.

Frequency of Reporting: Four years.

Information Storage System: Fauna module of the NRIS database.

Responsibility: Districts with synthesis of data by the Supervisor’s Office.

Cost: Approximately \$18,000 annually for surveys and reporting.

Data collection, Personnel cost	= \$9000
Vehicle cost	= \$2000
Data synthesis, Personnel cost	= \$3000
Miscellaneous supplies	= \$1000
Overhead, 20% of total cost	= \$3000

Sub-Item 18i: Goshawks

Authority: [36 CFR 219.19], Level 2

Indicators: Nesting activity.

Method of Data Collection: Site visits to historically known nest territories for which activity is suspected or possible.

Unit of Measure: Nest site activity;

Sample Design: Annual visits to known nest sites (those known to have the potential of being active). Sites will be visited between 1-June and 30 July.

Data Precision and Reliability: Class A

Frequency of Reporting: Yearly.

Information Storage System: Fauna module of the NRIS database.

Responsibility: Districts with data synthesis by the Supervisor's Office.

Cost: Cost of approximately \$13,800 annually for nest site monitoring.

Annual costs:

Data collection, Personnel cost	= \$8,000
Vehicle cost	= \$2,000
Data synthesis, Personnel cost	= \$500
Miscellaneous supplies	= \$1,000
Overhead, 20% of total cost	= \$2,300

Monitoring Item 19: NOXIOUS WEEDS - Noxious Weeds, Species, Trend

Authority: [36 CFR 222.8]

Level Two

Indicators: Increase or decrease in total acres of infestation

Method of Data Collection: General surveys for species of weeds present. Site visits to verify existence of weeds. In-depth survey of the extent of the infestation.

Unit of Measure: Acres of infestation by species

Sample Design: General field observations by Forest employees, with more intensive surveys of newly located infestations.

Data Precision and Reliability: Class B

Frequency of Reporting: 5 years

Information Storage System: RIS database (using ORACLE software) and Maps in District project files

Responsibility: Generally requires information from all field going personnel of the Forest Service followed by more intensive site surveys. Monitoring may be performed by the Forest Service, permittees, or other interested parties. Methods that will be used by the permittees or interested parties are to be approved prior to data collection. Techniques that are widely used by the scientific community may be used if they are approved by the Forest Service. All data collected is subject to field checks and verification before it is accepted.

Cost:

Costs borne by field personnel who observe infestations while performing other work. Additional cost of \$2,000 per year to review and verify information.

Monitoring Item 20: INSECTS AND DISEASES - Population, Damage Trend, and Hazard

Sub-Item 20a: Susceptibility of ponderosa pine stands to mountain pine beetle infestation

Authority: [36 CFR 219.27(a)(3)]

Level Two

Indicators: Hazard rating for mountain pine beetle

Method of Data Collection:

Ponderosa pine stands will be rated using accepted methods for the Black Hills for assessing relative hazard for mountain pine beetle. Inventory information or estimates based upon recent silvicultural treatments for average stand tree diameters (DBH), average basal area (BA) or growing stock level (GSL), and stand structure parameters, or other suitable variables will be used to calculate a current hazard rating level for each stand being considered. Mountain pine beetle hazard for analyzed stands may be displayed spatially on maps by hand or using GIS capability, as most appropriate.

Unit of Measure:

Acres of ponderosa pine timber stands at low, medium, and high hazard for mountain pine beetle.

Sample Design:

Hazard rating of ponderosa pine stands should be run using a computer database for any areas where stand data has changed significantly because of vegetation management activities (timber harvest, burning). Changes in relative hazard ratings should be compared to baseline figures or prior information. Forest-wide hazard rating estimates should be rerun following significant updates in inventory information (such as Stage I inventory) to establish a new baseline.

Data Precision and Reliability:

Class B

Frequency of Reporting:

Annually for new projects and 10 years for new baseline

Information Storage System:

R2 Forest Health Management files; RIS Database (using ORACLE software) and ARC/INFO

Responsibility:

Forest or district personnel will query RIS database for needed inventory information and provide information regarding vegetation changes due to project activities. Hazard rating determination and production of maps may be done by forest or district personnel, with or without assistance provided by the Rapid City Service Center, R2 Forest Health Management staff.

