

White Mountain National Forest



United States
Department of
Agriculture

Forest
Service

Eastern
Region



Monitoring and Evaluation Guide

May 2016



Monitoring for emerald ash borer. WMNF photo.

Monitoring and Evaluation Guide

Introduction

Monitoring and evaluation are required by the National Forest Management Act to determine how well the Land and Resource Management Plan (Forest Plan) is working and whether changes are needed. Key questions to be addressed through monitoring and evaluation are:

- Is management direction being followed?
- How well are Forest Plan objectives being achieved?
- Do management prescriptions respond to issues, concerns, and opportunities?
- Are the effects of Forest Plan implementation as predicted in the Plan FEIS?
- Is the Forest progressing toward its long-term goals?

The Forest Plan recognizes three basic categories of monitoring and evaluation: implementation, effectiveness, and validation monitoring. Each addresses a separate aspect of Forest Plan monitoring.

Implementation Monitoring: Did we do what we said we were going to do?

This question answers how well the direction in the Forest Plan is being implemented. Collected information is compared to Objectives, Standards, Guidelines and Management Area direction.

Effectiveness Monitoring: Are Forest Plan direction and our management working?

This question answers whether management consistent with the Forest Plan, including the application of standards and guidelines, is achieving the results envisioned in the Forest Plan and the associated Final Environmental Impact Statement (FEIS).

Validation Monitoring: Was our initial understanding of the situation accurate? Did we look at the right things?

This question answers whether the assumptions and predicted effects used to revise the Forest Plan were accurate.

The answers to these questions help determine if there is a need to amend or revise the Forest Plan to adapt to new information and changed conditions. Through this adaptive management approach, the Plan is kept current.

Monitoring Approach

Monitoring and evaluation are separate, sequential activities. Monitoring is the collection of data and information. Evaluation is the analysis and interpretation of the collected information and data. Monitoring and evaluation at the Forest level has three components: the Monitoring Plan, Monitoring and Evaluation Guide, and biennial Monitoring and Evaluation Report.

Chapter 4 of the Forest Plan is the *Monitoring Plan*. It provides programmatic direction for monitoring and evaluating Forest Plan implementation.

The *Monitoring and Evaluation Guide* (Monitoring Guide) provides more specific direction to implement the monitoring strategy outlined in the Forest Plan. It links the broad questions to monitoring items by asking more specific questions. See the next section for more information on the Monitoring Guide.

A *Monitoring and Evaluation Report* summarizes the results of completed monitoring from the previous years and evaluates the data. It displays whether observed changes are consistent with Forest Plan direction and what adjustments may be needed. The Forest Supervisor uses this information to determine whether the Forest Plan needs to be amended.

Not all monitoring data is acquired through focused, site-specific sampling efforts. Other information sources and monitoring methods to be used in evaluating our effectiveness may include:

- Accomplishment reports
- Annual project field reviews and NEPA compliance reviews
- General management reviews
- Functional assistance trips and activity reviews
- Project administration (Permit/Contract Administrator reports and inspection reports)
- Data or information provided by contractors, permittees, partners, cooperators, researchers, conservation organizations, and other State and Federal agencies.

Purpose of the Monitoring and Evaluation Guide

The Monitoring Guide outlines the methods to be used to collect and analyze information and data. In addition, it describes the purpose, methods, locations, responsible persons, and estimated costs. The Monitoring Guide also identifies the relative importance of the monitoring items. Specific components of each item in the Monitoring Guide include:

Monitoring Item Name: Descriptive name for the monitoring item.

Priority: Priorities are based on the following criteria:

- If the item is required by law, regulation, or policy.
- The ecological significance of having the results for the issue. This is a measure of the potential risk to natural resources if the monitoring is not completed. This includes the potential for long-term or irreversible damage and the geographic extent of the potential effects.
- The level of scientific controversy surrounding the issue.
- The level of public controversy or concern surrounding the issue.
- Strength of the connection to achieving Plan desired future conditions
- Assessment of benefits versus the cost of collecting data
- Emerging issues and concerns that may be addressed through monitoring

Required monitoring must be done to meet requirements in law, regulation, or policy.

High priority items should generally be funded after required items are funded. It is expected that annual budgets would normally allow most of these high priority items to be funded along with the required items.

Moderate items are important to the implementation of the Forest Plan, but are contingent upon funding.

Low items are desirable to complete but less important and also contingent on funding.

Evaluation Questions: What question(s) is the monitoring item designed to answer? Provides the purpose of the monitoring.

Indicators: Specific data that will be tracked to answer the question(s), usually expressed in the form of measurable or quantifiable units (i.e.: miles of trail, acres of harvest, etc.)

Data Collection Methods: Data collection techniques are described; if a separate document describes a monitoring protocol, that document is referenced.

Frequency of Monitoring: Describes how often information is gathered or measured. Some resources need to be monitored annually to produce trend data; others can be measured every 5 or 10 years and get quality results.

Estimated Cost - Explanation: Estimated dollar value cost to complete each round of monitoring. These estimates are for direct costs of retrieval or collection of data. Estimates do not include

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administrative overhead, supervision, contract preparation, or other similar indirect costs (unless otherwise noted).

Data Storage: Format and location where data will be stored.

Responsibility: Who on the Forest is the primary lead. This is often the program leader, who works with District counterparts and others to ensure the item is completed if funded.

Cooperators: Any partners involved in the data collection, processing and analysis

This document is a guide – it is not a decision document. It is intended to provide guidance for the implementation of Forest monitoring and evaluation activities required by NFMA. The Monitoring Guide itself is dynamic, and may be subject to periodic revision to meet current needs during the life of the Forest Plan.

Monitoring Items Summary Report

<i>Resource Name</i>	<i>Monitoring Item/ Indicator Name</i>	<i>Page #</i>	<i>Priority</i>	<i>Frequency</i>	<i>Cost (\$1,000)</i>
Air	Air quality related values	10	High	Annual	30
Air	Lichens	12	Medium	10 years	30
Air	Effects of prescribed fire on air quality	13	Medium	Biennial	1
Botany	Alpine ecological indicators	14	High	Varies	10
Botany	Cliff plant ecological indicators	16	High	5 years	40
Botany	TES plant population trends	18	High	Annual	20
Botany	Post-harvest herbaceous layer recolonization	20	Medium	5 years	10
Botany & Wildlife	Ecological conditions for TES species	21	High	Varies	Varies
Climate Change	Snow characteristics	22	High	Annual	1
Fire	Prescribed fire effectiveness	23	Medium	Annual	2
Fire	Wildland fire for resource benefit	24	Medium	Periodic	2
Forestry & Wildlife	Silvicultural and Habitat Objectives	25	High	Annual	4
Forestry & Wildlife	Even-aged regeneration harvest opening size and habitat objectives	26	High	10 years	4
Forestry	Increase of destructive insects and diseases	27	High	Annual	2
Forestry	Restocking success	28	High	Annual	Varies
Forestry	Suited land	29	High	Annual	2
Forestry	Forest composition objectives	30	High	Annual	TBD
Forestry	Residual tree damage from silvicultural practices	31	Medium	Annual	1
General	Goal and objective implementation	32	High	Biennial	Varies
General	Standard and guideline implementation	33	High	Biennial	Varies

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<i>Resource Name</i>	<i>Monitoring Item/ Indicator Name</i>	<i>Page #</i>	<i>Priority</i>	<i>Frequency</i>	<i>Cost (\$1,000)</i>
Heritage	Impacts on pre-historic and historic cultural sites from recreation	34	High	Annual	4
Heritage	Impacts on pre-historic and historic cultural sites from vegetation management	35	High	Annual	3
Minerals	Recreational rock and mineral collecting	36	Low	Annual	3
NNIS	Invasive species eradication effectiveness	37	High	Annual	5
NNIS	Presence of non-native invasive insects and diseases	38	High	Annual	3
NNIS	Invasive plant species prevention	39	High	Annual	Varies
Recreation	Off-road vehicle effects	40	Required	Annual	3
Recreation	Permitted outfitter/guide use	41	High	Annual	2
Recreation	Rock climbing use	42	High	3-5 years	TBD
Recreation	Use at developed campgrounds, day use areas, and ski areas	43	High	Annual	2
Recreation	Use at permitted backcountry facilities	44	High	Annual	2
Recreation	Use on Forest trails	45	High	Periodic	30
Recreation	Perceived quality of experience and perception of crowding among Forest visitors	46	High	10 years	100
Scenery	Effects of harvest on scenery	47	High	Annual	5
Scenery	Scenic integrity objective implementation	48	Medium	Annual	1
Socioeconomics	Socioeconomic indicators	49	High	10 years	30
Socioeconomics	Outputs accomplished	50	High	Biennial	1
Soils	Effects of management actions on soil physical conditions and productivity	51	High	Annual	3
Soils	Long-term soil chemistry and productivity	52	High	10 years	55

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<i>Resource Name</i>	<i>Monitoring Item/ Indicator Name</i>	<i>Page #</i>	<i>Priority</i>	<i>Frequency</i>	<i>Cost (\$1,000)</i>
Water Resources & Aquatic Species	Aquatic habitat improvement effectiveness	53	Medium	Annual	5
Water Resources & Aquatic Species	Effects of recreation use on water quality	54	Medium	Annual	8
Water Resources & Aquatic Species	Effects of land management on water quality and brook trout (focal species)	56	High	Annual	25
Water Resources & Aquatic Species	Long-term effects of climate change on aquatic resources	58	High	Annual	17
Water Resources & Aquatic Species	Wild trout assessments	59	High	Annual	4
Water Resources & Aquatic Species	Watershed condition	60	High	Annual	2
Water Resources & Aquatic Species	BMP implementation and effectiveness	61	High	Annual	7
Wild & Scenic Rivers	Compliance of developments or activities within Wildcat W&SR river corridor	63	High	3-5 years	1
Wilderness	Control of human litter and waste in Wilderness	64	High	3 years	2
Wilderness	Destination use trends in Wilderness	65	High	Annual	10
Wilderness	Dispersed campsite density and size in Wilderness	66	High	Annual	12
Wilderness	Trail use in Wilderness	67	High	Annual	8
Wilderness	Satisfaction of Wilderness visitors	68	High	10 years	75
Wildlife	Low elevation breeding bird population trends	69	High	Biennial	30
Wildlife	Vegetation composition and age class trends	70	High	5 years	1
Wildlife	Bicknell's thrush monitoring	71	High	Biennial	25
Wildlife	TES large mammals	72	High	Annual	20

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<i>Resource Name</i>	<i>Monitoring Item/ Indicator Name</i>	<i>Page #</i>	<i>Priority</i>	<i>Frequency</i>	<i>Cost (\$1,000)</i>
Wildlife	Woodland bat acoustic monitoring	73	High	Annual	Varies
Wildlife	Wood turtle monitoring	74	High	Biennial	10
Wildlife	RFSS butterflies	75	Medium	5 years	30
Wildlife	Bald eagle monitoring	76	Low	Annual	1
Wildlife	Loon monitoring	77	Low	Annual	2
Wildlife	Peregrine falcon ecological indicator	78	Low	3 years	10
Wildlife	Vernal Pools	79	Medium	3 Years	7

Air

Monitoring Item Name: Air Quality Related Values

Priority: High

Evaluation Question(s):

How are trends in air quality emissions affecting surface water quality in the WMNF? Are Air Quality Related Values (AQRVs) being impacted by air pollution, especially in Class I areas? Are the IMPROVE protocols or similar technology being implemented?

