

BIGHORN NATIONAL FOREST

Revised Land and Resource Management Plan

Administrative Change #4, March 2016

Monitoring and Evaluation

Table of Contents

Overview	4-1
Monitoring Purpose	4-1
Monitoring Plan Requirements.....	4-2
Biennial Forest Monitoring and Evaluation Report.....	4-3
Monitoring Meetings	4-4
Monitoring Strategy.....	4-4
Monitoring Elements.....	4-5
Monitoring Questions.....	4-5
Potential Monitoring Indicators	4-5
Frequency of Reporting.....	4-5
Potential Data Sources/Protocols	4-5
Updated Monitoring Strategy to Conform to the 2012 Planning Rule.....	4-6
(i) Status of select watershed conditions	4-6
(ii) Status of select ecological conditions including key characteristics of terrestrial and aquatic ecosystems	4-7
(iii) Status of focal species to assess the ecological conditions required under 219.9.....	4-8
(iv) Status of a select set of the ecological conditions required under 219.0 to contribute to the recovery of federal listed threatened and endangered species, conserve proposed and candidate species, and maintain a viable population of each species of conservation concern.....	4-9
(v) Status of visitor use, visitor satisfaction, and progress toward meeting recreation objectives.....	4-9
(vi) Measureable changes on the plan area related to climate change and other stressors that may be affecting the plan area.....	4-10
(vii) Progress toward meeting the desired conditions and objectives in the plan, including for providing multiple use opportunities	4-11
(viii) Effects of each management system to determine that they do not substantially and permanently impair the productivity of the land	4-14

Overview

This chapter provides programmatic direction for monitoring and evaluating plan implementation. Monitoring is the process of taking periodic observations to detect changes or trends in resources or environment. Evaluation is defined as interpreting or judging information collected from monitoring.

The purpose of this chapter is to provide the direction to facilitate successful monitoring and evaluation. In brief, the steps to monitoring are:

- ♦ **Establish Monitoring Priorities:** As part of the annual program budgeting process, priorities are established to conduct monitoring, as it is not possible to address all questions related to management issues or programs. The updated monitoring strategy described at the end of this chapter facilitates establishing these priorities to collect, manage, and evaluate data, and forms the plan of what data is to be collected.
- ♦ **Identify Responsible Parties and Potential Cooperators:** Resource program managers on the Forest accept responsibility for ensuring monitoring is completed, and identify ways to gather and evaluate data in conjunction with other agencies or interested parties.
- ♦ **Evaluate the Data:** Resource managers will evaluate the data collected, with the goal of answering the monitoring questions, and determine if changes are needed in plan direction or outputs.
- ♦ **Publish and Distribute the Annual Monitoring Report:** Resource managers will write, acquire approval by the Forest Supervisor, and distribute the annual monitoring report that summarizes information collected and the relevant evaluations.

Monitoring Purpose

Effective forest plan monitoring and evaluation improve both management and planning decisions. Monitoring and evaluation form the backbone of adaptive management. As Forest conditions change, monitoring and evaluation help identify the need to adjust desired conditions, goals, objectives, standards, and guidelines. They help the Forest Service and the public determine how the Revised Plan is being implemented, whether plan implementation is achieving desired outcomes, and whether assumptions made in the planning process are valid. Monitoring and evaluation allow the Forest Service to incorporate new understanding and technology; changes in law, policy, and resource conditions; and growing concerns, trends, and changing social values into forest planning.

Monitoring and evaluation are separate, sequential activities to determine how well objectives have been met and how closely management standards and guidelines have been applied. Monitoring generally includes the collection of data and information, either by observing or measuring.

Evaluation is the analysis of the data and information collected during monitoring. The evaluation results are used to:

- ♦ Answer the monitoring questions.
- ♦ Determine whether forest plan revision or amendment is warranted.
- ♦ Ascertain whether plan implementation should be modified.

Evaluation results form a basis for adaptively managing the Forest. Monitoring and evaluation keep the Revised Plan up-to-date and responsive to changing issues by verifying the effectiveness of the standards and guidelines, by anticipating program and project effects on resources, and by providing information for plan amendments. The following three types of monitoring are discussed in this chapter. The majority of monitoring at the national forest level is in the first two categories.

