Chapter

4

MEDICINE BOW NATIONAL FOREST
Revised Land and Resource Management Plan

Monitoring and Evaluation

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Chapter

4

Overview

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

- ◆ **Establish a Monitoring Budget:** As part of the annual program budgeting process, establish an annual budget to collect, manage, and evaluate data; coordinate with partners; produce the annual report; and fund the monitoring interdisciplinary (ID) team.

- ◆ **Identify a Monitoring ID Team:** At least once a year before publishing the annual monitoring report, establish an ID Team with the authority to coordinate and supervise monitoring activities, administer monitoring funding, evaluate the data collected, and produce the annual monitoring report.

- ◆ **Build a Monitoring Guide:** The ID team will annually build, update, or validate a Monitoring Guide designed to facilitate data collection and storage on monitoring items using standardized monitoring protocols and corporate data/information storage.

- ◆ **Find cooperators:** The ID team will find and manage cooperators who will help collect and possibly evaluate data. Cooperators will play a key role in a successful monitoring effort.

- ◆ **Establish an Annual Monitoring Work Plan:** The ID team, under the direction of the Forest Leadership Team, will build and work under a work plan with the budget provided. The project work plan will identify the monitoring questions to be addressed for the year, the funding available, where the data on monitoring items will be collected, and who will be responsible for obtaining the data.

- ◆ **Manage the Collection and Storage of Data:** The ID team will work with Forest Service employees and cooperators to see that data is collected using standard methods found in the Monitoring Guide and that the data is entered in the appropriate corporate data storage system.

Monitoring Steps, cont.

♦ **Evaluate the Data:** The ID team will evaluate the data collected with the goal of answering the monitoring questions.

♦ **Publish and Distribute the Annual Monitoring Report:** The ID team will write, acquire approval by the Forest Supervisor, and distribute the annual monitoring report.

Monitoring Purpose

Effective Land and Resource Management Plan monitoring and evaluation fosters improved management and more informed planning decisions. It helps identify the need to adjust desired conditions, goals, objectives, standards, and guidelines as conditions change. Monitoring and evaluation help the Forest Service and the public determine how a Land and Resource Management Plan is being implemented, whether plan implementation is achieving desired outcomes, and whether assumptions made in the planning process are valid.

Monitoring and evaluation are learning tools that form the backbone of adaptive management. With these tools, information is collected and compiled to serve as reference points for the future. 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 also allows the Forest Service to evaluate the assumptions used to develop the Land and Resource Management Plan. In short, monitoring and evaluation breathe life into a static document—the plan—to make it dynamic, relevant, and useful.

Several kinds of activities can be referred to as monitoring. Programmatic monitoring tracks and evaluates trends of ecological, social, or economic outcomes. Project implementation monitoring checks compliance with Land and Resource Management Plan standards and guidelines. Effectiveness monitoring evaluates how well Forest Service management actions are achieving desired outcomes. Validation monitoring verifies assumptions and models used in plan implementation. Monitoring may also address issues for large geographic areas of which the Forest is a part. These types of monitoring are addressed in Land and Resource Management Plans.

There are also two other types of monitoring which are not included in this chapter:

- ◆ Tracking or development of administrative reports (plans for protection of historic sites, interpretive plans, plans to inventory a particular resource, or conservation strategies).

- ◆ Tracking specific program outputs (miles of trail maintained, recreation visitor days, cubic feet of timber harvested, or acres of prescribed burning accomplished).

Tracking outputs can be referenced, using general terms, in the Land and Resource Management Plan and may be included in the annual monitoring plan or annual monitoring and evaluation report, as they are an important measure of how we use funds and are important to the public.

As a Forest plans and implements its monitoring and evaluation program, there are several important guidelines to consider. Monitoring should:

- ◆ Be purposeful and conducted to answer specific questions.

- ◆ Be done at the appropriate spatial and temporal scale to answer the question.

- ◆ Be done in collaboration with others (e.g., agencies, the public, researchers, and nongovernment agencies) to share the workload (including obtaining data from other sources), gain expertise, and build credibility and trust.

- ◆ Use the best available science and established protocols to collect and evaluate the data.

- ◆ Use modern information management techniques and tools.

- ◆ Apply stringent selection criteria so that a monitoring activity is only conducted if it is feasible, realistic, and affordable.

- ◆ Emphasize evaluation as much as the collection of the data.

Monitoring and evaluation are conducted at several scales and for many purposes, each of which has different objectives and requirements. Monitoring requirements and tasks are developed to be responsive to the objectives and scale of the plan, program, or project to be monitored.
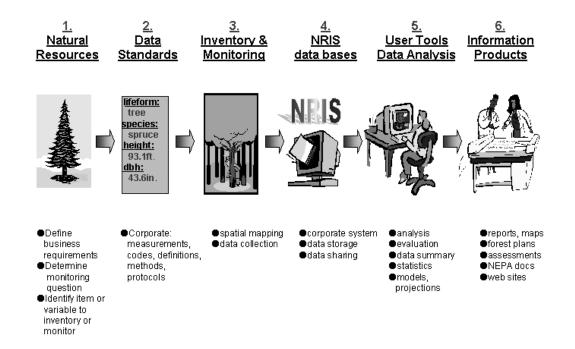
Monitoring and evaluation are separate, sequential activities to determine how well objectives have been met and how closely management standards and guidelines have been applied. Monitoring generally includes the collection of data and information, either by observing or measuring. Evaluation is the analysis of the data and information collected during monitoring. The evaluation results are used to answer the monitoring questions, determine the need to revise or amend the Land and Resource Management Plan or the way the plan is implemented, and form a

basis for adaptively managing the Forest. Monitoring and evaluation keep the Land and Resource Management Plan up-to-date and responsive to changing issues by verifying the effectiveness of the plan's standards and guidelines, by anticipating program and project effects on resources, and by providing information for amendments to the Land and Resource Management Plan.