Cost:

Cost of biological evaluations conducted by Rapid City Service Center staff generally is covered by R2 Forest Health Management.

Sub-Item 20b: Damage Levels and Trends

Authority: [36 CFR 219.27(a)(3)]

Level Two

Indicators:

Tree mortality caused by bark beetles; evidence of defoliation.

Method of Data Collection:

Detection (aerial and ground) surveys for pine mortality caused by bark beetles and observations of defoliation.

Unit of Measure:

Estimated acres, number of trees, and volume of pine killed; and acres of apparent defoliation.

Sample Design:

Aerial sketch-mapping of the entire forest will be conducted annually in late August or early September. Ground checks and surveys will be conducted as needed.

Data Precision and Reliability:

Class B

Frequency of Reporting:

Annually

Information Storage System:

Forest Health Management survey reports, Maps, Annual Monitoring Report

Responsibility:

R2 Forest Health Management staff will conduct aerial surveys.

Cost:

Costs are usually covered by R2 Forest Health Management funds.

Sub-Item 20c: Insect and Disease Evaluations

Authority: [36 CFR 219.19(a)]

Level Two

Indicators:

Insect or disease population or damage levels and trends.

Method of Data Collection:

1. Biological evaluations of insects and diseases of concern for project-level planning. Methods will vary depending upon insect or disease species.
2. Walk-through and ground surveys of project areas for damage caused by insects or diseases, especially those such as Ips, root disease, and red turpentine beetle, that may increase following certain management practices.

Unit of Measure:

1. Units of measure will vary depending upon insect or disease species being evaluated. May include number of insects per unit area, number of trees affected, acres affected, or other appropriate measure, and percent change from year to year.
2. Number of trees affected per unit area by pest species.

Sample Design:

1. Surveys for project-level biological evaluations will be designed and conducted as needed.
2. Ideally, monitoring for insect and disease activity following project implementation should be conducted within one year before and after management activity and again within five years following management activity. Survey for insect and disease occurrence following management activities can be incorporated into monitoring (walk-through) surveys for other resource elements.

Data Precision and Reliability:

Class B

Frequency of Reporting:

Annually, as appropriate.

Information Storage System:

Forest Health Management survey or evaluation reports, Maps, Annual Monitoring Reports, Project survey reports

Responsibility:

1. Ground surveys and evaluations may be coordinated as needed between Forest/District personnel and Rapid City Service Center, R2 Forest Health Management staff.
2. If necessary, District personnel will conduct pre- and post-project walk-through surveys, with technical assistance provided as needed by R2 Forest Health Management staff, especially for pest recognition and survey training.

Cost:

Costs covered by R2 Forest Health Management staff.

Monitoring Item 21: INSECTS AND DISEASES - Exotics

Authority: [36 CFR 219.27(a)(3)]

Level Two

Indicators: Presence of gypsy moth life stage(s).

Number of non-native organisms detected per unit area or sample unit.

Method of Data Collection:

Detection surveys using pheromone traps for new introductions of gypsy moth in high probability locations (such as moderate to high use developed recreation sites) identified by R2 Forest Health Management staff.

For gypsy moth, delimitation surveys using pheromone traps and egg mass surveys subsequent to positive trap catches and control projects.

Detection surveys for other insects and diseases as needed based upon knowledge of potential for introduction.

Unit of Measure:

Number and distribution of positive gypsy moth trap catches. May be displayed on maps.

Number of gypsy moth egg masses or other life stages detected per unit area or sample unit.

For other non-natives, numbers of insects, diseases, or affected plants detected depending upon species involved.

Sample Design:

Two gypsy moth detection traps per location for 30 locations in the Black Hills National Forest. Additional locations may be added as needed. Traps to be placed by early June each year and retrieved and checked in the following September.

