

BIGHORN NATIONAL FOREST

Revised Land and Resource Management Plan

Administrative Change #4, March 2016

Monitoring and Evaluation

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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 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 five 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 (see following table) 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 requirements:

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 questions. 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 cover each of the eight categories required under the 2012 Planning Rule.

Monitoring Questions

Specific monitoring questions are developed to ensure that 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 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 six years.

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.

Monitoring Strategy

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 following tables. “Frequency of Reporting” represents how often the monitoring data is included in the forest plan monitoring report. Individual programs will determine how often monitoring data is collected in order to meet the frequency of reporting (that is, monitored annually but only reported biennially).

(i) Status of select watershed conditions

Monitoring Elements	Monitoring Question(s)	Potential Indicator(s)	Frequency of Reporting	Potential Data Source(s)/ Protocol(s)
Watershed Condition Framework	Is the unit improving condition in priority watersheds?	Completion of essential projects identified in watershed restoration action plan.	6 years	Project completion reports
National Best Management Practices Program	Are best management practices implemented, and are they effective at protecting water quality?	Monitoring protocols rating system	2 years	Best management practices review forms, local and national protocols

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

Monitoring Elements	Monitoring Question(s)	Potential Indicator(s)	Frequency of Reporting	Potential Data Source(s)/ Protocol(s)
Air quality	Is acidic deposition impacting our high elevation mountain lakes?	Number and size of completed essential projects (identified in watershed restoration action plans). Changes in buffering capacity.	6 years	Wilderness lake sampling, long term at Solitude and Florence Lakes. U.S. Environmental Protection Agency sampling protocols
Camping Impacts in Wilderness	Are wilderness camping impacts exceeding acceptable limits?	Impacts to soils, water, and vegetation in use areas.	6 years	Wilderness - bare ground assessment and rapid campsite assessment forms
Wilderness	Are impacts exceeding acceptable limits?	Trends in visits, crowding, solitude, and woody debris.	2 years	Visits - based on wilderness registration data in Access database; crowding and solitude - wilderness ranger's log of encounters, National Visitor Use Monitoring survey data; Brown - Handbook for Inventorying Downed Woody Material and field inventory form
Forest Ecosystem Health	What are the status and trends of insects and disease in and around the plan area?	Type of occurrence, acres, and location.	2 years or as needed in response to disturbance events	Aerial and ground survey data

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Monitoring Elements	Monitoring Question(s)	Potential Indicator(s)	Frequency of Reporting	Potential Data Source(s)/ Protocol(s)
Forest Ecosystem Health	Are we moving towards desired future conditions for forested lands?	Habitat structural stage, elk security model, acres of change, both created and natural. This should be reported on a 10-year interval.	10 years	Corporate databases (that is, FS Veg)
Aquatic and Terrestrial Invasive Species	What are the status and trends of select aquatic and terrestrial invasive species?	Distribution and spread maps of select species. Priorities for the selection of species will be updated biennially or as needed.	2 years	Corporate databases (that is, Natural Resource Manager Threatened, Endangered, and Sensitive Plants - Invasive Species) and spatial data integrated from county planning.
Rangeland Health	What is the long-term trend of rangelands?	Number of monitoring sites that are meeting, moving toward, or moving away from desired conditions. Categorize sites by riparian or upland.	2 years	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 Elements	Monitoring Question(s)	Potential Indicator(s)	Frequency of Reporting	Potential Data Source(s)/ Protocol(s)
Focal Species	<p>Are forest management activities and natural events affecting ecological conditions indicated by the status of focal species?</p> <p>Are management activities, or lack thereof, providing for the ongoing persistence of structural stage diversity to support northern goshawk habitat?</p>	Changes in known historic nests for occupancy or abandonment and possible relocation.	2 years	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 Elements	Monitoring Question(s)	Potential Indicator(s)	Frequency of Reporting	Potential Data Source(s)/ Protocol(s)
Species Viability	Have there been changes to habitat or species trends for emphasis species that cause a concern for viability?	Significant changes in habitat or populations or species' status.	6 years	Legacy databases

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

Monitoring Elements	Monitoring Question(s)	Potential Indicator(s)	Frequency of Reporting	Potential Data Source(s)/ Protocol(s)
Recreation NVUM	What is the percent satisfaction for recreational visits on the unit?	Trends in visitor satisfaction for 1) very satisfied; 2) somewhat satisfied; and 3) total satisfaction.	National Visitor Use Monitoring data is collected at 5-year intervals and reported 1 to 2 years after collection.	National Visitor Use Monitoring master report provides satisfaction by site type (day-use developed sites, overnight developed sites, undeveloped area - general forest areas, and wilderness) and the forest as a whole in four categories (facilities, access, services, feeling of safety).
Recreation Demand	What is the trend in use (that is, dispersed recreation-social indicators/crowding)?	National, regional, and local reports of recreation use, National Visitor Use Monitoring visits	2 years (report NVUM visits after data collection occurs)	Summarize concessionaire reports, new National Visitor Use Monitoring data, and anecdotal reports with a brief description of trends. This may be by activity where available.
System Road Maintenance	To what extent are system roads being maintained to address resource concerns and identified management objectives?	Number of miles of road (and percentage) maintained to standard and managed to road management objective	2 years	INFRA (Forest Service infrastructure database)
Recreation Site Capacity and Condition	What are the trends in recreation site capacity and condition?	Changes in persons-at-one-time capacity. Sites managed to standard and estimated	2 years	Capacity and condition information from INFRA with supporting documentation of recent changes (construction,

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Monitoring Elements	Monitoring Question(s)	Potential Indicator(s)	Frequency of Reporting	Potential Data Source(s)/ Protocol(s)
		backlog in deferred maintenance.		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 Elements	Monitoring Question(s)	Potential Indicator(s)	Frequency of Reporting	Potential Data Source(s)/ Protocol(s)
SNOTEL	What are the status and trends of precipitation in the plan area?	Elevation, precipitation (inches), and percentage. Elevation, snow depth inches, and snow water equivalent.	6 years	Natural Resources Conservation Service, U.S. Geological Survey, and National Oceanic and Atmospheric Administration websites
SNOTEL	What are the status and trends of temperature change in the plan area?	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 temp (# of record high temperatures per station); stream temperature logger trends.	6 years	Natural Resources Conservation Service, U.S. Geological Survey, and National Oceanic and Atmospheric Administration websites

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

Monitoring Elements	Monitoring Question(s)	Potential Indicator(s)	Frequency of Reporting	Potential Data Source(s)/ Protocol(s)
Heritage	What activities have sustained heritage benefits and values	1) programmatic agreements, 2) historic preservation plans, 3) priority area inventories, 4) consultation, 5) public awareness and education	2 years	Report from Heritage INFRA module, supplemented by internal reporting of activities and accomplishments
Recreation Opportunity	To what extent are we providing diverse outdoor recreation and travel opportunities?	Trends indicated by recreation opportunity spectrum class map updates, permitted use numbers (outfitters-guides, cabins, events, etc.), recreation, road and trail facilities provided/maintained, changes in regulations. The range of indicators covers the extent of existing agency systems. This question addresses the issue of access to forest recreation opportunities. This concern is expressed frequently by user groups.	2 years: 1) permitted uses, 2) recreation facilities provided, and 3) changes in regulations with a brief discussion of any notable changes. 6-year interval: recreation opportunity setting class map showing the existing condition of settings.	Every 2 years: 1) permitted uses data from Special Use Data System database; 2) recreation facilities provided - number of developed sites by type (DUDS, OUDS, capacity from INFRA database and National Visitor Use Monitoring); 3) changes in regulations from special order files and Federal Register. Every 6 years: GIS maps showing changes in settings, access, and regulation.
Access	Are we providing appropriate legal	Number of easements; How many of these easements are being	2 years: 1) requests for legal access	Every 2 years: 1) requests for legal access and

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Monitoring Elements	Monitoring Question(s)	Potential Indicator(s)	Frequency of Reporting	Potential Data Source(s)/ Protocol(s)
	access to the National Forest?	utilized by the public? Number of requests for additional legal access. Is additional legal access needed? Number of rights-of-way needed based on the forest inventory.	and evaluation of need; 6 years: 1) number of easements held and information on utilization, 2) number of rights of way needed based on Forest inventory.	evaluation of need from lands staff; 6-year interval: 1) number of easements and GIS map of easements held from automated lands program data and anecdotal information on utilization from District staff, 2) number of rights of way needed based on Forest GIS inventory. INFRA database for roads and trails, report on education activities.
Decommissioning of Roads and Trails	To what extent are user created roads and trails being decommissioned and how is the issue being addressed through signing and public education?	Miles of road decommissioned, number of associated signs constructed, and education efforts.	2 years	INFRA database for roads and trails, report on education activities.
Scenic Character	Are activities and uses consistent with scenic character goals and scenic integrity objectives?	Compare forestwide existing scenic integrity level to current condition and scenic integrity objectives established in the forest plan.	2 years: 1) notable changes of vegetation, structures, and highway management in the scenic	GIS and INFRA data on visible changes in forested vegetation, changes in facilities (that is, construction, reconstruction, or removal of recreation; fire, administrative, and other

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Monitoring Elements	Monitoring Question(s)	Potential Indicator(s)	Frequency of Reporting	Potential Data Source(s)/ Protocol(s)
			<p>byway corridor. 2) review a sample of management activities and compare forest plan direction, NEPA record and actual outcomes for scenic integrity and landscape character.</p> <p>6-year interval: 1) map existing scenic integrity levels on NFS lands and compare it to the year 2000 baseline and the forest plan scenic integrity objectives with a brief narrative on trends</p>	<p>facilities; range; transportation; and special use structures). Wyoming Department of Transportation changes in road standards, maintenance, signs and other wayfinding infrastructure.</p>

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Monitoring Elements	Monitoring Question(s)	Potential Indicator(s)	Frequency of Reporting	Potential Data Source(s)/ Protocol(s)
Community Involvement	Are we participating in local regional and/or state efforts that build capacity to adapt to economic, environmental, and social change?	Youth activities outdoors, volunteer activities, cooperation with other government entities, partnership agreements, permits, employment programs, training and education outreach. Listing of activities that provide evidence of participation in the social and economic sphere.	2 years	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.
Public Communication	Are we communicating with the public about national forest management?	Number and methods of communication. Are our communications accurate and timely? Responsiveness to Steering Committee feedback.	2 years	Themes from public feedback: Steering Committee, organized public groups, key stakeholders, and individuals.
Economic Benefits	What are the contributions from the range, timber, and recreation program to the plan area?	Employment, income, and contribution to the GDP	10 years	Economic model with program-specific coefficients (that is, Impact Analysis for Planning model) State of Wyoming economic data

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Monitoring Elements	Monitoring Question(s)	Potential Indicator(s)	Frequency of Reporting	Potential Data Source(s)/ Protocol(s)
Permitted Livestock Grazing	What is the trend of livestock grazing on the Forest?	Animal unit months: permitted, authorized, and actual	2 years	INFRA
Wood Products and Stewardship	What forest products are sold from the Forest, what is their quantity, and how does that quantity compare with forest plan projections?	Volume sold by product and acres treated through contracting, permits, or other means (i.e., stewardship contracting).	2 years	Corporate databases (that is, Periodic Timber Sale Accomplishment Report (PTSAR) from Timber Information Manager (TIM)
Lands Suitable for Timber Production	Is the inventory of lands suitable for timber production accurate?	Use established process to evaluate lands.	10 years	Corporate databases (that is, 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 Elements	Monitoring Question(s)	Potential Indicator(s)	Frequency of Reporting	Potential Data Source(s)/ Protocol(s)
Soils	What activities have affected soil productivity and hydrologic function?	Type, degree and extent of soil disturbance and risk rating to determine the effect of soil disturbance on soil productivity and hydrologic function.	2 years	Best management practices review results (range, timber, recreation, facilities, roads, etc.)
Long Term Stream Monitoring	What does long-term monitoring station data demonstrate about	Geomorphic and greenline data from long-term monitoring station.	6 years	Long-term monitoring station data review and trend analysis.

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	aquatic ecosystem health and upstream watershed condition?			