

Chapter 4 Monitoring and Evaluation



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Cover

Fisheries monitoring (WMNF Photo by Mark Prout)

Introduction

The White Mountain National Forest's Forest Plan identifies management direction in terms of desired conditions, goals and objectives, standards and guidelines, and management area direction. Monitoring and evaluation are separate, sequential activities required by the National Forest Management Act (NFMA) to determine how well this management direction is being met, and to provide a basis for the periodic evaluation of the Forest Plan. Together, they constitute a quality control process.

Monitoring is the systematic collection of information which reflects changes in actions, conditions, and relationships over time and space, relative to a predetermined standard or expectation.

Evaluation is the interpretation or judging of the information collected during the monitoring phase. Evaluation results are used to answer the monitoring questions, determine the need to revise or amend management plans, or determine how they are implemented. They form a basis for adaptively managing National Forests.

Forest monitoring and evaluation have a number of purposes, including:

- Keeping the Plan current.
- Ensuring compliance with specific standards, laws, and regulatory requirements.
- Examining the implications of administrative decisions.
- Tracking public concerns about the Forest Plan.
- Assessing the state of systems.
- Ultimately, assessing the effectiveness of Forest management in moving toward management goals and desired conditions.

The revised Forest Plan recognizes three basic categories of monitoring and evaluation: *implementation*, *effectiveness*, and *validation* (Table 4-01). Forest

Table 4-01. Monitoring Categories.

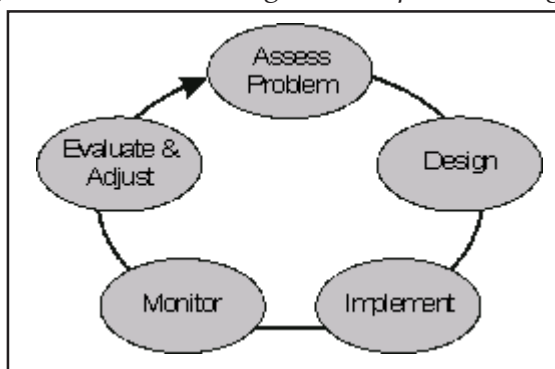
Monitoring Category	Purpose
Implementation	Is the overall direction in the revised Forest Plan being implemented? This includes goals, objectives, desired conditions, standards, guidelines, and management area direction. Or, "Did we do what we said we were going to do?"
Effectiveness	Are the standards and guidelines working? It also includes an evaluation of whether there are significant changes in productivity of the land. Or "Did it work?"
Validation	Are the assumptions and predicted effects used to formulate the revised Forest Plan accurate? Or "Were we right in our initial understanding of the situation, did we look at the right things?"

Plan monitoring focuses on the validation and effectiveness categories. This is Forest-wide monitoring. Implementation monitoring is done at the project level and is completed on a day to day basis. This project monitoring occurs hundreds of times each year and includes activities such as timber sale inspections, interdisciplinary project reviews, backcountry observations by Wilderness rangers, and construction inspections.

Adaptive Management

Knowledge gained through monitoring, evaluation, and associated research provide a basis for adaptive management. Information is collected and compiled that serves as reference points for resource conditions and emerging issues. The scientific validity and appropriateness of assumptions used in the development of the Forest Plan is evaluated. Monitoring and evaluation keep the Plan up-to-date and responsive to changing issues by verifying the effectiveness of management plan standards and guidelines, assessing program and project effects on resources, and providing information for amendments to the management plan. In short, the Forest Plan is made dynamic, relevant, and useful (Figure 4-01).

Figure 4-01. Monitoring and Adaptive Management.



Monitoring and Evaluation Components

Background

The process of monitoring and evaluation is complex; it takes on many forms and applies to many programs. Deciding what resources to monitor — as well as how, why, and when; the frequency; and by whom — requires the consideration of several important guidelines. An integrated and comprehensive monitoring and evaluation program includes three phases.