- ♦ **Implementation** monitoring determines if projects were implemented according to plan direction (standards and guidelines).
- ♦ **Effectiveness** monitoring determines if plan strategies and objectives were met.
- ♦ **Validation** monitoring verifies assumptions and models used in plan implementation, and determines if implementing the direction and desired conditions in the plan is effective at achieving the goals and objectives

Monitoring Plan Requirements

Forest plan development and revision initiated on or after May 9, 2012, must conform to the new planning requirements of the 2012 Planning Rule. This document updates this forest plan monitoring chapter to meet the current requirements of the 2012 Planning Rule. The remaining chapters of this forest plan are guided by the 1982 Planning Rule until a forest plan revision or amendment is initiated.

The National Forest Management Act (NFMA) requires “continuous monitoring and assessment in the field” to evaluate “the effects of each management system to the end that it will not produce substantial and permanent impairment of the productivity of the land.” The 2012 rule includes a three-part iterative cycle of assessment, planning, and monitoring in a continuous feedback loop. Monitoring supports the assessment process and evaluates forest plan implementation over time. This planning framework is designed to “inform integrated resource management and allows the Forest Service to adapt to changing conditions, including climate change, and improve management based on new information and monitoring.” The climate change monitoring requirement may relate to other monitoring indicators or the interactions with other stressors (i.e., fire, insects and disease, invasive species, changes in water, and geologic hazards).

A monitoring evaluation report is to be produced and made available to the public every two years. It “must indicate whether or not a change to the plan, management activities, the monitoring program, or a new assessment, may be warranted based on the new information... [and] must be used to inform adaptive management of the plan area”. The

monitoring program and evaluation report are part of the administrative record and the Forest Supervisor must document “how the best available scientific information was used to inform planning, the plan components, and other plan content, including the plan monitoring program.”

Under the 2012 Planning Rule, a monitoring plan will include monitoring questions and indicators designed to inform resource managers. The monitoring plan must “test relevant assumptions, track relevant changes, and measure management effectiveness” including “progress toward achieving or maintaining desired conditions or objectives.” The monitoring plan must also be “coordinated with the Regional Forester and Forest Service State and Private Forestry and Research and Development.” The monitoring plan should support and align with broader-scale monitoring. Broader-scale monitoring items are currently under development at the regional level and will provide for monitoring at a scale broader than one plan area.

Forests will also have to document how best available scientific information is used to develop the monitoring plan and specific monitoring items.

Biennial Forest Monitoring and Evaluation Report

The Forest documents its monitoring and evaluation in the Annual Monitoring and Evaluation Report which allows for output target reporting. The reports serves several purposes in addition to target reporting:

- ♦ Documenting monitoring and evaluation accomplishments.
- ♦ Providing an assessment of the current state of ecological conditions on the Forest.
- ♦ Providing adaptive management feedback to responsible officials of any needed changes to the Revised Plan or adjustments to management actions.
- ♦ Providing the public with relevant information about the management of the Forest.

The biennial monitoring and evaluation report is based on data and information gathered the previous fiscal year (October 1 – September 30). It evaluates implementation of the Revised Plan and provides an overview of resource conditions and trends as they relate to indicators and criteria for sustainability, with specific attention on the effects of management on ecological system structure and function. The monitoring and evaluation report is organized into 5 sections.

- ♦ The **Introduction** contains a description of the types of monitoring and evaluation occurring on the Forest, a brief discussion of forest plan revision and amendments, a comparison of projected and actual outputs, and a section describing the impact of budget on achieving forest plan objectives.
- ♦ The **Monitoring Results** section details the results of monitoring efforts for the following resource disciplines: water, air quality, minerals, soils, fish and riparian areas, fire, insects and disease, forested vegetation and timber, range, rare plants, wildlife, heritage, lands and special uses, recreation, facilities, and wilderness.

- ♦ **Recommendations** is a list of actions proposed by Forest specialists for their individual resources. The list includes a disposition component for each recommendation.
- ♦ **References** contains those bibliographic sources used to prepare the report.
- ♦ The authors of various sections are listed in the **List of Contributors** section.

Monitoring items reported on in any given year are determined by the reporting frequency detailed in the chart of monitoring questions in the Land and Resource Management Plan.

Monitoring Meetings

Monitoring and evaluation meetings will be offered twice a year with the forest plan revision cooperating agencies (State of Wyoming, County Commissioners, and Conservation District Board members). The meetings will be open to the public, with ground rules similar to those used in plan revision Steering Committee meetings.

Steering Committee members can help Forest personnel in monitoring forest plan and project implementation, in evaluating biological, social, and economic impacts; and by identifying amendment needs and proposed solutions. Maintaining the knowledge base and relationship with state agencies and local elected officials will provide continuity in the adaptive management cycle, from development of the Revised Plan to plan implementation, monitoring, evaluation, and amendment through to the next plan revision.

Monitoring Strategy

The monitoring strategy outlines the elements that should be monitored as required by the Revised Plan and the 2012 Planning Rule. At a minimum, the plan monitoring program must contain one or more monitoring questions and associated indicators addressing each of the following eight monitoring elements:

1. The status of select watershed conditions.
2. The status of select ecological conditions including key characteristics of terrestrial and aquatic ecosystems.
3. The status of focal species to assess the ecological conditions required.
4. The status of a select set of the ecological conditions to contribute to the recovery of federally listed threatened and endangered species, conserve proposed and candidate species, and maintain a viable population of each species of conservation concern.
5. The status of visitor use, visitor satisfaction, and progress toward meeting recreation objectives.
6. Measurable changes on the plan area related to climate change and other stressors that may be affecting the plan area.

7. Progress toward meeting the desired conditions and objectives in the plan, including providing for multiple use opportunities.
8. The effects of each management system to determine that they do not substantially and permanently impair the productivity of the land.

Forests will also have to document how best available scientific information is used to develop the monitoring plan and specific monitoring items. Land managers may need to prioritize what will be monitored in any given year based on monitoring drivers, monitoring priorities, previous year's accomplishments, and urgency of a monitoring question. Headings used in the monitoring strategy table are defined below.

Monitoring Elements

The monitoring elements consist of each of the eight categories required under the 2012 Planning Rule.

Monitoring Questions

Specific monitoring questions are developed to ensure monitoring and evaluation address each of the eight monitoring elements. Monitoring questions help identify issues of concern and determine whether observed changes are consistent with revised plan components including desired conditions, goals, objectives, standards, guidelines, and suitability.

Potential Monitoring Indicators

The potential monitoring indicators are performance measures used in answering the selected monitoring questions. Indicators are quantitative or qualitative performance measures for assessing progress toward achieving or managing for desired conditions.

Frequency of Reporting

Frequency describes the schedule of monitoring reporting and evaluation efforts over time. Most data is collected annually, with reporting or evaluation of the data conducted at certain times, such as biennially or every 6 years. For example, if field data for a monitoring question is chosen to be collected every field season and has a frequency of reporting of 10 years, the monitoring results would not be included in the biennial forest plan monitoring report until year 10.

Potential Data Sources/Protocols

The potential data sources and protocols consists of national forest system database information as well as qualitative and quantitative information such as survey responses, internal reviews, and program accomplishment and assessment records.

Updated Monitoring Strategy to Conform to the 2012 Planning Rule

Multi-party collaborative input at the geographic area, or larger, scale will, generally, precede project planning. This collaborative input will assess opportunities for travel management, elk security, and vegetation treatments, as well as other community issues. The input may be used to assist project level analysis. Exceptions may include, but are not limited to, fuels treatments or unplanned events such as insect infestations or wildfires where treatments are relatively inconsequential at the landscape scale.

The monitoring strategy table from the 2005 forest plan revision has been replaced with the monitoring approach listed below. “Frequency of Reporting” represents how often that the monitoring data is included within the forest plan monitoring report. Individual programs will determine how often that monitoring data is collected in order to meet the frequency of reporting (for example, monitored annually but only reported biennially).

(i) Status of select watershed conditions

Monitoring element 1: Watershed condition framework

Monitoring question(s): Is the unit improving condition in priority watersheds?

Potential indicator: Completion of essential projects identified in watershed restoration action plan.

Frequency of reporting: 6 years

Potential data sources or protocols: Project completion reports

Monitoring element 2: National Best Management Practices Program

Monitoring question: Are best management practices implemented, and are they effective at protecting water quality?

Potential indicator: Monitoring protocols rating system.

Frequency of reporting: 2 years.

Potential data sources or protocols: Best management practices review forms, local and national protocols.

(ii) Status of select ecological conditions including key characteristics of terrestrial and aquatic ecosystems

Monitoring element 3: Air quality

Monitoring question: Is acidic deposition impacting our high-elevation mountain lakes?

Potential indicators: Number and size of completed essential projects (identified in watershed restoration action plans). Changes in buffering capacity.

Reporting frequency: 6 years or earlier.

Potential data sources or protocols: Wilderness lake sampling, long term at Solitude and Florence Lakes, U.S. Environmental Protection Agency sampling protocols.

Monitoring element 4: Camping impacts in wilderness

Monitoring question: Are wilderness camping impacts exceeding acceptable limits?

Potential indicators: Impacts to soils, water, and vegetation in use areas.

Reporting frequency: 6 years.

Potential data sources or protocols: Bare ground assessments.

Monitoring element 5: Wilderness

Monitoring question: Are impacts exceeding acceptable limits?

Potential indicators: Trends in visits, crowding, and solitude. Woody debris.

Reporting frequencies: Two years for trends in visits, crowding, and solitude. Twenty years for woody debris.

Potential data sources or protocols: Visits based on wilderness registration data in Access database. Crowding and solitude based on wilderness rangers' logs of encounters and National visitor use monitoring survey data. Woody debris based on James K. Brown's "Handbook for Inventorying Downed Woody Material" and field inventory forms.

Monitoring element 6: Forest ecosystem health

Monitoring question: What are the status, extent, and trend of natural disturbance events in and around the plan area, including insects, diseases, wildfires, blowdowns, and other natural events?

Potential indicator: Type of occurrence, acres, and location.

Reporting frequency: 2 years or as needed in response to disturbance events.

Potential data sources or protocols: Aerial and ground survey data.

Monitoring element 7: Forest ecosystem health

Monitoring question: Are we moving toward desired future conditions for forested lands?

Potential indicator: Habitat structural stage, elk security model, acres of change, both created and natural.

Reporting frequency: 10 years.

Potential data sources or protocols: Corporate databases (FS Veg, LANDFIRE).

Monitoring element 8: Aquatic and terrestrial invasive species

Monitoring question: What are the status and trends of select aquatic and terrestrial invasive species?

Potential indicator: Distribution and spread maps of select species. Priorities for the selection of species will be updated biennially or as needed.

Reporting frequency: 2 years

Potential data sources or protocols: Corporate databases (Natural Resource Manager Threatened, Endangered, and Sensitive Plants – Invasive Species) and spatial data integrated from county planning

Monitoring element 9: Rangeland health

Monitoring question: What is the long-term trend of rangelands?

Potential indicator: Number of monitoring sites meeting, moving toward, or moving away from desired conditions. Categorize sites by riparian or upland.

Reporting frequency: 2 years.

Potential data sources or protocols: Long-term monitoring protocols outlined in the Region 2 “Rangeland Analysis and Management Guide” and further described within individual allotment management plans.

(iii) Status of focal species to assess the ecological conditions required under 219.9

Monitoring element 10: Focal species

Monitoring questions: Are forest management activities and natural events affecting ecological conditions indicated by the status of focal species? Are management activities, or lack thereof, providing for the ongoing persistence of structural stage diversity to support northern goshawk habitat?

Potential indicator: Changes in known historic nests for occupancy or abandonment and possible relocation.

Reporting frequency: 2 years.

Potential data sources or protocols: Tabular and spatial data held by wildlife biologists.

(iv) Status of a select set of the ecological conditions required under 219.0 to contribute to the recovery of federal listed threatened and endangered species, conserve proposed and candidate species, and maintain a viable population of each species of conservation concern.

Monitoring element 11: Species viability

Monitoring question(s): Have there been changes to habitat or species trends for emphasis species that cause a concern for viability?

Potential indicator(s): Significant changes in habitat, populations, or species' status.

Reporting frequency: 6 years or earlier.

Potential data sources or protocols: Corporate databases (including, but not limited to, Forest Service corporate habitat and species databases, Wyoming Game and Fish Department databases, Wyoming Natural Diversity Database databases, and any other like database with information concerning Bighorn National Forest species).

(v) Status of visitor use, visitor satisfaction, and progress toward meeting recreation objectives

Monitoring element 12: Recreation National visitor use monitoring

Monitoring question: What is the percent satisfaction for recreational visits on the unit?

Potential indicator: Trends in visitor satisfaction for very satisfied, somewhat satisfied, and total satisfaction.

Reporting frequency: National visitor use monitoring data is collected at 5-year intervals and reported 1 to 2 years after collection.

Potential data sources or protocols: The National Visitor Use Monitoring Master Report provides satisfaction by site type (day-use developed sites, overnight developed sites, undeveloped areas – general forest areas, and wilderness) and the forest as a whole in four categories (facilities, access, services, feeling of safety).

Monitoring element 13: Recreation demand

Monitoring question: What is the trend in use (for example, dispersed recreation – social indicators or crowding)?

Potential indicator(s): National, regional, and local reports of recreation use, National visitor use monitoring visits

Reporting frequency: 2 years (report National visitor use monitoring visits after data collection occurs).

Potential data sources or protocols: Summarize concessionaire reports, new National visitor use monitoring data, and anecdotal reports with a brief description of trends. By activity where available.

Monitoring element 14: System road maintenance

Monitoring question: To what extent are system roads being maintained to address resource concerns and identified management objectives?

Potential indicator: Number of miles of road (and percentage) maintained to standard and managed to road management objective.

Reporting frequency: 2 years.

Potential data sources or protocols: Forest Service Infrastructure database (INFRA)

Monitoring element 15: Recreation site capacity and condition

Monitoring question: What are the trends in recreation site capacity and condition?

Potential indicators: Changes in people-at-one-time capacity. Sites managed to standard and estimated backlog in deferred maintenance.

Reporting frequency: 2 years.

Potential data sources or protocols: Capacity and condition information from INFRA with supporting documentation of recent changes (construction, reconstruction, decommissioning, repurposing).

(vi) Measureable changes on the plan area related to climate change and other stressors that may be affecting the plan area

Monitoring element 16: Snow telemetry (SNOTEL)

Monitoring question: What are the status and trends of precipitation in the plan area?

Potential indicators: Elevation, precipitation (inches), and percentage. Elevation, snow depth inches, and snow-water equivalent.

Reporting frequency: 6 years.

Potential data sources or protocols: Natural Resource Conservation Service, U.S. Geological Survey, National Oceanic and Atmospheric Administration, Wyoming State Engineer's Office websites.

Monitoring element 17: Snow telemetry (SNOTEL)

Monitoring question: What are the status and trends of temperature change in the plan area?

Potential indicator(s): Trend in local and regional air and water temperatures. For example, U.S. Geological Survey and National Oceanic and Atmospheric Administration trend data, maximum air temperature (number of record high temperatures per station), stream temperature logger trends.

Reporting frequency: 6 years.

Potential data sources or protocols: Natural Resource Conservation Service, U.S. Geological Survey, National Oceanic and Atmospheric Administration, Wyoming State Engineer's Office websites.

(vii) Progress toward meeting the desired conditions and objectives in the plan, including for providing multiple use opportunities

Monitoring element 18: Heritage

Monitoring question: What activities have sustained heritage benefits and values?

Potential indicators: Programmatic agreements, historic preservation plans, priority area inventories, consultation, and public awareness and education.

Reporting frequency: 2 years.

Potential data sources or protocols: Report from Heritage INFRA module, supplemented by internal reporting of activities and accomplishments.

Monitoring element 19: Recreation opportunity

Monitoring question: To what extent are we providing diverse outdoor recreation and travel opportunities?

Potential indicator(s): Trends indicated by recreation opportunity spectrum class map updates, permitted use numbers (outfitters and guides, cabins, events, etc.), recreation, road and trail facilities provided or maintained, changes in regulations. The range of indicators covers the extent of existing agency systems.

Reporting frequencies: Two years for permitted uses, recreation facilities provided, and changes in regulations with a brief discussion of any notable changes. Six years for a recreation opportunity setting class map showing the existing condition of settings.

Potential data sources or protocols: Permitted uses data from the special use data system database; recreation facilities provided - number of developed sites by type (day use developed site results, overnight use developed site results, capacity from INFRA database and National visitor use monitoring); and changes in regulations from special order files and the Federal Register. For recreation opportunity setting class, GIS maps showing changes in settings, access, and regulation.

Monitoring element 20: Access

Monitoring question: Are we providing appropriate legal access to the National Forest?

Potential indicators: Number of easements (How many are being utilized by the public?). Number of requests for additional legal access (Is it needed? Is additional legal access needed?). Number of rights-of-way needed based on forest inventory.

Reporting frequencies: Two years for requests for legal access and evaluation of need. Six years for number of easements held and information on utilization and number of rights-of-way needed based on Forest inventory.

Potential data sources or protocols: Lands staff – requests for legal access and evaluation of need. Number of easements and GIS map of easements held from the automated lands project database and anecdotal information on utilization from ranger district staff. Number of rights-of-way needed based on forest GIS inventory. INFRA database for roads and trails.

Monitoring element 21: Decommissioning of roads and trails

Monitoring questions: To what extent are user-created roads and trails being decommissioned and how is the issue being addressed through signing and public education?

Potential indicators: Miles of road decommissioned, number of associated signs constructed, and education efforts.

Reporting frequency: 2 years.

Potential data sources or protocols: INFRA database for roads and trails, report on education activities.

Monitoring element 22: Scenic character

Monitoring question: Are activities and uses consistent with scenic character goals and scenic integrity objectives?

Potential indicator: Compare forestwide existing scenic integrity level to current condition and scenic integrity objectives established in the forest plan.

Reporting frequency: Two years for notable changes of vegetation, structures, and highway management in the scenic byway corridor. Every 2 years, review a sample of management activities and compare forest plan direction, National Environmental Policy Act record, and actual outcomes for scenic integrity and landscape character. Every 6 years, map existing scenic integrity levels on National Forest System lands and compare them to the year 2000 baseline and the forest plan scenic integrity objectives with a brief narrative on trends.

Potential data sources or protocols: GIS and INFRA data on visible changes in forested vegetation and changes in facilities (for example, construction, reconstruction, or removal of recreation; range; transportation; special use; and fire, administrative, and other facilities). Wyoming Department of Transportation changes in road standards, maintenance, signs, and other wayfinding infrastructure.

Monitoring element 23: Community involvement

Monitoring question: Are we participating in local, regional, and/or state efforts that build capacity to adapt to economic, environmental, and social changes?

Potential indicators: Youth activities outdoors, volunteer activities, cooperation with other government entities, partnership agreements, permits, employment programs, training and education outreach. List activities that provide evidence of participation in the social and economic sphere.

Reporting frequency: 2 years.

Potential data sources or protocols: District and supervisor's office staff in recreation and resources for youth activities, volunteer activities, partnership agreements and grants, research and event permits, conservation education, and interpretation. Line officers for cooperation and participation with other governmental entities.

Monitoring element 24: Public communication

Monitoring question: Are we communicating with the public about national forest management?

Potential indicators: Number and methods of communication. Are our communications accurate and timely? Responsiveness to Steering Committee feedback.

Reporting frequency: 2 years.

Potential data sources or protocols: Themes from public feedback: Steering Committee, organized public groups, key stakeholders, and individuals.

Monitoring element 25: Economic benefits

Monitoring question: What are range, timber, and recreation programs' contributions to the plan area?

Potential indicators: Employment, income, and contribution to the gross domestic product.

Reporting frequency: 10 years.

Potential data sources or protocols: Impact Analysis for Planning (IMPLAN) model with program-specific coefficients. State of Wyoming economic data.

Monitoring element 26: Permitted livestock grazing

Monitoring question: What is the trend of livestock grazing on the Forest?

Potential indicator: Animal unit months – permitted, authorized, or actual.

Reporting frequency: 2 years.

Potential data sources or protocols: INFRA database.

Monitoring element 27: Wood products and stewardship

Monitoring questions: What forest products are sold, what is the quantity, and how does that quantity compare with forest plan projections?

Potential indicator: Volume sold by product and acres treated through contracting, permits, or other means (stewardship contracting).

Reporting frequency: 2 years.

Potential data sources or protocols: Corporate databases (Periodic Timber Sale Accomplishment Report from Timber Information Manager).

Monitoring element 28: Lands suitable for timber production

Monitoring question: Is the inventory of lands suitable for timber production accurate?

Potential indicator: Use established process to evaluate lands.

Reporting frequency: 10 years.

Potential data sources or protocols: Corporate databases (FSVeg, Forest Inventory and Analysis data, Forest Plan direction)

(viii) Effects of each management system to determine that they do not substantially and permanently impair the productivity of the land

Monitoring element 29: Soils

Monitoring question: What activities have affected soil productivity and hydrologic function?

Potential indicators: Type, degree, and extent of soil disturbance and risk rating to determine the effect of soil disturbance on soil productivity and hydrologic function.

Reporting frequency: 2 years.

Potential data sources or protocols: Results from best management practices reviews for range, timber, recreation, facilities, roads, etc.

Monitoring element 30: Long-term stream monitoring

Monitoring question: What does long-term monitoring station data demonstrate about aquatic ecosystem health and upstream watershed condition?

Potential indicator(s): Geomorphic and greenline data from long-term monitoring stations.

Reporting frequency: 6 years.

Potential data sources or protocols: Long-term monitoring station data review and trend analysis.