Water quality can be affected by air quality through acidic deposition. Monitoring water quality trends in the Class I areas assists in determining if the streams have recovered from decades of acid deposition.

Air pollutants may impact AQRV's such as vegetation, water quality, and visibility. The Forest Plan includes direction on using the IMPROVE site to monitoring AQRVs (p. 1-4) and managing Class I areas to protect AQRV's (Plan p. 3-12).

Data Collection Methods:

Aerosol visibility monitoring is conducted year-round at Camp Dodge, which is representative of the visibility in the Class I areas, using the IMPROVE protocol. The IMPROVE monitor collects aerosol samples, which are analyzed to obtain a chemical profile of the airborne particles. States utilize this information to then develop plans to reduce the identified pollutants that impair Class I area AQRVs.

Direct ozone measurements have been collected annually at Camp Dodge and the Summit of Mount Washington: 28-year cumulative summer time 1987 – 2014 record. Ozone concentration data are collected utilizing the Federal Reference Method.

Water samples in Class I areas are collected through an agreement with AMC using standard scientific methods for water sample collection and analysis.

Indicators or Variables:

Ozone measurements
Water quality - ph, cations, anions, conductivity
Visibility

Frequency of Monitoring: Annual

Estimated Cost & Explanation:

\$30,000/year

Includes cost-share agreement with AMC for water quality work, utility expenses at Camp Dodge IMPROVE building, and Forest staff salaries for IMPROVE site maintenance and data collection

Data Storage:

Federal Land Manager Environmental Database:
<http://views.cira.colostate.edu/edmf/explorer/default.aspx>

Responsibility:

Air Resource Specialist

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Cooperators:

New Hampshire Department of Environmental Services, Air Resources Division (contact: Kendall Perkins, Air Monitoring Program Manager)

AMC (contact: Georgia Murray, Staff Scientist)

Colorado State University

Air

Monitoring Item Name: Lichens

Priority: Medium

Evaluation Question(s):

Are lichens being impacted by air pollution, especially in Class I wilderness areas?

Lichens are another Air Quality Related Values (AQRVs) for Class I areas because air pollutants can affect lichens at moderate and high concentration levels. This monitoring would help determine the extent of, and trends in, those impacts and inform Regional (states in the northeast and midwest) actions to improve air quality in the northeast.

Data Collection Methods:

Lichen monitoring should use the FIA lichen protocol

Indicators or Variables:

Lichen species, Presence, abundance, health condition, and changes over time

Frequency of Monitoring: Once every 10 years

Estimated Cost & Explanation:

\$30,000 for lichen monitoring contract

Data Storage:

Lichen Data Clearinghouse (<http://gis.nacse.org/lichenair/>)

Responsibility:

Air resource specialist

Cooperators:

Air

Monitoring Item Name: Effects of Prescribed Fire on Air Quality

Priority: Medium

Evaluation Question(s):

Are emissions from Forest prescribed fire activities negatively affecting sensitive receptors?

This monitoring will measure particulate matter on site, which will help determine if burning prescriptions and implementation adequately address air quality concerns.

Data Collection Methods:

Use portable data collectors to record particulate matter during the activity. Selected prescribed fires will be monitored for air quality parameters, such as particulate matter. Frequency of monitoring and number of fires monitored in a given year will depend on availability of data collector on Forest during burn windows as the collector is shared with other Forests.

Indicators or Variables:

Particulate matter

Frequency of Monitoring: Annually or Biennially

Estimated Cost - Explanation:

\$1000/event.

Field work and report writing for individuals using the data collector.

Data Storage:

Fire Cache Smoke Monitor Archive (<http://www.wrcc.dri.edu/cqi-bin/smoke.pl>)

Responsibility:

Air resource specialist

Cooperators:

Botany

Monitoring Item Name: Alpine Ecological Indicators

Priority: High

Evaluation Question(s):

What are the effects of various recreation use levels on alpine plant communities?

Similar to the cliff rock climbing study this monitoring helps determine the amount of impact of recreation use in the alpine zone on sensitive plants.

Data Collection Methods:

Monitor subsamples of alpine ecological indicators using plots established in several trailside locations (#1); resurveys of relevant historical datasets (#2a); and new samples specific to known sensitive areas (#2b):

1) Monitor subsamples of alpine ecological indicators based on proximity to trails to determine if hiking use is negatively affecting communities. See alpine ecological indicator protocol document:

Matrck, C. 2006. White Mountain National Forest Alpine Ecological Indicators Study Methods. Unpublished document. White Mountain National Forest, Campton, New Hampshire.

2) Additional alpine ecological indicator monitoring items will address remaining information gaps, including how use impacts may vary with site conditions and location. Additional items will be based on a combination of resurveys of relevant historical datasets and new samples specific to known sensitive areas:

a) Re-surveys of historically reproducible studies and photo records related to recreation use levels. For example, reconstruction of historical photo records, including re-surveys of photo transect and trail-side plot data on Franconia Ridge (1977, 1993) and select resurveys of alpine summit inventories and photos (from the 1990s and earlier). These studies encompass locations with different use levels, recreation impact levels, and variation in ecological site conditions and management histories (useful to interpreting use-level related impacts).

b) Subsamples that represent known areas of concern or sensitivity for potential recreation impacts (e.g., areas with RFSS or sensitive plant communities near trails).

Indicators or Variables:

Recreation use levels

Amount (area and condition) of trampling of plants or community patches

Permanent photo/plot records of strategic or important locations

Frequency of Monitoring: Varies, see details in costs

Estimated Cost - Explanation:

Numbers 1 and 2b would cost \$10,000 each and be resurveyed every 5 years, not necessarily in the same year.

The two historical study resurveys (described in #2a) each would be on 10-year resurvey intervals (Franconia is funded for 2016-2017). Each resurvey is estimated to cost \$10,000.

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Data Storage:

Data kept with Forest Botanist

Rare plant occurrence reported to NHNHB

Responsibility:

Forest botanist will coordinate monitoring; implementation possibly by units, through contract, partners, or some combination

Cooperators:

Botany

Monitoring Item Name: Cliff Plant Ecological Indicators

Priority: High

Evaluation Question:

What are the effects of cliff-related recreation use on cliff plant abundance and rare plant persistence?

We know we have rare species on the cliffs and at the base of cliffs. Rock climbing can affect these species. The monitoring will help determine the potential extent of these impacts.

Data Collection Method:

Initial surveys were conducted in 2008 and 2009 (Phase 1 and Phase 2 studies, see below).

Periodic follow-up (Phase 3) will help quantify recreational impacts on representative cliffs on the WMNF. To increase the usefulness of this monitoring in assessing potential effects on rare plant species, specific locations of greatest concern for potential recreation impacts (i.e., circumneutral cliffs and RFSS species habitat) will be identified through supplemental surveys of cliffs (Phase 3a).

- 1) Phase 3a: Identify important cliffs or cliff features on the WMNF: circumneutral cliffs (an Outstanding natural community); cliffs systems with RFSS species or sensitive habitats; and specific locations within cliffs where these features occur. Surveys will be based primarily on ground-level surveys (non-technical climbing), build off of the results of Phase 1 and 2, and result in documentation of areas of cliffs most in need of additional monitoring in terms of resource sensitivity and potential for impacts (this will include identification of largely unimpacted cliffs where climbing activity is expected to increase, which offer the best opportunity to document impacts over time.
- 2) Phase 3b: Ocular survey of cliff face/base and along specific climbing routes. See Cliff ecological indicator protocol documents. This is the anticipated re-survey of the original Phase 2 study, with appropriate revisions informed by Phase 2 and Phase 3a results.

Allard, D. 2008. White Mountain National Forest Cliff Community Monitoring Study: Phase 1. Unpublished Document. White Mountain National Forest, Campton, New Hampshire.

Johnson, S. and W. Smith. 2009. White Mountain National Forest Cliff Community Monitoring Study: Phase 2. Unpublished Document. White Mountain National Forest, Campton, New Hampshire

Indicators or Variables:

Rock-climbing / access hiking route use levels
Vegetative cover (percent cover) on and at base of cliffs
Surveys for circumneutral cliffs, rare plants, and sensitive habitat locations

Frequency of Monitoring: 5 years

Estimated Cost - Explanation:

WMNF lacks people with skills necessary for the cliff surveys involving technical climbing, so these must be done via contract (Phase 2 and 3b resurvey). 2008-2009 contract was \$33,000 (one round of surveys was completed over two years); future surveys will be more due to inflation. Ideally the rare plant and circumneutral cliff surveys (Phase 3a, above) would precede the Phase 3b resample,

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or be conducted concurrently if Phase 3b is conducted over two year period. Phase 3a is expected to cost \$25,000 (one time cost) and will help inform the refined protocol for implementing Phase 3b (FY2018; \$35-40,000). Phase 3b to be repeated on 5 year interval.

Data Storage:

Forest Botanist files

Responsibility:

Forest Botanist will coordinate monitoring; implementation will be through contract

Cooperators:

Botany

Monitoring Item Name: TES Plant Population Trends

Priority: High

Evaluation Question(s):

Are individual known occurrences on the Forest increasing, stable, or decreasing?

The monitoring helps establish population trends in order to insure these sensitive species persist on the Forest.

Data Collection Method:

Standard surveys: Subset of RFSS plant species will be visited each year. Visit site during appropriate identification season (usually summer), count plants and report according to MNAP or NHNHB protocols (see their survey forms).

Each occurrence is typically visited every five years; more often if population trends dictate. Two concurrent methods will be employed:

- 1) Standard survey protocols (in wide use in the region) are useful for establishing presence/absence and persistence; and potentially for detecting major changes in population size and trends. This will be employed for most species and populations.
- 2) Permanent plot surveys: The goal is to establish permanently referenced, reproducible surveys for a subset of the most vulnerable RFSS species and populations to provide better resolution and confidence in population trends across the spectrum of habitats/communities on the WMNF in which RFSS occur. Particular species and populations selected will include taxa in each of the major plant habitats/communities on the WMNF, and will be prioritized based on rarity, threats, vulnerability, feasibility of implementation, and adequacy of trend data available from standard surveys. We expect this to involve ~25-30 populations and to be implemented over a five year period (resurveyed on a 5 year rotation).

Indicators or Variables:

- 1) Standard surveys: Number of individuals / size of population, other standard information fields.
- 2) Permanent plot surveys: Timed surveys in permanent plots or transects (defined, geo-referenced areas); number of plants and/or area of occupancy (cover); abundance of associated species; habitat parameters. Design of surveys will depend on population and site characteristics..

Frequency of Monitoring: Annually

Estimated Cost - Explanation:

\$20,000/year

Standard Surveys: Funding is to cover Forest botanist's time to coordinate with task force, do some surveys, and report. Some of the monitoring is done by partners.

Permanent plots: Funding to cover Forest Botanist's time (or through contract or agreement) to select populations, design and implement surveys, and prepare documentation. Implement approximately 5-6 surveys per year for five years.