Monitoring Components

1. **Monitoring Plan.** Establishes the essential required monitoring items and questions, based on specific issues and elements unique to the White Mountain National Forest. The monitoring plan provides an outline that describes what will be accomplished in the Forest Plan monitoring process. Changing the monitoring plan requires a Forest Plan amendment.
2. **Monitoring Guide.** Frames the relationship between the monitoring chapter in the Forest Plan and the specific monitoring tasks. These specific tasks are external to the Forest Plan, and can be revised without amending the Plan. Monitoring tasks are prioritized based on legal requirements as well as resource and social needs. The priorities help establish which items should be accomplished when budgets are restricted. While the guide establishes an optimistic level of monitoring in order to take advantage of additional funding or new partnerships, it is likely that not all of the monitoring components will be funded.
3. **Annual Monitoring Schedule.** Establishes the annual monitoring program and priorities using the Forest's annual work planning process. Monitoring schedules are established for each year based on, among other things, monitoring data from previous years, public issues, tools available, and budgetary considerations.

Monitoring Plan

The *Monitoring Plan*, also known as Forest Plan monitoring and evaluation direction, is contained in this chapter. The Monitoring Plan is considered “strategic” for purposes of the Forest’s monitoring and evaluation effort because it provides a conceptual framework within which specific monitoring and evaluation criteria can be built. It defines the overarching questions that must be addressed through monitoring; but, it does not dictate exactly *how* they will be addressed. That detail is contained in the *Monitoring Guide* described in the next section.

The Monitoring Plan sets the direction, purpose, and overall context for monitoring and evaluating the Forest Plan. It establishes questions to be answered, timetables for reporting, and other information. Monitoring Plan direction is broad and ties directly to decisions made in this Forest Plan. Monitoring Plan direction will not change unless the Plan is amended.

Monitoring items included in this chapter are meant to define the broad areas that must be examined. Monitoring items and questions included here are intended to provide the basis for more specific, focused monitoring items to be included in the Monitoring Guide.

Basic monitoring requirements can be grouped into two broad categories: **specific requirements** and **general requirements**.

1) Specific Requirements

- Sustainability Monitoring.
- Outputs, Services, and Costs.
- Management Indicator Species (MIS).

2) General Requirements

- Attainment of Objectives.
- Standards and Guidelines.

The Monitoring Plan for the White Mountain National Forest is comprised of five tables, corresponding to the description above.

- 1) Sustainability Monitoring — [Table 4-02](#).
- 2) Outputs, Services, and Costs — [Table 4-03](#).
- 3) MIS Monitoring — [Table 4-04](#).
- 4) General Monitoring Requirements (Broad Scale) — [Table 4-05](#).
- 5) Providing Additional Detail — Monitoring related to Specific Issues, Topics, or Resources — [Table 4-06](#).

Monitoring Guide

The *Monitoring Guide* is a procedural document that is external to the Forest Plan. It describes the Forest's monitoring program in its entirety. It is based on guidance contained in this chapter, and its scope should encompass the scope of the Forest Plan. It is to be developed concurrently with, or immediately following, issuance of the revised Plan to ensure that the two are consistent, complete, and timely.

The Monitoring Guide contains specific monitoring items, along with methods, protocols, and analytical procedures for monitoring them. Monitoring direction and monitoring questions included in this chapter provide the basis for the more specific and detailed monitoring items included in the Monitoring Guide. Sources for the Monitoring Guide could include handbook direction, technical manuals, or other sources. The Guide can be modified in response to policy changes, updated procedures, or other changing conditions. Program managers responsible for Forest Plan development and implementation are involved in developing and updating the Monitoring Guide with the Forest Supervisor making the final decision on content and priorities. The list of items in the guide is beyond that normally funded and as a result includes a prioritization of the items identified. Final selection of the items to be monitored in a given year is outlined in the annual monitoring schedule.

Annual Monitoring Schedule

A monitoring schedule that outlines monitoring items, time frames, roles, and locations for the upcoming year will be prepared annually as part of the annual work planning process. The annual monitoring schedule will be tied to the Forest Plan and Monitoring Guide.

Monitoring program priorities are established or revised annually through the work planning process. Some items in the Monitoring Guide will be accomplished or measured annually, while others will be scheduled for whatever interval is determined necessary to provide for timely evaluation.

Priorities for monitoring will be revisited and revised (if necessary) each year by Forest program managers responsible for their respective resource areas. The annual monitoring program of work will be determined on the basis of many variables, including (but not limited to):

- Itemized frequencies included in this chapter (Tables 4-02 to 4-06) and in the Monitoring Guide.
- Current or emerging issues.
- New technologies.
- Annual funding constraints.
- Public interest or controversy.
- Evaluation of previous years' monitoring results.