Delimitation trapping around all positive gypsy catch sites according to APHIS guidelines. Egg mass searches for suspected newly-established populations of gypsy moth according to APHIS guidelines.

Delimitation trapping and egg mass surveys following all eradication treatments in accordance with APHIS guidelines. Generally, two years of no catch following treatment is needed to confirm successful eradication.

Detection surveys for other insect or disease introductions to be developed and conducted as needs arise.

Data Precision and Reliability: Class B

Frequency of Reporting: Annually

Information Storage System:

Forest Health Management reports, Annual Monitoring Report

Responsibility:

District personnel will conduct annual detection trapping surveys for gypsy moth in developed sites and other locations identified by Forest Health Management staff. Rapid City Service Center, Forest Health Management staff will coordinate detection, delimitation, and control programs on Forest land in cooperation with Forest/District and APHIS personnel. For programs that include non-federal lands as well, cooperation will also include appropriate state forestry and agricultural agencies. Coordination will be in accordance with Departmental regulations and the Memorandum of Understanding between APHIS and FS agencies regarding gypsy moth programs.

Cost:

Forest personnel cost approximately \$7,000 per year. Other costs covered by R2 Forest Health Management staff.

Monitoring Item 22: FIRE - Fuel Loading Hazard

Authority: Level Three

Indicators: Changes in the amount of Forest acreage classified as High Hazard fuel profile.

Methods of Data Collection: Data is generated through accomplishment reporting for all Forest project activities. Projects for which data is collected are those that result in modification to Forest fuel profiles.

Unit of Measure: Acres of high hazard fuel profile.

Sample Design: Each ranger district will annually enter its' fuel treatment project activities (includes prescribed natural fire) and other resource project activities which affect forest fuel profiles into the Forest Resource Information System (RIS) database. Various staff from different resource program areas on the unit will be responsible for compiling and entering data. This is an ongoing process done annually for resource information tracking and upward reporting purposes. The Forest Fire Management Officer will conduct an annual query of the Forest RIS database to determine the total acres identified as having fuel profiles at the High Hazard Index as defined in the Forest Fire Protection Assessment. The results are compared to information from the baseline year 1995 and any required adjustments to the Forests' Fire Management Program are made by the Forest Fire Management Officer.

Data Precision and Reliability: Class B

Frequency of Reporting: Annually

Information Storage System: RIS database (using ORACLE software) and the Forest Fire Protection Assessment.

Responsibility: District and Forest Fire Management Officers

Cost:

Most costs covered in other programs of work. Additional work for Forest Plan monitoring and evaluation is approximately \$6,000 for data queries, and \$1,000 for data analysis.

Monitoring Item 23: FIRE - Fuel Treatment

Authority: Level Three

Indicators: Numbers of fuel treatment acres

Method of Data Collection: Actual project acreage using appropriate measurement and/or mapping techniques.

Unit of Measure: Acres

Sample Design: Actual project acres and determined by mapping exercise or field traverse. Acres will be reported by District Fire Management staff and stored in Resource Information Data Base (RIS)

Data Precision and Reliability: Class A

Frequency of Reporting: Annually

Information Storage System: RIS database (using ORACLE software)

Responsibility: District and Forest Fire Management Officers

Cost: Most costs associated with forest inventory program of work. Additional cost of \$1,000 per year to evaluate the data.

Monitoring Item 24: FIRE - Prevention and Suppression

Sub-Item 24a: Suppression

Authority: Level Three

Indicators: Documented deviation between the annual actual and the predicted wildfire acreage identified for the Most Efficient Level (MEL) fire management program as defined in the most current National Fire Management Analysis System (NFMAS) analysis for the Forest.

Annual wildfire losses which appear to establish a trend which is inconsistent with historical wildfire data from the period 1962 through the current monitoring year based on the current year fire weather data and number of ignitions.