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Data Storage:

New Hampshire Natural Heritage Bureau database
Maine Natural Areas Program database
Botany program files

Responsibility:

Forest Botanist will coordinate monitoring; implementation by partners and all units

Cooperators:

New England Plant Conservation Program
NH Botany Club
Josselyn Botanical Society
MNAP
NHNHB

Botany

Monitoring Item Name: Post-harvest herbaceous layer recolonization **Priority:** Medium

Evaluation Question(s):

What are the effects of even-age regeneration harvesting on herbaceous species? What is the change in percent cover in the herbaceous layer? Is there a change in species composition/diversity? If a change in species composition does occur, do those species originally present re-colonize the site? How long until the site is re-colonized by these species?

Data Collection Method:

Standard project level botany survey protocols conducted prior to all forestry projects for pre-harvest baseline. Repeat stand surveys following harvesting of select stands. This method may be appropriate to compare gross composition differences at the stand scale.

Marked plots will be necessary to detect changes in percent cover, composition, and recolonization rates compared to reference conditions.

Indicators or Variables:

Frequency of Monitoring: 5 Years

Estimated Cost - Explanation:

Cost of original data gathering for selected stands is part of the program of work for the Forestry Program. Follow up surveys and reporting \$10,000 in identified year.

Data Storage:

Unpublished excel and word documents in Forest botanist's files

Responsibility:

Forest botanist

Cooperators:

Botany & Wildlife

Monitoring Item Name: Ecological Conditions for Federally-listed Species

Priority: High

Evaluation Question(s):

What is the status of key ecological conditions required by each Federally-listed Threatened and Endangered species known to occur on the White Mountain National Forest?

Data Collection Method:

Varies by species; protocols being identified in 2016.

Indicators or Variables:

Small-whorled pogonia

- EO Rank

Canada lynx

- Acres of suitable foraging and denning habitat

Northern long-eared bat

- Number of potentially suitable roost trees

Frequency of Monitoring: Varies by species

Estimated Cost - Explanation:

TBD

Data Storage:

Botany and Wildlife program files

Responsibility:

Forest botanist and Forest wildlife biologist

Cooperators:

New England Plant Conservation Program

NH Botany Club

Josselyn Botanical Society

MNAP

NHNHB

Climate Change

Monitoring Item Name: Snow Characteristics

Priority: High

Evaluation Question(s):

How are the characteristics of snow changing on the White Mountain National Forest?

Data Collection Method:

Hubbard Brook Experimental Forest (HBEF) snow course measurements

Indicators or Variables:

- Maximum snow depth per season – maximum snow depth on the course during the season
- Cumulative snow depth per season – total amount of snow that falls on the course during the season
- Snow water equivalent – amount of water contained in the cumulative snow depth
- Snow cover duration - period from first recorded snow to last recorded snow

Frequency of Monitoring: Annually

Estimated Cost - Explanation:

\$1,000 for salary to evaluate the results

Data Storage:

HBEF stores raw data

TBD how results for WMNF use will be stored between publications by HBEF

Responsibility:

Forest climate change coordinator

Cooperators:

NRS, HBEF

Fire

Monitoring Item Name: Prescribed fire effectiveness

Priority: Medium

Evaluation Question(s):

Is prescribed fire being effectively used as a tool to meet management objectives set forth in the Forest Plan (Chapter 1)? Are prescribed burns meeting the fire effect objectives set forth in each burn plan?

This monitoring will help managers determine if prescribed burns are providing the results expected.

Data Collection Methods:

Priority is for monitoring understory burns. Protocol exists to properly capture pre and post burn condition info to enable accurate evaluation of burn effectiveness in achieving site-specific objectives.

Other monitoring will be conducted according to resource areas that benefit from the burn (i.e. timber or wildlife). Staff specialists should design monitoring specific to their objectives.

Indicators or Variables:

Various depending on objectives to be met; may include vegetation changes, soil conditions, fuels characteristics, and human factors

Frequency of Monitoring: Annually

Estimated Cost - Explanation:

\$2,000/year

5 days/burn, dependent on size of burn and ecological objectives

Data Storage:

O:\NFS\WhiteMountain\Program\5100Fire\Monitoring

Responsibility:

Zone Fire Management Officer and Resource Specialist for program benefited by prescribed burn

Cooperators:

New Hampshire Prescribed Fire Council

Fire

Monitoring Item Name: Wildland fire for resource benefits

Priority: Medium

Evaluation Question(s):

Do wildland fires managed for resource benefit successfully meet objectives set forth in the Forest Plan and Fire Management Plan? Did the fire stay within the allowed management areas and fire behavior parameters presenting low risk to firefighter and public safety? Did the fire function as a natural ecosystem process to restore or maintain natural plant communities? Were hazardous fuels reduced? Monitoring the effects of a wildland fire is critical for documentation and assessment of ecosystem changes and rehabilitation needs.

Monitoring of non-resource benefit (suppression) wildland fires may also be included in this monitoring item if these fires answer the evaluation questions: Did the fire function as a natural ecosystem process to restore or maintain natural plant communities? Were hazardous fuels reduced?

Data Collection Methods:

Method, frequency, and intensity of monitoring will depend on location and size of wildland fires and the resource benefit for which they are managed.

Indicators or Variables:

Various -- can include vegetation, soil, fuels, and human components

Frequency of Monitoring: Periodic

Estimated Cost - Explanation:

\$2,000 each

Dependent on the location and size of fires and resources benefitted.

Data Storage:

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Responsibility:

Zone Fire Management Officer

Cooperators:

New Hampshire Prescribed Fire Council

Forestry & Wildlife

Monitoring Item Name: Silvicultural and Habitat Objectives

Priority: High

Evaluation Question(s):

Are we managing forests at the project level in ways that move the Forest toward our Forest Plan wildlife habitat objectives?

Data Collection Methods:

Use stocking surveys to determine if species presence and abundance in the seedling pool is closer to the desired composition in the silvicultural prescription or EA than species presence and abundance in the overstory.

Indicators or Variables:

Presence and relative abundance of seedlings of desired species in stands harvested to move conditions toward wildlife habitat composition objectives

Frequency of Monitoring: Annual

Estimated Cost - Explanation:

\$4,000

Salary for database queries and data evaluation.

Data Storage:

FSVeg database

Responsibility:

Forestry Program Leader/Wildlife Program Manager

Cooperators:

Forestry & Wildlife

Monitoring Item Name: Even-aged Regeneration Harvest Opening Size & Habitat Objectives

Priority: High

Evaluation Question(s):

Are even-age regeneration harvest openings exceeding the 30 acre maximum size (Forest Plan, Vegetation Management S-1, p. 2-29)? Are we meeting wildlife habitat regeneration objectives in both size and quantity of openings by habitat types? If not, why not?

This monitoring helps ensure NFMA requirements to limit opening size are being met.

Data Collection Methods:

Quantitative comparisons of the on-the-ground condition and Forest plan standard and habitat objectives. Query the FSVeg database to get stand information. Individual stand prescriptions will also be monitored through annual timber sale reviews. Wildlife program manager will track why units that are considered for even-aged regeneration harvest are dropped during project analysis.

Indicators or Variables:

Frequency of Monitoring: 10 Years

Estimated Cost - Explanation:

\$4,000

Salary for database queries and data evaluation.

Data Storage:

FSVeg database

Responsibility:

Forestry Program Leader/Wildlife Program Manager

Cooperators:

Forestry

Monitoring Item Name: Increase of Destructive Insects and Disease **Priority:** High

Evaluation Question(s):

To what extent have destructive insects and disease organisms increased?

This monitoring helps track trends in insect and disease activity and can be used to determine when management action should take place.

Data Collection Methods:

Record the number of outbreaks (and acres affected) for each insect or disease organism (quantitative). Unless "damaging levels" has been concretely defined, a qualitative assessment of suppression will be made. State & Private Forestry does an annual aerial detection survey. Hotspots are mapped while in the air and later followed up with ground-truthing and identification of the organisms causing the damage. They also summarize these efforts in an annual report that will be used as a source for our monitoring report.

Coordinate annually with State & Private Forestry and NH Division of Forest and Lands to monitor for presence of Emerald Ash Borer (EAB) through the establishment of EAB "trap trees" or other acceptable monitoring methods.

Coordinate with State & Private Forestry to identify areas of "high risk" for Hemlock Woolly Adelgid (HWA) and conduct visual inspections or other acceptable monitoring methods.

If monitoring shows greater than endemic levels, additional focused monitoring and an action plan will be required.

Indicators or Variables:

Number of outbreaks
Acres affected
Species of insects and diseases

Frequency of Monitoring: Annually

Estimated Cost & Explanation:

\$5,000

Forest Service State and Private Forestry funds the cost of the aerial detection. Costs shown are for routine reporting, ground truthing, trap trees, and visual inspections. If a problem occurs, protocols will have to be developed for the specific situation and costs identified for more intensive surveys.

Data Storage:

NRIS

Responsibility:

Forest Silviculturist/Forestry Program Leader and Forest Botanist

Cooperators:

Forest Service, State and Private Forestry

Forestry

Monitoring Item Name: Restocking Success

Priority: High

Evaluation Question(s):

Are lands adequately restocked within 5 years of a regeneration harvest or site preparation activities?

There is a legal requirement in NFMA that deciding officials must address restocking success in their decision documents. This monitoring ensures we have information for them to use in making their findings.

Data Collection Methods:

R9 FSH 2409.26b provides general guidance for stocking surveys and a White Mountain NF Supplement (FSH 2409.26B-2000-1) provides the specific protocol.

Indicators or Variables:

Stocking levels of suitable species in regeneration harvest areas.

Frequency of Monitoring: Annually

Estimated Cost & Explanation:

Costs for reporting the summary results at this time are negligible. Costs for conducting the stocking surveys have not been identified.

Data Storage:

Summary data will be stored in FACTS

Responsibility:

Forest Silviculturist or Forestry Program Leader if Silviculturist is not available.

Cooperators:

Forestry

Monitoring Item Name: Suited Land

Priority: High

Evaluation Question(s):

Are harvests occurring on lands suitable for timber management? Are our databases being kept current with identified changes that affect suitability determinations at the project and Forest Plan level?

The first question provides information to help decision makers address an NFMA requirement in their project decision findings.

Keeping our databases updated helps with future project planning and will inform our suitability analysis in our next plan revision. Changes can also affect our assumptions in the Forest Plan about the long-term availability of old forest habitat.

Data Collection Methods:

Annually pick a recent project area to verify that the harvest areas only occurred on suited lands. In addition, review our GIS and FSVeg databases for the area to see if they reasonably reflect accurate suitability determinations.

Indicators or Variables:

Frequency of Monitoring: Annually

Estimated Cost - Explanation:

\$2,000

Salary for silviculturist or forestry program leader, District foresters, and Forest GIS specialist

Develop Forest protocol in FY11; implement starting in FY12

Data Storage:

FSVeg (NRIS)

Responsibility:

Forestry Program Leader

Cooperators:

Forestry

Monitoring Item Name: Forest Composition Objectives

Priority: High

Evaluation Question(s):

Are we accomplishing silvicultural objectives related to our Forest Plan wildlife habitat types at the project level? For instance, if a forestry activity was intended to help perpetuate a paper birch/aspens forest type, did we meet that objective for the stand or harvest area?

Are we keeping our database updated relative to forest types? If forest type changed as a result of a harvest or new stand exam, did we update the FSVeg database to reflect the change?

If we meet the objective on the ground but do not update our database to reflect the resulting habitat conditions, all Forest-level monitoring that uses the database will be inaccurate, indicating that we were unsuccessful when we were actually successful.