This chapter provides programmatic direction for monitoring and evaluating plan implementation. Monitoring provides the Forest Service with the information necessary to determine whether the Land and Resource Management Plan is sufficient to guide the management of the Forest for the subsequent year or whether modification is needed.

Information Management

Monitoring and evaluation involve more than just collecting data. They encompass the full range of information management steps shown in the following figure:

1. Natural Resources	2. Data Standards	3. Inventory & Monitoring	4. NRIS data bases	5. User Tools Data Analysis	6. Information Products
●Define business requirements ●Determine monitoring question ●Identify item or variable to inventory or monitor	●Corporate: measurements, codes, definitions, methods, protocols	●spatial mapping ●data collection	●corporate system ●data storage ●data sharing	●analysis ●evaluation ●data summary ●statistics ●models, projections	●reports, maps ●forest plans ●assessments ●NEPA docs ●web sites

Once the purpose or reasoning for monitoring has been determined (such as to answer a particular monitoring question), careful thought needs to go into identifying what feature or variable needs to be measured, as well as how it will be measured (protocol). If no protocols exist to acquire the needed information, research should be consulted to assist in developing them.

After the Forest Service determines how information will be gathered, data collection begins. Using data from other sources saves the Forest the cost of collecting the information. Once data are obtained and have been edited to satisfy quality standards, the data need to be stored in a corporate electronic database, such as NRIS or GIS. The data is then analyzed and interpreted.

The interpreted information is evaluated by the ID team to answer the monitoring question and give it meaning in the context of the Land and Resource Management Plan. A variety of analytical tools and evaluation procedures are available to interpret data. The results are reported to the Forest Leadership Team to consider and act on. The results are also documented in the annual monitoring and evaluation report. Monitoring data, evaluation results, and the annual report should be accessible to the public electronically.

Reasons for Monitoring (Monitoring Drivers)

The National Forest Management Act (NFMA) requires National Forests to do specific monitoring tasks. The level and intensity of any additional monitoring is dependent on available staffing, funding, and Forest priorities.

The following is a list of reasons (monitoring drivers) why certain items are included in a Land and Resource Management Plan:

- ◆ Legal and regulatory requirements.

- ◆ Forest Service manual direction.

- ◆ Tracking Forest desired conditions, goals, and objectives.

- ◆ Validation of models/assumptions.

- ◆ Tracking agency expectations.

- ◆ Tracking public expectations/issues.

- ◆ Contributions to broad-scale monitoring.

- ◆ Court rulings.

Legal drivers include regulations at 36 CFR 219 that describe NFMA monitoring requirements. Some of these requirements provide guidance for developing the monitoring program while others include specific compliance requirements. The following regulations specify the minimum requirements for monitoring:

- ◆ 36 CFR 219.7(f) A program of monitoring and evaluation shall be conducted that includes the consideration of the effects of National Forest management on land, resources, and communities adjacent to or near the National Forest being planned, and the effects upon National Forest from management activities on nearby lands managed by other federal or government agencies or under the jurisdiction of local governments.

Regulations specifying minimum monitoring requirements, cont.

◆ 36 CFR 219.11(d) Monitoring and evaluation requirements that will provide a basis for a periodic determination and evaluation of effects of management practices.

◆ 36 CFR 219.12(k) Monitoring requirements identified in the Land and Resource Management Plan shall provide for the following:

▶ A quantitative estimate of performance comparing outputs and services with those projected by the plan.

▶ Documentation of the measured prescriptions and effects including significant changes in productivity of the land.

▶ Documentation of costs associated with carrying out the planned management prescriptions as compared to the costs estimated in the plan.

▶ A description of the following monitoring activities:

▷ The actions, effects, or resources to be measured and the frequency of measurements.
▷ Expected precision and reliability of the monitoring process.
▷ The time when evaluations will be reported.

▶ A determination of compliance with the following standards:

▷ Lands are adequately restocked as specified in the plan.
▷ Lands identified as not suited for timber production are examined at least every 10 years to determine if they have become suitable; and that, if determined suited, such lands are returned to timber production.
▷ Maximum size limits for harvest areas are evaluated to determine whether such size limits should be continued.
▷ Destructive insects and disease organisms to not increase to potentially damaging levels following management activities.

◆ 36 CFR 219.19(a) (6) Population trends of the management indicator species will be monitored and relationships to habitat changes determined. This monitoring will be done in cooperation with state fish and wildlife agencies, to the extent possible.