Monitoring Plan and Monitoring Guide Relationship

This Monitoring and Evaluation chapter of the Forest Plan is general in nature. It provides a conceptual framework within which specific monitoring and evaluation criteria can be built. Therefore, this chapter does not display specific monitoring and evaluation criteria for any particular resource. These are found in the Monitoring Guide. The Monitoring Guide will not deviate from the Plan in substance or obligations. Forest specialists involved in monitoring and evaluation will use the Monitoring chapter to form their conceptual approach to monitoring resources, but will refer to the Monitoring Guide to find the actual criteria used to measure or otherwise conduct monitoring. The Monitoring Guide is intended to be a flexible component that could change as new methodologies and techniques are developed, or to be more responsive to changing needs and new information. This approach means that monitoring techniques can adapt to the rapid changes that occur under ecosystem management philosophies.

Sustainability Monitoring

Table 4-02 outlines monitoring activities identified.

Table 4-02. Sustainability.

Sustainability	Frequency of Measurement	Time of Evaluation
1) Lands are adequately restocked	Annual	Annual
2) Lands not suited for timber production	10 years	10 years
3) Maximum openings from even-aged management - appropriate	Years 5 & 10	5 years
4) Increase of destructive insects and diseases.	Annual	Annual

Outputs, Services, and Costs

The Forest Plan must monitor its own performance in terms of outputs, services, and costs (see Appendix B). This includes whether the projected outputs and services were actually provided. It also must include how projected costs compare with actual costs of implementing the management prescriptions in the Plan.

Table 4-03 lists the monitoring items to monitor outputs, services, and costs associated with implementing the Forest Plan. Monitoring and evaluating this information will be done on an annual or five-year basis, and results should be made available as a part of the annual monitoring report.

Table 4-03. Outputs, Services, and Costs.

Outputs, Services and Costs	Frequency of Measurement	Time of Evaluation
1) Comparison of projected and actual outputs and services	Annual	Annual
2) Comparison of actual and estimated costs	5 years	5 years

Management Indicator Species (MIS)

The Forest Plan embodies a strategy for conserving Management Indicator Species (MIS). This consists of management direction including specific objectives for maintaining or improving MIS habitat.

The management direction pertaining to MIS populations and their habitat must be monitored to determine whether the actual effects on habitat and populations are consistent with those predicted in the EIS. To the extent practicable, MIS monitoring must be done in cooperation with Fish and Wildlife agencies at the state and federal levels.

The regulations do not require MIS monitoring on every project, but the Forest-wide effects of projects on MIS populations and habitat must be periodically evaluated (Table 4-04). Additional monitoring items and protocols specific to MIS populations on the White Mountain National Forest will be provided in the Monitoring Guide.

Table 4-04. MIS Monitoring — Implementation and Effectiveness.

MIS Conservation Strategy	Monitoring Questions	Spatial Scale Measurement	Frequency of Evaluation	Time of Reliability
Monitor Forest Plan management direction (goals, objectives, standards/guidelines) that affect: 1) amount and quality of habitats and 2) trends in populations for each MIS.	a) How has the amount and quality of habitat changed relative to the changes projected?	Forest-wide	5 years	5 years
	b) Are population trends of the MIS consistent with those projected under the Plan?	Forest-wide	5 years	5 years
	c) What is the relationship between trends in habitat and populations?	Forest-wide	5 years	5 years

General Monitoring Requirements

These monitoring items, identified in Table 4-05, are necessary to confirm that Forest Plan management direction is being implemented and that the effects are as expected. Implementation shall be evaluated annually on a sample basis to determine how well objectives are being met and whether management standards and guidelines are being applied appropriately. Much of this implementation monitoring will be done at the project level, with Forest-wide reporting to track overall Plan implementation. Monitoring also will be conducted to document the effects of prescribed management actions, including whether there are significant changes in productivity of the land.

Table 4-05 lists implementation and effectiveness monitoring requirements. They are broad in scale. The Monitoring Guide is expected to provide more specific monitoring items and questions that will be used to collectively address these monitoring questions.