Data Collection Methods:

Protocols to be developed by FY 2016. Ideally, we would systematically sample ten-year old stands/harvest areas to review project and prescription objectives and outcomes on the ground. If funding and staffing are limited, we could instead rely on observations while doing annual district project monitoring visits. Working draft from Andro District is in progress.

Indicators or Variables:

Frequency of Monitoring: Annually

Estimated Cost - Explanation:

Personnel costs; total costs will depend on final protocol and whether we rely on project monitoring trips or implement specific monitoring to address these questions.

Data Storage:

Program files and project implementation records; FSVeg if stand forest types change

Responsibility:

Forestry program manager

Cooperators:

Forestry

Monitoring Item Name: Residual tree damage from silvicultural practices **Priority:** High

Evaluation Question(s):

Is residual tree damage from silvicultural activities within acceptable levels to meet our resource objectives?

This is a legally required item based on NFMA, and Deciding Officials must address it in their decision findings. Monitoring will ensure we have the information to support their findings.

Data Collection Methods:

Timber sale administration team will monitor protection of residual trees (i.e. provision BT6.32 under 2400-6T Timber Sale Contract) during routine inspections of operations (often inspections take place multiple times per week during active logging operations).

In addition, annually pick a recent sale area to verify that residual tree damage from silviculture activities is within acceptable levels to meet resource objectives.

Indicators or Variables:

Stocking levels of acceptable growing stock of suitable species in harvest areas to meet resource objectives.

Frequency of Monitoring: Annually

Estimated Cost - Explanation:

Sale administration monitoring costs tied to this item cannot be determined because so many aspects of an operation are monitored during each inspection.

\$1,000 estimate for monitoring trip targeted at this topic.

Data Storage:

Responsibility:

Forestry program manager

Cooperators:

General

Monitoring Item Name: Goal and objective implementation

Priority: High

Evaluation Question:

To what extent are Forest Plan goals and objectives being attained?

This monitoring evaluates Forest Plan implementation success.

Data Collection Method:

Varies by program and by goal or objective. Every year, a sample of Forest Plan goals and objectives should be considered by Forest resource program managers to determine whether the Forest is on-track to attain the stated outcome or if additional or different work needs to be done.

Indicators or Variables:

Varies by program and by goal or objective.

Frequency of Monitoring: Biennially

Estimated Cost - Explanation:

Costs will vary depending on number of people involved and number of programs reviewing this in a year.

Data Storage:

Reported in Biennial Monitoring Report

Responsibility:

Forest program managers are responsible for reviewing accomplishments in their program. Forest Planner will track whether reviews are occurring and which goals and objectives have been evaluated

Cooperators:

General

Monitoring Item Name: Standard and guideline implementation

Priority: High

Evaluation Question:

Are Forest Plan standards and guidelines being implemented at the project level consistent with the Plan and NEPA analysis?

This monitoring evaluates Forest Plan implementation success and assesses if mitigation that is analyzed for in NEPA analyses is then incorporated into project plans

Data Collection Method:

Project-level reviews, post decision and post implementation. Post decision reviews will determine whether S&Gs identified as applicable during the NEPA analysis were incorporated into project design and contracts. Post implementation monitoring will evaluate whether the S&Gs were followed on the ground. Random samples selected by program. At least 1 project per District per year. Not every S&G applicable to a given project can be evaluated in every review; select appropriate S&Gs for review based on importance to minimizing effects and to cover S&Gs for all programs over a ten year period (i.e. not the same few on every project)

Indicators or Variables:

Varies by project based on applicable S&Gs

Frequency of Monitoring: Annually

Estimated Cost - Explanation:

Costs will vary depending on number of people involved and number of projects reviewed in a year.

Data Storage:

Results of project reviews and evaluation of standard and guideline implementation and effectiveness will be documented on Activity Review forms and reported in biennial Monitoring Reports

Responsibility:

Forest program managers should ensure project reviews are occurring on a subset of projects in their program and that application of S&Gs for their resource is being evaluated periodically.

Cooperators:

Heritage

Monitoring Item Name: Impacts on pre-historic and historic cultural sites from recreation

Priority: High

Evaluation Question:

What effect do management of recreation facilities and recreational use of the forest have on cultural and historic sites? This monitoring will help determine if there is unacceptable damage from vandalism, adjacent use, or recreation projects.

Data Collection Method:

Site visits to document changes from previous visits and evaluate the agents of those changes. Schedule inspections of all Priority Heritage Assets (PHAs) over a five year period, with more frequent inspections of sites in high use areas or at greater risk of damage.

Indicators or Variables:

Unacceptable damage attributable to vandalism, visitor use, or management practice as determined based on a condition assessment of structural remains, and/or presence or absence of ground disturbance near subsurface historic and prehistoric sites, and photos taken from established photo points (if applicable).

Frequency of Monitoring: Annually

Estimated Cost - Explanation:

\$4,000/year

Personnel time for annual site visits, data input and management, and report preparation.

Some of this cultural resource monitoring is accomplished during project-level cultural resource surveys. The level of funding identified in this guide is for visits to sites that are not part of proposed project areas.

Data Storage:

Infra - Heritage, GIS Heritage site and survey layers, Heritage site and survey files and atlas

Responsibility:

Forest Heritage Program Manager

Cooperators:

New Hampshire Division of Historic Resources and Maine Historic Preservation Commission (SHPOs)

Heritage

Monitoring Item Name: Impacts on pre-historic and historic cultural sites from vegetation management

Priority: High

Evaluation Question:

What effect do vegetation management activities have on cultural and historic sites?

This monitoring will aid in evaluating the effects of timber management practices (equipment, felling, yarding), habitat management (e.g. opening creation and maintenance), and prescribed fire on cultural sites and in evaluating the effectiveness of mitigation measures.

Data Collection Method:

Field inspection before and after project implementation to evaluate the change in condition of the cultural site. Site inspections are scheduled based on vegetation management project timing, with inspections occurring one or two years prior to treatment and within three years after treatment.

Indicators or Variables:

Unacceptable damage attributable to vegetation management practices as determined based on a condition assessment of structural remains, presence or absence of ground disturbance near subsurface historic and prehistoric sites, and photos taken from established photo points (if applicable).

Frequency of Monitoring: Annually

Estimated Cost - Explanation:

\$3,000/year

Personnel time for scheduled site inspections, data input and management, and report preparation.

Data Storage:

INFRA-Heritage, GIS Heritage site and survey layers, Heritage site and survey files and atlas.

Responsibility:

Forest Heritage Program Manager

Cooperators:

New Hampshire Division of Historic Resources and Maine Historic Preservation Commission (SHPOs)

Minerals

Monitoring Item Name: Recreational rock and mineral collecting

Priority: Low

Evaluation Question:

Are mineral collectors adhering to Forest Plan standards and guidelines?

Determine whether established sites are being maintained to safety and resource protection standards with a focus on fee sites. This monitoring helps managers determine if additional actions are needed to protect the sites.

Monitor collection activity at other sites in the Forest including the extent of excavation, damage to other resources and the creation of de facto collection sites. This monitoring helps managers determine if additional actions are needed to designate new sites, implement closure orders, or take other actions.

Data Collection Method:

At established collection sites: site visits to evaluate effectiveness of management actions. Check for permits in cars, tube, and with collectors, assess whether collectors on-site are within the permit area (if applicable) and whether they are following the standards and guidelines, evaluate area for hazards and boundary markers.

At undesignated sites: monitor collector activity to determine if they are following the standards and guidelines. Collect photographic and other measurement data to capture changes in site conditions. Talk with collectors. Monitor activities of clubs and groups thru blog postings or other internet traffic that might identify new sites.

Indicators or Variables:

Annual report of geology/mineral activities on the forest includes number of permits sold at Deer Hill, other permit information as available, inventory reports, GIS data, site reports, pictures, and other items.

Frequency of Monitoring: Annually

Estimated Cost - Explanation:

\$3,000/year

\$1000 for salary to compile information; \$2000 for intern and monitoring equipment. Site visits are part of the Minerals program of work.

Data Storage:

GIS, Excel

Responsibility:

Geology/mineral program manager

Cooperators:

NNIS

Monitoring Item Name: Invasive species eradication effectiveness

Priority: High

Evaluation Question:

To what extent have been NNIS control objectives been attained?

Monitoring helps determine how effective NNIS eradication treatments are and guides future actions.

Data Collection Method:

Visit treatment sites and monitor effectiveness. Measure occurrences. Revisit populations of NNIS after eradication treatment to determine if size/condition of population has declined. Frequency of visits to a given site depends on species, treatment, etc.

Indicators or Variables:

Area of infestation post-treatment (area of coverage, number of stems, etc. depending on species)

Frequency of Monitoring: Annually

Estimated Cost - Explanation:

\$5,000/year

Salary to revisit sites and document findings

Data Storage:

FACTS

Responsibility:

Forest Botanist will direct project; implementation may be by all units

Cooperators:

NNIS

Monitoring Item Name: Presence of non-native invasive insects and diseases

Priority: High

Evaluation Question:

Are invasive insects or diseases present on the WMNF? Where are the nearest infestations of these species?

This monitoring tracks the movement and presence of several invasive pests that pose the greatest risk for the forests of the WMNF. The insects that are monitored for/tracked are Asian Long-horned beetle, emerald ash borer, hemlock woolly adelgid, sirenix wood wasp, sudden oak death.

Data Collection Method:

Ocular ground survey of host trees in campgrounds (using binoculars)
Canopy inspection of host trees by tree climbing (NA FHP)

Data collection/survey work conducted in part by WMNF staff, contractors, and concessionaires while conducting hazard tree removal. Other data collected via ground detection surveys in campgrounds and at high use recreation areas by staff of WMNF and Northern Area Forest Health Protection (NA FHP).

Indicators or Variables:

Record presence/absence on each Ranger District. If not present, update on a quarterly basis the nearest known infestation of each species. If present, identify location with GPS and map total acres affected.

Frequency of Monitoring: Annually

Estimated Cost - Explanation:

\$3,000/year

Forest Service Northern Area Forest Health funds some of the costs to conduct campground surveys on the Forest. On Forest, ground survey work by WMNF staff conducted by Wildlife/Botany program seasonal. Additional costs incorporated into hazard tree removal costs.

Data Storage:

WMNF files

Responsibility:

Forest Botanist

Cooperators:

Contractors, concessionaires, NA Forest Health Protection

NNIS

Monitoring Item Name: Invasive plant species prevention

Priority: High

Evaluation Question:

What portion of the Forest is infested with non-native, invasive plant species?

This monitoring helps indicate if infestations are occurring and where treatment should occur.

Data Collection Method:

Identification of new invasive plant site locations and monitoring of known occurrences. Some portion of the Forest should be surveyed each year depending on budget and future NEPA project locations, but the same locations will not be revisited annually

Indicators or Variables:

Number of new occurrences of NNIS plants

Frequency of Monitoring: Annually

Estimated Cost - Explanation:

\$5,000-\$30,000 is range for each survey depending on the intensity desired. A portion of the Forest should be monitored each year.