◆ 36 CFR 219.21(g) Forest planning shall evaluate the potential effects of vehicle use off roads and, on the basis of the requirements of 36 CFR 295, classify areas and trails of National Forest System lands as to whether or not off-road vehicle use may be permitted.

Definitions

Monitoring questions: Specific monitoring questions are developed to ensure that monitoring and evaluation address information essential to measuring Land and Resource Management Plan accomplishments and effectiveness. These questions help identify issues of concern and reveal how they are changing. The evaluation process (discussed below) determines whether the observed changes are consistent with Land and Resource Management Plan desired future conditions, goals, and objectives and what adjustments may be needed.

Monitoring items: A monitoring item, or data element, is a quantitative or qualitative parameter that can be measured or estimated. One or more monitoring items are selected to answer a monitoring question. A particular monitoring item may be used to answer more than one monitoring question. Potential monitoring items are listed in the Land and Resource Management Plan as part of the accompanying table of monitoring questions. These are thought to be the best items needed to answer the questions, but they are subject to change as the monitoring strategy is implemented. Any changes to the list of potential monitoring items will be reflected in the Monitoring Guide or Annual Monitoring Work Plan that accompany this Land and Resource Management Plan. Each monitoring item has an associated unit of measure, such as acre, mile, etc. Examples of monitoring items and associated units of measure include acres and location of soils improved or number of degraded water bodies restored on National Forest System land. Details on the units of measure are shown in the Monitoring Guide.

Monitoring methods: Monitoring methods are developed in the Monitoring Guide and may change based on changes in technology, staffing, budgets, and issues. Only standardized protocols will be used to collect monitoring item data. Protocols will be peer reviewed as needed.

Precision/Reliability: The precision and reliability with which each Forest program or activity is monitored depends on the particular program or activity to be monitored. There are two recognized classes of precision and reliability:

- ◆ **Class A:** The methods are generally well accepted for modeling or measuring the resource or condition. They 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.

- ◆ **Class B:** These methods are based on project records, communication, on-site ocular estimates, or less formal measurements like paced transects, informal visitor surveys, air photo interpretation, or other similar types of assessments. Reliability, accuracy, and precision are good but less than Class A. Class B methods are often qualitative but still provide valuable information on the status of the resource.

Scale: Scale describes the level of analysis with respect to land size. This measure is important in describing effects dealing with habitat heterogeneity and viability issues, as well as describing cumulative effects of management actions. Examples include 6th-level watersheds, geographic areas, administrative units, or landscapes.

Frequency: Frequency describes the timing of monitoring and evaluation efforts over time. Examples include annually, every 5 years, or every 10 years.

Monitoring Priorities

After monitoring questions are developed, a screening process sorts the more significant questions from those of lesser significance to ensure efficient use of limited resources—time, money, and personnel. The priority of a question may affect the intensity or extent of associated monitoring activities. The following is a list of questions used in the screening process with a brief explanation or example.

- **Is there a high degree of uncertainty associated with management assumptions?** Examples: (1) a new way of doing something where there is limited experience with the new technique; (2) actions taken in response to an unprecedented event; (3) a lack of data for a particular resource response to a management action.

- **Is there a high degree of disparity between existing and desired conditions?** Examples: (1) a particular habitat component is at a much lower level than desired; (2) the amount of use of a particular resource or use at a particular location is much higher than desired.

- **Are proposed management activities likely to affect resources of concern?** There may be other forces affecting a resource much more significantly than anything the Forest Service does. There may also be portions of the landscape where no management activities are planned. An efficient monitoring strategy will focus on those circumstances where management activities are expected to have a discernable outcome.

- **What are the consequences of not knowing resource condition?** Examples: (1) if a species is at risk, consequences could be higher, whether or not management activities are likely to affect it; (2) if a relationship with cooperators or local government is at risk due to a management activity, consequences could be high (in this case, a human resource).

- **Will monitoring respond to a key issue?** Key issues identified through scoping may warrant monitoring, even if they are: (1) well understood, (2) the existing condition is good, and (3) management activities will have little impact. Monitoring may be necessary for educational and/or accountability purposes.

 ◆ **In addition to the above, can the question be answered cost effectively?** If the cost of answering the question is especially high in regard to benefits, or if an adequate monitoring method cannot be developed, the resource in question may be more appropriately studied by another entity, such as Forest Service Research or private educational institutions.

Research Contributions

Research needs are identified during the development of Land and Resource Management Plans. Any additional research needs are identified during monitoring and evaluation of the plan as it is implemented and in the annual monitoring and evaluation reports. The Regional Forester evaluates any research needs for inclusion in the Regional research program proposal that is used by Forest Service Research and Development as input for determining priorities for research funding at the regional and national levels.

Monitoring Guide

The Monitoring Guide will be developed in the first year of Plan implementation. It provides the specific methodologies, protocols, and administrative information associated with each monitoring item described in a Land and Resource Management Plan. The guide is flexible and may be changed as new methodologies and techniques for monitoring are developed and corporately approved. While the guide uses information in the Land and Resource Management Plan, it is not a part of the plan; therefore, it may be changed without necessitating plan amendment.

