

## Chapter 4 - Monitoring and Evaluation

### Introduction

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 is not completed on every activity nor is it designed to be similar to research in either purpose or degree of statistical rigor. Monitoring completed for the purpose of determining how well the forest plan is working is called National Forest Management Act (NFMA) monitoring.

Monitoring and evaluation are separate, sequential activities required by NFMA regulations 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 observation or measurement. Evaluation is the analysis of the data and information collected during the monitoring phase. The evaluation results are used to determine the need for changes to the Revised Plan or how it is implemented.

This chapter provides programmatic direction for monitoring and evaluating forest plan implementation. Monitoring will provide the Forest Supervisor with the information necessary to determine whether the Revised Plan is sufficient to guide management of the Routt National Forest for the subsequent year or whether modification of the plan is needed.

The monitoring program described in this chapter differs from the process used to monitor the 1983 Plan. The monitoring program in this Revised Plan is more programmatic and is designed to better evaluate the conditions on the Forest. The following pages describe the monitoring process and requirements.

### Monitoring Strategy

NFMA monitoring for forest plan implementation involves both minimum legally required monitoring activities as well as additional monitoring that will be conducted based on the availability of funding and personnel. The level and intensity of monitoring and analysis will vary with the budget and other forest priorities.

The monitoring strategy components are:

- Minimum legally required monitoring (Table 4-1).
- Monitoring questions (Table 4-2) which address monitoring beyond the minimum legally required activities. These questions are developed by an interdisciplinary team. Monitoring in response to the monitoring questions is identified, approved, and scheduled through the annual budget process.
- An Annual Monitoring Plan of Operations which identifies the project-level information relevant to how the monitoring questions will be answered.
- The Monitoring Evaluation Report which provides an analysis of monitoring results.

### Minimum Legally Required Monitoring

The regulations at 36 CFR 219 describe the 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 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 management of activities on nearby lands managed by other Federal or other government agencies or under the jurisdiction of local governments.

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

**36 CFR 219.12 (k)** - Monitoring requirements identified in the forest plan shall provide for:

- (1) A quantitative estimate of performance comparing outputs and services with those projected by the forest plan;
- (2) Documentation of the measured prescriptions and effects, including significant changes in productivity of the land.
- (3) Documentation of costs associated with carrying out the planned management prescriptions as compared with costs estimated in the forest plan.
- (4) A description of the following monitoring activities:
  - (i) The actions, effects, or resources to be measured and the frequency of measurements.
  - (ii) Expected precision and reliability of the monitoring process.
  - (iii) The time when evaluations will be reported.
- (5) A determination of compliance with the following standards:
  - (i) Lands are adequately restocked as specified in the forest plan.
  - (ii) Lands identified as not suited for timber production are examined at least every 10 years to determine if they have become suited; and that, if determined suited, such lands are returned to timber production.
  - (iii) Maximum size limits for harvest areas are evaluated to determine whether such size limits should be continued.
  - (iv) Destructive insects and disease organisms do 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 part 295 ..., classify areas and trails of National Forest System lands as to whether or not off-road vehicle use may be permitted.

<b>Table 4-1. Minimum Legally Required Monitoring</b>
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Action, Effect, or Resource to be Measured	Frequency of Measurements*	Expected Precision and Reliability	Reporting*
Lands are adequately restocked. 36 CFR 219.12(k)5(i)	Mix of 1st, 3rd, and 5th years as described in FSM 2472.4	A	Annual
Lands not suited for timber production. 36 CFR 219.12(k)5(ii)	Year 10	A	Year 10
Harvest unit size. 36 CFR 219.12(k)5(iii)	Years 5 and 10	B	Years 5 and 10
Control of destructive insects and diseases. 36 CFR 219.12(k)5(iv)	Annual	B	Annual
Population trends of management indicator species (MIS). ** 36 CFR 219.19(a)(6)	Years 5 and 10	B	Years 5 and 10
Effects of off-road vehicles. 36 CFR 219.21(g)	Annual review. Analysis Years 5 and 10.	B	Years 5 and 10
Effects to lands and communities adjacent to or near the National Forest and effects to the Forest from lands managed by government entities. 36 CFR 219.7(f)	Years 5 and 10	B	Years 5 and 10
Comparison of projected and actual outputs and services. 36 CFR 219.12(k)1	Annual	A	Annual
Prescriptions and effects. 36 CFR 219.12(k)2	Years 5 and 10	B	Years 5 and 10
Comparison of estimated and actual costs. 36 CFR 219.12(k)3	Annual	A	Years 5 and 10
Effects of management practices. 36 CFR 219.11 (d)	Years 5 and 10	B	Years 5 and 10

\* The frequency of measurement and reporting are triggered by regulation as well as anticipated intervals at which gathered data will provide meaningful information.

\*\*Chapter 3 FEIS, Wildlife - Monitoring of MIS - describes how MIS will be monitored.

Table 4-1 describes how the Routt National Forest will respond to the minimum legally required monitoring items. The specific techniques and protocols to be used are identified in the Annual Monitoring Plan of Operations, which is developed in conjunction with the annual budget and the work planning process. The monitoring methods used are divided into two categories, A and B, based on their precision and reliability:

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

**B** - These methods of measurement are valuable tools that are based on a variety of techniques. These tools include: project records, communications, on-site ocular estimates, and less formal measurements such as pace transects, informal visitor surveys, aerial photo interpretation, and other similar types of assessments.

Reliability, accuracy, and precision are good, but usually less than that of Class A. Class B methods are often qualitative in nature but still provide valuable information on resource conditions.

### Monitoring Questions

To initiate monitoring, the interdisciplinary team developed a series of monitoring questions (see Table 4-2) to help the Forest Supervisor determine the effectiveness of forest plan implementation. The questions are designed to be responsive to the Forest goals and objectives. The specific techniques and protocols for answering the questions will be identified in the Annual Monitoring Plan of Operations.

<b>Goal-Question Number *</b>	<b>Expected Frequency</b>	<b>Questions</b>
1-1	Annual	Are long-term soil health and productivity being maintained?
1-2	Annual	Are management activities maintaining or improving air quality across the Forest, including the Mount Zirkel Wilderness?
1-3	Annual	How well are management activities maintaining watersheds in a healthy condition and meeting state of Colorado water quality standards?
1-4	Annual	Are insect and disease populations compatible with attainment of management area desired conditions and themes?
1-5	Every 5 Years	How is harvest unit size affecting landscape patterns across the Forest?
1-6	Annual	Are habitats for threatened, endangered, and Forest Service, Region 2 sensitive species for the Routt National Forest being maintained or enhanced? (Fine filter scale)
1-7	Every 5 Years	Are forest cover types and habitat structural stages (coarse filter scale as described in the FEIS) being provided for across the Forest?
1-8	Every 5 Years	How are management activities affecting late successional forest structure in management areas 5.11 and 5.13?
1-9	Every 5 Years	How are management activities affecting riparian habitats (including wetlands) on the Forest?
1-10	Annual	Are stands adequately restocked within five years of final harvest treatment?
1-11	Year 10	Has timber suitability classification changed on any lands?
1-12	Every 5 Years	What is the relationship between changes in habitat and population trends of the management indicator species?
2-1	Every 5 Years	Do recreational opportunities respond to Forest users desires, needs, and expectations?
2-2	Every 5 Years	Does the Forest infrastructure (travelways, roads, trails) facilitate attainment of desired recreational experiences, including access, for a wide range of abilities?
2-3	Annual	How are recreational activities affecting the physical and biological resources of the Forest?
2-4	Annual	How are projects and programs affecting visual quality?
2-5	Annual	How are partnerships contributing to maintaining or enhancing recreation resource opportunities?

Table 4-2. Monitoring Questions

Goal- Question Number *	Expected Frequency	Questions
2-6	Annual	Does the Forest provide interpretive experiences that describe ecosystem functions and the Forest Service mission?
3-1	Report Annually, Evaluate Every 5 Years	Are outputs of goods and services being produced at a rate consistent with the projections in Supplemental Table S-2 of the FEIS?
3-2	Every 5 Years	Are costs of implementing programs occurring as predicted in the Supplemental Table S-3 of the FEIS?
3-3	Every 5 Years	How are forest management activities affecting local employment and income?
3-4	Annual	How well is the Forest interacting and planning in cooperation with communities?
<b>General Questions Not Linked to Forest Goal Statements</b>		
1	Every 5 Years	Are there changes that have resulted in unforeseen issues requiring forest plan amendment?
2	Annual	Are the standards and guidelines prescribed in the plan being incorporated in NEPA documents and implemented on the ground?
3	Every 5 Years	Is the Forest moving closer to the desired condition identified in the Revised Plan at both the geographic area and management area scales?

\* The first number relates to the goals identified in Chapter 1 of this Plan. The second number identifies the question.

### Annual Monitoring Plan of Operations

The interdisciplinary team will annually review the minimum legally required monitoring items and monitoring questions and develop an Annual Monitoring Plan of Operations that specifies the methods and protocols to be used. The Annual Monitoring Plan of Operations is a required part of the monitoring strategy but is not a part of the Revised Plan. It provides a structure for reviewing past and current priorities. The priorities are used to select the monitoring tasks that will be accomplished during the year. In the development of the Annual Monitoring Plan of Operations, the interdisciplinary team will consider:

- Additional data needs identified during previous monitoring activities.
- Methodology and measurements to provide consistent information to determine trends.
- Benefit versus cost of the data collection.
- Level of protocol and statistical rigor needed to produce usable results.
- The intensity, level of detail, and type of data needed to achieve the monitoring purpose and the type of monitoring needed to address key issues.
- The importance of the item or activity being monitored (i.e., potential for long term or irreversible damage, local versus national interest, risk of not monitoring, etc.).

- Emerging issues and concerns that may be addressed through monitoring.

The purpose of the Annual Monitoring Plan of Operations is to identify and schedule the site-specific, on-the-ground monitoring activities. The Annual Monitoring Plan of Operations is submitted for approval and funding through the budget process. The Forest Supervisor then determines the appropriate level of funding for monitoring and approves the Annual Monitoring Plan of Operations.

Approval of the Annual Monitoring Plan of Operations initiates the monitoring program. Specialists maintain records of the data gathered in response to the specific monitoring tasks identified in the Annual Monitoring Plan of Operations. These records provide the basis for the evaluation in the Monitoring Evaluation Report and are on file with the report. The Annual Monitoring Plan of Operations is available for review on request at the Forest Supervisor's office.

### **Monitoring Evaluation Report**

The interdisciplinary team develops an annual Monitoring Evaluation Report which summarizes the results of completed monitoring, evaluates the data, and makes recommendations to the Forest Supervisor. Based on the report and other relevant information, the Forest Supervisor will either certify the Revised Plan as sufficient for management over the subsequent year or pursue an amendment to the plan.

The Monitoring Evaluation Report may provide summaries of data collected, but is primarily written to display the evaluation of the data and the conclusions and recommendations reached. Comparison of subsequent monitoring evaluation reports provides a tracking mechanism for forest plan implementation, for the plan's effectiveness, for changes to the plan that have been made, and for those changes still needed.

The Monitoring Evaluation Report:

- Summarizes the results of monitoring.
- Assesses management practices and the effectiveness of management in achieving goals, objectives, and desired conditions specified in the Revised Plan.
- Compares actual outputs, services, and costs with those estimated in the Revised Plan.
- Evaluates the data for indications of trends or effects.
- Identifies needed changes in forest plan implementation. Indicates whether there is a need to amend or revise the Revised Plan.
- Identifies research needed by National Forest System.

Monitoring and the evaluation of monitoring data are considered key management elements. They keep the Revised Plan up-to-date and responsive to changing issues by verifying the effectiveness of forest plan standards and guidelines, anticipated program and project effects on resources, and providing the basis for amendments to the Plan.

### **Sources of Monitoring Information**

The information needed to answer the monitoring questions in Table 4-2 may be the result of a special data-gathering effort, or it may come from existing sources. These information sources

include regular inventory surveys, accomplishment reports, environmental analysis reports, integrated management reviews, site-specific observations by specialists, and special data collection efforts initiated for other purposes but of value for monitoring. Detailed information collected through project-level monitoring will be used whenever appropriate. Monitoring and evaluation will be conducted in an efficient, practical, and affordable manner and should not duplicate existing data collection or analysis efforts.

As an integral part of the Annual Monitoring Plan of Operations and the Monitoring Evaluation Report preparation, the interdisciplinary team will coordinate with other federal, state, and local entities to monitor items that are broader in scope than can be resolved on a single National Forest (examples may include goshawk and Neotropical bird surveys, insect and disease trends, etc.). In addition, coordination with the public, academia, other government agencies, and research scientists is an important part of the monitoring program. Due to the complexities and uncertainties of resource management, the Forest will rely on many sources for information, data, input, and feedback.

### **Summary**

The monitoring strategy identified in this chapter establishes the process the Forest will follow to ensure it meets regulatory requirements for monitoring. The four major components of the process are:

- The minimum legally required monitoring.
- The monitoring questions to verify how well the Forest Plan is being implemented.
- The Annual Monitoring Plan of Operations which identifies the information relevant to how the monitoring questions will be answered.
- The Monitoring Evaluation Report which provides an analysis of monitoring results.

Through this process, implementation of the forest plan will be evaluated on a sample basis to determine how well objectives have been met and how closely management standards and guidelines have been applied. This process also provides for comparison of outputs and services with those projected by the plan; documentation and evaluation of the effects of prescriptions and management practices; and comparison of costs with those established in the plan. We have chosen not to prejudge all the monitoring activities that will be necessary during the decade at this time. However, the process required will provide for a reasonable and adaptable way to continuously monitor and evaluate plan implementation.