Data Storage:

TERRA

Responsibility:

Forest Botanist will direct project; implementation by all units

Cooperators:

New England Wild Flower Society
Invasive Plant Atlas of New England

Recreation

Monitoring Item Name: Off-road vehicle effects

Priority: Required

Evaluation Question:

What is the effect of off-road vehicles when using snowmobile trails early or late in the winter use season on soil, water, vegetation, fish and wildlife, forest visitors and cultural and historic resources?

Monitoring of ORV impacts is required by regulation. The results will help identify if there are problems in the "shoulder" seasons when there is higher risk of damage. The results will help determine if management action is needed.

Data Collection Method:

On-the-ground monitoring of identified areas. Individual district meetings to identify, discuss and document problem; follow-up meetings with appropriate groups to address those locations where monitoring proves a problem exists. Requires cooperation with the States

Indicators or Variables:

Frequency of Monitoring: Annually

Estimated Cost - Explanation:

\$3,000/year

3 days for one employee per District per year plus time to compile info.

Data Storage:

Individual report on review done to be made part of applicable annual monitoring report, but building on previous reports

Responsibility:

Assistant Recreation Program Manager

Cooperators:

State OHRV Offices and local clubs.

Recreation

Monitoring Item Name: Permitted outfitter/guide use

Priority: High

Evaluation Question:

Where and how much backcountry use is attributed to permitted outfitter/guides?

This monitoring will help identify trends and locations of use by outfitter and guides. The information will be helpful should the need arise to control use and protect areas of currently low use.

Data Collection Method:

Enter counts of all Outfitter/Guide permit use from "end of year" reports into Outfitter/Guide database.

Indicators or Variables:

Number of Outfitter/Guide permits, number of people using Outfitter/Guides, organizations making use of Outfitter/Guide permits, activities being accomplished with Outfitter/Guides, location of Outfitter/Guide activity on the Forest

Frequency of Monitoring: Annually

Estimated Cost - Explanation:

\$2,000/year

Outfitter and Guide database will need to be maintained annually. Every 3 years the information will be reported and evaluated for changes. Database maintenance funded out of NFRW program of work as permits are generated.

Data Storage:

Forest Outfitter/Guide use database

Responsibility:

Outfitter/Guide administrator

Cooperators:

Outfitter/Guide permit holders

Recreation

Monitoring Item Name: Rock climbing use

Priority: High

Evaluation Question:

What is the rock climbing use on the Forest?

Should be combined with other monitoring efforts related to cliff plant species and peregrines to evaluate potential impacts from climbing use

Data Collection Method:

To be determined. Consider parking lot vehicle counts, climbing site registration process (especially at a subsample of peregrine or sensitive plant sites), counts by climbers who would voluntarily complete use questionnaire each time they used a climbing site, etc. Combine the protocol with those for the monitoring of peregrine and cliff plants.

Use of climbing sites in general but also a subsample of active peregrine eyeries and proximity of routes to nests as well as a subsample of specified cliff routes evaluating rare plant occurrences and condition. Will also need to evaluate potential routes not yet being climbed

Indicators or Variables:

Rock-climbing / access hiking route use levels in visits

Frequency of Monitoring: 3-5 Years

Estimated Cost - Explanation:

TBD based on final protocol. Likely to need a seasonal dedicated to this

Data Storage:

Use data stored as part of Forest database for recreation use pending national implementation of use module for INFRA.

Responsibility:

Assistant Recreation Program Manager

Cooperators:

Rock climbing community
Peregrine falcon volunteers

Recreation

Monitoring Item Name: Use at developed campgrounds, day use areas, and ski areas **Priority:** High

Evaluation Question:

How is the amount of use at Forest developed campgrounds, day use areas, developed facilities, and ski areas changing over time?

This is about capacity at sites. Occupancy rates in developed campgrounds and use levels at day use and ski areas can help show a demand for additional or fewer facilities. Use figures will help determine where management approaches need to be changed or where capacity needs to be adjusted. The developed campground information can help in discussing changes with concessionaires.

Data Collection Method:

Record use by campground concession operations, permitted ski areas (downhill and cross-country), and other use information (e.g. counts at PNVC, counts at visitor centers, fee tube counts at day use sites, etc.).

Developed campgrounds, permitted ski areas, and some day use areas (PNVC, Saco RD VIS center, Gateway Center, etc.) have good, complete data. Other day use areas would have to be estimated use (e.g. analysis of fee tube collections or sampling protocol, if necessary TBD).

Indicators or Variables:

Visits and visitor days - use standard Length of Stay Factors (LOS) to translate between visits and visitor days.

Site occupancy rates at developed campgrounds

Use at ski areas.

Use at day use areas.

Frequency of Monitoring: Annually

Estimated Cost - Explanation:

\$2,000/year

Data Storage:

Forest database for recreation use pending national implementation of use module for INFRA.

Responsibility:

Assistant Recreation Program Manager

Cooperators:

Concession operators and permit holders

Recreation

Monitoring Item Name: Use at permitted backcountry facilities

Priority: High

Evaluation Question:

Over time is there a change in use at permitted Forest backcountry facilities?

This monitoring provides an idea of use trends in the backcountry. When combined with other backcountry trail monitoring, it can help inform managers about the type of use occurring and if changes in the amount of use indicate a need to change management in order to meet the recreation strategy of protecting recreational opportunities in low use areas.

Data Collection Method:

Input reports of use at permitted backcountry facilities. May also sample use at nonpermitted backcountry facilities. Data will be entered into the recreation use database annually. Reports will be developed at least every three years.

Indicators or Variables:

Visits and visitor days - use standard Length of Stay Factors (LOS) to translate between visits and visitor days.

Frequency of Monitoring: Annually

Estimated Cost - Explanation:

\$2,000/year

Salary to enter data and report on it.

Data Storage:

Forest database for recreation use pending national implementation of use module for INFRA.

Responsibility:

Assistant Recreation Program Manager

Cooperators:

Permit holders

Recreation

Monitoring Item Name: Use on Forest trails

Priority: High

Evaluation Question:

Over time is there a change in use on Forest motorized and non-motorized trails?

This monitoring information is needed to implement the Forest plan recreation approach of maintaining a balance of recreation opportunities across the high, moderate, and low use areas on the Forest. The information will indicate if there is a need to take management action to insure a balance is maintained.

Data Collection Method:

National Visitor Use Monitoring effort for overview. Evaluate process used by Forest for trailhead monitoring in 1999 for long-term application. Collect several consecutive years of data, stop for few years, then collect for same period again to compare use levels.

Trailhead registers, trailhead counts, and backcountry ranger counts compiled in a Forest recreation use database.

Indicators or Variables:

Visits and visitor days - use standard Length of Stay Factors (LOS) to translate between visits and visitor days.

Frequency of Monitoring: Periodic

Estimated Cost - Explanation:

\$30,000 per round of monitoring

Salary for backcountry crews

Data Storage:

Forest database for recreation use pending national implementation of use module for INFRA.

Responsibility:

Assistant Recreation Program Manager

Cooperators:

Trail clubs, AMC, RMC, DOC ATC etc.

Recreation

Monitoring Item Name: Perceived quality of experience and perception of crowding among Forest visitors **Priority:** High

Evaluation Question:

What is the level of visitor satisfaction on the Forest (as measured by quality of experience and perception of crowding) at developed sites as well as in the backcountry?

This monitoring provides trend information to help managers determine if they are meeting visitor expectations. This gives managers an indication of management actions that may need to be taken to meet visitor needs and to judge their reaction to the implementation of the recreation strategy

Data Collection Method:

Attitude Survey on visitor satisfaction (quality of experience and perception of crowding). Methods will at least include an on-site exit survey of Forest visitors.

Survey will focus on visitor perceptions of crowding at selected developed sites and selected sites in the backcountry. Survey will also focus on visitor satisfaction as a measure of whether information delivery and education messages are helping visitors find the recreation opportunity they desire.

Sample design (number of samples, location and timing of sampling, etc) of survey to be determined during development of protocol. The Wilderness visitor satisfaction survey implemented as part of the plan will serve to help in defining this for recreation in the backcountry areas of the Forest.

Indicators or Variables:

The parameters will be determined during development of the protocol for this survey. It will be developed in partnership with recreation researchers.

Frequency of Monitoring: 10 Years

Estimated Cost - Explanation:

\$100,000 for contract or agreement

Data Storage:

Recreation Files

Responsibility:

Assistant Recreation Program Manager

Cooperators:

UVM

Scenery

Monitoring Item Name: Effects of harvest on scenery

Priority: High

Evaluation Question:

How do different harvest methods affect the visual landscape over time? Does modeling accurately display scenic conditions on the landscape?

Evaluate rate at which visual impact of each harvest type changes and impacts on foreground, middleground, and background views. Over time, goal is to determine whether Forest Plan direction regarding size of openings relative to Scenic Integrity Objectives, project-level design features, and overall amount of opening on the landscape are appropriate given the types of harvest, variety of viewpoints, and rate of vegetative regrowth on the Forest.

Data Collection Method:

Photographic monitoring of a sampling of typical harvest types from easy-to-access superior viewpoints. Select several units from a project, sufficient to evaluate foreground, middleground, and background effects. Photos would be taken:

- Pre-harvest leaf-on
- Pre-harvest leaf-off if winter use at superior viewpoint makes it appropriate
- Immediately after harvest
- Annually for five years, then periodically until not visible (frequency may be adjusted based on speed of changes detected)

Indicators or Variables:

Frequency of Monitoring: Annually

Estimated Cost - Explanation:

Approx. \$1,500-2,000/year/project for salary to identify points and take photos.

Data Storage:

Landscape architect's files and project implementation records

Responsibility:

Forest landscape architect

Cooperators:

Scenery

Monitoring Item Name: Scenic integrity objective implementation

Priority: Medium

Evaluation Question:

To what degree are Scenic Integrity Objectives being followed in our decisions?

Data Collection Method:

Landscape architect reviews all projects that propose timber harvest each year to determine how often the selected alternative follows scenic integrity objective guidelines entirely, partially, or minimally. Determination usually would be based on NEPA analysis.

Indicators or Variables:

Frequency of Monitoring: Annually

Estimated Cost - Explanation:

\$1,000/year

2-3 days of time per year for landscape architect to compile and review info from NEPA analyses.

Data Storage:

LA files and monitoring reports

Responsibility:

Landscape Architect

Cooperators:

Socioeconomics

Monitoring Item Name: Socioeconomic indicators

Priority: High

Evaluation Question:

What is the economic role of the Forest in the region?

Data Collection Method:

Data will be collected from multiple sources, primarily recurring budget and finance reports available from the Forest, Region and Washington Office.

Indicators or Variables:

Payments to States (PTS); Payments in Lieu of Taxes (PILT); Stumpage value and volume of timber sold and harvested; Special use permit receipts; Recreation pass receipts; Recreation use; WMNF annual budget and expenditures; Number of full and part-time employees;

Frequency of Monitoring: 10 Years

Estimated Cost - Explanation:

\$30,000

Estimated costs to compile and evaluate data and update the socio-economic report or to fund agreement for someone else to update the report

Data Storage:

Electronic copies stored on the corporate network. Paper copies stored in Forest Planner's monitoring records.

Responsibility:

Forest Planner

Cooperators:

Socioeconomics

Monitoring Item Name: Outputs accomplished

Priority: High

Evaluation Question:

How do actual outputs and management activities compare with the estimated practices identified in Forest Plan Appendix B?

Data Collection Method:

Utilize annual target reporting and existing data bases to assemble the information.