Specific information for each monitoring item in the Monitoring Guide should include the following:

 ◆ Resource or condition being monitored

 ◆ Monitoring question

 ◆ Monitoring Driver

 ◆ Cooperators

 ◆ Monitoring items (Information/Indicators)

   ▶ Metadata of data collection

      ▷ Scale

      ▷ Unit of measure

      ▷ Precision and reliability (This must also be in the LRMP per 36 CFR 219.12(k)(4)(ii))

      ▷ Quality Assurance/ Quality Control

      ▷ Methods (i.e., standard, approved protocols)

Monitoring item information, cont.

   ▷ Frequency of measurement

   ▷ Who collected? When collected?

   ▷ Reporting period (This must also be in the LRMP per 36 CFR 219.12(k)(4)(iii)

   ▷ Information management (description of how data will be stored and made accessible)

   ◆ Responsibility

   ◆ Cost

   ◆ Evaluation Process

Annual Monitoring Work Plan

An annual monitoring plan of operations, with a list of monitoring items, is prepared each year. Methods and protocols for each monitoring item are derived from the Monitoring Guide.

The Forest Leadership Team approves the annual monitoring plan based on interdisciplinary team recommendation, budget constraints, and management issues. Monitoring drivers and priority considerations will help in the selection process.

The Forest interdisciplinary team (ID Team) reviews the previous years' monitoring and evaluation results to determine if methodology and protocols in the Monitoring Guide are effective and efficient; if not, changes may be made to the Monitoring Guide.

A strategy for involving the public and other agencies in our monitoring activities should be considered each year. This may be accomplished through partnerships with interest groups, volunteer groups, other federal, state and local agencies, and universities. Monitoring information trips for the public could also be scheduled to demonstrate monitoring methods. The public is informed about Land and Resource Management Plan monitoring through new releases and the Internet.

The monitoring plan includes direction for preparing the current year's annual monitoring and evaluation report and lays the framework for information required for five- and 10-year evaluation reports. Results of this plan will show priority and budget trends that guide future priorities and budgets.

The following is an example of annual monitoring plan items that would be monitored according to direction in the Monitoring Guide:

Activity	Monitoring Guide Page Reference	Responsible Person
What is the increase/decrease in noxious weeds?		District through Forest Rangeland Management Specialist
Reforestation: Are lands adequately stocked five years after regeneration harvest?		District through Forest Silviculturist

Each Forest ID Team member coordinates the data collection for his or her respective resource area. The data is then interpreted and contributes to the annual monitoring and evaluation report prepared by the team the following fiscal year.

Evaluation Process

The Forest ID Team evaluates the data and information collected through monitoring. Successful adaptive management depends on collectively evaluating the effectiveness of management activities in moving the Forest toward desired conditions. The "desired condition" (or other driver) that prompted the development of the monitoring question is typically associated with one or more monitoring items. Whereas the desired condition may be conceptual or visionary in nature, the monitoring items are generally a measurable aspect of the desired condition.

Evaluation is the process of transforming data into information—a value-added process. It is a process of synthesis that brings together value, judgment and reason with monitoring information to answer the question "So what?" and perhaps, "Why?"

Evaluation requires context: A sense of the history of the place or the circumstances (temporal and special context) are important to the evaluation of management activities.

Evaluation requires base line or reference information: Evaluation will describe movement from a known point (baseline or reference condition) either toward or away from a desired condition. The desired condition may or may not ever be fully achieved, but it is important to know if management activities are heading in the right direction.

Evaluation produces information that is used to infer outcomes and trends: Conclusions will be drawn from an interpretation of evidence.

The evaluation process will be documented: Evaluation may occur through a variety of means such as facilitated group interactions, scaled survey instruments, or through computer-assisted technology (e.g., statistical or analytical tools or internet forums). The processes used will be described in the annual monitoring and evaluation report.

Evaluation results are documented in an annual monitoring and evaluation report:
The responsible official (i.e., the Forest Supervisor) uses this report as a tool to initiate change.

Annual Forest Monitoring and Evaluation Report

The annual monitoring and evaluation report is a requirement and an output target for Forests and Grasslands. Besides fulfilling these requirements, these reports serve several purposes, including:

- Documenting monitoring and evaluation accomplishments.

- Providing an accountability tool for monitoring and evaluation expenditures.

- Providing an assessment of the current state of the Forest.

- Providing adaptive management feedback to responsible officials of any needed changes to the Land and Resource Management Plan or adjustments to management actions.

- Describing to the public how their public lands are being managed.

The monitoring and evaluation report is based on monitoring data and information gathered the previous fiscal year. It evaluates the Land and Resource Management Plan implementation 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 following items are included in the report:

- **Key findings**. What has changed, what the Forest Supervisor is committing to do about them (signed and dated).

- **Chapter 1.** Setting the Context. An overview of past, present and desired conditions is presented which may be summarized from broad scale assessments, projects, programs, policy and law. Organize by the Montreal criteria of sustainability where practicable. These seven criteria are: conservation of biological diversity; maintenance of productive capacity of ecosystems; maintenance of Forest ecosystem health and vitality; conservation and maintenance of soil and water resources; maintenance of Forest contribution to globally meet the needs of society; and legal, institutional and economic framework for conservation and sustainable management.

- **Chapter 2.** Monitoring Results. The monitoring results are described, organized by GPRA goals where practicable. These goals are: ecosystem health; multiple benefits to people; scientific and technical assistance; and effective public service.

◆ **Chapter 3.** Evaluation and Action Plan. This is a synthesis of results, interpreted to draw conclusions about whether or not we are moving toward the Forest or Grassland goals and desired conditions.

◆ **Appendix**

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 Strategy

The monitoring strategy contains all the relevant Land and Resource Management Plan monitoring called for by the monitoring drivers. The available monitoring budget will, in all likelihood, require a significantly smaller monitoring program in any given year than the table below presents. The monitoring items, not the monitoring questions, are the major cost factor. The monitoring item initiates the data collection and a single monitoring item may answer several monitoring questions. Cooperators can greatly expand the annual monitoring program and stretch a Forest's available monitoring budget many fold.

In almost all cases, it will be necessary for the Forest Leadership Team, in conjunction with the Monitoring ID team, to prioritize what will be monitored in any given year based on the monitoring drivers, monitoring priorities, the accomplishments of the previous year's monitoring, and the urgency of a monitoring question.

Monitoring Driver	Monitoring Question	Monitoring Priority	Potential Monitoring Items	Precision & Reliability	Scale	Frequency of Reporting
EFFECTIVENESS MONITORING						
Goal I – Insure Sustainable Ecosystems						
Objective 1.a.1	**Watershed:** To what extent has watershed condition been maintained or improved?	Key Issue	Number or acres of fifth level watersheds in watershed condition classes I-III (FSM 2521.1). Extent (acres, miles) of disturbance and restoration over time in watersheds.	A	Administrative Unit Wide	Five Years
Notes:						

Monitoring Driver	Monitoring Question	Monitoring Priority	Potential Monitoring Items	Precision & Reliability	Scale	Frequency of Reporting
Objective 1.a.2	**Watershed:** To what extent has water quality been restored maintained or improved?	High Condition Disparity, Likely to Affect, Key Issue	Miles of stream and acres of lakes fully supporting designated beneficial uses (State of Wyoming 305[b] and 303[d] lists). Number of water quality violations.	A	Administrative Unit Wide	Five Years
Notes:						
Objective 1.a.3	**Watershed:** To what extent are riparian and wetland areas meeting proper functioning condition.	Key Issue	Acres of riparian and wetland areas meeting Proper Functioning Condition.	A	Administrative Unit Wide	Five Years
Notes:						
Objective 1.a.4	**Watershed:** To what extent have stream flows been protected or enhanced?	Key Issue	Based on records from fixed monitoring devices or "hand" monitoring (especially during low flow periods) provide stream flow data for high value stream segments.	A	Administrative Unit Wide	Five Years
Notes:						
Subgoal 1.a 36 CFR 219.12 (k)(2)	**Productivity:** Are long-term soil health and productivity being maintained?	Key Issue	Percent change in acres of soils eroded, disturbed, and restored.	A	Administrative Unit Wide	Annually
Notes:						

Monitoring Driver	Monitoring Question	Monitoring Priority	Potential Monitoring Items	Precision & Reliability	Scale	Frequency of Reporting
Objective 1.b.1	**Ecological Conditions:** To what extent are management actions maintaining and/or restoring composition and structure of forest and other vegetation?	Key Issue, Recovery and Viability	Amount and distribution of cover types and habitat structure stages.	B	Administrative Unit Wide	Five Years
Notes: Vegetation composition and structure is largely determined by wildlife and domestic livestock grazing, fire, weather patterns, and plant species composition (Benkobi et al. 2000; Benkobi 1999)						
Objective 1.b.2	**Ecological Conditions:** To what extent have current conditions and opportunities been identified for restoration enhancement and commodity production?	Key Issue	Number and percent of watersheds evaluated.	B	Administrative Unit Wide	Five Years
Notes:						
Objective 1.b.3	**Ecological Conditions:** To what extent have habitat improvement needs been identified and implemented using structural and non-structural habitat improvement treatments?	Key Issue	Number of improvement projects by watershed identified and implemented.	A	5th Level Watershed	Annually
Notes:						
Objective 1.b.4	**Ecological Conditions:** Is old growth forest mapped and managed at least to the minimum amounts and distribution stated in the Plan?	Key Issue	Acres of old growth forest by forested cover type and distribution mapped, maintained and available at project level analysis.	B	Geographic Areas with Active Management	Annually

Monitoring Driver	Monitoring Question	Monitoring Priority	Potential Monitoring Items	Precision & Reliability	Scale	Frequency of Reporting
Notes:						
Objective 1.b.5 36 CFR 219.19	**Ecological Conditions:** To what extent are listed species, sensitive species and species of local concern and MIS species habitat availability, habitat quality and populations maintaining stable or positive trends?	Key Issue and Recovery and Viability	Survey data for T,E MIS and priority sensitive species and species of local concern. Habitat /population correlation modeling.	B	Administrative Unit Wide	Five Years Collect data annually, but trend information must be reported every 5 years.
Notes: Some MIS species require baseline population information and development of survey protocols in the first year of plan implementation.						
Objective 1.c.1	**Fire:** Has the Forest developed a fire management Plan which allows for implementing wildland fire use plans to work towards desired vegetative conditions?	Forest and Rangeland Health, Key Issue	Number of prescribed natural fires. Acres burned through natural ignitions.	B	Administrative Unit Wide	Annually
Notes						

Monitoring Driver	Monitoring Question	Monitoring Priority	Potential Monitoring Items	Precision & Reliability	Scale	Frequency of Reporting
Objective 1.c.2	**Fire:** How many acres in high hazard/high risk and residential interface areas were treated with mechanical treatments or prescribed fire in an effort to move affected landscapes toward their desired vegetation composition and structure as described in the Geographic Area direction?	Forest and Rangeland Health, Key Issue	Change in condition class ratings in high priority and high-risk areas on the forest.	A	Administrative Unit Wide	Annually
Notes: The need to support the National Fire Plan, and high public concern for the "urban interface," makes this a Key Issue.						
Objective 1.c.3 36 CFR 219.12 (K)(5)(iv)	**Insects and disease:** Are insect and disease populations compatible with attainment of management area goals and objectives?	Key Issue	Acres lost to timber production due to insects and disease. Acres of moderate and high risk stand treated. Forest Health maps of spread of insects and disease	B	Administrative Unit Wide	Five Years Report evaluations every five years, but collect information annually.
Notes:						
Objective 1.c.4	**Invasive Species:** To what extent have noxious weed populations been managed (Forest-wide and within wilderness)?	Key Issue	Change in acres of noxious weed levels.	A	Administrative Unit Wide	Annually
Notes: Management activities can spread or control noxious weeds; early detection is the most economical and sure way of controlling outbreaks. Noxious weed control is a key issue.						

Monitoring Driver	Monitoring Question	Monitoring Priority	Potential Monitoring Items	Precision & Reliability	Scale	Frequency of Reporting
Subgoal 1c 36 CFR 219.12 (K)(iii)	**Ecological Conditions:** How is harvest unit size affecting landscape patterns across the Forest?	Key Issue	Harvest unit size and average patch size measured at the Geographic Area scale.	A	Geographic Area	Five Years
Notes:						
Goal 2 – Multiple Benefits to People						
Objective 2.a.1	**Outdoor Recreation:** To what extent have dispersed recreation sites been rehabilitated?	High Degree of Disparity	Change in Cole's campsite condition classifications.	B	Geographic Area – Cumulative	Five Years
Notes:						
Objective 2.a.2	**Outdoor Recreation:** Where can we plan for and improve recreation sites?	High Degree of Disparity	Number of site plans up-to-date (cumulative).	B	Administrative Unit Wide	Within Five Years
Notes:						
Objective 2.a.3	**Outdoor Recreation:** How many miles of trail meet agency standards?	High Degree of Disparity	Total miles of trail. Total miles constructed. Total miles reconstructed.	A	Administrative Unit Wide (Cumulative)	Annually
Notes:						
Objective 2.a.4	**Outdoor Recreation:** How many trailheads have been rehabilitated or reconstructed over the life of the plan?	Key Issue	Number of trailheads available. Number of trailheads rehabilitated. Number of trailheads constructed.	A	Administrative Unit Wide (Cumulative)	Five Years
Notes:						

Monitoring Driver	Monitoring Question	Monitoring Priority	Potential Monitoring Items	Precision & Reliability	Scale	Frequency of Reporting
Subgoal 2.a 36 CFR 219.21 (g)	**Outdoor Recreation:** What are the effects of vehicle use off roads?	Key Issue	Occurrence or areas where vehicle use off designated routes has resulted in excessive erosion or creation of unauthorized roads. Numbers of offenses ticketed and fines levied.	B	Administrative Unit Wide	Five Years

Notes: NFMA requirement to assess the effects of vehicle use off roads.

Monitoring Driver	Monitoring Question	Monitoring Priority	Potential Monitoring Items	Precision & Reliability	Scale	Frequency of Reporting
Objective 2.b.1	**Wilderness:** How many areas recommended for wilderness provide SPNM opportunities?	Resources of Concern	Miles of trail managed for non-motorized use. Incidents of unauthorized motorized use in areas recommended for wilderness.	B	Administrative Unit Wide	Five Years

Notes:

Monitoring Driver	Monitoring Question	Monitoring Priority	Potential Monitoring Items	Precision & Reliability	Scale	Frequency of Reporting
Objective 2.b.2	**Wilderness:** To what extent have monitoring plans been developed and implemented for elements critical to maintaining ecological conditions?	High Degree of Disparity	Wilderness acres managed to standard. Number of monitoring plans created and implemented.	B	Administrative Unit Wide (Wilderness Areas)	Five Years

Notes:

Monitoring Driver	Monitoring Question	Monitoring Priority	Potential Monitoring Items	Precision & Reliability	Scale	Frequency of Reporting
Objective 2.b.3	**Wilderness:** What is the Forest doing to ensure the rehabilitation of heavily impacted campsite areas?	High Degree of Disparity	Percent change of campsites showing an improved Cole's condition class.	B	Administrative Unit Wide (Wilderness Areas)	Five Years

Notes:

Monitoring Driver	Monitoring Question	Monitoring Priority	Potential Monitoring Items	Precision & Reliability	Scale	Frequency of Reporting
Objective 2.b.4 &5	**Protected Areas:** To what extent have heritage resource sites been inventoried, interpreted and protected?	Resources of Concern	Confirm the development of a heritage inventory strategy with tribal and state collaboration. Number of sites identified for NRHP listing. Number of such sites with implemented interpretive plans.	A	Administrative Unit Wide	Five Years
Notes:						
Objective 2.c.1 36 CFR 219.12 (K)(1)	**Outputs:** Are outputs of goods and services being produced at a rate consistent with the projections in Supplemental Table S-2 of the FEIS?	Key Issue	Compare expected outputs from FEIS Table S-2 with reported outputs.	A	Administrative Unit Wide	Annually
Notes:						
Objective 2.c.2	**Livestock Use**: What levels of grazing use are permitted while still meeting or moving toward desired vegetative condition?	High	Grazing allotments administered to standard. Total number of active grazing allotments. Allotments with updated signed NEPA decisions (cumulative). Rangeland acres monitored. Authorized head months of grazing use.	A	Administrative Unit Wide	Annually
Notes:						

Monitoring Driver	Monitoring Question	Monitoring Priority	Potential Monitoring Items	Precision & Reliability	Scale	Frequency of Reporting
Objective 2.c.3	**Fish and Wildlife and Plant Use:** What levels of big game use can be provided for while still meeting or moving toward desired vegetative condition?	High	Minutes from annual meetings to establish big game herd objectives. WG&F annual reports on populations compared to herd objectives.	B	Administrative Unit Wide	Three Years
Notes:						
Objective 2.c.4	**Miscellaneous Products:** How do we provide for the environmentally responsible harvest of "special products," such as mushrooms, floral products and medicinal plants and be responsive to the cultural plant needs of American Indian Tribes?	Resources of Concern	Number of standardized protocols for collection permits. Number of consultations initiated with tribes concerning traditional plant use.	A	Administrative Unit Wide	Five Years
Notes:						
Objective 2.c.5	**Scenery:** How do we protect the values for which the Snowy Range Scenic Byway was designated?	Likely to Affect	Develop and implement a Scenic Byway Plan for the Snowy Range Scenic Byway.	A	Snowy Range Scenic Byway Corridor	By year 10
Notes:						
Objective 2.c.6	**Research Natural Areas:** To what extent have establishment reports been developed?	Key Issue	Number of establishment reports prepared.	A	Administrative Unit Wide	Five Years
Notes:						

Monitoring Driver	Monitoring Question	Monitoring Priority	Potential Monitoring Items	Precision & Reliability	Scale	Frequency of Reporting
Objective 2.c.7	**Land Ownership:** How do we respond to public need in the area of land ownership adjustments (exchanges, etc.)?	Key Issue	Development and implementation of a Forest-wide land ownership adjustment plan.	A	Administrative Unit Wide	Five Years
Notes:						
Objective 2.c.8	**Relations:** To what extent has a rights-of-way acquisition program been developed in consideration of all program areas?	Key Issue	Number of Rights-of way acquisitions identified. Number of Rights-of-way acquisitions completed.	A	Administrative Unit Wide	Five Years
Notes:						
Subgoal 2.c 36 CFR 219.12 (K)5)(i)	**Restocking:** Are stands adequately restocked within five years of final harvest treatment?	Key Issue	Acres meeting restocking requirements.	A		Annual
Notes:						
Subgoal 2.c 36 CFR 19.12 (K)5)(ii)	**Timber suitability:** Has timber suitability classification changed on any lands?	Key Issue	Acres with changed suitability classification.	A	Administrative Unit Wide	Year 10
Notes:						
Subgoal 2.c 36 CFR 219.12 (K)(3)	**Costs:** Are costs of implementing programs occurring as predicted in the Supplemental Table S-3 of the FEIS?	Key Issue	Comparison of all budget reports.	A	Administrative Unit Wide	Annually
Notes:						

Monitoring Driver	Monitoring Question	Monitoring Priority	Potential Monitoring Items	Precision & Reliability	Scale	Frequency of Reporting
Subgoal 2.c 36 CFR 219.7 (f)	**Communities:** How are forest management activities affecting land, resources and communities adjacent to the National Forest?	Key Issue	National Forest management related jobs and income.	B	County and community depending on data availability	Five Years
Notes:						
Goal 3 – Scientific and Technical Assistance						
Objective 3.a.1	**Cooperation:** How do we address problems with Forest land management, invasive species, animal damage, and noxious weeds in a collaborative way?	Resources of Concern & High Degree of Disparity	Number of memoranda of understanding or agreement signed with agencies, individuals, non-governmental organizations and educational and research institutions.	A	Administrative Unit Wide	Five Years
Notes:						
Objective 3.a.2	**Cooperation:** To what extent is public assistance and participation being utilized in implementing monitoring activities?	Cost Effectiveness	Number of individuals and organizations assisting in the implementation of the monitoring plan.	A	Administrative Unit Wide	Annually
Notes:						
Objective 3a.3	**Wildlife:** To what extent have watchable wildlife activities been developed?	Key Issue	Number of watchable wildlife and plant sites identified and managed.	A	Administrative Unit Wide	Annually
Notes:						