Table 4-05. General Monitoring Requirements — Broad Scale Treatment.

General Monitoring Requirements	Monitoring Question	Frequency of Measurement	Time of Evaluation
1) Attainment of Objectives	To what extent have Objectives been attained?	Annual	Annual
2) Application of Standards and Guidelines	To what extent have Standards and Guidelines been applied?	Annual	Annual
3) Effects of Management Practices	What are the effects of management practices prescribed by the Forest Plan?	Annual	Annual

Monitoring for Issues, Topics, and Public Concerns

The preceding sections and tables have provided basic monitoring plan items. In practice, it is appropriate to go beyond basic monitoring requirements to highlight certain high profile issues or concerns specific to the White Mountain National Forest.

Table 4-06 provides a place for these additional monitoring needs to be addressed. The monitoring questions in Column 2 are intended to highlight specific issues or topics of concern in the Forest Plan. The questions provide additional detail for monitoring the management direction in the Forest Plan and for use in adaptive management.

This list of monitoring questions has been designed to help answer the question “Are we accomplishing the goals of our Forest Plan?” The questions provide a foundation for developing the Monitoring Guide, which will ask supplemental questions that collectively respond to the goals and questions included in this table.

Table 4-06. Monitoring Related to Specific Issues, Topics, or Resources.

Monitoring Goal	Monitoring Questions
Goal 1: Manage for Ecosystem Health	a) To what extent is terrestrial ecosystem health being maintained or restored by management activities?
	b) To what extent is air quality impacting Forest resources?
	c) To what extent are water resources and aquatic ecosystems being maintained or restored by management activities?
Goal 2: Provide quality recreation opportunities, experiences, and benefits not readily available elsewhere.	To what extent are we maintaining an appropriate range and quality of recreation opportunities?
Goal 3: Manage Wilderness consistent with Wilderness Act.	To what extent is Wilderness managed to preserve its Wilderness character?
Goal 4: Recognize the socioeconomic role of the Forest in the region.	To what extent is the Forest providing a mix of products, services, and amenities?
Goal 5: Provide for a natural appearing landscape.	To what extent are scenic goals and objectives being met?

Evaluation

Data collected in response to Monitoring Plan requirements outlined in the Forest Plan must be evaluated and interpreted to provide useful information (see Figure 4-01). Evaluation is designed to address three basic questions.

- Is the Forest Plan implemented properly? (Implementation)
- Is the Forest Plan achieving the desired outcomes? (Effectiveness)
- Does the Forest Plan need to be changed? (Validation)

Evaluation is performed at intervals established in Tables 4-02 through 4-06. Reporting of the most recent evaluation results will be provided in conjunction with the annual report, when possible. At a minimum, evaluation must:

1. Be conducted such that every 5 years (at minimum) the Forest Supervisor can determine if there have been any significant changes in the condition of the land or the demands of the public.
2. Provide a basis for determining management effects.
3. Determine how well objectives have been met and how closely standards and guidelines have been applied. An interdisciplinary team performs the evaluation and recommends any needed changes to the Forest Plan.
4. Assess the effects of off-road use on National Forest System lands. Results will be used in the planning process to evaluate current and potential impacts and to classify areas and trails as to whether or not off-road vehicle use may be permitted.
5. Assess forest productivity every 10 years.
6. Determine whether the maximum size limits for harvest areas are appropriate.
7. Help identify research needs.

Evaluation reports will assess how well the outputs, goals and objectives of the Forest Plan have been met, and how closely management standards and guidelines have been applied. Changed conditions and new information will be considered. Results of the evaluation are used to identify changes that may be needed to the Forest Plan.

Annual Monitoring Report

The annual monitoring report provides a basis for evaluating implementation of revised Forest Plan decisions and the effectiveness of specific management practices. It is more internal to the Forest Service than some reports in that it provides immediate guidance to ongoing management. The annual monitoring report is tied directly to the questions identified for each monitoring element and specified in [Table 4-02](#) through [Table 4-06](#). Other components of information management, including collection and storage of data, evaluation and interpretation of data, sharing of information and findings, and coordination with research, will be more fully discussed in the Monitoring Guide.

Researcher studies a little brown bat (WMNF photo)