Indicators or Variables:

- Volume of sawtimber and pulp sold
- Acres of even-aged regeneration, even-aged intermediate, and uneven-aged harvest
- Total acres harvested
- Miles of stream habitat restored
- Number of road crossings where fish passage was restored
- Net increase in miles of non-motorized trails and snowmobile trails
- Net increase in number of developed campground sites
- Net increase in backcountry facility capacity (persons at one time or PAOT)
- Miles of roads constructed, reconstructed, and decommissioned
- Acres of improved watershed or soil conditions
- Number of fires where wildland fire was managed for resource benefits

Frequency of Monitoring: Biennially

Estimated Cost - Explanation:

\$1,000

Salary for program managers to provide information and Forest Planner to compile it.

Data Storage:

Biennial Monitoring Report

Responsibility:

Forest Planner compiles information from: Fisheries program manager, Recreation program manager, Fire Planner, Forestry program manager, Soil scientist, and Forest Engineer

Cooperators:

Soils

Monitoring Item Name: Effects of management actions on soil physical condition and productivity **Priority:** High

Evaluation Question:

Is soil compaction or displacement occurring as a result of Forest management actions (harvest prescribed fire, recreation management)? If so, are there indirect effects on forest productivity and/or forest health?

Data Collection Method:

Based on Regional Monitoring Guide for Soils

Indicators or Variables:

- Soil compaction indicator: severity of bulk density
- Soil displacement indicator: severity of erosion (sheet, rill, and gully)

Frequency of Monitoring: Annually

Estimated Cost - Explanation:

\$3,000/year

Several days per year for soil scientist to collect data at variety of sites and compile info for evaluation

Data Storage:

Program files

Responsibility:

Forest Soil Scientists/Ecologist

Cooperators:

Soils

Monitoring Item Name: Long-term soil chemistry and productivity

Priority: High

Evaluation Question:

Is soil base cation depletion occurring? If so, are there indirect effects on forest productivity or forest health?

This is a long term monitoring effort to measure soil, and ultimately forest, productivity. It responds to concerns about acid deposition effects on forest productivity.

Data Collection Method:

Data collection methods appear in Forest Service GTR. In brief, soil descriptions are standard soil taxonomy. Collection is soil layer by layer. Health data is collected for all trees within a 30m diameter plot centered around the soil pit as plot center. Biomass data is the same 30m diameter plot.

Soil data is for 40 sites selected to represent the range of soil calcium concentration on the WMNF. This sample was derived using the till source model (Bailey et al 2004) as the initial representation. All sites were similar in forest type (northern hardwood), slope position (ridge, mid, toe), and soil (moderately well-drained basal till). In 1998-2004, forest health was measured for all trees within a 30 meter circular plot at all 40 soil data sites. Forest productivity was measured within 30 meter circular plot at all 40 soil data sites. Plot size was determined for similarity with other productivity plots in New England, and to sample enough trees (50-70 per plot) for statistically useful data.

Indicators or Variables:

Calcium Depletion: Total and Exchangeable Calcium concentration

Forest Health: Vigor and Dieback Ratings

Forest Productivity: Biomass Accumulation

Frequency of Monitoring: 10 Years

Estimated Cost - Explanation:

Depletion: \$30-40,000/round of sampling (unlikely it can be accomplished in a single year)

Health/Productivity: \$20,000/round of sampling (unlikely it can be accomplished in a single year)

Data Storage:

Soil samples are archived at Hubbard Brook Experimental Forest. Increment cores and foliar samples are stored at HBEF.

Responsibility:

WMNF Forest Soil Scientist/Ecologist and NRS Ecologists

Cooperators:

Northeast Research Station (Dr's Scott Bailey, HBEF; Rich Hallett and Marie-Louise Smith, NRS-Durham).

Water Resources & Aquatic Species

Monitoring Item Name: Aquatic habitat improvement effectiveness

Priority: Medium

Evaluation Question:

Are stream habitat restoration/improvement projects meeting objectives and increasing habitat complexity and fish productivity? Are AOP projects providing fish passage and stable stream beds through the crossings?

This monitoring compares measurements before and after aquatic improvement work. It helps determine if habitat improvements are effectively improving fish productivity and habitat conditions.

Data Collection Method:

Fish productivity: Use multiple-pass depletion methods. Backpack electrofishers will be used to collect fish from specific stream reaches. Block nets are used to isolate fish from other portions of the stream and fish are temporarily held after each pass through the station. Standard statistical software will be used to provide estimates of both juvenile and adult fish population abundance and biomass. This sampling would be done at selected stream restoration projects and nearby control sites before and after habitat improvement work.

Variables or Parameters:

Biomass and density of fish populations
Habitat complexity (%pool, riffle, glide); Substrate size distribution; Large woody debris size and abundance; Bankfull dimensions;

Frequency of Monitoring: Annually

Estimated Cost - Explanation:

\$5000 per year for salary to electrofish and map habitat

Data Storage:

Excel Spreadsheet designed specifically for fish population data

Responsibility:

Forest Fisheries Biologist

Cooperators:

Northern Research Station

Water Resources & Aquatic Species

Monitoring Item Name: Effects of recreation use on water quality

Priority: Medium

Evaluation Question:

What are the effects of recreation use and related infrastructure on water quality?

This monitoring assesses effects of recreation activity on water quality. Over time, it will help managers evaluate the effects of a particular type of activity and identify areas of greatest concern where mitigation or modification of recreation use would be appropriate.

Data Collection Method:

Water chemistry samples will be collected from streams near 2-5 developed recreation sites (including dispersed camping areas) each year. For uses with the highest development levels (downhill ski areas and campgrounds), recreation sites will be monitored on a rotating basis to cover all recreation areas within 300 feet of water bodies. For other types of recreation sites, locations will be randomly selected from all sites within 300 feet of water bodies as resources allow. Additional sites may be selected for monitoring in conjunction with BMP monitoring or project proposals. Samples will be collected at points above and below the recreation site at minimum, and in other areas of interest to best describe recreation impacts. Timing of sampling will correspond to peak uses and capturing a range of flows; sites sampled for *E. coli* should be sampled 3 times within 60 days to allow the best comparison with state standards.

Variables or Parameters:

Evidence of erosion, sedimentation, and/or waste in or near water bodies
Turbidity
Nutrients (nitrogen, phosphorus species)
Bacteria (*E. coli*)
Specific conductance
Temperature

Other parameters may be assessed to better understand other aspects of water quality across the WMNF.

Frequency of Monitoring: Annually

Estimated Cost - Explanation:

\$7,500

Salary for two staff /interns for eight days a year, supplies, and analysis of water samples (partial funding of agreement with Northern Research Station's Durham Lab)

Data Storage:

WMNF water quality data spreadsheets

STORET/Water Quality Exchange (WQX) for data meeting quality assurance/quality control standards

Responsibility:

Forest Hydrologist

White Mountain National Forest Monitoring and Evaluation Guide

Cooperators:

Northern Research Station - Durham Analytical Laboratory

Water Resources & Aquatic Species

Monitoring Item Name: Effects of land management on water quality and brook trout (focal species)

Priority: High

Evaluation Question:

Are Forest Plan S&G's sufficient for protecting, restoring, or improving headwater stream ecosystems (riparian and aquatic)?

Data Collection Method:

Water chemistry samples and fish surveys are conducted in control and treatment streams in selected vegetation management project areas for 2-5 years pre and post-harvest.

At least 3 water samples will be collected each survey year, representing at minimum spring snowmelt, summer base flow, and fall leaf-off conditions. Increase water sampling frequency to biweekly or monthly to capture a wider range of flows when resources permit. Sample timing and frequency should be comparable for pre and post-harvest datasets. Current protocol is field data collection for pH, conductivity, temperature, turbidity and WMNF lab analysis for alkalinity and apparent color. Grab samples are sent to an external laboratory for all other parameters. Sites may be coordinated with data logger sites for continuous readings during the growing season.

Brook trout abundance will be estimated using multiple-pass depletion methods. Backpack electrofishers will be used to collect fish from specific stream reaches. Block nets are used to isolate fish from other portions of the stream and fish are temporarily held after each pass through the station. Standard statistical software will be used to provide estimates of both juvenile and adult fish population abundance and biomass.

Variables or Parameters:

Biomass of wild brook trout in a stream reach (kg/hectare)
Density of young-of-the-year brook trout in a stream reach (#/100m²)
Turbidity
Major cations and anions
Monomeric aluminum - total, organic (inorganic calculated)
Nutrients (nitrogen and phosphorus species)
Alkalinity (measured)/ Acid Neutralizing Capacity (calculated) Dissolved Organic Carbon
pH
Conductivity
Temperature

Frequency of Monitoring: Annually

Estimated Cost - Explanation:

Hydrology: \$13,500 per year includes salary, supplies, and analysis of water samples (partial funding of agreement with NRS Durham Lab)
Fisheries: \$11,000 per year for salary to sample fish.

Data Storage:

STORET/Water Quality Exchange (WQX)

Fish abundance data stored in Excel spreadsheet; include in NRIS if it becomes compatible

White Mountain National Forest Monitoring and Evaluation Guide

Responsibility:

Forest Hydrologist and Forest Fisheries Biologist

Cooperators:

Northern Research Station

Plymouth State University

NH Fish & Game

Water Resources & Aquatic Species

Monitoring Item Name: Long-term effects of climate change on aquatic resources

Priority: High

Evaluation Question:

Are stream temperatures changing over time? Are fish communities changing with temperature changes.

Data Collection Method:

Use HOBO thermographs to monitor air and stream temperatures. Monitor air and water temperatures in first, second, and third order streams in 5-6 watersheds. Electrofish to document species composition and abundance at a subsample of all temperature sites.

Variables or Parameters:

Average July and August water and air temperatures.

Frequency of Monitoring: Annually

Estimated Cost - Explanation:

\$17,000 for salary and new data loggers every five years, averaged to get annual cost; salary for electrofishing

Data Storage:

Excel spreadsheet, NRIS, and NHDES

Responsibility:

Forest Ecologist and Forest Fisheries Biologist

Cooperators:

Plymouth State University

Water Resources & Aquatic Species

Monitoring Item Name: Wild Trout Assessments

Priority: High

Evaluation Question:

Is the Forest providing a range of fishing opportunities that meets fishing demand while identifying and protecting wild populations of brook trout?

This helps determine if we are meeting one of the Fisheries goals in the Forest Plan to provide a balance between wild and stocked indigenous fish species.

Data Collection Method:

In cooperation with NHF&G, electrofish select watersheds to estimate wild trout biomass; all stocked fish in the watershed will be marked for the years that assessment occurs to ensure origin of fish is known

Variables or Parameters:

wild trout biomass;

Frequency of Monitoring: Annual

Estimated Cost - Explanation:

\$4000 per year for personnel costs

Data Storage:

Fisheries files; Monitoring Report

Responsibility:

Forest Fisheries Biologist

Cooperators:

NHF&G; Trout Unlimited

Water Resources & Aquatic Species

Monitoring Item Name: Watershed condition

Priority: High

Evaluation Question:

Are watersheds fully functioning as ecological systems? Is watershed condition being maintained or improved?