Methods of Data Collection: Wildfire statistical information is recorded through individual fire reports by Fire Staff at each Forest Unit. The Forest Dispatcher serves as the clearing center for fire reports and enters the data into the FIRESTAT data base. FIRESTAT is the National wildfire data base located at Kansas City, Kansas. Weather data from Forest Weather Stations is archived through the Weather Information Management System (WIMS).

Unit of Measure: Number of fires and acres burned by wildfire.

Sample Design: The Forest Fire Management Officer compiles and reviews annual fire statistics, completes an analysis and documents conclusions in the Annual Monitoring report.

Data Precision and Reliability: Class A

Frequency of Reporting: Annually

Information Storage System: National Weather Information Management System (WIMS), the National Wildfire Database located at Kansas City, KS

Responsibility: Forest Fire Management Officer

Cost:

Data entry - \$4,000 based on an average year.

Statistical analysis and report - \$1,000 per year.

Sub-Item-24b: Prevention

Authority: Level Three

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

- Status of fire management agreements with partner agencies;
- Involvement in interagency fire training exercises;
- Involvement in pre-suppression and prevention activities;
- Involvement in South Dakota Interagency Fire Council meetings and activities;
- Effectiveness of the Custer Interagency Dispatch Center as assessed by fire management partners;
- Assessment of suppression support afforded partners through ICS process and as might be identified through post fire reviews, reports or exit conferences;
- All other information which might cast light on the Forests record of performance related to efficiency of operation in the fire management arena through interagency cooperation and prevention activities.

Method of Data Collection: Collect and document all information related to partnership activities within the Fire Management Program with particular emphasis on information related to monitoring indicators.

Unit of Measure: Narrative in Annual Report.

Sample design: Annually document the Forests' annual involvement in interagency fire management activities. Assimilate data making subjective comparisons of previous years activities and document in an annual report.

The Forest Fire Management Officer collects and or documents information related to the monitoring indicators and incorporates it into the Annual Monitoring Plan. Adjustments to the Fire Management Program are made as needed to maintain a high level of interagency involvement.

Data Precision and Reliability: Class B

Frequency of Reporting: Annually

Information storage system: Annual Monitoring Report

Responsibility: Forest Fire Management Officer

Cost:

One week's time of Fire Management Officer, approximately \$1,000 per year.

Monitoring Item 25: WILDLIFE - Threatened and Endangered Species

Authority: Endangered Species Act

Level One

Indicators: Trends of wintering bald eagles based on annual sightings database

Method of Data Collection: Annual collection of eagle sightings

Unit of Measure: Number of birds recorded

Sample Design: District biologists will record bald eagle sightings throughout the winter during normal work activities. Sightings are presented regardless of landownership.

Data Precision and Reliability: Class B

Frequency of Reporting: Annually

Information Storage System: Wildlife observation database, natural heritage database

Responsibility: Districts with synthesis of data by Supervisor's Office

Cost:

Approximately \$1,000 per year for about one week of forest biologist's time to do analysis and reporting.

Monitoring Item 26: WILDLIFE - Habitat Capability Relationships, including MIS

Authority: [36 CFR 219.19(a)]

Level Two

Indicators:

- 1) Amount and distribution of suitable habitat.
- 2) Wildlife species/habitat relationship validation.
- 3) Bird population trends.

Method of Data Collection:

- 1) Use updated RIS database for GIS/HABCAP analysis for all Black Hills species included in model.
- 2) Research comparing existing to observed coefficients relating habitat value to wildlife species for cover types and structural stages.
- 3) Breeding bird surveys.

Unit of Measure: Individual species GIS/HABCAP results Acres and distribution of suitable habitat. Breeding bird population trends.

Sample Design:

- 1) Run HABCAP model on two planning units (or similar sized area) per District per year. Select planning units with most recently updated Stage II inventory data.
- 2) Validate GIS/HABCAP assumptions with research. Comparison of use to availability to determine relative value of habitats of different condition.
- 3) Established breeding bird survey routes conducted during early breeding season. Data analyzed by USGS, BDS. Data collected by qualified volunteers.

Data Precision and Reliability: Class B

Frequency of Reporting: 3 years

Information Storage System:

- 1) RIS database (using ORACLE software) and ARC/INFO
- 2) RIS database (using ORACLE software) and ARC/INFO
- 3) USGS, BDS

Responsibility: Potential for cooperative projects.

- 1) Supervisor's Office synthesis of District field data
- 2) Supervisor's Office, Habitat Relationship Center of Excellence, and Rocky Mtn. Station.
- 3) Supervisor's Office coordination with Breeding Bird Survey volunteers and USGS, BDS

Cost:

- 1) One week of GIS technician and forest biologist's time (approximately \$2,000 per year)

- 2) Experienced costs of \$120,000 per project. 5 to 20 species can be validated per project, total need of 40 species in the Black Hills. Estimated cost of \$240,000 to \$960,000 total, depending on cooperative projects. Rarer species, or those with more specialized habitat requirements would require more effort.
- 3) Approximately \$2,500 per year for expense reimbursement for volunteers and coordinators.

Monitoring Item 27: SCENERY - Scenic Integrity

Authority: Level Three.

Indicators: Scenic Condition.

Method of Data Collection:

1. Computer simulations of proposed projects.
2. Review of project EAs, including an inventory of existing scenic integrity and discussion of established SIOs for project area. Photo control points may be established for critical viewing areas which may be affected by the project.
3. Field review of completed projects.

Unit of Measure: Existing Scenic Integrity and Scenic Integrity Objectives.

Sample Design:

SIO	% SAMPLE	% OF FOREST	REVIEW PROJECTS
High	100%	12%	3
Moderate	50%	42%	5
Low	10%	30%	1
Very Low	0%	16%	0

(Assuming 9 major projects needing review annually.)

Data Precision and Reliability: Class B

Frequency of Reporting: Annually for projects and 5 years for cumulative effects.

Information Storage System: District project files, SO scenic management files, RIS database and ARC/INFO

Responsibility: Landscape Architect and District Recreation Specialist.

Cost:

(9 major project review per year)x(2 people per review) = (18 person days)x(\$200 per day) = \$3,600 per year.

Monitoring Item 28: HERITAGE RESOURCES - Protection of Resources

Authority:

Level Two - Sub-items 1,2,3,4 (36 CFR 219.24).

Level Three - Sub-items 5,6,7.

Indicators:

1. Heritage resources compliance process completed prior to signing of environmental decision document (comply with NEPA, NHPA and Chief's Direction).
2. Avoidance of mitigation requirements effectively implemented prior to, during, and after project (comply with NHPA/NEPA).
3. Inventories conducted to comply with Archeological Resource Protection Act, as amended 1988.
4. Protection of heritage resources listed in, or eligible for listing in National Register of Historic Places. May or may not be associated with project specific activities (comply with NHPA).
5. Number of heritage resource interpretive sites provided (include sites, signs, roadside pullouts, brochures, public participation opportunities, sponsorship of heritage activities, etc.)
6. Number of heritage resources stabilization and rehabilitation projects conducted (comply with NHPA).
7. Increase in heritage resources listed in the National Register of Historic Places (comply with NHPA).

Method of Data Collection: Field visits, Forest Heritage Resource Management Project Summary Forms and Annual accomplishment reports.

Unit of Measure:

1. Completion of NHPA compliance process before date environmental decision document is signed.
2. Field monitoring projects for proper implementation of avoidance or mitigation requirements.
3. Numbers and acres of inventory completed for project and non-project related areas.
4. Field monitoring NRHP eligible and listed heritage resources.
5. Interpretive sites and opportunities provided for the public.
6. Stabilization and rehabilitation projects conducted.
7. Increasing numbers of heritage resources listed on the National Register of Historic Places.

Sample Design:

1. Heritage resource work accomplished as indicated by Heritage Resource Management Project Summary Forms.
2. Field monitoring of NRHP listed heritage resources (ten sites annually and all sites every five years), five percent of NRHP eligible but unlisted heritage resources, and ten percent of projects completed on each district.

Data Precision and Reliability: Class A

Frequency of Reporting: Annually

Information Storage System: Forest Heritage Resources Database and hardcopy files.

Responsibility: Forest Historic Preservation Officer and District Heritage Specialists.

Cost:

INDICATOR NUMBER	DISTRICTS	S.O.	TOTAL
1. Compliance process completed	\$2,000	\$500	\$2,500
2. Avoidance/Mitigation completed	\$1,000	\$200	\$1,200
3. ARPA Inventory Compliance	\$800	\$200	\$1,000
4. Annual Field Monitoring and Long Term Monitoring	\$11,000	\$1,500	\$12,500
5. Interpretive Opportunities	\$2,000	\$500	\$2,500
6. Stabilization and Rehabilitation Projects	\$2,000	\$500	\$2,500
7. NRHP Nominations	\$800	\$200	\$1,000

Monitoring Item 29: WILDERNESS - Wilderness Ecosystem Condition, Use and Trend

Authority: Level Three, except for heritage resource Inventories (Level 2)

Indicators: Wilderness Condition.

Method of Data Collection:

Specific long term monitoring plans include:

1. Complete human impacted site re-inventory every 5 years, including Trail 9, Centennial Trail, and Harney Peak Lookout Complex. Authority level three.
2. Extensive social data survey summary, to determine trends of use, to be completed every 7 years. Authority level three.
3. Insect and disease inventory to be summarized every 7 years. Authority level three.
4. Harney Peak Lookout inventory to be completed and summarized every 7 years as to condition of structure. Authority level three.
5. Outfitter Guide, special use impacts to be monitored and evaluated every 5 years. Authority level three.
6. Fire occurrence and aftermath will be summarized and evaluated for impacts on wilderness conditions every 5 years. Authority level three.

Annual monitoring process: All management personnel, outfitter guides, and special use permittees will monitor trail and human impacted site conditions during the course of their travels. Specific short term monitoring plans include:

1. Forage utilization (horses) to be monitored annually in transition areas, trailheads and horse staging areas (to be determined). Authority level three.
2. Monitoring of overall use patterns, activities and level of use will take place annually. Authority level three.
3. As a minimum, (transition) trail and destination point (Harney Peak) encounters will be monitored weekly during June, July, and August. Intermediate monitoring, at least once a month, to occur on transition trails and at Harney Peak Lookout area the rest of the year. Authority level three.
4. Heavily used areas will be inventoried annually and changed noted and summarized. Sites containing human impacted areas that violate standards will be rehabilitated and posted. They will be monitored at two- and five- year intervals to determine the effectiveness of managerial actions. Human impacted sites closed due to violations of standards will be monitored annually. Closures will be in effect until conditions are acceptable (lower 1/3) of the range for each indicator. Authority level three.
5. Those trails exceeding trail encounter standards will be monitored for 15 days throughout the season. This monitoring will verify that the standard is, in fact, exceeded before any management actions are initiated. Authority level three.

Unit of Measure: Recreation Visitor Days, trail encounters, trail conditions, helicopter overflights, campsite conditions, condition of Harney Peak Lookout, water quality and user satisfaction surveys.

Sample Design: Long term and short term monitoring as described above.

Data Precision and Reliability: Class B

Frequency of Reporting: 5 years

Information Storage System: S.O. Black Elk Wilderness Files.

Responsibility: Wilderness Group Leader

Cost:

Long term priorities: \$23,500

Annual priorities: \$24,000

Monitoring Item 30: RECREATION - Recreation Opportunities

Authority: Two (36 CFR 219.21a).

Indicators: Variety of Recreation Opportunities

Method of Data Collection: Field review of management areas.

Unit of Measure: Acres of Recreation Opportunity Spectrum (ROS) and Recreation Visitor Days (RVDs) by activity.

Sample Design: Utilize data collected by other agencies to identify trends in various activities. For example, state game agencies for hunting and fishing use, and state highway departments for road traffic use.

Data Precision and Reliability: Class A

Frequency of Reporting:

<u>Monitoring</u>	<u>Frequency</u>
ROS Review	Annually

Information Storage System: District project files, RRIS data base, Recreation Information Management System and Infrastructure.

Responsibility: Forest and District Recreation Specialists

Cost:

Estimated cost is \$7,000, or approximately 5 percent of the general area recreation budget..

Monitoring Item 31: RECREATION - Recreation Use, Trend and Demographics

Authority: Level Two (36 CFR 219.21a).

Indicators: Condition and Use of Recreation Facilities

Method of Data Collection: On-site questionnaires for visitor's use; campground fee collection data; incident reports of vandalism; visual observations by FS and concession personnel; random surveys by site; marketing surveys; and hazard tree analysis.

Unit of Measure: Facility condition; number of public comments; number of vandalism incidents; amount of use in each site by design type; and site use figures in Recreation Visitor Days.

Sample Design: 100% sample using fee receipts at fee sites and randomly selected sample survey at non-fee facilities

Data Precision and Reliability: Class A

Frequency of Reporting:

MONITORING	FREQUENCY
Facility Condition	5 Years
Customer Report Cards	5 Years
Recreation Use	Annually

Information Storage System: Management Attainment Report, Recreation Information Management System, and Infrastructure Database.

Responsibility: Forest and District Recreation Specialists

Cost:

Estimated cost is \$25,000 or approximately 5 percent of the developed recreation annual budget.

Monitoring Item 32: ACCESS - Road Mileage

Authority: Level Three

Indicators: Miles of Forest Development Road, Locations of Entrance Devices, Electronic Quads. (Each of these indicators already has a system in place for measurement.)

Method of Data Collection:

Use the Transportation Database, which tracks changes in the Forest Development Road system. Also track the attributes of new roads, changes to existing roads, travel management actions, and road obliterations. This data uses GPS as much as possible to identify the location of road facilities.

Unit of Measure: Miles of road by management category. Number and type of travel management devices and their effectiveness.

Sample Design: Monitor annually the Forest Development Road system to classify roads as follows:

- FDR Maintenance Levels 1, 2, 3, 4, 5
- FDR Miles constructed
- FDR Miles reconstructed
- FDR Miles under Forest Service jurisdiction
- FDR Miles under local government jurisdiction
- FDR miles obliterated
- FDR Miles open year long, seasonally for low clearance vehicles
- FDR Miles open year long, seasonally which are accessible to high clearance vehicles only

Data Precision and Reliability: Class A

Frequency of Reporting: Annually

Information Storage System: Cartographic Feature Files, Infrastructure or the Region 2 Transportation Feature File

Responsibility: Transportation Coordinator

Cost:

Most of the costs are borne by engineering zone roads engineers during normal project area planning and transportation inventories. Additional \$3,000 per year to conduct field reviews and evaluate data.

Monitoring Item 33: ACCESS - Off-Road Vehicle Access

Authority: [36 CFR 295.5]

Level Two

Indicators: Acres, Physical Location, Locations of Entrance Devices, Electronic Quads, Signing (Each of these indicators already has a system in place for measurement.)

Method of Data Collection:

1. Conduct field reviews of travel management actions to assess their effectiveness in meeting resource management objectives.
2. Conduct field reviews of areas receiving concentrated use to assess whether resource damage is excessive and warrants a change in management strategy for the area.

Unit of Measure: Acres available year long or seasonally and their location.

Sample Design: Monitor annually acres by off-road motorized vehicle use management strategy as follows:

- Acres open year long with no restrictions
- Acres open seasonally with no restrictions
- Acres closed year long
- Acres closed seasonally.
- Acres and number of areas where, due to unacceptable resource damage, off-road vehicle management should be re-evaluated.

Data Precision and Reliability: Class A

Frequency of Reporting: Annually

Information Storage System: GIS - travel management layer

Responsibility: Off Road Vehicle Coordinator

Cost: Most of the costs are associated with travel management inventories. Additional \$3,000 per year to conduct field reviews and evaluate data.

Monitoring Item 34: ACCESS - Trail Opportunities

Authority: [36 CFR 295.5]

Level Two

Indicators: Miles, Miles of Trail by User Type, Trail Development (Each of these indicators already has a system in place for measurement.)

Method of Data Collection:

1. Use the transportation inventory, which maps the location of changes to the forest trail system. Also track the attributes of trails, changes to existing trails, trail travel management, new trails, and trail obliterations. This data uses GPS as much as possible to identify the location of trail facilities.
2. Conduct field reviews of trail travel management actions to assess their effectiveness in meeting resource management objectives.

Unit of Measure: Miles of trail forest wide, Miles of trail by user type

Sample Design: Monitor annually the forest trail system to classify trails as follows:

- Forest development trail miles constructed
- Forest development trail miles reconstructed
- Forest development trail miles obliterated
- Forest development trail miles by user type
- Trails where user conflicts exist or where user type constraints are not effective, or where unacceptable resource damage is occurring .

Data Precision and Reliability: Class A

Frequency of Reporting: Annually

Information Storage System: Trail coverage in ARC/Info of Infrastructure

Responsibility: Forest Trail Coordinator

Cost:

Most of the costs are associated with transportation inventories. Additional \$1,000 per year to conduct field reviews and evaluate data.

Monitoring Item 35: ACCESS - Right-of-Way Acquisition

Authority: Level Three

Indicators: Number of right-of-way cases, Miles of acquisition (Each of these indicators already has a system in place for measurement.)

Method of Data Collection:

Use the transportation inventory, which maps the location of changes to the Forest Development Road or Trail system due to right-of-way acquisition. Also track the attributes of acquired roads or trails. This data uses GPS as much as possible to identify the location of road facilities.

Unit of Measure: Number of Right-of-Way Cases, Miles of road acquired as Forest Development Roads or Trails.

Sample Design:

- Number of right-of-way cases completed
- Miles of Forest Development Road or Trail acquired in right-of-way cases.
- Miles of Forest Development Road or Trail conveyed to other jurisdiction in right-of-way cases.

Data Precision and Reliability: Class A

Frequency of Reporting: Annually

Information Storage System: Cartographic Feature Files, Road and Trail Management Objectives, Infrastructure or the Region 2 Transportation Feature File

Responsibility: Forest Lands Coordinator

Cost:

Most of the costs are associated with transportation inventories. Additional \$1,000 per year to conduct field reviews and evaluate data.

Monitoring Item 36: REAL ESTATE - Land Adjustment

Authority: Level Three

Indicators: Acres, Physical Location, Net Change in National Forest ownership each Fiscal year (Each of these indicators already has a system in place for measurement.)

Method of Data Collection:

1. Track acres acquired, acres conveyed, and the net change in National Forest lands for each Fiscal year. Track these same three items for those lands in the pipeline for exchange.
2. Track those parcels that change ownership or are proposed for exchange using GIS and an appropriate database.

Unit of Measure: Acres

Sample Design:

List acres acquired, acres conveyed to other ownership, and the net change to National Forest ownership in each Fiscal year.

List acres by these same three categories that are actively being considered for exchange in the future.

Data Precision and Reliability: Class A

Frequency of Reporting: Annually

Information Storage System: Cartographic Feature Files and an associated database.

Responsibility: Forest Lands Coordinator.

Cost:

Most of these costs are associated with the normal program of work for land adjustment.

Monitoring Item 37: ECONOMIC EFFICIENCY - Cost

Authority: Level Three

Indicators: Dollars expended, benefits received.

Method of Data Collection: Through TSPIRS and Budget/Finance reports.

Unit of Measure: Dollars

Sample Design: Through accounting procedures.

Data Precision and Reliability: Class A

Frequency of Reporting: Annually

Information Storage System: TSPIRS and Budget/Finance reports.

Responsibility: Forest Budget Coordinator and Forest Economist

Cost:

Costs associated with accounting programs. No additional costs for Forest Plan monitoring.