Monitoring Driver	Monitoring Question	Monitoring Priority	Potential Monitoring Items	Precision & Reliability	Scale	Frequency of Reporting
Objective 3.b.1	**Knowledge Base:** How can we build technical knowledge bases across all land ownerships?	High Degree of Disparity	Number of cases where inventory and monitoring can be collaboratively accomplished with other landowners and agencies.	A	Geographic Area	Five Years
Notes:						
Goal 4 – Effective Public Service						
Objective 4.a.1	**Safety and Economy:** Does the road system meet public safety and management needs for passenger vehicles while protecting resources?	Key Issue	Miles of level 3,4,5 roads maintained to standard. (Annual Maintenance Only)	A	Administrative Unit Wide	Annually
Notes:						
Objective 4.a.2	**Safety and Economy:** Does the road system meet public safety and management needs for high clearance vehicles while protecting resources?	Key Issue	Miles of level 1, 2 roads maintained to standard. (Annual Maintenance Only)	A	Administrative Unit Wide	Annually
Notes:						
Objectives 4.a.3 and 4.a.4	**Safety and Economy:** To what extent have roads that have been identified as unneeded by a roads analysis been decommissioned?	Key Issue	Miles of designated motorized routes decommissioned.	A	Administrative Unit Wide	Annually
Notes:						

Monitoring Driver	Monitoring Question	Monitoring Priority	Potential Monitoring Items	Precision & Reliability	Scale	Frequency of Reporting
Objective 4.a.5	**Safety and Economy:** Do the existing facilities with the potential for reconstruction provide for safety and security of the public and employees?	Key Issue	Accomplished reconstruction projects identified in the facility master Plan.	B	Administrative Unit Wide	Annually
Notes:						
Objective 4.a.6	**Safety and Economy:** To what extent are the existing buildings, bridges and other facilities maintained to standard?	Key Issue	Deferred maintenance completed.	B	Administrative Unit Wide	Annually
Notes:						
Objective 4.a.7	**Safety and Economy:** Does the road system meet public safety needs?	Key Issue	Deferred maintenance annual reports.	A	Administrative Unit Wide	Five Years
Notes:						

IMPLEMENTATION MONITORING

Monitoring Driver	Monitoring Question	Monitoring Priority	Potential Monitoring Items	Precision & Reliability	Scale	Frequency of Reporting
Subgoal 1.b Endangered Species Act	**Implementation Monitoring 1/T&E:** Are actions identified in national recovery plans for threatened and endangered species being implemented where opportunities exist on the Forest?	Key Issue, Recovery and Viability, Great Consequences	Compare the accomplished or ongoing actions to those called for in the respective recovery plans.	A	Administrative Unit Wide	Annually

Monitoring Driver	Monitoring Question	Monitoring Priority	Potential Monitoring Items	Precision & Reliability	Scale	Frequency of Reporting
Notes: Recovery plans have been prepared for each of the threatened and endangered species occurring on the National Forests. National recovery plans have specific action items that could be applied to the National Forests in the planning area. These lands can play a significant role in the recovery of these species.						
36 CFR 219.12 (k)	**Implementation Monitoring /Plan Implementation:** Have site-specific decisions successfully implemented the Forest Plan's direction?	Likely to Affect, Resources of Concern	Percent compliance (narrative). Review a minimum of three timber sales Forest-wide. Review one AMP Forest-wide. Review one other NEPA project completed per District.	B	Administrative Unit Wide	Annually
Notes: This implementation monitoring is best carried out with supporting field visits by an interdisciplinary team of specialists.						
Subgoal 3a & b 36 CFR 219.12 (k)	**Implementation Monitoring /Scientific and Technical Assistance:** Are the action plans identified in Goal 3 - Scientific and Technical Assistance, being completed on schedule?	Likely to Affect, Resources of Concern	Percent compliance narrative.	B	Administrative Unit Wide	Annually
Notes: These are the administrative activities such as conducting studies, obtaining inventories, completing actions plans, or coordinating with other groups that set the stage for successful Plan implementation.						

Monitoring Driver	Monitoring Question	Monitoring Priority	Potential Monitoring Items	Precision & Reliability	Scale	Frequency of Reporting
VALIDATION MONITORING						
Subgoal 1.b 36 CFR 219.11 (d)	**Validation Monitoring /MIS:** Are the selected management indicator species and their response to management activities in habitats on local National Forest System lands adequately representing the management effects on other species in the associated response guilds and is the species membership identified for each response guild reasonably accurate and complete?	Key Issue, Recovery and Viability, Great Consequence	MIS population and reproduction statistics. Habitat use and availability statistics for MIS and associated species.	B	Administrative Unit Wide	Five Years

Notes: MIS Species selected are: Northern Goshawk, American marten, Snowshoe Hare, Golden-crowned kinglet, Three-toed woodpecker, Common trout (brook, brown and rainbow), Lincoln's sparrow, and Wilson's warbler.