This monitoring determines what watersheds are fully functioning based on physical and biological indicators for both aquatic environments and terrestrial parameters that influence water quality and quantity. This will help select priority locations for watershed improvement projects. Results of periodic watershed condition assessments and targeted action plans will determine whether watershed restoration has resulted in improvement or maintenance of watershed condition, or whether watershed function is at risk of deterioration. The monitoring will also help meet Forest Plan Water Resource goals.

Data Collection Method:

The National Watershed Condition Classification protocol is used for the assessment of Watershed Condition Class, as of 2011 (USDA Forest Service 2011). Changes in watershed condition based on completion of Watershed Restoration Action Plans are tracked and updated annually. At least every 5 years, the Forest will determine the need for reassessment of any other watersheds and complete this activity when appropriate.

Protocol documented at: U.S. Department of Agriculture (USDA) Forest Service. 2011. Forest Service watershed condition classification technical guide. FS-978. Washington, DC: U.S. Department of Agriculture, Forest Service, Watershed, Fish, Wildlife, Air, and Rare Plants Program. Available at:

http://www.fs.fed.us/publications/watershed/watershed_classification_guide.pdf

Variables or Parameters:

Watershed Condition Class, based on a suite of watershed attributes (see data collection methods)

Frequency of Monitoring: Annually

Estimated Cost - Explanation:

Estimated \$17K salary cost for full team assessment; \$2K for monitoring and updates of essential projects and condition class in other years.

Data Storage:

Watershed Classification and Assessment Tracking Tool (WCATT) - watershed condition class, attribute and indicator scores, priority status, priority rationale and action plans

Watershed Improvement Tracking (WIT) - essential project status and details

Responsibility:

Forest Hydrologist

Cooperators:

Water Resources & Aquatic Species

Monitoring Item Name: BMP Implementation and Effectiveness

Priority: High

Evaluation Question:

Are Best Management Practices (BMPs) for soil and water being implemented? Are BMPs effective at preventing negative impacts to soil and water?

This monitoring determines whether BMPs are implemented for National Forest activities in accordance with any guidance referenced in decision documents or operating plans. This guidance may include Forest Plan Standards and Guidelines, state or national BMPs, or applicable regulations for soil and water conservation. It also evaluates the effectiveness of BMP implementation. This monitoring is also used for Forest Plan Standard and Guideline monitoring.

Data Collection Method:

The National Core BMP Monitoring Technical Guide (Volume 2, FS-990b, in prep) provides the instructions and forms for site selection and monitoring. Each year, a certain number of sites must be randomly selected from a pool of eligible projects; additional projects may be non-randomly selected. For monitoring not required to meet national targets, the protocol may be adapted to meet the need of programs and partners.

Protocol documented at:

http://fsweb.wo.fs.fed.us/wfw/watershed/national_bmps/bmp_docs.html (internal FS site; final document in preparation).

Variables or Parameters:

A series of questions about: basic project information and location; which BMPs were specified for the project; whether BMPs were implemented; whether sediment or pollutants reached protected zones around water bodies; and whether sediment or pollutants reached water bodies. J

Questions vary by project type.

Frequency of Monitoring: Annually

Estimated Cost - Explanation:

\$7,000

Salary cost for teams of three people to assess six sites, plus specialist time for planning, site selection and reporting. A target of six sites was assigned to the Forest in 2014 and 2015, but is subject to change with corresponding change in costs.

Data Storage:

Interim National BMP Monitoring Database, accessed through Citrix National Applications. By 2016, the FS expects to integrate the interim database into a more permanent Natural Resource Manager (NRM) data management system.

Responsibility:

Forest Hydrologist

White Mountain National Forest Monitoring and Evaluation Guide

Cooperators:

UNH Cooperative Extension

Maine Forest Service

Northeastern Area State and Private Forestry

FS permittees, concessionaires, contractors

Wild & Scenic Rivers

Monitoring Item Name: Compliance of developments or activities within Wildcat W&SR river corridor **Priority:** High

Evaluation Question:

Are developments and projects within the Wildcat Wild & Scenic River corridor consistent with the Wild and Scenic Rivers Act.?

The Forest has a legal responsibility as the lead agency to insure both federal and private land use in the corridor is consistent with the Comprehensive River Management Plan (CRMP) and Section 7 requirements of the Clean Water Act. This monitoring evaluates recent and past Section 7 consultation reports to insure that we are meeting this responsibility.

Data Collection Method:

Field review of completed projects where permit is issued by state or town every three to five years.

Approval of NHDES Wetland permit or 404 Clean Water Act permits prior to Section 7 determination, if applicable.

Indicators or Variables:

Number of wetland permit applications received and consultations provided.
Check for consistency of private and agency activities, and town zoning ordinances, with the CRMP and the Wild and Scenic Rivers Act.

Frequency of Monitoring: 3-5 Years

Estimated Cost - Explanation:

\$1,000 every three to five years for salary to do field reviews.

Data Storage:

Forest records for Wildcat WSR

Responsibility:

Saco RD

Cooperators:

Town of Jackson
US Army Corps of Engineers

Wilderness

Monitoring Item Name: Control of human litter and waste in Wilderness **Priority:** High

Evaluation Question:

Is there a change in the number of incidents of improperly disposed of human litter and waste in Wilderness?

This monitoring helps define the impacts use may have in the backcountry. This can affect the visitors experience. The information gathered will help identify if trigger points in the stewardship plan have been reached and if management action is needed

Data Collection Method:

As discovered on regularly scheduled patrols

Indicators or Variables:

Frequency of Monitoring: 3 Years

Estimated Cost - Explanation:

\$2,000

Minimal costs for salary - incorporated as part Wilderness patrols.

Data Storage:

LEMARS as part of incident reporting system

Responsibility:

Wilderness staff

Cooperators:

Wilderness

Monitoring Item Name: Destination use trends in Wilderness

Priority: High

Evaluation Question:

Over time is there a change in visitor use at Wilderness destinations?

The Forest Plan lists a variety of sites and desired conditions for the sites. This monitoring will help determine if desired future conditions for these sites are being met and if management action is needed

Data Collection Method:

Select 4 destination sampling areas per zone. Record total number of users encountered, group sizes, and maximum and minimum users at any time during sampling period. Monitor use annually. Utilize same destinations and sampling dates and times for duration of this plan.

Indicators or Variables:

Frequency of Monitoring: Annually

Estimated Cost - Explanation:

\$10,000 annually for salary for data collection.

Data Storage:

As part of Forest database for recreation use pending national implementation of use module for INFRA.

Responsibility:

Wilderness staff

Cooperators:

Potential cooperators include:

Trail cooperator clubs

New England universities with recreation research programs

Wilderness Society

Wilderness

Monitoring Item Name: Dispersed campsite density and size in Wilderness **Priority:** High

Evaluation Question:

Does the density and size of dispersed campsites in Wilderness meet set criteria?

This monitoring helps define the impacts higher use may have in the Wilderness. Increases in campsite density or size as well as the number of users can affect the visitors experience and especially the visitor's sense of solitude. The information gathered will help identify if trigger points in the Wilderness stewardship plan have been reached and if management action is needed.

Data Collection Method:

Field survey of selected drainages/untrailed peaks/Wilderness.

Density: Zone A: Survey dispersed campsites along 1 selected stream drainage as appropriate in each Wilderness each year. Survey dispersed campsites on 1 trailless peak above 2,999 feet as appropriate in each Wilderness each year. Zones B, C, and D: Complete update of dispersed campsite inventory during the life of the Plan. Size: Zone A: Survey along 1 selected stream drainage as appropriate in each Wilderness each year. Survey of 1 trailless peak above 2999 feet in each Wilderness each year. Zones B: Complete update of dispersed campsite inventory during the life of the Plan. Zone C-D - Select 10 sample sites. Measure campsite area at sample sites on 3-year interval. Monitor remaining campsites for area change. Utilize same sample sites for duration of this plan.

Indicators or Variables:

Number of dispersed campsites within set distance of each other
Area of dispersed campsites without vegetative cover

Frequency of Monitoring: Annually

Estimated Cost - Explanation:

\$12,000

Average annual salary for annual data collection for some of the items, once every 3 years for some, and once per plan period for others.

Data Storage:

As part of Forest dispersed campsite database

Responsibility:

Wilderness staff

Cooperators:

Potential cooperators include:
Trail cooperator clubs
New England universities with recreation research programs
Wilderness Society

Wilderness

Monitoring Item Name: Trail use in Wilderness

Priority: High

Evaluation Question:

Over time is there a change in visitor use on trails in Wilderness?

This monitoring will provide use trend data that can be used to determine if managers are meeting the Forest-wide recreation strategy and the Wilderness plan. Both of these are aimed at maintaining a balance between high, moderate, and low use areas. The Wilderness plan provides more specific requirements and trigger points for when additional action should be taken. The monitoring will determine if some of those trigger points have been reached.

Data Collection Method:

Visitor counts on trails in Wilderness zones B, C, and D. No trails in Wilderness Zone A by definition.

Select three trail sampling points per Wilderness, one per zone. Sample use at determined dates and time periods (sample two times per season). Record total number of users and group sizes encountered during sampling period. Monitor use annually. Analyze data on 3-year intervals. Utilize same trail segments and sampling dates and times for duration of this plan.

Indicators or Variables:

Visitor count

Frequency of Monitoring: Annually

Estimated Cost - Explanation:

\$8,000 annually for salary.

Data Storage:

As part of Forest database for recreation use pending national implementation of use module for INFRA.

Responsibility:

Wilderness staff

Cooperators:

Potential cooperators include:

Trail cooperator clubs

New England universities with recreation research programs

Wilderness Society

Wilderness

Monitoring Item Name: Satisfaction of Wilderness visitors

Priority: High

Evaluation Question:

What is the level of visitor satisfaction in Wilderness (quality of experience and perception of crowding)?

One of the goals of Wilderness management is to provide users with an opportunity for solitude and challenge. This monitoring will help determine if we are meeting this goal and visitor expectations. Likely will be done in conjunction with Recreation visitor satisfaction monitoring item.

Data Collection Method:

Attitude Survey on visitor satisfaction (quality of experience and perception of crowding) in Wilderness. This survey will be developed in partnership with recreation researchers.

Survey will focus on visitor perceptions of crowding at selected sites within Wilderness. Survey will also focus on visitor satisfaction as a measure of whether information delivery and education messages are helping visitors find the appropriate recreation opportunity they desire.

Ideally survey should be conducted twice during life of Forest Plan to evaluate change.

Indicators or Variables:

Frequency of Monitoring: 10 Years

Estimated Cost - Explanation:

\$75,000 to \$100,000 for a partnership agreement.

Data Storage:

SO Wilderness Files

Responsibility:

Wilderness staff

Cooperators:

UVM

Wildlife

Monitoring Item Name: Low elevation breeding bird population trends **Priority:** High

Evaluation Question:

Are population trends of low elevation breeding birds consistent with those projected under the Plan based on projected habitat changes?

The Forest Plan FEIS disclosed wildlife changes based on habitat objectives using Management Indicator Species (MIS). Although MIS are no longer required, this monitoring is still needed in order to determine if changing habitat conditions are reflected in corresponding population shifts. This monitoring uses a coarse filter approach that covers a broad suite of species so that unrelated variability in a single species trend does not confound analysis results. This monitoring is intended to provide long-term Forest-wide trends.

Data Collection Method:

Breeding Bird Survey point count using WMNF Permaplot survey protocol.

The purpose is to count and evaluate the number of breeding birds by species along fixed transects over time. As various habitat types (based on composition and age class) increase or decrease substantially, we would expect to see corresponding shifts in population trends of breeding birds that are supported by these habitats. Gross level habitat changes can be determined by using the FSVegSpatial database, harvest records, or other methods.

Works well to run this survey in alternate years from the high elevation bird survey (see Bicknell's thrush).

Indicators or Variables:

Number of birds over time or Proportion of points with positive detections over time depending on relative abundance.

Frequency of Monitoring: 2 Years

Estimated Cost - Explanation:

\$30,000/survey

Cost includes salary, vehicles, supplies (paint, flagging, etc.), plus overtime for non-exempt employees working prior to 0600. Cost also includes estimate for data entry, but not analysis

Data Storage:

WMNF Birds (Access database)

Responsibility:

Forest Biologist coordinates; implementation by all units

Cooperators:

Wildlife

Monitoring Item Name: Vegetation composition and age class trends **Priority:** High

Evaluation Question:

How has the amount and quality of habitat changed relative to the changes projected by the Plan?

This allows for evaluation of progress towards meeting the objectives in the Plan identified as the basis of coarse scale habitat management on the WMNF.

Data Collection Method:

Query acres of habitat type and age classes from existing databases. Use the Habitat Guidance document to identify which forest types and age classes are tied to each habitat type (e.g. hardwoods, softwoods, etc.) for each habitat category.

Indicators or Variables:

Acres of habitat by forest type and age class.

Frequency of Monitoring: 5 Years

Estimated Cost - Explanation:

\$1,000

Salary for a query of data bases.

Data Storage:

Stand data stored in FSVeg Spatial. Harvest accomplishments stored in FACTS. Queries stored in Forest Biologist's files. Reported in Forest monitoring report.

Responsibility:

Forest Biologist

Cooperators:

Wildlife

Monitoring Item Name: Bicknell's thrush monitoring

Priority: High

Evaluation Question:

What is the population trend of Bicknell's thrush on the Forest?

The monitoring helps establish population trends in order to insure this sensitive species persists on the Forest.

Data Collection Method:

Auditory/ocular breeding bird survey along established transects.

See WMNF High Elevation Breeding Bird Survey protocol.

Indicators or Variables:

Number of individuals / size of population – changes over time

Frequency of Monitoring: 2 Years

Estimated Cost - Explanation:

\$25,000/survey

Salary, overtime for non-exempt employees prior to 0600, per diem for on-Forest overnight camping, miscellaneous supplies (camping equipment, headlamps, flagging, paint, tree tags, etc.).

Data Storage:

WMNF Birds (Access database)

Responsibility:

Forest Biologist will coordinate monitoring; implementation by all units

Cooperators:

International Bicknell's Thrush Conservation Group

Wildlife

Monitoring Item Name: TES large mammals

Priority: High

Evaluation Question:

Are Canada lynx and gray wolf present as residents on the WMNF?

The monitoring helps determine if these federally-listed species exist on the Forest in more than simply a transient status. It also tracks the prey base for these species. This information will help inform decisions on protection should either species become established on the Forest. The information will also play a role in implementing recovery/conservation plans.

At the same time, presence/absence and relative abundance can be obtained for other important carnivores such as bobcat, marten, fisher, and coyote, all of which may compete for the same prey resources as lynx and wolf. Additional uses for information captured with this protocol include comparison of presence by elevation (climate change concerns), snow depth over time, and counts of prey base (snowshoe hare or deer/moose).

Data Collection Method:

Large mammal winter track counts and camera traps along established transects.

Indicators or Variables:

Number of individuals by transect

Frequency of Monitoring: Annually

Estimated Cost - Explanation:

\$20,000/year

Salary, batteries. Currently protocol is being implemented through an agreement as part of a PhD study. Cost estimate represents cost of completing the protocol entirely with force account.

Data Storage:

Access database / GIS shapefile & attribute table; all photos stored on T: drive in 2600_Wildlife

Responsibility:

Forest Biologist will coordinate monitoring; implementation by all units

Cooperators:

UMASS-Amherst; NRS

Wildlife

Monitoring Item Name: Woodland bat acoustic monitoring

Priority: High

Evaluation Question:

Where are woodland bats located on the Forest and what are their population trends?

This monitoring protocol will help us track trends of several TES bats (northern long-eared bat, eastern small-footed bat, little brown bat, and tri-colored bat), as well as other bats affected by White-nose Syndrome (big brown bat) and other migratory bats. It will also help us identify where these bats are located on the Forest.

Data Collection Method:

Driving surveys with bat detectors following the R8/R9 Britzke Protocol

Stationary surveys following the USFWS Indiana bat/northern long-eared bat survey protocol

Region 9 may adopt the North American Bat Survey protocol in the near future, but has not yet.

Indicators or Variables:

Species presence/absence; call abundance

Frequency of Monitoring: Annually

Estimated Cost - Explanation:

\$20-85,000/year

\$20,000 for driving survey includes regular salary and overtime costs for work after 1800 hours. This covers the base minimum needed with the current Britzke protocol. If we switch to the NA Bat protocol, salary costs may increase depending on how many routes we take on.

Stationary surveys are dependent on level of effort. We have prioritized surveys on the large integrated project areas first, which are approximately 40-60 detector locations each and cost between \$35,000 and \$65,000 per year depending on logistics in getting to the sites, weather, etc. and assuming a seasonal workforce performs the surveys.

Data Storage:

GIS shapefiles, raw datasheets stored at units; copy in Forest Biologist files; data shared with FWS and NHFG/MDIFW; raw data stored on T: drive; photos and copies of datasheets scanned and stored on O: drive. Copies of driving survey raw data also stored on external hard drives held at the Superior NF, Chequamegon-Nicolet NF, and with the Forest Biologist.

Responsibility:

Forest Biologist coordinates; all units implement

Cooperators:

Forest Service Regions 8 and 9
U.S. Fish & Wildlife Service
NH Fish & Game

Wildlife

Monitoring Item Name: Wood turtle monitoring

Priority: High

Evaluation Question:

Are wood turtles continuing to persist on the WMNF?

The monitoring helps confirm whether this sensitive species remains present on the Forest.

Data Collection Method:

Identify suitable streams for wood turtles; time-constrained active search of overwintering pools, root wads, undercut banks, and along shores in identified segments during April and May or in September. To determine population trends, need photo-documentation of individuals captured. Recommend initial survey first to look for evidence of turtles (tracks), then follow-up detailed search for nests and evidence of hatched eggs.

Indicators or Variables:

Location/number of individuals per site

Frequency of Monitoring: Biennial

Estimated Cost - Explanation:

\$10,000/survey

Salary and equipment (e.g., waders, hip boots)

Data Storage:

Forest Biologist's files; occurrences mapped in WILDLIFE

Responsibility:

Forest Biologist will coordinate monitoring; all units implement

Cooperators:

Wildlife

Monitoring Item Name: RFSS butterflies

Priority: Medium

Evaluation Question:

What is the population trend of sensitive butterfly species on the Forest?

The monitoring helps establish population trends in order to ensure these sensitive species persist on the Forest.

Data Collection Method:

McFarland protocol: Ocular count of target species; weekly visits throughout summer in potential alpine habitat (minimum). Could also add mark-recapture effort to improve statistics.

Indicators or Variables:

Number of individuals / size of population over time.

Frequency of Monitoring: 5 Years

Estimated Cost - Explanation:

\$30,000/survey minimum cost

Likely implemented through contract due to expertise required and logistical constraints of repeated travel to the alpine zone throughout the summer. If mark-recapture and host plant identification are added, would be approx. \$50,000 per survey

Data Storage:

GIS transects plus Excel or Access database; occurrences mapped in WILDLIFE and shared with NHFG

Responsibility:

Forest Biologist will coordinate monitoring

Cooperators:

Likely contract through VCE (Vermont Center for Ecostudies)

Wildlife

Monitoring Item Name: Bald eagle monitoring

Priority: Low

Evaluation Question:

What is the population trend of breeding bald eagles on the WMNF?

Identification of suitable nesting habitat on the Forest, which may be limited to Lake Tarleton. This contributes to recovery efforts and helps point out needs for nest protection.

Data Collection Method:

Monitoring is to determine if breeding is occurring on Lake Tarleton. Ocular survey for, and count of, eagles following NH Audubon Society protocols.

Indicators or Variables:

Number of individuals / size of population

Frequency of Monitoring: Annually

Estimated Cost - Explanation:

\$1,000/year

Salary

Data Storage:

NH Audubon Society; WILDLIFE

Responsibility:

Forest Biologist

Cooperators:

New Hampshire Audubon Society

Wildlife

Monitoring Item Name: Loon monitoring

Priority: Low

Evaluation Question:

What is the population trend of loons on the Forest?

The monitoring helps establish population trends in order to insure this sensitive species persists on the Forest.

Data Collection Method:

Nest productivity survey. Visit lakes or ponds where loon nesting is known or has occurred historically. Count nesting pairs during breeding season (June and July). Follow up to determine number of chicks fledged.

Indicators or Variables:

Number of individuals / size of population

Frequency of Monitoring: Annually

Estimated Cost - Explanation:

\$2,000/year

Salary to check sites and nests.

Data Storage:

Forest and District bio files; data also sent to Loon Preservation Committee

Responsibility:

Forest Biologist will coordinate monitoring; implementation by districts

Cooperators:

Loon Preservation Committee

Wildlife

Monitoring Item Name: Peregrine falcon ecological indicator

Priority: Low

Evaluation Question:

What are the effects of cliff-related recreation use on peregrine falcons and their nest success?

This monitoring will display the effects and help determine if current mitigation is effective.

Data Collection Method:

Determine if there is peregrine activity at known nest sites; monitor sites for reproductive activity; count fledglings and note how many are successfully fledged.

Indicators or Variables:

Peregrine nesting success (nest occupancy, percent nestlings successfully fledged)

Frequency of Monitoring: 3 Years

Estimated Cost - Explanation:

\$10,000/ survey

Salary. Some Peregrine counts are done annually by partners or because they are so easily accomplished.

Data Storage:

Peregrine occurrence and productivity data stored with NH Audubon

Responsibility:

Forest Biologist will coordinate monitoring; implementation by all units

Cooperators:

New Hampshire Audubon Society; Maine Dept. Inland Fish & Wildlife

Wildlife

Monitoring Item Name: Vernal pools

Priority: Medium

Evaluation Question:

Where are vernal pools on the Forest located and are they continuing to provide suitable habitat?

This monitoring is important partly to determine if standards and guidelines are effective, but also because vernal pools are one of the wildlife habitats more susceptible to risks from climate change.

Data Collection Method:

Ocular counts of vernal pool indicator species identified for NH and ME (e.g., wood frog, spotted salamander). Target survey during spring when egg masses will be visible. Consider later visits in addition to determine reproductive success (e.g., did pool dry up before eggs could hatch or juveniles could metamorphose to adults?)

Indicators or Variables:

Number of egg masses of indicator species per pool.

Evidence of water levels not being maintained long enough for eggs to hatch successfully.

Frequency of Monitoring: 3 Years

Estimated Cost - Explanation:

\$7,000/survey

Primarily salary costs

Data Storage:

Access database; GIS shapefile

Responsibility:

Forest Biologist will coordinate monitoring; implementation by all units

Cooperators: