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August 2026



Green Mountain National Forest

Monitoring and Evaluation Report

Fiscal Years 2019 to 2024



Timber harvest activity within the Camp 5 Timber Sale, Rochester Ranger District

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Monitoring and Evaluation Report Fiscal Years 2019 to 2024

Green Mountain National Forest

USDA Forest Service, Eastern Region
August 2026

This Monitoring and Evaluation Report combines monitoring completed from fiscal years 2019 to 2024 for the Green Mountain National Forest Land and Resource Management Plan (Forest Plan) dated 2006. Monitoring and evaluation of forest plans is required by the National Forest Management Act and associated 2012 planning rule (36 CFR 219 dated April 9, 2012). The Green Mountain National Forest Monitoring Program consists of monitoring questions to address whether management activities are meeting or implementing Forest Plan direction including Goals, Objectives, Desired Future Conditions, and Forest-wide and Management Area Standards and Guidelines. The Green Mountain National Forest Monitoring Program is described in Chapter 4 (Monitoring and Evaluation) of the Forest Plan.

The 2012 planning rule requires Forest Service staff to conduct a biennial evaluation of new information gathered through the monitoring program, complete a written report of the evaluation, and make it available to the public (36 CFR 219.12(d)). Information derived from the monitoring and evaluation of required and other monitoring questions included in the monitoring program forms the basis for continuous improvement of the Forest Plan needed for consideration of adaptive management strategies.

Approval

I have reviewed the *Green Mountain National Forest – Monitoring and Evaluation Report for Fiscal Years 2019 to 2024* including its findings, conclusions, and recommendations. I find the report meets the intent of both the Forest Plan (Chapter 4) as well as the 2012 planning rule.

**CHRISTOPHER
MATTRICK**

 Digitally signed by CHRISTOPHER
MATTRICK
Date: 2026.10.13 13:26:16 -04'00'

Christopher Mattrick
Acting Forest Supervisor
Green Mountain and Finger Lakes National Forests

Date

1. Introduction

Monitoring and evaluation reporting is required by the National Forest Management Act. The Green Mountain National Forest (GMNF) Monitoring Program initially developed following the 1982 planning rule effective September 30, 1982, was modified in 2016 to comply with the 2012 planning rule (36 CFR 219.12 (c)(1)). Monitoring Program expectations are included in Chapter 4 of the GMNF Land and Resource Management Plan (Forest Plan). Monitoring and evaluation are critical steps in the process of keeping the Forest Plan responsive to changing conditions, thereby providing the feedback mechanism for an adaptive management framework.

The intent of the Monitoring Program is to provide the Forest Service and the public information to determine how well the Forest Plan is being implemented, whether management activities are achieving desired outcomes, and whether assumptions made in the planning process are valid. It also provides a basis to identify when changes are needed to 1) Forest Plan components (goals, objectives, desired future conditions, suitability of lands, and Forest-wide and management area standards and guidelines), and 2) the design of future management activities to more effectively meet Forest Plan direction. The Forest Plan may be amended to adapt to new information and changed conditions identified through monitoring and evaluation efforts. Through this adaptive management approach, the Forest Plan is kept current.

The Monitoring Program (Forest Plan, Chapter 4) is strategic in nature and provides programmatic direction for monitoring and evaluating Forest Plan implementation. It describes what will be monitored and what Forest Service staff expect to learn from that monitoring and subsequent evaluation. Monitoring falls into three general areas of focus, depending on whether they examine the implementation or effectiveness of management actions, or the validity of the underlying assumptions on which management is based:

1. Implementation - Is the overall direction in the Forest Plan being implemented? This includes goals and objectives, desired conditions, standards and guidelines, and management area direction.
2. Effectiveness - Are the standards and guidelines working? Are there significant changes in productivity of the land?
3. Validation - Are the assumptions and predicted effects used to formulate the Forest Plan accurate?

The Monitoring Program has three major components: the Monitoring Plan, the Monitoring Implementation Guide (or Monitoring Guide), and the Biennial Monitoring and Evaluation Report. Each are described below.

Monitoring Plan

The GMNF *Monitoring Plan* provides a conceptual framework for specific monitoring and evaluation elements as outlined in Chapter 4 of the Forest Plan. It includes detailed questions and associated indicators for monitoring a wide variety of resource items. The 2012 planning rule requires every national forest monitoring program to address each of eight resource monitoring elements with at least one monitoring question and associated indicators (36 CFR 219.12(a)(5)). Ten existing, modified, or new questions and associated measurement indicators selected to comply with the 2012 planning rule were reflected by Forest Plan administrative changes in May 2016. These questions were reviewed in 2025 to evaluate whether they needed changes to better meet the intent of the Monitoring Program. Although ten questions were retained to address the required monitoring elements, some questions were added or modified, and others removed as reflected by Forest Plan administrative changes in May 2026. These ten

required questions, and associated indicators are included in the GMNF Monitoring Plan (Forest Plan, Chapter 4, Section 4.1.4 Monitoring Plan; and Section 4.4.5 Required Monitoring).

Other monitoring questions were also developed to assist in determining how well management activities are meeting Forest Plan direction (Forest Plan, Chapter 4, Section 4.1.6 Other Monitoring). While none of these other questions were selected to address any of the required elements and are not part of the formal Monitoring Plan, Forest Service staff can use them to improve Forest Plan components or refine management activities pending budget and staffing capacity.

Monitoring Implementation Guide

The *Monitoring Implementation Guide* (monitoring guide) is a procedural document that is external to the Forest Plan and describes the Monitoring Program in its entirety. The monitoring guide provides more specific procedural guidance to implement the monitoring strategy outlined in the Forest Plan including monitoring resource elements or items, management and monitoring questions, monitoring drivers, measurement indicators, monitoring methodology, and reporting frequency. Management questions provide an overarching objective for the more detailed monitoring questions. The monitoring guide is intended to be a flexible document that can change as new methodologies and techniques are developed, or to be more responsive to changing needs and new information. This monitoring and evaluation report is based on the most recent version of the monitoring guide (*2025 Monitoring Guide*) which reflects modifications to monitoring questions completed in 2026.

Biennial Monitoring and Evaluation Reports

The 2012 planning rule requires the Forest Service to evaluate and report monitoring results biennially. The first GMNF biennial monitoring and evaluation report covering fiscal years 2017 and 2018 was completed in April 2022. Although important monitoring continued in fiscal year 2019 for most resource program areas, continued staffing turnover, budget constraints, and the covid 19 pandemic exacerbated inattention to the monitoring program in subsequent years. In 2023, Forest Service staff began to earnestly re-evaluate the monitoring program to address identified shortcomings in meeting monitoring obligations. Each question was considered for change to ensure they were meaningful, feasible, cost effective, and scientifically sound. This effort culminated in a modified monitoring program consisting of required and other monitoring questions completed in May 2026.

The final management and monitoring questions have been used retroactively starting in fiscal year 2019 as a basis for this monitoring and evaluation report. The *Green Mountain National Forest – Monitoring and Evaluation Report for Fiscal Years 2019 to 2024* documents the results of monitoring information covering fiscal years 2019 to 2024 (October 1, 2018, to September 30, 2024). Comparison of results with those from previous years can identify trends and highlight where management is or is not meeting Forest Plan direction.

Monitoring and Evaluation Report Outline

This report is divided into five chapters and multiple appendices:

- Chapter 1 is the introduction providing an overview of the monitoring program.
- Chapter 2 provides the evaluation and conclusions for the monitoring questions addressing the eight required monitoring elements (36 CFR 219.12(a)(5)).
- Chapter 3 provides the evaluation and conclusions for the other monitoring questions retained to help ascertain how well management activities are implementing the Forest Plan and validating the effectiveness of Forest Plan components.
- Chapter 4 is a list of the Forest Service staff that provided information for the report.

- Chapter 5 is literature cited to support evaluation for monitoring items.
- Appendices include detailed information to supplement evaluation of various resource monitoring items.

Each monitoring question is addressed in the following format:

- Monitoring Resource Category
- Monitoring Item
- Monitoring Question
- Detailed Monitoring Question
- Monitoring Measurement Indicator(s)
- Monitoring Driver
- Reporting Frequency
- Last Year Reported
- Next Year Scheduled for Reporting
- Background
- Monitoring Activities
- Evaluation and Conclusions
- Recommended Changes (Monitoring Question or Forest Plan Components)

2. Required Monitoring Questions

This chapter includes consideration of the monitoring questions addressing the eight monitoring resource elements required by 36 CFR 219.12(a)(5). Table 2-1 provides the monitoring questions selected to address these required elements. It identifies the required resource element, monitoring question, and measurement indicators that are discussed in this report.

Table 2-1. Required monitoring questions (from Forest Plan, Chapter 4, Table 4.1-2).

Required Element	Monitoring Question	Measurement Indicator(s)
1. Status of select watershed conditions.	To what extent are management activities maintaining or restoring watershed functions?	- Number of sub-watersheds in each watershed condition class - Number of essential projects completed in priority watersheds per year
2. Status of select ecological conditions including key characteristics of terrestrial and aquatic ecosystems.	To what extent are management activities and natural processes leading to increased structural diversity within forested stands and across forested landscapes, moving areas toward desired objectives identified under Goal 2 of the Forest Plan?	- Number of acres and proportion of each forest type in each age class - Number of acres and proportion of harvest acres treated with uneven-aged management - Number of acres treated explicitly to enhance early successional characteristics - Number of acres treated explicitly to enhance late successional characteristics - Number of acres treated with various methods to explicitly enhance health, longevity, and/or structural diversity of forested stands at the stand and landscape scales
	To what extent are management activities conserving or improving water quality?	- Miles of stream and acres of lake/ pond on National Forest System lands by Vermont water quality classification - Ambient Biomonitoring Network stream reach score for a representative subset of stream reaches across GMNF - Implementation and effectiveness monitoring for Best Management Practices
3. Status of focal species to assess the ecological conditions required under § 219.9.	Does the headwater streams ecosystem provide a full array of riparian and aquatic communities and stream channel types supported by the varied physiographic conditions across GMNF?	Number of wild brook trout (<i>Salvelinus fontinalis</i>) per stream mile
4. Status of a select set of the ecological conditions required under § 219.9 to contribute to the recovery of federally listed threatened and endangered species, conserve proposed and candidate species, and maintain a viable population of each species of conservation concern.	What are the population trends for sensitive plants (increasing, decreasing, or stable)? To what extent are management activities affecting conditions for sensitive plant populations?	Population trends for plants listed as Regional Forester Sensitive Species: - Number of ramets or genets - Percent reproductive - Spatial extent of population - Number of populations of a species - Ranked condition of populations

Required Element	Monitoring Question	Measurement Indicator(s)
5. Status of visitor use, visitor satisfaction, and progress toward meeting recreation objectives.	To what extent are management activities providing high quality recreation services that meet the expectations of the public?	- Percent Meets Expectations (PMEs) in National Visitor Use Monitoring (mean visitor satisfaction compared to mean importance). PME data reported for developed facilities, access, services, and feeling of safety in developed sites, undeveloped areas, and designated wilderness. - Trend in number of visitors, visitor satisfaction and changes in visitor participation by activity over 5-year NVUM reporting periods.
6. Measurable changes on the plan area related to climate change and other stressors that may be affecting the plan area.	To what extent are insects and disease organisms impacting forest conditions?	Insect or disease infestations: - Number of outbreaks by species - Acres affected by species Trends in outbreak persistence, spread, and associated tree mortality
	Within site plots how are soil/site quality and productivity changing over the long term in response to factors such as acid deposition, climate change, invasive species, and other environmental problems? How are management activities potentially mitigating or exacerbating changes in soils? More specifically: Are soil nutrient levels changing, and are the changes affecting soil/site productivity? What toxins exist in the soil (such as from the atmosphere), and how are they changing in quantity and type over time? Is this affecting productivity?	Within site plots established in wilderness areas measure changes over time for: - Soil quality - Soil nutrient levels, soil organic matter, total soil carbon, and toxins by major horizon - Soil productivity - Forest health - Soil climate - Soil temperature and moisture, depth of freezing, correlated with selected meteorological parameters
7. Progress toward meeting the desired conditions and objectives in the plan, including for providing multiple use opportunities.	How do actual resource and service accomplishments compare to those projected in the Forest Plan Appendix D, Proposed and Probable Practices?	Actual annual resource and service accomplishments for management activities listed in the Forest Plan, Appendix D, Table D-5.
8. The effects of each management system to determine that they do not substantially and permanently impair the productivity of the land (16 U.S.C. 1604(g)(3)(C)).	To what extent are management activities impacting soil quality and productivity?	Within the Forest Service Soil Disturbance Monitoring Protocol sampling and monitoring areas including select areas where timber harvest, prescribed fire, and other management activities have been implemented: - Amount of forest floor impacted - Amount of topsoil displacement - Severity of rutted, burned or compacted soil - Severity of platy/massive soil structures, or puddled soil

Monitoring Element 1: Water

Monitoring Item: Watershed Function

Management Question

What is the status of select watershed conditions?

Detailed Monitoring Question

To what extent are management activities maintaining or restoring watershed functions?

Measurement Indicators

1. Number of sub-watersheds in each watershed condition class
2. Number of essential projects completed in priority watersheds per year

Monitor Driver

Forest Plan Goal 4 and associated Objectives

Reporting Frequency

Annually

Last Year Reported

Not applicable; new question starting fiscal year 2019

Next Year Scheduled for Reporting

Fiscal years 2025 and 2026 biennial monitoring and evaluation report

Background

This monitoring question was newly developed to monitor watershed functions starting in fiscal year 2019 to address required Element 1 from the 2012 planning rule (36 CFR 219.12(5)(i)): *The status of select watershed conditions*. This monitoring question helps determine if management activities are meeting the intent of Forest Plan Goal 4 to “*maintain or restore aquatic, fisheries, riparian, vernal pool, and wetland habitats*” (Forest Plan, p. 13).

The U.S. Forest Service Watershed Condition Framework was developed to protect water quality on National Forest System (NFS) lands. This framework includes six steps, the first of which is classifying watershed conditions. A watershed condition classification protocol was developed to serve as a high-level, semi-quantitative tool to assess the function of watersheds as a reflection of 23 attributes representing 12 different indicators that fall into one of four process categories: 1) aquatic physical processes, 2) aquatic biological processes, 3) terrestrial physical processes, and 4) terrestrial biological processes. A detailed technical guide is available for the assessment of the Watershed Condition Classification process (USDA Forest Service 2011). For each sub-watershed, each of the 23 attributes is assessed to determine if the attribute is functioning, functioning-at-risk, or non-functioning and given an associated numerical score of 1, 2, or 3, respectively. The assessment protocol includes a weighting system for the attributes and indicators, ultimately indicating a condition score between 1 and 3 and descriptive assessment of functioning, functioning-at-risk, or non-functioning for the sub-watershed as a whole.

Project-level, long-term, and opportunistic monitoring and assessment along with professional judgement are used to adjust attribute assessments and, therefore, watershed condition classifications over time. As a

part of the Watershed Condition Framework, Forest Service staff further identify priority watersheds in which a focused effort can be made to improve the condition of a watershed through the implementation of various management actions, called essential projects. These essential projects are documented in a Watershed Restoration Action Plan (WRAP). Tracking the completion of essential projects and the condition of sub-watersheds across GMNF can help inform whether management activities are meeting Forest Plan Goal 4 and inform the status of select watershed conditions. An interactive map of sub-watersheds across all NFS lands along with their classification, priority designations, and any associated WRAPs is available on the USDA Forest Service website at [Watershed Condition Framework Map Viewer](#).

Monitoring Activities

Forest Service staff maintain a list of 42 sub-watersheds and their functional condition using the U.S. Forest Service Watershed Condition Assessment protocol (Table 2-2). This list comprises all the sub-watersheds in which at least five percent of the land area is made up of NFS lands. When new information is collected that indicates a shift in watershed condition, that change is updated in the Watershed Condition Assessment Tracking Tool (WCATT), an internal database that provides the background data for the interactive map (linked above). WCATT can be queried to identify if and when adjustments were made to each sub-watershed attributes or overall condition classification.

Table 2-2. Status of sub-watershed conditions on GMNF from fiscal year 2019 to 2024.

Year	Number of Functional Sub-Watersheds	Number of Functional, At-Risk Sub-Watersheds	Number of Nonfunctional Sub-Watersheds
2019	35	7	0
2020	35	7	0
2021	36	6	0
2022	36	6	0
2023	36	6	0
2024	36	6	0

Prior efforts to assess all 42 sub-watershed assessed for GMNF have made a blanket assumption that the fire regime condition class is departed from what would be expected without past human interventions. This is one attribute that causes all GMNF sub-watershed scores to skew away from fully functional. In 2021, Forest Service staff completed a forest-wide review of watershed classifications for these sub-watersheds. The updated information and professional judgement used for this reassessment resulted in numerous watersheds showing minor improvements, but only one showing improvement to a different functional class. Only six sub-watersheds were ultimately classified as “at-risk”. This means that while the watershed is in a functional condition overall, there are sufficient attributes in a less than desirable condition that the sub-watershed is considered to have decreased resistance or resilience to additional stressors, leaving it “at-risk” to degrade further without careful land management.

The six at-risk watersheds include:

1. Headwaters Mad River (Middlebury and Rochester Ranger Districts)
2. Neshobe River (Middlebury and Rochester Ranger Districts)
3. Broadneck Brook-White River (Middlebury and Rochester Ranger Districts)
4. Cold River on the Rochester-Middlebury District (Middlebury and Rochester Ranger Districts)
5. Flood Brook-West River (Manchester Ranger District)
6. Winhall River (Manchester Ranger District)

All these sub-watershed classifications are further reduced by a poor rating for large woody debris (i.e., not enough wood in the streams) and/ or aquatic habitat fragmentation.

In reviewing these data for this report, it was discovered that the Headwater Mad River sub-watershed was identified in 2011, during the initial classification effort, as having a “water quality” attribute rating as “good”. However, this attribute was entered into WCATT as “poor”. The original mistake may have stemmed from the presence of a “Mad River” sub-watershed with a water quality rating of “poor” in a spreadsheet assessing water quality for numerous sub-watersheds across the country. However, the “Mad River” sub-watershed is distinct from the “Headwaters Mad River” sub-watershed, the former being located on another National Forest altogether. This original rating was made based on the inclusion of impaired waters within the assessed sub-watershed. This monitoring effort confirmed that no waterbodies listed as impaired by the state of Vermont occur within the Headwaters Mad River sub-watershed. This rating was carried over during a re-evaluation in 2021. Correcting this attribute, brings the watershed classification rating to “functional”.

Flood Brook-West River and Winhall River both have water quality concerns identified in their scores. In the case of the Flood Brook-West River sub-watershed, a portion of the West River downstream of NFS lands is listed as impaired and driving the score. In the case of the Winhall River sub-watershed, there are two ponds, Little Pond and Stratton Pond, that are listed as impaired and driving the watershed score. The water quality concerns at these ponds, however, is caused by atmospheric deposition rather than any adjacent land use concerns.

From the 42 sub-watersheds previously discussed, Forest Service staff may identify a small number of “priority” sub-watersheds. Watershed restoration action plans (WRAP) are then developed for these priority sub-watersheds that include various restoration activities (i.e., essential projects) intended to address indicators identified as less than fully functional by the watershed assessment and classification. When all essential projects in a WRAP are completed, a sub-watershed’s condition class is generally assumed to improve by at least one category if it isn’t already identified as functional. In 2023, the Headwaters White River (HWR) sub-watershed WRAP was formally closed out since all the essential projects had previously been completed. The HWR functional score improved from 1.6 to 1.0. and HWR was removed as priority watershed. In 2024, the Middlebury River and Broadneck Brook-White River sub-watersheds were identified as priority watersheds and Forest Service staff began developing a WRAP for each.

Forest Service staff report annually on essential projects completed in priority watersheds as identified in WRAPs. These data are maintained in the Forest Service Watershed Improvement Tracking database (WIT). There were no essential projects reported as completed in priority watersheds from fiscal years 2019 to 2024.

Evaluation and Conclusions

Monitoring indicates that watershed conditions are improving, even if slowly. Completion of essential projects identified in the Headwaters White River WRAP by 2019 allowed Forest Service staff to formally close the WRAP and record an improved condition for that watershed; however, this administrative closeout “step” did not occur until 2023. Forest Service staff continue to utilize the Watershed Condition Framework to identify priority watersheds and associated essential projects; however, implementation has slowed. This is likely due to funding and staffing limitations. No watersheds are known to have experienced a degradation of their functional status. Forest Plan Standards and Guidelines, and project-level design features and mitigation measures appear to be effective in maintaining watershed functions. Proactive restoration projects (as documented in WRAPs) have come to a standstill during this monitoring period and thus are not having an impact on watershed functions in

priority watersheds. Forest Service staff should continue to seek opportunities to develop WRAPs and implement essential projects. When possible, use newer or improved watershed condition information to adjust watershed condition classifications.

Recommended Changes (Monitoring Question or Forest Plan Components)

None.

Monitoring Element 2: Vegetation

Monitoring Item: Forest Structure

Management Question

What is the status of select ecological conditions including key characteristics of terrestrial and aquatic ecosystems?

Detailed Monitoring Question

To what extent are management actions and natural processes leading to increased structural diversity within forested stands and across forested landscapes, moving areas toward desired objectives identified under Goal 2 of the Forest Plan?

Measurement Indicators

1. Number of acres and proportion of each forest type in each age class
2. Number of acres and proportion of harvest acres treated with uneven-aged management
3. Number of acres treated explicitly to enhance early successional characteristics
4. Number of acres treated explicitly to enhance late successional characteristics
5. Number of acres treated with various methods to explicitly enhance the health, longevity, and/or structural diversity of forested stands at the stand and landscape scales

Monitoring Driver

Forest Plan Goal 2 and associated Objectives

Reporting Frequency

Every 5 years (this report covers fiscal years 2019 to 2023)

Last Year Reported

Fiscal years 2017 and 2018 biennial monitoring and evaluation report covered the 2014 to 2018 monitoring period

Next Year Scheduled for Reporting

Fiscal year 2028 (anticipated to cover fiscal years 2024 to 2028)

Background

This monitoring question addresses required Element 2 from the 2012 planning rule (36 CFR 219.12(5)(ii)): *The status of select ecological conditions including key characteristics of terrestrial and aquatic ecosystems*. Forest structure is a key ecosystem characteristic that is important for restoring and maintaining the abundance and distribution of native species. The intent of this monitoring question is to help determine if management activities are meeting Forest Plan Goal 2 to “*maintain and restore quality, amount, and distribution of habitats to produce viable and sustainable populations of native and*

desirable non-native plants and animals” (Forest Plan, p. 10). Age class objectives associated with even-age systems are identified in Tables 2.2-2 and 2.2-3 (Forest Plan, pp. 11 to 12), while the objective for managed uneven-age forest structure is a minimum of 20 percent of lands suitable for timber management (Forest Plan, p. 12).

Monitoring Activities

Timber harvesting activities and other silvicultural treatments are tracked using the Forest Service Activity Tracking System (FACTS). The FACTS manages information about activities related to fire/fuels, silviculture, Trust Funds, and invasive species used by all levels of the Forest Service. Field Sample Vegetation data is also tracked in the FSveg system, which is updated to reflect treatments once completed. These systems can provide reports summarizing the number of acres and proportion of harvest acres treated with uneven-aged management (selection, groups, and irregular shelterwood); the number of acres treated explicitly to enhance early successional characteristics (clearcutting, patch cutting, and shelterwood); then number of acres treated explicitly to enhance late successional characteristics; and the number of acres treated with various methods (thinning and improvement) to explicitly enhance the health, longevity, and/or structural diversity of forested stands at the stand and landscape scales.

This data can be used to monitor the progress made toward desired age class and structure objectives. There is some level of error associated with this data entry and consistency of activity classification; however, the data is sufficient for tracking overall trends.

Evaluation and Conclusions

Proposed and Probable Practices Table D-4 (Forest Plan, Appendix D) lists the acreage of silvicultural practices estimated for implementation to work toward the vegetative and other multiple-use desired conditions and objectives of the Forest Plan. Table D-4 shows timber harvest would occur on 40,550 acres and 48,798 acres during the first decade (2006 to 2015), and second decade (2016 to 2025) of Forest Plan implementation, respectively for a total of 89,348 acres. Table 2-3 provides a summary of actual harvest treatments implemented during fiscal years 2019 to 2023. It also provides total acres treated for fiscal years 2006 to 2023 and compares them by percentage to estimated amounts. Total harvest treatment acres by treatment type helps gauge how well management practices have contributed toward creating structural diversity across the forest landscape.

Table 2-3. Acres harvested by treatment type from fiscal years 2006 to 2023 to create structural diversity across the forest landscape.

Commercial Harvest Treatments	Decades 1 and 2 estimates ¹	Acres treated 2006-2018	Acres treated 2019-2023 ¹	Total acres treated 2006-2023 ²	Percent of estimates
Even-aged Regeneration Harvest (creates regenerating age classes)	34,264	1,183	421	1,604	4.7
Even-aged Intermediate Harvest (improves forest health and longevity)	33,893	1,874	1,232	3,106	9.2
Uneven-aged management (creates structural diversity within forested stands)	21,191	3,020	562	3,582	16.9
All treatments	89,348	6,077	2,215	8,292	9.3

Source: Forest Service data

¹ Estimated management practices for Decades 1 (2006-2015) and Decade 2 (2016-2025) from Forest Plan, Appendix D, Table D-4.

² Acres from Forest Service Activity Tracking System (FACTS)

³ 237,985 acres represent federal lands suitable for timber harvesting that have suitability data; 2,380 represents one percent of these lands.

From 2006 to 2023, timber harvest occurred on approximately 8,292 acres or about 9.3 percent of estimated harvest levels. For the timber harvest that has been implemented, even-aged regeneration harvest has a much smaller proportion of harvest than estimated compared to other treatments. The total harvest treatments since 2006 is approximately 3.5 percent of the total suitable lands on GMNF. Between 2006 and 2013, an average of 501 acres were treated annually. This level of management increased slightly between 2014 and 2018 to 513 acres per year and then decreased to 443 acres per year between 2019 to 2023. At this level, the effects of management on overall age class distributions are minimal, with natural processes, succession, and the aging of forests having a much greater effect. Some natural disturbance has taken place on the landscape, however no large scale, stand replacing disturbance has been documented. Most natural disturbance has been small-scale, creating gaps and contributing to more diverse forest structure at the stand level as forests age.

Table 2-4 shows the comparison of the existing age class distribution as of 2013 across all federal lands and lands suitable for timber management with the existing condition in 2006 documented in the Forest Plan Final Environmental Impact Statement (Final EIS) and Forest Plan age class objectives. Acres displayed in this table provide a baseline for age class distribution trends since 2013.

The percentage of forestland in the regenerating age class (0 to 9 years) is well below Forest Plan objectives across all habitat types for suitable lands, and minimal progress has been made toward these objectives. Forest Plan objectives range from 5 to 20 percent across habitat types. In 2006, less than 1 percent of suitable forestland was in the regenerating age class. All that area has now aged into the young age class. Since 2006, less than 1 percent of suitable lands has been harvested using even-age regeneration methods. Management implemented since 2006 has allowed the area in the regenerating forest habitat type to remain somewhat stable on suitable lands but is not increasing it or moving it toward target levels.

The percentage of forestland in the young forest habitat type is also well below Forest Plan objectives across all habitat types for suitable lands and has been steadily decreasing as forests age. The level of harvesting on GMNF has not been sufficient to move toward Forest Plan objectives or to maintain 2006 levels. Forest Plan objectives for young forest in suitable lands range from 15 to 55 percent across habitat types. The young forest habitat type objective for northern hardwood (10 to 59 years), which is the most common habitat type on GMNF, is 30 to 50 percent. In 2006, approximately 11 percent of suitable forestland was in the young age class and decreased to 8 percent by 2013. That proportion of young forest habitat is now approximately 5 to 6 percent and continues to decrease.

The percentage of suitable forestland in the old age classes is also departing from Forest Plan objective levels across all habitat types. The area represented by this age class is increasing as mature forests age into old forests, and management has been insufficient to alter this trend. There has been a corresponding decrease in the percentage of mature forest, since there is not enough young forest aging to compensate. Forest Plan objectives range from 3 to 40 percent for old forest across habitat types. The old forest habitat type objective for northern hardwood (120+ years) is 5 to 30 percent. In 2006, approximately 18 percent of suitable forestland was in the old age class, and by 2013 this increased to 30 percent. That trend has continued, and the percentage of old forest is now exceeding the high end of the objective range specified in the Forest Plan. Overall, the area occupied by old forest has roughly doubled since 2006.

Table 2-4. Comparison of existing age class distribution in 2013 across all federal lands and lands suitable for timber management with the existing condition documented in the Forest Plan FEIS and Forest Plan age class objectives.

Habitat Type	Age Class (years)		2013 Existing Condition (all NFS lands) ¹		2013 Existing Condition (suitable) ²		2006 Existing Condition ³		Forest Plan Objectives ⁴
	yrs	class	ac	%	ac	%	ac	%	%
Northern Hardwood	0-9	Regen.	0	0	0	0	1,192	<1	5-10
	10-59	Young	26,880	9	21,237	11	34,786	12	30-50
	60-119	Mature	197,703	67	137,193	73	217,755	76	35-50
	120+	Old	69,641	24	29,439	16	34,144	12	5-30
Mixedwood	0-9	Regen.	12	<1	12	<1	336	1	5-15
	10-39	Young	1,802	4	1,628	6	2,303	6	15-40
	40-99	Mature	21,140	50	14,520	53	24,389	63	35-55
	100+	Old	19,670	46	11,331	41	11,463	30	5-40
Softwood	0-9	Regen.	49	<1	49	1	83	<1	5-15
	10-39	Young	1,113	5	1,039	11	1,862	8	15-40
	40-99	Mature	11,971	51	5,385	57	14,864	60	35-55
	100+	Old	10,473	44	2,843	31	7,933	32	5-40
Aspen	0-9	Regen.	18	2	18	3	89	1	10-20
	10-39	Young	392	51	354	67	NA	NA	45-55
	40-59	Mature	35	5	15	3	NA	NA	25-35
	60+	Old	318	42	141	27	NA	NA	3-5
Birch	0-9	Regen.	0	0	0	0	0	0	5-15
	10-49	Young	377	3	260	13	1,120	10	45-55
	50-79	Mature	2,368	17	669	34	1,949	17	30-40
	80+	Old	11,000	80	1,060	53	8,218	72	3-5
Oak	0-9	Regen.	0	0	0	0	37	1	5-15
	10-59	Young	173	4	173	5	265	7	45-55
	60-99	Mature	1,603	35	1,353	41	1,453	41	30-40
	100+	Old	2,820	61	1,780	54	1,794	51	5-10
All Types		Regen.	79	<1	79	<1	1,737	<1	
		Young	30,736	8	24,691	11	40,336	11	
		Mature	234,821	62	159,134	69	260,410	71	
		Old	113,922	30	46,594	20	63,552	18	

¹ These acres do not include the 464 acres of regenerating age class harvested between 2007 and 2013 that have not been entered into Forest Service databases to date.

² Applies only to federal lands suitable for timber management.

³ Documented in Table 3.5-7, p. 3-67 of the Forest Plan Final EIS; aspen and birch are combined in this table; new regeneration harvests in this period focused on aspen; it is impossible to attribute acres in other age classes to each type so all are assigned to birch.

⁴ Forest Plan, Table 2.2-2, p. 11.

In addition to age class objectives by habitat type, the Forest Plan includes objectives for the proportion of suitable lands managed using uneven-aged silvicultural methods. These include single tree selection,

group selection and irregular shelterwood methods. Forest Plan objectives include the use of uneven-aged harvesting on a minimum of 20 percent of lands suitable for timber management to create multi-age conditions. Since 2006, approximately 43 percent of timber harvest treatments have used uneven-aged methods. Uneven-aged harvests increase structural diversity, increase habitat diversity, and enhance late successional characteristics within stands.

Management trends are generally moving GMNF toward older and more uneven-age forest structure. Increased structural diversity in uneven-aged stands and the development of old forest can be beneficial for habitat diversity. The aging of forests and treatments that enhance late successional characteristics create forest habitats with large trees, abundant dead and downed wood, and canopy gaps. The complex structure of these forests results in diverse habitats, many of which are not present in younger forests. However, both young and old forest conditions are needed to maintain an ecologically functional landscape. Even-aged regeneration harvest is not being implemented at the rate needed to reverse a declining trend in regenerating and young forest and to reach a level that supports native species that require young forest. The use of even aged regeneration methods has been decreasing at the landscape scale. Without the establishment of larger patches of early successional habitat over the next 50 or more years, a whole suite of early successional species strongly associated with this habitat will continue to decline.

Management trends also have potential consequences for forest health and resilience to climate change. Relatively homogenous, even-aged stands resulting from agricultural abandonment in the early 1900s make up a large proportion of the Forest. The maturing of these even-aged stands and the lack of diversity present in these forests are risk factors for forest health. Increasing stressors include native and non-native insects and diseases, invasive plants, invasive earthworms, pollution and atmospheric deposition. These stresses are compounded by climate change. These risks can be mitigated by increasing structural diversity and sustaining productivity and growth at the stand and landscape level.

The level of timber harvesting on GMNF since 2006 has not been sufficient to move age class distributions toward Forest Plan objectives, or even to prevent further departure from these objectives. Forest Service staff should consider opportunities to increase the number of acres treated using all silvicultural methods to move age class distributions toward Forest Plan objectives, or at least to slow the departure. Proposed treatments should seek to increase habitat diversity and increase resilience to increasing stressors, using the best available science. Even-aged regeneration harvest should be emphasized to slow the decline of regenerating and young forest habitat, and the decrease of overall habitat diversity on the landscape. Where even-aged regeneration is not used in mature and old forest classes, intermediate treatments should be emphasized to increase resilience, growth and productivity while reducing forest health risks.

Recommended Changes (Monitoring Question or Forest Plan Components)

None.

Monitoring Element 2: Water

Monitoring Item: Water Quality

Management Question

What is the status of select ecological conditions including key characteristics of terrestrial and aquatic ecosystems?

Detailed Monitoring Question

To what extent are management activities conserving or improving water quality?

Measurement Indicators

1. Miles of stream and acres of lake/pond on National Forest System (NFS) lands by Vermont water quality classification
2. Ambient Biomonitoring Network (ABN) stream reach score for a representative subset of stream reaches across GMNF
3. Implementation and effectiveness monitoring for Best Management Practices (BMPs)

Monitoring Driver

- Forest Plan Goal 2 and associated Fisheries Objectives; and Forest Plan Goal 4 and associated Objectives
- Forest-wide Management Direction, Section 2.3.2 Soil, Water, and Riparian Area Protection and Restoration Standards and Guidelines
- Forest-wide Management Direction, Section 2.3.18 Transportation Analysis, Road Design and Construction Standards S-3 and S-6

Reporting Frequency

Biennially for measurement indicators 1 and 3; Annually for management indicator 2 (revised from all indicators annually starting fiscal year 2019)

Last Year Reported

Not applicable; new question starting fiscal year 2019

Next Year Scheduled for Reporting

Fiscal years 2025 and 2026 biennial monitoring and evaluation report

Background

This monitoring question addresses required Element 2 from the 2012 planning rule (36 CFR 219.12(5)(ii)): *The status of select ecological conditions including key characteristics of terrestrial and aquatic ecosystems*. The intent of this monitoring question is to help determine if management activities are meeting Forest Plan Goal 2 to “*maintain and restore quality, amount, and distribution of habitats to produce viable and sustainable populations of native and desirable non-native plants and animals*”, and Goal 4 to “*maintain or restore aquatic, fisheries, riparian, and wetland habitats*” and associated Objectives (Forest Plan, pp. 10 to 13).

There are some water quality influences for which the Forest Service does not have control, such as atmospheric deposition of pollutants, and altered air temperature and stream flow levels related to climate change. There are other influences for which the Forest Service does have control within NFS land boundaries, namely land cover and land uses. Water quality monitoring can be the leading indicator for processes, activities, or discrete disturbances that result in the addition of pollutants to waterbodies.

Monitoring Activities

The state of Vermont, pursuant to Clean Water Act and Environmental Protection Agency (EPA) requirements, defines water quality criteria for waterbodies within Vermont, monitors whether water bodies are meeting these criteria, and reports biennially on these results (Table 2-5). Their reporting provide high quality, consistent data which provide a snapshot of water quality on NFS lands overall.

These reports are assessed by the Forest Hydrologist for waterbodies on NFS lands that are not meeting water quality criteria to help determine whether Forest Service management actions or approved activities are leading to the failure to meet those criteria.

The Vermont Agency of Natural Resources - Department of Environmental Conservation (VT DEC) provides the following definitions and clarifications to consider when monitoring water quality (details found on the VT DEC website at: <https://dec.vermont.gov/watershed/protecting>:

- A surface water is classified for each designated use in the Vermont Water Quality Standards.
- The water classification determines the management objectives and the minimum water quality criteria.
- There are four classes of water including A(1), B(1), B(2), and A(2).
- Class A(1) and Class B(1) have higher minimum water quality criteria relative to Class B(2).
- The state legislature established that all waters above 2,500 are Class A(1), unless they are a public water source, in which case they are Class A(2).
- All other waters are Class B(2) unless they have been explicitly reclassified.
- To date, only a small portion of Vermont's waters have been reclassified, though many are eligible for reclassification as they meet the minimum water quality criteria for a higher class.

In addition to designated uses and the minimum water quality criteria necessary to protect and maintain them, the Vermont Water Quality Standards include the Antidegradation Policy. Antidegradation limits incremental lowering of water quality, above the minimum water quality criteria, in lakes, rivers, and wetlands when applied during the applicable permitting process for new and increased discharges. When a waterbody fails to meet the identified water quality minimums, it is identified as "impaired" per section 303(d) of the Clean Water Act and the state is then responsible for developing a remediation plan, called a Total Maximum Daily Load or TMDL, to bring the waterbody back into alignment with the water quality classification.

Table 2-5. State reporting results for GMNF streams, rivers, lakes and ponds for 2018, 2020, 2022, and 2024.

Streams and Rivers		
<i>Water Quality Classification</i>	<i>Total Miles on NFS Lands</i>	<i>Impaired (303(d)) Miles on NFS Lands</i>
A(1)	285.4	5.6
A(2)	101.0	0.0
Mixed ¹	603.4	6.1
B(2)	638.2	1.5
Total	1,628.0	13.2
Lakes and Ponds		
<i>Water Quality Classification</i>	<i>Total Acres on NFS Lands</i>	<i>Impaired (303(d)) Acres on NFS Lands</i>
A(1)	290.8	1.3
A(2)	45.9	0.0
Mixed ¹	532.9	0.0
B(2)	1,587.9	0.0
Total	2,457.6	1.3

¹ Some Vermont waterbodies have a different water quality classification or standard for different beneficial uses. All of the areas with a mixed classification on NFS lands have an A(1) classification for aquatic biota and habitat and a B(2) classification for public water source uses.

Each year, VT DEC staff conduct water quality and aquatic habitat monitoring on representative stream segments or stream segments of specific management interest (such as segments downstream and representative of potential impacts from timber harvest activities). Table 2-6 provides ABN monitoring

results during this monitoring period. Results of this monitoring prove a more site-specific indicator of water quality issues that may arise from short- and long-term influences. The Forest Service provided funding and staff time to support monitoring at sites on NFS lands during the years included in this report. The Forest Hydrologist reviews data reported by VT DEC to assess what water quality concerns were found and whether or how they are related to land management actions or allowable land uses on NFS lands.

Table 2-6. ABN stream reach score for GMNF stream reaches for 2019 to 2024.

Site Name	2019	2020	2021	2022	2023	2024
Ball Mountain Bk. 3.1	E/ G					
Bear Creek Bk. 0.7	VG/ NA					
Bickford Hollow Bk. 0.1				E/ UtA		
Bingo Bk. 1.8	VG/ NA	E-VG/ NA	E/ UtA	E/ NA	E-VG/ VG	E-VG/ G
Blue Bank Bk. 1.7	E/E					
Bolles Brook 1.6	VG/ NA					
Broad Bk. 2.4				VG/E		
Bully Bk. 2.3		G/ UtA				
Deer Hollow Bk. 0.9	E/ NA					
Hancock Branch 3.9	VG/ G	VG/ NA				VG/G
Little White Cr. 11.9					G/ UtA	F/ NA
Mad Tom Bk. 1.2			VG-E/ G			
Reservoir Bk. 0.4			VG/ UtA			
Roaring Bk. 2.4					VG/ UtA	
Robbins Branch 1.4	VG/ NA	VG/ E				
Smith Bk. 1.3	E-VG/ NA				F-G/ E	E/VG-G
Wing Brook 0.2			E/ VG	VG/ VG		
Winhall River 8.1	E/ VG				E-VG/ VG	

Abbreviations: E-Exceptional, VG-Very Good, G-Good, F-Fair, NA-Not Assessed, UtA-Unable to Assess

To help protect water quality, Forest Service staff use Best Management Practices for Water Quality Management (USDA Forest Service 2012a) in all projects. They also have developed a standardized monitoring protocol to track the degree to which these Best Management Practices (BMPs) are implemented as well as how effective they are in preventing degradation to water quality. Forest Service staff conduct BMP monitoring on a handful of randomly selected, representative, or targeted projects each year. The results provide a snapshot of how well water quality is protected during project implementation from potential degradation by land management activities and allowable land uses (Table 2-7).

Table 2-7. Monitoring of BMPs efficacy for the fiscal years 2019 to 2024 reporting period.

Composite Rating (Number of Sites)							
Fiscal Year	Excellent	Good	Fair	Poor	Undetermined	No Plan	Missing Data
2019-2020	1			1			2
2021-2022	2				3		
2023-2024	1						

Evaluation and Conclusions

Forest Plan Standards and Guidelines, and project-level design features and mitigation measures appear to be effective in conserving or improving water quality in GMNF surface waters according to their respective VT DEC water quality classifications. Where waters are listed as impaired on NFS lands, the root cause is atmospheric deposition of acidifying pollutants. While this is outside of the control of the Forest Service, these waterbodies are still managed to promote a high level of functionality to support

water quality. Ambient biomonitoring data demonstrates a bit more variation in water quality over time as represented by biotic factors; however, the overall condition of waters on GMNF is good or better according to the qualitative score nomenclature used by VT DEC.

Monitoring results also indicate reductions in ABN stream reach score were often a result of scouring events from thunderstorms events that temporarily reduced aquatic invertebrate diversity and these impacts were regional, not specific to NFS lands. The BMP monitoring results indicate projects are generally managed successfully to conserve water quality, though there is opportunity for improvements. The apparent contradiction between a few sites receiving a low score during BMP monitoring and the broad indication of good water quality by state data can likely be explained by the site-specific, high degree of scrutiny included in the Forest Service BMP monitoring protocol. Small disturbances can be accounted for and influence the BMP composite rating at the site level, but those impacts do not necessarily translate to widespread impacts on downstream water quality.

Forest Service staff should continue to use BMP monitoring to refine the design and implementation of project specific design features and mitigation measures to protect water quality. Better composite ratings across all project types ensure GMNF is not contributing to degradation of on-Forest or downstream surface and groundwater. Forest Service staff should continue to collaborate with the state on monitoring efforts and support reassessments of water quality classifications to higher standards.

Recommended Changes (Monitoring Question or Forest Plan Components)

None.

Monitoring Element 3: Aquatic Ecosystems

Monitoring Item: Focal Species (Brook Trout)

Management Question

What is the status of focal species to assess the ecological conditions required under 36 CFR 219.9?

Detailed Monitoring Question

Does the headwater streams ecosystem provide a full array of riparian and aquatic communities and stream channel types supported by the varied physiographic conditions across GMNF?

Measurement Indicators

Number of wild brook trout (*Salvelinus fontinalis*) per stream mile

Monitoring Driver

Forest Plan Goals 2 and 4, and associated Objectives

Reporting Frequency

Annually

Last Year Reported

Fiscal years 2017 and 2018 biennial monitoring and evaluation report

Next Year Scheduled for Reporting

Fiscal years 2025 and 2026 biennial monitoring and evaluation report

Background

This monitoring question addresses required Element 3 from the 2012 planning rule (36 CFR 219.12(5)(iii)): *The status of focal species to assess the ecological conditions required under 36 CFR 219.9.* For context, 36 CFR 219.9 is a reference to the planning rule section on ecological conditions to provide for a diversity of plant and animal communities. Focal species are defined as a small subset of species whose status permits inference to the integrity of the larger ecological system to which it belongs and provides meaningful information regarding the effectiveness of the plan in maintaining or restoring the ecological conditions to maintain the diversity of plant and animal communities in the plan area (36 CFR 219.19). Focal species are selected based on their functional role in ecosystems.

The intent of this monitoring question is to use brook trout (*Salvelinus fontinalis*) as a surrogate for aquatic system health. The GMNF contains headwater streams that sustain many aquatic cold water adapted species. The headwater streams ecosystem was identified as a priority for monitoring because high-quality surface waters fill an essential niche in overall ecosystem health and provide important habitat for a richly biodiverse community of aquatic dependent species. The desired conditions for this ecosystem emphasize the extent to which water quality, riparian area conditions, and watershed health will be maintained and/or restored. Maintenance of water quality and riparian area conditions is an important part of restoring, protecting, maintaining, and enhancing biological and ecological diversity.

Brook trout are a species that are well adapted to this area and are sensitive to many of the contributing injuries to aquatic habitat over the last 200 years. They require temperatures that do not exceed 65° F for any extended period, prefer a relatively neutral pH (6.5 to 8.0), and streams/rivers with spawning habitat and structure. These preferences are directly affected by changes to the condition of these headwater streams. In an ideal circumstance, an increase in the number of brook trout per mile would be positively correlated to improvements to habitat. This is rarely the case, and the interpretation of limited population estimates are difficult.

Monitoring Activities

Forest Service staff have been collecting trout population data from GMNF streams for more than three decades. Historically, a larger subset of streams was sampled with attempts at replicates within streams for stronger statistical power; much of this was to account for large scale salmon stocking programs that ended around 2011. The sampled reaches were likely representative of stream condition across GMNF. Table 2-8 provides brook trout monitoring results for fiscal years 2019 to 2024. Annually, electrofishing is used to estimate a “trout per mile” statistic. These samples are collected using a three-pass depletion estimate model. Sampling events generally occur in late summer (August and September). The number of sites has decreased substantially since this data collection began due to decreased staffing and the high degree of variance seen in this data over time. Forest Service staff have also helped the VT DEC staff collect samples to support the ambient biomonitoring network (see Element 2 water quality monitoring item).

Table 2-8. Brook trout per mile stream for fiscal years 2019 to 2024.

Fiscal Year	# of Sites	Brook Trout per Mile ¹	Standard deviation	Coefficient of Variation (%)
2019	10	488	308.3	6,318
2020	6	873	1,359.5	15,573
2021	8	648	619.6	9,562
2022	3	2,069	1,455.1	7,033
2023	4	1,223	1,038.7	8,493
2024	1	976	0.0	0
Average		1,046		

¹ Calculated statistic (not actual measurements)

Evaluation and Conclusions

On average, the headwaters ecosystem containing instream and riparian habitats provides a full array of conditions to support brook trout on GMNF. However, it has been determined measuring “brook trout per mile” is not an effective measure to expand to habitat condition. GMNF surface waters have been affected by many of the historic disturbances that affect the Northeast’s aquatic communities. Past efforts to create statistical and sampling design that adequately reflect the condition of the fishery, such as trout per mile, are not robust or meaningful. The variance of these systems masks any underlying signals that could be attributed to land management activities or trends in the health of the ecosystem. These types of statistics with this high degree of variance require large amounts of sample replicates to produce an effect size that reflects actual conditions. The effect size is the measurable biologically change which is detectable.

The trout per mile measurement indicator should no longer be considered adequate to represent the condition of headwater stream ecosystems. This does not suggest Forest Service management activities have negatively impacted aquatic ecosystems. Monitoring has consistently shown that Forest Plan components have generally resulted in good stewardship of aquatic resources. However, increased pressure from pre-existing and new environmental stressors continue to degrade aquatic ecosystems in this region. These stressors add more variance to an already disturbed system for which the existing sample design simply does not work. Additionally, the monitoring question does not encompass the entirety of headwater streams, riparian/ aquatic communities and stream channel across GMNF because it is narrowly focused on one species.

Recommended Changes (Monitoring Question or Forest Plan Components)

Monitoring brook trout as the focal species to assess the ecological conditions required under 36 CFR 219.9 should be discontinued. Efforts should be made to select a replacement focal species (terrestrial or aquatic) to be monitored starting in fiscal year 2025. The new monitoring question should measure change across the ecosystem represented by the selected focal species using measurable variables that display less variance than was experienced with brook trout.

Monitoring Element 4: Rare Plants Population

Monitoring Item: Sensitive Plant Population Trends

Management Question

What is the status of a select set of the ecological conditions required under 36 CFR 219.9 to contribute to the recovery of federally listed threatened and endangered species, conserve proposed and candidate species, and maintain a viable population of each species of conservation concern?

Detailed Monitoring Questions

- What are the population trends for sensitive plants (increasing, decreasing, or stable)?
- To what extent are management activities affecting conditions for sensitive plant populations?

Measurement Indicators

Population trends for plants listed as Regional Forester Sensitive Species (RFSS):

1. Number of ramets or genets
2. Percent reproductive
3. Spatial extent of population
4. Number of populations of a species
5. Ranked condition of populations

Monitoring Driver

Forest Plan Goal 2 and associated Objectives

Reporting Frequency

Every 5 years for terrestrial species (this report covers fiscal years 2019 to 2024); every 10 years for aquatic species (revised from annually starting fiscal year 2019)

Last Year Reported

Fiscal years 2017 and 2018 biennial monitoring and evaluation report (monitoring question and measurement indicators revised starting fiscal year 2019)

Next Year Scheduled for Reporting

Fiscal year 2029 (anticipated to cover fiscal years 2025 to 2029) for terrestrial species; fiscal year 2028 (anticipated to cover fiscal years 2019 to 2028) for aquatic species

Background

This monitoring question addresses required Element 4 from the 2012 planning rule (36 CFR 219.12(5)(iv)): *The status of a select set of the ecological conditions required under 36 CFR 219.9 to contribute to the recovery of federally listed threatened and endangered species, conserve proposed and candidate species, and maintain a viable population of each species of conservation concern.* For context, 36 CFR 219.9 is a reference to the planning rule section on ecological conditions to provide for a diversity of plant and animal communities. This section provides for the identification of species of conservation concern, which is *a species, other than federally recognized threatened, endangered, proposed, or candidate species, that is known to occur in the plan area and for which the Regional Forester has determined that the best available scientific information indicates substantial concern about the species' capability to persist over the long-term in the plan area* (36 CFR 219.9(c)).

Although species of conservation concern are not anticipated to be identified for GMNF until the Forest Plan is revised, the focus on plant species listed as Regional Forester Sensitive Species (RFSS) is a good alternative approach to meet the intent of this monitoring element. Regional Forester Sensitive Species are those that have been identified to have population viability as a concern as evidenced by 1) significant current or predicted downward trends in population numbers or density; and 2) significant current or predicted downward trends in habitat capability that would reduce a species' existing distribution.

The intent of this monitoring question is to help determine how well management activities are meeting Forest Plan Goal 2 to “*maintain and restore quality, amount, and distribution of habitats to produce viable and sustainable populations of native and desirable non-native plants and animals*” (Forest Plan, p. 10). Forest Plan Forest-wide Standards and Guidelines for Rare and Unique Biological Features (Forest Plan, p. 30) also direct Forest Service staff to maintain a list of federally listed threatened, endangered, or sensitive (TES) species (Standard S-2), and investigate all project sites for presence of federally listed TES species prior to beginning any ground disturbing activities at the site (Standard S-1). Although there are no federally listed threatened or endangered plant species on GMNF, Forest Plan direction states critical habitat and key habitat features upon which RFSS depend should be protected. Agency policy provides direction to develop and implement management practices to ensure that sensitive species do not become threatened or endangered because of Forest Service actions (Forest Service Manual 2670). Management decisions must not result in loss of sensitive species viability or create significant trends toward federal listing.

Monitoring Activities

Rare plant populations are monitored every five years (every ten years for aquatic species); the subset monitored in any given year is determined by its last monitoring date and its population trend. Monitoring visits are timed to occur within the appropriate phenological window (such as flowering or fruiting time). Data collected includes size and extent of the population, number of reproductive individuals, percent reproductive, number of populations of a species, and known or observed threats. The population trend is estimated using these data. For example, populations with fewer total individuals, fewer reproductive individuals, or a smaller spatial extent, from the last monitoring date, are assumed to be declining.

The 2017 RFSS list for plants includes 106 vascular and 2 nonvascular plant species (Appendix B, Table B-2). The RFSS list was updated in 2024 which added 12 vascular plant species and removed 6 vascular species. Vascular plants dropped from the list were those that: 1) had not been found in 30 or more years; 2) were determined to be more common than previously thought or 3) were believed to be extirpated. The updated 2024 RFSS list now includes a total of 114 plant species (112 vascular and 2 nonvascular).

This report summarizes GMNF rare plant monitoring results for 108 sensitive plants for fiscal years 2019 to 2022, and 114 sensitive plants for fiscal years 2023 to 2024. Uncommon or rare non-RFSS plant species that are monitored (or for which new populations have been found on GMNF) are evaluated for inclusion on the RFSS list with each scheduled list update.

All data was gathered using the USDA Forest Service Natural Resources Information System (NRIS) protocol, to be entered into the Natural Resources Manager (NRM) corporate database. Recorded information from this Forest Service corporate database for botanical data includes: 1) number of ramets or genets, 2) percent reproductive, 3) spatial extent of population, 4) number of populations of a species, and 5) ranked condition of populations. If the available taxa list in NRIS does not keep up with species tracked, data for those taxa are stored in a spatial layer ("Rare Plants not in NRIS"). In addition, each year, survey data for all rare plants (RFSS and non-RFSS Vermont state-listed rare plants) that are monitored (or newly discovered) are entered into the Vermont Natural Heritage Inventory (VNHI) spatial database and updated in a GIS layer.

Monitoring results for fiscal years 2019 to 2024 including estimated acres surveyed/inventoried and survey highlights are listed in Table 2-9, and monitoring trends for each species are summarized in Appendix B, Table B-3. In addition to monitoring known populations of RFSS, botanical inventory is undertaken to search for new populations, either in response to proposed ground-disturbing projects, or to learn more about habitats within managed areas.

Table 2-9. Sensitive plant species monitoring results for fiscal years 2019 to 2024.

Fiscal Year	Monitoring Results
2019	1,732 acres surveyed and inventoried 51 out of 106 RFSS vascular plant species monitored (70 known populations) 1 out of 2 nonvascular RFSS plant species monitored (1 known population) - Botanical inventory detected 16 new populations of these 8 RFSS: hairy woodmint (<i>Blephilia hirsuta</i>), hay sedge (<i>Carex argyrantha</i>), marsh willow-herb (<i>Epilobium palustre</i>), meadow horsetail (<i>Equisetum pratense</i>), butternut (<i>Juglans cinerea</i>), Huron orchid (<i>Platanthera huronensis</i>) and roundleaf and large roundleaf orchids (<i>Platanthera orbiculata</i> and <i>P. macrophylla</i>) 8 uncommon or rare non-RFSS Vermont state-listed plants monitored; 1 new population found
2020	5,084.6 acres surveyed and inventoried 24 out of 106 RFSS vascular plant species monitored; no non-vascular species (36 known populations) - Botanical inventory detected 30+ new occurrences of these 21 RFSS: eastern dwarf mistletoe (<i>Arceuthobium pusillum</i>), hairy woodmint (<i>Blephilia hirsuta</i>), leathery grapefern (<i>Botrychium</i>

Fiscal Year	Monitoring Results
	<i>multifidum</i>), large toothwort (<i>Cardamine maxima</i>), northeastern sedge (<i>Carex cryptolepis</i>), Michaux sedge (<i>Carex michauxiana</i>), Schweinitz's sedge (<i>Carex schweinitzii</i>), purple clematis (<i>Clematis occidentalis</i>), Steller's cliffbrake (<i>Cryptogramma stelleri</i>), showy lady's-slipper (<i>Cypripedium reginae</i>), matted spikerush (<i>Eleocharis intermedia</i>), ovate spikerush (<i>Eleocharis ovata</i>), marsh willow-herb (<i>Epilobium palustre</i>), rough cotton-grass (<i>Eriophorum tenellum</i>), boreal bedstraw (<i>Galium kamtschaticum</i>), ginseng (<i>Panax quinquefolius</i>), Huron orchid (<i>Platanthera huronensis</i>), Pennsylvania buttercup (<i>Ranunculus pennsylvanicus</i>), hoary willow (<i>Salix candida</i>), bog chickweed (<i>Stellaria alsine</i>), crooked-stem aster (<i>Symphyotrichum prenanthoides</i>) • 10 uncommon or rare non-RFSS Vermont state-listed plants were monitored; 6 new populations were found
2021	• 3,260.9 acres surveyed and inventoried • 25 out of 106 RFSS vascular plant species monitored; no non-vascular species (23 known populations) • Botanical inventory detected 15 new occurrences of these 9 RFSS: eastern dwarf mistletoe (<i>Arceuthobium pusillum</i>), hairy woodmint (<i>Blephilia hirsuta</i>), summer sedge (<i>Carex aestivalis</i>), Schweinitz's sedge (<i>Carex schweinitzii</i>), long-bract green orchis (<i>Dactylorhiza viridis</i>) boreal bedstraw (<i>Galium kamtschaticum</i>), ginseng (<i>Panax quinquefolius</i>), Huron orchid (<i>Platanthera huronensis</i>), and bog chickweed (<i>Stellaria alsine</i>) • 6 uncommon or rare non-RFSS Vermont state-listed plants were monitored; 1 new population found
2022	• 549.5 acres surveyed and inventoried • 25 out of 106 RFSS vascular plant species monitored; no non-vascular species (27 known populations) • Botanical inventory detected 4 new occurrences of these 4 RFSS: summer sedge (<i>Carex aestivalis</i>), American cancer-root (<i>Conopholis americana</i>), Boreal Bedstraw (<i>Galium kamtschaticum</i>), butternut (<i>Juglans cinerea</i>) • 8 uncommon or rare non-RFSS Vermont state-listed plants were monitored; 3 new populations found
2023	• 222.3 acres surveyed and inventoried¹ • 35 out of 112 vascular plant species monitored no non-vascular species (44 known populations) • Surveys detected 4 new occurrences of these 4 RFSS: large yellow lady's-slipper (<i>Cypripedium parviflorum</i> var. <i>pubescens</i>), great blue lobelia (<i>Lobelia siphilitica</i>), ginseng (<i>Panax quinquefolius</i>), round-leaved orchis (<i>Platanthera orbiculata</i>) • 6 uncommon or rare non-RFSS Vermont state-listed plants monitored (no new populations found)
2024	• 208 acres surveyed and inventoried¹ • 44 out of 112 RFSS vascular plant species monitored; no non-vascular species (60 known populations) • Botanical inventory detected new occurrences of these 10 RFSS: Blunt-lobed grapefern (<i>Botrychium oneidense</i>), Back's sedge (<i>Carex backii</i>), large yellow lady's-slipper (<i>Cypripedium parviflorum</i> var. <i>pubescens</i>), glade fern (<i>Homalosaurus pycnocarpus</i> (= <i>Diplazium pycnocarpon</i>)) Merritt Fernald's Sedge (<i>Carex merritt-fernaldii</i>), marsh willow-herb (<i>Epilobium palustre</i>); butternut (<i>Juglans cinerea</i>), Ginseng (<i>Parthenocissus quinquefolia</i>), Rand's Goldenrod (<i>Solidago simplex</i> ssp. <i>randii</i>), yellow ladies'-tresses (<i>Spiranthes ochroleuca</i>) • 26 uncommon or rare non-RFSS Vermont state-listed plants were monitored; 35 new occurrences were found including 3 historic populations (not found since 1923, 1984, 1996), and a Vermont S1 (very rare-critically imperiled) non-vascular species

¹ Due to short staffing, some surveys conducted in fiscal years 2023 and 2024 have not yet been entered into the database. Acreage listed is therefore less than what was actually surveyed.

Evaluation and Conclusions

Monitoring shows management activities are meeting Forest Plan direction for sensitive plants by completing rare plant and botanical inventories for the following projects prior to their implementation

(numerous miscellaneous small projects are not included or reflected in survey acres reported in Table 2-9):

- Five timber sales associated with the Early Successional Habitat Creation project (Bully Brook, Old Job, West River, Southfork, and Grass Mountain)
- Timber sales and other projects associated with the Robinson, Somerset, Telephone Gap, and South of Route 9 integrated resource projects
- Velomont Trail project
- Wildlife Openings
- Special Use Permit areas
- Other small project sites not listed here

Biological evaluations were completed for all proposed site-specific projects during the monitoring period. Projects were either modified or mitigation measures developed to ensure the proposals did not result in loss of sensitive species viability or create significant trends toward threatened or endangered federal listing.

The following trends have been noted after six years of monitoring activities (fiscal years 2019 to 2024) for plants on the RFSS list:

- 31 vascular plant species are apparently stable.
- 19 vascular species seem to be increasing to different degrees, some more evidently than others.
- 11 vascular plant species are apparently declining. There are four that have encroaching non-native invasive plant infestations (one is also threatened by ATV use, 1 by deer browsing, and 1 by harvesting). Five others may be declining as the canopy closes the habitat. One was adversely affected by road maintenance, and one is known to be dying from the butternut canker (*Juglans cinerea*).
- 2 vascular species have uncertain trends: one is an orchid species that does not emerge in the same place from year to year, and the other may be declining from canopy closure (more data is needed to identify a trend).
- 49 vascular and 2 non-vascular species are unable to be assessed due to a lack of data. Some are populations that have not been monitored recently, and some are species recently added to the RFSS list for which we have limited survey data.

Species-specific recommended management actions are provided in Appendix B, Table B-3.

In addition to monitoring existing rare plant occurrences and inventorying for new ones, non-native invasive plant (NNIP) management occurs to benefit RSCS listed plants and other rare plants. Forest Plan Forest-wide Standards and Guidelines for Non-native Invasive Plants (NNIP) (Forest Plan, Chapter 2, Section 2.3.9, p. 33), specifically Guideline G-1 emphasizes the use of basic prevention measures to reduce the potential effect of NNIP on RFSS listed plant species (see the Non-native Invasive Species monitoring item).

To strengthen the capacity of the rare plant monitoring program, the Forest Service contracts with local professional botanists (as funding permits), and seeks to cultivate partnerships with local volunteers, colleges, and other organizations. There is increasing recognition that climate change impacts rare plants. Keeping abreast of the best available science regarding this issue enables the Forest Service botany program to implement the best management practices to protect RSCS listed and other rare plant populations in the future.

Recommended Changes (Monitoring Question or Forest Plan Components)

None.

Monitoring Element 5: Recreation

Monitoring Item: Recreation Visitor Satisfaction

Management Question

Is the status of visitor use and visitor satisfaction meeting recreation objectives?

Detailed Monitoring Question

To what extent are management activities providing high quality recreation services that meet the expectations of the public?

Measurement Indicators

1. Percent Meets Expectations (PMEs) in National Visitor Use Monitoring (mean visitor satisfaction compared to mean importance); PME data reported for developed facilities, access, services, and feeling of safety in developed sites, undeveloped areas, and designated wilderness
2. Trend in number of visitors, visitor satisfaction and changes in visitor participation by activity over 5-year NVUM reporting periods

Monitoring Driver

Forest Plan Goal 12 and associated Objectives

Reporting Frequency

Every 5 years (this report covers fiscal years 2016 to 2020)

Last Year Reported

Fiscal years 2017 and 2018 biennial monitoring and evaluation report (monitoring question and measurement indicators revised starting fiscal year 2019)

Next Year Scheduled for Reporting

Fiscal years 2025 and 2026 biennial monitoring and evaluation report (in accordance with the next NVUM survey data anticipated in 2025)

Background

This monitoring question addresses required Element 4 from the 2012 planning rule (36 CFR 219.12(5)(v)): *The status of visitor use, visitor satisfaction, and progress toward meeting recreation objectives*. The intent of this monitoring question is to provide information to help managers assess if visitor expectations are meeting Forest Plan Goal 12 to “*provide a diverse range of high-quality, sustainable recreation opportunities that complement those provided off National Forest System lands*”. Visitor satisfaction tracks the congruence between the agency’s performance and customer evaluations of importance, giving managers an indication of management actions that may need to be taken to meet visitor needs. Overall trip satisfaction is used as a primary management criterion for evaluating the quality of an outdoor recreation experience.

Monitoring Activities

The Forest Service monitors recreation use on national forests through the National Visitor Use Monitoring program (NVUM). Specific NVUM protocols, terminology, limitations, data, annual reports, and other information are available at: <https://www.fs.usda.gov/about-agency/nvum/>

In essence, visitation is estimated through a combination of exiting traffic counts and surveys of visitors leaving a national forest. Both are obtained from random locations and days over a period of one year. Recreation visitors who are surveyed are asked numerous questions, including about their overall satisfaction. About one-third of visitors are also asked a series of detailed satisfaction questions about specific aspects of their visit. Onsite surveys are a key part of the NVUM process, and they help show the characteristics of recreation-related visits.

The NVUM data is collected and reported on a five-year cycle; data for GMNF was collected in 2015 by West Virginia University Research Corporation and in 2020 by the University of New Hampshire (USDA Forest Service 2015 and 2020). To assess visitor satisfaction, recreation visitors were asked through the NVUM program to provide an overall rating of their visit to the national forest, on a 5-point Likert scale, ranging from not important to very important. Visitors rated both the importance and performance (satisfaction) of these elements.

Results from a given sampling effort are assumed to be valid for 5 years, until the next iteration of NVUM. The onset of the COVID-19 pandemic, however, necessitated a revision in NVUM data collection efforts on GMNF starting March 19, 2020, to maintain safety for both visitors and survey staff. At that time, all face-to-face survey interviews were halted in accordance with state and federal social distancing guidelines. A large part of the NVUM process, however, relies on conducting accurate exit-use visitor counts. As such, University of New Hampshire field staff continued to work each of the assigned NVUM sites, while conducting exit-use visitor counts from the safety of their vehicles. Field staff maintained this vehicular based count-only protocol until the end of the NVUM program (September 30, 2020). As a result, data analysis adjustments were made for the COVID-19 pandemic. Changes in traffic volume and/or proxy counts observed in the last half of fiscal year 2020 compared to the last half of fiscal year 2015 were assumed to represent the effects of the pandemic. Those changes were projected to corresponding sampling strata on all other forest units; individual characteristics from the last half of fiscal year 2015 were assumed to be sufficiently accurate. Responses were re-weighted to fiscal year 2020 visitation levels and incorporated into the analysis.

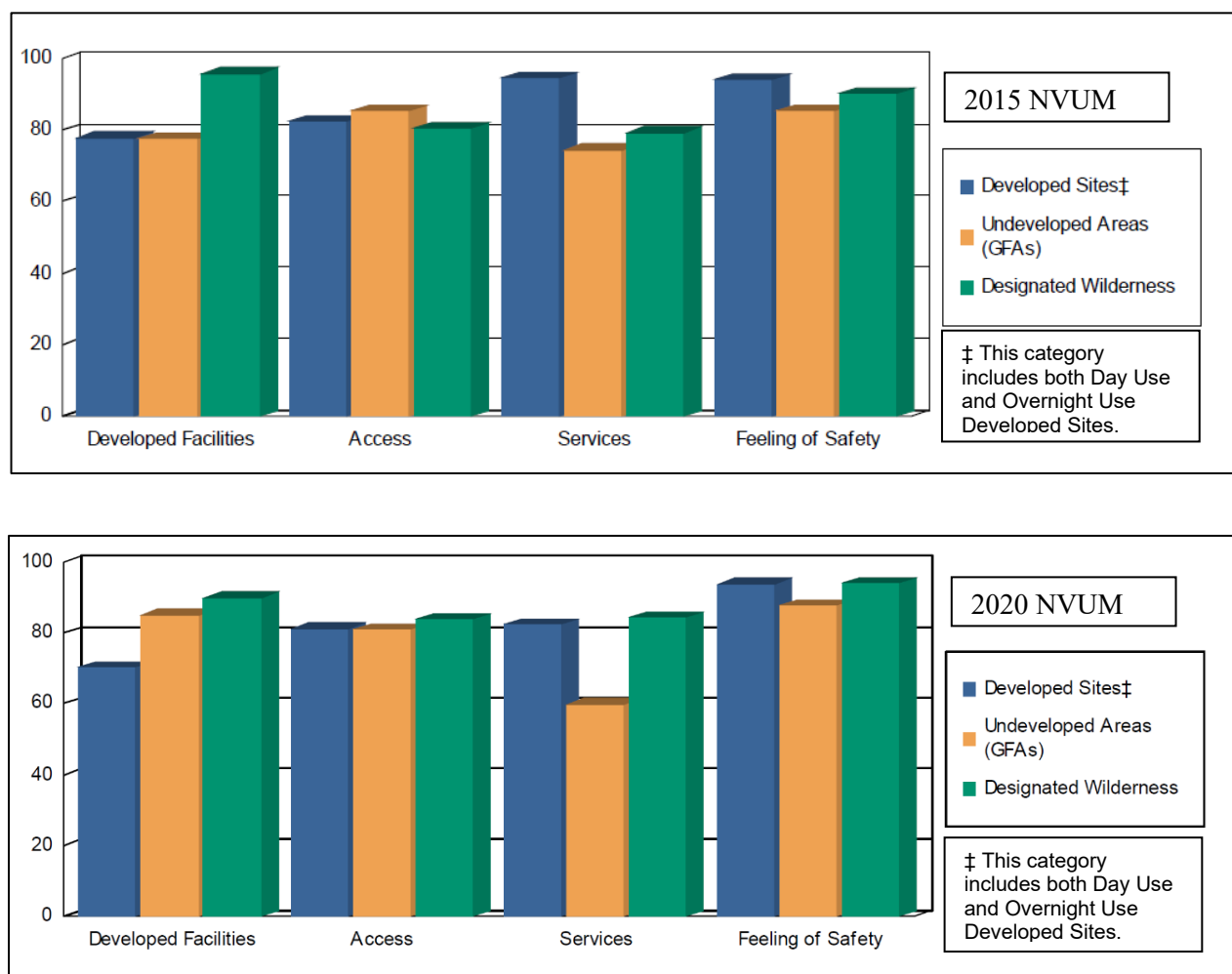
Evaluation and Conclusions

The NVUM results identify the proportion of satisfaction ratings in which the numerical satisfaction rating for a particular element is equal to or greater than the importance rating for that element, known as the “Percent Meet Expectations” (PME). This indicator tracks the congruence between the agency’s performance and customer evaluations of importance. The idea behind this measure is that those elements with higher importance levels must have higher performance levels. Lower scores indicate a gap between desires and performance. Figure 2-1 shows GMNF scores rated above 70 percent with the exception of services provided in undeveloped areas in 2020. This suggests there is no significant gap between public desires and agency performance with the exception of services during the Covid-19 pandemic at undeveloped areas that are managed for users who are prepared for self-sufficient recreation.

Additional details from the 2015 NVUM results indicated that PME scores would increase if efforts focused on improving: 1) restroom cleanliness in overnight developed recreation areas; and 2) parking lot conditions serving as access to wilderness. In 2020, the performance ratings for these categories noted that parking lot conditions serving as access to wilderness had been improved and were possible over-kill and should not be a future focus. Additional details from the 2020 report suggest a shift in user desires with recommendations for Forest Service staff to focus on the following to improve PME scores: 1)

employee helpfulness in day-use developed sites; and 2) signage adequacy in undeveloped areas. Feedback from 2020 reflects the lack of employee presence when stay-at-home orders were in effect and when additional signage would have provided the lack of in-person information. The pandemic also led to a significant increase in outdoor recreation, as people sought refuge, exercise, and a way to safely socialize while indoor options were limited. A considerable number of people were new to outdoor recreation on national forests during the pandemic and may have desired more signage and directions for reassurance and information.

Figure 2-1. Percent Meets Expectations Scores.

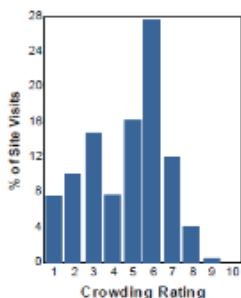
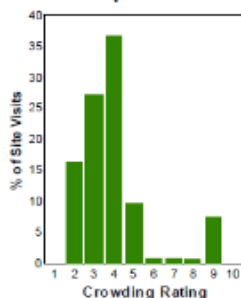
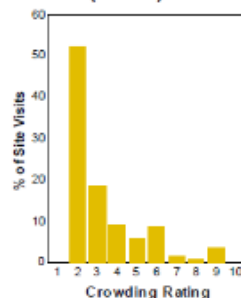
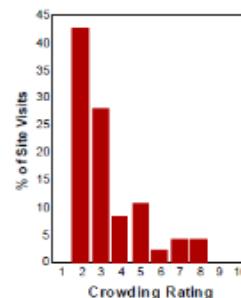


NVUM also assessed visitor perceptions of crowding. Visitors rated their perception of how crowded the recreation site or area felt to them. This information is useful when considering the type of site the visitor was using since someone visiting a designated Wilderness may think 5 people is too many while someone visiting a developed campground may think 50 people is about right. Figure 2-2 shows the distribution of responses for each site type and reflects that users generally do not perceive recreation on GMNF to be overcrowded. Crowding was reported on a scale of 1 to 10 where 1 denotes hardly anyone was there, and a 10 indicates the area was perceived as overcrowded. The average rating for crowding declined from 2015 to 2020 despite visitation numbers increasing during the pandemic.

Figure 2-2. Percent of Visits by Crowd Rating and Site Type: 2015 and 2020.

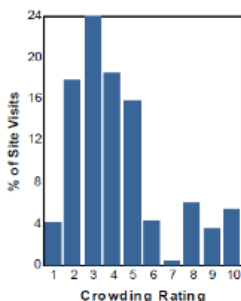
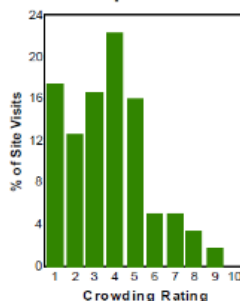
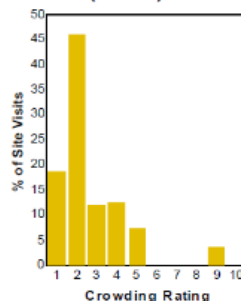
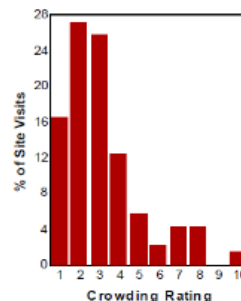
2015 NVUM

Crowding Rating†	Site Types (% of Site Visits)			
	Day Use Developed Sites	Overnight Use Developed Sites	Undeveloped Areas (GFAs)	Designated Wilderness
10 - Overcrowded	0.0	0.0	0.0	0.0
9	0.4	7.5	3.5	0.0
8	4.1	0.7	0.7	4.1
7	11.9	1.0	1.3	4.1
6	27.5	1.0	8.6	2.0
5	16.1	9.7	5.7	10.6
4	7.6	36.7	9.3	8.5
3	14.7	27.3	18.6	28.1
2	10.1	16.2	52.2	42.7
1 - Hardly anyone there	7.5	0.0	0.0	0.0
Average Rating	4.7	3.9	3.2	3.3

Day Use Developed Sites**Overnight Use Developed Sites****Undeveloped Areas (GFAs)****Designated Wilderness**

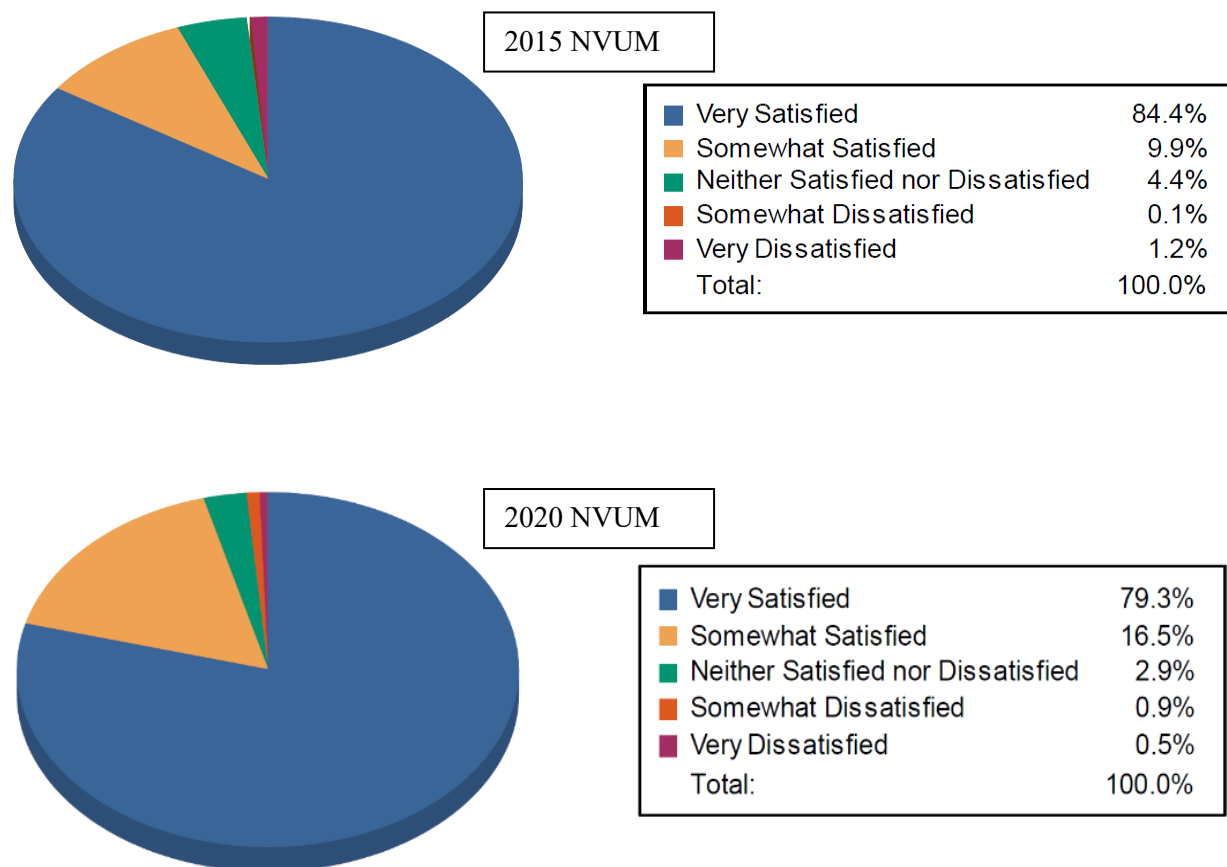
2020 NVUM

Crowding Rating†	Site Types (% of Site Visits)			
	Day Use Developed Sites	Overnight Use Developed Sites	Undeveloped Areas (GFAs)	Designated Wilderness
10 - Overcrowded	5.5	0.0	0.0	1.6
9	3.5	1.7	3.7	0.0
8	6.0	3.3	0.0	4.3
7	0.5	5.0	0.0	4.3
6	4.3	5.0	0.0	2.1
5	15.9	16.0	7.3	5.8
4	18.6	22.2	12.4	12.4
3	23.9	16.6	12.0	25.8
2	17.8	12.7	45.8	27.2
1 - Hardly anyone there	4.1	17.4	18.7	16.5
Average Rating	4.3	3.7	2.7	3.2

Day Use Developed Sites**Overnight Use Developed Sites****Undeveloped Areas (GFAs)****Designated Wilderness**

Based on 2015 and 2020 NVUM data, the majority of visitors (94.3 percent in 2015 and 95.8 percent in 2020) to GMNF reported that they are either “very satisfied” or “somewhat satisfied” with their overall National Forest experience (Figure 2-3). Although the percent of users reporting the highest level of satisfaction declined 5.1 percent (from 84.4 to 79.3 percent) over the 5-year period, the overall percent reporting some degree of satisfaction increased 1.5 percent (from 94.3 to 95.8 percent).

Figure 2-3. *Satisfaction Rating for National Forest Visits: 2015 and 2020 National Visitor Use Monitoring (NVUM).*



In respect to providing high-quality recreation services, NVUM monitoring considers the satisfaction elements most readily controlled by managers. These are aggregated into four categories: developed facilities, access, services, and visitor safety. The site types sampled are aggregated into three groups: developed sites (includes both day use and overnight developed sites); dispersed areas; and designated Wilderness. The “Percent Satisfied Index” (PSI) identifies the proportion (%) of elements and sites with a numerical rating of 4 or 5, equivalent to the percent of all recreation customers who are satisfied with agency performance. The agency’s national target for this measure is 85 percent. Table 2-10 displays the aggregate PSI scores for GMNF from 2015 and 2020 survey data.

Table 2-10. Percent Satisfied Index¹ scores for aggregate categories from 2015 and 2020 survey data.

Satisfaction Element	Satisfied Survey Respondents (%)					
	Developed Sites ²		Undeveloped Areas		Designated Wilderness	
Survey Year	2015	2020	2015	2020	2015	2020
Developed Facilities	89.8	93.3	77.5	85.0	95.7	90.0
Access	89.8	89.5	90.6	93.5	80.7	83.3
Services	96.0	82.4	82.0	73.2	85.5	81.8
Feeling of Safety	98.3	97.8	95.8	96.2	97.8	95.8

¹ This is a composite rating. It is the proportion of satisfaction ratings scored by visitors as good (4) or very good (5). Computed as the percentage of all ratings for the elements within the sub-grouping that are at or above the target level, and indicates the percent of all visitors that are reasonably well satisfied with agency performance.

² This category includes both Day Use and Overnight Use Developed Sites.

Developed Sites

Developed sites on GMNF include both day use sites, such as the Texas Falls Observation Site or Stratton Mountain ski area, and overnight sites, such as Hapgood Pond and Moosalamoo Campgrounds. Overall, GMNF developed recreation sites met user expectations to a high degree in 2015 and 2020 with satisfaction indices showing between 82.4 and 98.3 percent satisfaction; users were most satisfied with the feeling of safety. Trends over the 5-year period show an increased level of satisfaction with developed facilities, such as shelters, restrooms and pavilions. The largest decline in developed site satisfaction was with available services, falling below (at 82.4 percent) the Forest Service NVUM program target of 85 percent PSI. This 2020 score and downward trend in service satisfaction may reflect the impact of the Covid-19 pandemic when many services, including restroom facilities, were closed or halted.

Undeveloped Areas

In the context of NVUM, undeveloped areas are characterized by the absence of developed facilities and are used to facilitate activities like hiking, nature viewing, hunting, and other dispersed recreation. National forests provide a unique value in offering opportunities for dispersed recreation for visitors who seek a more natural and less crowded experience. Examples of undeveloped sites on GMNF include West Branch Trailhead on the Manchester Ranger District and the Sherburne Trails parking lot on the Rochester-Middlebury Ranger Districts. Visitors to undeveloped areas on GMNF reported that access and the feeling of safety also met their expectations very well (over 90 percent satisfaction in 2015 and 2020 in both categories). Visitors to undeveloped areas were less satisfied with developed facilities in 2015 (77.5 percent) though that satisfaction rate jumped to 85 percent in 2020, achieving the NVUM PSI target. Similar to developed sites, the downward trend in service satisfaction may reflect the impact of the Covid-19 pandemic; however, for undeveloped areas, it may indicate that users are expecting or desiring more services than the Forest Service provides in undeveloped settings.

Designated Wilderness

Visitors to Congressionally Designated Wilderness had expectations met for developed facilities (95.7 and 90 percent in 2015 and 2020, respectively) and the feeling of safety (97.8 and 95.8 percent); however, visitor satisfaction dropped below or hovered near the agency's national target of 85 percent for access and services in Wilderness (Table 2-10). Again, the downward trend in service satisfaction in designated wilderness may reflect the impact of the Covid-19 pandemic.

Additional Monitoring

A University of New Hampshire (UNH) study was conducted in 2024 to assess GMNF and Finger Lakes National Forest (FLNF) outdoor recreation visitors' perceptions, attitudes, and behaviors (Ferguson et.al, 2024). The UNH study asked visitors to evaluate their overall level of satisfaction with GMNF and FLNF on both single-item and multi-item satisfaction scales (Tables 2-11 and 2-12). The single-item

measurement of overall satisfaction was measured on a seven-point scale where one represented 'poor' and seven represented 'perfect' (Table 2-11). Ferguson et al. found that overall satisfaction was very high among respondents, with the majority of visitors (76.9 percent) indicating their overall trip that day was either *excellent* or *perfect*, with an average of 5.94 on a 7-point scale.

Table 2-11. Visitors' overall satisfaction rating in fiscal year 2024.

Mean	Valid Percentages						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
5.94	0.5%	1.2%	1.4%	4.6%	15.4%	47.1%	29.8%

Note: Percentages may not equal 100 because of rounding

Response Code: 1 = Poor and 7 = Perfect

The multi-item measurement of visitors' satisfaction was measured on a seven-point scale where one represented 'completely disagree' and seven represented 'completely agree' (Table 2-12). Ferguson et al. noted that the vast majority of respondents (92.6 percent) agreed they thoroughly enjoyed their trip, with an average of 6.30 on a 7-point scale. Approximately 90 percent of the sample agreed that their trip was well worth the time and money spent, with an average of 6.20 on a 7-point scale. Finally, 70 percent of the sample agreed that they could not imagine better trips, with an average of 5.40 on a 7-point scale (Ferguson et al. 2024).

Table 2-12. Visitors' multi-item satisfaction rating in fiscal year 2024.

Variable	Mean	Percentage		
		Disagree	Neutral	Agree
I have thoroughly enjoyed my trips to the forest	6.30	2.9	4.6	92.6
My trips to the forest have been well worth the money and time I spend on them	6.20	3.7	6.2	90.1
I cannot imagine better trips to the forest	5.40	10.4	18.8	70.7

Note: Percentages may not equal 100 because of rounding

Response Code: 1 = Completely Disagree and 7 = Completely Agree

No significant changes to recreation management and maintenance need to be taken based on the findings reported during this monitoring period; however, continued monitoring of the 5-year downward trend in satisfaction with services at developed, undeveloped and wilderness sites may provide insight as to the 2020 survey results and if the lack of satisfaction with services was a result of the Covid-19 pandemic or a trend. Additional education about what users can expect, and not expect, for services in wilderness and undeveloped areas may help visitors refine what locations they want to visit based on the level of services provided. Increasing services, such as adding restrooms, may be considered where appropriate and with consideration to resource limitations such as available staffing and funding.

The Percent Satisfied Index score for Designated Wilderness suggests GMNF may need to increase user education about what to expect when visiting a Congressionally designated wilderness area. Expectations regarding access and services may need tempered by the fact that these areas are managed to preserve their "wilderness character," emphasizing natural conditions and solitude over human conveniences. Both the NVUM and UNH study suggest that one service, increasing the presence of Forest Service staff, will support visitor satisfaction as staff provide valuable information, enhance visitor experiences, and encourage repeat visits.

Continued challenges to fund the NVUM effort may result in increasingly limited data in future survey years. Recreation managers should continue to support NVUM data collection to the extent reasonable and practical to help inform future decisions in addition to assessing and implementing site-specific improvement plans and maintenance to improve visitor satisfaction.

Recommended Changes (Monitoring Question or Forest Plan Components)

None.

Monitoring Element 6: Forest Health

Monitoring Item: Increase of Destructive Insects and Diseases

Management Question

Are there measurable resource changes related to climate change and other stressors that may be affecting the GMNF?

Detailed Monitoring Question

To what extent are insects and disease organisms impacting forest conditions?

Measurement Indicators

Insect or disease infestations with the following measurement indicators:

1. Number of outbreaks by species
2. Acres affected by species
3. Trends in outbreak persistence, spread, and associated tree mortality

Monitoring Driver

- Forest Plan Goal 2 and associated Objectives
- Forest-wide Management Direction, Section 2.3.9 - Forest Health and Disturbance Processes; Pests, Diseases, and Non-Native Invasive Species Standards and Guidelines

Reporting Frequency

Every 5 years (this report covers fiscal years 2019 to 2023)

Last Year Reported

Fiscal years 2017 and 2018 biennial monitoring and evaluation report (monitoring question revised starting fiscal year 2019)

Next Year Scheduled for Reporting

Fiscal years 2027 and 2028 biennial monitoring and evaluation report (anticipated to cover fiscal years 2024 to 2028)

Background

This monitoring question addresses required Element 6 from the 2012 planning rule (36 CFR 219.12(5)(vi)): *Measurable changes on the plan area related to climate change and other stressors that may be affecting the plan area.* The intent of this monitoring question is to help determine if management activities are meeting Forest Plan Goal 2 and associated Objective, and Forest-wide Standards and Guidelines specific to pests and diseases. The occurrence of existing and future insects and diseases represent a potentially major stressor in the ecosystem. It is important to monitor both individual outbreaks of insects and diseases as well as trends that may indicate ecosystem stress resulting from climate change, acid deposition or other factors. Monitoring the extent and magnitude of insect and disease infestations on NFS lands will assist in determining necessary adaptations for management

practices to achieve long-term forest management goals considering ongoing and future anticipated ecosystem stressors.

Monitoring Activities

A variety of monitoring activities are conducted at the state and Forest level by several different agencies and organizations. Forest Service staff review this data and cooperate with partners to assess forest health conditions, and then supplement observations made during inventory and management activities. Table 2-13 shows a summary of monitoring activities conducted during fiscal years 2019 to 2023.

Table 2-13. Fiscal years 2019 to 2023 insect and disease monitoring.

Insect or Disease Agent	Organization & Date of Monitoring	Type of Monitoring Effort
Forest tent caterpillar, saddled prominent, gypsy moth, oak leaf tier, balsam wooly adelgid and dieback or mortality from beech bark disease, septoria leaf spot, cankers and other unknown agents	Vermont Department of Forests, Parks and Recreation flown annually during summer months Northeastern Area State & Private Forestry, Forest Health Protection, USDA Forest Service	Annual aerial detection surveys of forest health conditions on GMNF.
Insects, disease or events harmful to sugar maple trees	Northeastern Area State & Private Forestry, Forest Health Protection, USDA Forest Service	Sugarbush surveys, on the ground field surveys, site visits
Sugar maple general health and decline, tree health and pest populations	Vermont Department of Forests, Parks and Recreation University of Vermont, Forest Ecosystem Monitoring Cooperative	Field surveys, long-term monitoring plots

The USDA Forest Service Forest Health Protection and Vermont Department of Forests, Parks and Recreation staff conduct aerial and ground surveys to detect forest damage, map late season defoliators and assess general forest conditions. In addition to annual aerial detection surveys, a satellite driven change detection tool called Forest Disturbance Monitor is used throughout the season to flag potential areas of pest activity. The disturbance monitor is updated every eight days and is located at: <https://www.foresthealth.fs.usda.gov>

The Forest Health Technology Enterprise Team has developed a new Forest Health Advisory System using data from the 2013-2027 National Insect and Disease Forest Risk Assessment. The advisory system derives forest insect and disease summaries by national forest and national park which can be used as announcements, bulletins, or online links.

Annual monitoring of maple tapping special use areas (sugarbush leases) was completed by Forest Health Protection staff annually from 2019 to 2023. There are six tapping sites located in five towns (Stockbridge, Pomfret, and two in Lincoln - Rochester/Middlebury Ranger Districts; and Wilmington and Mt. Tabor - Manchester Ranger District). The annual monitoring consists of six criteria: two growing season site visits for visual inspection of conditions; pheromone trapping for damaging insects; insect egg mass surveys during outbreaks; taphole closure assessment; root starch reserve measurements; and using the aerial detection survey to determine if any damaging agents are active in the area around the sugarbushes. Pheromone traps for forest tent caterpillar (*Malacosoma disstria*) were deployed, as well as traps for saddled prominent (*Heterocampa guttivitta*).

Establishment and monitoring trap trees to detect emerald ash borer (*Agrilus planipennis*) has been conducted by GMNF and Forest Health Protection staff annually from 2019 to 2023. Trees were girdled on 8 to 10 sites across NFS lands in the spring and were subsequently felled and peeled to detect emerald ash borer following the growing season.

Evaluation and Conclusions

Insect and disease levels at present do not affect Forest Service management activities to maintain forest conditions and objectives, or outputs of forest products, however increasing compounding stressors are likely to adversely affect forest health on GMNF over the next 5 to 10 years. Emerald ash borer, beech bark disease, beech leaf disease, and hemlock wooly adelgid are likely to cause significant tree mortality across NFS lands. Other native and non-native defoliators, and a changing climate will add to growing cumulative stressors.

Insect epidemics and resulting population numbers vary greatly from year to year, resulting from a combination of susceptible host habitats, favorable weather conditions, and previous year population levels. Forest vulnerability to insects and disease which lead to individual tree mortality increases as the forest ages. Since 2006, annual harvest levels have been less than 25 percent of annual Allowable Sale Quantity (see the Outputs Accomplished - Volume and Acres of Timber Offered and Sold monitoring item) and average stand age is increasing. Drought continues to be of concern with droughts recorded in 2016-2017, 2020-2021 and part of 2022. Impacts of drought on forested ecosystems can be variable in expression and severity, and drought-associated forest disturbances are expected to increase with climatic change. Drought also acts as a major inciting factor in tree decline diseases, leading to increased susceptibility to other threats.

There have been several hardwood defoliation events on GMNF between 2019 and 2023. Maple defoliators were the most observed, including forest tent caterpillar, maple webworm, and maple leaf skeletonizer. Forest tent caterpillar and spongy moth defoliation was most widespread statewide, however damage on GMNF was localized. White pine needle damage and beech bark disease remain widespread on GMNF. Reports of red pine mortality continue at the state level from multiple pests and pathogens and have been observed in some forested stands on NFS lands. Butternut canker continues to cause decline in butternut trees.

Evaluation of monitoring results for sugarbush special use areas indicate they are in a generally healthy condition, although one site suffered some forest tent caterpillar damage. Saddled prominent was not a major threat during the monitoring period; maple leaf cutter and leaf spot diseases were the more common pests found, and forest tent caterpillar still the biggest concern.

Table 2-14 lists a summary of insect and disease occurrence on GMNF during the fiscal years 2019 to 2023 monitoring period. Table 2-15 shows estimated NFS acres affected limited to insect and disease agents that were aerially detected.

Table 2-14. Insect and disease occurrence during fiscal years 2019 to 2023.

Insect or Disease	Monitoring Results
Balsam wooly adelgid (<i>Adelges piceae</i>)	Reported in all Vermont counties, with continued public reports in 2023. During the 2023 aerial survey, 400 acres of fir dieback and mortality attributed to this adelgid were mapped as compared to 3,945 acres mapped in 2022. Tree mortality in 2020 for areas where balsam wooly adelgid-initiated mortality was previously reported were not documented due to aerial survey restrictions.
Beech bark disease (caused by <i>Cryptococcus fagisuga</i> and <i>Nectria coccinea</i> var. <i>faginata</i>)	Continues to be mapped each year across Vermont and on GMNF. Approximately 1,800 acres were mapped in Vermont in 2023, a large decrease from 31,086 acres mapped in 2022. Bark symptoms are a common feature in forested stands and crown symptoms including early yellowing and dieback are noticeable in late summer.
Beech leaf disease (caused by <i>Litylenchus crenatae</i> ssp. <i>mccannii</i>)	Affects all species of beech trees (<i>Fagus spp.</i>) in North America, and causes leaf deformation, dieback, and mortality of infested hosts. This pest was first documented in Ohio in 2012 and was detected in Vermont in 2023. Beech leaf disease has not yet

Insect or Disease	Monitoring Results
	been detected on NFS lands but has the potential to cause significant tree mortality if it occurs since beech is the most frequent understory and midstory tree on GMNF.
Emerald ash borer (<i>Agrilus planipennis</i>)	Detected off NFS lands in Orange County, Vermont in February 2018. The emerald ash borer (EAB) was first detected on NFS lands in 2020 within the Town of Stamford - Manchester Ranger District. Between 2020 and 2023, EAB has been detected in multiple towns across GMNF and is expected to continue spreading and building in population. Although ash mortality resulting from EAB has not been observed on GMNF, significant mortality in ash species is expected to occur over the next 5 to 10 years.
Forest tent caterpillar (<i>Malacosoma disstria</i>)	This insect is a native hardwood defoliator of sugar maple, poplars, oaks, and other hardwoods. Extensive defoliation occurred throughout Vermont including NFS lands in 2018 and 2019, however populations have since crashed. In 2023, no reports of defoliation were received, nor were incidental observations or defoliation recorded by aerial detection surveys.
Hemlock woolly adelgid (<i>Adelges tsugae</i>)	Continues to threaten hemlock trees in southern Vermont, especially in combination with drought and elongate hemlock scale. This adelgid has been positively identified in Vermont just adjacent to GMNF, but infestations are not spreading quickly. There has also been observed spread into Windsor, a new town along the north leading infestation edge. No hemlock decline related to this adelgid was mapped during aerial surveys in 2023. As of 2023, known infestations were detected in Windham, Windsor, and Bennington counties. Only small, isolated infestations of hemlock woolly adelgid have been detected on NFS lands, including a 2-acre infestation in the Town of Pownal.
Maple leafcutter (<i>Paraclemensia acerifoliella</i>)	Damage is predominately found on sugar maples, although this insect also feeds on other hardwoods such as red maple, beech, and birch species. This insect is a late season defoliator and is usually of little consequence unless present in extremely high numbers in successive years. Defoliation can result in decreased sap production which reflects loss of photosynthetic surface area. Maple leafcutter caused observable damage to hardwoods during late summer and early autumn in 2021, causing 27,791 acres of mapped damage throughout Vermont. In 2022, observable damage decreased dramatically across the state, with only 1,557 acres of damage mapped. Little defoliation from this insect was reported in 2023, and no defoliation was observable during aerial detection surveys.
Saddled prominent moths (<i>Heterocampa guttivitta</i>)	Native hardwood defoliators that commonly feed on sugar maple, beech, and other hardwoods. Unlike other pests monitored, their populations do not follow a typical outbreak cycle, with populations reaching outbreak levels sporadically, and then crashing within 1 to 3 years. Increased reports of defoliation during the growing season of 2020 led to reestablishing trapping efforts in 2021. To track population outbreaks, pheromone traps were deployed statewide in late spring at nine sites. Populations did not build and this insect has not been a major agent of defoliation of hardwood species during the monitoring period.
Spongy moth caterpillars (<i>Lymantria dispar</i>)	Responsible for the largest disturbance to Vermont forests in 2021 and 2022, with populations crashing dramatically in 2023. The most recent outbreak began with more than 50,000 acres of defoliation statewide in 2021, followed by defoliation of 2,797 acres in 2022, but only 98 acres in 2023. During this outbreak, defoliation was primarily mapped in the Champlain Valley of western Vermont, although a small number of locations in the Connecticut River Valley (eastern Vermont) were mapped as well. As expected, oak species suffered most of the defoliation, but other hardwoods were also affected. These defoliation events did not affect most NFS lands, but several hundred acres of dry oak forest near the Dome in the Town of Pownal – Manchester Ranger District were affected for multiple seasons. Some mortality in these stands is likely caused by the combined stresses of defoliation and other factors such as drought.
Spruce budworm (<i>Choristoneura fumiferana</i>)	Native softwood defoliators of fir, spruce and occasionally larch, pine, and hemlocks. In consecutive years of severe outbreaks, trees may experience complete defoliation which can lead to dieback and mortality of infested hosts. In 2023, budworm moth trap catches in Vermont decreased to 9.6 moths per trap, following a historic count of 99.3 moths per trap in 2022. No significant defoliation has been mapped on NFS lands.

Insect or Disease	Monitoring Results
White Pine Needle Damage	Caused by a complex of four fungal species that infect newly emerged needles. Although the infected needles remain asymptomatic in the first year, the following spring, they turn yellow, then brown, and eventually fall off prematurely. The extent of damage is linked to the humidity and moisture levels from the previous spring. White Pine Needle Damage rarely results in mortality but can reduce growth and overall health. White pine needle damage has been observed in Vermont since 2009, with severity varying based on weather conditions. Heavy infections can cause significant defoliation and limited dieback of unhealthy trees. In 2023, it accounted for 3,349 acres of observable damage on white pine trees throughout the state, a slight increase compared to 2022 and one of the highest levels in recent years.

Table 2-15. Estimated acres affected by insects or disease on GMNF during fiscal years 2019 to 2023.

Insect or Disease	Acres Affected
<i>Fiscal Year 2019</i>	
Balsam woolly adelgid	17
Beech bark disease	1,839
Maple leafcutter	3,956
White pine needle damage	1,444
Total	7,256
<i>Fiscal Year 2020</i>	
Beech bark disease	472
Maple leafcutter	3,540
Total	4,012
<i>Fiscal Year 2021</i>	
Beech bark disease	5,566
Maple leafcutter	1,025
Saddled prominent	555
Spongy moth	5,407
White pine needle damage	630
Total	13,706
<i>Fiscal Year 2022</i>	
Beech bark disease	1,435
Spongy moth	2,440
White pine needle damage	968
Total	4,843
<i>Fiscal Year 2023</i>	
Balsam woolly adelgid	5
Beech bark disease complex	104
Spongy moth	161
White pine needle damage	63
Total	333

Recommended Changes (Monitoring Question or Forest Plan Components)

None.

Monitoring Element 6: Soils

Monitoring Item: Long Term Soil Quality and Soil Productivity

Management Question

Are there measurable resource changes related to climate change and other stressors that may be affecting GMNF?

Detailed Monitoring Questions

- Within site plots how are soil/site quality and productivity changing over the long term, in response to factors such as acid deposition, climate change, invasive species, and other environmental problems?
- How are management activities potentially mitigating or exacerbating changes in soils?

More specifically:

- Are soil nutrient levels changing, and are the changes affecting soil/site productivity?
- What toxins exist in the soil (such as from the atmosphere), and how are they changing in quantity and type over time? Is this affecting productivity?

Measurement Indicators

Within site plots established in wilderness areas measure changes over time for:

1. Soil quality - Soil nutrient levels, soil organic matter, total soil carbon, and toxins by major horizon
2. Soil productivity - Forest health
3. Soil climate - Soil temperature and moisture, depth of freezing, correlated with selected meteorological parameters

Monitoring Driver

Forest Plan Goal 3 and associated Objectives

Reporting Frequency

Every 10 years (included in this monitoring and evaluation report for context only)

Last Year Reported

Never reported.

Next Year Scheduled for Reporting

Fiscal years 2027 and 2028 biennial monitoring and evaluation report (in accordance with the results of Long-Term Monitoring Project survey data anticipated to be complete in 2027)

Background

This monitoring question addresses required Element 6 from the 2012 planning rule (36 CFR 219.12(5)(vi)): *Measurable changes on the plan area related to climate change and other stressors that may be affecting the plan area.* The intent of this monitoring question is to help determine if the Forest Plan Goal 3 Objective is being met to “*minimize the adverse impacts on soils from management activities*” (Forest Plan, p. 13) by establishing a base line to determine long-term impact to soils. This is important monitoring because it provides information needed to differentiate between soil stressors from

timber management compared to those from other sources such as atmospheric deposition and climate change. Information obtained from ongoing long-term monitoring can provide a scientific basis to measure changes in soil productivity over long periods of time.

Forest managers recognize that a number of broad-scale factors such as atmospheric deposition, climate change, and invasion of non-native plant species have the potential to introduce long-term changes into forested environments. Baseline and long-term monitoring data is needed to track these changes so that land managers can respond by adapting their forest management decisions and strategies.

Monitoring Activities

The Long-term Ecosystem Monitoring Project (LEMP) was initiated in 2008 to examine long-term effects of broad-scale environmental changes, particularly changes in climate, air quality, soil health, and vegetation. Plots are located on GMNF in areas with minimal evidence of past anthropogenic disturbance. Monitoring includes vegetation, trees and saplings, soil, lichens, and down woody material. During 2008, 2009, 2010 and 2011, a total of 20 LEMP plots were established with 5 per sampling season and results analyzed in 2017. Follow-up data collection was completed in 2018, 2019, 2020 and 2021 with an analysis report anticipated in 2027. This cycle is planned to continue to total 50 years of data collection. The sample plots have been established throughout GMNF representing various forest and soil types. Details of plot establishment, monitoring protocol, and data collected through 2011 are provided in the *Green Mountain National Forests Long Term Monitoring Project - Detailed History, Background, and Sampling Protocol* document (USDA Forest Service 2025a).

Study Areas (plot locations)

The LEMP focuses on monitoring the natural progression of locally undisturbed areas faced with global and regional impacts such as climate change and acid deposition. Therefore, the plots must not have been disturbed in the recent past and must not be disturbed in the future. The 20 plots currently established are located within management areas where anthropogenic vegetative manipulation is not expected (Table 2-16). In this way, forest conditions reflect, as close as possible, “reference” or undisturbed conditions.

Table 2-16. LEMP plot locations.

Plot Name	Town	Management Area	Area Name
1) Hancock Branch	Hancock	Forest (Wilderness edge)	Breadloaf (Wilderness Area)
2) Little Rock Pond	Wallingford	National Recreation Area	Robert T. Stafford White Rocks
3) Forest Road 60	Danby	National Recreation Area	Robert T. Stafford White Rocks
4) Sunderland	Sunderland	Wilderness	Lye Brook
5) French Hollow	Winhall	Ecological Special Area (ESA)	French Hollow
6) Lake Brook	Mount Tabor	Wilderness	Peru Peak
7) Three Shanties Knoll	Mount Tabor	Wilderness	Peru Peak
8) Mad Tom	Peru	Wilderness	Peru Peak
9) Maple Hill	Woodford	Wilderness	Glastenbury
10) Camp Meadows	Woodford	Wilderness	George D. Aiken
11) Leicester Oak	Leicester	National Recreation Area	Moosalamoo
12) Bingo Brook	Rochester	Wilderness	Joseph Battell
13) Bryant Mountain Hollow	Salisbury	ESA & Green Mountain Escarpment	Bryant Mountain Hollow (Ecological Special Area)
14) Gilmore Pond	Lincoln	Wilderness	Bristol Cliffs
15) Mount Abraham	Lincoln	Alpine/Subalpine Special Area	Not applicable
16) Greenwall Shelter	Wallingford	National Recreation Area	Robert T. Stafford White Rocks
17) Wallingford Pond	Wallingford	National Recreation Area	Robert T. Stafford White Rocks
18) Griffith Lake	Peru	Wilderness	Big Branch

Plot Name	Town	Management Area	Area Name
19) Castle Brook	Glastenbury	Wilderness	Glastenbury
20) Yaw Pond	Woodford	Wilderness	George D. Aiken

Evaluation and Conclusions

No evaluation or conclusions are available. Soil data collection and analysis is on a 10-year cycle and is anticipated for completion in 2027.

Recommended Changes (Monitoring Question or Forest Plan Components)

None.

Monitoring Element 7: Program Management***Monitoring Item: Outputs Accomplished - Other Resources***

Management Question

What is the progress toward meeting Forest Plan desired conditions and objectives, including providing multiple use opportunities?

Detailed Monitoring Question

How do actual resource and service accomplishments compare to those projected in the Forest Plan Appendix D, Proposed and Probable Practices?

Measurement Indicators

Actual annual resource and service accomplishments for management activities listed in the Forest Plan, Appendix D, Table D-5

Monitor Driver

- Forest Plan Goal 1 and associated Objectives
- Forest Plan Appendix D, Proposed and Probable Practices, Table D-5

Reporting Frequency

Annually

Last Year Reported

Fiscal years 2017 and 2018 biennial monitoring and evaluation report (monitoring question revised starting fiscal year 2019)

Next Year Scheduled for Reporting

Fiscal years 2025 and 2026 biennial monitoring and evaluation report

Background

This question addresses required Element 7 from the 2012 planning rule (36 CFR 219.12(5)(vii)): *Progress toward meeting the desired conditions and objectives in the plan, including for providing multiple use opportunities.* This question provides an excellent means to measure how well Forest Service management activities are meeting Forest Plan resource output and service expectations associated with moving existing resource conditions toward desired future conditions. Forest Plan, Appendix D, Table D-

5 provides an estimate of the proposed and probable management practices expected during the first two decades of Forest Plan implementation, as well as estimates of the goods and services provided by managing resources on GMNF.

Construction of temporary roads to access timber sale areas was added to Table D-5 per the Roads Management Supplemental Information Report (USDA Forest Service 2021) and associated Forest Plan Administrative Change dated September 7, 2021. The amount of temporary road construction from 2006 to 2030 is estimated to be 26.3 miles.

Monitoring Activities

There were numerous outputs and services provided from managing GMNF during fiscal years 2019 to 2024. These outputs are displayed in Table 2-17. Management of GMNF entered the second decade of Forest Plan implementation in fiscal year 2016. Although Appendix D, Table D-5 of the Forest Plan provides estimated measure of unit activity outputs to work toward desired conditions and management objectives for the first decade of Forest Plan implementation (2006 to 2015), these estimated outputs are repeated for the second decade (2016 to 2025). For this report, a summary of total resource output for each management activity during the first decade of Forest Plan implementation is provided in Table 2-17 for context. The monitoring resource outputs are then provided for 2019 to 2024 so they can be compared with amounts estimated for the second decade.

Some outputs listed in Table 2-17 are no longer included or have been modified compared to past monitoring and evaluation reports due to the inability to continue tracking the specificity of implementation for some activities or practices.

These changes include the following activity or practice:

- Breakdown of specific harvest methods which have now been consolidated into three categories: even-aged regeneration harvest, even-aged intermediate harvest, and uneven-aged harvest
- No longer tracked:
 - Miles of trail improvement or rehabilitation
 - Stand improvement activities
 - Planting activities
 - Release activities
 - Monitor condition of sites and species under special forest product permits
 - Oak and oak-pine habitat related activities
 - Non-Commercial Clearcutting of Aspen and Paper Birch
 - Burn Marshes
 - Other Wildlife Habitat Improvement
 - Fish Habitat Monitored

Table 2-17. Estimated and actual outputs achieved in fiscal years 2019 to 2024 (Forest Plan Appendix D, Proposed and Probable Practices).

Activity or Practice	Unit of Measure	Estimated Amount (Decades 1 and 2) ¹	Total Amount Achieved 2006-2015	Amount Achieved 2019	Amount Achieved 2020	Amount Achieved 2021	Amount Achieved 2022	Amount Achieved 2023	Amount Achieved 2024	Total Amount Achieved 2016-2024
Heritage Resource Protection										
Inventoried Acres	Acres	2,000 to 4,000	46,890	2,500	1,800	460	572	1,540	790	7,762
New Sites Identified	Sites	10 to 40	140	Not available	Not available	2	16	8	11	38
New Sites Evaluated	Sites	2 to 7	29	Not available	Not available	20	8	3	5	36
Sites Monitored	Sites	30 to 60	270	Not available	Not available	37	16	43	38	206
Recreation Resources										
Trail Improvement	Miles	10 to 20	22	Not tracked starting in 2019 ²						n/a
Trail Rehabilitation	Miles	200 to 400	194	Not tracked starting in 2019 ³						n/a
Trail Maintenance ⁴	Miles	9,050	2,853	305	166	317	515	684	797	3,855
Wilderness Managed ⁵	Areas	30 to 50	42	0	0	7	8	8	8	31
Roads Management										
Rights-of-Way Acquisition	Rights-of-Ways	40	4	0	0	0	0	0	0	0
Maintain Local Roads	Miles	100 to 200	778	67.1	62.5	62.4	62.4	51.8	8.1	559.7
Restore Local Roads	Miles	10 to 20	67	5.9	0.1	0	0	3.8	9.8	28.8
Reconstruct Local Roads	Miles	5 to 10	5.1	0	0	0	0	0	0	9.2
Construct Local Roads	Miles	0 to 5.25 ⁶	0.1	0	0	0	0	0	0	0
Maintain Arterial and Collector Roads ⁷	Miles	40 to 80	97.3	29.4	29.5	19.5	19.5	32.8	18.8	192.5
Decommission Local Roads	Miles	5 to 10	15	0	0	0	0	0	0	0
Construct Temporary Roads ⁸	Miles	26.3	3.2	1.7 (2016 to 2020)		.03	.06	.01	.01	1.8

Activity or Practice	Unit of Measure	Estimated Amount (Decades 1 and 2) ¹	Total Amount Achieved 2006-2015	Amount Achieved 2019	Amount Achieved 2020	Amount Achieved 2021	Amount Achieved 2022	Amount Achieved 2023	Amount Achieved 2024	Total Amount Achieved 2016-2024
Vegetation Management										
Hardwood Selection Cuts	Acres	8,366	1,829	Combined into Uneven-aged Harvest acres starting in 2019						n/a
Hardwood/Oak Shelterwood Regeneration	Acres	11,496	400	Combined into Even-aged Regeneration Harvest acres starting in 2019						n/a
Hardwood/Oak Shelterwood Removal	Acres	3,240	91	Combined into Even-aged Regeneration Harvest acres starting in 2019						n/a
Hardwood Clearcut	Acres	2,376	75	Combined into Even-aged Regeneration Harvest acres starting in 2019						n/a
Hardwood/Oak Thin	Acres	9,000	1,067	Combined into Even-aged Intermediate Harvest acres starting in 2019						n/a
Hardwood Stand Improvement	Acres	2,650	577	Not tracked starting in 2019						n/a
Softwood Shelterwood Regeneration	Acres	2,814	48	Combined into Even-aged Regeneration Harvest acres starting in 2019						n/a
Softwood Selection Cuts	Acres	1,444	347	Combined into Uneven-aged Harvest acres starting in 2019						n/a
Softwood Clearcut	Acres	10	155	Combined into Even-aged Regeneration Harvest acres starting in 2019						n/a
Softwood Thin	Acres	1,000	134	Combined into Even-aged Intermediate Harvest acres starting in 2019						n/a
Softwood Stand Improvement	Acres	700	193	Not tracked starting in 2019						n/a
Softwood Planting	Acres	350	71	Not tracked starting in 2019						n/a
Release Softwood from Hardwoods	Acres	1,700	86	Not tracked starting in 2019						n/a
Clearcut Hardwoods for Softwoods	Acres	90	2	Combined into Even-aged Regeneration Harvest acres starting in 2019						n/a
Plant Softwoods for Conversion	Acres	500	42	Not tracked starting in 2019						n/a
Clearcut Aspen	Acres	146	14	Combined into Even-aged Regeneration Harvest acres starting in 2019						n/a

Activity or Practice	Unit of Measure	Estimated Amount (Decades 1 and 2) ¹	Total Amount Achieved 2006-2015	Amount Achieved 2019	Amount Achieved 2020	Amount Achieved 2021	Amount Achieved 2022	Amount Achieved 2023	Amount Achieved 2024	Total Amount Achieved 2016-2024
Clearcut Hardwoods for Aspen Regeneration	Acres	725	186	Combined into Even-aged Regeneration Harvest acres starting in 2019						n/a
Total Selection Cuts	Acres	9,810	2,348	Combined into Uneven-aged Harvest acres starting in 2019						n/a
Total Shelterwood Regeneration	Acres	14,310	409	Combined into Even-aged Regeneration Harvest acres starting in 2019						n/a
Total Shelterwood Removals	Acres	3,240	182	Combined into Even-aged Regeneration Harvest acres starting in 2019						n/a
Total Clearcut	Acres	3,347	465	Combined into Even-aged Regeneration Harvest acres starting in 2019						n/a
Total Thin	Acres	10,000	1,237	Combined into Uneven-aged Harvest acres starting in 2019						n/a
Total Stand Improvement	Acres	3,350	1,241	Not tracked starting in 2019						n/a
Total Release	Acres	1,700	194	Not tracked starting in 2019						n/a
Total Planting	Acres	850	112	Not tracked starting in 2019						n/a
Total Even-aged Regeneration Harvest ⁹	Acres	16,764 ¹²	New starting 2019	107	19	55	46	194	59	777
Total Even-aged Intermediate Harvest ¹⁰	Acres	20,653 ¹²	New starting 2019	313	278	272	127	243	237	1,793
Total Uneven-aged Harvest ¹¹	Acres	9,810 ¹²	New starting 2019	173	102	101	96	91	67	1,302
Hardwood Sawtimber Cut	MMBF ¹³	110	9.3	Included in total timber cut starting in 2019						n/a
Softwood Sawtimber Cut	MMBF	10	6.3	Included in total timber cut starting in 2019						n/a
Combined Sawtimber	MMBF	120	15.6	Included in total timber cut starting in 2019						n/a
Hardwood Roundwood Cut	MMBF	41	14.1	Included in total timber cut starting in 2019						n/a
Softwood Roundwood Cut	MMBF	3	4.3	Included in total timber cut starting in 2019						n/a

Activity or Practice	Unit of Measure	Estimated Amount (Decades 1 and 2) ¹	Total Amount Achieved 2006-2015	Amount Achieved 2019	Amount Achieved 2020	Amount Achieved 2021	Amount Achieved 2022	Amount Achieved 2023	Amount Achieved 2024	Total Amount Achieved 2016-2024
Combined Roundwood	MMBF	44	18.4	Included in total timber cut starting in 2019						n/a
Total Timber Cut ¹⁴	MMBF	164	33.9	10.1	10.4	7.6	13.3	12.2	8.8	79.7
Monitor condition of sites and species under special forest product permits	Sites	All	All	Not tracked starting in 2019						n/a
Rare or Outstanding Ecological Resources										
Monitor known rare or outstanding ecological, biological, or geological features	Sites	All (129+)	141	2	4	3	7	4	9	34
Inventory for TES ¹⁵ species and rare or outstanding natural communities	Acres	4,000	10,363	All threatened or endangered wildlife inventoried during site specific project analysis – acres not tracked						n/a
				1,732 (plants)	5,085 (plants)	3,261 (plants)	550 (plants)	222 (plants)	208 (plants)	14,882 (plants)
Prepare conservation plans for each rare or outstanding area	Sites	20	0	0	0	0	0	0	0	0
Establish RNAs ¹⁶	Sites	2	0	0	0	0	0	0	0	0
Wildlife, Fisheries, and Rare Plant Resources										
Protect known occurrences of TES species	Sites	All	All	All	All	All	All	All	All	All
Protect, and where feasible, improve or restore habitat conditions for TES plants, and for TES animals of riparian and wetland habitats.	Sites	All	All	All	All	All	All	All	All	All

Activity or Practice	Unit of Measure	Estimated Amount (Decades 1 and 2) ¹	Total Amount Achieved 2006-2015	Amount Achieved 2019	Amount Achieved 2020	Amount Achieved 2021	Amount Achieved 2022	Amount Achieved 2023	Amount Achieved 2024	Total Amount Achieved 2016-2024
Protect important habitat sites for TES bats	Hibernacula	All hibernacula	All known hibernacula protected during project implementation	All known hibernacula protected, or effects minimized below unacceptable thresholds during project implementation						All known hibernacula and roosting habitat protected during project implementation
Protect important habitat sites for TES bats	Roost trees	Adequate numbers of roost trees	TES bats are not summer habitat limited; all known maternity areas are protected during project implementation	Summer TES bat habitat is not limited; all known maternity areas protected during project implementation						TES bats are not summer habitat limited; all known maternity areas protected during project implementation
Protect nesting TES bird species from disturbance	Active nest sites	All	Extent unknown; review project by project; Forest actions complied with Migratory Bird Treaty Act (MBTA)	Extent unknown; no threatened or endangered bird species on GMNF; sensitive bird species are protected by Forest Plan Standards and Guidelines, and project specific design features and mitigation measures; no species trending toward federal listing because of project implementation						All sensitive bird species nesting sites protected or effects minimized

Activity or Practice	Unit of Measure	Estimated Amount (Decades 1 and 2) ¹	Total Amount Achieved 2006-2015	Amount Achieved 2019	Amount Achieved 2020	Amount Achieved 2021	Amount Achieved 2022	Amount Achieved 2023	Amount Achieved 2024	Total Amount Achieved 2016-2024
Monitor known occurrences of TES species	Sites / Populations	All	All	All	All	All	All	All	All	All
Update conservation assessments for RFSS ¹⁷	Species	All	0	0	0	0	0	0	0	0
Oak Released from Hardwoods, and Oak and Oak-Pine Habitat Restored/ Improved	Acres	2,000	51	Not tracked starting in 2019						n/a
Mow Upland Wildlife Openings	Acres	2,000	682	197	178	133.4	145.2	105.5	219.1	1,732.2
Non-Commercial Clearcutting of Aspen and Paper Birch	Acres	2,000	0	Not tracked starting in 2019						n/a
Burn Upland Wildlife Openings	Acres	5,000	0	402.9	0	224	358	423.6	439.8	2,237.3
Burn Marshes	Acres	250	316	Not tracked starting in 2019						n/a
Other Wildlife Habitat Improvement	Acres	250	2,182	Not tracked starting in 2019						n/a
Stream Habitat Restored/ Improved	Miles	50	58	21	7.5	3.1	7.8	12.8	5.6	220.7

Activity or Practice	Unit of Measure	Estimated Amount (Decades 1 and 2) ¹	Total Amount Achieved 2006-2015	Amount Achieved 2019	Amount Achieved 2020	Amount Achieved 2021	Amount Achieved 2022	Amount Achieved 2023	Amount Achieved 2024	Total Amount Achieved 2016-2024
Lake Habitat Restored/Enhanced	Acres	10	459	0	0	0	45	0	0	265
Fish Habitat Monitored	Sites	80	175	Not tracked starting in 2019						n/a
Fish Passage Restored	Road Crossing	10	24	3	1	0	0	2	1	22

¹ These numbers represent the sum of annual activities in years 1 through 10 (2006 to 2015) and repeated for years 11 to 20 (2016 to 2025).

² There is no Forest Plan definition for Trail Improvement.

³ The Forest Plan definition for Rehabilitation (of Assets) is “Renovation or restoration of an existing fixed asset or any of its components in order to restore the functionality or life of the asset. Because there is no significant expansion or change of purpose for the fixed asset, the work primarily addresses deferred maintenance” (Forest Plan Glossary, p. 144). For this reason, this type of maintenance is incorporated into Trail Maintenance starting in 2019.

⁴ The Forest Plan definition for Maintenance is “The act of keeping fixed assets in acceptable condition. It includes preventive maintenance, normal repairs, replacement of parts and structural components, and other activities needed to preserve a fixed asset, so that it continues to provide acceptable service and achieves its expected life” (Forest Plan Glossary, pp. 134 to 135).

⁵ Wilderness managed to standard.

⁶ Changed Forest Plan Appendix D, Proposed and Probable Practices, Table D-5 in 2021. “Local roads” is not defined in the Forest Plan. The term is a holdover from the 1987 Forest Plan defined as permanent system roads accessing areas of the forest for management needs from other parts of the existing transportation network.

⁷ Town jurisdiction roads accessing National Forest System land maintained through road cooperative agreements.

⁸ Added to Forest Plan Appendix D, Proposed and Probable Practices, Table D-5 in 2021.

⁹ Consolidated all clearcut, shelterwood, shelterwood with reserves, and shelterwood removal harvest methods starting in 2019.

¹⁰ Consolidated all thinning and improvement cut harvest methods starting in 2019.

¹¹ Consolidated all group selection and individual tree selection harvest methods starting in 2019.

¹² Estimated acreage of silvicultural practices for Decade 2 (2016 to 2025) from Forest Plan Appendix D, Proposed and Probable Practices, Table D-4.

¹³ Million board feet.

¹⁴ Consolidated all wood products commercially harvested starting in 2019.

¹² Threatened, endangered, and sensitive (Regional Forester Sensitive Species) species.

¹⁶ Research Natural Areas.

¹⁷ Regional Forester Sensitive Species

Evaluation and Conclusions

Progress toward meeting outputs or services estimated by the Forest Plan from management activities during this monitoring period are mixed depending on the activity or practice monitored (Table 2-18). Discussion of how actual activities or practices implemented affect resource conditions and management ability to meet Forest Plan direction is found in many of the monitoring item question sections.

Table 2-18. Status of meeting estimated output and service for Decade 2 of Forest Plan implementation.

Activity or Practice	Status
Burn upland wildlife openings	Below estimates
Construct local roads	Below estimates
Construct temporary roads	Below estimates
Decommission local roads	Below estimates
Establish RNAs	Below estimates
Fish passage restored	Above estimates
Heritage resource protection	Exceeds estimates
Inventory for TES species	Exceeds estimates
Lake habitat restored or enhanced	Above estimates
Monitor known rare or outstanding resources	Below estimates
Mow upland wildlife openings	Slightly below estimates
Prepare conservation plans	Below estimates
Protect TES species	Meets estimates
Road maintenance and reconstruction	Exceeds or slightly less than estimated levels
Road rights-of-way	Below estimates
Stream habitat restored or improved	Above estimates
Total even-aged intermediate harvest	About 9 percent of estimated levels
Total even-aged regeneration harvest	About 5 percent of estimated levels
Total timber cut	About 49 percent of estimated levels
Total uneven-aged harvest	About 12 percent of estimated levels
Trail maintenance	Below estimates but has improved three-fold from Decade 1 total outputs
Update conservation assessments for RFSS	Below estimates
Wilderness managed to standard	Began Decade 2 below estimates but has greatly improved starting in 2021

Recommended Changes (Monitoring Question or Forest Plan Components)

None.

Monitoring Element 8: Soils

Monitoring Item: Soil Quality Standard Compliance

Management Question

Are the effects of each management system substantially and permanently impairing the productivity of the land?

Detailed Monitoring Question

To what extent are management activities impacting soil quality and productivity?

Measurement Indicators

Within the Forest Service Soil Disturbance Monitoring Protocol sampling and monitoring areas including select areas where timber harvest, prescribed fire, and other management activities have been implemented:

1. Amount of forest floor impacted
2. Amount of topsoil displacement
3. Severity of rutted, burned or compacted soil
4. Severity of platy/massive soil structures, or puddled soil

Monitor Driver

Forest Plan Goal 3 and associated Objectives

Reporting Frequency

Every 5 years (revised from annually starting fiscal year 2019); this report covers fiscal years 2019 to 2024 and includes monitoring data from 2017 to 2018

Last Year Reported

Fiscal years 2017 and 2018 biennial monitoring and evaluation report

Next Year Scheduled for Reporting

Fiscal years 2029 and 2030 biennial monitoring and evaluation report (anticipated to cover fiscal years 2025 to 2029)

Background

This monitoring question addresses required Element 8 from the 2012 planning rule (36 CFR 219.12(5)(viii)): *The effects of each management system to determine that they do not substantially and permanently impair the productivity of the land (16 U.S.C. 1604(g)(3)(C))*. For context, U.S.C. 1604(g)(3)(C) is a reference to the section of the National Forest Management Act specifying guidelines for land management plans to achieve the goals which “*insure research on and (based on continuous monitoring and assessment in the field) evaluation of the effects of each management system to the end that it will not produce substantial and permanent impairment of the productivity of the land*”.

The intent of this monitoring question is to help determine if management activities are meeting Forest Plan Goal 3 to “*maintain or restore the natural, ecological functions of the soil*” (Forest Plan, p. 13) by focusing on key ecosystem characteristics in the plan area related to soils and soil productivity. Associated Objectives for Goal 3 are to minimize the adverse impacts on soils from management activities; and restore natural soil processes and functions on degraded soils.

The Forest Soil Disturbance Monitoring Protocol (FSDMP) outlines a framework for monitoring soil disturbances from forest management pre- and post-activity. This national protocol is intended to consistently assess, monitor, and communicate soil disturbances caused by land management activities, particularly those involving mechanized equipment like logging. It is part of an adaptive management framework aimed at maintaining or improving soil productivity and hydrologic function on NFS lands. The FSDMP offers a standardized way to define and quickly evaluate soil disturbance using a combination of scientifically informed risk ratings and visually observable soil-disturbance classes. These classes range from Class 0 - Undisturbed, Class 1 - Light Disturbance, Class 2 - Moderate Disturbance, and Class 3 - Severely Disturbed (Page-Dumroese et.al, 2009b), and include collecting soil attributes that characterize the state of the Forest Floor, Topsoil and Subsoil.

Current Regional Soil Quality Standards (R9 RO 2550-2012-1) discuss seven types of soil disturbance: 1) compaction, 2) displacement (mixing), 3) puddling/rutting, 4) burned, 5) erosion, 6) loss of ground cover, and 7) mass movement. Other relevant laws applicable to the Forest Service's responsibility to maintain long-term soil productivity on all lands it manages include the Organic Administration Act of 1897 (16 U.S.C. 473-475), the Bankhead-Jones Act of 1937, the Multiple-Use, Sustained-Yield Act of 1960 (P.L. 86-517, 74 Stat. 215; 16 U.S.C. 528-531), the National Environmental Policy Act (NEPA) of 1969 (16 U.S.C. 4321), and the Forest and Rangeland Renewable Resources Planning Act (RPA) of 1974 (16 U.S.C. 1600-1614) (as amended by National Forest Management Act (NFMA) of 1976 (16 U.S.C. 472a) (USFS 2500-2010-1, 2010).

Detrimental disturbance is a separate determination from soil disturbance class and soil attributes generally considered not expected to be on the trajectory of recovery or the level of disturbance was not part of the management intent. Although areas classified as Class 3 are the most disturbed, they may or may not be detrimentally disturbed for some ecological systems. The Soil Disturbance Field Guide (Page-Dumroese et.al 2009a and 2009b; and Napper et.al 2009) supports FSDMP implementation in the field and supports consistent data collection.

Monitoring Activities

Although this report monitoring period covers fiscal years 2019 to 2024, documented results for this question include monitoring conducted in previous years. Data collected was limited to timber harvest units. No data was collected on prescribed fire areas or other types of management. There were 36 pre-harvest monitoring sites and 50 post-harvest monitoring sites where data was collected during fiscal years 2017 to 2024 (Table 2-19). Evaluation of monitoring data was derived from six paired pre- and post-harvest monitoring sites collected from the same units (Table 2-20).

The FSDMP provides formulas for determining the recommended number of soil pits ("holes") required to achieve the desired level of statistical accuracy. In practice, completing this number is often infeasible when very large sample sizes are indicated. In 2024, the Standardization Data Collection Guidance recommended an upper limit of 80 holes per monitoring site. Prior to this guidance, upper limits varied across USDA Forest Service Region 9 forests from 40 to 120 holes. The "Holes Needed" column in Table 2-19 shows the shortfall between holes dug and the recommended number. A value of "0" indicates the site met the required number. Accuracy levels were not factored into the results presented here.

At each site, soil data were collected and summarized as percentages. Attributes measured included: disturbance class (0 to 3), detrimental soil disturbance (DSD), forest floor impacted, live plant cover, invasive plant presence, woody debris (<7 cm and >7 cm), bare soil, surface rock, topsoil displacement, erosion, mixed horizons, rutting depths, compaction depths, and structure (platy, massive, puddled). Sites were targeted for pre-monitoring based on potential soil impacts or other concerns.

Table 2-19. Soil disturbance monitoring sites where data was collected from fiscal years 2017 to 2024.

Timber Sale and Payment Unit	Pre or Post Harvest Monitoring	Fiscal Year Monitored	Holes Needed	Associated Project Name
Albee 1A	Post	2020	35	Upper White River IRP
Albee 4	Post	2020	25	Upper White River IRP
Albee 5	Pre	2018	0	Upper White River IRP
Beech Ridge 5	Pre	2020	0	Dorset-Peru IRP
Broad Brook 29	Pre	2020	0	South of Route 9
Broad Brook 8	Pre	2020	0	South of Route 9

Timber Sale and Payment Unit	Pre or Post Harvest Monitoring	Fiscal Year Monitored	Holes Needed	Associated Project Name
Bully Brook 1	Pre	2020	0	Early Successional Habitat
Bully Brook 17	Pre	2020	0	Early Successional Habitat
Bully Brook 18	Pre	2020	0	Early Successional Habitat
Bully Brook 3	Pre	2021	0	Early Successional Habitat
Cook Brook 09	Post	2017	0	Dorset-Peru IRP
Cook Brook 10	Post	2018	0	Dorset-Peru IRP
Cook Brook 3	Post	2018	0	Dorset-Peru IRP
Cook Brook 7	Post	2018	0	Dorset-Peru IRP
Country Road 2	Post	2018	0	Nordic IRP
Country Road 6	Post	2019	9	Upper White River IRP
Country Road 7	Post	2018	0	Nordic IRP
Dutch Hill 18	Pre	2020	0	South of Route 9
Gilmore Aspen 3	Post	2018	108	Gilmore Aspen Management Project
Gilmore Aspen 4	Pre	2019	0	Gilmore Aspen Management Project
Gilmore Aspen 4	Post	2021	51	Gilmore Aspen Management Project
Gilmore Aspen 7	Pre	2018	0	Gilmore Aspen Management Project
Gilmore Aspen 7	Post	2021	46	Gilmore Aspen Management Project
Grouse 18	Post	2017	0	Upper White River IRP
Grouse 3	Post	2018	0	Upper White River IRP
Grouse 7	Pre	2019	0	Upper White River IRP
Grouse 9	Post	2017	0	Upper White River IRP
Grouse Stewardship 7	Post	2018	116	Upper White River IRP
Mad Tom 13	Post	2018	0	Dorset-Peru IRP
Mad Tom 18	Post	2018	37	Dorset-Peru IRP
Mad Tom 8	Pre	2019	0	Dorset-Peru IRP
Old Job 6	Pre	2021	0	Early Successional Habitat
Old Job 12	Pre	2021	0	Early Successional Habitat
Old Job 18	Pre	2020	0	Early Successional Habitat
Old Job 4	Pre	2020	30	Early Successional Habitat
Old Job 5N	Pre	2021	0	Early Successional Habitat
Old Job 9	Pre	2020	0	Early Successional Habitat
Pumphouse 1	Post	2018	0	Dorset-Peru IRP
Pumphouse 14	Pre	2019	0	Upper White River IRP
Pumphouse 16	Post	2019	0	Dorset-Peru IRP
Pumphouse 19	Pre	2023	0	Dorset-Peru IRP
Pumphouse 19	Post	2020	30	Dorset-Peru IRP
Pumphouse 3	Post	2018	0	Dorset-Peru IRP
Pumphouse 8	Pre	2018	0	Dorset-Peru IRP
Pumphouse 9	Post	2020	0	Dorset-Peru IRP
Souphouse 1	Post	2023	0	Robinson IRP
Souphouse 12	Pre	2021	0	Robinson IRP
Souphouse 3 and 14	Pre	2019	123	Robinson IRP

Timber Sale and Payment Unit	Pre or Post Harvest Monitoring	Fiscal Year Monitored	Holes Needed	Associated Project Name
Souphouse 3 and14	Post	2022	0	Robinson IRP
Souphouse 5	Pre	2023	0	Robinson IRP
Souphouse 5	Post	2023	0	Robinson IRP
Sunnyside 1	Pre	2018	0	Dorset-Peru IRP
Sunnyside 13	Pre	2020	0	Dorset-Peru IRP
Sunnyside 14	Pre	2018	0	Dorset-Peru IRP
Sunnyside 6	Pre	2020	1	Dorset-Peru IRP
Sunnyside 9	Post	2019	11	Dorset-Peru IRP
Swans Mill 1	Pre	2023	9	Robinson Integrated Resource Project (IRP)
Swans Mill 11A	Pre	2022	0	Robinson IRP
Swans Mill 12B	Post	2022	0	Robinson IRP
Swans Mill 7	Pre	2020	9	Robinson IRP
Texas 15	Post	2019	0	Upper White River IRP
Texas 18	Post	2017	0	Upper White River IRP
Texas 19	Post	2017	0	Upper White River IRP
Texas 2	Post	2017	0	Upper White River IRP
Texas 22	Post	2019	0	Upper White River IRP
Texas 23	Post	2019	0	Upper White River IRP
Texas 7A	Post	2020	108	Upper White River IRP
Texas 7C	Post	2020	66	Upper White River IRP
Texas 8	Post	2020	106	Upper White River IRP
Tucker Brook 1	Post	2019	0	Upper White River IRP
Tucker Brook 2	Post	2019	30	Upper White River IRP
Tucker Brook 3	Post	2018	0	Upper White River IRP
Tucker Brook 5	Post	2018	5	Upper White River IRP
Upper White 13B	Post	2017	0	Upper White River IRP
Upper White 15	Post	2019	0	Upper White River IRP
Upper White 3	Post	2023	7	Upper White River IRP

Table 2-20. Paired pre- and post-harvest data evaluated for the fiscal years 2019 to 2024 monitoring period.

Timber Sale and Payment Unit	Pre or Post Harvest Monitoring	Monitoring FY
Souphouse 5	Pre	Null
Souphouse 5	Post	2022
Grouse 7	Pre	2019
Grouse 7	Post	2018
Gilmore Aspen 4	Pre	2018
Gilmore Aspen 4	Post	2020
Gilmore Aspen 7	Pre	2018
Gilmore Aspen 7	Post	2020
Country Road 6	Pre	2015
Country Road 6	Post	2018
Grouse 3	Pre	2015
Grouse 3	Post	2018

Evaluation and Conclusions

Paired Pre- and Post-Harvest Site Monitoring

The paired site data are monitoring records of the same timber stand and payment unit, pre- and post-harvest. The data displayed in Table 2-21 spanned monitoring completed from fiscal years 2017 to 2024. The pre-sites had very low levels of Class 1, Class 2, and no Class 3 disturbance, with most of the soil area classified as Class 0. There was some level of Class 2 and lesser amounts of Class 1 disturbance in the sites before harvesting was implemented. Soil disturbance in pre-harvest monitoring can be caused by past management, either from Forest Service activities or by the previous land managers before federal acquisition. Past management practices that could have had a lasting impact on soil characteristics include agricultural practices such as crop cultivation, pasture grazing, or other activities such as mining, homesteading, timber plantations, timber harvesting, recreation and road construction. There are also natural disturbances that are to be expected, such as tree tips, erosion from large storm events, or disturbances from wildlife, such as digging and trampling of areas. The overall detrimental soil disturbance (DSD) to the pre-harvest monitoring sites was found to cover 1.67 percent of the area, which shows there was some level of detrimentally disturbed soil before harvesting was implemented.

Table 2-21. Estimated percent area of paired pre- and post-harvest sites monitored for disturbance class and detrimental soil disturbance (DSD) for fiscal years 2017 to 2024.

Pre- or Post-Harvest	Percent				
	Class 0	Class 1	Class 2	Class 3	DSD
Pre	107.83 ¹	0.50	1.67	0.00	1.67
Post	47.83	43.50	7.83	1.00	7.41

¹ The 100+ percent in Class 0 is due to averaging across sites. When each site's proportions are computed separately and then averaged, the sums can exceed 100. This is expected in this kind of site-level averaging approach, or it can be due to errors from data imputing.

In these paired monitoring sites after harvesting, the amount of Class 1 disturbance on average went up from 0.50 to 43.50 percent. Class 2 increased in estimated area by 6.16 percent more area and Class 3 increased by 1 percent. It is expected that timber harvesting will have some impact on the ground, but reducing the long-term negative impact is essential for future soil function and productivity. The increase in Class 1 level of disturbances is high, but Class 1 soil disturbance is defined as a light disturbance and would be expected to recover over time and not have a negative impact on soil functions and long-term productivity. Having a large increase in this type of disturbance would be expected to recover over time and not have lasting impacts on the soil. Class 3 disturbance is defined as severe and should be limited as much as possible but would still be expected in localized areas such as roads or some landings. The low level of Class 3 disturbance suggests soils are being protected from more extensive negative impacts from timber operations that would have less likelihood of successful recovery. According to these results, there is room to reduce the amount of Class 1 soil disturbance. The increase in Class 2 shows some increase in total area of moderate soil impact. Ideally, Class 3 areas would be minimized, followed by Class 2 and then Class 1 due to the severity of impact and assumed effects on recovery to soil functions.

The DSD area was found to increase after harvesting on average 5.74 percent across the six paired sites. A DSD rating is not expected to recover soil function within the next 10 to 20 years, although the exact definition of what DSD is may change between monitoring data collectors. An overall increase of 5.74 percent from before to after harvesting is low, but it indicates there were likely some effects. It is difficult to prevent all levels of disturbance, especially in areas such as main skid trails and landings. These areas can and often are reused in the future, so the impact on other soils in the area is spared, as the impact is concentrated in smaller areas. While some disturbance is an inevitable consequence of active land management, the low (1 percent) average rate of Class 3 disturbance added after harvesting indicates that these projects remained within acceptable thresholds.

The attributes of the effects on forest floor attributes are provided in Table 2-22. The impact on the forest floor greatly increased from 1.11 to 39.85 percent for pre-to-post harvest paired sites during fiscal years 2017 to 2024. Forest floor includes all organic materials above the mineral soil surface (litter, sticks, moss, leaves, duff and O horizons, and plants) as defined by the Forest Soil Disturbance Monitoring Protocol US Forest Service Region 9 Standardized Data Collection Guidance June 4, 2024. This data shows timber harvesting had an increased impact on the Forest Floor from around 1 percent to almost 40 percent of the areas monitored. This is a large increase in area and likely reflects the increase in Class 1 disturbance after harvesting.

Table 2-22. Estimated percent area of paired pre- and post-harvest sites monitored for forest floor attributes for fiscal years 2017 to 2024.

Forest Floor Attributes	Percent	
	Pre-Harvest	Post-Harvest
Forest Floor Impacted	1.11	39.85
Understory Live Plant Cover	58.89	72.63
Invasive Plants	0.00	0.00
Fine Woody <7cm	83.89	88.26
Coarse Woody >7cm	8.33	31.84
Bare Soil	0.00	4.99
Surface Rock	1.11	5.83

The following observations are highlighted for monitoring data collected from pre- and post-harvest paired sites:

- On average, after harvest, there was an increase in area of 13.74 percent in the understory live plant cover. This is expected as removing overhead trees from harvesting would open the canopy and allow for more light to reach the ground, encouraging understory plant cover.
- There were no invasive plants found before or after monitoring, which is a good indicator that practices to reduce invasive species have been working.
- Fine woody debris has a slight increase of about 4.37 percent. Coarse wood debris increased by a larger 23.51 percent in area after harvesting. Often, larger branches are broken during harvesting, and parts of trees are purposefully left behind to add protection to the ground during operations in the form of slash mats, as well as slash left on site after harvesting to retain nutrients and carbon on sites. An increase in coarse wood debris could become an issue if they prevented new plant growth from occurring but should not have a negative effect on soils if they are not left in dense piles.
- Bare soil increased by 4.99 percent and bare rocks increased in area by 4.27 percent after harvesting. Machinery likely could have exposed more topsoil and bare rock during timber operations. This would be expected in areas such as skid trails, but should be reduced in areas, especially off skid trails. Sometimes, some bare soil exposure is good or is planned to improve recruitment of desirable plants such as oaks. Increasing the diversity of species within a forest can allow for more robust diversity in soil organisms that would improve soil function and productivity long-term, so having some area of bare soil and rock exposed but not in excessive amounts where erosion and nutrient loss are occurring is acceptable.
- The overall large increase in impacted forest floor measured can be due to a combination of the increase in live understory plant cover, increased coarse woody debris, and increased amounts of bare soil and surface rock.

Table 2-23 provides monitoring results for surface soil attributes that explain more about the increase in forest floor impacted and Class 1 after harvesting. Topsoil (surface soil) primarily includes the mineral A horizon but may include other horizons if it is shallow or not well developed. Topsoil displacement involves the removal of soil material from one place to another. Topsoil usually has high infiltration rates, and subsoils tend to be more erodible, which is why it is important to maintain topsoil. Topsoil displacement went from 2 percent of the area on average in pre-harvested sites to 9.22 percent after harvesting. This increase of about 7 percent lines up well with the bare soil and surface rock increase of about 5 and 6 percent, respectively (Table 2-22). As previously discussed, having some exposure of the mineral soil from topsoil displacement is not a detrimental issue to soil if it is not occurring on a large percentage of the units. Maintenance of surface soils is an important objective, especially in shallow soils or where they are particularly thin, and the organic horizons help protect against erosion and store a large amount of shallow soil nutrients.

Table 2-23. Estimated percent area of paired pre- and post-harvest sites monitored for surface soil attributes for fiscal years 2017 to 2024.

Surface Soil Attributes	Percent	
	Pre-Harvest	Post-Harvest
Topsoil Displacement	2.22	9.22
Erosion	4.44	6.21
Mixed Top and Sub Soil	2.22	2.55
Shallow Rutting (0-5cm in depth)	0.00	2.23
Moderate Rutting (5-10cm in depth)	0.00	0.46
Deep Rutting (10+cm in depth)	0.00	1.21

The change in mixed top and subsoil attribute was negligible after harvest. Erosion is the detachment and movement of soil or rock by water, wind, ice, or gravity. Indicators include rills, gullies, erosion pavement, and pedestalling. There was only a slight increase in erosion of 1.77 percent increase in area after harvesting.

Ruts vary in depth but are primarily the deformation of the soil from equipment operation during suboptimal moisture conditions or on soils with low bearing strength. Compacted ruts can channel water downslopes, cause erosion, and slow vegetation regeneration. Shallow ruts after harvest increased in area from zero to 2.23 percent, moderate ruts increased 0.46 percent, and deep ruts increased 1.21 percent. There was some increase in rutting at these sites, but as long as these remain low and BMPs are utilized to reduce issues with runoff and erosion, this level is not detrimental.

Table 2-24 provides monitoring results for subsurface attributes that can occur deeper into the soil. Soil compaction is an increase in the soil bulk density, and a decrease in the soil porosity, by the application of mechanical forces to the soil (Soil Science Society of America 2001). Compaction reduces soil water and air and can make it harder for plant roots to grow.

Table 2-24. Estimated percent area of paired pre- and post-harvest sites monitored for subsurface attributes for fiscal years 2017 to 2024.

Subsurface Attributes	Percent	
	Pre-Harvest	Post-Harvest
Compaction (0-10cm in depth)	4.44	21.63
Compaction (0-30cm in depth)	2.22	5.81
Compaction (30+cm in depth)	2.22	0.00
Platy, Massive, Puddled (0-10cm in depth)	1.11	5.65
Platy, Massive, Puddled (10-30cm in depth)	1.11	0.56
Platy, Massive, Puddled (30+cm in depth)	1.11	0.00

There was an increase in compaction of 17.19 percent from 0-10cm, 3.59 percent 10-30cm, and a decrease in compaction greater than 30cm deep in the estimated percentage of area after timber harvesting. The decrease in deep compaction after harvest is not likely because deep compaction disappeared after harvesting, but because of the random nature of transect sampling or due to the interpretation of the person collecting the data. Shallow compaction often recovers relatively quickly compared to deeper or more severe soil impacts. Shallow compaction, particularly in coarse-textured soils, recovers naturally where freeze-thaw cycles, biological activity, and root growth restore porosity over time. BMPs such as designated skid trails, limited operations during wet conditions, and slash applications further minimize impacts and support recovery. Soils on GMNF tend to be silt loam or very fine sandy loam. Studies to determine the recovery of shallow compaction would be very valuable in better understanding the long-term effects on soils. Some features, like landings, primary skid trails, and temporary roads, pose a higher risk for long-term degradation, especially when compacted beyond recovery thresholds or left untreated. Reducing the amount of compaction is preferred, so encouraging the use of lightweight machinery with large tires and tracks and using slash and other matter to help distribute weight together with avoiding operations during wet conditions could help reduce compaction. The observed increase in shallow compaction is not too much of a concern at this time, although finding options to reduce compaction would be useful.

A platy soil structure is evident with flat-lying or tabular structure in the mineral soil. Massive indicates no structural units are present, and soil material is a coherent mass. A puddled soil condition results from both shearing and compactive forces, which destroy natural structure and result in a condition of greatly reduced pore space (Soil Science Society of America 2001). The platy, massive puddled 0-10cm attribute increased 4.54 percent of area after harvesting and decreased slightly after harvesting for 10cm or greater depths. Like the deep compaction, the decrease in platy massive structure is not likely due to timber harvesting. Platy structure often happens with compaction, and this low amount found at shallow depths suggests that not a large impact is occurring to soils after harvest.

In summary, the impacted area of forest floor attributes increased greatly after timber harvest. This can be due to the larger increases in plant cover, large woody debris, as well as the increases in bare soil and surface rock from rutting and topsoil displacement. Erosion and mixing of topsoil and subsoil, and rutting were minimally increased in the area after harvesting, which is good. Compaction at 0-10cm increased in area by about 17 percent after harvesting, with no indication of the less recoverable deep compaction occurring after timber harvest. Shallow compaction is believed to recover with time on its own, but the persistence of GMNF soils should be further studied to better understand if there could be impacts on long-term soil functions and productivity. According to the paired before and after monitored sites, having operators continue to follow BMPs, as well as using more slash on the ground to dissipate tire pressure, can reduce shallow compaction. Operating during conditions when the ground is most stable, such as when frozen, under snow cover, or when dry can also reduce compaction. Overall, the sites with paired pre- and post-results appear to be meeting Forest Plan goals, objectives, and Forest-wide standards for maintaining soil functions and productivity during operations.

All Pre- and Post-Harvest Site Monitoring

Monitoring results are also derived from forest-wide data collected between fiscal years 2017 and 2024 (Table 2-19). Unlike the paired pre- and post-harvest comparisons previously discussed, most of these sites are not the same before and after harvest. While less direct, this broader data set provides an opportunity to consider how forest management affects soils.

Table 2-25 includes the estimated percent area of all pre-harvest sites monitored for Disturbance Class 0-3 and detrimental soil disturbance (DSD) for fiscal years 2017 to 2024. Pre-harvest sites on average had a high percentage of Class 0 soils, although not entirely undisturbed. An estimated 10.97 percent of area was classified as Class 1 (light disturbance), with very low amounts of Class 2 and Class 3 disturbance, and 1.26 percent classified as DSD. These areas of moderate to high disturbance, including those identified as detrimental, were present prior to harvest and may reflect legacy impacts such as old roads and trails.

Table 2-25. Estimated percent area of all pre- and post-harvest sites monitored for Disturbance Class 0-3 and DSD for fiscal years 2017 to 2024.

Pre- or Post-Harvest	Percent Disturbance Class				Percent DSD
	Class 0	Class 1	Class 2	Class 3	
Pre	89.69	10.97	1.17	0.17	1.26
Post	45.65	37.86	12.78	5.41	17.15

Table 2-25 also includes post-harvest sites monitored that are not related directly to pre-harvest site monitoring. Data results show the level of Class 0 soils was much lower at 45.65 percent (decreasing potentially around 44.04 percent). Post-harvest Class 1 estimated percent area of the units was on average at 37.86 percent with increase of 26.89 percent. These sites are not direct comparisons, but they suggest on average there can be larger amount of Class 0 soils transitioning to Class 1 after timber harvests. Some soil disturbance is to be expected after timber harvests, and Class 1 areas are believed to remain functioning and are more likely to recover naturally over time.

Class 2, which indicates a moderate impact on the soil, is at a moderate level of 12.78 percent potentially increasing 11.61 percent of area. This level of disturbance is not ideal, as recovery is slower than Class 1, but it remains below detrimental thresholds. More mitigation measures might be beneficial in reducing the area of Class 2 disturbances. Class 3 soil disturbance post-harvest was on average 5.41 percent. The low percentage of severe soil disturbance is good, as this type of impact is less likely to recover.

DSD determinations reflect the likelihood of soils recovering function and productivity within 10 to 20 years. Post-harvest DSD averaged 16.18 percent, which indicates a need for improved management practices. Monitoring results specific to the Texas Timber Sale indicate very high levels of Class 2, Class 3, and DSD disturbance (Table 2-26). When these timber sale sites were excluded, overall post-harvest averages dropped Class 3 to 2.22 percent and DSD to 11.91 percent, a reduction of 3.19 percent, and 5.24 percent, respectively.

Table 2-26. Estimated percent area of Texas Timber Sale post-harvest sites monitored for Disturbance Class 0-3 and DSD for fiscal years 2017 to 2024.

Survey Timing	Percent Disturbance Class				Percent DSD
	Class 0	Class 1	Class 2	Class 3	
Post	39.00	27.36	17.73	16.91	35.32

Soil attribute disturbance levels indicated by Texas Timber Sale monitoring sites suggest that many affected areas in this sale are unlikely to recover for an extended period and may require active

restoration. Discussions with Forest Service timber staff indicate some sale units were harvested as wildlife openings. The long-term timber productivity within these units is expected to be compromised since the primary objective of harvest is to provide wildlife habitat. However, the level of soil disturbance observed exceeded expectations for openings. Harvesting occurred under wet conditions, and Vermont Acceptable Management Practices (VANR 2018) were either incorrectly applied or not applied at all. Subsequent rain events caused additional erosion. These results demonstrate the importance of harvesting under suitable conditions and applying Acceptable Management Practices correctly to prevent detrimental disturbance.

Table 2-27 shows results from monitoring all pre-harvest sites for soil disturbance attributes. Pre-harvest sites had very low levels of forest floor impact (1.63 percent), bare soil (1 percent), and surface rock (3.41 percent). Live plant cover was high at 68.25 percent. Fine woody debris was abundant, coarse woody debris moderate, and topsoil displacement was minimal, with almost no erosion or rutting observed. Shallow compaction (0–10 cm) averaged 5 percent and decreased with depth. Small amounts of platy or puddled soils were found in the top 0–10 cm but were nearly absent deeper.

Table 2-27. Estimated percent area of all pre-harvest sites monitored for soil disturbance attributes for fiscal years 2017 to 2024.

Area Disturbed - Pre-Harvest	
<i>Forest Floor Attributes</i>	<i>percent</i>
Forest Floor Impacted	1.63
Understory Live Plant Cover	68.25
Invasive Plants	0.00
Fine Woody <7cm	91.60
Coarse Woody >7cm	15.79
Bare Soil	1.00
Surface Rock	3.41
<i>Surface Soil Attributes</i>	<i>percent</i>
Topsoil Displacement	2.69
Erosion	0.65
Mixed Top and Sub Soil	0.48
Shallow Rutting (0-5cm in depth)	0.18
Moderate Rutting (5-10cm in depth)	0.09
Deep Rutting (10+cm in depth)	0.09
<i>Subsurface Attributes</i>	<i>percent</i>
Compaction (0-10cm in depth)	4.98
Compaction (0-30cm in depth)	0.98
Compaction (30+cm in depth)	0.37
Platy, Massive, Puddled (0-10cm in depth)	0.46
Platy, Massive, Puddled (10-30cm in depth)	0.37
Platy, Massive, Puddled (30+cm in depth)	0.28

Post-harvest monitoring showed higher levels of forest floor impact (Table 2-28), similar to paired results previously discussed. Coarse woody debris also appeared to increase. There was more bare soil in this post site data (averaged 9.15 percent), while surface rock area remained low. Topsoil displacement averaged 14.17 percent consistent with the increase in bare soil. Erosion levels were higher after harvesting, increasing about 5 percent, and rutting rose from nearly zero pre-harvest to about 2 percent.

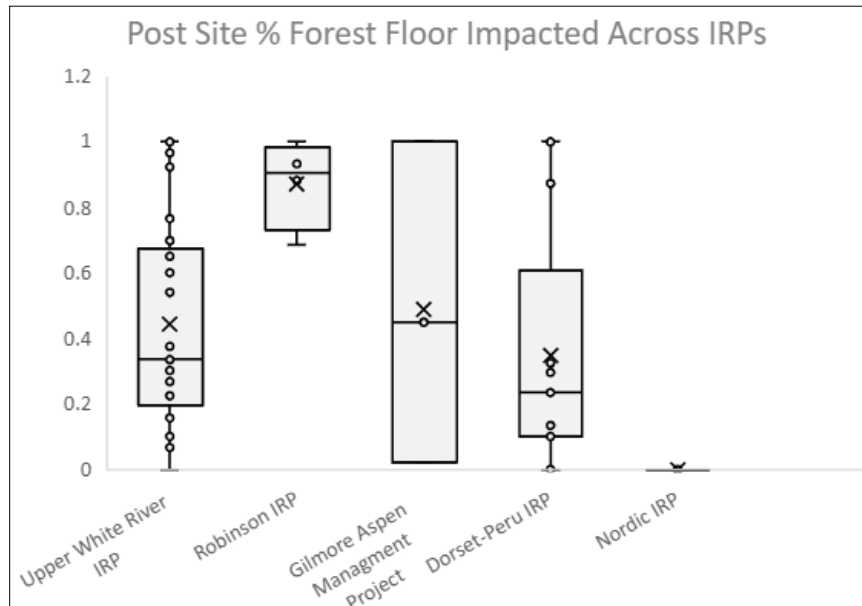
In the subsoil, compaction may have increased after harvesting, especially at shallower 0-10cm depths. However, there was also deeper compaction in the post site data with 0-30cm having 8.32 percent of area

and 30+cm at 2.73 percent. Platy massive, puddled soils slightly increased also at all depths but more so at the surface 0-10cm. It would be expected for platy, massive and puddled soils to increase when compaction increases. Shallow compaction is less persistent, especially in sandy soils, but deeper compaction poses longer-term risks.

Table 2-28. Estimated percent area for all post-harvest sites monitored for soil disturbance attributes in fiscal years 2017 to 2024.

Area Disturbed: Post-Harvest	
<i>Forest Floor Attributes</i>	<i>percent</i>
Forest Floor Impacted	42.02
Understory Live Plant Cover	76.98
Invasive Plants	0.28
Fine Woody <7cm	89.34
Coarse Woody >7cm	26.09
Bare Soil	9.15
Surface Rock	3.77
<i>Surface Soil Attributes</i>	<i>percent</i>
Topsoil Displacement	14.17
Erosion	5.90
Mixed Top and Sub Soil	4.37
Shallow Rutting (0-5cm in depth)	2.56
Moderate Rutting (5-10cm in depth)	1.83
Deep Rutting (10+cm in depth)	1.36
<i>Subsurface Attributes</i>	<i>percent</i>
Compaction (0-10cm in depth)	18.86
Compaction (0-30cm in depth)	8.32
Compaction (30+cm in depth)	2.73
Platy, Massive, Puddled (0-10cm in depth)	8.15
Platy, Massive, Puddled (10-30cm in depth)	2.92
Platy, Massive, Puddled (30+cm in depth)	1.34

Figure 2-4 shows box plots of the percentage of area in sites with forest floor impacted grouped by vegetation management project. Mean and medians were highest in the Robinson Integrated Resource Project (IRP). The Nordic Project had very few monitoring sites but had the lowest impact with Dorset-Peru IRP as second lowest. The Gilmore Aspen Project also had few monitoring sites but contained a great amount of variability in the results. Overall impact to the forest floor was a common indicator in post site monitoring's across projects except the Nordic Project which had a very low monitoring sample size.

Figure 2-4. Box plots of the percentage of area in sites with forest floor impacted grouped by project.

Note: Mean is represented by x and median is represented by the middle line.

Figure 2-5 shows the post-harvest percentage of DSD across the different vegetation management projects. The Gilmore Aspen Project exhibited the greatest variability, while Nordic Project showed almost no measurable DSD. Dorset-Peru IRP had comparatively low mean and median DSD levels. In contrast, Upper White River IRP displayed higher overall variability, with several sites experiencing elevated disturbance levels. Robinson IRP had a higher median than Upper White River IRP but, on average, exhibited less disturbance and lower variability.

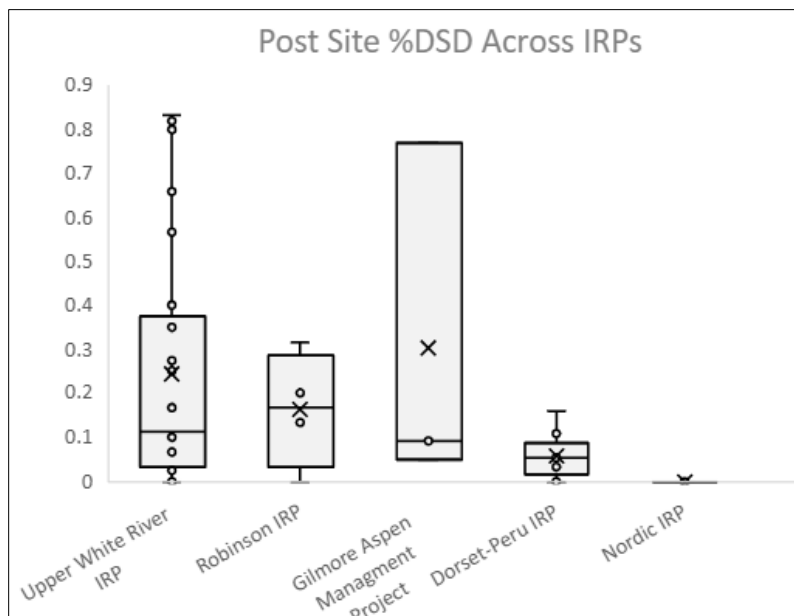
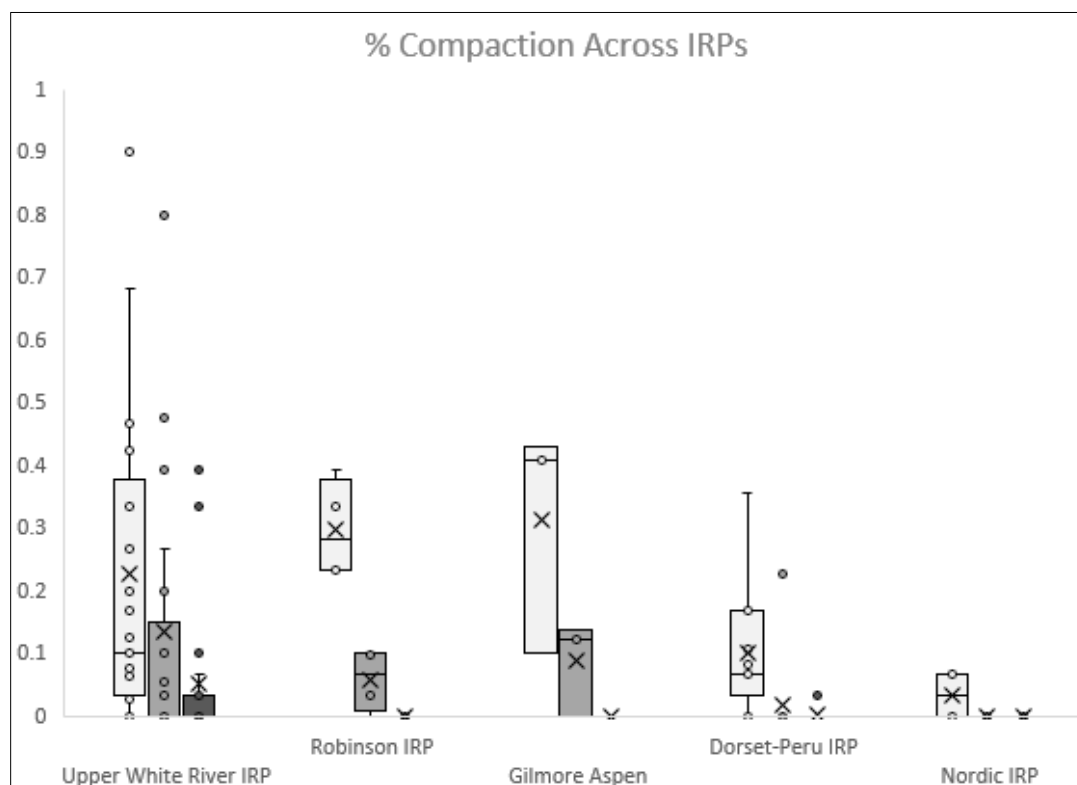
Figure 2-5. Post-harvest percentage of DSD for vegetation management projects.

Figure 2-6 shows boxplots of the percent area with compacted soils for vegetation management projects at multiple depths. The Upper White River IRP demonstrated the highest level of compaction at depths ≥ 30 cm, while the other sites showed negligible deep compaction. Dorset-Peru IRP and Nordic Project had the lowest overall mean and median compaction values.

Disturbance to the forest floor was observed more consistently than deep soil compaction across management units. Levels of DSD were generally higher in the Upper White River and Robinson IRPs compared to Dorset-Peru IRP, and Nordic and Gilmore Aspen projects. These differences likely reflect variation in soil properties, harvesting conditions and/or in the application of BMPs. For example, the more detrimentally disturbed Texas Timber Sale was located within the Upper White River IRP possibly contributing to elevated overall disturbance levels and the wide range of variability of impacts. The occurrence of deeper compaction highlights the importance of harvesting during optimal conditions to prevent long-term negative impacts to soil resources. Although shallow compaction (0–10 cm) was recorded across all sites, variation in averages suggests these effects could continue to be reduced through careful management practices.

Figure 2-6. Boxplots of the percent area with compacted soils for vegetation management projects at multiple depths (very light grey = 0-10cm, medium grey = 10-30cm, dark grey = 30cm+).



Overall monitoring results showed that soils can be adversely impacted when not following Acceptable Management Practices (VANR 2018) and not harvesting during ideal conditions. This further supports the importance of Forest Service staff continuing to follow Forest Plan Standards and Guidelines, and project specific design features and mitigation measures for future projects to help reduce compaction and disturbance.

Across all sites, it was more common to have an increased impact on the forest floor after timber harvesting as well as Class 1 disturbance levels. A combination of factors, such as increased coarse

woody material and live plants, or an increase in topsoil displacement with more bare ground and rocks being exposed, were common indicators that occurred and are related to changes in the forest floor. Class 1 light soil disturbance levels should improve with time, but steps can be taken to reduce these impacts further into the future. It should also be noted that the sites for post-harvest were selected because of unique concerns with soil or other variables, and likely other timber sale sites would be similar to or less impacted than the sites that were monitored. Additional techniques, such as doing more with slash or worksite mats to help reduce impacts to the forest floor and reduce compaction, could allow for more harvesting to be done with less impact to the soil.

Increases in forest floor disturbance and Class 1 disturbance levels were also common. Indicators included greater amounts of coarse woody material and live plants, as well as increased topsoil displacement and bare ground exposure. Although Class 1 disturbances are expected to recover over time, steps can be taken to further reduce these impacts. It should also be noted that post-harvest sites selected for monitoring were chosen due to specific concerns with soils or other variables, and other timber sale sites may have similar or lower levels of disturbance as they had less soil related concerns. Soil scarification will also cause some minor soil disturbance but can be used as a management technique to help the regrowth of certain tree species such as oak. In this circumstance some Class 1 soil disturbance is necessary to reach forest management objectives and would not be expected to cause long-term soil concerns.

Additional management techniques such as using more slash or worksite mats could further reduce compaction and forest floor disturbance, allowing harvesting to proceed with fewer soil impacts. Post-harvest monitoring should continue to track changes in compaction at different depths and to document recovery of other indicators over time. Monitoring other sites using the FSDMP protocol, such as prescribed burned areas or in areas of new trail construction, should also be included to determine soil effects from these types of management activities.

Recommended Changes (Monitoring Question or Forest Plan Components)

None.

3. Other Monitoring Questions

In addition to the monitoring questions selected to address the eight required elements listed in Table 2-1, other monitoring questions have been developed to assist in determining how well management activities are meeting Forest Plan direction. While none of these questions have been selected to address any of the required elements, Forest Service staff can use them to improve the Forest Plan or refine management activities pending budget and staffing capacity. The details for these other monitoring questions can be found in the 2025 Monitoring Guide including the Forest Plan component they address, associated measurement indicators, monitoring protocol and methodology, and reporting frequency.

Air

Monitoring Item: Air Particulate

Management Question

To what extent are air quality and atmospheric deposition affecting sensitive components of the forest ecosystem?

Detailed Monitoring Question

What is the composition of particles in the air, and how are the levels of particulates changing over time?

Measurement Indicators

Elements and compounds (type and amount) present in particulate matter

Monitoring Driver

Forest Plan Goal 5 and associated Objectives

Reporting Frequency

Annually

Last Year Reported

Fiscal years 2017 and 2018 biennial monitoring and evaluation report

Next Year Scheduled for Reporting

Fiscal years 2025 and 2026 biennial monitoring and evaluation report

Background

The intent of this monitoring question is to help determine if management activities are meeting Forest Plan Goal 5 to “*maintain or improve air quality on the GMNF*”, and associated Objective to “*provide credible air quality and Air Quality Related Values monitoring data to contribute to air quality permit reviews and Regional Planning Organization processes*” (Forest Plan, p. 14). Air quality is a major factor influencing forest ecosystem and human health. Air chemistry is measured on NFS lands at Mount Snow using the IMPROVE protocol. The IMPROVE monitor collects aerosol samples which may impact air quality related values (AQRVs), such as water quality, scenic values, and visibility in the Lye Brook Class I Area. These aerosol samples are analyzed to obtain a chemical profile of airborne particles.

Monitoring Activities

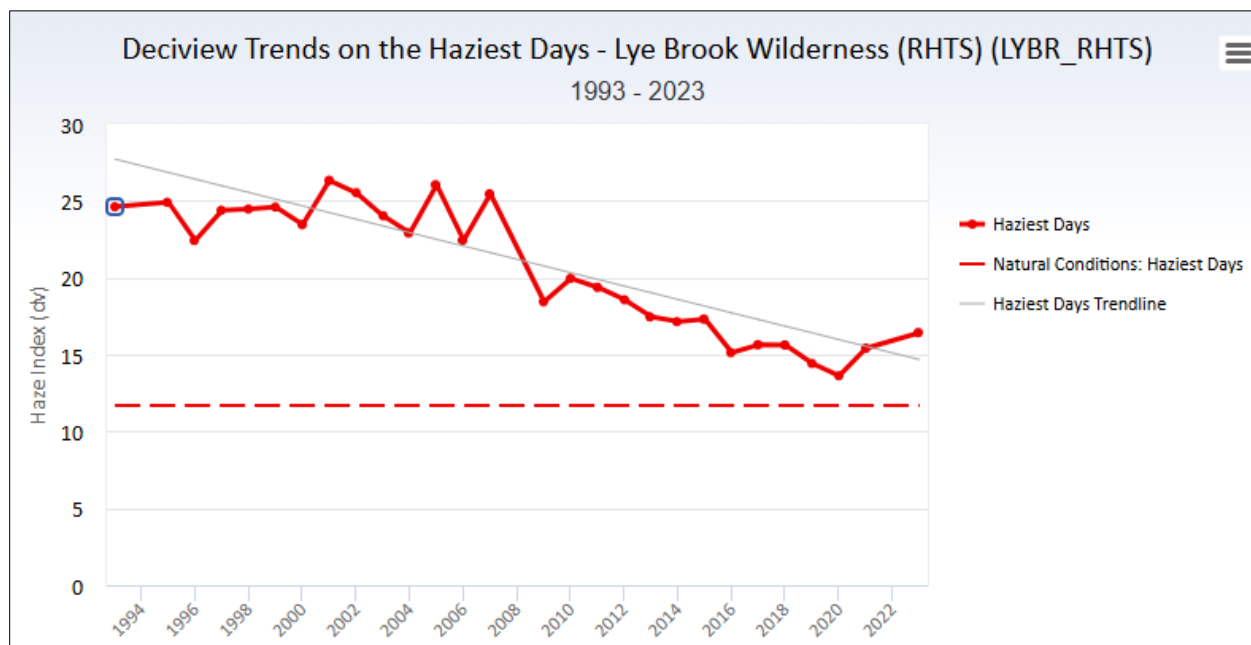
To measure for the visibility AQRV, Forest Service staff maintain an IMPROVE (Interagency Monitoring of Protected Visual Environments) site at Mount Snow within the Manchester Ranger District, near the Lye Brook Wilderness Area. Filter samples are analyzed and data is processed in partnership with Colorado State University and University of California. The IMPROVE site consists of an aerosol visibility monitor, measuring speciated fine particulate matter. On a national scale, managing for visibility impairment in Class I areas is being done, in part, due to the 1990 amendments to the Clean Air Act. The 1990 amendments noted numerous sources of air pollution were contributing to regional haze, which affects Class I areas.

Regional haze is defined as visibility impairment caused by the cumulative air pollution emissions from numerous sources over a wide geographic area. Some of the common fine particulates that can impair visibility include sulfates, nitrates, organic material, elemental carbon (soot), and soil. The initial Regional Haze Rule was proposed by the Environmental Protection Agency (EPA) in 1997 and was finalized in 1999. Under this rule, all states are required to submit implementation plans for improvement of visibility in Class I areas to EPA. The Forest Service has been active in reviewing these state implementation plans across the United States. For GMNF, the focus is on reviewing the state implementation plans that have the greatest likelihood of affecting the air quality in the Class I area.

Evaluation and Conclusions

The IMPROVE site has been in operation since the 1990's. Figure 3-1 demonstrates how standard visual range has dramatically improved for the haziest 20 percent days at the Lye Brook IMPROVE site from 1993 through 2023 (FED 2025); data is not yet available for 2024.

Figure 3-1. *Reductions in haze/speciated fine particulate matter at Lye Brook from 1993 to 2023 using the haze index, in deciview (dv) units.*

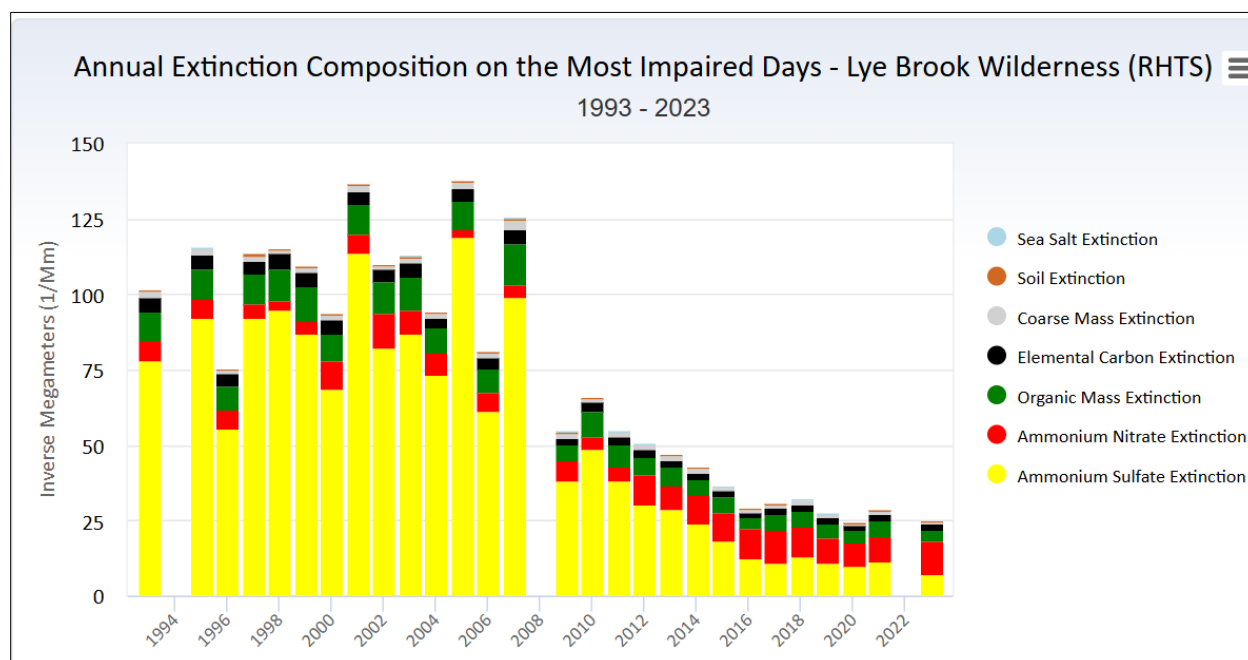


Increased visibility, or standard visual range, is a direct result of less air pollution, or haze, being visible to the human eye and is measured using the term “deciview”. The deciview, a unit of measure of haze, or “haze index,” is a measure of visibility derived from light extinction that is designed so that incremental changes in the haze index correspond to uniform incremental changes in visual perception, across the

entire range of conditions from pristine to highly impaired. The haze index, in units of deciviews (dv), is calculated directly from the total light extinction. From 1993 to 2007, visibility on the haziest 20 percent days in Lye Brook Wilderness was in the range of about 22 to 26 dv, which is approximately the equivalent to a 25 to 40 kilometer (km) standard visual range. By 2023, the visibility on the haziest 20 percent days was 17 dv, or about 71 km standard visual range. This improvement over 15 years has approximately doubled how far one can see on the haziest 20 percent days due to fewer particles/less pollution in the air.

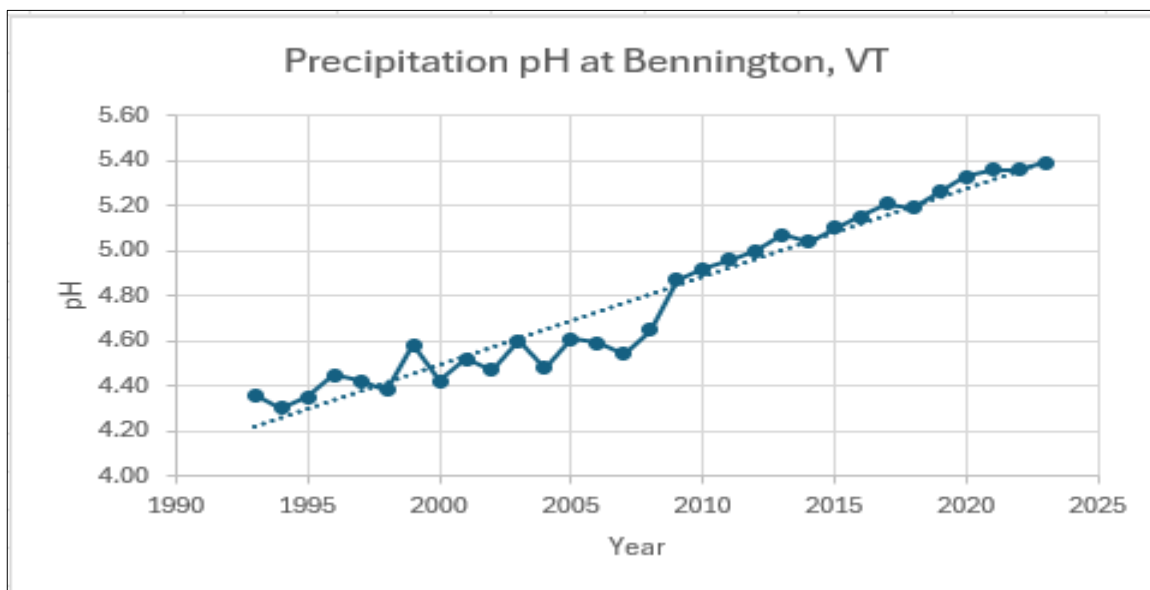
The composition of particulates of pollutants which cause visibility degradation at the Lye Brook IMPROVE site is shown in Figure 3-2. The primary pollutant causing approximately 75 percent of this reduced standard visual range, or haze, on the 20 percent worst days, from 1993 to 2007 was ammonium sulfate (FED 2025). The precursor (sulfur dioxide emissions) that led to these levels of ammonium sulfate in the atmosphere above Lye Brook Wilderness Area has been reduced, in part, due to federal Clean Air Act requirements. By 2023, ammonium sulfate levels had reduced dramatically at Lye Brook, and contributed to less than 30 percent of the reduced standard visual range. This helps to explain the improvements in air quality over the past 15 years. No data was available for 1995, 2008, or 2022 due to incomplete datasets for those years.

Figure 3-2. *The composition of particulates of pollutants which cause visibility degradation at the Lye Brook IMPROVE site.*



Atmospheric deposition, as measured by wet precipitation, is measured in Bennington, VT, approximately 25 km southwest of Lye Brook, by the Town of Bennington and the State of Vermont. Figure 3-3 shows the change in acidity (measured as pH) for the years 1993 through 2023; data is not yet available for 2024. Acidity of wet deposition over this time has changed almost one pH unit, which means the wet precipitation is almost ten times less acidic in 2023 as compared to 1993 (NADP 2025). This data is similar to the data collected at the IMPROVE site as both data sets are showing improvements in air quality.

Figure 3-3. Annual volume-weighted mean concentrations in standard pH units for the NADP/NTN site in Bennington, VT.



Air particulate monitoring should continue on GMNF as part of Federal rules requiring state and federal agencies to work together to improve visibility in Class I areas, such as Lye Brook Wilderness Area, so that the Regional Haze Rule goal of achieving natural visibility by 2064 is achieved. This protocol does not address to what extent air quality and atmospheric deposition are affecting sensitive components of the forest ecosystem. Effects on sensitive components of forest ecosystems are addressed in several other monitoring questions in this monitoring and evaluation report.

Recommended Changes (Monitoring Question or Forest Plan Components)

None.

Aquatic Ecosystems

Monitoring Item: Fish Habitat

Management Question

How well do Forest Plan components conserve or improve fisheries habitat?

Detailed Monitoring Question

To what extent are management activities conserving or improving fisheries habitat?

Measurement Indicators

1. Implementation and effectiveness monitoring for Best Management Practices (BMPs)
2. Aquatic habitat improved – miles of stream and acres of lakes and ponds (excluding fish stocking-related accomplishments)

Monitoring Driver

- Forest Plan Goal 2 and associated Fisheries Objective
- Forest Plan Goal 4 and associated Objectives

Reporting Frequency

Biennially for measurement indicator 1; Annually for measurement indicator 2

Last Year Reported

Not applicable; new question starting fiscal year 2019

Next Year Scheduled for Reporting

Fiscal years 2025 and 2026 biennial monitoring and evaluation report

Background

The intent of this monitoring question is to help determine how well management activities are meeting Forest Plan Goal 2 Fisheries Objective to “*maintain or enhance fish populations through habitat protection, enhancement, and restoration, and stocking programs*”, and Goal 4 to “*maintain or restore aquatic, fisheries, riparian, and wetland habitats*” and associated Objectives (Forest Plan, p. 13). It also helps address specific concerns related to management of fish habitat on NFS lands. Historically, fish habitat has been impacted by various land use and land cover changes. Some of those impacts are recovering slowly through natural processes, but some require or are expedited by active management. Additionally, water quality is a key driver for the success of fish spawning and survival. Ensuring water quality is conserved helps ensure the persistence of fish populations.

Monitoring Activities

To help protect water quality, Forest Service staff incorporates water quality Best Management Practices (BMPs) into all project design and implementation (USDA Forest Service 2012a). The Forest Service developed a standardized monitoring protocol to track the degree to which BMPs are implemented as well as how effective they are in preventing degradation to water quality. Forest Service staff conduct BMP monitoring on a handful of randomly selected, representative, or targeted projects each year. The results provide a snapshot of how well water quality is protected from degradation by land management activities and permitted land uses. Table 3-1 shows the results of BMP monitoring activities during fiscal years 2019 to 2024.

Table 3-1. Best Management Practices monitoring results during fiscal years 2019 to 2024.

Fiscal Year Reporting Period	Composite Rating (Number of Sites)						
	Excellent	Good	Fair	Poor	Undetermined	No Plan	Missing Data
2019-2020	1			1			2
2021-2022	2				3		
2023-2024	1						

Aquatic habitat restoration projects of various types are completed as staff and funding allow. These accomplishments are reported annually via the Watershed Improvement Tracking (WIT) database and include miles of stream habitat improved and acres of lake habitat improved. This database is queried to indicate the accomplishments reported by fiscal year (Table 3-2).

Table 3-2. Miles of stream habitat and acres of lake habitat improved during fiscal years 2019 to 2024.

Fiscal Year	Stream Habitat Improved (miles)	Lake Habitat Improved (acres)
2019	21.00	0
2020	7.45	0
2021	3.12	0
2022	7.81	45
2023	12.78	0
2024	5.88	0
Totals	145.26	45

Evaluation and Conclusions

Although there is room to improve, BMP monitoring indicates that projects are generally managed successfully to conserve conditions that support healthy fisheries. Accomplishment monitoring shows that there was a sharp drop in annual stream habitat improvement projects in 2020 and 2021, likely related to logistical restrictions caused by the response to the Covid 19 pandemic. However, rates of project implementation have not markedly increased as work has gotten back to normal, which is likely a reflection of reductions in funding. In most years, lake-related habitat projects are not implemented. This is likely a reflection of the reduced need for projects in lake habitat relative to streams, the latter being more at risk of erosional concerns and absence of deep-water refuge for aquatic species. The lake habitat work completed in 2022 is reflective of a riparian willow planting project intended to reduce shoreline erosion at a waterbody with high recreational use.

Forest Service staff should continue to utilize BMP monitoring to refine the design and implementation of project specific design features and mitigation measures to supplement Forest Plan Standards and Guidelines to protect fisheries habitat. Better composite ratings across all project types ensure ground disturbing or vegetation manipulation management activities are not contributing to degradation of on-Forest or downstream fish habitat. Staff should also continue to seek low-cost and/or partner-supported opportunities for stream habitat improvements.

Recommended Changes (Monitoring Question or Forest Plan Components)

None.

Monitoring Item: Stream Function

Management Question

How well do Forest Plan components provide desirable aquatic organism passage and stream function conditions?

Detailed Monitoring Question

To what extent are management activities ensuring stream crossing structures allow desirable fish habitat and stream function conditions such as aquatic organism passage and passage of water and debris associated with high flows?

Measurement Indicators

Number of stream crossing structures improved per year to meet Aquatic Organism Passage design criteria (i.e., crossings mitigated to standard)

Monitoring Driver

- Forest Plan Goal 2 and Fisheries Objectives

- Forest Plan Goal 4 and associated Objectives
- Forest-wide Direction, Section 2.3.2 Soil, Water, and Riparian Area Protection and Restoration Standards S-5 and S-6
- Forest-wide Direction, Section 2.3.8 Fisheries Standard S-1
- Forest-wide Direction, Section 2.3.18 Transportation Analysis; Road Design and Construction Standards S-4 and S-5

Reporting Frequency

Annually

Last Year Reported

Fiscal years 2017 and 2018 biennial monitoring and evaluation report (monitoring question and measurement indicators revised starting fiscal year 2019)

Next Year Scheduled for Reporting

Fiscal years 2025 and 2026 biennial monitoring and evaluation report

Background

The intent of this monitoring question is to help determine how well management activities are meeting Forest Plan Goal 2 Fisheries Objective to “*maintain or enhance fish populations through habitat protection, enhancement, and restoration, and stocking programs*”, and Goal 4 to “*maintain or restore aquatic, fisheries, riparian, and wetland habitats*” and associated Objectives (Forest Plan, p. 13). Forest-wide Standards and Guidelines also call for adequate aquatic passage associated with the transportation network. Aquatic organism passage (AOP) has been a particular management focus on GMNF for more than a decade. Poorly designed bridges and culverts that represent the historical standard for stream crossings based on idealized stream flow conditions are insufficient for maintaining functional stream channels. This has led to habitat fragmentation for aquatic species and accelerated erosion and deposition in stream habitat. The importance of improving stream crossings by providing AOP for fisheries habitat and stream functions is great enough that it merits a dedicated monitoring question to demonstrate the degree to which fish habitat and watershed function improvements are being made by completing these projects.

Monitoring Activities

AOP projects are completed on NFS lands and non-NFS lands via the Wyden authority as Forest Service staff and funding allow. These accomplishments are reported annually via the WIT database and include a count of projects completed. This database is queried to indicate the accomplishments reported by fiscal year (Table 3-3).

Table 3-3. Number of stream crossing structures improved to meet AOP design criteria during fiscal years 2019 to 2024.

Fiscal Year	Number of Improved Stream Crossings	Location
2019	3	(Unnamed, Hanks Brook, Voter Brook)
2020	1	(unnamed)
2021	0	n/a
2022	0	n/a
2023	2	(both unnamed)
2024	1	(unnamed)
Total	7	

Evaluation and Conclusions

Monitoring indicates Forest Service staff continue to seek opportunities to improve aquatic habitat through the removal of aquatic organism passage barriers and improvement of road-stream crossings to meet AOP design principles. Accomplishment monitoring shows that there was a sharp drop in annual AOP projects in 2020 and 2021, likely related to logistical restrictions caused by the response to the Covid 19 pandemic. However, rates of project implementation have not markedly increased as work has gotten back to normal, which is likely a reflection of reductions in funding.

Recommended Changes (Monitoring Question or Forest Plan Components)

None.

Fire

Monitoring Item: Hazardous Fuels

Management Question

Are fuel treatment activities reducing fuel loads?

Detailed Monitoring Question

To what extent have management activities reduced hazardous fuels?

Measurement Indicators

Number of KP6 and KP3 acres treated for hazardous fuels reduction

Monitoring Driver

Forest Plan Goal 21 and associated Objectives

Reporting Frequency

Annually

Last Year Reported

Fiscal years 2017 and 2018 biennial monitoring and evaluation report (monitoring question and measurement indicator revised starting fiscal year 2019)

Next Year Scheduled for Reporting

Fiscal years 2025 and 2026 biennial monitoring and evaluation report

Background

The intent of this monitoring question is to help determine how well management activities are meeting Forest Plan Goal 21 to “*protect human life, property, and facilities from wildland fire hazards*”, and associated Objective to “*reduce hazardous fuels through fire use, mechanical treatments, and harvest treatments*” (Forest Plan, p. 18). Hazardous fuels reduction is a nationally recognized area of emphasis for the Forest Service and is prioritized in Fire and Fuels Program management activities. Prescribed fire, mechanical treatments (mowing and mastication), and timber management are all valuable methods in reducing hazardous fuels in most fuel types found on GMNF. Hazardous fuels treatments are effective in reducing risk on NFS lands, communities, human improvements, and infrastructure associated with wildland fires. When treatments are conducted near forest boundaries, they can reduce the risk of fire

crossing between lands of varying ownership and jurisdiction. Reducing hazardous fuels also increases firefighter safety by providing potential control locations in the event of a wildland fire.

Monitoring Activities

Hazardous fuels treatments are tracked and reviewed by utilizing the Forest Service Activities Tracking System (FACTS). Number of acres are documented annually and include activity used to accomplish the treatment, acres, funding sources, and additional relevant data. Table 3-4 shows treatment acres categorized by prescribed fire (pile and broadcast prescribed fire) and other treatment types collectively (mastication, grazing, timber management). The system also tracks data associated with primary hazardous fuels reduction activities (KP3) and secondary hazardous fuels reduction activities (KP6), though that data is not included here due to significant gaps in that data set.

Table 3-4. Hazardous fuels reduction treatments for fiscal years 2019 to 2024.

Fiscal Year	Treatment Type		
	Prescribed Fire	Other Treatment	Total Acres Treated
2019	887	3,945	4,832
2020	11	3,873	3,884
2021	352	2,633	2,985
2022	899	2,983	3,882
2023	392	1,932	2,325
2024	422	1,636	2,058
Total	2,963	17,002	19,966

Evaluation and Conclusions

Hazardous Fuels reduction efforts on GMNF are well aligned with Forest Plan Goal 21, Objectives, and associated Forest-wide Standards and Guidelines. Current projects focus on multiple forest types and are effective at reducing hazardous fuels. Hazardous fuels reduction accomplishments consistently exceed annually targeted number of acres. Additional treatments that qualify as hazardous fuels reduction are likely occurring but are not being entered into the FACTS database due to varying interpretations of what qualifies as hazardous fuels reduction among specialists, and time constraints associated with the entry of data.

Any activities that alter the structure, composition and arrangement of fuels should be evaluated by fire and fuels specialists to determine whether those treatments should be entered into the FACTS database. The use of targeted hand treatments (and associated chipping or pile burning) could be utilized in areas where broadcast prescribed fire and mechanical treatments are not currently suitable or desired. These could be particularly useful in areas that are immediately adjacent to values at risk of being impacted by wildfires on private, municipal, county, state, and federal lands. Incorporating multiple treatments of varying types could also create a landscape where important follow-up treatments become more sustainable.

When prioritizing treatment areas, Forest Service staff should consider using updated modeling tools (such as Interagency Fuels Treatment Decision Support System-IFTDSS, and Wildfire Risk Viewer) to identify areas of higher risk of wildfires and associated impacts. Staff should also work closely with adjacent partners to help them understand and plan for risk reduction on their lands. Wildland fires often burn across administrative and ownership boundaries and hazardous fuels treatments are most effective when conducted in collaboration with those partners.

Recommended Changes (Monitoring Question or Forest Plan Components)

Although there are no recommended changes to this monitoring question at this time, future Forest Plan amendments or revisions should include more specificity to Goal 21 and Objectives, and Forest-wide Standards and Guidelines associated with reduction of hazardous fuels.

Monitoring Item: Prescribed Fire

Management Question

To what extent is prescribed fire benefitting resources?

Detailed Monitoring Question

Is prescribed fire restoring and/or maintaining desired vegetation composition and structure?

Measurement Indicators

1. Acres of desired habitat restored or maintained
2. Acres where fire is reintroduced into historically fire adapted landscapes

Monitoring Driver

- Forest Plan Goal 6 and associated Objectives
- Forest-wide Direction, Section 2.3.10 Fire Management, Standards and Guidelines

Reporting Frequency

Annually

Last Year Reported

Fiscal years 2017 and 2018 biennial monitoring and evaluation report (monitoring question and measurement indicators revised starting fiscal year 2019)

Next Year Scheduled for Reporting

Fiscal years 2025 and 2026 biennial monitoring and evaluation report

Background

The intent of this monitoring question is to help determine how well management activities are meeting Forest Plan Goal 6 to “*maintain or restore ecological processes and systems on the GMNF within desired ranges of variability, including a variety of native vegetation and stream channel types, and their patterns and structural components*” (Forest Plan, p. 14). Prescribed fire is a management tool that is utilized to help accomplish this Goal and associated Objectives. It also can work toward meeting other Forest Plan Goals and Objectives including those that address wildlife habitat improvement and maintenance, timber stand improvement, enhancing viewpoints, and resource protection from impact resulting from high intensity wildland fires that can negatively impact forest lands. Prescribed fire is also utilized to reduce hazardous fuels and associated threats to private lands, communities, human improvements, and infrastructure (see Hazardous Fuels monitoring item).

Implementation of prescribed fire activities comply with Forest-wide Standards and Guidelines (Section 2.3.10) that directly address prescribed fire, though many other Standards and Guidelines have direct implications for how and where prescribed fire is used on GMNF. All applicable Standards and Guidelines help guide management decisions and activities as they pertain to utilizing prescribed fire as a tool to accomplish resource management objectives.

Monitoring Activities

Prescribed fire data is collected annually utilizing the Forest Service Activities Tracking System (FACTS) by Forest Service Fire Management staff. This system documents the location, acres burned, and tools used to accomplish the annual prescribed fire program of work. Fire staff also collaborate with individual Forest Service resource specialists including range, wildlife/fisheries, ecology, botany, watershed, soils, and heritage to assess the benefits and potential negative impacts to each individual resource. Table 3-5 shows total acres burned on GMNF from fiscal years 2019 to 2024. It also indicates how many acres of burning help restore oak habitat. Assessments are made through post prescribed fire field visits to randomly selected treatment units and through monitoring of the Monitoring Trends in Burn Severity Database/Viewer. Watershed and soils specialists also utilize National Best Management Practices for Water Quality Management on NFS Lands (USDA Forest Service 2012a) for monitoring "Wildfire Management Activities," to assess prescribed fire effects to ensure management practices are protecting natural resources.

Table 3-5. Acres burned using prescribed fire for fiscal years 2019 to 2024.

Fiscal Year	Acres Treated with Prescribed Fire	Acres of Oak Restoration with Prescribed Fire
2019	887	370
2020	11	0
2021	352	0
2022	899	331
2023	392	0
2024	422	0
Total	2,963	701

Evaluation and Conclusions

The GMNF prescribed fire program of work remains relatively consistent regarding the annual number of acres burned over the monitoring period. Fiscal year 2020 burning levels were impacted by Covid 19 pandemic staffing constraints. Other constraints that can impact annual numbers and effects are fluctuating weather conditions, administrative agency-wide moratoriums on burning, and other factors occurring outside of the programs control. Prescribed fires acres accomplished in 2019 and 2022 are notably higher due to the implementation of an oak restoration project that will continue periodically to mimic natural fire return intervals in those forest types.

Prescribed fire activities continue to accomplish Forest Plan Goals and Objectives, while remaining aligned with all applicable Forest-wide Standards and Guidelines. All resource specialists that attend monitoring trips and field visits are consistently positive in feedback provided regarding the prescribed fire effects. For example, wildlife habitat is maintained and improved at a level that is consistent with Forest Plan direction. Specialist monitoring of resources such as soils, watershed, and fisheries has noted minimal negative impact associated with prescribed fire. Much of this feedback is likely due to a combination of factors including a comprehensive planning process involving input from resources specialists, robust use of fire behavior modeling during prescription development, fire effects driven go/no-go decision making, and utilizing low to moderate fire behavior to accomplish prescribed fire objectives.

Additional planning consideration should include broadening the areas and resources where prescribed fire could be utilized to accomplish Forest Plan Goals and Objectives. These considerations should include non-native invasive plant management, fire adapted ecosystem restoration and maintenance, and additional wildlife habitat opening creation and maintenance.

Recommended Changes (Monitoring Question or Forest Plan Components)

None.

Monitoring Item: Wildfire Occurrence

Management Question

To what frequency do wildfires occur?

Detailed Monitoring Questions

How many wildfires occurred on National Forest System (NFS) land?

Measurement Indicators

1. How many wildfires occurred on NFS land?
2. How many total acres?
3. How many human-caused wildfires?
4. How many wildfires in wildland urban interface (WUI)?
5. If human caused, what is the statistical cause?

Monitoring Driver

Forest Plan Goal 21 and associated Objectives

Reporting Frequency

Every 5 years (changed from annually starting fiscal year 2019; this report covers fiscal years 2019 to 2024)

Last Year Reported

Fiscal years 2017 and 2018 biennial monitoring and evaluation report (monitoring question and measurement indicators revised starting fiscal year 2019)

Next Year Scheduled for Reporting

Fiscal years 2029 and 2030 biennial monitoring and evaluation report (anticipated to cover fiscal years 2025 to 2029)

Background

The intent of this monitoring question is to help determine how well management activities are meeting Forest Plan Goal 21 to “*protect human life, property, and facilities from wildland fire hazards*”, and associated Objective to “*provide an Appropriate Management Response to all wildland fire. Firefighter and public safety will be given the first priority in every fire management activity.*” (Forest Plan, p. 18). Wildland fire can have negative impacts upon ecosystems, public and private land, as well as improvements and infrastructure on those lands. Suppression of wildland fire is important for resource and property protection, and public safety. When weather and fuel conditions are favorable, wildland fires that are naturally caused may be used to achieve resource management objectives. Wildland fire occurrence data on GMNF is important to help identify trends, plan for future staffing needs, and to identify where Forest Service staff need to focus prevention/education efforts or hazardous fuels reduction work.

Monitoring Activities

Wildland fire data is collected during each incident and is collected in the InForm Database. This database collects information on wildland fire incidents for most local, state, county, and federal agencies across the country. Information includes fire weather during the incident, terrain and fuels, fire cause, values at risk, and jurisdiction. InForm began to be utilized for this data collection in 2020, and prior to that several other systems were used for collecting and compiling wildland fire occurrence data.

It should be noted that the following factors may cause gaps in data collected for this monitoring and evaluation report:

- Multiple systems used to collect data
- Not all agencies/departments use InForm for reporting wildland fires
- Not all partner agencies know of jurisdictional response associated with the Forest Service and may not report all fires
- Collected data may be missing elements (such as cause, jurisdiction, Wildland Urban Interface) based upon how the fire information is received and who enters the data
- Many municipal and county departments record responses in a different system that does not feed data into InForm (updates to this system are currently in development and will integrate with InForm in the future)

Data should be analyzed on 1-year, 5-year, and 10-year timeframes to identify trends and associated management needs. Table 3-6 shows annual wildland fire occurrence from fiscal years 2019 to 2024. The forest averaged four fires per year during this monitoring period for an average of 3.6 acres per year. All fires were human caused, except for the Chandler Ridge fire in 2024, which was caused by lightning. Human caused fires were largely attributed to escaped campfires, debris burning and several undetermined sources.

Table 3-6. Wildland fire occurrence on GMNF for fiscal years 2019 to 2024.

Fiscal Year	Number of Wildfires	Acres
2019	5	0.5
2020	4	3.7
2021	3	2.1
2022	7	10.7
2023	3	4.5
2024	2	0.2
Total	24	21.7

Evaluation and Conclusions

Despite assumed gaps in data, overall trends and data collection provide a valuable picture of wildland fire occurrence on GMNF. Annual wildland fire occurrence remains relatively stable and acres affected remain low. This information is aligned with Forest Plan Goals, Objectives, and Forest-wide Standards and Guidelines. Efforts to improve the completeness and accuracy of this data are ongoing and will improve as reporting systems become integrated, data elements are better standardized and InForm remains the collection point for all wildland fire data.

Recommended Changes (Monitoring Question or Forest Plan Components)

None.

Heritage

Monitoring Item: Heritage Resource Program Objectives

Management Question

How well do Forest Plan components provide protection and stewardship for significant heritage resources?

Detailed Monitoring Question

How many acres surveyed and how many sites protected during Forest project National Historic Preservation Act, Section 106 clearance?

Measurement Indicators

1. Number of sites monitored, updated or recorded
2. Number of acres surveyed

Monitoring Driver

- Forest Plan Goal 16 and associated Objectives
- Forest-wide Direction, Section 2.3.14 Tribal Relations, Standards and Guidelines
- Forest-wide Direction, Section 2.3.15 Heritage Resources, Standards and Guidelines

Reporting Frequency

Annually (revised from every 5 years starting fiscal year 2019)

Last Year Reported

Fiscal years 2017 and 2018 biennial monitoring and evaluation report (monitoring question and measurement indicators revised starting fiscal year 2019)

Next Year Scheduled for Reporting

Fiscal years 2025 and 2026 biennial monitoring and evaluation report

Background

The intent of this monitoring question is to help determine how well management activities are meeting Forest Plan Goal 16 to “*provide protection and stewardship for significant heritage resources on the GMNF*” (Forest Plan, p. 17). Section 106 of the National Historic Preservation Act of 1966 (NHPA) requires federal agencies to consider the effects on historic properties of projects they carry out, assist, fund, permit, license, or approve throughout the country. If a federal or federally-assisted project has the potential to affect historic properties, a Section 106 review will take place.

The historic preservation review process required by Section 106 is outlined in regulations (36 CFR (Code of Federal Regulations) Part 800, Protecting Historic Properties) issued by Advisory Council on Historic Preservation. The goal of the Section 106 review process is to seek ways to avoid, minimize, or mitigate any adverse effects to historic properties. To ascertain the effects for archaeological resources (sites) within a project, archaeologists survey project areas to locate, record, monitor and define boundaries for archaeological resources so that protective measures can be developed to mitigate adverse effects associated with project activities.

This process provides documentation for how Forest Plan components provide protection and stewardship for significant heritage resources to track compliance with the National Historic Preservation Act, Archaeological Resources Protection Act, Section 106.

Monitoring Activities

Table 3-7 shows heritage resource survey monitoring activities conducted during fiscal years 2019 to 2024.

Table 3-7. Heritage resource survey activities conducted on GMNF from fiscal years 2019 to 2024.

Fiscal Year	Acres Surveyed	Total Sites Visited/ Protected	New Sites	Sites Evaluated	Sites Monitored/ Updated
2019	~2,500	25	Data not available	Data not available	Data not available
2020	1,800	22	Data not available	Data not available	Data not available
2021	460	39	2	20	37
2022	572	65	16	8	16
2023	1,540	51	8	3	43
2024	790	49	11	5	38
Total	5,162	251	37	36	134

Evaluation and Conclusions

Since 2021, compliance with Forest Plan Goals, Objectives, Forest-wide Standards and Guidelines, and Section 106 have been met for Federal undertakings on GMNF. Complete data for fiscal years 2019 and 2020 are not available.

Recommended Changes (Monitoring Question or Forest Plan Components)

None.

Monitoring Item: Heritage Resource Site Protection

Management Question

How well do Forest Plan components provide protection and stewardship for significant heritage resources?

Detailed Monitoring Question

How many projects were reviewed under National Historic Preservation Act, Section 106?

Measurement Indicators

1. Total number of projects reviewed under Section 106 compliance
2. Number of projects categorized by finding of effect

Monitoring Driver

- Forest Plan Goal 16 and associated Objectives
- Forest-wide Direction, Section 2.3.14 Tribal Relations, Standards and Guidelines
- Forest-wide Direction, Section 2.3.15 Heritage Resources, Standards and Guidelines

Reporting Frequency

Annually (revised from every 5 years starting fiscal year 2019)

Last Year Reported

Fiscal years 2017 and 2018 biennial monitoring and evaluation report (monitoring question and measurement indicators revised starting fiscal year 2019)

Next Year Scheduled for Reporting

Fiscal years 2025 and 2026 biennial monitoring and evaluation report

Background

The intent of this monitoring question is to help determine how well management activities are meeting Forest Plan Goal 16 to *“provide protection and stewardship for significant heritage resources on the GMNF”* (Forest Plan, p. 17). Section 106 of the National Historic Preservation Act of 1966 (NHPA) requires federal agencies to consider the effects on historic properties of projects they carry out, assist, fund, permit, license, or approve throughout the country. If a federal or federally assisted project has the potential to affect historic properties, a Section 106 review will take place.

The historic preservation review process required by Section 106 is outlined in regulations (36 CFR (Code of Federal Regulations) Part 800, Protecting Historic Properties) issued by Advisory Council on Historic Preservation. The goal of the Section 106 review process is to seek ways to avoid, minimize, or mitigate any adverse effects to historic properties.

Three types of finding of effect under Section 106 include:

1. No Historic Properties Affected - implementation of this project will have no effect as there are no historic properties located within the undertaking’s project area.
2. No Adverse Effect to Historic Properties - Historic properties are located within the project area, but protection measures will be used to protect, manage, or maintain historic properties in a manner that avoids adverse effects during implementation.
3. Adverse Effect to Historic Properties - Historic Properties will be adversely impacted by the implementation of this project. A Memorandum of Agreement is developed to mitigate the Adverse Effects.

This process provides documentation for how Forest Plan components provide protection and stewardship for significant heritage resources to track compliance with the National Historic Preservation Act, Archaeological Resources Protection Act, Section 106.

Monitoring Activities

Table 3-8. Projects reviewed for Section 106 compliance on GMNF from fiscal years 2019 to 2024.

Fiscal Year	Total # Projects Reviewed under Section 106	# of Projects with “No Historic Properties Affected”	# of Projects with “No Adverse Effect to Historic Properties”	# of Projects with “Adverse Effect to Historic Properties”
2019	33	Data not available	Data not available	Data not available
2020	21	Data not available	Data not available	Data not available
2021	16	12	1	3
2022	37	24	10	3
2023	36	22	13	1
2024	27	20	6	1
Total	170	78	30	8

Evaluation and Conclusions

Since 2021, compliance with Forest Plan Goals, Objectives, Forest-wide Standards and Guidelines, and Section 106 have been met for Federal undertakings on GMNF. Complete data for fiscal years 2019 and 2020 are not available.

Recommended Changes (Monitoring Question or Forest Plan Components)

None.

Monitoring Item: Heritage Resource Standards and Guidelines

Management Question

How well do Forest Plan components provide protection and stewardship for significant heritage resources?

Detailed Monitoring Question

How many National Historic Preservation Act, Section 110 activities have been completed?

Measurement Indicators

Total number of Section 110 projects completed

Monitoring Driver

- Forest Plan Goal 16 and associated Objectives
- Forest-wide Direction, Section 2.3.14 Tribal Relations, Standards and Guidelines
- Forest-wide Direction, Section 2.3.15 Heritage Resources, Standards and Guidelines

Reporting Frequency

Annually (revised from every 5 years starting fiscal year 2019)

Last Year Reported

Fiscal years 2017 and 2018 biennial monitoring and evaluation report (monitoring question and measurement indicators revised starting fiscal year 2019)

Next Year Scheduled for Reporting

Fiscal years 2025 and 2026 biennial monitoring and evaluation report

Background

The intent of this monitoring question is to help determine how well management activities are meeting Forest Plan Goal 16 to “*provide protection and stewardship for significant heritage resources on the GMNF*” (Forest Plan, p. 17). Section 110 of the National Historic Preservation Act (NHPA) outlines the responsibilities of Federal agencies in preserving historic properties. It mandates that historic preservation must be integrated into the ongoing programs of all Federal agencies to ensure the protection of historic resources. This section establishes a framework for Federal agencies to identify, evaluate, and protect historic properties, ensuring that preservation efforts are a fundamental part of their operations. Section 110 also charges each Federal agency with affirmative responsibility for considering projects and programs that further the purposes of the NHPA, and it declares that the costs of preservation activities are eligible project costs in all undertakings conducted or assisted by a Federal agency. It is through

Section 110 activities that the Forest Service evaluates its Heritage Programs for Heritage Program Managed to Standard under NHPA.

Monitoring Activities

Table 3-9 shows Section 110 compliance activities conducted during fiscal years 2019 to 2024.

Table 3-9. Projects reviewed for Section 110 compliance on GMNF from fiscal years 2019 to 2024.

Fiscal Year	# of Section 110 Projects	Project Specifics
2019	Data not available	Data not available
2020	Data not available	Data not available
2021	8	1. Determination of Eligibility of ten Adirondacks style historic trail shelters along the Appalachian Trail/Long Trail (AT/LT) including: Battell, Big Branch, Boyce, Greenwall, Seth Warner, Story Spring, Sucker Brook, Sunrise, Kid Gore, Coley Glen and Emily Proctor Shelters. 2. Repair/Renovation work on Cooley Glen Trail Shelter. 3. Repair/Renovation work on Kid Gore Trail Shelter. 4. Repair/Renovation work on Emily Proctor Trail Shelter. 5. Determination of Eligibility for CCC culvert (8.4) on Forest Road (FR) 10. 6. Vegetation clearing at Pier's Tavern archaeological site in partnership with the VT Youth Conservation Corps (VYCC). 7. Determination of Eligibility of nine historic buildings on GMNF including: Glastenbury Lookout Tower, Grout Pond Winter Cabin, Mt Tabor (Dynamite House, Explosives House, Fire Warehouse, Fire Workshop), Ripton North Warehouse, Ripton South Warehouse, and CCC Blacksmith Shop. 8. Volunteer hours on various projects (100 hours).
2022	9	1. Determination of Eligibility for Stratton Mountain Scout Reservation. 2. Determination of Eligibility for CCC culvert (11.53) on FR 10. 3. Determination of Eligibility for CCC culvert (10.4) on FR 10. 4. Priority Heritage Asset monitoring of 13 sites. 5. Vegetation clearing at Pier's Tavern archaeological site in partnership with the VYCC. 6. Mt. Tabor Workshop Lead Paint removal and roof repair. 7. GMNF Rangers Talk about Archaeology. 8. Pier's Tavern Sign Installation by Ripton Historical Society on Robert Frost Trail. 9. Volunteer hours on various projects (420 hours).
2023	13	1. Determination of Eligibility of Texas Falls Recreation Area. 2. Priority Heritage Asset monitoring of 9 sites and 2 assemblages. 3. Completed Section 110 Survey on GMFL 100 acres. 4. Artifact or Trash information pamphlet. 5. Green Mountain Power Monitoring of Sliver Lake sites. 6. Restoration/repair work on NRHP listed Stratton Mountain Cabin by Green Mountain Club (GMC). 7. Author Marty Podskoch CCC file search. 8. Chittenden Historical Society field trip to Green Tavern. 9. Chittenden Historical Society Telephone Gap history presentation. 10. HistoriCorps repair work Assessment for Hapgood Pond CCC features. 11. Pier's Tavern Dedication by Ripton Historical Society. 12. Determination of Eligibility on Breadloaf culvert. 13. Volunteer hours on various projects (60 hours).

Fiscal Year	# of Section 110 Projects	Project Specifics
2024	9	1. Determination of Eligibility on Ten Kilns site. 2. CorpsTHAT vegetation clearance on FR10 CCC culverts and Pier's Tavern. 3. Dublin Seminar Presentation. 4. Priority Heritage Asset monitoring of 17 sites. 5. GMNF Curation Collections Assessment. 6. Completed Section 110 survey of 600 acres. 7. Determination of Eligibility for FR 10. 8. Determination of Eligibility on FR278 Bridge. 9. Volunteer hours on various projects (425 hours).
Total	39	

Evaluation and Conclusions

The GMNF Heritage Program completed 39 Section 110 activities in compliance with NHPA. Since 2021, the Forest Service met Heritage Program Managed to Standard. Section 110 data for fiscal years 2019 and 2020 are not available. Providing funding, partnership opportunities and considering projects/ programs that further the purposes of the NHPA for future Section 110 activities would strengthen the Heritage Program's ability to preserve cultural resources outside of Section 106 related projects.

Recommended Changes (Monitoring Question or Forest Plan Components)

None.

Human Dimensions

Monitoring Item: Local and Regional Economies

Management Question

To what extent have management activities supported regional and local economies?

Detailed Monitoring Questions

- What is the range of dollar amounts and board feet in timber sale contracts?
- Who has been awarded the timber sale contract?

Measurement Indicators

1. Number of timber sale contracts awarded for ranges of board feet and monetary values, and location of contractor
2. Number of board feet processed at local mills

Monitoring Driver

- Forest Plan Goal 8 and associated Objectives
- Forest Plan Goal 17 and associated Objectives

Reporting Frequency

Every 5 years (this report covers fiscal years 2019 to 2023)

Last Year Reported

Fiscal years 2017 and 2018 biennial monitoring and evaluation report

Next Year Scheduled for Reporting

Fiscal years 2027 and 2028 biennial monitoring and evaluation report (anticipated to cover fiscal years 2024 to 2028)

Background

The intent of this monitoring question is to help determine how well management activities are contributing to social, cultural, and economic attributes of desired conditions. Forest Plan Goal 8 and associated Objective is to “*provide for a sustainable supply of forest products...for local economies*” (Forest Plan, p. 14). Forest Plan Goal 17 states management should “*support regional and local economies through resource use, production, and protection*”, and an associated Objective is to “*vary the range of project sizes for contracts*” (Forest Plan, p. 17). Monitoring Forest Service economic contributions to local economies has been an interest to the public since Forest Plan revision, especially for towns within the GMNF proclamation boundary. The commercial harvest of timber is an important contributor to local and regional economies by providing jobs and supporting businesses associated with the wood products industry.

Monitoring Activities

Forest Service staff provide an annual bid monitoring report which is sent to the Regional Forester at the end of each fiscal year. This report analyzes changes and trends in bidding, bid values and the bidders for GMNF timber sales offered each year. Data required for bid monitoring and for tracking timber sales comes from Timber Sale Accounting (TSA) system reports. Volumes are reported in hundred cubic feet (CCF) as well as thousand board feet (MBF). Volumes and targets are officially reported in CCF.

Evaluation and Conclusions

From fiscal years 2019 to 2023, the Forest Service sold 20 separate GMNF timber sales, which were awarded to 11 different bidders (Table 3-10). Sales ranged in volume from 13 CCF to 7,185 CCF. Individual contract values ranged from \$525 to \$546,692. Successful bidders consisted of logging companies (55 percent) and sawmills (45 percent). Of the successful bidders, all but two are headquartered in Vermont and approximately 75 percent are based in communities within or adjacent to NFS lands. With only a few exceptions, logging timber sale contracts were completed by companies based in communities and towns within or adjacent to GMNF.

Table 3-10. Contract value distribution by fiscal year (FY).

Contract Size (value)	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023	Total
\$301 - \$10,000	1	0	1	1	1	4
\$10,001 - \$100,000	2	1	1	0	4	8
\$100,001 - \$1,000,000	1	2	1	3	1	8

Forest Service staff strive to offer timber sales geographically distributed throughout GMNF and in a range of sizes to provide economic benefits to different towns and businesses of various sizes. Sales over the last five years have been roughly evenly distributed between the Manchester Ranger District, and the Middlebury/Rochester Ranger Districts (north and south portions of GMNF, respectively). Most sales in the north portion of GMNF were associated with the Robinson Integrated Resource Project (IRP) in the towns of Rochester and Hancock. Southern sales were part of the South of Route 9 IRP and Early Successional Habitat Project with the latter more evenly distributed throughout the area. Sales have varied in size but have also trended toward larger sales that are more efficient and cost effective to prepare. Approximately 20 percent of sales offered were less than \$10,000 in value.

Forest Service staff do not track the marketing of wood after it has been sold and removed. There is no data collected on GMNF to provide estimates of wood volume used for various products or processing locations. It is estimated that about three quarters of hardwood lumber (maple, birch, oak, ash) cut in Vermont is processed in state, but most softwood lumber (white pine, hemlock, spruce, fir) cut in Vermont is more likely to be shipped out of state without further processing. Anecdotal evidence would support that a similar percentage of wood harvested on NFS lands is processed in Vermont. Most of the wood being exported is softwood being processed in Canada and pulpwood being processed in New York. The local economic benefits of timber harvested on NFS lands are strongly tied to local and regional markets for wood. These markets are constantly changing largely in response to broader national and international economic trends.

The most significant challenge to providing economic benefits to local and regional economies is the overall level of timber harvest on GMNF. The amount of timber sold and harvested each year remains well below the levels allowed by the Forest Plan and averages less than 25 percent of the Allowable Sale Quantity (see Outputs Accomplished - Volume and Acres of Timber Offered and Sold monitoring item). These reduced levels of harvest result in the creation of fewer direct and indirect jobs related to timber harvesting and processing. Less overall harvest also results in fewer timber sale contracts being offered each year, and longer durations between contracts in or near individual communities.

Increased levels of timber harvest on GMNF would create increased economic benefits locally and regionally. Forest Service staff should continue to work internally and with Regional leadership to seek opportunities to continue to increase annual timber offerings. Forest Service staff should also continue to offer sales in a range of sizes and to distribute them geographically and over time for economic benefits. Sales should have a mix of products, including sawtimber, pulpwood, fuelwood, and other product types.

All the businesses that have purchased timber sales since 2019 are considered small businesses according to standards set by the Small Business Administration. These businesses are competitive in bidding on the varied sizes of sales being offered on GMNF. Smaller sales cost more to prepare and administer in meeting annual targets and accomplishing Forest Plan management objectives. Forest Service staff should continually evaluate the costs and benefits of offering small sales to determine how best to balance economic opportunities for the smallest businesses with other objectives and consider viable offers of even smaller sales (less than 500 CCF) for these businesses.

Recommended Changes (Monitoring Question or Forest Plan Components)

None.

Monitoring Item: Partnerships Maintenance and Enhancement

Management Question

To what extent are partnerships maintained and enhanced?

Detailed Monitoring Question

Are partnerships active and effective to help meet Forest Plan goals and objectives, and are Forest Service staff participating in partnership activities?

Measurement Indicators

1. Number of formal partnership agreements (inter-agency, Challenge Cost Share, Memorandums of Understanding)

2. Number of Forest Service staff participating in outside organizations in official capacity (representing Forest Service interest)
3. Evaluation (narrative) of how the partnership has been effective in helping the Forest Service meet Goals and Objectives
4. Number of people hours contributed by partnerships

Monitoring Driver

Forest Plan Goal 18 and associated Objectives

Reporting Frequency

Annually

Last Year Reported

Fiscal years 2017 and 2018 biennial monitoring and evaluation report

Next Year Scheduled for Reporting

Fiscal years 2025 and 2026 biennial monitoring and evaluation report

Background

The intent of this monitoring question is to help determine if management activities are meeting Forest Plan Goal 18 to *“maintain and enhance partnerships with communities and organizations”* and associated Objective to *“increase the effective use of partnerships to achieve Forest goals”* (Forest Plan, p. 17). Monitoring partnership contributions to management activities helps track progress toward meeting the desired conditions and objectives related to social and economic sustainability.

Monitoring Activities

Reporting contributions from partner agreements is a consistent and accurate method for measuring the extent and effectiveness of partner groups and organizations to assist in managing resources on NFS lands. Agreements with partners, such as challenge cost-share agreements and participating agreements, are recorded together for the Green Mountain and Finger Lakes National Forests (GMFL NFs) in the Natural Resource Management database, including partner cash, non-cash and in-kind contributions. Table 3-11 shows partner contributions for fiscal years 2019 to 2024. See the Partner Contributions monitoring item section for partner contributions specific to the Recreation program.

In addition to monitoring agreements, individual and group volunteer contributions for GMFL NFs management activities were recorded during fiscal years 2019 to 2024 (Table 3-12). It is recognized that this report does not account for all annual volunteer hour contributions, since volunteer hours are reported inconsistently and there is no accurate way to depict annual volunteer contributions. There were 179 agencies, towns, Tribes, non-government organizations, and academia know to have partnered with Forest Service staff to assist in management activities on GMNF during this monitoring period (USDA Forest Service 2024a). Like volunteer contributions, there is no consistent data collection effort to document and quantify the number of partners engaged in any given year since many partners may informally collaborate with the Forest Service outside of a signed agreement.

Table 3-11. Partner agreement contributions in New York and Vermont from fiscal years 2019 to 2024.

Fiscal Year	Dollars			
	Non-Federal Contributions	Other Federal Contributions	State Contributions	Total
2019	393,672.87	35,000.00	0.00	428,672.87
2020	191,113.21	50,000.00	0.00	241,113.21
2021	441,467.59	43,000.00	10,000.00	494,467.59
2022	1,036,619.90	0.00	24,884.68	1,061,504.58
2023	509,741.75	0.00	0.00	509,741.75
2024	207,224.75	0.00	0.00	207,224.75
Total	2,779,840.07	128,000.00	34,884.68	2,942,724.75

Table 3-12. Volunteer contributions in New York and Vermont from fiscal years 2019 to 2024.

Fiscal Year	Number of Volunteers	Total Hours Contributed	Equivalent Fund Contribution (dollars)	Percent of Full-Time Employee Contributed
2019	169	16,621	422,672.00	9.23
2020	9	3,815	103,768.00	2.12
2021	154	12,428	354,695.00	6.90
2022	148	11,939	357,573.00	6.63
2023	871	39,048	1,241,726.00	21.69
2024	975	43,733	1,390,733.00	24.29
Total	2,326	127,584	3,871,167.00	70.86

Evaluation and Conclusions

Forest Service staff have maintained, expanded and enhanced formal and informal partnerships in recent years and continue to successfully meet management objectives through financial and other agreements. Partnership organizations have been integral for meeting important management objectives including trail maintenance, wildlife habitat and stream restoration, sensitive species inventory, and education outreach (see Teacher Development and Forest Stewardship monitoring item).

Engagement continues with many partners through regular e-mails, mailings, phone conversations and in person meetings. Partnerships continue to be active and valued, and many if not all Forest Service program areas communicate with partners on a frequent basis.

Recommended Changes (Monitoring Question or Forest Plan Components)

None.

Monitoring Item: Payments to Towns

Management Question

To what extent have Forest programs supported regional and local economies?

Detailed Monitoring Question

How much funding was paid to towns through Payment in Lieu of Taxes (PILT) and Secure Rural Schools (SRS) payments?

Measurement Indicators

Amount of PILT and SRS payment to towns and/or counties

Monitoring Driver

Forest Plan Goal 17 and associated Objective

Reporting Frequency

Annually

Last Year Reported

Fiscal years 2017 and 2018 biennial monitoring and evaluation report (monitoring question and measurement indicators revised starting fiscal year 2019)

Next Year Scheduled for Reporting

Fiscal years 2025 and 2026 biennial monitoring and evaluation report

Background

The intent of this monitoring question is to help determine if management activities are meeting Forest Plan Goal 17 to “*support regional and local economies through resource use, production, and protection*”, and associated Objective to “*maintain communications with Forest communities with regard to Payment in Lieu of Taxes, 25 Percent Fund, and/or Secure Schools and Community Self-Determination Act* (Forest Plan, p. 17). Tracking payments to towns is a good measurement of contributions to economic sustainability of communities. It remains important to inform municipalities of federal programs that impact their tax base.

There are two types of federal payments reaching municipalities that have NFS lands: 1) Payments in Lieu of Taxes; and 2) Public Law 106-393, Secure Rural Schools and Community Self-Determination Act of 2001, reauthorized in 2008. Payments in lieu of taxes funds are directed to towns, and the Public Law 106-393 funds are directed to school districts.

Monitoring Activities

Annual payments in lieu of taxes to towns and associated entitlement acreage they are based on for fiscal years 2019 to 2024 are obtained from U.S. Department of the Interior, Payment in Lieu of Taxes Annual reports: <https://www.doi.gov/pilt/resources/annual-reports>.

Annual secure rural school payments by Vermont town for fiscal years 2019 to 2024 are obtained from USDA Forest Service, Secure Rural Schools - Payments reports: <https://www.fs.usda.gov/working-with-us/secure-rural-schools/payments>.

Evaluation and Conclusions

See Appendix A for specific federal payment information for each GMNF town. All towns have access to specific payment amounts as soon as they are released.

Payments in lieu of taxes were provided to 60 towns within 6 counties (Addison, Bennington, Rutland, Washington, Windham, and Windsor counties). Total annual payments steadily increased during the monitoring period from \$1,035,173 in fiscal year 2019 to \$1,269,694 in fiscal year 2024.

Secure rural school payments were provided to 55 towns within 7 counties (Addison, Bennington, Essex, Rutland, Washington, Windham, and Windsor counties). Total annual payments during the monitoring period ranged from \$230,276.52 in fiscal year 2020 to \$317,981.08 in fiscal year 2023.

Recommended Changes (Monitoring Question or Forest Plan Components)

None.

Monitoring Item: Teacher Development and Forest Stewardship

Management Question

To what extent have Forest programs provided a diverse range of information and education opportunities?

Detailed Monitoring Question

Was educator development or support in forest stewardship offered?

Measurement Indicators

Number of programs offered

Monitoring Driver

Forest Plan Goal 19 and associated Objective

Reporting Frequency

Annually (revised from every 5 years starting fiscal year 2019)

Last Year Reported

Fiscal years 2017 and 2018 biennial monitoring and evaluation report (monitoring question and measurement indicators revised starting fiscal year 2019)

Next Year Scheduled for Reporting

Fiscal years 2025 and 2026 biennial monitoring and evaluation report

Background

The intent of this monitoring question is to help determine if Forest Service staff are meeting Forest Plan Goal 19 to “*provide a diverse range of information and education opportunities that will enhance the understanding of the GMNF*”, and associated Objective to “*include teacher development in stewardship of living systems in the educational outreach program*” (Forest Plan, p. 18). The question has been worded to include non-traditional teachers, such as librarians, homeschoolers, and rotating education specialists. It also includes “support” activities such as classroom visits or learning materials often sought by busy educators.

Monitoring Activities

Monitoring is focused on capturing the occurrence of developed, repeatable program offerings because miscellaneous topics or individual classroom visits can be easily missed. Many requests made from organizations to specific GMNF units (Ranger Districts or Forest Headquarters) are not easily captured due to under reporting. Developed programs are designed so that any Forest Service staff member can present the content to fill a request in the course of everyday duties. It’s common for staff to forget to document each request in detail. At the same time, some groups request specific content that only a subject matter expert can deliver; such one-off opportunities can also be difficult to track. However, a District commonly reports that certain programs were requested or delivered during the year, making total programs offered more reliable than total number of classroom visits.

Table 3-13 lists education programs offered during fiscal years 2019 to 2024. Forest Service staff provided or supported 42 education programs hosted in traditional classrooms, libraries, on the National Forest, at summer camps, and at partner facilities. An effort is made to track the details of delivered programs, but the quantity of learning spaces, educators, or students may not be exact or known.

Table 3-13. Education programs offered by Forest Service staff during fiscal years 2019 to 2024.

Fiscal Year	Education Programs Offered
2019	Envirothon: With Forest Service support, Lamoille County Natural Resource Conservation District hosted ten teams from eight schools at the Vermont Technical College for students to compete in the state-wide Envirothon competition. In preparation for the event, 70 participants also attended a training day at Marsh Billings Rockefeller National Historical Park for hands on training. Forest for Every Classroom: Partner organization, Shelburne Farms, provided professional development training geared toward outdoor learning to educators, with Forest Service support. Mt. Ascutney Interpreter Services: With Forest Service support, the Vermont Department of Forests, Parks and Recreation hired a State Park Interpreter stationed at Mt. Ascutney. The position leads classroom or public field trips, visits schools, and teaches outdoor education programming to visitors at State Parks and in the National Forest. Fire Prevention: Upon request, Forest Service staff provided an educational conversation about wildfire prevention, as well as a visit from Smokey Bear. Leave No Trace: Upon request, Forest Service staff provided an educational conversation about Leave No Trace Ethics, as well as a visit from Woodsy Owl. Skins & Skulls: Upon request, Forest Service staff provided an educational display and conversation about wildlife found on GMNF. Snorkel Program: For two weeks, Forest Service staff invite and coordinate local classes to the West Branch of the White River to snorkel and explore freshwater ecosystems.
2020	Envirothon: Due to COVID19, Lamoille County Natural Resource Conservation District, was unable to host students to compete in the state-wide Envirothon competition. The District and the Envirothon steering committee focused on preparing for the following year's event while trying to maintain contact with interested teachers. Forest for Every Classroom: Partner organization, Shelburne Farms, provided professional development training geared toward outdoor learning to at least 40 educators in the Northeast, with Forest Service support. Mt. Ascutney Interpreter Services: With Forest Service support, the Vermont Department of Forests, Parks and Recreation hired a State Park Interpreter stationed at Mt. Ascutney. The position leads classroom or public field trips, visits schools, and teaches outdoor education programming to visitors at State Parks and in the National Forest. Fire Prevention: Smokey Bear visits were limited to virtual or very specific events due to COVID19 restrictions.
2021	Envirothon: Due to lack of capacity and lingering COVID19 concerns, Vermont Natural Resource Conservation Districts, were unable to host students to compete in the state-wide Envirothon competition. The District and the Envirothon steering committee focused on preparing for the following year's event while trying to maintain contact with interested teachers. Forest for Every Classroom: Partner organization, Shelburne Farms, provided four professional development training days to 21 teachers, two workshop training days to 12 educators, and two GLOBE program workshops to 33 educators, with Forest Service support. Mt. Ascutney Interpreter Services: With Forest Service support, the Vermont Department of Forests, Parks and Recreation hired a State Park Interpreter stationed at Mt. Ascutney. The position leads classroom or public field trips, visits schools, and teaches outdoor education programming to visitors at State Parks and in the National Forest. Fire Prevention: Smokey Bear visits were limited to virtual or very specific events due to COVID19 restrictions. Leave No Trace: Upon request, Forest Service staff provided an educational conversation about Leave No Trace Ethics, as well as a visit from Woodsy Owl. Visits were limited due to COVID19 restrictions.

Fiscal Year	Education Programs Offered
2022	Envirothon: Winooski Natural Resource Conservation District, was unable to host students to compete in the state-wide Envirothon competition. The District and the Envirothon steering committee focused on reviewing available training materials and updating resources available to interested coaches and teams for future participation. Forest for Every Classroom: Partner organization, Shelburne Farms, provided professional development training geared toward outdoor learning to educators, with Forest Service support. Moosalamoo Interpreter Services: With Forest Service support, the Vermont Department of Forests, Parks and Recreation hired a State Park Interpreter stationed at Branbury State Park. The position leads classroom or public field trips, visits schools, and teaches outdoor education programming to visitors at State Parks and in the National Forest. Mt. Ascutney Interpreter Services: With Forest Service support, the Vermont Department of Forests, Parks and Recreation hired a State Park Interpreter stationed at Mt. Ascutney. The position leads classroom or public field trips, visits schools, and teaches outdoor education programming to visitors at State Parks and in the National Forest. Fire Prevention: Upon request, Forest Service staff provided an educational conversation about wildfire prevention, as well as a visit from Smokey Bear. Pittsford Reads: Forest Service staff read forest related books to classrooms of all ages and engaged in conversations about recreation, wildlife, and the Forest Service.
2023	Envirothon: With Forest Service support, Winooski Natural Resource Conservation District hosted seven teams from five schools as students competed in the state-wide Envirothon competition. In preparation for the event, participants also attended a training day at Marsh Billings Rockefeller National Historical Park for hands on training. Forest for Every Classroom: Partner organization, Shelburne Farms, provided professional development training geared toward outdoor learning to 15 educators, with Forest Service support. Moosalamoo Interpreter Services: With Forest Service support, the Vermont Department of Forests, Parks and Recreation hired a State Park Interpreter stationed at Branbury State Park. The position leads classroom or public field trips, visits schools, and teaches outdoor education programming to visitors at State Parks and in the National Forest. Mt. Ascutney Interpreter Services: With Forest Service support, the Vermont Department of Forests, Parks and Recreation hired a State Park Interpreter stationed at Mt. Ascutney. The position leads classroom or public field trips, visits schools, and teaches outdoor education programming to visitors at State Parks and in the National Forest. Fire in our Northeast Forest: Visiting local schools and libraries, Forest Service staff played games and presented materials about how the Forest Service uses prescribed fire to manage the landscape. Fire Prevention: Upon request, Forest Service staff provided an educational conversation about wildfire prevention, as well as a visit from Smokey Bear. Pittsford Reads: Forest Service staff read forest related books to classrooms of all ages and engaged in conversations about recreation, wildlife, and the Forest Service. Pollinator Pathways: Forest Service staff provided a presentation and educational materials about pollinators and creating your own pollinator gardens at local community hubs. Skins & Skulls: Upon request, Forest Service staff provided an educational display and conversation about wildlife found in GMNF. Snorkel Program: For two weeks, the Forest Service staff invited and coordinated local classes to the West Branch of the White River to snorkel and explore freshwater ecosystems.
2024	Envirothon: With Forest Service support, Winooski Natural Resource Conservation District hosted six teams from three schools as students competed in the state-wide Envirothon competition. Forest for Every Classroom: Partner organization, Shelburne Farms, provided professional development training geared toward outdoor learning to 15 educators in the Northeast, with Forest Service support. Moosalamoo Interpreter Services: With Forest Service support, the Vermont Department of Forests, Parks and Recreation hired a State Park Interpreter stationed at Branbury State Park. The position leads classroom or public field trips, visits schools, and teaches outdoor education programming to visitors at State Parks and on the National Forest. Mt. Ascutney Interpreter Services: With Forest Service support, the Vermont Department of Forests, Parks and Recreation hired a State Park Interpreter stationed at Mt. Ascutney. The position

Fiscal Year	Education Programs Offered
	leads classroom or public field trips, visits schools, and teaches outdoor education programming to visitors at State Parks and in the National Forest. 5. Fire in our Northeast Forest: Visiting local schools and libraries, Forest Service staff played games and presented materials about how the Forest Service uses prescribed fire to manage the landscape. 6. Fire Prevention: Upon request, Forest Service staff provided an educational conversation about wildfire prevention, as well as a visit from Smokey Bear. 7. Leave No Trace: Upon request, Forest Service staff provided an educational conversation about Leave No Trace Ethics. 8. Pittsford Reads: Forest Service staff read forest related books to classrooms of all ages and engaged in conversations about recreation, wildlife, and the Forest Service. 9. Skins & Skulls: Upon request, Forest Service staff provided an educational display and conversation about wildlife found on GMNF. 10. Snorkel Program: For two weeks, Forest Service staff invited and coordinated local classes to the West Branch of the White River to snorkel and explore freshwater ecosystems.

Evaluation and Conclusions

The Forest is meeting the intent of Forest Plan Goal 19 consistently during this monitoring period. However, there is a noticeable need to embrace flexibility in providing education opportunities and a desire for more accessible, deliverable content. Rural school districts are changing, and non-traditional education avenues are more prevalent every year. To continue to provide educator development, Forest Service staff need to meet educators where they are in a changing environment.

Recommended Changes (Monitoring Question or Forest Plan Components)

None.

Invasive Species Population

Monitoring Item: Non-native Invasive Species

Management Question

How well do Forest Plan components prevent and control the spread of non-native invasive plants?

Detailed Monitoring Question

To what extent are non-native invasive species impacting other Forest resources?

Measurement Indicators

Extent of infestations in a) vicinity of Regional Forester Sensitive Species populations, b) wildlife openings and/or c) Ecological Special Areas/Research Natural Areas/Candidate Research Natural Areas:

1. Percentage of sites infested, within a), b) and c)
2. Acres and/or sites infested, within a), b) and c)
3. Acres and/or sites treated, within a), b) and c)
4. Control effectiveness upon completion of treatment

Monitoring Driver

- Forest Plan Goal 2 and associated Objectives
- Forest-wide Direction, Section 2.3.9 Forest Health and Disturbance Processes, Pests, Diseases; Non-Native Invasive Species, Standards and Guidelines

Reporting Frequency

Annually

Last Year Reported

Fiscal years 2017 and 2018 biennial monitoring and evaluation report (measurement indicators revised starting fiscal year 2019)

Next Year Scheduled for Reporting

Fiscal years 2025 and 2026 biennial monitoring and evaluation report

Background

The intent of this monitoring question is to help determine if management activities are meeting Forest Plan Goal 2 to “*maintain and restore quality, amount, and distribution of habitats to produce viable and sustainable populations of native and desirable non-native plants and animals*”, and associated Objective to “*minimize adverse effects of non-native invasive species on National Forest resources*” (Forest Plan, pp. 10 and 13). Forest-wide Standards and Guidelines, Section 2.3.9 Forest Health and Disturbance Processes, Pests, Diseases; Non-Native Invasive Species incorporate information on the status and threat of NNIP infestations as part of project development and prevent and control their spread using an integrated pest management approach (Forest Plan; pp. 33 and 34).

Some of the undesirable effects caused by non-native invasive plants (NNIP) include loss of biological diversity; loss of natural wildlife habitat, including habitat used by threatened, endangered and sensitive species; changes in water or fire regimes; degradation of soil structure; health and safety concerns; and decreased quality of recreational experiences. Of immediate concern is the potential replacement of native vegetation with solid stands of NNIP that could possibly lead to local extirpation of native plant species, as well as the reduction of natural ecological community diversity across GMNF. Existing NNIP infestations are affecting various resources and their continued spread or introduction of new infestations can be accelerated by ground disturbing management activities.

Monitoring Activities

The impact of NNIP on GMNF has been monitored by surveying the extent of infestations in areas prioritized to protect, or in areas most likely to be sources of seeds or plant propagules that could be dispersed to areas to be protected. It also includes monitoring any treatments. All data was gathered using the USDA Forest Service Natural Resources Information System (NRIS) protocol, to be entered into the NRM (Natural Resources Manager) corporate database. All sites monitored provide baseline information that can be used during ongoing implementation of the Forest-wide Invasive Plant Control Project approved in 2010 (USDA Forest Service 2010b). Table 3-14 lists the acres of botanical inventory completed and where inventories were conducted for both rare plants and NNIP during fiscal years 2019 to 2024.

Table 3-14. Botanical inventory completed on GMNF during fiscal years 2019 to 2024.

Fiscal Year	Botanical Inventory Completed
2019	• 1,732.03 acres inventoried ◦ Early Successional Habitat Creation Project timber sales, and Robinson Integrated Resource Project (IRP), Somerset IRP, Telephone Gap IRP, South of Route 9 IRP, the town of Bennington, and multiple small project locations

Fiscal Year	Botanical Inventory Completed
2020	• 5,084.56 acres inventoried ◦ Early Successional Habitat Creation Project timber sales, trail bridge replacements, roadsides, recreation areas, trail reroutes, Telephone Gap IRP, wildlife openings and small project locations
2021	• 3,260.86 acres inventoried ◦ Floodplain restoration, trail widenings, constructions and restorations, recreation areas, Somerset IRP, Telephone Gap IRP, and special use permit sites
2022	• 549.47 acres inventoried ◦ Floodplain restoration, trail constructions, improvements, or relocations, shelter relocation, Telephone Gap IRP, reviewing the site of a timber theft, timber projects, ski area improvements, Ecological Special Areas, wildlife openings, RFSS habitat improvement, and special use permit sites
2023	• 222.34 acres inventoried¹ ◦ Wildlife opening surveys, trail relocations, bridge replacements, special use permit sites
2024	• 208.04 acres inventoried¹ ◦ Wildlife opening surveys, bridge replacements, and the Velomont Trail construction project

¹ Due to short staffing, some surveys conducted in fiscal years 2023 and 2024 have not yet been entered into the database. Acreage listed is therefore less than what was actually surveyed.

This report discusses only known infestations during the monitoring period. It should be noted that with over 400,000 acres of land to cover on GMNF, it is next to impossible to have a complete and 100 percent accurate picture of all NNIP infestations at any given time. An infestation that is recorded one year may stay the same or become much larger in subsequent years. Certain species, such as garlic mustard, can spread rapidly. Others, such as barberry or buckthorn, can quickly occur as individual plants that have sprouted from bird droppings in the middle of the forest, and would be difficult to find until they become a larger infestation that is more visible. Wall lettuce has seeds that, like dandelions, spread on the wind; the scattered nature of the resulting plants can also make them difficult to find. Forest Service staff are constantly working to find and control more NNIP, and to update the geospatial database.

Most NNIP continue to occur along edges such as roads, trails, and rivers, or along access points such as trailheads and parking lots, with very few within forest interiors. However, many of the species that are now primarily on the edges have the potential to establish deeper into the woods, given the opportunity. An example is Japanese barberry; if it established in forest interiors, could limit ground flora diversity and provide ideal microsites for deer ticks.

Monitoring during fiscal years 2019 to 2024 focused on three specific resource areas that could be especially negatively impacted by NNIP: 1) Regional Forester Sensitive Species (RFSS) populations, 2) areas managed for wildlife (in this case, wildlife openings), and 3) areas especially important for ecology and research including Ecological Special Areas (ESAs), Research Natural Areas (RNAs) and candidate Research Natural Areas (cRNAs). Table 3-15 lists the percent of the resource areas infested, the number of sites/acres infested, the acres treated, and the treatment effectiveness by resource area.

Table 3-15. Botanical resource areas and the effect of NNIP on each (known percentage infested, known infestation extent, treatment size, and treatment effectiveness).

Resource Area	Percentage of Resource Area Sites Infested	Acres and/or Sites Infested	Acres and/or Sites Treated	Treatment Effectiveness ³
Rare plant populations ¹	41% of sites	298 sites	18 sites	To be determined
Wildlife Openings	48% of sites	304 acres	92 acres	To be determined
ESAs, RNAs and cRNAs ²	1% of acres	26 acres	1 acre	To be determined

¹ For rare plant populations, the number of sites that are infested or treated as opposed to the number of acres infested are reported, because rare plant populations take up a relatively small area on the landscape and there are many of them.

² For ESAs, RNAs and cRNAs, the acres infested and treated are reported, because they are much larger and there are fewer of them.

³ Treatment effectiveness can be subjective as well as difficult to gauge in the short-term. Soon after treatment, it may appear that all plants are gone or dead, only to find the following year that some have survived or resprouted from the seed bank. The “treatment effectiveness” portion of the database is meant to be recorded after 30 days; while there are reasons that timeframe exists, it is more accurate to look at long-term effectiveness, over multiple years’ worth of treatments. Long-term effectiveness data is beyond the scope of this report.

About half of the rare plant populations (41 percent) have NNIP present within 100 feet of the population boundary. There are 298 sites infested. About half of the wildlife openings have NNIP present (48 percent) for a total of 304 acres. For the ESAs and cRNAs, a very small percentage (1 percent of acres) have NNIP infestations. The RNAs and cRNAs could be considered more remote and less disturbed, but the same is not necessarily true for the ESAs, and it is unknown why they would have fewer NNIP. In general, the closer a site is to settlements, roads, and human activities, the more NNIP the resource area could be expected to have.

In wildlife openings and around rare plant populations, the most abundant NNIP species include honeysuckle, barberry, common buckthorn, Japanese knotweed, and multiflora rose. In the wildlife openings, wild parsnip is abundant as well. Similar species are abundant in the ESAs, RNAs and cRNAs, but wild chervil is more abundant than all the others except for wild parsnip, which is the most abundant. Wild parsnip is most problematic in open areas, where it has the potential to limit biodiversity and affect wildlife habitat diversity by altering available habitat structure and food sources.

Treatments of many NNIP infestations occurred on a total of approximately 738.9 acres during fiscal years 2019 to 2024 (Table 3-16). Treatments included hand-pulling, digging, herbicide applications, goats, and flame torching. Treatments typically focus on one of three elements: 1) controlling source populations, which are the ultimate cause of the negative impacts on forest resource areas, 2) on forest roads and trails, which can allow the NNIP to spread into new areas, and 3) in areas slated for active resource management. Most treatments occurred along forest roads, in areas slated for timber management, early successional habitat creation, or other management activities, in wildlife openings, at recreation sites, and around rare plant populations.

Table 3-16. NNIP treatments implemented on GMNF during fiscal years 2019 to 2024.

Fiscal Year	NNIP Treatments
2019	• 79.2 acres treated ○ Administrative sites, campgrounds, Early Successional Habitat Creation project sites, forest roads and trails, forested sites, Robinson Integrated Resource Project (IRP), and wildlife openings

Fiscal Year	NNIP Treatments
2020	• 48.3 acres treated ○ Administrative sites, campgrounds, Early Successional Habitat Creation project sites, forest roads, trails and trailheads, forested sites, Robinson IRP, sites within the Upper White River Cooperative Weed Management Area (UWR CWMA), South of Route 9 IRP, wildlife openings (some using goats), and wind energy permit site
2021	• 314.4 acres treated ○ Administrative sites, campgrounds, Early Successional Habitat Creation project sites, forest roads, trails and trailheads, recreation areas, Robinson IRP, sites within UWR CWMA, Somerset IRP, and wildlife openings
2022	• 128.6 acres treated ○ Administrative sites, campgrounds, Early Successional Habitat Creation project sites, forest roads and trails, Somerset IRP, and wildlife openings
2023	• 80.6 acres treated ○ Administrative sites, Early Successional Habitat Creation project sites, forest roads, trails and trailheads, recreation sites, and wildlife openings
2024	• 87.8 acres treated ○ Administrative sites, Early Successional Habitat Creation project sites, forest roads and trails, forested sites, recreation sites, Robinson IRP, and wildlife openings
Total	• 738.9 acres treated

Evaluation and Conclusions

While monitoring (botanical inventories/surveys) indicated the extent of NNIP infestations, Forest Service staff do not currently have a means of quantifying the effect of NNIP on other resources. Monitoring protocols were otherwise efficient and easy to use and allow assessing the short-term effectiveness of the treatments. NNIP effects associated with each botanical forest resource could be better quantified by parsing out NNIP population extents and acres treated for each resource area (rare plant sites, grasslands for wildlife, and ESAs, RNAs and cRNAs).

Foliar spot-spraying woody species is generally effective if the infestation is treated at least two or three years in a row, although common buckthorn is less easily killed than other woody NNIP. The same method used on garlic mustard is less effective, most likely due to the extensive seed bank. Cutting woody NNIP is only temporarily effective at knocking back these shrubs and therefore needs to be done together with cut-stump herbicide treatment, or else followed by foliar spot spray of the regrowth. Digging or “popping” woody NNIP can be effective, but causes ground disturbance which can then invite the NNIP seed bank to sprout vigorously or new NNIP to take hold. Hand-pulling wild chervil is labor intensive but generally effective for a year. While it must be repeated annually because of the extensive seed bank in the soil, over multiple years, it dramatically reduces the seed bank and allows for native vegetation to flourish.

Monitoring shows it is never enough to treat infestations just once, and sometimes even two times is not adequate. The reasons for this vary; in some cases, the treatment method is simply not 100 percent effective, and in other cases, the method might be effective, but there is an abundant NNIP seed source in the soil. It is also very difficult to prevent new infestations that can arrive at a site by several means, including wind, rain, wild and domestic animals, and human activity of all kinds.

Management activities monitored comply with Forest Plan Goal 2 by having rare plant and non-invasive plant inventories completed at rare plant sites in Integrated Resource Project (IRP) areas and other sites across GMNF. Knowing what NNIP are present, along with what rare plants occur there that need protection, allows the effective development of treatment plans. Management activities also comply with

Forest-wide Standards and Guidelines, Pests, Diseases, and Non-Native Invasive Species Standard S-1, p. 33) by implementing mitigation measures developed during IRP analysis.

Despite NNIP control challenges, monitoring guide measures, indicators, and methodology appear to be providing useful information, although they only assess the extent of infestations and effectiveness of treatments, not the impact on other resources. Impact on other resources may be best assessed qualitatively by specialists who manage other resources. For example, a silviculturist may recognize reduced tree seedling regeneration in a forest heavily infested with garlic mustard, and a wildlife biologist may notice decreased habitat quality in a maintained opening infested with multiflora rose.

Recommended Changes (Monitoring Question or Forest Plan Components)

Although there are no recommended changes to this monitoring question, after more than a decade of implementing NNIP treatments since the 2010 Forest-wide Invasive Plant Control Project was completed, monitoring results indicate Forest-wide Standards and Guidelines for NNIP seem more idealistic than realistic to achieve.

The following recommendations should be considered to improve Forest-wide NNIP Guidelines (Forest Plan, p. 33) for more effective NNIP management direction:

- G-1 emphasizes use of basic prevention measures, but is not clear on what these are, does not provide guidance on how to use them, or explain their value. This guideline would be more helpful if it referred to the 2012 Best Management Practices (BMP) for the Eastern Region (USDA Forest Service 2012b) available online at <https://www.fs.usda.gov/sites/nfs/files/legacy-media/r09/NNIS%20BMP%20-R9.pdf> and recommended implementing the BMP most appropriate for the specific activities undertaken. It is also recommended that training be developed for all field-going staff, and that the Forest Leadership Team develop and communicate expectations regarding prevention measures. In addition, it is recommended that each GMNF unit (Ranger Districts and Forest Headquarters) have the ability to clean machinery in the field, including between sites. In the meantime, basic prevention measures are included as design features or mitigation measures specific to each proposed project.
- G-2 directs Forest Service staff to attempt to determine the source of infestation before treatment begins. While that is solid advice (its goal is to prevent immediate reinfestation of a site after it is treated), it is often not possible. It is recommended that the wording be changed to *“To increase the likelihood of treatment success, if the source of an infestation can be identified, attempt to address it prior to treating the infestation”*.
- G-2 encourages restoration of native communities where feasible, but does not define what that is, or how to go about developing restoration plans. It is recommended that the wording be changed to *“Include restoration, rehabilitation, or revegetation, as defined by Forest Service Manual 2070”*.
- G-2 also directs the use of herbicides only when other methods are ineffective, but monitoring indicates the most suitable method is often very species-specific and is also influenced by time and budget. It is recommended that the wording be changed to *“Use the method most likely to be effective given the species, infestation characteristics, and available resources”*.
- G-5 suggests prioritization of treatment actions, but that prioritization does not align with what is feasible on the ground. Realistically, the choice of treatments is based on the sources of funding available, the availability of Forest Service staff to identify and carry out priorities, and the need to focus on response to proposed ground-disturbing projects. It is recommended the first and fifth bullets (prevention and early detection rapid response) remain, but be reordered so they are first and second, respectively. The last bullet (containing and controlling established infestations)

should remain last, and the remaining three should be combined into one bullet that is referred to as “*Sites with high dispersal potential or sites we need to protect*”.

Lands

Monitoring Item: Land Ownership Adjustment

Management Question

Has Forest land ownership been adjusted to meet future needs and improve management effectiveness?

Detailed Monitoring Question

To what extent has the Forest's land base been adjusted through purchase, exchange, transfer, interchange, boundary adjustment and donation?

Measurement Indicators

Amount of acres adjusted

Monitoring Driver

- Forest Plan Goal 22 and associated Objectives
- Forest-wide Direction, Section 2.3.17 Land Ownership Adjustments, Guidelines

Reporting Frequency

Annually

Last Year Reported

Fiscal years 2018 and 2019 biennial monitoring and evaluation report

Next Year Scheduled for Reporting

Fiscal years 2025 and 2026 biennial monitoring and evaluation report

Background

The intent of this monitoring question is to assess whether adjustment to land ownership patterns within the National Forest System align with Forest Plan Goal 22 to “*meet anticipated future needs and opportunities on public lands and improve management effectiveness of the National Forest through adjustment of land ownership*” (Forest Plan, p. 18). Forest-wide Land Ownership Adjustments Guideline G-1 states that lands that become available for purchase by willing sellers should meet a list of priorities including the consolidation of “*public ownership to facilitate natural resource restoration and conservation, improve management effectiveness, and provide large contiguous areas for multiple-use opportunities*” (Forest Plan, p. 41).

Land ownership adjustment involves acquiring and disposing of land through methods like exchanges and purchases, with the overall goal of enhancing land management and achieving various public benefits.

Adjustment benefits may include:

- **Consolidating land ownership:** By exchanging or acquiring lands, the Forest Service aims to create a more consolidated land base, leading to better public use and efficient management.
- **Protecting critical resource areas:** The program focuses on acquiring land that contains critical resources, such as habitat for threatened species or important cultural sites.

- **Improving public access and recreation:** Land acquisitions can enhance legal public access to National Forest System lands by acquiring rights-of-way for roads and trails, and by providing increased public recreation opportunities.
- **Supporting forest and watershed restoration:** In some cases, land adjustments contribute to projects aimed at restoring degraded lands by reducing hazardous fuels, improving wildlife habitat, and fostering watershed health.
- **Protecting environmentally important areas:** The Forest Legacy Program, a related initiative, aims to conserve privately owned forest lands that are threatened by conversion to non-forest uses, maintaining various public benefits like clean water, wildlife habitat, and forest products.

Monitoring Activities

Conservation partners, state and local colleagues, and interested citizens have provided tremendous assistance in identifying lands from willing sellers that would benefit the National Forest System. Land adjustment activities are recorded in the Landownership Adjustment Data System (LADS 4.0), including the acquisition of parcels, the donation of parcels to the federal government, the exchange of land, and the conveyance of land (USDA Forest Service, 2025d). The LADS 4.0 system recorded 3,391.1 acres of land acquired during fiscal years 2019 to 2024 and 3.9 acres of lands disposed through conveyance (3.9 acres) (Table 3-17).

Table 3-17. GMNF land adjustments for fiscal years 2019 to 2024.

Fiscal Year	Type of Case	Town	Acres	Management Area	Notable Features
2021	Purchase	Dorset	28	Green Mountain Escarpment	Recreation access, headwater tributary with critical fish spawning habitat, wildlife habitat
2022	Purchase	Lincoln	103	Remote Backcountry, Diverse Backcountry, and Long Trail	Recreation access (Catamount and Long Trails), fisheries and wildlife habitat, watershed enhancement opportunities
2022	Purchase	Warren	516	Alpine/Subalpine Special Area, Remote Backcountry, and Diverse Backcountry	
2023	Purchase	Chittenden, Killington, Mendon	2,744.1	Diverse Backcountry and Candidate Research Natural Area	Multiple resource benefits
2023	Conveyance	Middlebury	3.9		
Total Acres Purchased			3,391.1		
Total Acres Conveyed			3.9		

Evaluation and Conclusions

The major partners offering assistance for land adjustments during this monitoring period included Trust for Public Land, facilitating the purchase of 2,744.1 acres; and Park Forestry, LLC that assisted in the acquisition of 619 acres.

Largest Acquisition Features

The 2,744.1-acre acquisition (called Rolston Rest) includes the following benefits:

- Recreation opportunities from the 3.2 miles of the 272-mile Long Trail, 2.3 miles of the 300-mile Catamount Trail, and nearly a mile of the Blue Ridge Mountain Trail and its trailhead within the acquisition boundary.
- The property also has eight summits, with views of the Adirondacks to the west and White Mountains to the east.

- Opportunities for hunters and wildlife-watchers.
- Includes 11.2 miles of headwater streams, two-thirds of which flow west into Lefferts Pond and Chittenden Reservoir, which are being actively managed by the Forest Service to protect and improve water quality for human health and safety as well as wildlife. The other third of the property's streams flow east into the White River, a designated Special Focus Area of the Silvio O. Conte National Wildlife Refuge.
- Includes 328 acres of wetlands, an 8-acre pond, 97 acres of Class 2 scrub-shrub and forested wetlands, and 82 acres of the Source Water Protection Area for Rutland's drinking water.
- Includes habitat for the federally threatened northern long-eared bat.
- Adds protection to the Blue Ridge Fen candidate Research Natural Area. This fen is considered one of the highest quality rich fens in Vermont and provides habitat for GMNF sensitive species.

The 619-acre Lincoln Peak acquisition (within the towns of Lincoln and Warren) includes the following benefits:

- Recreation opportunities from the 1.3 miles of the 300-mile Catamount Trail. It is also adjacent to 0.4 miles of the Long Trail.
- Includes 60.1 acres of riparian areas, 0.24 miles of Lincoln Brook, 0.76 miles of Bradley Brook, and 3.0 miles of unnamed headwater streams that flow into Lincoln Brook.
- Includes habitat for the federally threatened northern long-eared bat and Bicknell's thrush, a Regional Forester Sensitive Species, and a Species of Global Conservation Concern.
- According to the VT Natural Heritage Program, nearly half the acquisition is comprised of very high quality Uncommon Natural Communities (S3) of statewide significance including 120 acres of Montane Spruce-Fir Forest and 181 acres of Montane Yellow Birch-Red Spruce Forest.
- Adjacent to 6.4 miles of NFS land boundary reducing the administrative burden of 5.9 miles of boundary maintenance.

The information and collaboration gained from partners and the willingness of local participation continues to highlight the importance of partnerships and community involvement in the land adjustment program. Forest Service staff should continue to work with partners, state entities and communities to identify, evaluate and subsequently acquire properties and secure rights of ways to accomplish land adjustment goals.

Recommended Changes (Monitoring Question or Forest Plan Components)

None.

Monitoring Item: Special Uses - Lands

Management Question

How well do Forest Plan components ensure special use permits are properly administered?

Detailed Monitoring Question

Are special use permit authorizations administered to standard?

Measurement Indicators

Percentage of special use permit authorizations administered to standard

Monitoring Driver

- Forest Plan Goal 1 and associated Objectives
- Forest-wide Direction, Section 2.3.19 Special Uses, Standards and Guidelines

Reporting Frequency

Annually (revised from every 5 years starting fiscal year 2019)

Last Year Reported

Fiscal years 2017 and 2018 biennial monitoring and evaluation report (monitoring question revised starting fiscal year 2019)

Next Year Scheduled for Reporting

Fiscal years 2025 and 2026 biennial monitoring and evaluation report

Background

The intent of this monitoring question is to help determine if management activities are meeting Forest Plan Goal 1 to “*provide for a wide range of uses and activities in an ecologically, socially, and economically sustainable way*” (Forest Plan, p. 10). Forest-wide Special Uses Standard S-1 provides direction for special use permits to be “*administered to standards described in Forest Service Handbooks and Manuals, as well as other internal management direction*” (Forest Plan, p. 43). Special use permits are a type of Forest Service authorization that may allow short- or long-term uses of NFS lands that are otherwise not permitted to the general public. The purpose of placing these uses under authorization is to include terms and conditions that allow the Forest Service to manage land uses, protect natural resources from overuse or damage, and protect public health and safety.

This monitoring question will provide information to help managers assess whether GMNF special use authorizations are administered in a way that will meet the public need, protect the environment according to Forest Plan direction and applicable project specific design features and mitigation measures, and meet legal obligations. Monitoring the number and types of special use authorizations also helps track contributions to economic sustainability of communities, and in providing renewable energy.

Monitoring Activities

Data for special use permits is consolidated for the Green Mountain (Vermont) and Finger Lakes (New York) National Forests (GMFL NFs) and is found in the Forest Service Special Uses Database System (SUDS). Special use authorizations are evaluated annually as to whether they are “to standard” based on six criteria, five of which apply to lands authorizations:

1. Is the authorization document current?
2. Are the rental fees documented?
3. Has a bill been issued or is the rent fully waived?
4. Is there documentation of current and adequate insurance?
5. Have inspections been performed and documented according to schedule, and has there been action taken for non-compliance?

This information is collected by the Forest Service special use permit administrator and entered into the Special Uses Database by the end of every fiscal year. Table 3-18 shows total special use permit authorizations for fiscal years 2019 to 2024, and whether they were administered to standard.

Table 3-18. Special use permit authorizations monitored for fiscal years 2019 to 2024 (GMFL NFs combined).

Fiscal Year	Administered to Standard	Not Administered to Standard	Total Authorizations	Percent Authorizations to Standard
2019	127	5	132	96.2
2020	121	0	121	100.0
2021	105	11	116	90.5
2022	106	8	114	93.0
2023	82	29	111	73.9
2024	104	7	111	93.7

Evaluation and Conclusions

A transition in Lands Special Uses staff occurred in 2016, at which time steady progress has been made to address a backlog of permit administration needs. As a result, 81.1 percent of authorizations were managed to standard in 2017 and by 2020, 100 percent of authorizations were managed to standard. Following 2020, Lands Special Uses staff levels fluctuated with periods of no staff in any given year, preventing the program from maintaining 100 percent of authorizations to standard.

Recommended Changes (Monitoring Question or Forest Plan Components)

None.

Program Management

Monitoring Item: Project Implementation

Management Question

How well are project activities moving resources toward desired future conditions?

Detailed Monitoring Questions

- Are project activities improving desired future conditions?
- Are Forest Plan Standards and Guidelines, and project specific design criteria and mitigation measures effective at achieving desired results?

Measurement Indicators

- List of projects with completed NEPA decisions
- Recommended changes from project implementation monitoring

Monitoring Driver

- Forest Plan Goal 1 and associated Objectives
- Forest Plan Forest-wide and Management Area Standards and Guidelines
- Management Area direction (management area major emphasis and desired future conditions)

Reporting Frequency

Annually

Last Year Reported

Not applicable; new question starting fiscal year 2019 (variation of Desired Future Conditions and Standards and Guidelines - Implementation and Effectiveness monitoring item questions from fiscal years 2017 and 2018 biennial monitoring and evaluation report)

Next Year Scheduled for Reporting

Fiscal years 2025 and 2026 biennial monitoring and evaluation report

Background

The intent of this monitoring question is to help determine if Forest Service staff are meeting Forest Plan Goal 1 to “*provide for a wide range of uses and activities in an ecologically, socially, and economically sustainable way*” (Forest Plan, p. 10), and if project implementation is moving existing resource conditions toward the major emphasis and desired future conditions provided for each Management Area. The purpose of Forest-wide Standards and Guidelines (S&Gs) which apply to all NFS lands, and S&Gs that are specific to Management Areas is to achieve Forest Plan goals and objectives and minimize or negate the effects of a management action or land use. Additional design features and/or mitigation measures are also developed for site specific projects during the environmental analysis process to further protect resources or lessen potential impacts.

The Forest Plan provides a framework and context that guides day-to-day resource management operations on GMNF. It is a strategic, programmatic document and does not make any project level decisions. Forest Plan goals, objectives, and desired future conditions provide the basis for site specific project development, analysis and implementation. Compliance with the National Environmental Policy Act (NEPA) involves the environmental analysis process for a specific proposal, proper documentation, and public disclosure of effects in an environmental assessment, environmental impact statement, or categorical exclusion before a decision is made to implement the project.

Monitoring Activities

The total number of GMNF projects approved during fiscal years 2019 to 2024 to implement the Forest Plan is provided in Table 3-19 by the level of analysis required by the National Environmental Policy Act (NEPA). The list of projects approved for each fiscal year is provided in Table 3-20. A total of 158 projects were approved by NEPA decisions during the monitoring period. Most projects were completed with Categorical Exclusions with 137 Decision Memos or Letter to the Files (87 percent of total projects approved or reviewed). A total of 17 projects were reviewed considering new information or changed circumstances to determine if their effects were within the range originally disclosed in their respective NEPA decisions. In all cases, additional analyses or new decisions were not needed, and are documented in respective project Supplemental Information Reports.

Four Environmental Assessments with Decision Notices were approved during the planning period for the following projects:

- Two in Fiscal Year 2019 - Robinson Integrated Resource Project on the Rochester Ranger District, and Early Successional Habitat Creation Project on the Manchester Ranger District
- One in Fiscal Year 2021 - Somerset Integrated Resource Project on the Manchester Ranger District
- One in Fiscal Year 2023 - Maple Tapping Special Use Permits on the Middlebury Ranger District

Table 3-19. Number of projects approved for implementation during fiscal years 2019 to 2024.

National Environmental Policy Act – Level of Analysis	Fiscal Year						Total
	2019	2020	2021	2022	2023	2024	
Record of Decision (EIS – Environmental Impact Statement)	0	0	0	0	0	0	0
Decision Notice (EA – Environmental Assessment)	2	0	1	0	1	0	4
Decision Memo (CE – Categorical Exclusion)	23	17	9	16	14	13	92
Letter To the File (CE – Categorical Exclusion)	10	13	7	5	7	3	45
Supplemental Information Report	5	6	2	1	2	1	17
Total Projects Approved	40	36	19	22	24	17	158

Table 3-20. List of GMNF projects approved for implementation during fiscal years 2019 to 2024.

Project Name	Unit ¹	NEPA Level ²	Project Description
Fiscal Year 2019			
Alectoris Fontinalis, LLC Outfitter & Guide Special Use Permit	MID/ROC	LTF	Issuance of a temporary special use permit authorizing Alectoris Fontinalis, LLC to conduct Outfitting & Guiding activities on the Middlebury and Rochester Ranger Districts.
Appalachian Trail/Long Trail Stratton Pond Trail Relocation	MAN	DM	Approximately 0.2 mile of Appalachian Trail/Long Trail (AT/LT) near Stratton Pond relocated away from the eastern shore of the pond to reduce impacts to the shoreline and water quality of Stratton Pond. Includes changing AT Management Area boundary.
Arace Special Use Permit	MAN	DM	Issuance of a special use permit for existing spring, water pipeline, and parking lot to serve private camp.
Beane ROW Authorization	ROC	DM	Issuance of a special use permit to Mr. Beane to reconstruct and maintain part of the Tunnel Brook trail to his private property.
C7 Tread Improvement near Grout Pond Winter TH	MAN	LTF	Use excavator and a tracked dump truck to re-establish tread and drainage on Corridor 7 snowmobile trail. Add existing 120-foot Class 4 single-wide connector trail from the parking lot the C7 to NFS trail system.
Camp Casino Timber Sale Barrow Pit	MAN	SIR	Review of barrow pit needed for the Camp Casino on Timber Sale within the South of Route 9 IRP project area.
Catamount Trail Connector	MAN	DM	Construct an approximate 1.6-mile segment of the Catamount Trail to provide connectivity between Forest Trail 134, Round Robin Trail, and the South Pond parcel.
Crossman Right of Way Special Use Permit	MID	DM	Issuance of a special use permit to build logging road from Cobb Hill Road to private property. Road is 3,595 feet long and approximately 12-16 feet wide to be used for removing logs with eventual use as road access for a camp.
Devils Den Bridge Removal	MAN	LTF	Dismantle and remove seven bridges from the Devils Den Trail.
Douglas Shelter Privy Conversion	MAN	LTF	Build moldering privy to replace the current pit privy at Douglas Shelter. Construction will be with hand tools and on site.
Early Successional Habitat Creation	MAN	EA	Increase acres of early successional (0-9 age class) habitat for neotropical migrant songbirds and other wildlife species using primarily commercial timber harvests. A maximum of approximately 15,000 acres would be harvested over the next 15 years.
Forest Road 24B Aquatic Organism Passage Culvert Replacement	MID	LTF	Reconstruct the road and stream crossing with a new aquatic organism passage (AOP) structure along North Branch of Sucker Brook.

Project Name	Unit ¹	NEPA Level ²	Project Description
Forest Road 55 Relocation special use permit	ROC	DM	Issuance of a special use permit to the Town of Granville to make necessary repairs to FR 55. This includes moving the roadbed up to 25 feet to re-contour and stabilize a slumping bank with rip rap to increase its stability.
Goshen Dam Spillway Authorization	MID	DM	Issuance of a special use permit to Green Mountain Power Corp. for the purpose of reconstructing and extending the spillway at Goshen Dam to withstand floods and meet FERC requirements.
Gran Fondo Recreation Event Authorization	ROC	LTF	Issuance of a special use permit to "Ride it if You Can" to set up a rest area in the parking area on Lincoln Gap during the annual Gran Fondo endurance riding event.
Green Mountain Power Route 125 Powerline Reconstruction Permit	MID	DM	Issuance of a special use permit for powerline reconstruction right-of-way along Route 125 in Ripton.
Green Mountain Trailblazers ROW Authorization	MAN	DM	Issuance of a special use permit to the Green Mountain Trailblazers for a private snowmobile trail.
Hewitt Brook Trail Rehabilitation	ROC	LTF	Install water control/drainage structures for the portion of the Hewitt Brook Trail located between Forest Road 99 to the west and the National Forest property boundary to the east.
Isaiah Slade ROW Permit	MAN	DM	Issuance of a special use permit to allow construction and use of a driveway to access private land.
Large Longleafed Orchid Habitat	MAN	SIR	Review of new habitat conditions found for the large longleafed orchid in the Early Successional Habitat Creation project area.
Lincoln Brook AOP Placement	ROC	DM	Removal and replacement of the existing structure on Hanks Brook at the intersection of Lincoln Gap Road and Hanks Road in the Town of Warren.
Lincoln Peak Communication Site Expansion Permit	ROC	DM	Issuance of a special use permit to VELCO to expand communication site at Lincoln Peak.
Marques ROW Special Use Permit	ROC	DM	Issuance of a special use permit to Mr. Marques to reconstruct and maintain 700 feet of the Tunnel Brook trail to his private property. This is an extension of the Beane ROW
Mount Snow Snowmaking Project	MAN	SIR	Review of new information for northern long-eared bat listing.
Pinnacle Lodge Special Use Reissue	MAN	DM	Reissuance of an existing special use permit authorizing previously approved uses with no change in operation on 13+ acres of NFS land.
Robinson Integrated Resource Project	ROC	EA	Multiple resource projects to implement Forest Plan objectives and meet desired conditions.
Rose Logging Access Permit	MAN	DM	Issuance of a special use permit to allow use of skid trails on NFS lands to harvest adjacent private property.
Rose Logging Access Permit	MAN	LTF	Changed original logging access route location approved in February 2019 DM under a less than 1-year permit.
Shelburne Bike Trails System - Connector Trail	ROC	SIR	Review of new information for the Killington Bike Trails Addition DM dated 2014 to add a 45-foot-long connector trail between existing Shelburne bike trails system (formerly named Killington bike trails) and adjacent bike system on private land.
Smith ROW Authorization	MID	DM	Issuance of a road right-of-way permit to Mr. Smith for the reconstruction, utilization and maintenance of a timber haul road and a gate.

Project Name	Unit ¹	NEPA Level ²	Project Description
South of Route 9 - Changed Prescribed Burn Area	MAN	SIR	New information/changed circumstance - moved prescribed burn area boundary to west of planned location that includes sensitive plants.
Stratton Pond Recreation Area Realignment	MAN	DM	Decommission the North Shore Trail and North Shore Tenting Area. Construct new 10-person shelter, privy and tenting area in a new location. Construct new spur trail shelter to Lye Brook trail and the water source. Replace puncheon and relocate section of Lye Brook Trail. Relocate shelter caretaker's platform/site. Formally manage additional tenting area near Stratton Pond Shelter and add moldering privy.
Sugarbush Heaven's Gate Patrol Shack	ROC	DM	Relocate the ski patrol building in an area at Sugarbush Resort to the south of the unload ramp of Heaven's Gate chairlift.
Sugarbush Sleeper Trail Widening	ROC	DM	Widen trails to improve ski terrain at Sugarbush Resort.
Swan's Mill Trail & California Lot Trail Bridges Replacement	ROC	LTF	Tiered to the Forest-wide Trail Maintenance LTF. Replacement of bridges along trails.
Utley Brook North Bike Trail Designation	MAN	LTF	Add mountain bike trail use to existing system trails.
Woodford Lake Estates Snowmobile Trail Additions	MAN	DM	Designate 1.6 miles of exiting trail for snowmobile use. Grade trail tread, install waterbars, ditches, 2 culverts and inspect bridge. Block/obliterate 2 unauthorized access trails. Includes the removal of 4 miles of snowmobile use on FT 393 (Dome Trail).
Woodford State Park Right of Way Special Use Permit	MAN	DM	Reissuance of a special use permit to Woodford State Park for 1.36 miles of hiking trails (portions of 2 trails, one which is in Aiken Wilderness).
Fiscal Year 2020			
Appalachian Trail Winturri Shelter Privy Replacement	ROC	LTF	Replace the existing privy with a FSORG moldering privy. Includes relocating the privy away from the shelter and stream.
AT/LT Griffith Lake Tread Repair	MAN	LTF	Reconstruct approximately 0.4 mile of AT/LT near Griffith Lake including general maintenance and replacement of existing structures in-kind.
Bingo Road Reroute Special Use Permit	ROC	DM	Issuance of a special use permit to the Town of Rochester to temporarily reroute 150 feet of the Bingo Road and permanently reroute 575 feet of the Bingo Road to address flood damage.
Camping Theater Special Use Permit	MAN	LTF	Issuance of an Outfitter & Guide special use permit for a term of one year to authorize Campfire Theater Tours to lead four trips with backpacking, camping, and theatrical performance.
Chateaugay Trail Relocation	ROC	DM	Reroute the existing trail bypass to the east to avoid wetlands requiring approximately 500 feet of new trail construction.
Early Successional Habitat Creation Project - Poorly Drained Soil	MAN	SIR	Review modifications to soil design features included in the Early Successional Habitat Creation (ESHC) Project for the Bully Brook and Old Job timber sales.
ESHC Project - Group with Improvement Harvest Method	MAN	SIR	Review group with improvement harvest method to add as an option for remaining acres subject to ESHC project implementation.
ESHC Project - Pool Unit Acre Adjustment	MAN	SIR	Review added acres to the ESHC Project to consider for harvest for the West River timber sale.

Project Name	Unit ¹	NEPA Level ²	Project Description
Fairpoint Master Permit	GMNF	DM	Re-authorization of the special use permit for the operation and maintenance of all existing Fairpoint Telephone lines located across the Forest.
Feller Brook Snowmobile Trail Decommissioning	MAN	DM	Remove Forest Trail 322 (Feller Brook) from the NFS Trails Database. The trail has not seen snowmobile use in several years, is missing two bridges over stream crossings, and is not part of the Vermont Association of Snow Travelers (VAST) trail system.
Forest Road 10 AOP Culvert Replacement (2019)	MAN	LTF	Reconstruct FR 10 and stream crossing at Mt. Tabor Brook with a new AOP structure. Includes removing the existing structure; installing the new structure; rebuilding the roadway and stream; and other site work.
Forest Road 10 Bridge Replacement	MAN	LTF	Remove existing bridge and abutments along FR 10; construct new abutments and bridge; and restore the road and stream.
Forest Road 100 AOP Culvert Replacement	ROC	LTF	Reconstruct FR 100 and stream crossing at Taylor Brook with a new AOP structure. The construction activities include removing the existing structure; installing the new structure; rebuilding the roadway and stream; and other site work.
Forest Road 30 - Opening Reclamation	MAN	DM	Remove large diameter trees from upland opening in conjunction with ESHC Project timber sale units.
Forest-wide Trail Decommissions and Trail Additions	GMNF	DM	Decommission trails across GMNF. Added the Goshen Trail to the NFS trail system.
FR 10 AOP Culvert Replacements (2020)	MAN	LTF	Reconstruct FR 10 and stream crossings at MP 10.4 and 11.53 with new AOP structures. Includes removing the existing structures; installing the new structures; rebuilding the roadway and stream; and other site work. Combined decision with 2019 FR10 AOP Replacement LTF.
Frost Wayside Connector and Accessibility Trail Upgrade	MID	DM	Upgrading trails to be fully accessible, relocating trails away from wetlands, installing interpretive signs, planting a pollinator garden, and constructing 0.2 miles of connector trail.
GMP Little Pond Road Electric Line Construction Permit	MAN	DM	Reviewed at 11/19 SPD. A permit with a two-year term would be issued to Green Mountain Power for construction of an underground powerline. Green Mountain Power would install approximately 600 feet of underground powerline in a conduit. Decision Memo signed by John Sinclair on 2/24/2020.
Green Mountain Power Goshen Dam Special Use Permit	MID	DM	Issuance of a special use permit for a term of two years to authorize the construction of a primary voltage underground electric line and fiber optic cable line along the access road from the Goshen-Ripton Road to Green Mountain Power property at Goshen Dam.
Mount Snow Sunbrook Area Trail Widening	MAN	DM	Create an alternative top to bottom beginner level trail at Mount Snow Ski Area by widening sections of Moon Walk, Little Dipper, Big Dipper and Moon Beam trails at Sunbrook, and then add snowmaking pipelines.
Mountain Top Resort Special Use Permit Re-issuance	MID	DM	Re-issuance of a special use permit for a term of 10 years to Mountain Top Resort to operate and maintain portions of existing trails for Nordic skiing and guided horseback rides. The Nordic trail system includes 12 miles of trail on NFS lands. Guided horseback rides occur from May 15 to October 31 on 3.6 miles of trails/roads located on NFS lands.
Nordic Removal Harvests	MAN	SIR	Review the overstory removal of shelterwood units harvested as part of the Nordic EA timber sales.

Project Name	Unit ¹	NEPA Level ²	Project Description
Potekhen Log Landing Special Use Permit	MAN	LTF	Issuance of a special use permit not to exceed one year to Bruce Potekhen for use of an existing log landing on NFS land.
Prospect Mountain Vernal Pool Reroute	MAN	LTF	Create an estimated 345 feet of new better aligned trail and decommission 225 feet of the current trail which is part of the Prospect Mountain permit area.
RASTA Recreation Event Special Use Permit	MID/ROC	LTF	Issuance of a not to exceed one-year special use permit to the Rochester/Randolph Area Sports Trail Alliance (RASTA), authorizing them to conduct a one-day backcountry skiing race at the Brandon Gap backcountry skiing area.
Rochester/Middlebury Outfitter & Guide Special Use Permit	MID/ROC	DM	Reauthorization of Outfitter & Guide special use permits for True North, Confluence, Killington Mountain Guides, Alectoris Fontinalis and Alpine Endeavors for a term of ten years. Activities include backpacking, cross-country skiing, fishing and rock climbing.
Sand Piper ROW Special Use Permit	MAN	LTF	Issuance of a ROW special use permit for an existing driveway across NFS land to private property. The property is currently for sale and once ownership is transferred, a new permit would need to be issued.
Sargent ROW Permit Reauthorization	MAN	DM	Issuance of a special use permit to replace an expiring right-of-way easement for a road that is 3,160 feet long. The right-of-way width would be increased to 16 feet to allow for maintenance of drainage structures.
Sugarbush Special Use Permit Reissuance	ROC	LTF	Reissuance of a special use permit for the Sugarbush Ski Area and a water well permit.
Supervisor's Office Relocation	MID	SIR	Review of new/changed information for the 2010 decision notice to relocate the Supervisor's Office to Mendon site.
Upper White River Integrated Resource Project - Brush Pile Burning	ROC	SIR	Review of proposal to burn piles of slash in timber sale unit Albee 3, within Compartment 59 Stand 7 which is part of the Upper White River Integrated Resource Project EA to foster better planting conditions.
Vermont Mountain Adventures Special Use Permit	MAN	LTF	Issuance of an Outfitting and Guiding special use permit to Vermont Mountain Adventures for a term of one year to authorize them to lead up to 484 tours between the dates of December 16 to April 13.
West Hill Bridge Replacement Special Use Permit	ROC	DM	Issuance of a special use permit to the Town of Rochester with a term of two years for the construction of a new bridge on West Hill Road (FR 41) at its intersection with State Route 73 in Rochester.
Weston CCC Trail	MAN	DM	Add 0.25 miles of Forest Road 299 (OML 1) as a hiking trail (Trail Class 2). No bridges or other trail tread infrastructure are needed.
White Pine/Oak/Hickory Timber Stand Improvement	GMNF	DM	Release white pine regeneration from competition via non-commercial, non-ground disturbing, hand felling in up to 19 stands.
Woodford Snobusters Recreation Event Special Use Permit	MAN	DM	Reauthorization of a Recreation Event special use permit for a term of five years, authorizing two annual snowmobiling events.
Fiscal Year 2021			
2021 Apple Tree Release Stands	MAN	DM	Release apple trees across Manchester Ranger District by removing trees that over-top and shade them, and to prune excess vegetative growth from these apple trees to restore their fruit production and overall vigor.

Project Name	Unit ¹	NEPA Level ²	Project Description
Additional Apple Tree Release Stands	MAN	DM	Additional apple tree sites to be released by removing trees that over-top and shade them, and to prune excess vegetative growth from these apple trees to restore their fruit production and overall vigor.
Agricultural Special Use Permit Reauthorizations	MID/ROC	LTF	Reauthorization of six agricultural special use permits on parcels within the Appalachian Trail Corridor.
Cobb Log Landing Special Use Permit	MAN	DM	Issuance of a special use permit for use of an existing log landing and skid road in the Town of Landgrove.
Endurance Events Special Use Permits Reauthorization	MID/ROC	LTF	Reauthorization of special use permits for two endurance running race events.
Forest Plan - Forest Roads Management	GMNF	SIR	Review of new information/changed circumstances for road management to determine if a Forest Plan amendment or administrative change is warranted.
Goshen Blueberry Opening Management	MID	DM	Reopen overgrown areas that were once productive low-bush blueberry forage for both wildlife and recreation opportunity. Treatments include timber harvest and prescribed fire.
Green Mountain Power (2021) Reconstruction Permit	MID	DM	Issuance of a special use permit to Green Mountain Power to reconstruct an existing powerline in 2 separate areas.
Macintyre Permanent Opening Reclamation	MAN	DM	Create one opening by combining stands 104, 105, and 40 into a single 35-acre opening as a complimentary action to the Early Successional Habitat Creation Project.
Moses Pond Trail Bridge Replace	MAN	LTF	Replace two bridges on the Moses Trail. Also designates a total of 2 additional miles of trail for mountain bike use and removing 2 miles of trail for snowmobile use.
Mount Snow Epic Mix Installation	MAN	DM	Installation of infrastructure associated with an interactive skiing app and to increase areas on the mountain where electrical power would be available. The Epic Mix Installation would be a ski-through gantry that skiers interact with via a smartphone app.
Somerset Integrated Resource Project	MAN	EA	Multiple resource projects to implement Forest Plan objectives and meet desired conditions.
South Fork of the Roaring Branch Stream Restoration	MAN	DM	Large wood placement on up to approximately 2.1 miles of stream within the South Fork Timber Sale boundary where chainsaws will be used to directionally fell and position trees from the adjacent streamside.
True North O&G Special Use Permit Amendment	MAN	LTF	Amend the existing special use permit to include backpacking at locations on the Manchester Ranger District.
Velomont Trail Relocation - Robinson Integrated Resource Project	ROC	SIR	Relocate segment of Velomont Trail connecting Sections 1 & 2 along existing road prohibiting public use with 0.2 mile of new trail construction. Reviewed Robinson Integrated Resource Project EA for changed circumstance.
Wild Wings Special Use Permit Reissuance	MAN	LTF	Reissuance of a 10-year special use permit authorizing Wild Wings Ski Touring Center to operate and maintain a system of cross-country ski trails totaling approximately 6.35 miles.
Wild Wings Trail Improvement Project	MAN	LTF	Improve cross-country ski trails at the Wild Wings Ski Center.
Wise Joint Properties II ROW Special Use Permit	MAN	LTF	Issuance of a special use permit to authorize an existing right-of-way to a new property owner.
Woodford Estates ROW Special Use Permit	MAN	DM	Issuance of a special use permit to authorize a right-of-way for snowmobile use for a term of 20 years.

Project Name	Unit ¹	NEPA Level ²	Project Description
Fiscal Year 2022			
2021 Skid Road Special Use Permits	ROC	DM	Issuance of a right-of-way special use permit to allow use of existing skid roads on NFS land for logging operations on adjoining private land.
Blueberry Lake Riparian Planting	ROC	DM	Prevent further resource damage from beaver activity by enhancing riparian vegetation at Blueberry Lake with live-staking willow cuttings along sections of the shoreline.
Dutch Hill Glade Additions	MAN	DM	Add new glades to the Dutch Hill backcountry ski area.
ESHC Project - Reduced Roads	MAN	SIR	Review of new information associated with reduced roads and harvest areas as originally approved in the ESHC project EA/DN.
Falls of Lana Parking Lot Improvement	MID	DM	Improve the Falls of Lana Trailhead parking lot through repaving and marking of parking spaces.
Goshen Dam Spillway Special Use Permit Amendment	MID	DM	Issuance of a special use permit to authorize activities to address emergency containment efforts from high precipitation events in the summer of 2021.
Hoosac Ridge Trail Relocation	MAN	DM	Snowmobile trail relocations to avoid wetlands and route around private property.
Manchester Trail Bridge Replacements	MAN	DM	Replace two snowmobile bridges and one foot bridge.
Middlebury Office Conveyance	MID	LTF	Conveyance of Middlebury Ranger District office and administrative site to a third party.
Minvera Hinchey Shelter Area Management	MAN	DM	Replace and relocate the shelter along the AT/LT corridor.
Moosalamoo Ultra Special Use Permit Reauthorization	MID	LTF	Reauthorization of a special use permit to conduct a trail racing event in the Moosalamoo National Recreation Area.
Mount Snow Lift Replacements	MAN	DM	Replace three existing ski lifts with two new lifts at Mount Snow Ski Area to reduce waiting times.
North Country Trail Corridor/Oak Ridge Trailhead	MID	DM	Reconstruct the Oak Ridge Trailhead, construct 0.3 miles of North Country National Scenic Trail, and improve existing trails to connect the North Country trail on private land from the west across NFS land to the Long Trail.
Prospect Mountain Trail Improvements	MAN	DM	Improve Nordic ski trails including widening and new segments to improve trail congestion.
Ridgeline Outdoor Collective Mountain Bike Clinic Special Use Permit	ROC	LTF	Issuance of a special use permit to Ridgeline Outdoor Collective to hold children's mountain bike clinics.
Sugarbush Heaven's Gate Lift Replacement	ROC	DM	Replace chairlift at Sugarbush Ski Resort. Includes some additional clearing to accommodate lift realignment.
Sugarbush Reverse Traverse Realignment and Snowmaking	ROC	DM	Realign existing ski trails at Sugarbush Ski Resort; includes new snowmaking infrastructure.
Summer Skid Road Special Use Permits	MID	DM	Issuance of special use permits to cross NFS lands using existing skid trails to access private land logging.
Vermont Mountain Adventures O&G Special Use Permit	MAN	LTF	Reauthorization of Outfitting and Guiding special use permit for Vermont Mountain Adventures to lead snowmobile tours on NFS lands from private land owned by Pinnacle Lodge.
West Hill Bridge Replacement Special Use Permit	ROC	DM	Issuance of a special use permit to authorize the Town of Rochester to replace an existing single-lane road bridge over Brandon Brook on West Hill Road (Forest Road 41).

Project Name	Unit ¹	NEPA Level ²	Project Description
White Oak Planting	MAN	DM	Plant up to 2,000 white oak seedlings on approximately 3 acres to conduct genetic tests on which trees are best adapted to local conditions.
Woodstock Inn Outfitter Guide Special Use Permit	ROC	LTF	Issuance of a special use permit to Woodstock Inn to lead guided fly-fishing tours on GMNF.
Fiscal Year 2023			
2021 Maple Tapping Special Use Permits	MID	EA	Issuance of multiple maple tapping permits.
2023 Outfitter & Guide Special Use Permit Reauthorizations	GMNF	LTF	Reissuance of special use permits to 5 Outfitters and Guides; 4 10-year permits and one 2-year permit.
Adventure Racing Association Recreation Event Special Use Permit	MID/ROC	LTF	Issuance of a Recreation Event special use permit with a term of less than one year, authorizing Green Mountain Adventure Racing Association to conduct an endurance event.
Ash Treatment for Emerald Ash Borer	GMNF	DM	Treat emerald ash borer infestations with insecticide across at sites across GMNF.
Bear Brook Winter Parking Lot Construction	ROC	DM	Improve the former Bear Brook Picnic Ground parking lot to provide up to 50 parking spaces for users of the Brandon Gap Backcountry Zones.
Goshen Gallop Special Use Permit Reauthorization	MID	LTF	Reissuance of a five-year recreation event permit to Blueberry Hill Inn, Inc. to allow an annual cross-country race on existing trails.
Green Mountain Power - Peru Construction Special Use Permit	MAN	DM	Issuance of a special use permit to GMP to upgrade existing powerlines.
Green Mountain Power Cobb Hill Construction Special Use Permit Authorization	MID	DM	Issuance of a special use permit with a term of three years to GMP to construct approximately 1,200 feet of above ground powerline with six poles on NFS land.
Hogback Loop Trail Realignment	MID	DM	Realignment of Hogback Loop near Blueberry Hill Inn from private land where development is planned.
Invasive Plant Control Early Detection Rapid Response (EDRR)	GMNF	SIR	Review of new information relative to the 2010 Invasive Plant Control EA/DN specific to application of early detection rapid response to control invasive plants.
Killington Parking Lot Special Use Permit	ROC	DM	Issuance of a special use permit to the Town of Killington to use 0.08 acres of NFS lands as part of the Killington Town Hall parking lot.
KST Outfitter & Guide Special Use Permit Reauthorization	MAN	LTF	Reissuance of Outfitter and Guide special use permit to Killington Snowmobile Tours for a term of ten years.
Lauzon & Sausville Wilderness Road ROW Special Use Permit Reauthorization	MAN	DM	Reissuance of a special use permit for a right-of-way to cross NFS lands to access private land inholding within Glastenbury Wilderness.
Lincoln Gap Parking Improvement	ROC	DM	Expand the Long Trail trailhead parking lot at Lincoln Gap to make more efficient use of the space and increase safety.
Minor Building Decommission	MAN	LTF	Demolish and remove materials associated with the Capella Camp off of Burgess Road, in Woodford, VT. Removed Mt. Tabor Dynamite and Cap House buildings from original proposal due to heritage concerns.
Moosalamoo to Silver Lake Connector Trail	MID	DM	Establish connector trail in the Moosalamoo National Recreation Area.

Project Name	Unit ¹	NEPA Level ²	Project Description
Northern Long-Eared Bat Biological Opinion	GMNF	SIR	Review of USFWS northern long-eared bat biological opinion reflecting ongoing projects with “likely to adversely affect” determinations.
Pinnacle Lodge Special Use Permit Reauthorization	MAN	LTF	Reissuance of a 5-year special use permit to Pinnacle Lodge for the use and maintenance of a sewage lagoon, spray field, parking lot, sign, and septic pump house covering approximately 4 acres.
Richville Road Riparian Restoration	MAN	DM	Restore native forest on floodplain along Batten Kill. Post-decisional addition of tree-cages also approved.
Ridgeline Outdoor Collective Outfitter & Guide Special Use Permit	ROC	LTF	Issuance of a special use permit for a term of ten years to Ridgeline Outdoor Collective to use existing mountain biking trails behind the Rochester Ranger Station for after school & family programming, and summer camp activities.
Silver Lake Recreation Site Improvements	MID	DM	Improve Silver Lake Campground and picnic area to address resource damage issues.
Texas Falls Observation Site Renovation	ROC	DM	Improve the public infrastructure and accessibility at Texas Falls recreation area, remove features that may pose a public health and safety risk, and reduce deferred maintenance.
Wardsboro Link #3 Snowmobile Trail Bridge Replacement	MAN	DM	Replace Wardsboro Link #3 Snowmobile Trail Bridge.
Widow's Clearing Trail Realignment	MID	DM	Realign Widow's Clearing Trail along Forest Road 32.
Fiscal Year 2024			
Appalachian Trail/Long Trail (AT/LT) Relocations in Bennington County	MAN	DM	Relocation of a section of the AT/LT from private onto public lands and a different section from unstable terrain to a better location.
FR 278 Road Bridge Superstructure Replacement	MAN	LTF	Replace bridge along FR 278 with AOP structure.
Hapgood Pond Recreation Site Improvements	MAN	DM	Maintenance and improvement of Hapgood Pond Recreation Site features including stairs, fishing and boat access, toilets, and pavilions.
Hard Fall 24 Hour Adventure Race Special Use Permit	MAN	LTF	Issuance of a special use permit for 120-participant recreation event that occurs on parts of GMNF.
Jones Brook East Trail Relocation/ Managed Bike Use	MAN	DM	Add mountain bike to Jones Brook East Trail for managed use. Includes short relocation around wetland.
Little Mad Tom Brook Diversion Repair Special Use Permit	MAN	DM	Issuance of a special use permit to the Town of Dover for berm repair to divert the stream channel to historic location to protect downstream private infrastructure.
Manchester Trail Bridge Replacements and Repairs	MAN	DM	Replace 11 existing trail bridges across the Manchester Ranger District.
Mount Snow High Traverse Widening	MAN	DM	Widen High Traverse alpine trail, increase snowmaking and electrical conduit capacity, and construct valve house at Mount Snow Ski Resort.
Clark Right of Way Reconstruction Special Use Permit	MID	DM	Issuance of a temporary special use permit with a term of less than one year to authorize improvement of an existing right-of-way and use by commercial vehicles for less than one year in non-snow conditions.

Project Name	Unit ¹	NEPA Level ²	Project Description
Green Mountain Power Silver Lake Diversion Dam Dredging (at Sucker Brook)	MID	DM	Issuance of a special use permit to improve the Silver Lake Diversion Dam (at Sucker Brook) access roads, installation of temp structures for removal of sediment, and deposition of sediment at Goshen pit.
Mountain Top Trail improvement Project - 2023	MID	DM	Improvement and widening of about 2 miles of ski/snowshoe trail for drainage and safety.
Route 125 Hazard Tree Removal Project	MID	LTF	Authorize VTrans to remove hazard trees (due to summer storm erosion) along VT 125 from Oak Ridge to Ripton.
Silver Towers Trail Right of Way Special Use Permit	MID	DM	Reissuance of a special use permit for construction, maintenance, and use of a 500-foot-long trail to alleviate safety concerns of campers with disabilities traveling on FR 32.
Appalachian Trail Side and Corridor Crossing Trail Designations	ROC	DM	Add three existing trail segments to the National Forest System in the Town of Norwich (Dothan Brook, Joshua, and Griggs Mountain Trails).
2022 Sugarbush Heaven's Gate Chairlift Replacement	ROC	SIR	Review of original chairlift replacement DM to reflect changed bat and Bicknell's thrush tree cutting seasonality.
Maher ROW Special Use Permit Amendment	ROC	DM	Issuance of an amendment of an existing right of way (ROW) special use permit to include year-round use and to extend the ROW by approximately 460 feet from the end of Pine Gap Road to the existing ROW.
Corridor 7 Trail Relocation of Highway 11/30 Crossing	MAN	DM	Relocation of Corridor 7 snowmobile trail to address safety concerns due to bridges in poor condition and a highway crossing.

¹ GMNF = Forest-wide; MAN = Manchester Ranger District; ROC = Rochester Ranger District; MID RD = Middlebury Ranger District; MID/ROC RD = Middlebury and Rochester Ranger Districts

² EA = Environmental Assessment; DM = Categorical Exclusion (Decision Memo); Categorical Exclusion (Letter to the File); SIR = Supplemental Information Report.

Monitoring project implementation during or after completion determines if projects have been implemented as designed and whether they have achieved the desired results. Monitoring projects also determine whether Forest Plan S&Gs, and project specific design features and mitigation measures have been correctly applied and whether they have protected resources as intended. Although this level of monitoring is completed by resource specialists as they visit project sites throughout each fiscal year, they also visit sites as a formal monitoring team on scheduled dates to discuss the interdisciplinary approach to assess implementation effectiveness. Table 3-21 lists the formal site-specific project monitoring field visits conducted by the GMNF monitoring team during this monitoring period.

Table 3-21. Monitoring field visits conducted during fiscal years 2019 to 2024.

Fiscal Year	Location	Dates
2020	Manchester Ranger District	September 2 and 3, 2020
2022	Middlebury/Rochester Ranger Districts	May 17 and 18, 2022
2023	Manchester Ranger District	September 27 and 28, 2023
2024	Middlebury/Rochester Ranger Districts	September 25 and 26, 2024

Each project site visited was evaluated by the monitoring team using a set of questions designed to answer the following Forest Plan implementation monitoring questions:

1. Did the project move the area or resource toward the Forest Plan desired future condition and/or meet the intent of the purpose/need from the decision document? Did the project accomplish what it was planned to achieve?

2. If no, what is it about the project that did not move toward the desired future condition or achieve what it was planned to do? How could the project be improved to do so?
3. Was the project implemented as designed?
4. If no, what was changed and what was the reason for the change? Were the changes effective, and within the project scope of the analysis and decision including mitigation measures? Were the changes reviewed, reported or documented?
5. Were Forest Plan standards and guidelines followed during project preparation and implementation?
6. If no, what is it about the project that did not meet Forest Plan standards and guidelines and how could it be improved to do so?
7. Should the Forest Plan standards and guidelines be changed or improved as a result of the implementation of this project?
8. If yes, how and why should it change?
9. Were the mitigation measures and/or design criteria included in the project decision followed during project preparation and implementation?
10. If no, what is it about the project that did not include required mitigation measures and/or design criteria and how could it be improved to do so?
11. Were the mitigation measures and/or design criteria effective and achieve their desired intent?
12. If no, what changes or improvements should be made so that they are more effective?
13. Were the applicable Forest Plan standards and guidelines, mitigation measures and/or design criteria included in the project contract or force account instructions, or reviewed with partners or Forest Service staff implementing the project?
14. If no, how could this process be improved?
15. Are there any other specific resource concerns identified from monitoring this project?

Evaluation and Conclusions

All projects analyzed and approved during fiscal years 2019 to 2024 were designed and found to be consistent with Forest Plan direction including goals, objectives, and Forest-wide and Management Area S&Gs, and collectively, have moved existing conditions toward desired future conditions across GMNF. Most projects analyzed include special use permit authorizations, recreation infrastructure enhancement, road infrastructure maintenance, and wildlife and aquatic habitat improvement projects approved at the Categorical Exclusion level of NEPA.

Three projects analyzed as environmental assessments and approved with Decision Notices (Robinson Integrated Resource Project, Early Successional Habitat Creation Project, and Somerset Integrated Resource Project) include a wide range of multiple resource activities. These projects are anticipated to be implemented over a 10-to-15-year period following their decisions to move their respective project area landscapes toward desired resource conditions. Project activity highlights include:

- Robinson Integrated Resource Project (IRP) and Somerset IRP
 - Improve wildlife and fish habitat, restore soils and wetlands, provide a network of sustainable roads and trails, increase the quality of recreation opportunities in the area, and protect heritage resources. The projects also include the harvesting of timber to provide wood products to the local and regional economy, enhance forest health and diversity, and create more diverse plant and wildlife habitat.
- Early Successional Habitat Creation Project
 - Harvest of timber up to 15,000 acres over a 15-year period to create early successional habitat that will benefit nesting birds and other wildlife dependent on this habitat type. The project

has been designed to achieve desired conditions across the forest landscape by increasing the regenerating age class (0 to 9 years old) of forested stands. The project also includes activities to increase the aspen/birch forest, restore and improve wetland resources, and provide a sustainable supply of forest products.

This report includes the results from the monitoring team field reviews conducted in fiscal years 2020, 2022, 2023, and 2024. Except for limited circumstances highlighted in Table 3-22, all projects monitored during the field visits were found to meet intended management objectives, and Forest Plan S&Gs, and project design features and mitigation measures were effectively implemented to achieve their desired level of protection to resources.

Table 3-22. Results from monitoring project sites for fiscal years 2020, 2022, 2023, and 2024.

Fiscal Year	Monitoring Results
2020	• Burned unit as part of the Manchester Ranger District Permanent Upland Opening Maintenance Project Decision Memo (C129/S114 at end of Forest Road 273) completed in Spring 2018 ◦ The project migratory bird mitigation measures could be written more clearly. For example, what would be the protocol if a bird nest is found, especially on the day of implementation? How does “take” apply to the action? Consult with the recent Region 9 guidance regarding migratory birds and take.
2022	• Timber sale activity associated with the Robinson IRP (Souphouse Timber Sale, Unit 9) harvested in Winter 2022 ◦ S&Gs and project mitigation measures were implemented adequately, but a designated cross country ski trail transected the harvest area and was difficult to discern following harvest activities. Several members of the public complained to the District Ranger regarding this issue. ◦ It was suggested to use designated trails as the sale unit boundary for future sale layout if feasible to avoid unnecessary impacts on trail features. • Timber sale activity associated with the Robinson IRP (Swans Mill Timber Sale, Units 16 and 18) harvested in Winter 2021 ◦ Stream and wetland buffers were flagged to their edge and did not include their protective buffer area. Although no unacceptable resource damage occurred, it was suggested to flag stream and wetland protective buffers similar to how heritage sites are flagged. • Moosalamoo National Recreation Area Campground Timber Management Project implemented in Winter of 2017-2018 ◦ There is contradictory language for project mitigation measures, i.e., there is a mitigation to retain snags but also a mitigation to remove hazard trees. ◦ Future project design should include clear definitions for these features so that they can be applied correctly. Also, project design should be clear we are constructing mountain bike trails to Forest Service standards and should not default to IMBA guidelines.
2023	• Timber sale activity associated with the Somerset IRP (Airstrip Timber Sale, Units 5 and 10) harvested in Winter 2023 ◦ Small groups of leave-trees were designated in areas of poor, shallow soils to prevent equipment damage to those soils. Unfortunately, many of the leave-trees were subsequently blown down, with their uprooting possibly impacting the sensitive soils as much or more so than equipment might otherwise have. ◦ Future sale layout planning should consider sensitive soils when designating areas with harvest units for leave-trees. • Timber sale activity associated with the Early Successional Habitat Creation Project (Bully Brook Timber Sale, Units 3 and 5) harvested in Winter 2023 ◦ Heritage-related Forest-wide Standard S-2 was not fully followed: “<i>All proposed undertakings must take into account the effect on any NR-listed, NR-eligible or unevaluated heritage resource within the Area of Potential Effect (APE) prior to implementation. The Forest must protect and manage properties found to be eligible for the NR, or which remain unevaluated, as if they were listed on the NR.</i>” Project specific heritage mitigation measures were also not fully followed.

Fiscal Year	Monitoring Results
	○ Skid road construction between units caused some damage to a heritage site. Additionally, a log landing wasn't constructed in the location as planned. Although the location change was made with good intentions to protect soil and water resources, it was constructed close to a heritage site which would have had a higher level of review (shovel testing). ○ For future projects, Forest Timber staff should better communicate/coordinate with Forest Heritage staff in the implementation process and all protection boundaries should be included on timber sale maps, even if located outside of the proposed units. ● Timber sale activity associated with the Early Successional Habitat Creation Project (Bully Brook Timber Sale, Unit 12) harvested in Summer/Fall 2022 ○ Diverted water from skid road waterbars and large log landing causes some impact to an adjacent heritage site. ○ Better communication between Forest Heritage staff and timber sale administer is needed to prevent future occurrences of unintended impacts. In this case, the skid road and log landing should have been relocated away from the heritage site. ● Grout Pond Hut Construction associated with the Somerset IRP constructed in Summer 2022 ○ The hut design direction in the EA lacked the specificity needed to fully understand what was planned for construction and how it was to be accessed during implementation. As a result, soil and water impacts occurred due to access road construction and use (rutting, erosion, and pooling of water). Soil and water protection may also not be fully covered for this type of action in the Forest Plan. ○ Future project descriptions including soil and water mitigation measures should include more specificity to guide implementation and ensure compliance with S&Gs. Also, Forest-wide S&Gs may need more specificity for equipment, beyond guidance for timber-associated equipment (Soil, Water, and Riparian Area Protection and Restoration Standard S-3 and Guideline G-14). For example, the equipment that created most of the issues on the hut access road (UTV and trailer) would not be characterized as heavy equipment according to current Forest Plan direction. ● Moses Pond Trail Bridge Replacements Project implemented in Summer 2022 ○ The western bridge goes over/through good beaver habitat where beavers were known to be active. This bridge was designed to withstand beaver activity; however, it may have been beneficial to reroute the trail completely around the wetland. ○ More in-depth analysis could have improved overall resource outcomes. District staff should reach out and begin communicating with resource specialists as early as possible to better identify opportunities to modify and improve projects in the earliest stages of development. ● Wildlife opening creation as part of the Dorset/Peru IRP (Mad Tom Timber Sale Unit 13, originally C61/S14b, now C61/S104) timber harvested early 2017, masticated spring 2023 ○ It was noted the shape of the opening was very linear (squared) due to historic homestead/farm boundaries. Mitigation measures were not clearly written, and some specialists were unaware of implementation timing to ensure application of protective measures. For example, visual mitigation measures were poorly written and hard to implement with too much use of "may" language. ○ For future opening creation or expansion, an effort should be made to design more irregular boundaries and such as leave pockets of standing trees. Mitigation measure language needs to be written more clearly and directly and included in one location in the decision document. ● Prospect Mountain Vernal Pool and Nordic Trail Improvements Project implemented Fall 2022 ○ The original trail route created existing vernal pools, so the re-routes were adjacent to those pools. There was discussion about the trade-off between the impact to the wetland from a nearby trail re-route compared to the impacts of moving the re-route sections 100 feet away per Soil, Water, and Riparian Area Protection and Restoration Guideline G-10, thus substantially lengthening the trail. ○ Guideline G-10 states <i>"within 100 feet of wetlands and seasonal pools, activities should be limited to those that protect, manage, and improve the condition of these resources. Acceptable activities should be approved on a case-by-case basis"</i>. Clarification for the intent and level of discretion for applying this Guideline may be needed for future project design and implementation.

Fiscal Year	Monitoring Results
2024	• Timber sale activity associated with the Robinson IRP (Camp 5 Timber Sale, Unit 4 (C8/S39) harvested Winter 2022 ○ Heritage sites to protect were not included on the timber sale map but were flagged on the ground for protection. No inadvertent impacts were noted. Excessive timber slash left at the log landing site along Forest Road 62 may be a visual concern if not scattered. ○ Ensure all heritage sites are included on future timber sale maps. Excessive timber slash should be scattered according to project specific mitigation measures: <i>“For all roads maintained for passenger vehicle travel, slash resulting from timber harvest within 15 feet of the road edge will be pulled back and then lopped and/or scattered. Beyond 15 feet, lop and scatter slash to a height no greater than two feet above ground for a distance of 100 feet from the roads edge (unless local topography naturally mitigates visible slash)”</i>.

The following suggestions were also noted by resource specialists during routine project monitoring and formal monitoring team site visits to improve project design for more effective implementation:

- Consider developing mitigation measures to require placement of slash piles away from trails to be more project specific rather than applied for all projects. Is the set distance of 25 feet from trail corridors necessary for all situations?
- Develop an efficient method to track when projects implementation is ongoing or complete. Many specialists need to be informed to trigger their respective responsibilities to check mitigation efficacy and follow-up monitoring during project implementation or immediately after.
- Consider standardizing mitigation measures, when possible, to establish consistency for projects. Mitigation measures worded differently with the same intention or use of slightly different metrics can be confusing.
- Projects with stream crossings should always be checked by Heritage Program staff.

Recommended Changes (Monitoring Question or Forest Plan Components)

None.

Recreation

Monitoring Item: Partner Contributions

Management Question

To what extent are partners contributing to management of recreation facilities and trail systems?

Detailed Monitoring Question

What is the trend in partner contributions towards the improvement, maintenance and operation of the Forest Recreation Sites and Trails System?

Measurement Indicators

Trend in total cash, non-cash and in-kind contributions from partner agreements

Monitoring Driver

- Forest Plan Goal 12 and associated Objectives
- Forest Plan Goal 18 and associated Objectives
- Forest Plan Goal 21 and associated Objectives

Reporting Frequency

Annually

Last Year Reported

Not applicable; new question starting fiscal year 2019

Next Year Scheduled for Reporting

Fiscal years 2025 and 2026 biennial monitoring and evaluation report

Background

The intent of this monitoring question is to assess the trend in partner contributions in alignment with multiple Forest Plan Goals and Objectives. An Objective associated with Goal 12 is to “*increase the effective use of partnerships in the improvement, maintenance, and operation of the Forest trails system*” (Forest Plan, p. 15). Goal 18 directs management to “*maintain and enhance partnerships with communities and organizations*”, and an associated Objective is to “*increase the effective use of partnerships to achieve Forest goals*” (Forest Plan, p. 17). Finally, an Objective associated with Goal 18 directs management to “*develop and maintain agreements with outside partners to increase effectiveness and efficiencies*” (Forest Plan, p. 18).

Partnerships are crucial for the Forest Service as the agency amplifies the capacity to manage national forests effectively by leveraging resources, expertise, and diverse perspectives. These collaborations enhance on-the-ground work, improve public engagement, and facilitate the achievement of shared conservation goals.

Monitoring Activities

Agreements with partners, such as challenge cost-share agreements and participating agreements, are recorded in the Natural Resource Management database, including partner cash, non-cash and in-kind contributions (Table 3-23). Reporting contributions from partner agreements is a consistent, accurate method for reporting contributions; however, it is recognized that this does not account for all annual volunteer hour contributions. Volunteer hours are reported inconsistently and there is no accurate way to depict annual volunteer contributions at this time for GMNF. Similarly, there is no consistent data collection effort to document and quantify the number of partners engaged in any given year; many partners may informally collaborate with Forest Service staff outside of a signed agreement.

Table 3-23. Partner agreement contributions from fiscal years 2019 to 2024.

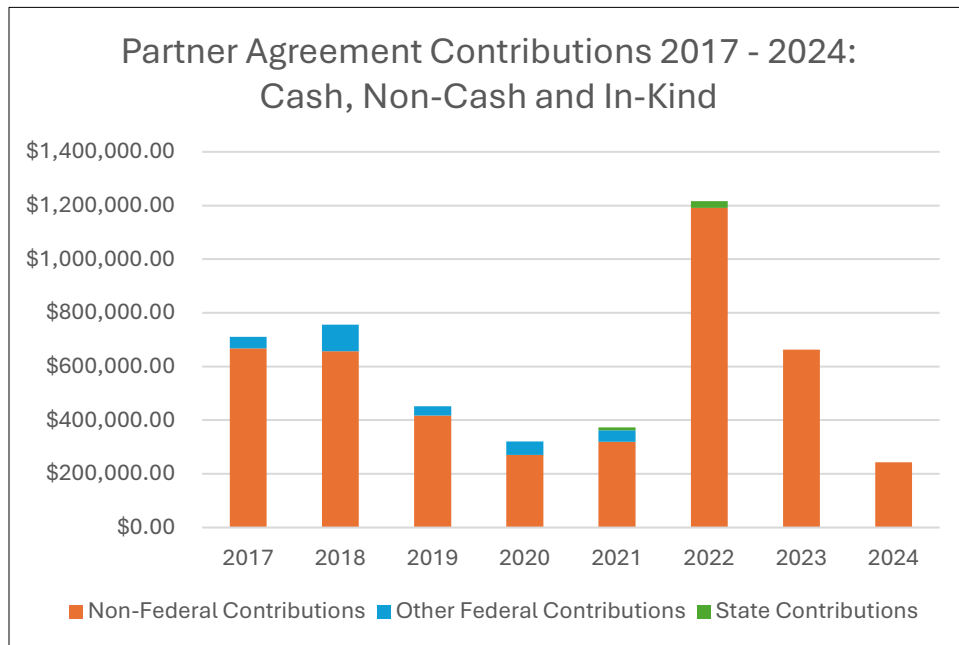
Fiscal Year	Dollars			
	Non-Federal Contributions	Other Federal Contributions	State Contributions	Total
2019	417,051.31	35,000.00	0.00	452,051.31
2020	270,401.58	50,000.00	0.00	320,401.58
2021	319,825.63	43,000.00	10,000.00	372,825.63
2022	1,190,953.87	0.00	24,884.68	1,215,838.55
2023	662,372.29	0.00	0.00	662,372.29
2024	242,992.39	0.00	0.00	242,992.39
Total	3,103,597.07	128,000.00	34,884.68	3,266,481.75

Evaluation and Conclusions

Over the six-year period of 2019 to 2024, partners contributed over \$3.2 million dollars to National Forest System management (Table 3-23) (USDA Forest Service 2025c). Figure 3-4 shows the breakdown of

contributions by entity. Most of these funds (95 percent) are from non-federal contributions, such as non-profit matches. Other federal contributions make up 4 percent, for example an Air Force agreement supporting wildland fire operations, and state contributions make up the remaining 1 percent.

Figure 3-4. *Total partner agreement Contributions from fiscal years 2019 to 2024 (fiscal years 2017 and 2018 are included for context).*



Partner contributions recorded in agreement data often reflect the ability of the Forest Service to fund an agreement, wherein the partner is required to make a substantial match, typically a minimum of 20 percent. When the Forest Service secures substantial “supplemental” funding, such as from the Great American Outdoors Act, there is more flexibility to add funding into a challenge cost-share agreement and secure and record partner matching contributions. Therefore, reduced partner contributions, such as evidenced in 2024, may be the result of limited funding secured by the Forest Service to initiate an agreement.

A Volunteer and Partnership Coordinator is needed to expand partner engagement, management, and reporting. If a coordinator were hired, the ability to collect and report additional data points, such as annual volunteer hour contributions, would provide a broader picture of partner and volunteer contributions on the national forest.

Recommended Changes (Monitoring Question or Forest Plan Components)

None.

Monitoring Item: Trail Maintenance

Management Question

Is the quality of the Forest Service trail system being improved through operation and maintenance?

Detailed Monitoring Question

How many miles of trail are maintained annually and how many trail miles are meeting standard?

Measurement Indicators

1. Miles of trail maintained
2. Miles of trail maintained to standard
3. Trends in percent of total trail miles maintained
4. Net change in designated system trail mileage

Monitoring Driver

Forest Plan Goal 12 and Objectives

Reporting Frequency

Annually (revised from every 5 years beginning 2019)

Last Year Reported

Fiscal years 2017 and 2018 biennial monitoring and evaluation report (measurement indicators revised starting fiscal year 2019)

Next Year Scheduled for Reporting

Fiscal years 2025 and 2026 biennial monitoring and evaluation report

Background

The intent of this monitoring question is to assess the quality of National Forest System trails in alignment with Forest Plan Goal 12 Objectives to: 1) “*increase the number of miles of trails that are operated and maintained to full standard*”; and 2) “*reduce the total deferred maintenance on the GMNF trail system*” (Forest Plan, p. 15). Maintaining trails on federal land is crucial for environmental protection, public access, and economic benefits. Well-maintained trails minimize environmental damage, enhance recreational experiences, and support local economies while also providing opportunities for education, fitness, and connecting with nature. Analyzing the total miles of trail, miles of trails maintained, and trails maintained to standard provides insight about Forest Service capacity, with support from partners, to maintain the GMNF trail network and prevent a persistent backlog in maintenance.

Monitoring Activities

Each year, trail managers, volunteers, and partners work hard to manage and maintain National Forest System trails. Forest Service trail managers are required to collect and enter annual trail maintenance accomplishments in a consistent way on each forest and record these accomplishments in the Natural Resource Manager (NRM) database. Table 3-24 shows GMNF trail accomplishments reported in NRM from fiscal years 2019 to 2024 (USDA Forest Service, 2025b). For one trail mile to be claimed as “maintained,” at least one maintenance task must be performed during the fiscal year, such as removing one log or repairing a puncheon. For one mile to be claimed as “meeting standard,” the segment must: 1) meet all critical National Quality Standards; 2) meet at least 80 percent of the remaining [National Quality Standards](#); and 3) have little to no deferred maintenance (USDA Forest Service 2008). There are 16 National Quality Standards for Trails embedded within five key measures: 1) health and cleanliness, 2) safety and security, 3) condition of facilities, 4) responsiveness, and 5) resource setting. Of the 16 standards, the 3 identified as critical include:

1. Effects from trail use do not conflict with environmental laws (such as the Endangered Species Act, National Historic Preservation Act, and Clean Water Act).
2. Hazards do not exist on or along the trail.
3. When a trail is signed as accessible, it meets current agency policy and accessibility guidelines.

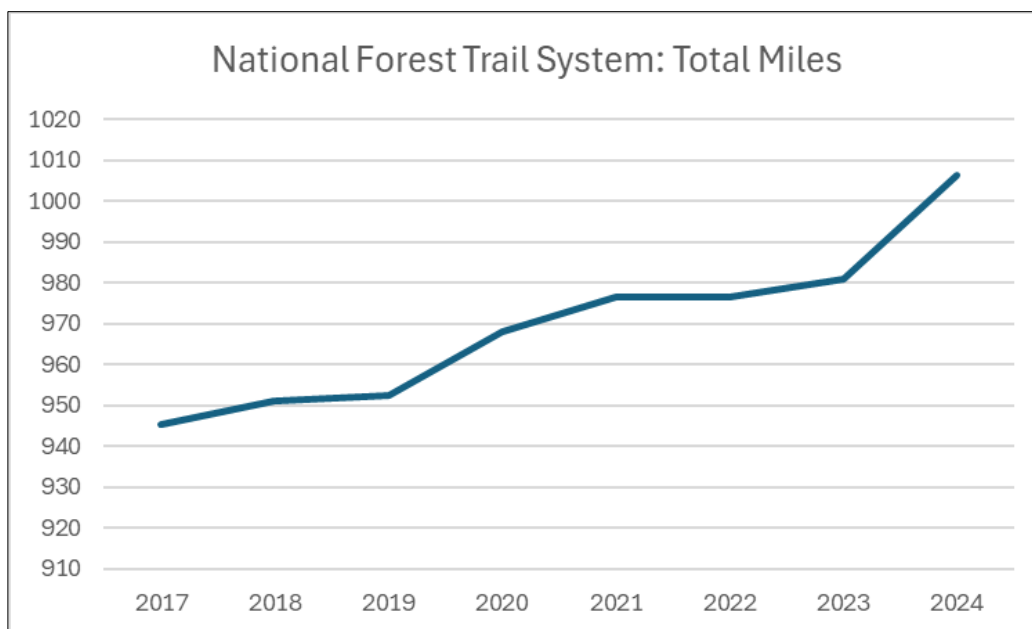
Table 3-24. GMNF trail accomplishment reporting.

Fiscal Year	Total GMNF National Forest Trail System (NFST) Miles	NFST Miles Maintained	% NFST Miles Maintained	NFST Miles Meeting Standard	% NFST Miles Meeting Standard
2019	952.3	165.9	17	141.6	15
2020	968.1	316.8	33	206	21
2021	976.5	514.9	53	368.4	38
2022	976.6	683.6	70	545.4	56
2023	981.0	797.4	81	527.2	54
2024	1006.3	669.5	67	585.5	58

Data collection efforts are performed by Forest Service staff; however, over 75 percent of the GMNF trail system is maintained in partnership with non-profit entities, such as Green Mountain Club, Vermont Association of Snow Travelers, Vermont Mountain Bike Association, Catamount Trail Association, and others. It is acknowledged that when local trail adopters remove a downed tree from the trail prism or perform other routine maintenance tasks, they are not reporting every accomplishment on that trail mile. For this reason, it is expected that trail maintenance miles are higher than the reported figures ranging from 17 percent of trails maintained in 2019 to 81 percent maintained in 2023 (USDA Forest Service 2025b).

In addition to monitoring trail maintenance activities, the total mileage of National Forest System trails on the GMNF system was recorded every year to assess if there is a net gain or loss in total trail miles. From 2019 to 2024, the GMNF trail network had a net gain of 54 miles, from 952.3 miles in 2019 to 1,006.3 miles in 2024 (Figure 3-5).

Figure 3-5. Total National Forest System Trail Miles on GMNF from fiscal years 2019 to 2024 (fiscal years 2017 and 2018 are included for context).



Evaluation and Conclusions

Since 2019, recorded trail maintenance shows a steady climb in accomplishments (from 17 percent in 2019 to 81 percent in 2023) with a decline in 2024 (to 67 percent). Trails maintained to standard reflects an overall positive trend from 2017 to 2024 with 58 percent of GMNF National Forest System trails meeting standard by 2024 (Figures 3-6 and 3-7) (USDA Forest Service 2025b). In comparison, 52 percent of all trails in the USDA Forest Service Eastern Region (Region 9) met standard in 2024, which was a 30 percent increase regionally over the five-year average from 2020 to 2024 (USDA Forest Service 2024b).

Funding provided through the Great American Outdoors Act, Legacy Roads and Trails program, grants, and partner contributions has enabled a relatively steady increase in the miles of trail maintained and maintained to standard. It is acknowledged that limited Forest Service staff capacity has resulted in a need to prioritize accomplishing field work, including trail maintenance, for the health and safety of visitors over the reporting of these accomplishments in the NRM database. Despite efforts to improve annual reporting and the resulting positive trends, the potential for a minimum maintenance gap on approximately 40 percent of the GMNF trail network could translate to negative impacts related to user safety, resource damage, user experience, and long-term maintenance costs. More accurate accounting of trails maintained and maintained to standard would highlight if the existing trail network is sustainable or if the total trail network may need reduced.

Figure 3-6. Total National Forest System Trails on GMNF maintained and maintained to standard from fiscal years 2019 to 2024 (fiscal years 2017 and 2018 are included for context).

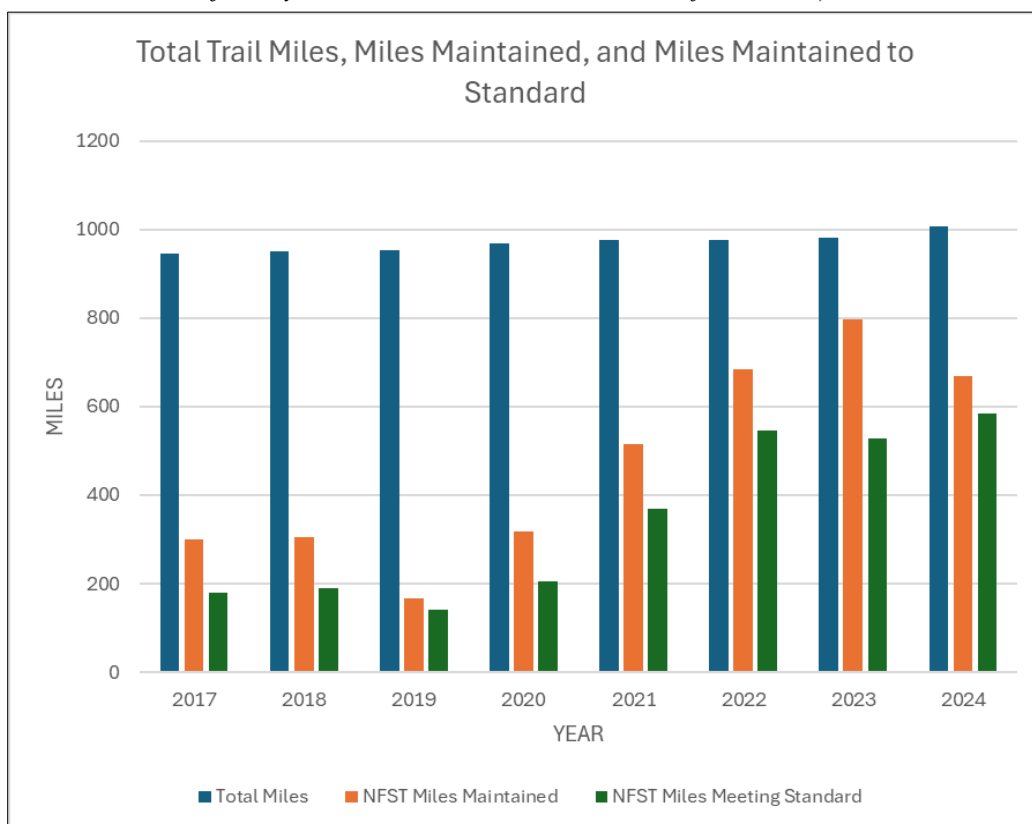
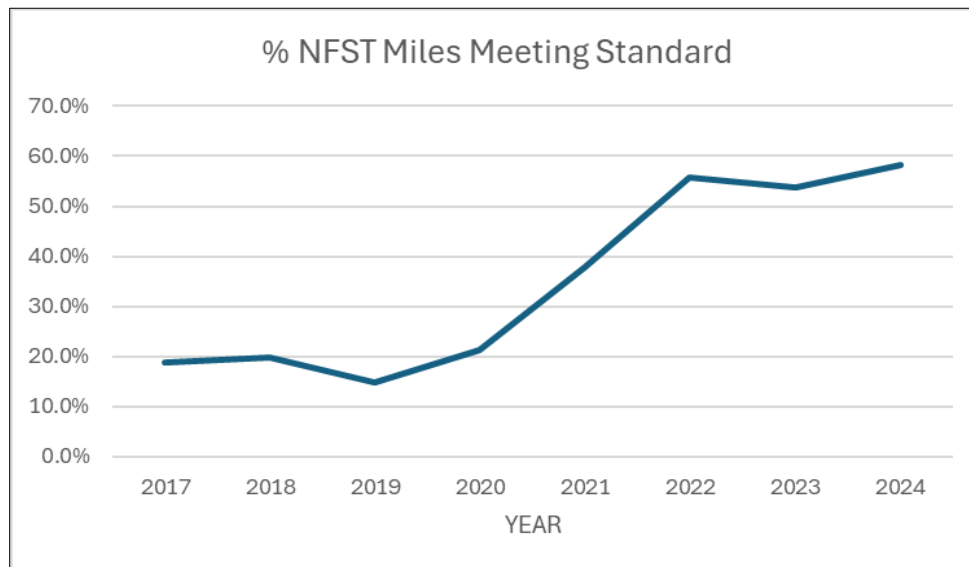


Figure 3-7. *Percent of National Forest System Trails on GMNF meeting standard from fiscal years 2019 to 2024 (fiscal years 2017 and 2018 are included for context).*



Despite maintenance challenges, the Forest Service has increased the total number of trail miles by approximately 6 percent from 2017 to 2024. The increase in trail miles has occurred for the following reasons:

- **Increased and diversified trail demands** for access to national forests for recreation, health and wellness, and other outdoor activities. New trails have focused on providing accessible or adaptive-friendly opportunities to engage people of different abilities and mobility and to provide unique experiences such as long-distance bike trails with hut-to-hut experiences in alignment with the Expanding Public Lands Outdoor Recreation Experiences (EXPLORE) Act. The EXPLORE Act is a bipartisan bill focused on improving and expanding access to outdoor recreation on public lands and waters.
- **Economic benefits:** trails generate significant economic activity, including tourism revenue and job creation.
- **Conservation and resource protection:** trail reroutes often add miles to the existing trail network and are necessary to ensure trail sustainability. New trails can minimize impacts created when demand exceeds supply in the trail system.

Adequate funding and resources should be directed towards addressing the trail maintenance backlog. Continued funding through the Great American Outdoors Act, the Legacy Roads and Trails program, and other programs would support the steady progress towards maintaining more trail miles. Knowing volunteers play a crucial role in trail maintenance, working to increase partner and volunteer reporting of trail accomplishments may show a more accurate reflection of overall accomplishments. The Forest Service should invest in staff to improve collaboration and maximize the impact of volunteer efforts.

If staffing levels are not increased, prioritizing maintenance based on safety hazards, potential environmental damage, and resource limitations is key to help mitigate the most severe consequences of under-maintained trails. Forest Service staff should work to address the existing trail maintenance backlog by:

- Prioritizing maintenance areas
- Engaging partners and volunteers

- Exploring innovative funding solutions
- Improving data management to accurately identify maintenance gaps

A goal of trail management is to strike a balance between providing new or emerging recreational opportunities to meet demand while maintaining existing infrastructure, recognizing the multi-faceted benefits that trails offer. When new trails are designated, they should be designed and built with sustainability in mind, reducing future maintenance burdens. This includes utilizing techniques that promote drainage, minimize erosion, and utilize durable materials. In addition, assessing opportunities to reduce the GMNF trail system through trail decommissions would further the ability to right-size the program to existing resources.

Recommended Changes (Monitoring Question or Forest Plan Components)

None.

Terrestrial Ecology

Monitoring Item: Ecological Type Mapping and Representation

Management Question

How well do Forest Plan components maintain or restore ecological processes and systems within desired ranges of variability?

Detailed Monitoring Question

What proportion are ecological types on GMNF represented within the ecological reference area network?

Measurement Indicators

Proportion of each ecological type on GMNF that occurs within the reference area network

Monitoring Driver

Forest Plan Goal 6 and associated Objectives

Reporting Frequency

Every 10 years (changed from every 5 years starting fiscal year 2019); this report covers fiscal years 2013 to 2023

Last Year Reported

Fiscal years 2017 and 2018 biennial monitoring and evaluation report (monitoring question and measurement indicators revised starting fiscal year 2019)

Next Year Scheduled for Reporting

Fiscal years 2033 and 2034 biennial monitoring and evaluation report (anticipated to cover fiscal years 2024 to 2033)

Background

The intent of this monitoring question is to help determine if management activities are meeting Forest Plan Goal 6 to “*maintain or restore ecological processes and systems on the GMNF within desired ranges of variability...*”, with an Objective to “*manage at least five percent of each ecological type*

present on the GMNF for old-growth characteristics” (Forest Plan, p. 14). Managing a proportion of each type in a way that allows natural disturbance processes to regulate forest types and forest structure ensures that the full range of variation in ecological systems on GMNF can be supported.

To address representation of ecological types in the network of reference areas, ecological types were defined in the GMNF Forest Plan Environmental Impact Statement (FP EIS) in three ways:

1. Landtype Associations (LTAs) represent landscape-sized units defined by broad patterns of vegetation in combination with the physical environment. LTAs include groupings of Ecological Land Unit Groups (ELUGs), and are nested within the biophysical regions of Vermont (such as valley bottoms LTA or mountain slopes LTA within the Northern Green Mountains; Table 3.11-3, FP EIS, p. 3-236).
2. ELUGs represent groups of ecological types defined by unique combinations of soil conditions and late-successional vegetation expected to be at a particular site due to geology, soils, topography, existing vegetation, and land use history (such as subalpine forest, mid-elevation slope forest, low rocky slope and crest forest; Table 3.11-4, FP EIS, p. 3-237).
3. Major Forest Communities are similar to habitat types defined in the Forest Plan. They consist of groupings of forest types that are classified by foresters for inventory purposes. For example, northern hardwoods include typical beech-birch-maple forests as well as forests dominated by beech and red maple, and those dominated by sugar maple, basswood, and ash (Table 3.11-5, FP EIS, p. 3-237).

The FP EIS ensures that old growth characteristics are maintained or allowed to develop via passive management on GMNF by representing these ecological types in the “Reference Area Network”, a grouping of management areas and other conditions that “...*provide ecological reference or benchmark conditions for baseline monitoring and research, provide refuge for rare species, and provide some ecological conditions or functions that are not otherwise available across the landscape*” (FP EIS p. 3-227). Areas that currently provide these conditions or will be allowed to develop these conditions via passive management for GMNF that comprise the Reference Area Network (RAN) include the following:

- Wilderness Management Area (MA)
- Remote Backcountry Forest MA
- Robert T. Stafford White Rocks National Recreation Area MA, excluding areas near roads where early successional habitat creation is planned
- Existing and Candidate Research Natural Area MA
- Ecological Special Area MA
- Alpine/Subalpine Special Area MA
- Eligible Wild Rivers MA
- Significant Ecological Features (2006)
- Unsuitable lands

Representation of ecosystems within areas that are protected from extractive uses helps to protect the full range of variation associated with ecosystems on GMNF. This monitoring question tracks how well Forest Plan Goal 6 and associated Objectives are being met in light of ongoing active and passive management activities.

Monitoring Activities

This report documents an updated analysis of representation of ecological units in the RAN. Four factors affect this analysis and can lead to different proportions than those documented in the FP EIS (Section

3.11, pp. 3-226 to 3-254): 1) adjustment of management area allocation can change the size and delineation of the RAN; 2) new acquisitions can change the abundance and distribution of ecological types forest-wide.; 3) new classifications of ecological types could change the analysis of what is being represented in the RAN; and 4) there is some discretion as to what lands are suitable, and adjustments to these determinations (usually by the District Silviculturists) would affect the final numbers in this analysis. From fiscal years 2013 to 2023, GMNF had a net change of 4,453.5 additional acres reflecting 4,457.5 acres of acquisitions and 3.9 acres of disposals (Table 3-25).

In addition to ownership changes, Forest Service staff are making corrections over time to several geographic data layers that represent GMNF ownership, management area delineation, stand delineation, and classification of unsuitable lands. These corrections are ongoing and will continue for the foreseeable future since staff only have the capacity to make these corrections in areas where projects are currently ongoing. These changes affect both the relative proportion of ecological types on GMNF, and the acres and delineation of the RAN.

Table 3-25. GMNF land acquisitions from fiscal years 2013 to 2023.

Fiscal Year	Acres Acquired	Acres Disposed
2013	337	0.03
2014	0	0
2015	144.23	0
2016	378.84	0
2017	166.3	0
2018	40	0
2019	0	0
2020	0	0
2021	28	0
2022	619	0
2023	2,744.1	3.9
Total	4,457.47	3.93

A GIS analysis conducted during July 2025 calculated the GMNF land managed by the Forest Service at the end of fiscal year 2023 within each category of the three ecological classifications: 1) Land Type Associations; 2) Ecological Land Unit Groups; and 3) Ecological Land Types/Major Forest Communities. The acreage of NFS lands in each category of classifications that was within the RAN at the end of fiscal year 2023 was also calculated, and the results were compared to determine the proportion of each ecological type represented in the RAN (Tables 3-26, 3-27, and 3-28). Table 3-29 compares the GMNF and RAN acreages within each of the Ecological Systems modeled by The Nature Conservancy.

Table 3-26. Land Type Association map units as represented on GMNF and in the RAN at the end of fiscal year 2023, from most to least prevalent.

LTA Map Unit	GMNF (Acres)	% of GMNF	RAN (Acres)	% of type in RAN
Mountain Slopes	138,777	34	60,535	44
Bedrock Hills	106,785	26	40,281	38
Upper Mountain Slopes/Mountaintops	65,233	16	55,203	85
Precambrian Plateau	53,967	13	23,175	43
Vermont Escarpment	34,992	8	20,015	57
Valley Bottom Riverine and Lakeside Floodplain	8,997	2	6,161	68
Dissected Low to Mid-Elevation Calcareous Metamor	1,806	<1	1,698	94
Enriched Mid-Elevation Slopes	1,111	<1	1,082	97

LTA Map Unit	GMNF (Acres)	% of GMNF	RAN (Acres)	% of type in RAN
Low Rolling Upland	810	<1	274	34
Temperate Hills of Southeastern Vermont	786	<1	652	83
Marine-Lacustrine-Glaciofluvial Coarse Sediments	56	<1	17	30
Water-Deposited Glacial Sediments Major Streamways	47	<1	40	85
Totals	413,100¹	99	209,133	51

Source: McNab et al (2009), USDA Forest Service GIS data

¹ Acres are less than the total acres of federal ownership due to exclusion of the waterbody classification.

Table 3-27. Ecological Land Unit Groups (ELUG) Characteristic Communities as represented on GMNF and in the RAN at the end of fiscal year 2023, from most to least prevalent.

LUG Characteristic Community	GMNF (Acres)	% of GMNF	RAN (Acres)	% of type in RAN
Northern hardwoods	196,115	48	79,229	40
Northern hardwoods-spruce	107,976	26	67,370	62
Spruce mixed - spruce-fir	33,192	8	30,229	91
Oak-Northern hardwoods	23,274	6	6,902	30
Hemlock-Northern hardwoods	20,299	5	6,467	32
Spruce flats	6,443	2	3,575	55
Rich Northern hardwoods	2,537	1	1,083	43
Transition hardwoods	1,878	<1	974	52
Mesic transition hardwoods	1,368	<1	611	45
Dry oak forest	1,199	<1	649	54
Dry oak-pine	1,129	<1	769	68
Oak-rich northern hardwoods	1,077	<1	526	49
Hemlock-rich N. hardwoods	886	<1	271	31
Temperate acidic cliff/talus/outcrop	752	<1	729	97
Hemlock-mesic transition hardwoods	712	<1	336	47
Rich transition hardwoods	341	<1	115	34
Boreal acidic cliff/talus/outcrop	249	<1	244	98
Hemlock-rich transition hardwoods	135	<1	48	36
Dry oak-hophornbeam forest	78	<1	65	83
Temperate calc cliff/talus/outcrop	74	<1	71	96
Alpine/krummholz	9	<1	9	100
Totals	399,723¹	98	200,272	50

Sources: US Geological Survey, ESRI, USDA Forest Service GIS data

¹ Acreage total is less than the acres of federal ownership due to exclusion of waterbody and developed classifications.

Table 3-28. Ecological Land Type (ELT) Major Forest Communities as represented on GMNF and in the RAN at the end of fiscal year 2023, from most to least prevalent.

ELT Major Forest Communities	GMNF (Acres)	% of GMNF	RAN (Acres)	% of type in RAN
Mixedwood	262,513	68	127,251	48
Hardwood	75,316	20	34,136	45
Spruce-Fir	31,030	8	27,963	90
Hemlock	15,883	4	7,099	45
Oak-Pine	462	<1	210	45
Not classified	935	<1	929	99
Totals	386,139¹	100	197,588	51

Source: The Nature Conservancy Northeast Habitat Map (last updated 2019), USDA Forest Service GIS data

¹ Acreage total is less than the acres of federal ownership due to exclusion of acreage in waterbody, agricultural, and developed ecological system classes.

Table 3-29. The Nature Conservancy's Ecological Systems as represented on GMNF and in the RAN at the end of fiscal year 2023, from most to least prevalent.

Ecological System	GMNF (Acres)	% of GMNF	RAN (Acres)	% of type in RAN
Laurentian-Acadian Northern Hardwood Forest: typic	244,916	61	108,925	44
Laurentian-Acadian Red Oak-Northern Hardwood Forest	26,526	7	10,227	39
Laurentian-Acadian Northern Hardwood Forest: high conifer	23,363	6	12,746	55
Acadian-Appalachian Montane Spruce-Fir-Hardwood Forest	23,087	6	21,225	92
Laurentian-Acadian Northern Hardwood Forest: moist-cool	16,268	4	8,894	55
Laurentian-Acadian Pine-Hemlock-Hardwood Forest: typic	12,860	3	3,790	29
Acadian Low Elevation Spruce-Fir-Hardwood Forest	10,575	3	5,580	53
Northern Appalachian-Acadian Rocky Heath Outcrop	9,378	2	6,339	68
Northern Appalachian-Acadian Conifer-Hardwood Acidic Swamp: Isolated	5,377	1	3,299	61
Northern Appalachian-Acadian Conifer-Hardwood Acidic Swamp: Smaller river floodplain/riparian	5,081	1	3,081	61
Laurentian-Acadian Acidic Cliff and Talus	4,401	1	3,324	76
Appalachian (Hemlock)-Northern Hardwood Forest: typic	3,830	1	1,213	32
Laurentian-Acadian Freshwater Marsh: Smaller river floodplain/riparian	1,750	<1	1,532	88
Acadian Sub-boreal Spruce Flat	1,721	<1	1,123	65
Laurentian-Acadian Calcareous Cliff and Talus	1,414	<1	1,254	89
Laurentian-Acadian Freshwater Marsh: Isolated	1,389	<1	1,170	84
Laurentian-Acadian Calcareous Rocky Outcrop	1,236	<1	803	65
Boreal-Laurentian-Acadian Acidic Basin Fen: Undifferentiated	1,009	<1	933	92
Appalachian (Hemlock)-Northern Hardwood Forest: moist-cool	850	<1	382	45
Laurentian-Acadian Wet Meadow-Shrub Swamp: Smaller river floodplain/riparian	801	<1	694	87
North-Central Appalachian Acidic Cliff and Talus	614	<1	574	93
Agriculture	497	<1	323	65
Laurentian-Acadian Wet Meadow-Shrub Swamp: Isolated	392	<1	255	65
Laurentian-Acadian Pine-Hemlock-Hardwood Forest: moist-cool	364	<1	200	55
Northern Appalachian-Acadian Conifer-Hardwood Acidic Swamp: Lake/pond: any size	336	<1	295	88
Laurentian-Acadian Alkaline Conifer-Hardwood Swamp: Isolated	279	<1	190	68
Central Appalachian Dry Oak-Pine Forest	266	<1	151	57
Laurentian-Acadian Alkaline Conifer-Hardwood Swamp: Smaller river floodplain/riparian	112	<1	55	49

Ecological System	GMNF (Acres)	% of GMNF	RAN (Acres)	% of type in RAN
Laurentian-Acadian Freshwater Marsh: Lake/pond: any size	106	<1	80	75
North-Central Interior and Appalachian Rich Swamp: Smaller river floodplain/riparian	92	<1	48	52
North-Central Appalachian Circumneutral Cliff and Talus	54	<1	51	94
North-Central Interior and Appalachian Rich Swamp: Isolated	38	<1	10	26
Laurentian-Acadian Large River Floodplain: Floodplain Forest	26	<1	21	81
Central Appalachian Pine-Oak Rocky Woodland	23	<1	20	87
Laurentian-Acadian Large River Floodplain: Conifer-Hardwood Acidic Swamp	19	<1	19	100
Laurentian-Acadian Large River Floodplain: Freshwater Marsh	13	<1	12	92
Laurentian-Acadian Large River Floodplain: Wet Meadow-Shrub Swamp	8	<1	5	63
North-Central Interior Wet Flatwoods: Undifferentiated	7	<1	4	57
Laurentian-Acadian Wet Meadow-Shrub Swamp: Lake/pond: any size	7	<1	5	71
North-Central Appalachian Acidic Swamp: Smaller river floodplain/riparian	4	<1	<1	9
Laurentian-Acadian Large River Floodplain: Acidic Swamp	4	<1	4	100
Acadian-Appalachian Alpine Tundra	3	<1	3	100
Laurentian-Acadian Large River Floodplain: Alkaline Conifer-Hardwood Swamp	<1	<1	<1	100
Totals	399,096¹	96	198,859	50

Source: The Nature Conservancy northeast habitat map (last updated 2019), USDA Forest Service GIS data

¹ Acreage total is less than the acres of federal ownership due to exclusion of waterbody, agricultural, and developed ecological system classes.

Evaluation and Conclusions

Based on current information, a range of ecosystems and processes on GMNF continues to be represented within the RAN at greater than five percent, as directed by the Forest Plan. All ecological units analyzed are represented at nine percent or greater, including numerous types that are rare (<1 percent of acreage) at the scale of GMNF. This level of representation helps to ensure that a portion of the GMNF ecosystem types are protected from direct human modification and allowed to develop structural complexity over time via passive management. These reference ecosystems provide baseline conditions for long-term monitoring of environmental change. Some of these ecosystems are represented and monitored via the GMNF Long-term Ecosystem Monitoring Project plots (see the Long Term Soil Quality and Soil Productivity monitoring item), which are measured every 10 years. Smaller patch ecosystems that are considered rare or significant on GMNF are monitored more regularly for condition and threats.

The most pressing challenge in representing ecosystems within the RAN is in classification of ecosystems. Most of the classifications for ecosystems smaller than landscapes rely on existing vegetation. While it is relatively straightforward to inventory or model ecosystems based on vegetation, particularly with remote sensing products, existing vegetation on GMNF is broadly a product of past land use and disturbance history. The history of forest change is extensive and dramatic for Vermont, and the ecosystems of GMNF and the RAN are largely a product of that history. Ecosystem components besides vegetation, such as terrain, aspect, elevation, soils, and geology, that are relatively static compared to vegetation, can be very useful in defining ecological units. Forest Service staff will incorporate characterization of these enduring features as part of their ecological classification efforts, as these delineations are most likely to remain evident despite land use history. Until the revision of the ecological

classification system is complete, the best evaluation of ecosystem representation in the RAN is to analyze a variety of classifications.

Continued work toward a revised ecological classification (Terrestrial Ecological Unit Inventory, TEUI) would increase the precision and relevance of monitoring calculations. Additionally, continued work to inventory old forest occurrences on GMNF along with analysis of which ecological types are represented within existing old forest will further strengthen the ability to quantify the range of ecological variation represented within the RAN.

Recommended Changes (Monitoring Question or Forest Plan Components)

None.

Terrestrial Wildlife Population

Monitoring Item: Sensitive Species

Management Question

How well do Forest Plan components maintain and restore habitats to ensure population viability for native and desirable non-native species?

Detailed Monitoring Question

Are management activities ensuring the protection and promotion of Regional Forester Sensitive Species (RFSS) habitats and populations?

Measurement Indicators

1. What management activities protect or promote RFSS?
2. What monitoring of RFSS individuals, populations, and habitats has occurred?
3. What are the results of that monitoring?
4. Do RFSS conservation plans exist or are we moving toward creating plans?
5. If a plan exists, what actions are we taking to implement the plan?

Monitoring Driver

- Forest Plan Goal 2 and associated Objectives
- Forest-wide Rare and Unique Biological Features - Threatened, Endangered, Proposed, and Sensitive Species; Rare and Exemplary Natural Communities Standards and Guidelines

Reporting Frequency

Annually

Last Year Reported

Not applicable; new monitoring question starting fiscal year 2019 (combined several monitoring questions into the new question)

Next Year Scheduled for Reporting

Fiscal years 2025 and 2026 biennial monitoring and evaluation report

Background

The intent of this monitoring question is to determine if fauna listed as a RFSS are protected and enhanced to ensure management activities are meeting Forest Plan Goal 2 to “*maintain and restore quality, amount, and distribution of habitats to produce viable and sustainable populations of native and desirable non-native plants and animals*” (Forest Plan, p. 10). Associated Objectives direct management to “*protect critical habitat and key habitat features upon which federally listed endangered, threatened, proposed species, and Regional Forester’s Sensitive Species depend*”, and “*implement established conservation strategies for RFSS where they exist; otherwise, maintain or enhance habitat conditions for these species through the development of specific site prescriptions during project development*” (Forest Plan, p. 12).

The RFSS list was updated in 2017 and again in June 2024. This report considers RFSS listed in 2017 since most of the monitoring period was complete when the 2024 list was available (Appendix B, Table B-2). There is no expectation to monitor all RFSS. Rather, the open-endedness of this monitoring question allows Forest Service staff to focus on several key species for the monitoring period based on level of threat, distribution, and other factors. The long-term goal is to consider the occurrence and protection of all RFSS wildlife species.

Collection of population data for RFSS has been facilitated through the efforts of Forest Service staff, local universities, Vermont Fish and Wildlife Department, and numerous volunteer groups and individuals. These data are used with project-specific analysis (biological evaluation per Forest Service Manual 2670.32) and monitoring to determine if species are trending toward a loss of viability or in a trend toward federal listing. While it has proven difficult to collect annual population data due to a variety of factors such as weather, staffing, and funding, consistent annual efforts have been made to gather information about RFSS on GMNF. This is especially true for Bicknell’s thrush, common loon, peregrine falcon and sensitive herptile species which are the focus of this report. Incidental information on other RFSS is collected through observational databases such as the Vermont Natural Heritage database, Vermont Atlas of Life, eBird, and iNaturalist. Sensitive bat species are addressed in the Threatened, Endangered, and Sensitive Bats monitoring item section.

Monitoring Activities

Bicknell’s Thrush (Catharus bicknelli)

Bicknell’s thrush is considered one of North America’s most rare and vulnerable songbird species due to limited habitat for breeding and significant habitat loss on its wintering grounds. Regionally, Bicknell’s thrush populations have been declining across New England for many years. Their breeding habitat includes dense and stunted balsam fir-red spruce forests found at high elevations (greater than 2,800 feet), which on GMNF mostly occur along the spine of the Green Mountains. The Vermont Center for Ecostudies (VCE) is the primary monitor of Bicknell’s thrush breeding activity. Mountain Birdwatch (MBW) is the monitoring project for Bicknell’s thrush and nine other bird species that breed in montane habitats across New England and in parts of the Catskill and Adirondack Mountains.

Table 3-30 shows monitoring results for Bicknell’s thrush during fiscal years 2019 to 2024. The MBW project engages numerous volunteers to conduct bird surveys along designated routes at fixed locations that are surveyed every year. Each route is surveyed once each June, when Bicknell’s thrushes can be detected by sight and sound in their breeding habitat. Each route typically covers six sample points; individual birds are counted by species and any nesting data are collected. On GMNF, there are ten established routes, primarily on the Long Trail and/or the Appalachian Trail from Glastenbury Mountain north to Mt. Ellen. It should be noted that not all routes were surveyed every year during the period covered in this report.

Table 3-30. Monitoring results for Bicknell's thrush on GMNF during fiscal years 2019 to 2024.

Fiscal Year	Routes Surveyed	Bicknell's Thrush Detected
2019	10	21
2020	6	32
2021	7	9
2022	7	11
2023	8	11
2024	9	5

* Data for fiscal years 2022 to 2024 will not be available until October 2025 at the earliest and is anticipated to be included in the fiscal years 2025 and 2026 biennial monitoring report.

Common Loon (Gavia immer)

In Vermont, common loons are monitored across the state by the Vermont Center for Ecostudies (VCE) biologists and by public volunteers (<https://vtcostudies.org/projects/lakes-ponds/vermont-loon-conservation-project/>). Additional technical support is provided by the Vermont Fish and Wildlife Department. Monitoring includes watching loons and collecting data on loon distribution, abundance, nesting success, and chick survival. Also, common loons are monitored through a VCE-sponsored citizen science annual event called LoonWatch, which provides data for determining a statewide population estimate, and includes information on breeding and territorial pairs and presence of non-breeding loons. Ponds, lakes and reservoirs on GMNF are included in these monitoring efforts (Table 3-31). Forest Service staff contribute to data collection for loons by participating in LoonWatch and by monitoring loon activity when visiting GMNF water bodies.

Table 3-31. Monitoring results for common loon in Vermont during fiscal years 2019 to 2024.

Fiscal Year	Nesting pairs	Successful Nests	% Chick Survival	LoonWatch Adult Loons
2019	101	75	76	339
2020	96	65	74	358
2021	109	77	67	349
2022	106	78	77	379
2023	108	73	70	348
2024	123	85	65	368

Peregrine Falcon (Falco peregrinus anatum)

Audubon Vermont coordinates peregrine falcon monitoring and management efforts in partnership with the Vermont Department of Fish and Wildlife, private and public landowners, and citizen scientists across Vermont (Table 3-32). Forest Service staff and citizen scientists (volunteers) monitor known and possible nesting cliffs on GMNF and adjacent land (<https://vt.audubon.org/conservation/peregrine-falcon-monitoring-and-management-project>). Monitoring surveys for falcons begin in late winter, when falcons migrate back to cliff sites, and continues through the fledging of chicks in mid-summer. Observers documented if falcons were present; if and when they successfully nested; and how many chicks survived to fledging. There are two GMNF cliff sites that are accessed by hiking trails and monitored. Both of those trails have seasonal closures, which are critical to protecting falcons from human disturbance.

Table 3-32. Monitoring results for peregrine falcon in Vermont during fiscal years 2019 to 2024.

Fiscal Year	Nesting pairs	Successful Nests	Fledglings
2019	48	34	68
2020	48	36	77
2021	40	32	68
2022	37	29	63
2023	30	24	48
2024	35	24	42

Note: Not all known sites are monitored every year.

Sensitive Herptile Species

Sensitive herptile species on GMNF include Jefferson salamander (*Ambystoma jeffersonianum*), blue-spotted salamander (*Ambystoma laterale*), four-toed salamander (*Hemidactylium scutatum*), spotted turtle (*Clemmys guttata*), and wood turtle (*Glyptemys insculpta*). Monitoring sensitive herptile species is completed through a combination of Forest Service monitoring and a variety of conservation partners, including the Vermont Center for Ecostudies (VCE), the Vermont Fish and Wildlife Department, and the Vermont Reptile and Amphibian Atlas Project. Biologists from these organizations administer various herptile data collection projects, many of which engage citizen scientists to contribute data to state-wide and regional data sets. Forest Service staff have contributed data to the Vermont Herp Atlas and to VCE's Vernal Pool Mapping Project and Atlas of Life. As in previous years, Forest Service staff have investigated vernal pools and evaluated habitat variables around the pools, most frequently when they lie within the project area of proposed land management projects, such as trail creation or timber management. Modeling of distribution maps has been conducted during this monitoring period to guide surveys for these sensitive species and habitats.

Concern about threats to populations and habitats of wood turtles increased throughout the northeastern region and the species is being reviewed for federal listing. The Forest Service, in collaboration with The Orianne Society, began a forest-wide assessment of wood turtle habitat, presence, and potential for restoration. This work is ongoing and will continue into future years.

Other RFSS

Monitoring for the remaining sensitive species on GMNF is conducted mostly through a combination of field surveys conducted by Forest Service staff, conservation partners, VCE, the Vermont Fish and Wildlife Department, and citizen scientists. These contributions are documented through a variety of platforms including the Vermont Reptile and Amphibian Atlas Project, Vernal Pool Mapping Project, Vermont Butterfly Atlas, eBird, iNaturalist, and Atlas of Life. Forest Service staff also conduct project-specific biological evaluations for RFSS throughout each fiscal year. Table 3-33 provides documentation of new occurrences of other RFSS on GMNF during fiscal years 2019 to 2024 (some occurrences listed were noted in fiscal years 2017 and 2018).

Table 3-33. New occurrences of other RFSS on GMNF during fiscal years 2019 to 2024.

Species	Documented Occurrence ¹
Rusty blackbird	14 documented occurrences of 19 total birds. Of these, only 6 occurrences of 9 birds were reported during the typical breeding season for the species (late April through June). 9 observations were included in the Vermont Atlas of Life, but all were duplicate reports from eBird. No observations of nesting attempts were noted.
Eastern whip-poor-will	3 observations of 3 total birds. 2 birds were detected on the Manchester Ranger District in 2023 using Automated Recording Units.
Monarch	Reported frequently on GMNF with over 120 observations
Yellow-banded bumble bee	14 observations

Species	Documented Occurrence ¹
Appalachian tiger beetle	0 observations
Harpoon clubtail	0 observations
Southern pygmy clubtail	5 observations
West Virginia white	32 observations
Early hairstreak	17 observations
Azalea mining bee	1 observation
Tiger spiketail	0 observations
Dark-legged yellow loosestrife bee	1 observation
Creek heelsplitter	0 observations
Brook floater	0 observations
Eastern pearlshell	0 observations

¹ Source for occurrence of rusty blackbird and Eastern whip-poor-will is eBird unless otherwise noted; VT Atlas of Life is the source for occurrence of all other species.

Evaluation and Conclusions

Bicknell's Thrush

Although the limited sample size is not enough to determine trends in Bicknell's thrush populations on GMNF, project-specific design features and mitigations, such as avoidance of high elevation timber harvest and seasonal restrictions during the breeding season, have functioned to limit impacts to this species. Although data results are limited, they are important as part of the larger, regional Bicknell's thrush data set. VCE has used these data to test predictions of Bicknell's thrush, and other mountain bird, population trends and published by State of the Mountain Birds, a project of VCE (<https://mountainbirds.vtecostudies.org/birds/bicknells-thrush/>). The 2024 report indicates a 43.9 percent decrease in the Bicknell's thrush population since 2010. The major factors believed to cause this decline are lack of protections for wintering habitat in the Caribbean, climate change, and forestry operations in Canadian breeding habitat. Breeding habitat in the United States largely falls in areas that are already conserved, such as GMNF lands managed by the Forest Service.

Forest Service biologists refer to the Guidelines for Managing Bicknell's Thrush Habitat in the United States when recommending project-specific protection measures on GMNF. Breeding habitat largely falls in areas that are already conserved, such as NFS lands managed by the Forest Service. No specific efforts to target breeding habitat improvements have been implemented on GMNF, but activities such as ski trail widening can stimulate new balsam fir growth thereby creating preferred habitat.

Common Loon

The number of nesting loons in Vermont has risen steadily over the last 40 years from only seven pairs in 1983 to 123 in 2024, indicating that common loons are still finding new water bodies to occupy. This trend is similar on NFS lands with nesting pairs remaining stable during the monitoring period (Table 3-31). The GMNF provides many relatively undisturbed ponds that are ideal nesting locations for loons. Project proposals that can impact loons have been very infrequent over the monitoring period, and this trend is expected to continue. While there is no conservation plan for common loons, Forest-wide standards and guidelines provide protection to water bodies and wetland habitats, limiting habitat changes and disturbance in these areas. Project-specific design features and mitigation measures have also functioned to successfully limit impacts on common loon habitat and populations such as interpretive signs at known nesting ponds that provide information to the public for how to minimize effects that may disrupt loon nesting.

Peregrine Falcon

Vermont has had a steady population growth of peregrine falcons during this monitoring period although nesting pairs slightly declined starting in fiscal year 2021. While limited to two sites, falcon monitoring data from nests on GMNF are an important part of the annual state-wide falcon population evaluation. Forest-wide Standards and Guidelines, and project specific design features and mitigation measures have successfully limited impacts on falcons. Given the vulnerability of falcon nesting to disturbance, assessing success of individual nests and documenting the results of each nesting season is important to ensure species viability. Monitoring also provides information on potential threats, such as environmental contaminants, that will be important state-wide in the future.

Sensitive Herptile Species

Forest Service survey efforts and collaboration with conservation partners continue to grow. Vernal pool species and wood turtles have been the primary focus for sensitive herptile species. Spotted turtles continue to be a primary focus of the VT Fish and Wildlife Department monitoring efforts because of their extremely limited populations in Vermont on privately owned land. In Vermont, the vulnerability of herptile habitats to disturbance has resulted in a wider interest in their conservation across the state. Data collected on GMNF contributes to the understanding of herptile populations and informs recommendations regarding state status and state rank of these species. More formal surveys for each of the RFSS herptile species should be conducted on NFS lands in future years to further strengthen knowledge of their habitat needs and population status.

Management recommendations from *A Guide to Habitat Management for Wood Turtles* (Northeast Wood Turtle Working Group, Date Unknown) and *Habitat Management Guidelines for Amphibians and Reptiles of the Northeastern United States* (Partners in Amphibian and Reptile Conservation, Date Unknown) are consulted when planning or reviewing projects. For example, several stream restoration projects have been implemented to increase the amount of large woody debris in waterways, thereby retaining riparian and wetland habitats and reducing erosion in headwater streams.

Other RFSS

In collaboration with Vermont Center for Ecostudies, Forest Service staff have created modelled habitat distribution maps for many of other RFSS species. In addition to these maps, species summary guides were written for each RFSS wildlife species to compile current understanding of these species on GMNF and recommend next steps for survey and monitoring. Field survey efforts for wildlife RFSS species have increased during this monitoring period, supporting the mission of wildlife conservation on NFS lands and Vermont.

Recommended Changes (Monitoring Question or Forest Plan Components)

None.

Monitoring Item: Threatened, Endangered, and Sensitive Bats

Management Question

To what extent are Forest Service management activities contributing toward population viability for native and desired non-native species?

Detailed Monitoring Question

Are threatened, endangered, and sensitive bat species continuing to persist on the landscape?

Measurement Indicators

Species presence/no detection, location, and/or number of individuals at North American Bat Monitoring Program (NABat) and pre-project monitoring sites

Monitoring Driver

- Forest Plan Goal 2 and associated Objectives
- Forest-wide Rare and Unique Biological Features - Threatened, Endangered, Proposed, and Sensitive Species; Rare and Exemplary Natural Communities Standards and Guidelines

Reporting Frequency

Annually

Last Year Reported

Fiscal years 2017 and 2018 biennial monitoring and evaluation report (monitoring question and measurement indicator revised starting in 2019)

Next Year Scheduled for Reporting

Fiscal years 2025 and 2026 biennial monitoring and evaluation report

Background

The intent of this monitoring question is to determine if bat species listed as RFSS or listed as threatened or endangered per the Endangered Species Act (ESA) are protected and enhanced to ensure management activities are meeting Forest Plan Goal 2 to “*maintain and restore quality, amount, and distribution of habitats to produce viable and sustainable populations of native and desirable non-native plants and animals*” (Forest Plan, p. 10). Associated Objectives also direct management to “*protect critical habitat and key habitat features upon which federally listed endangered, threatened, proposed species, and Regional Forester’s Sensitive Species depend*” (Forest Plan, p. 12). Further, Forest-wide Threatened, Endangered, Proposed, and Sensitive Species Standard S-1 specifically states “*all project sites must be investigated for the presence of federally listed endangered, threatened, or proposed species, Regional Forester’s Sensitive Species, and/or habitat for these species prior to beginning any authorized ground-disturbing activity at the site*” (Forest Plan, p. 30).

It is important to track federally listed and sensitive bat species population viability and ensure their habitat is not adversely impacted because of Forest Service management activities. Table 3-34 lists the three bat species found in Vermont including the GMNF that are federally listed as threatened, endangered, or proposed for listing, and two bat species included on the RFSS list. The RFSS list was updated in 2017 and again in June 2024. This report considers RFSS listed in 2017 since most of the monitoring period was complete when the 2024 list was available. Note tri-colored bat was considered a RFSS until it was proposed to list as endangered in September 2022. These bat species are also included in Appendix B, Tables B-1 and B-2. All projects must comply with Endangered Species Act (ESA) consultation requirements prior to implementation to ensure protection for federally listed bats. Additionally, all site-specific project analyses include a biological evaluation per Forest Service Manual 2670.32 to ensure sensitive species viability and to preclude trends toward endangerment that would result in the need for federal listing.

Table 3-34. Bat species occurring on GMNF federally listed or proposed for listing per the Endangered Species Act (ESA), or included on the RFSS list.

Scientific Name	Common Name	Designation
<i>Myotis leibii</i>	Eastern small-footed myotis	RFSS
<i>Myotis lucifugus</i>	Little brown bat	RFSS
<i>Myotis septentrionalis</i>	Northern long-eared bat	ESA threatened
<i>Myotis sodalis</i>	Indiana bat	ESA endangered
<i>Perimyotis subflavus</i>	Tri-colored bat ¹	ESA proposed endangered and RFSS

¹ The U.S. Fish and Wildlife Service proposed to list the tricolored bat as endangered on September 13, 2022.

Collection of data for bats has been facilitated through the efforts of Forest Service staff, Vermont Fish and Wildlife Department, and environmental consultants. While it is generally difficult to collect annual population data for bats due to a variety of factors such as timing of activity, weather, staffing, and funding, consistent annual efforts have been made to gather information on bat distribution on GMNF.

Monitoring Activities

Forest Service staff completed acoustic bat monitoring protocols described in *A Plan for the North American Bat Monitoring Program (NABat)* during fiscal years 2019 to 2024. Each summer, four stationary detectors were deployed at set locations within each Ranger District for four nights apiece. Mobile monitoring was also conducted on a set route for two nights within each Ranger District. Occasional variations to this protocol occurred due to weather or staffing limitations. The resulting audio files were sent to Bat Conservation International (BCI) for identification of species presence.

Little brown bat was detected during all years surveyed and tricolored bat was only detected in fiscal year 2023. No confirmed detections of Indiana bat, northern long-eared bat, or eastern small-footed myotis were recorded during the survey period.

Evaluation and Conclusions

Survey efforts have resulted in no confirmed Indiana bat detections. This is likely reflected in the location of monitoring sites, which are located outside the known species distribution in low elevation areas of Vermont. Northern long-eared bats have also not been detected, despite widespread suitable roosting habitat across GMNF. However, northern long-eared calls are difficult to separate from similar species, and many “high frequency” *Myotis* spp. detections have been noted. The Vermont Fish and Wildlife Department has confirmed the continued presence of hibernating Indiana and northern long-eared bats in non-NFS locations.

Continued participation in the annual NABat monitoring effort is essential for detecting changes to bat distribution on GMNF as well as contributing to the overall national effort to track bat species across all Forest Service units. The continued use of pre-harvest acoustic surveys for late summer vegetation treatments should provide protection to threatened, endangered, and sensitive bat species during their vulnerable time of year. Additional opportunistic surveys in poorly covered areas should be pursued to expand the understanding of bat distribution across GMNF.

Recommended Changes (Monitoring Question or Forest Plan Components)

None.

Vegetation

Monitoring Item: Forest-wide Habitat Composition

Management Question

To what extent are management activities maintaining and restoring quality, amount, and distributions of habitats to desired levels?

Detailed Monitoring Question

To what extent are management activities and natural processes moving forest composition and age classes toward Forest Plan objectives (Tables 2.2-1 and 2.2-2)?

Measurement Indicators

1. Number of acres and proportion in each type and of each age class
2. Number of acres of treatments associated with habitat objectives, including:
 - To enhance softwood component or convert to mixedwood or softwood habitat
 - To maintain, enhance, or restore oak habitat
 - To maintain, enhance, or create aspen habitat
 - To maintain, enhance, or create permanent or temporary upland opening habitat
 - To maintain, enhance, or create old-growth characteristics

Monitoring Driver

Forest Plan Goal 2 and associated Objectives

Reporting Frequency

Every 5 years (changed from annually starting fiscal year 2019); this report covers fiscal years 2019 to 2023

Last Year Reported

Fiscal years 2017 and 2018 biennial monitoring and evaluation report (monitoring question and measurement indicators revised starting fiscal year 2019)

Next Year Scheduled for Reporting

Fiscal years 2027 and 2028 biennial monitoring and evaluation report (anticipated to cover fiscal years 2024 to 2028)

Background

One of the primary means to meet Forest Plan Goal 2 “*to maintain and restore quality, amount, and distribution of habitats to produce viable and sustainable populations of native and desirable non-native plants and animals*” is to implement management activities that address forest-wide habitat composition and structure objectives. The intent of this monitoring question is to help determine if management activities are meeting Goal 2 and associated Objectives including desired composition of northern hardwoods, mixedwoods and softwoods, oak, aspen-birch, upland open habitats, and late-successional and old forest habitats (Forest Plan, pp. 10 and 11).

Table 3-35 replicates Table 2.2-1 in the Forest Plan which provides composition objectives that represent long-term ecological tendencies of the GMNF landscape (Forest Plan, p. 11). Additionally, Forest Plan,

Table 2.2-3 provides the desired amounts and distribution of various age classes for different forest types using standard and extended rotation ages designed to increase acres of late-successional and old forest habitats (Forest Plan, p. 12). Late-successional and old forest habitats are further discussed in the Forest Structure monitoring item section.

Table 3-35. Habitat type long-term composition objectives for all GMNF lands (Forest Plan, Table 2.2-1).

Habitat Type	Current (2006) (% Forest)	Objective (% Forest)
Northern Hardwoods	76	30-40
Mixedwood	10	45-55
Softwoods	7	15-25
Aspen - Birch	3	1-5
Oak	1	1-5
Permanent Upland Openings	1-2	1-5
Wetlands	1-2	1-2

There are wide gaps between existing and forest composition objectives across GMNF including for the northern hardwoods, mixedwoods, softwoods, aspen-birch, oak, permanent and upland openings habitat types. This monitoring question can help track the extent to which management activities are making progress toward those objectives.

Monitoring Activities

Timber harvesting activities and other silvicultural treatments are tracked using the Forest Service Activity Tracking System (FACTS). FACTS manages information about activities related to fire/fuels, silviculture, special funding, range vegetation improvement, and invasive species used by all levels of the Forest Service. Field Sample Vegetation data is also tracked in the FSVeg system, which is updated to reflect treatments once completed.

These systems can provide reports summarizing the number of acres and proportion of harvest acres treated with uneven-aged management (selection, groups, irregular shelterwood); the number of acres treated explicitly to enhance early successional characteristics (clearcutting, patch cutting, shelterwood); then number of acres treated explicitly to enhance late successional characteristics; and the number of acres treated with various methods (thinning, improvement) to explicitly enhance the health, longevity, and/or structural diversity of forested stands at the stand and landscape scales. This data can be used to monitor the progress made toward desired forest composition, age class, and structure objectives. There is some inherent error associated with the entry of this data and consistency of activity classification; however, the data is sufficient for tracking overall trends.

Evaluation and Conclusions

Composition objectives provided by Forest Plan, Table 2.2-1 represent long-term ecological tendencies of Forest landscapes, with adjustments to manage aspen-birch, oak, and permanent upland opening habitats at, or slightly higher than, current levels. Because changes in forest composition take time, even with management, these composition objectives may take decades or even centuries to achieve. The Forest Plan identified a desire to conduct vegetation management in a way that supports the natural transition of forested ecosystems toward composition that is more suited to the natural tendencies of the sites within which they are found.

Most of the GMNF had been cleared at least once by the end of the nineteenth century, and much of it was farmed or grazed. Most red spruce was cleared or preferentially harvested, and few mature trees were left to provide seed except in the steepest or more inaccessible sites. As a result, most of the area

regenerated to northern hardwoods or its variants where northern hardwoods account for 76 percent of the habitat present on GMNF at the time the Forest Plan was revised (Table 3-35). About half of this northern hardwood habitat falls on sites that are more suited for softwoods or conifers like red spruce and hemlock, for instance sites that are cold, moist, with either poorer drainage or shallow soils. Forest inventory and research findings have indicated that softwood regeneration is slowly becoming established and competing well on suitable sites throughout the region. This trend may allow softwood and mixedwood habitat types to increase over time through natural processes. These processes can be facilitated and enhanced through management.

In addition to facilitating transitions from hardwoods to mixedwood and softwoods, long-term composition objectives include maintaining and increasing habitat types that are short-lived or uncommon and have high value for a variety of wildlife and plant species. These include aspen, paper birch, and other early successional hardwoods, forests dominated by or mixed with oak, and upland openings. Without management intervention, it is likely that most of these habitats would become quite rare on GMNF; the abundance of these habitats was documented in the Environmental Impact Statement (EIS) for the Forest Plan (pp. 3-62 to 3-64) to have declined over time.

Although there has been progress made for each habitat type objective, the level of management on GMNF since 2006 has not been sufficient to make notable or detectable progress toward Forest Plan objectives at the landscape scale. Total acres managed to promote any one habitat type represents less than one percent of the total GMNF area. Timber harvest and other management activities continue to provide opportunities to facilitate shifts in habitat composition toward desired objectives but will ultimately only supplement natural shifts that will occur over time for habitats like northern hardwoods, mixedwood, and softwoods.

For oak and aspen, the level of activity to promote these habitats is not keeping pace with the aging and decline of stands of these species. Most aspen stands are now either mature or over-mature, and once they start to decline, they quickly die and are replaced by species expected to live two-three times as long. Aspen is the most likely habitat to fall below the one percent lower threshold in the Forest Plan composition objectives over the next 50 years at the current level of treatment.

Oak stands are also aging, and the trees species growing below oak overstories tend to be northern hardwood species, particularly beech affected by beech bark disease, along with maple and birch species. Oak trees are relatively long-lived and many of these stands will retain oak in the overstory for decades, however shade tolerant northern hardwood understories will continue to develop and maintaining oak on these sites will become increasingly difficult and impractical. At the current rate of management, it is likely that most of existing oak stands on GMNF will be replaced by northern hardwoods over time and the proportion of forest dominated by oak will slowly decrease. Potential habitat for oak species is projected to increase under various climate change scenarios; however, forest stand dynamics and succession is expected to play a larger role in determining future forest types. Oak stands with well-developed northern hardwood understories are already on a trajectory toward those species in the absence of continued disturbance or management.

The area of upland opening habitat has been stable with some increases resulting from the maintenance and establishment of several hundred openings throughout GMNF. Not all openings are treated annually; some are treated by mowing or burning every two to three years, while others may only be treated once every five to ten years. Given the costs and staffing needed to maintain openings, it is expected that permanent upland openings will be maintained at or below the desired one percent level.

The level of management since 2006 has not been sufficient to make detectable progress in shifting composition at the forest-wide scale, however management has made progress at the stand, project and sub-watershed level. Management has also slowed or prevented further departure from target conditions for uncommon habitat types such as aspen/birch, oak, and upland openings. Continued efforts should include opportunities to increase the overall number of acres treated using a variety of treatment methods. These treatments can increase compositional diversity and enhance uncommon habitat types. Even-aged regeneration harvest should be emphasized to slow the decline of aspen/birch forest habitat, and the decrease of overall habitat diversity on the landscape.

Recommended Changes (Monitoring Question or Forest Plan Components)

None.

Monitoring Item: Outputs Accomplished - Volume and Acres of Timber Offered and Sold

Management Question

To what extent are management activities providing sustainable supply of forest products?

Detailed Monitoring Question

How do actual outputs compare to those projected in Appendix D, Proposed and Probable Practices, specifically related to timber offered and sold?

Measurement Indicators

1. Acres of even-aged regeneration harvest annually and total for the decade
2. Acres of even-aged intermediate harvest annually and total for the decade
3. Acres of uneven aged harvest annually and total for the decade
4. Million board feet (MMBF) volume of sawtimber and non-sawtimber products offered and sold annually and total for the decade

Monitoring Driver

- Forest Plan Goal 8 and Objectives
- Forest Plan Appendix D, Proposed and Probable Practices, Tables D-2, D-3, and D-4

Reporting Frequency

Annually

Last Year Reported

Fiscal years 2017 and 2018 biennial monitoring and evaluation report

Next Year Scheduled for Reporting

Fiscal years 2025 and 2026 biennial monitoring and evaluation report

Background

The intent of this monitoring question is to help determine if management activities are meeting Forest Plan Goal 8 to “provide for a sustainable supply of forest products” (Forest Plan, p. 14). This question also tracks how well management activities are meeting estimated acreage of silvicultural practices (Forest Plan Appendix D, Table D-4, Estimated Management Practices). Monitoring timber harvest related outputs helps assess contributions of management toward meeting social, cultural, and economic

attributes of Forest Plan desired conditions, and ensures timber harvest levels do not exceed the Allowable Sale Quantity (Forest Plan, Appendix D, Table D-2).

Monitoring Activities

Forest Activity Tracking System (FACTS) and Timber Sale Accounting (TSA) reports were used to monitor the annual amount of timber offered and sold along with the type of timber harvesting practices used to implement the Forest Plan.

Evaluation and Conclusions

The Forest Plan average annual Allowable Sale Quantity (ASQ) is the maximum amount of timber volume that may be offered and sold during Decade 2 (2016 to 2025), expressed on an annual basis. The annual average ASQ for GMNF is 19.7 million board feet (MMBF). The annual amount of timber sold may exceed 19.7 MMBF as long as the decadal ASQ (197 million board feet) is not exceeded. Table 3-36 displays the volume of timber offered and sold for fiscal years 2019 to 2024 compared to the annual average and decadal ASQ. The amount of timber sold annually during this monitoring period remains well below the average annual ASQ. There has been a total of 79.74 MMBF of timber sold from 2016 to 2024 which is 40.5 percent of the decadal ASQ. Total timber volumes sold during Decade 1 (2006 to 2015) and from 2006 to 2024 are included in Table 3-36 for context.

Table 3-36. Timber volume offered and sold for fiscal years 2019 to 2024 compared to the Allowable Sale Quantity (Forest Plan, Appendix D, Table D-2).

Fiscal Year	Timber Volume Sold (MMBF ¹)	Percent of Annual Average ASQ (19.7 MMBF ¹)	Percent of Decadal ASQ (197 MMBF ¹) of Total Harvest
2019	10.13	51	-
2020	10.39	53	-
2021	7.59	39	-
2022	13.31	68	-
2023	12.2	62	-
2024	8.75	44	-
2016-2024	79.74		40.5
2006-2015 ²	50.0	-	25
2006-2024	129.74	-	-

¹ Million board feet.

² Fiscal year 2006 to 2015 is Decade 1 of Forest Plan implementation.

³ Fiscal year 2016 was the start of Decade 2 of Forest Plan implementation which reset the 197 MMBF decadal ASQ.

Table 3-37 displays actual acres harvested from fiscal years 2019 to 2024 by management practice (silvicultural practice method) compared to estimated annual management practices for Decade 2 of Forest Plan implementation (2016 to 2025). Table 3-38 displays percent of actual estimated management practices harvested for this monitoring period. Table 3-39 displays the total actual acres harvested from fiscal years 2016 to 2024 compared to Decade 2 estimates. For context, Table 3-40 displays the total actual acres harvested during Decade 1 of Forest Plan implementation (2006 to 2015).

Table 3-37. Actual acres for fiscal years 2019 to 2024 compared to Decade 2 Forest Plan estimated management practices (2016 to 2025).

Management Practice ¹	Estimated Annual Acres in Decade 2 ²	Actual Acres Harvested					
		2019	2020	2021	2022	2023	2024
Even-aged Regeneration Harvest	1,676.4	107	19	55	46	194	59
Even-aged Intermediate Harvest	2,065.3	313	278	272	127	243	237
Uneven-aged Harvest	1,138.1	173	102	101	96	91	67
Total Harvest	4,879.8	593	399	428	269	528	363

¹ Even-aged regeneration includes clearcut, shelterwood and shelterwood removal harvest methods; even-aged intermediate includes thinning and improvement harvest methods; and uneven-aged includes group selection and individual tree selection harvest methods.

² 10-year annual average of Decade 2 (2016-2025) acres from Forest Plan, Appendix D, Table D-4; note these acres are different for Decade 1 (2006-2015).

Table 3-38. Percent of actual estimated annual acres harvested for fiscal years 2019 to 2024.

Management Practice ¹	Estimated Annual Acres in Decade 2 ²	Percent of Estimated Annual Acres Harvested					
		2019	2020	2021	2022	2023	2024
Even-aged Regeneration Harvest	1,676.4	6	1	3	3	12	4
Even-aged Intermediate Harvest	2,065.3	15	13	13	6	12	11
Uneven-aged Harvest	1,138.1	15	9	9	8	8	6
Total Harvest	4,879.8	12	8	9	6	11	7

¹ Even-aged regeneration includes clearcut, shelterwood and shelterwood removal harvest methods; even-aged intermediate includes thinning and improvement harvest methods; and uneven-aged includes group selection and individual tree selection harvest methods.

² 10-year annual average of Decade 2 (2016-2025) acres from Forest Plan, Appendix D, Table D-4; note these acres are different for Decade 1 (2006-2015).

Table 3-39. Total actual harvest acres for fiscal years 2016 to 2024 compared to Decade 2 Forest Plan estimated management practices.

Management Practice ¹	Planned Annual Acres in Decade 2 ²	Total Acres Harvested 2016-2024	Average Annual Acres Harvested 2016-2024	Percent of Planned Annual Acres
Even-aged Regeneration Harvest	1,676.4	777	86.3	5.1
Even-aged Intermediate Harvest	2,065.3	1,793	199.2	9.6
Uneven-aged Harvest	1,138.1	1,302	144.7	12.7
Total Harvest	4,879.8	3,872	430.2	8.8

¹ Even-aged regeneration includes clearcut, shelterwood and shelterwood removal harvest methods; even-aged intermediate includes thinning and improvement harvest methods; and uneven-aged includes group selection and individual tree selection harvest methods.

² 10-year annual average of Decade 2 (2016-2025) acres from Forest Plan, Appendix D, Table D-4.

Table 3-40. Total actual acres harvested for fiscal years 2006 to 2015 compared to Decade 1 Forest Plan estimated management practices.

Management Practice ¹	Planned Annual Acres in Decade 1 ²	Total Acres Harvested 2006-2015	Average Annual Acres Harvested 2006-2015	Percent of Planned Annual Acres
Even-aged Regeneration Harves	1,750	1,124	112.4	6.4
Even-aged Intermediate Harvest	1,324	1,551	155.1	11.7
Uneven-aged Harvest	981	2,348	234.8	23.9
Total Harvest	4,055	5,023	502.3	12.4

¹ Even-aged regeneration includes clearcut, shelterwood and shelterwood removal harvest methods; even-aged intermediate includes thinning and improvement harvest methods; and uneven-aged includes group selection and individual tree selection harvest methods.

² 10-year annual average of Decade 1 (2006-2015) acres from Forest Plan, Appendix D, Table D-4.

The amount of timber sold and harvested each year remains well below the levels allowed in the Forest Plan. Continued low harvest levels inhibit management ability to meet other objectives such as those related to desired forest type age class and composition, or contributions to the local and regional timber-based economy.

Recommended Changes (Monitoring Question or Forest Plan Components)

None.

Monitoring Item: Rare or Outstanding Natural Areas

Management Question

How well do Forest Plan components protect rare or outstanding biological, ecological, or geological areas?

Detailed Monitoring Question

To what extent are rare and outstanding biological, ecological, or geological features being protected, maintained, enhanced, or threatened?

Measurement Indicators

1. Number of rare or outstanding natural area sites monitored
2. Number of outstanding natural area sites for which condition was documented

Monitoring Driver

Forest Plan Goal 7 and associated Objectives

Reporting Frequency

Every 5 years (changed from annually starting fiscal year 2019); this report covers fiscal years 2019 to 2024

Last Year Reported

Fiscal years 2017 and 2018 biennial monitoring and evaluation report (monitoring question and measurement indicators revised starting fiscal year 2019)

Next Year Scheduled for Reporting

Fiscal years 2029 and 2030 biennial monitoring and evaluation report (anticipated to cover fiscal years 2025 to 2029)

Background

The intent of this monitoring question is to help determine if management activities are meeting Forest Plan Goal 7 to “*protect rare or outstanding biological, ecological, or geological areas on the GMNF*” and the associated Objective to “*maintain or enhance areas with rare or outstanding biological, ecological, or geological features*” (Forest Plan, p. 14). Ecologically rare or outstanding areas on GMNF have been identified and assigned to one of the following protective designations:

- Management Areas comprising Ecological Special Area, Candidate/Research Natural Area, and Alpine/Subalpine Special Area
- Significant Ecological Features (2006) which are mapped natural communities that are too small to be their own management area or are included in another protective management area type (such as Wilderness) and were determined to be significant sites retained for consistent monitoring through the 2006 Forest Plan Revision evaluations (Burbank 2004).

Data gathered during Forest Plan revision helped to identify 129 sites with at least one significant feature, including plants, animals, and/or natural communities, for a total of almost 13,000 acres. Of these, 61 sites (around 9,500 acres) were identified as having high-quality features, primarily natural communities, which could be conserved as distinct management areas within the ecological reference area network. The 61 rare or uncommon natural communities recognized as significant are listed in Appendix C, Table C-1. Like rare species, rare or outstanding natural communities are vulnerable to loss because the combination of biophysical factors and disturbance history that created or sustain these communities are unusual or rare. Monitoring these areas on a schedule helps to sustain them by identifying potential threats before the system is irreparably harmed.

Monitoring Activities

A monitoring schedule was established in fiscal year 2006 in which on average 12 significant sites are visited every year, and every site is visited at least once every 5 years. Sites in which concerns are identified or have other unique attributes may have adjusted monitoring schedules. For example, Forest Service staff have adjusted the monitoring cycle for the Mount Tabor Work Center Swamp to be more frequent because it has portions dominated by ash and may be particularly vulnerable to emerald ash borer. In another case, Lye Brook Headwaters is so remote and inaccessible that it is unlikely to be impacted by human use or non-native invasive plants, so its monitoring cycle has been adjusted to 10 years.

At each site staff collect field notes addressing the condition and quality of the site and/or rare plant populations. Table 3-41 shows 29 sites that were visited and the results of monitoring activities during fiscal years 2019 to 2024. In general, because these sites have been inventoried and evaluated in the past, notes highlight distinctive features, new information that had not previously been collected (for example, GPS coordinates of special features), and changes in size, disturbance levels, and conditions of the surrounding landscape. A key position vacancy and combining of roles contributed to reduced capacity to monitor these areas for a period, particularly during fiscal years 2019 to 2021.

Table 3-41. Ecologically rare or outstanding areas monitored during fiscal years 2019 to 2024.

Fiscal Year	Sites Visited/Monitored
2019	2 sites visited/monitored and for which condition was documented Grout Pond Ecological Special Area (ESA): Visited by Forest Service staff. Protection of wet areas during trail building were discussed to ensure best practices are implemented to minimize impacts. Elephant Mountain ESA: Visited by VT Natural Heritage Inventory (VNHI) staff. No threats or management needs were noted.
2020	4 sites visited/monitored and for which condition was documented Blue Ridge Fen Candidate Research Natural Area (cRNA): Visited by Forest Service and VNHI staff. Monitored where trash was removed but no threats or management needs were noted. North Pond: Visited by Forest Service and VNHI staff. Monitored where user trails and fire rings had been previously noted. Breadloaf Mountain: Visited by Forest Service staff. No management needs noted. Gilmore Pond: Visited by Forest Service staff. No threats or management needs were noted. The Cape Research Natural Area (RNA): Visited by VNHI staff. No management needs beyond continued protection were noted.
2021	3 sites visited/monitored and for which condition was documented Downer Glen: Visited by Forest Service and VNHI staff. No management needs or threats were noted. Texas Falls ESA: Visited by Forest Service and VNHI staff. No management needs or threats were noted. The Cape RNA: Visited by VNHI staff. No management needs beyond continued protection were noted.
2022	7 sites visited/monitored and for which condition was documented Blue Ridge Fen cRNA and The Cape RNA: Visited by Forest Service staff. No threats or management needs were noted. Bryant Mountain, Bryant Mountain Hollow, and Burnt Mountain: Visited by Forest Service staff. Noted under-and mid-story vegetation departure from canopy composition, as well as a build-up of surface fuels. Prescribed fire will be considered in the future at these sites. Fifield Pond and bog: Visited by VNHI staff. Buffer zones around these features were recommended, which is standard practice on GMNF. Wallingford Pond: Visited by VNHI staff. No management needs were noted.
2023	4 sites visited/monitored and for which condition was documented Bryant Mountain Escarpment, Bryant Mountain Hollow, and Burnt Mountain: Visited by Forest Service staff. Recorded current conditions and considered future management needs. Mesophication is a threat to the integrity of the xeric natural communities at these sites. North Pond: Visited by Forest Service and VNHI staff. No new user impacts were noted but additional old forest inventory is desired.
2024	9 sites visited/monitored and for which condition was documented Chandler Ridge, Bryant Mountain Hollow, Burnt Mountain, and Leicester Hollow: Visited by Forest Service staff. Evaluated fire-adapted natural communities, mesic natural communities, and future restoration management needs and areas which would be sensitive to or require exclusion from prescribed fire. Blue Ridge Fen cRNA: Visited by Forest Service staff. No threats noted. Alpine/Subalpine Special Area (Mt Abraham), Rattlesnake Point ESA, and the West of Mt. Tabor Work Center Swamp ESA: Visited by Forest Service and VNHI staff. On Mt Abraham, alpine natural community boundaries were refined; there is a need to continue efforts to keep hikers on the trail at Mt Abraham to allow for continued recovery of the alpine meadow. Rattlesnake Point was considered for evidence of fire history; while pitch pine and other fire-adapted plants occur, the area visited is mesic and shows no evidence of recent fire. At West of Mt Tabor, old forest inventory was refined.

Fiscal Year	Sites Visited/Monitored
	○ Chandler Ridge, Bryant Mountain, Bryant Mountain, Bryant Mountain Hollow, Burnt Mountain, and Leicester Hollow: Visited and evaluated by UVM Field Naturalist graduate student. Noted conditions and level of departure between canopy and under/mid-story vegetation.

Evaluation and Conclusions

The GMNF ecology and wilderness programs were limited in capacity (key positions vacant) during this monitoring period. This impacted both the amount of site monitoring and record keeping.

Over the past several years VNHI has been both increasing its numbers of visits to sites that haven't been monitored recently and updating its mapping information on significant natural communities based on new state-wide inventory information. There is now a substantial amount of new information on sites of ecological significance in the State that was not analyzed during the revision of the Forest Plan. Reviving cooperation between the GMNF ecology program and other Forest programs, individuals, and VNHI will make it more likely that most existing and new sites will be monitored within 10 years of their last visit, and some will be monitored on the 5-year monitoring cycle identified for these areas. Some sites have received repeated visits to relocate rare plants or to respond to natural disturbances or proposed activities, which reduces the number of new sites monitored each season.

Existing monitoring protocols continue to be effective and demonstrate the importance of gathering precise GPS coordinates for special features and rare plant populations so they can be relocated efficiently. Compiling, maintaining, and updating the data gathered during these monitoring efforts continues to be a challenge. Coordinating among individual monitors could also be improved to avoid duplication and leverage the capacity of program areas and organizations to conduct monitoring more strategically based on complementary skills.

Results from this monitoring period suggest that impacts to the integrity of ecologically significant sites and features are most often associated with recreational uses. A stronger relationship between GMNF recreation, law enforcement, and ecology staff is important to effectively mitigate some of these impacts. The Forest Service has been relatively successful at mitigating impacts through cooperation between staff areas. The GMNF ecology program continues to strive to annually monitor closer to 10 to 12 sites with significant ecological features on GMNF with help from VNHI and available Forest Service biological, botanical, and wilderness crews.

Future monitoring should be prioritized for the following areas:

- Remaining sites that have not been monitored since 2006
- Sites that are or may be affected by management activities
- Sites in need of management to maintain or enhance their condition
- Sites that are suffering from unauthorized uses such as illegal trails and cutting

Recommended Changes (Monitoring Question or Forest Plan Components)

None.

Monitoring Item: Stocking Level

Management Question

Are harvested lands adequately restocked according to National Forest Management Act requirements?

Monitoring Question

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

Measurement Indicators

Acres with percent stocked to minimal standards

Monitoring Driver

The National Forest Management Act at 16 USC 1604(g)(3)(E)(ii)

Reporting Frequency

Annually

Last Year Reported

Fiscal years 2017 and 2018 biennial monitoring and evaluation report

Next Year Scheduled for Reporting

Fiscal years 2025 and 2026 biennial monitoring and evaluation report

Background

The National Forest Management Act requires suitable timberlands are adequately restocked within five years following harvest. The intent of this monitoring question is to help determine if management activities comply with this requirement. Monitoring protocols and procedures are well established and are consistent with Forest Service Handbook (Forest Service Handbook 2409.17, Silvicultural Practices). Reforestation success is measured on new plantations or harvested stands in years one, three, and five (if needed) following the planting or other regeneration effort. Successful reforestation is assured when new stands are certified as “free to grow” by year five.

Monitoring Activities

Table 3-42 shows stocking survey results for fiscal years 2019 to 2024. Stocking surveys are conducted using 1/700 and 1/100 acre sized circular plots on which all seedlings and saplings are tallied. A plot is considered stocked if at least one acceptable tree seedling or sapling occurs is found. The plot data is summarized providing the total stocking percentage for each stand. Stocking surveys were conducted for all stands harvested with even-aged and/or uneven-aged regeneration methods. Survey results were reported in the FACTS database.

Table 3-42. Acres surveyed for first and third/fifth year stocking during fiscal years 2019 to 2024.

Fiscal Year	First Year (acres)	Third/Fifth Year (acres)
2019	437	631
2020	129	256
2021	315	438
2022	303	403
2023	295	315
2024	224	218
Totals	1,703	2,261

Evaluation and Conclusions

Review of evaluation surveys completed during the monitoring period indicates that reforestation efforts underway are sufficient to meet stocking certification for all units within the required timeframes. All units harvested were certified as fully stocked. For natural regeneration survival examinations, all sampled stands were stocked with acceptable seedlings or saplings to be considered moving towards reforestation certification.

Recommended Changes (Monitoring Question or Forest Plan Components)

None.

Wild and Scenic Rivers***Monitoring Item: Wild and Scenic Rivers***

Management Question

To what extent are eligible Wild and Scenic Rivers managed to preserve their outstandingly remarkable values?

Detailed Monitoring Question

Are management activities within the eligible National Wild and Scenic River Management Area consistent with the Outstandingly Remarkable Values for which each river segment was determined eligible?

Measurement Indicators

Number of projects or sites reviewed during annual monitoring and evaluation visits that did not maintain outstandingly remarkable values (ORVs) and retain eligibility for river segments

Monitoring Driver

- Forest Plan Goal 7 and associated Objective
- Forest Plan Eligible Wild, Scenic, and Recreational Rivers Management Area direction

Reporting Frequency

Annually

Last Year Reported

Fiscal years 2017 and 2018 biennial monitoring and evaluation report (measurement indicators revised starting fiscal year 2019)

Next Year Scheduled for Reporting

Fiscal years 2025 and 2026 biennial monitoring and evaluation report

Background

The intent of this monitoring question is to help assess if management activities have preserved the outstandingly remarkable values that led rivers and streams to be determined as eligible Wild, Scenic, or Recreational Rivers in alignment with Forest Plan Goal 7 “*to protect rare or outstanding biological, ecological, or geological areas on the GMNF*” (Forest Plan, p. 14). The desired future condition for the Eligible Wild, Scenic and Recreational Rivers Management Area “*will protect classification characteristics and ORVs for each of the identified stream segments located on federal land*” (Forest Plan p. 105).

Annual monitoring of project implementation allows for on-site reviews to assess if the outstanding remarkable values (ORVs) were retained for eligible river segments. Application of Management Area Standards and Guidelines, and project specific design features and mitigation measures are reviewed prior to and during implementation to determine if the ORVs are maintained.

Monitoring Activities

Monitoring for consistency with managing eligible wild, scenic, and recreational rivers to preserve each river’s outstandingly remarkable values occurs through environmental analysis (NEPA) review of proposed actions for activities that may be occurring within the Eligible Wild, Scenic, and Recreational Rivers Management Area. Annual monitoring visits also provide the opportunity to review project implementation and adherence to Forest Plan Standards and Guidelines as well as project-specific design features and mitigation measures. During monitoring activities, Forest Service staff review whether ORVs associated with eligible rivers are maintained.

Evaluation and Conclusions

Based on available documentation, annual monitoring site visits, field reviews, and NEPA decisions, monitoring results showed that all projects implemented successfully maintained the ORVs for eligible Wild, Scenic and Recreation River corridors.

Recommended Changes (Monitoring Question or Forest Plan Components)

None.

Wilderness

Monitoring Item: Wilderness Areas Managed to Standard

Management Question

To what extent are management activities meeting the intent of the Wilderness Act?

Detailed Monitoring Question

Are wilderness areas trending to meet the national Wilderness Stewardship Performance?

Measurement Indicators

1. Wilderness stewardship performance (WSP)
2. Increase in the total element score per Wilderness for WSP measures

Monitoring Driver

- Forest Plan Goal 13 and Objectives
- Wilderness Management Area direction
- Wilderness Act of 1964

Reporting Frequency

Annually

Last Year Reported

Fiscal years 2017 and 2018 biennial monitoring and evaluation report (monitoring question and measurement indicators revised starting fiscal year 2019)

Next Year Scheduled for Reporting

Fiscal years 2025 and 2026 biennial monitoring and evaluation report

Background

The intent of this monitoring question is to help determine if Forest Service staff are managing *“designated wilderness to preserve an enduring resource that represents ecosystems and natural processes unique to northeastern forests while providing opportunities for solitude and unconfined recreation consistent with the Wilderness Act of 1964 and subsequent legislation”* (Forest Plan Goal 13, p. 16).

Monitoring focuses on wilderness character described as five mutually reinforcing qualities derived from the Wilderness Act of 1964:

1. **Untrammelled** – The intentional management actions that directly control or manipulate the components or processes of ecological systems inside wilderness.
2. **Natural** – The effects of modern people on ecological systems inside wilderness since the time the area was designated.
3. **Undeveloped** – The structures, installations, and other evidence of modern human presence or occupation, and the use of motor vehicles, motorized equipment, or mechanical transport.
4. **Solitude or Primitive and Unconfined Recreation** – The conditions that affect the opportunity for people to experience solitude or primitive, unconfined recreation.
5. **Other Feature of Value** – The ecological, geological, or other features of scientific, educational, scenic, or historical value.

Table 3-43 shows the eight Congressionally designated wilderness areas on GMNF. Management is guided by Forest Plan direction for the Wilderness Management Area (Forest Plan, p. 49 to 53).

Table 3-43. Designated Wilderness Areas on GMNF.

Wilderness Area	Acres
Big Branch	6,767
Breadloaf	25,237
Bristol Cliffs	3,775
George D. Aiken	5,060
Glastenbury	22,425
Joseph Battell	12,333
Lye Brook	17,718

Peru Peak	7,672
Total	100,987¹

Source: Forest Plan, Wilderness Management Area, Table 3.1-1, p. 50

¹ Acres included in wilderness legislation. These acres do not match Forest Plan, Appendix F Maps, Table F-1 Management Area Allocations (101,039 acres) that were calculated using GIS.

In 2015, the national wilderness program adopted the Wilderness Stewardship Performance (WSP) protocol. The WSP contains metrics used by the Forest Service to track management accomplishments in designated wilderness areas, with each national forest selecting ten core elements annually. Element selection can change from year to year for each wilderness. The WSP framework aims to measure the Forest Service's effectiveness in preserving wilderness character by tracking management actions, such as implementing invasive species plans.

The WSP elements for GMNF designated wilderness monitored during fiscal years 2019 to 2024 include:

- Additional Requirements
- Agency Management Actions
- Air Quality Values
- Cultural Resources
- Education
- Invasive Species
- Motorized Equipment / Mechanical Transport Use Authorization
- Non-Compliant Infrastructure
- Opportunities for Solitude
- Opportunities for Primitive and Confined Recreation
- Outfitters & Guides
- Recreation Sites
- Trails
- Water
- Wilderness Character Baseline
- Workforce Capacity

A possible 10 points per 10 elements are possible in WSP following the WSP guidebook. A wilderness is considered to meet national standard and “meet baseline performance for preserving Wilderness character” when it achieves 60 WSP points.

Monitoring Activities

Table 3-44 shows the WPS rating for the eight designated GMNF wilderness areas for fiscal years 2019 to 2024. As mentioned in previous monitoring and evaluation reports, Forest Service staff have not been able to meet the WSP national standards due to lack of workforce capacity. Wilderness monitoring was increased by Forest Service staff with the assistance of partners such as the Society of Wilderness Stewardship (SWS) and Student Conservation Association (SCA). In fiscal years 2020 to 2024 SWS fellows assisted with Wilderness character monitoring. SCA Wilderness stewardship crews also supported the program from fiscal years 2021 to 2024.

Table 3-44. Wilderness Stewardship Performance rating for fiscal years 2019 to 2024.

Fiscal Year	Wilderness Performance Standard Element Score																Total Score
	Additional Requirements	Agency Management Actions	Air Quality Values	Cultural Resources	Education	Invasive Species	Motorized Equipment/ Mechanical Trasport	Non-Compliant Infrastructure	Opportunities for Primitive/Unconfined	Opportunities for Solitude	Outfitters & Guides	Recreation Sites	Trails	Water	Wilderness Character Baseline	Workforce Capacity	
Big Branch Wilderness																	
2019	4	4	2	0	8	0	-	-	-	2	4	4	-	-	4	2	34
2020	4	4	6	0	8	6	-	-	-	6	4	4	-	-	4	4	50
2021	4	6	6	0	8	6	-	-	-	6	6	6	-	-	6	8	62
2022	4	6	6	2	8	6	-	-	-	6	6	6	-	-	8	10	68
2023	4	6	6	2	8	6	-	-	-	6	6	6			8	10	68
2024	4	6	6	2	8	6	-	-	-	6	6	6			8	10	68
Breadloaf Wilderness																	
2019	4	4	2	-	8	-	-	-	-	2	4	4	2	2	4	2	38
2020	4	4	6	-	8	-	-	-	-	6	4	4	2	4	4	4	50
2021	4	4	6	-	8	-	-	-	-	6	4	6	4	4	6	8	60
2022	4	6	6	-	8	-	-	-	-	6	4	6	4	4	8	10	66
2023	4	6	6	-	8	-	-	-	-	6	4	6	4	4	8	10	66
2024	4	6	6	-	8	-	-	-	-	6	4	6	2	4	8	10	64
Bristol Cliffs Wilderness																	
2019	4	4	2	-	8	0	-	-	-	2	4	4	-	2	4	0	34
2020	4	4	6	-	8	6	-	-	-	2	4	4	-	4	4	2	48
2021	4	6	6	-	8	6	-	-	-	4	6	6	-	4	6	8	64
2022	4	6	6	-	8	6	-	-	-	4	6	6	-	4	8	10	68
2023	4	6	6	-	8	6	-	-	-	4	6	6	-	4	8	10	68
2024	4	6	6	-	8	6	-	-	-	4	6	6	-	4	8	10	68
George D. Aiken Wilderness																	
2019	4	4	2	-	8	-	2	-	0	2	-	4	-	2	4	2	34
2020	4	4	6	-	8	-	2	-	0	2	-	4	-	4	4	4	42
2021	4	4	6	-	8	-	2	-	4	4	-	4	-	4	6	8	54
2022	4	6	6	-	8	-	4	-	6	4	-	4	-	4	8	10	64
2023	4	6	6	-	8	-	4	-	6	4	-	4	-	4	8	10	64
2024	4	6	6	-	8	-	4	-	6	4	-	4	-	4	8	10	64
Glستنbury Wilderness																	
2019	4	4	2	0	8	-	-	-	-	2	4	6	2	-	4	2	38
2020	4	4	10	0	8	-	-	-	-	6	4	6	2	-	4	4	52
2021	4	6	10	4	8	-	-	-	-	6	6	6	4	-	6	8	68
2022	4	6	10	4	8	-	-	-	-	6	6	6	4	-	8	10	72
2023	4	6	10	4	8	-	-	-	-	6	6	6	4	-	8	10	72
2024	4	6	10	4	8	-	-	-	-	6	6	6	2	-	8	10	70
Joseph Battell Wilderness																	
2019	4	4	2	-	10	-	-	0	-	2	4	6	-	2	4	2	40
2020	4	4	6	-	10	-	-	0	-	6	4	6	-	4	4	4	52
2021	4	6	6	-	10	-	-	6	-	6	4	6	-	4	6	8	66

Fiscal Year	Wilderness Performance Standard Element Score																Total Score
	Additional Requirements	Agency Management Actions	Air Quality Values	Cultural Resources	Education	Invasive Species	Motorized Equipment/Mechanical Transport	Non-Compliant Infrastructure	Opportunities for Primitive/Unconfined	Opportunities for Solitude	Outfitters & Guides	Recreation Sites	Trails	Water	Wilderness Character Baseline	Workforce Capacity	
2022	4	6	6	-	10	-	-	6	-	6	4	6	-	4	8	10	70
2023	4	6	6	-	10	-	-	6	-	6	4	6	-	4	8	10	70
2024	4	6	6	-	10	-	-	6	-	6	4	6	-	4	8	10	70
<i>Lye Brook Wilderness</i>																	
2019	4	4	2	0	8	0	-	-	-	2	0	4	-	-	4	2	34
2020	4	4	10	0	8	6	-	-	-	6	4	4	-	-	4	4	54
2021	4	6	10	2	8	6	-	-	-	6	4	6	-	-	6	8	66
2022	4	6	10	2	8	6	-	-	-	6	4	10	-	-	8	10	74
2023	4	6	10	2	8	6	-	-	-	6	4	10	-	-	8	10	74
2024	4	6	10	2	8	6	-	-	-	6	4	10	-	-	8	10	74
<i>Peru Peak Wilderness</i>																	
2019	4	4	2	-	8	-	-	-	-	2	4	4	2	2	4	2	38
2020	4	4	10	-	8	-	-	-	-	6	4	4	2	4	4	4	54
2021	4	6	10	-	8	-	-	-	-	6	6	6	4	4	6	8	68
2022	4	6	10	-	8	-	-	-	-	6	6	6	4	4	8	10	72
2023	4	6	10	-	8	-	-	-	-	6	6	6	4	4	8	10	72
2024	4	6	10	-	8	-	-	-	-	6	6	6	2	4	8	10	70

Evaluation and Conclusions

Although no wilderness areas scored the minimum 60 WSP rating threshold to meet the Wilderness Managed to Standard in fiscal years 2019 and 2020, the WSP total scores increased into the 50s from the 30s from previous years starting in fiscal year 2020. In fiscal years 2021 to 2024, all eight designated wilderness areas met the national standard for preserving wilderness character with total scores of 60 or greater. The only exception was George D. Aiken Wilderness with a total score of 54 in fiscal year 2020. The improved scores were largely due to adequate Wilderness Program staffing in conjunction with the shared partnership approach to meeting wilderness stewardship objectives and fulfilling Forest Plan direction associated with wilderness management.

Recommended Changes (Monitoring Question or Forest Plan Components)

None.

4. List of Preparers

Table 4-1 provides the Forest Service monitoring team that collected, evaluated, or compiled data for the *Green Mountain National Forest Fiscal Years 2019 to 2024 Monitoring and Evaluation Report*:

Table 4-1. Preparers of the fiscal Years 2019 to 2024 monitoring and evaluation report.

Name	Position or Resource Responsibility
Jay Strand	Monitoring Team Leader/Forest Planner
Ralph Perron	Air Quality Specialist
Karen Bucher	Archaeologist and Heritage Resource Specialist
Marybeth Hanley	Botanist
Melissa Green	Botanist
Stephanie Erlandson	Botanist
Suzanne Gifford	Ecologist
Brian Austin	Engineer
Ryan Hughes	Fire Management Officer
Jeremy Mears	Fisheries Biologist
Cassie Spires	Lands Specialist
Ethan Ready	Public Affairs Officer
Briana Shepherd	Public Affairs Specialist
Steven Pytlik	Recreation Planner/Wilderness Coordinator
Holly Knox	Recreation Program Manager/Public Services Staff Officer
Jeffrey Tilley	Silviculturist
Kaitlyn Mroczka	Soil Scientist
Jennifer Edmonds	Special Uses Coordinator
John Mccann	Watershed Program Manager
Meredith Naughton	Wildlife Biologist
Shawn Langston	Wildlife Biologist

5. Literature Cited

FED (Federal Land Manager Environmental Database). 2025. Interactive Data Explorer [Web page]. Located at: <https://views.cira.colostate.edu/fed/> Accessed 2025 July 25.

Ferguson, Michael D., et. al. May 2024. Proactively Assessing Outdoor Recreation Visitor Attitudes, Behaviors, and Perceptions on the Green Mountain and Finger Lakes National Forests: Final Report. University of NH Department of Recreation Management and Policy.

NADP (National Atmospheric Deposition Program). 2025. National Trends Network [Web page]. Located at: <http://nadp.slh.wisc.edu/ntn/> Accessed 2025 July 25.

Napper, Carolyn, Steven Howes, and Deborah Page Dumroese. 2009. Soil Disturbance Field Guide. Tech. Rep. 0819 1815—SDTDC 1940. San Dimas, CA: U.S. Department of Agriculture, Forest Service, San Dimas Technology & Development Center.

Page-Dumroese, Deborah, Ann Abbott, Tom Rice. 2009a. Forest Soil Disturbance Monitoring Protocol, Volume I: Rapid Assessment. United States Department of Agriculture, Forest Service. General Technical Report WO-82a.

Page-Dumroese, Deborah, Ann Abbott, Tom Rice. 2009b. Forest Soil Disturbance Monitoring Protocol, Volume II: Supplementary Methods, Statistics, and Data Collection. United States Department of Agriculture, Forest Service. General Technical Report WO-82b.

Soil Science Society of America. 2001. Glossary of soil science terms. Madison, WI: Soil Science Society of America.

USDA Forest Service, Eastern Region. 2005. FSH 2509.18 Soil Management, Chapter 2 Soil Quality Monitoring. R9RO 2509.18-2005-1. February 23, 2005.

USDA Forest Service. 2006. Green Mountain National Forest 2006 Forest Plan including Appendices. <https://www.fs.usda.gov/r09/gmfl/planning>

USDA Forest Service. 2008. Forest Service Handbook 2309.18 – Trails Management Handbook Section 10 USDA Forest Service. October, 2008. Washington, DC. Available online at <https://www.fs.usda.gov/about-agency/regulations-policies/handbook/230918-10-trail-planning>; last accessed July 2, 2025.

USDA Forest Service. 2010a. Forest Service Manual. FSM 2500 Watershed and Air Management, Chapter 2550 Soil Management. November 23, 2010.

USDA Forest Service. 2010b. Forest-Wide Non-Native Invasive Plant Control Project – Decision Notice and Finding of No Significant Impact. October 2010. 37 pp.

USDA Forest Service. 2011. Watershed Condition Classification Technical Guide. FS-978. July 2011. 41 pp. Available at https://www.fs.usda.gov/biology/resources/pubs/watershed/maps/watershed_classification_guide2011FS978.pdf

USDA Forest Service. 2012a. National Best Management Practices Program for Water Quality Management on National Forest System Lands. Volume 1: National Core BMP Technical Guide. FS-

990a. 177 pp. Available online at
https://www.fs.usda.gov/sites/default/files/FS_National_Core_BMPs_April2012_sb.pdf

USDA Forest Service. 2012b. Non-native Invasive Species Best Management Practices - Guidance for the U.S. Forest Service Eastern Region. August 2012. 282 pp. Available at
<https://www.fs.usda.gov/sites/nfs/files/legacy-media/r09/NNIS%20BMP%20-R9.pdf>

USDA Forest Service. 2015. National visitor use monitoring results: Visitor Use Report Green Mountain and Finger Lakes National Forests Data collected FY2005. USDA Forest Service. Washington, DC. Available online at <https://www.fs.usda.gov/about-agency/nvum>; last accessed July 2, 2025.

USDA Forest Service. 2020. National visitor use monitoring results: Visitor Use Report Finger Lakes National Forest Data collected FY2015. USDA Forest Service. Washington, DC. Available online at <https://www.fs.usda.gov/about-agency/nvum>; last accessed July 2, 2025.

USDA Forest Service. 2021. Final Supplemental Information Report: Review of New Information and Changed Circumstances, Roads Management, Green Mountain National Forest Land and Resource Management Plan and Environmental Impact Statement/Record of Decision. July 2021. 25 pp.

USDA Forest Service. 2024a. List of partners assisting with Green Mountain National Forest management activities.

USDA Forest Service. 2024b. Fiscal Year 2024 Accomplishments Region 9 Trail Program.

USDA Forest Service. 2025a. Green Mountain National Forests Long Term Monitoring Project - Detailed History, Background, and Sampling Protocol.

USDA Forest Service. 2025b. Natural Resources Management (NRM) Trail Annual Accomplishments reports for Fiscal Years 2017-2024. July 2025.

USDA Forest Service. 2025c. Resources Management (NRM) G&A by Cooperator Type and Associated Funds reports from 2017-2024. July 2025.

USDA Forest Service. 2025d. LADS 4.0 Lands Adjustment Report. USDA Forest Service. Washington, DC. Available online at https://app.powerbigov.us/links/L4WDAn1IgM?ctid=ed5b36e7-01ee-4ebc-867e-e03cfa0d4697&pbi_source=linkShare&bookmarkGuid=3174df5e-9016-46a9-91ad-3a6a5875e091; last accessed July 2, 2025.

VANR (Vermont Agency of Natural Resources). 2018. Acceptable Management Practices for Maintaining Water Quality on Logging Jobs in Vermont. Effective 11 August 2018. 13 pp.

Appendix A: Payments to Towns

There are two types of federal payments reaching municipalities that have National Forest System (NFS) lands: 1) Payments in Lieu of Taxes (PILT); and 2) Public Law 106-393, Secure Rural Schools and Community Self-Determination Act of 2001, reauthorized in 2008. Payments in lieu of taxes funds are directed to towns, and the Public Law 106-393 funds are directed to school districts.

Payments in Lieu of Taxes

Generally, federal lands may not be taxed by state or local governments unless they are authorized to do so by Congress. Since local governments are often financed by property or sales taxes, the inability to tax the property values or products derived from the federal lands may significantly affect local tax bases. Instead of authorizing taxation, Congress created various payment programs designed to make up for lost tax revenue.

Under current federal law, local governments are compensated through various programs for losses to their tax bases due to the presence of most federally owned land. The most widely applicable program, while run by the Bureau of Land Management, applies to many types of federally owned land, and is called "Payments in Lieu of Taxes" or PILT. Table A-1 shows PILT payments and entitlement acres for Vermont towns during fiscal years 2019 to 2024. Each town can receive additional PILT dollars if they contain other federal lands, such as National Park Service or Army Corps of Engineer lands. Not all federal acres within towns are entitled to PILT payments. The level of PILT payments is calculated under a complex formula which considers figures such as acres of eligible lands, population, and previous year payments from other federal agencies. The PILT, made in or around October, is indexed by the inflation rate and set by federal law.

Table A-1. Vermont Payments in Lieu of Taxes (PILT) and acreage for fiscal years 2019 to 2024.

Town ¹	PILT Payment Amount by Fiscal Year (dollars)						2024 Entitlement Acres ²
	2019	2020	2021	2022	2023	2024	
ARLINGTON	11,600	11,852	12,019	12,313	13,193	14,031	4,191
BARNARD	1,899	1,940	1,968	2,016	2,160	2,297	686
BENNINGTON	3,789	3,871	3,926	4,022	4,309	4,583	1,369
BRANDON	244	249	253	259	277	295	88
BRIDGEWATER	6,870	7,019	7,118	7,292	7,813	8,310	2,482
BRISTOL	15,600	15,938	16,163	16,558	17,741	18,869	5,636
CHITTENDEN	81,512	83,277	84,457	86,518	92,701	105,569	31,533
CLARENDON	285	291	296	303	324	345	103
DANBY	0	0	0	0	0	0	3
DORSET	15,605	16,045	16,272	16,746	17,943	19,083	5,700
DOVER	14,155	14,462	14,663	15,021	16,095	17,118	5,113
GLASTENBURY	n/a ³	n/a	n/a	1,384	1,483	1,576	26,718
GOSHEN	21,211	21,669	21,977	22,513	24,122	25,655	7,663
GRANBY	4,694	4,796	4,864	4,982	5,338	5,678	1,696
GRANVILLE	40,768	41,651	42,241	43,272	46,364	49,311	14,729
HANCOCK	55,045	56,237	57,034	58,426	62,601	66,579	19,887
HARTFORD	3,847	3,931	3,141	3,217	3,447	3,666	1,095
HARTLAND	1,716	1,754	2,587	2,650	2,839	3,020	902
JAMAICA	5,201	5,314	5,334	5,464	5,855	6,227	1,860
KILLINGTON	15,680	16,020	16,247	18,491	19,813	21,975	6,564
LANDGROVE	2,250	2,299	2,331	2,388	2,559	2,722	813

Town ¹	PILT Payment Amount by Fiscal Year (dollars)						2024 Entitlement Acres ²
	2019	2020	2021	2022	2023	2024	
LEICESTER	7,473	7,635	7,743	7,932	8,499	9,039	2,700
LINCOLN	30,031	30,683	31,117	31,876	34,473	36,663	10,951
LONDONDERRY	1,944	1,985	2,014	\$2,063	2,209	2,351	702
MANCHESTER	15,038	15,363	15,581	15,962	17,102	18,189	5,433
MENDON	8,387	8,568	8,690	8,902	9,539	11,674	3,487
MIDDLEBURY	8,638	8,825	8,950	9,169	9,824	10,435	3,117
MOUNT HOLLY	9,381	9,584	9,719	9,957	10,668	11,346	3,389
MOUNT TABOR	48,282	49,471	49,858	50,809	44,496	47,283	25,491
NORWICH	3,739	3,820	3,874	3,969	4,253	4,523	1,351
PERU	47,303	48,328	49,012	50,209	53,797	57,216	17,090
PITTSFIELD	21,133	21,590	21,897	22,431	24,034	25,561	7,635
POMFRET	7,487	7,649	7,757	7,947	8,515	9,056	2,705
POWNA	11,437	11,685	11,850	12,139	13,007	13,833	4,132
READSBORO	25,580	26,135	26,505	27,152	29,092	30,941	9,242
RIPTON	61,364	62,693	63,581	65,133	69,789	74,223	22,170
ROCHESTER	32,874	33,586	34,062	34,893	37,388	39,763	11,877
ROXBURY	102	105	106	109	117	124	37
RUPERT	465	475	482	494	529	563	168
SALISBURY	10,515	10,743	10,895	11,161	11,959	12,719	3,799
SEARSBURG	20,133	20,740	20,870	21,550	24,261	25,802	7,707
SHAFTSBURY	3,529	3,605	3,656	3,745	4,014	4,268	1,275
SHREWSBURY	12,002	12,262	12,435	12,739	13,649	14,517	4,336
SOMERSET	n/a	n/a	n/a	594	847	900	9,644
SPRINGFIELD	560	572	2,624	2,688	2,880	3,063	915
STAMFORD	33,776	34,508	34,997	35,851	38,413	40,854	12,203
STOCKBRIDGE	2,466	2,520	2,555	2,618	2,805	2,983	891
STRATTON	37,656	38,055	38,263	38,946	56,670	60,272	18,003
SUNDERLAND	60,384	61,692	62,566	64,093	68,673	73,038	21,816
THETFORD	2,704	2,763	2,799	2,867	3,072	3,268	976
TOWNSHEND	2,743	2,803	2,897	2,967	3,180	3,382	1,010
WALLINGFORD	26,115	26,681	27,058	27,719	29,700	31,587	9,435
WARDSBORO	8,644	8,831	8,956	9,175	9,830	10,455	3,123
WARREN	19,901	20,332	20,621	21,124	24,304	25,849	7,721
WEATHERSFIELD	3,075	3,142	1,141	1,169	1,253	1,332	398
WESTON	24,977	25,518	25,881	26,512	28,407	30,211	9,024
WILMINGTON	4,579	4,677	4,743	4,860	5,206	5,537	1,654
WINHALL	43,741	44,688	45,321	46,428	49,745	52,906	15,803
WOODFORD	70,911	72,447	73,472	75,266	75,008	79,705	25,619
WOODSTOCK	2,114	2,160	2,191	2,244	2,405	2,557	764
TOTAL	1,035,173	1,057,554	1,071,651	1,101,319	1,182,612	1,269,694	426,624

Source: <https://www.doi.gov/pilt/resources/annual-reports>

¹ Not all towns listed are within the National Forest Proclamation boundary, however they still receive PILT payments based on the presence of other federal lands within their boundaries.

² Entitlement acres are those lands that were not tax exempt (such as owned by state or local government) prior to when the land was conveyed to the United States.

³ Not reported

Secure Schools Act

Table A-2 provides the payments to Vermont towns by county in fiscal years 2019 to 2024. The Secure Rural Schools (SRS) and Community Self-Determination Act of 2001 (Secure Schools Act) was reauthorized for four years in 2008. This law was promulgated by Congress to restore stability and predictability to the annual payments made to states and counties containing NFS lands for the benefit of schools and roads. Prior to the passage of the Secure Schools Act, these payments were based upon income generated by the USDA Forest Service, typically through timber sales. As this timber sale-related income fluctuated and generally waned, communities that relied on the annual payments for the support of their schools suffered from a lack of funding stability and predictability to the detriment of their educational systems. The Secure Schools Act severs the tie between rural school funding and timber sale income to offer rural school systems continual, level funding.

Table A-2. Secure Rural Schools payments by Vermont town/county for fiscal years 2019 to 2024.

Town by County	Payment Amount by Fiscal Year (dollars)					
	2019	2020	2021	2022	2023	2024
Addison County						
Bristol	3,682.64	3,641.40	4,338.55	4,472.14	4,230.99	4,442.30
Goshen	5,007.11	4,951.04	5,898.92	6,080.56	5,752.67	6,039.98
Granville	9,731.29	9,622.32	11,464.52	11,817.53	11,180.28	11,738.66
Hancock	12,994.44	12,848.93	15,308.86	15,780.25	14,929.31	15,674.94
Leicester	1,764.22	1,744.46	2,078.44	2,142.44	2,026.91	2,128.14
Lincoln	7,413.63	7,330.62	8,734.07	9,083.15	8,593.34	9,022.53
Middlebury	2,098.76	2,075.26	2,472.57	2,548.71	2,408.27	2,528.55
Ripton	14,498.60	14,336.25	17,080.92	17,606.88	16,657.44	17,489.37
Salisbury	2,482.32	2,454.52	2,924.44	3,014.49	2,851.94	2,994.37
Total	59,673.01	59,004.80	70,301.29	72,546.15	68,631.15	72,058.84
Bennington County						
Arlington	2,399.95	2,356.80	2,800.23	3,040.35	3,244.47	3,078.07
Bennington	783.95	769.86	914.71	993.14	1,059.81	1,005.46
Dorset	3,356.26	3,295.93	3,932.75	4,269.99	4,556.66	4,322.96
Glastenbury	15,299.88	15,024.85	17,851.72	19,382.51	20,683.81	19,622.99
Landgrove	467.85	459.44	545.88	592.69	632.48	600.05
Manchester	3,166.72	3,109.79	3,694.88	4,011.73	4,281.07	4,061.49
Peru	9,815.11	9,638.66	11,452.15	12,434.17	13,268.98	12,588.44
Pownal	2,366.16	2,323.62	2,760.81	2,997.55	3,198.80	3,034.74
Readsboro	5,292.37	5,197.23	6,175.07	6,704.59	7,154.72	6,787.77
Rupert	96.20	94.47	112.25	121.87	130.06	123.39
Searsburg	4,413.36	4,334.02	5,149.46	5,591.02	5,966.40	5,660.39
Shaftsbury	730.12	717.00	851.89	924.94	987.05	936.42
Stamford	6,987.96	6,862.34	8,153.47	8,852.64	9,446.99	8,962.47
Sunderland	12,520.27	12,295.20	14,608.51	15,861.19	16,926.08	16,057.98
Winhall	9,110.75	8,946.98	10,630.32	11,541.87	12,316.78	11,685.07
Woodford	15,579.33	15,299.27	18,178.45	19,737.25	21,062.38	19,982.13
Total	92,386.24	90,725.46	107,812.55	117,057.50	124,916.54	118,509.82
Essex County						

Town by County	Payment Amount by Fiscal Year (dollars)					
	2019	2020	2021	2022	2023	2024
	1,748.15	1,552.54	1,597.78	1,570.40	1,804.05	1,827.51
Total	1,748.15	1,552.54	1,597.78	1,570.40	1,804.05	1,827.51
Rutland County						
Brandon	53.33	53.46	61.26	70.10	69.60	70.95
Chittenden	17,846.67	17,889.07	20,499.07	23,458.48	24,938.29	25,395.80
Clarendon	44.24	44.34	50.81	58.15	57.73	58.86
Danby	1.82	1.82	2.09	2.39	2.37	2.42
Killington	2,206.52	2,211.76	2,534.45	2,900.35	3,093.07	3,134.06
Mendon	2,021.08	2,025.88	2,321.45	2,656.59	2,999.74	3,051.01
Mount Holly	2,053.80	2,058.68	2,359.04	2,699.61	2,680.24	2,732.53
Mount Tabor	15,448.04	15,484.74	17,743.96	20,305.61	20,159.90	20,553.20
Pittsfield	4,626.96	4,637.95	5,314.63	6,081.89	6,038.24	6,156.04
Shrewsbury	1,275.67	1,278.70	1,465.26	1,676.80	1,664.77	1,697.25
Wallingford	5,408.72	5,421.57	6,212.58	7,109.47	7,058.46	7,196.16
Total	50,986.85	51,107.97	58,564.60	67,019.44	68,762.41	70,048.28
Washington County						
Roxbury	17.39	17.91	20.56	21.85	21.35	21.35
Warren	3,449.95	3,552.57	4,078.78	4,646.83	4,541.33	4,541.44
Total	3,467.34	3,570.48	4,099.34	4,668.68	4,562.68	4,562.79
Windham County						
Dover	3,329.48	3,284.38	3,705.83	4,442.23	4,391.78	4,557.94
Jamaica	755.22	745.14	840.75	1,007.82	996.37	1,034.07
Londonderry	284.51	280.71	316.73	379.67	375.36	389.56
Non-Township/Somerset	6,343.86	6,259.14	7,062.31	8,465.70	8,369.54	8,686.21
Stratton	11,720.90	11,564.37	13,048.32	15,641.22	15,463.55	16,048.62
Wardsboro	2,033.24	2,006.08	2,263.51	2,713.30	2,682.48	2,795.56
Wilmington	1,076.84	1,062.46	1,198.80	1,437.01	1,420.69	1,474.44
Total	25,544.05	25,202.28	28,436.25	34,086.95	33,699.77	34,986.4
Windsor County						
Barnard	18.21	17.90	20.80	20.42	21.95	22.00
Bridgewater	635.89	624.86	726.17	712.97	766.44	768.26
Hartford	128.49	126.26	146.74	144.07	154.87	155.24
Norwich	343.49	337.53	392.26	385.13	414.01	414.99
Pomfret	690.02	678.05	787.99	773.66	831.69	833.65
Rochester	6,010.35	5,906.05	6,863.70	6,738.89	7,244.33	7,261.47
Stockbridge	449.22	441.43	513.00	503.67	541.45	542.73
Weston	4,565.06	4,485.84	5,213.20	5,118.40	5,502.30	5,515.32
Woodstock	105.73	103.89	120.74	118.54	127.44	127.74
Total	12,946.46	12,721.81	14,784.60	14,515.75	15,604.48	15,641.4
Grand Total	246,752.10	230,276.52	285,596.41	311,464.87	317,981.08	317,635.04

Source: <https://www.fs.usda.gov/working-with-us/secure-rural-schools/payments>

Appendix B: Threatened, Endangered and Sensitive Species (Fauna and Flora)

Table B-1 lists federally listed threatened and endangered wildlife species specific to the Green Mountain National Forest per the Endangered Species Act during the fiscal years 2019 to 2024 monitoring period. Table B-2 lists the Green Mountain National Forest 2017 Regional Forester Sensitive Species (fauna and flora). Table B-3 provides the monitoring results and recommended actions for plant species (flora) included on the RFSS list for fiscal years 2019 to 2024.

Table B-1. Wildlife species listed as threatened or endangered under the Endangered Species Act with current or historic occurrence in Vermont and on National Forest System lands.

Scientific Name	Common Name	ESA Status	Status on GMNF
<i>Canis lupus</i>	Gray wolf	Endangered	Historic only
<i>Lynx canadensis</i>	Canada lynx	Threatened	Historic only
<i>Myotis septentrionalis</i>	Northern long-eared bat	Threatened	Current
<i>Myotis sodalis</i>	Indiana bat	Endangered	Current
<i>Perimyotis subflavus</i>	Tri-colored bat ¹	ESA proposed endangered	Current
<i>Puma concolor cougar</i>	Eastern mountain lion	Endangered	Historic only

¹ The U.S. Fish and Wildlife Service proposed to list the tricolored bat as endangered on September 13, 2022.

Table B-2. Fauna and flora species listed on the Regional Forester Sensitive Species List specific to Green Mountain National Forest (scientific name in italics, followed by common name).

MAMMALS			
<i>Lasiurus borealis</i> ¹	Eastern Red Bat	<i>Bombus terricola</i>	Yellow-banded Bumble Bee
<i>Myotis leibii</i>	Eastern Small-footed Myotis	<i>Cicindela ancocisconensis</i>	Appalachian Tiger Beetle
<i>Myotis lucifugus</i>	Little Brown Myotis	<i>Danaus plexippus</i>	Monarch
<i>Perimyotis subflavus</i> ²	Tri-colored Bat	<i>Erora laeta</i> ¹	Early Hairstreak
BIRDS		<i>Lanthus vernalis</i>	Southern Pygmy Clubtail
<i>Antrostomus vociferus</i> ¹	Whip-poor-will	<i>Macropis nuda</i> ¹	Common Loosestrife Oil Bee
<i>Catharus bicknelli</i>	Bicknell's Thrush	<i>Phanogomphus descriptus</i>	Harpoon Clubtail
<i>Euphagus carolinus</i>	Rusty Blackbird	<i>Pieris virginensis</i>	West Virginia White
<i>Falco peregrinus anatum</i>	American Peregrine Falcon	NON-VASCULAR PLANTS	
<i>Gavia immer</i>	Common Loon	<i>Metzgeria crassipilis</i>	A liverwort
AMPHIBIANS		<i>Sphagnum pulchrum</i>	Sphagnum
<i>Ambystoma jeffersonianum</i>	Jefferson Salamander	VASCULAR PLANTS	
<i>Ambystoma laterale</i>	Blue-spotted Salamander	<i>Agalinis paupercula</i> var. <i>paupercula</i> ¹	Small-flower False Foxglove var. <i>paupercula</i>
<i>Hemidactylium scutatum</i>	Four-toed Salamander	<i>Agrostis mertensii</i> ²	Small-flower False Foxglove
REPTILES		<i>Alopecurus aequalis</i> ¹	Short-awn Foxtail
<i>Clemmys guttata</i>	Spotted Turtle	<i>Arabis drummondii</i>	Drummond's Rockcress
<i>Glyptemys insculpta</i>	Wood Turtle	<i>Arceuthobium pusillum</i>	Eastern Dwarf-mistletoe
INVERTEBRATES - BIVALVES		<i>Asclepias exaltata</i>	Poke Milkweed
<i>Alasmidonta varicosa</i>	Brook Floater	<i>Aureolaria flava</i>	Smooth Yellow False Foxglove
<i>Lasmigona compressa</i>	Creek Heelsplitter	<i>Aureolaria pedicularia</i>	Fernleaf Yellow False Foxglove
<i>Margaritifera margaritifera</i> ¹	Eastern Pearlshell	<i>Blephilia hirsuta</i>	Hairy Woodmint
INVERTEBRATES - INSECTS		<i>Botrychium ascendens</i> ¹	Trianglelobe Moonwort
<i>Andrena cornelli</i> ¹	Azalea Mining Bee		

VASCULAR PLANTS	
<i>Botrychium multifidum</i>	Leathery Grapefern
<i>Botrychium oneidense</i>	Bluntlobe Grapefern
<i>Botrychium spathulatum</i> ¹	Spoon-leaf Moonwort
<i>Calamagrostis stricta</i> <i>ssp. inexpansa</i>	New England Northern Reed Grass
<i>Callitriche heterophylla</i>	Twoheaded Water- starwort
<i>Cardamine concatenata</i> ¹	Cutleaf Toothwort
<i>Cardamine maxima</i>	Large Toothwort
<i>Cardamine parviflora</i> <i>var. arenicola</i>	Sand Bittercress
<i>Carex aestivalis</i>	Summer Sedge
<i>Carex aquatilis</i> <i>var.</i> <i>substricta</i>	Calcareous Water Sedge
<i>Carex argyrantha</i>	Hay Sedge
<i>Carex backii</i>	Rocky Mountain Sedge
<i>Carex bigelowii</i>	Bigelow's Sedge
<i>Carex cryptolepis</i>	Northern sedge
<i>Carex foenea</i>	Dryspike Sedge
<i>Carex lenticularis</i>	Shore Sedge
<i>Carex merritt-fernaldii</i> ¹	Merritt Fernald's Sedge
<i>Carex michauxiana</i>	Michaux's Sedge
<i>Carex oligosperma</i>	Fewseed Sedge
<i>Carex schweinitzii</i>	Schweinitz's Sedge
<i>Carex scirpoidea</i>	Bulrush Sedge
<i>Carex wiegandii</i>	Wiegand's Sedge
<i>Carya glabra</i>	Sweet Pignut Hickory
<i>Celastrus scandens</i> ¹	American Bittersweet
<i>Ceratophyllum</i> <i>muricatum australe</i> ²	Prickly Hornwort
<i>Clematis occidentalis</i> <i>var. occidentalis</i>	Purple Clematis
<i>Collinsonia canadensis</i>	Canada Horse-balm
<i>Conopholis americana</i>	American cancer-root
<i>Cryptogramma stelleri</i>	Fragile Rockbrake
<i>Cypripedium</i> <i>parviflorum</i> <i>var.</i> <i>pubescens</i>	Greater Yellow Lady's- slipper
<i>Cypripedium reginae</i>	Showy Lady's-slipper
<i>Cystopteris laurentiana</i> ¹	St. Lawrence Bladderfern
<i>Dactylorhiza viridis</i>	Long-bract Green Orchis
<i>Desmodium</i> <i>paniculatum</i>	Panicleleaf Ticktrefoil
<i>Desmodium perplexum</i>	Perplexed Ticktrefoil
<i>Diplazium pycnocarpon</i>	Glade Fern
<i>Draba arabisans</i>	Rock Whitlow-grass
<i>Dryopteris filix-mas</i>	Male Fern
<i>Eleocharis intermedia</i>	Matted Spikerush
<i>Eleocharis olivacea</i>	Bright Green Spikerush

VASCULAR PLANTS	
<i>Eleocharis ovata</i> ²	Ovate Spikerush
<i>Epilobium palustre</i>	Marsh Willowherb
<i>Equisetum pratense</i> ¹	Meadow Horsetail
<i>Eriophorum tenellum</i>	Rough Cotton-grass
<i>Eurybia radula</i>	Rough Wood-aster
<i>Eutrochium maculatum</i>	Sweet Joe-pyeweed
<i>Galium kamtschaticum</i>	Boreal Bedstraw
<i>Gentianopsis crinita</i> ¹	Fringed Gentian
<i>Glyceria septentrionalis</i>	Floating Mannagrass
<i>Hackelia deflexa</i> <i>var.</i> <i>americana</i>	Northern Stickseed
<i>Helianthus strumosus</i>	Harsh Sunflower
<i>Hieracium venosum</i>	Rattlesnakeweed
<i>Huperzia appalachiana</i> ²	Appalachian Clubmoss
<i>Isoetes lacustris</i>	Western Lake Quillwort
<i>Isoetes viridimontana</i>	A Quillwort
<i>Isotria verticillata</i>	Large Whorled Pogonia
<i>Juglans cinerea</i>	Butternut
<i>Juncus trifidus</i>	Highland Rush
<i>Kalmia latifolia</i> ¹	Mountain Laurel
<i>Lespedeza hirta</i>	Hairy Lespedeza
<i>Lespedeza violacea</i>	Violet Lespedeza
<i>Littorella uniflora</i> (<i>syn =</i> <i>L. americana</i>)	American Shoregrass
<i>Lobelia siphilitica</i>	Great Blue Lobelia
<i>Lonicera hirsuta</i>	Hairy Honeysuckle
<i>Myriophyllum farwellii</i>	Farwell's Water-milfoil
<i>Myriophyllum humile</i>	Low Water-milfoil
<i>Nyssa sylvatica</i>	Blackgum
<i>Panax quinquefolius</i>	American Ginseng
<i>Parathelypteris simulata</i>	Bog Fern
<i>Peltandra virginica</i>	Green Arrow-arum
<i>Phegopteris</i> <i>hexagonoptera</i>	Broad Beechfern
<i>Pinus rigida</i>	Pitch Pine
<i>Platanthera hookeri</i> ¹	Hooker's Orchid
<i>Platanthera hyperborea</i> <i>var. huronensis</i>	Fragrant Green Orchid
<i>Platanthera orbiculata</i>	Lesser Roundleaved Orchid
<i>Platanthera orbiculata</i> <i>var. macrophylla</i>	Large Roundleaf Orchid
<i>Podostemum</i> <i>ceratophyllum</i> ¹	Threadfoot
<i>Polemonium</i> <i>vanbruntiae</i>	Bog Jacob's-ladder
<i>Polygala verticillata</i>	Whorled Milkwort
<i>Potamogeton</i> <i>bicupulatus</i>	Snail-seed Pondweed
<i>Potamogeton</i> <i>confervoides</i>	Algae-like Pondweed

VASCULAR PLANTS	
<i>Potamogeton hillii</i>	Hill's Pondweed
<i>Potentilla arguta</i>	Tall Cinquefoil
<i>Pyrola minor</i> ²	Snowline Wintergreen
<i>Ranunculus pensylvanicus</i>	Pennsylvania Buttercup
<i>Rhodiola rosea</i>	Roseroot Stonecrop
<i>Salix candida</i>	Hoary Willow
<i>Salix pedicellaris</i>	Bog Willow
<i>Sanicula canadensis</i> <i>var. canadensis</i>	Canadian Black- snakeroot var. <i>canadensis</i>
<i>Sanicula trifoliata</i> ¹	Largefruit Blacksnakeroot
<i>Saxifraga paniculata</i>	White Mountain Saxifrage
<i>Scheuchzeria palustris</i> <i>ssp. americana</i>	American Scheuchzeria
<i>Schoenoplectus torreyi</i>	Torrey's Bulrush
<i>Selaginella apoda</i>	Meadow Spike-moss
<i>Selaginella rupestris</i> ²	Ledge Spike-moss
<i>Sisyrinchium angustifolium</i>	Pointed Blue-eyed-grass
<i>Sisyrinchium atlanticum</i>	Eastern Blue-eyed-grass
<i>Solidago patula</i>	Roundleaf Goldenrod
<i>Solidago simplex ssp.</i> <i>randii</i>	Rand's Goldenrod
<i>Solidago squarrosa</i>	Squarrose Goldenrod
<i>Sparganium natans</i>	Small Bur-reed
<i>Stellaria alsine</i>	Bog Chickweed
<i>Symphyotrichum prenanthoides</i> ²	Crooked-stem Aster
<i>Trillium cernuum</i>	Whip-poor-will Flower
<i>Utricularia resupinata</i>	Northeastern Bladderwort
<i>Uvularia perfoliata</i>	Perfoliate Bellwort
<i>Vaccinium uliginosum</i>	Alpine Blueberry
<i>Viburnum rafinesqueanum</i>	Downy Arrow-wood
<i>Woodsia glabella</i>	Smooth Woodsia
¹ Added in 2024	
² Removed in 2024	

Table B-3. Monitoring results for plant species (flora) included on the Regional Forester Sensitive Species list specific to the Green Mountain National Forest for fiscal years 2019 to 2024 (species with an asterisk were added to the list in 2024; species with a superscript are aquatic; species highlighted in yellow have been removed when the list was updated in 2024).

Legend: **NM** = not monitored; **NF**= not found; **ST** = stable; **INC** = increasing; **DEC** = declining; **UNC** = uncertain; **UNK** = unknown; **NA** = not applicable; **PRPH** = Potential rare plant habitat; **NNIP** = non-native invasive plants; **EO** = Element Occurrence; **hx** = historical occurrence (not located in 25+ years)

Species (number of populations in parenthesis)	Monitoring Results by Fiscal Year						Trend	Recommended Action
	2019	2020	2021	2022	2023	2024		
VASCULAR PLANTS								
<i>Agalinis paupercula</i> var. <i>paupercula</i> (=A. <i>paupercula</i>) Smooth agalinis (2)	NM	NM	NM	1 population NF; 1 population DEC (ATV use has damaged habitat)	NM	NM	Declining	Search for NF population; manage ATV traffic; treat NNIP.
<i>Arabis drummondii</i> (=Boechera stricta) Drummond's rock-cress (2)	NM	NM	NM	NM	NM	UNK -2 populations marked-not fully surveyed; 1 population not on NFS land	Unable to assess	Keep on a regular monitoring schedule.
<i>Arceuthobium pusillum</i> Eastern Dwarf-mistletoe (12)	NM	3 populations found: 1 is ST; 2 require re-evaluation	3 new populations found	1 population may be DEC (plants found on fewer spruce trees)	NM	NM	Apparently increasing	Recheck population monitored in 2022 to confirm # of trees; where this parasitic plant occurs; treat NNIP.
<i>Asclepias exaltata</i> Poke milkweed (7)	3 sites monitored	NM	1 population monitored: DEC	1 population monitored: ST	2 sites monitored: 1 ST; 1 NF	2 sites monitored: 1 UNC;1 UNK: population marked-not fully surveyed.	Apparently stable	Monitor deer herbivory; consider opening canopy at some sites; survey sites due for monitoring and compare results to earlier surveys to identify trends.
<i>Aureolaria flava</i> (=Aureolaria flava var. flava) Smooth false-foxglove* (1)	NM	NM	NM	NM	NM	NM	Unable to assess	Keep on a regular monitoring schedule.
<i>Aureolaria pedicularia</i> var. <i>pedicularia</i> Fernleaf yellow false-foxglove (1)	NM	NM	NM	NM	1 population monitored: ST	1 population monitored: ST	Stable	Monitor deer browse at known site; reconfirm species variety.

Species (number of populations in parenthesis)	Monitoring Results by Fiscal Year						Trend	Recommended Action
	2019	2020	2021	2022	2023	2024		
<i>Blephilia hirsuta</i> Hairy woodmint (7)	2 sites monitored, 1 new site found	4 sites monitored: 2 new populations (1 w/ 5 sub-populations); 1 NF; 1 w/2 new sub-populations	1 population relocated after many years; 1 other new sub-population discovered	NM	NM	1 population monitored INC/UNC:	Increasing	Investigate disease, pests, drought at 1 site; monitor deer browse at 1 site.
<i>Botrychium multifidum</i> Leathery grapefern (7)	NM	1 tiny new population found	NM	NM	NM	1 population monitored: ST	Potentially increasing	Check NNIP at one site; seek permission from landowner to monitor.
<i>Botrychium oneidense</i> Blunt-lobed grapefern (3)	1 new sub-population found at 1 site	NM	1 tiny new population found	NM	1 population monitored: ST	1 population monitored; INC; 1 new population found	Potentially Increasing	Visit 1 site earlier to confirm ID.
<i>Calamagrostis stricta ssp. inexpansa</i> New England northern reed grass (1)	NM	NM	NM	NM	1 population monitored: ST	1 population monitored: ST	Stable	Monitor herbivory and drought effects; keep on regular monitoring schedule.
<i>Callitriche heterophylla</i> Large water-starwort (1)	NM	NM	NM	NM	NM	NM	Unable to assess	Site overdue for monitoring.
<i>Cardamine maxima</i> Large toothwort* (4)	1 site visited-maybe smaller	1 new site with 2 sub-populations visited	1 new population found (confirm ID & determine population extent)	NM	NM	NM	Apparently Stable	At 1 site: monitor deer brose and control NNIP; Revisit new population found in 2021: confirm ID and extent of population.
<i>Cardamine parviflora</i> (= <i>C. parviflora</i> var. <i>arenicola</i>) Small-flower bitter-cress (3)	2 sites visited: ST	NM	NM	NM	NM	2 populations monitored: 1 NF; 1 DEC/UNC	Apparently Stable	Educational signs seem to be helping a 1 site; NNIP a concern on private land at another site.
<i>Carex aestivalis</i> Summer sedge (8)	NM	NM	1 new robust population found	New population found (ski area)	NM	NM	Increasing	Control NNIP; keep on regular monitoring schedule.
<i>Carex aquatilis</i> var. <i>substricta</i> Water sedge (3)	1 site visited; potentially abundant, high water prevented up-close inspection	NM	NM	NM	NF	NM	Unable to assess	Confirm ID at EO#18; monitor EO#15 overdue for monitoring.

Species (number of populations in parenthesis)	Monitoring Results by Fiscal Year						Trend	Recommended Action
	2019	2020	2021	2022	2023	2024		
<i>Carex argyrantha</i> Hay sedge (5)	1 new site (sub-population needs ID); 1 hx sub-population relocated; 1 UNC/ may have DEC; 1 site more robust	NM	1 population monitored: ST	NM	1 population DEC; habitat disappearing (succession); may persist in seed bank.	1 population monitored: ST	Stable	Evaluate opening canopy at sites visited in FY18 and FY23; confirm identity at site monitored in FY19.
<i>Carex backii</i> Rocky mountain sedge (6)	NM	NM	NM	1 population monitored: NF	1 population monitored: ST	4 populations monitored: 1 ST; 1 UNC (no field form from prior survey); 2 new populations found	Potentially increasing	Visit NF sites earlier; search for additional sites/sub-populations in PRPH at optimal time; monitor in connection with Escarpment Restoration project.
<i>Carex bigelowii ssp. bigelowii</i> Bigelow sedge (1)	NM	NM	NM	NM	NM	1 population monitored: INC	Increasing	Continue to educate hikers; keep on regular monitoring schedule.
<i>Carex cryptolepis</i> Northeastern sedge (4)	NM	1 new robust site found	NM	NM	NM	NM	Unable to assess	Treat NNIP at 1 site; intentionally survey for species in PRPH.
<i>Carex foenea (=aenea)</i> Bronze sedge (4)	2 sites monitored: 1 NF, 1 DEC	NM	NM	1 population monitored: NF	NM	3 populations: 2 ST; 1 UNC (hx EO NF since 2004); needs full survey	Stable	Do complete survey at hx site relocated in 2024; consider opening canopy at one site; monitor in connection with Escarpment Restoration project.
<i>Carex lenticularis</i> Shore sedge (7)	1 site monitored & additional sub-population found: INC	NM	NM	NM	NM		Apparently stable	1 site needs survey to determine full extent of the EO; 1 site NNIP control, and monitoring of recreational use concerns.
<i>Carex michauxiana</i> Michaux sedge (5)	NM	1 site monitored: 1 new sub-population found, the other 1 DEC	NM	NM	NM	NM	Apparently stable	Survey sites overdue for monitoring; note water level fluctuations impact on populations.
<i>Carex oligosperma</i> Few-seeded sedge (6) *1	1 site monitored NF in 2017, no concerns: ST	NM	NM	NM	NM	NM	Apparently stable	Determine full extent of population monitored in 2019.

Species (number of populations in parenthesis)	Monitoring Results by Fiscal Year						Trend	Recommended Action
	2019	2020	2021	2022	2023	2024		
<i>Carex schweinitzii</i> Schweinitz's sedge (2)	NM	1 site monitored: 7 new sub-populations found	2 populations monitored: ST	NM	NM	NM	Possibly increasing	Monitor/possibly treat NNIP near 2 sub-populations.
<i>Carex scirpoidea</i> Bulrush sedge (1)	1 site monitored: posted signs helping protect pop from rock climbing	NM	NM	NM	NM	NM	Apparently Stable	Continue to monitor rock climbing threats to population.
<i>Carex wiegandii</i> Wiegand's sedge (1)	NM	NM	NM	1 population monitored, possibly INC in size	NM	NM	Stable	keep on a regular monitoring schedule.
<i>Carya glabra</i> Pignut hickory (1)	1 site visited (NF)-visit brief-plants likely still there	NM	NM	NM	NM	NM	Unable to assess	Survey population NF in FY29 to confirm if extant.
<i>Ceratophyllum echinatum</i> Prickly hornwort (1)	1 site visited, not found in past 23 years	NM	NM	NM	NM	NM	NA	None. Believed historical NF (despite searches, since 1996); removed from RFSS list.
<i>Clematis occidentalis</i> var. <i>occidentalis</i> (= <i>verticillaris</i>) Purple clematis (3)	NM	1 site monitored: NF (NF in 26 years)	1 population monitored: NF	NM	1 population monitored: DEC	1 population monitored: UNC	Declining	Consider site NF since 1993 historical; keep other sites on regular monitoring schedule.
<i>Collinsonia canadensis</i> Canada horsebalm (4)	NM	NM	1 population monitored- some plants may be lost due to ditching	NM	1 population monitored: declining	NM	Declining	Revisit site monitored in FY21 to assess if stable
<i>Conopholis americana</i> Squaw-root (5)	NM	NM	1 site monitored & new sub-population found	1 population found: INC; 1 new population found	1 population monitored: ST/INC	NM	Apparently increasing	For new population found, survey greater area to determine extent of population.
<i>Cryptogramma stelleri</i> Steller's cliffbrake (5)	1 site monitored and apparently DEC due to recreational use	1 new robust site found	NM	NM	NM	NM	Potentially stable	Pops visited in previous years vulnerable to drought & recreation use of cave; monitor species more often.

Species (number of populations in parenthesis)	Monitoring Results by Fiscal Year						Trend	Recommended Action
	2019	2020	2021	2022	2023	2024		
<i>Cypripedium parviflorum</i> var. <i>pubescens</i> Large yellow lady's-slipper (9)	3 sites: 1 population NF; 1 population ST (1 sub-population OK; 1 relocated). 1 site found w/2 sub-populations ST	NM	NM	2 populations monitored: increasing	1 population monitored: stable; 1 new sub-population found - increasing	4 pops monitored: 1 slightly decreasing; 1 NF/decreasing; 2 populations UNC	Stable	1 site: control NNIP and consider opening the canopy; revisit population visited in FY22 and search larger area to determine full extent of population.
<i>Cypripedium reginae</i> Showy lady's slipper (7)	2 sites: 1 site found w/sub-population OK; 1 site possibly destroyed by ATV's.	2 new sites found.	NM	1 population monitored: ST	NM	1 population monitored: NF	Stable	Control NNIP at 2 sites.
<i>Dactylorhiza viridis</i> (=Coeloglossum viride) Long-bract green orchis* (4)	1 site monitored: ID needs confirmation	NM	1 tiny new population found	NM	1 population monitored: NF	NM	Unable to assess	Revisit site monitored in 2019 where identity needs confirmation, and survey new population found in 2021.
<i>Desmodium paniculatum</i> Paniculate tick-trefoil (5)	2 populations: 1 w/2 of 7 sub-populations (maybe smaller, but early); 2nd site smaller annual fluctuations)	NM	1 population monitored: ST	1 population monitored: NF	1 population monitored: ST	1 population monitored: ST	Stable	Revisit site where not found in FY22. Consider how to address trampling near edge of trail at another site.
<i>Desmodium perplexum</i> Perplexed tick-trefoil (4)	1 site monitored (2 of 8 sub-populations); few plants but maybe too early in season.	NM	NM	NM	1 population monitored: ST	NM	Apparently stable	Control NNIP at site where this was a concern in a previous year; revisit site where ID confirmation needed.
<i>Diplazium pycnocarpon</i> Glade fern (5)	2 populations monitored: 1 no concern (ST), 1 NF (not found in 10+ years). .	NM	NM	NM	1 population monitored: ST	1 historic population (last found in 1984) relocated	Stable	Complete full survey of historic site relocated in 2024 to determine full extent of the population. Inquire about treating NNIP off NFS land at trail access at a 2nd site.

Species (number of populations in parenthesis)	Monitoring Results by Fiscal Year						Trend	Recommended Action
	2019	2020	2021	2022	2023	2024		
<i>Draba arabisans</i> Rock whitlow-grass (2)	NM	NM	NM	NM	NM	1 population monitored: UNC (needs full survey)	Unable to assess	Revisit site monitored in FY18 where rock too crumbly to get closer & confirm ID; survey site found in 2024.
<i>Dryopteris filix-mas</i> Male fern (5)	1 population monitored: ST	NM	NM	1 population monitored: ST	NM	1 population monitored: ST	Stable	Keep on a regular monitoring schedule; investigate ways to discern the species from its hybrids.
<i>Eleocharis intermedia</i> Matted spikerush (6)	1 site visited: 1 of 3 sub-populations monitored, but too early in season to assess.	2 populations monitored: 1 INC & new site (4 sub-populations) common reed concern; 1 ST	1 site: ST; multiple sub-populations fluctuating with changes in hydro-regime.	NM	2 sites monitored: NF	NM	Possibly increasing	Evaluate new site found in 2020 with NNIP; evaluate controlling NNIP at a 2nd site; Monitor remaining sub-populations at EO#15.
<i>Eleocharis olivacea</i> (=E. <i>flavescens</i> var. <i>olivacea</i>) Capitate spikerush or olive spikerush (1)	NM	NM	NM	NM	1 site monitored: NF	NM	Unable to assess	Survey 1 extant site when water levels are low enough for plants to emerge to evaluate the population.
<i>Eleocharis ovata</i> Ovate spike-rush (12, not all on GMNF)	NM	INC: new populations with 10 sub-populations, some very robust.	NM	1 population relocated; 1 population not relocated but likely still present	1 population monitored: NF	NM	NA	None. Trend was increasing so species was removed from RFSS list.
<i>Epilobium palustre</i> Marsh willow-herb* (8)	INC: 1 new site found note habitat not fully explored	INC: 1 new site found with 2 sub-populations.	NM	1 site monitored: NF (tiny)	NM	NM	Potentially increasing	Re-monitor sites either NF or 1 where habitat was not fully surveyed; control NNIP at 1 site. Intentionally search for in PRPH at peak flowering time.
<i>Equisetum pratense</i> Meadow horsetail (2)	1 new very robust site found	NM	NM	NM	NM	1 population monitored: DEC	Unable to assess	Survey robust site found in 2019 (due for monitoring 2026)
<i>Eriophorum tenellum</i> Rough cotton-grass (4)	NM	1 new population with one stem found.	NM	NM	NM	NM	Unable to assess	Survey the extant 3 populations that are due for monitoring.

Species (number of populations in parenthesis)	Monitoring Results by Fiscal Year						Trend	Recommended Action
	2019	2020	2021	2022	2023	2024		
<i>Eupatorium purpureum</i> Sweet joe-pye weed (4)	3 sites: 1 NF; 1 w/new sub-population found; 1 site all vegetative.	NM	1 population DEC (deer browse concern)	NM	1 site monitored: NF; 1 site monitored but not complete search	NM	Possibly declining	Collect baseline data to track vigor reliably; survey full extent/control NNIP at 1 site; evaluate deer browse 1 site; consider opening canopy 1 site.
<i>Eurybia radula</i> (=Aster r.) Rough-leaved aster (2)	NM	NM	NM	NM	NM	NM	Unable to assess	Survey the 2 extant populations at the most optimal time of year for ID.
<i>Galium kamtschaticum</i> Boreal bedstraw (11)	NM	3 populations monitored: 1 ST; 2 new populations found, one of which is robust.	4 new populations found	1 new population found	NM	NM	Increasing	Eradicate NNIP at 1 site; monitor moose trampling at 1 site.
<i>Glyceria septentrionalis</i> Floating mannagrass (2)	NM	NM	NM	NM	NM	NM	Unable to assess	Prioritize surveying EOID#5307 population at optimal time.
<i>Hackelia deflexa</i> var. <i>americana</i> Northern stickseed (1)	NM	NM	NM	NM	NM	1 population monitored: ST	Stable	Continue to keep on a regular monitoring schedule.
<i>Helianthus strumosus</i> Pale-leaved sunflower (1)	1 population monitored: ST	NM	NM	NM	NM	NM	Unable to assess	Survey extant population and compare findings to 2019 survey.
<i>Hieracium venosum</i> Rattlesnakeweed or rattlesnake hawkweed (3)	2 sites monitored: 1 population NF; 1 population very robust with no concerns.	NM	1 population monitored: NF	1 population monitored: significant DEC	NM	2 populations monitored: 1 continued DEC; 2 UNC (need full survey)	Declining	Evaluate habitat at site robust in 2019 & compare to 2 other sites. Control multiple NNIP at another site. Monitor in connection with the Escarpment Restoration project.
<i>Huperzia appalachiana</i> Appalachian fir-clubmoss (1)	NM	NM	NM	NM	NM	NM	NA	None. Believed historical and removed from RFSS list.
<i>Isoetes lacustris</i> (=I. <i>macrospora</i>) Lake quillwort*a (2)	NM	NM	NM	NM	NM	NM	Unable to assess	Prioritize surveying extant 2 sites overdue for monitoring.
<i>Isoetes viridimontana</i> Green Mountain quillwort*a (1)	NM	NM	NM	NM	NM	NM	Unable to assess	Confer with State of VT to update survey.

Species (number of populations in parenthesis)	Monitoring Results by Fiscal Year						Trend	Recommended Action
	2019	2020	2021	2022	2023	2024		
<i>Isotria verticillata</i> Large whorled pogonia (3)	2 sites:EO#1 more robust after Rx fire; EO#3 continues to increase after selective cut in 2014	NM	NM	1 population monitored outside of RX burn: ST	1 population monitored inside RX burn: ST	1 population monitored inside RX burn: ST	Stable	Monitor sites in relation to disturbance; devise method to reliably quantify sites with multiple sub-populations to ID trend. Address illegal dirt bike trails at EO#1.
<i>Juglans cinerea</i> Butternut (many)	1 new site found with 1 individual.	1 site monitored: NF (no trees found for 26 years).	2 sites monitored: 1 population ST, 1 population NF	3 populations monitored: 1 population ST; 1 population relocated but DEC (diseased); 1 new population found	2 populations monitored: 1 ST; 1 DEC	3 populations monitored: 1 DEC; 1 UNC (needs full survey); 1 new population found	Declining	Species is declining range-wide due to butternut canker, for which we have no known cure; do not prioritize populations for monitoring.
<i>Juncus trifidus</i> Highland rush (1)	1 site: 1 of 3 sub-populations recovering from drought & recreational impacts.	NM	NM	NM	NM	NM	Unable to assess	Overdue for monitoring; survey and compare results to 2019 data. Educational signs seem to be helping. Survey remaining sub-populations.
<i>Lespedeza hirta</i> Hairy bush-clover (2)	1 site monitored: 2 of 7 sub-populations briefly searched and NF	NM	NM	NM	NM	1 population monitored (3 sub-populations): 1 ST, 1 DEC, 1 NF	Possibly declining	Revisit EO#6, search remaining sub-pop locations; monitor in connection with the Escarpment Restoration project.
<i>Lespedeza violacea</i> Violet bush-clover (2)	1 site monitored briefly searched 1 of 2 sub-populations NF	NM	NM	1 site monitored: NF	NM	NM	Possibly declining	Revisit EOID#9882 for a more thorough search; monitor in connection with the Escarpment Restoration project.
<i>Littorella americana</i> (= <i>Plantago Americana</i>, <i>Littorella uniflora</i>) American shore-grass (2)	NM	NM	NM	NM	NM	NM	Unable to assess	Make a priority to survey (both populations overdue for monitoring) and compare results to previous data.

Species (number of populations in parenthesis)	Monitoring Results by Fiscal Year						Trend	Recommended Action
	2019	2020	2021	2022	2023	2024		
<i>Lobelia siphilitica</i> Great blue lobelia (2)	1 site monitored, many ramets found despite NNIP and trampling from anglers: INC	NM	NM	NM	1 small new population found	NM	Increasing	Consider removal from RFSS list at next update. VT has changed species from S1 to S3S4, hence monitoring is less of a priority.
<i>Lonicera hirsuta</i> Hairy honeysuckle* (1)	1 site monitored and flowering has increased due to staff opening canopy.	NM	1 population surveyed - ramet numbers ST from 2018	NM	NM	NM	Stable	Continue to monitor in connection with the Escarpment Restoration project; watch for NNIP and advise trail crews not to cut plants.
<i>Myriophyllum farwellii</i> Farwell's water-milfoil (4)	NM	NM	NM	NM	NM	NM	Unable to assess	Prioritize 3 overdue surveys (EO#20, EO#15; EO#22).
<i>Myriophyllum humile</i> Low water-milfoil a (3)	1 new site found	NM	NM	NM	NM	1 population monitored: INC	Possibly increasing	Survey EO#1 populations and compare data to last surveys to determine if a trend exists across the 3 sites.
<i>Nyssa sylvatica</i> Black gum or Tupelo (2)	NM	NM	NM	NM	NM	NM	Unable to assess	Due for monitoring; compare results to 2018 survey.
<i>Panax quinquefolius</i> Ginseng (many)	5 sites: 1 with single individual; 1 site smaller, all sub-populations not searched; 1 site ST; 2 sites with NNIP.	4 populations :1 NF; 3 new sites found: 1 with 2 genets, 1 with 9 genets, 1 with 7 genets.	2 populations monitored: 1 new; 1 NF	3 populations: 2-small (harvest?); 3 rd w/ 3 separate sites; plants not robust; NNIP a concern all 3 sites.	6 populations monitored: 1 new sub-population; 1 INC, 1 DEC ;1 UNC; 1 ST; 1 NF	3 populations monitored: 1 new sub-population, 1 hx EO (NF since 1995) relocated; 1 new site: UNC	Possibly declining	Treat problem NNIP at sites; survey relocated hx population/determine full extent; Do a full survey of new UNC site.
<i>Parathelypteris simulata</i> (= <i>Thelypteris simulata</i>) Massachusetts Fern (2)	NM	NM	NM	NM	NM	NM	Unable to assess	Both extant sites overdue for monitoring.
<i>Peltandra virginica</i> Green arrow-arum (2)	NM	NM	NM	NM	1 population monitored: ST/INC	NM	Unable to assess	Survey population due for monitoring (EO#9); compare data for both the extant sites over time to identify trend.

Species (number of populations in parenthesis)	Monitoring Results by Fiscal Year						Trend	Recommended Action
	2019	2020	2021	2022	2023	2024		
<i>Phegopteris hexagonoptera</i> (=Thelypteris hexagonoptera) Broad beech fern (4)	1 site: 1 new healthy sub-population found; 1 site: ST; heavy deer browse both sites but not on this sp.	NM	1 population monitored: ST	1 population monitored: INC (abundant/robust)	NM	1 population monitored: UNC	Potentially increasing	EO#16 is due for monitoring: compare results of that survey to previous and do a complete survey of the population marked UNC in 2024.
<i>Pinus rigida</i> Pitch pine (4)	NM	NM	NM	NM	1 population monitored: ST	1 population monitored: UNC	Unable to assess	Continue to monitor in connection with the Escarpment Restoration project.
<i>Platanthera hookeri</i>* Hooker's orchid (1)	NM	NM	NM	NM	NM	NM	Unable to assess	New to RFSS list: intentionally survey for in PRPH.
<i>Platanthera huronensis</i> (=P. hyperborea var. huronensis) Huron orchid* (4)	3 sites: 1 ST; 1 NF (deer herbivory); 1 new sub-population at EO#3.	2 new populations found: 2 genet at EO#2.	NM	NM	NM	NM	Potentially increasing	Monitoring surveys due for all 4 sites; eradicate NNIP at 1 site.
<i>Platanthera orbiculata</i> Round-leaved orchis (12)	1 hx site NF; 3 small new populationss found (1 genet; 4 genets; 5 genets)	NM	NM	NM	1 new population found; 2 populations NF	3 populations monitored: 1 ST/ INC; 2 DEC	Uncertain	Monitor EO#7; Exclosures no longer intact: evaluate their benefit to plants, research better ways to protect them and install new exclosures.
<i>Platanthera orbiculata</i> var. <i>macrophylla</i> (=P. macrophylla) Large roundleaf orchid* (8)	1 new population with one genet; 2 new populations (1 site 1 genet; 1 site 7 genets)	NM	NM	One population relocated: ST but non-reproductive	NM	2 populations monitored: 1 ST; 1 INC	Stable	EO#11 due for monitoring. Exclosure at 1 site no longer intact: evaluate benefit to plants, research ways to protect them, and install new exclosures.
<i>Polemonium vanbruntiae</i> Appalachian Jacob's ladder (many)	2 robust sites monitored: Stable.	3 new sites (all robust); 11 old sites monitored: ST, concerns (over-crowding, climate change, mowing.	3 populations monitored healthy number of plants recorded: ST	3 populations monitored healthy number of plants recorded: ST	2 populations monitored: UNK	NM	Increasing	Decipher extant sites to assess vigor reliably over time. Watch for NNIP; possible road shoulder re-routing at SubEO# 024, formerly EO#005 new site 2.
<i>Polygala verticillata</i> (=P. v. var. v.) Whorled milkwort (1)	NM	NM	NM	NM	NM	NM	Unable to assess	Overdue for monitoring.

Species (number of populations in parenthesis)	Monitoring Results by Fiscal Year						Trend	Recommended Action
	2019	2020	2021	2022	2023	2024		
<i>Potamogeton bicupulatus</i> Snail-seed pondweed (1)	NM	NM	NM	NM	NM	NM	Unable to assess	Overdue for monitoring.
<i>Potamogeton confervoides</i> Tuckerman's pondweed (10)	NM	NM	NM	NM	NM	NM	Unable to assess	7 populations due for monitoring.
<i>Potamogeton hillii</i> Hill's pondweed (1)	NM	NM	NM	NM	NM	NM	Unable to assess	Search intentionally for this species during aquatic plant monitoring surveys.
<i>Potentilla arguta</i> (=Drymocallis a.) Tall cinquefoil* (1)	NM	NM	NM	NM	NM	1 population monitored: possibly DEC/UNC	Unable to assess	Continue to monitor; compare 2024 data with later surveys to assess population vigor over time.
<i>Pyrola minor</i> Lesser wintergreen (2 historical)	NM	NM	NM	NM	NM	NM	NA	None. Believed extirpated and removed from RFSS list.
<i>Ranunculus pensylvanicus</i> Pennsylvania buttercup or bristly crowfoot (3)	NM	1 site monitored: 3 of 5 sub-populations with no concerns.	1 population (4 sub-populations) monitored, apparently ST	1 population monitored, apparently DEC; NNIP a concern	NM	NM	Stable	Population monitored in 2022 was apparently declining: evaluate population status and control NNIP.
<i>Rhodiola</i> (=Sedum) rosea Roseroot stonecrop (1)	1 site monitored with 2 sub-pops: ST	NM	NM	NM	NM	NM	Unable to assess	Compare next survey (due 2026) results to last survey in 2019.
<i>Salix candida</i> Hoary willow (2)	NM	1 new robust site found.	NM	NM	1 site monitored: ST	NM	Unable to assess	Survey due 2027: compare results to 2020 data to identify trend.
<i>Salix pedicellaris</i> Bog Willow (1)	NM	NM	NM	NM	NM	NM	Unable to assess	1 population overdue for monitoring.
<i>Sanicula canadensis</i> var. <i>canadensis</i> Short-styled snakeroot (4)	1 site monitored: NF	NM	1 population monitored: NF	NM	1 population monitored: UNK	NM	Declining	1 site overdue for monitoring.
<i>Saxifraga paniculata</i> (=aizoon) ssp. neogaea White mountain saxifrage (1)	1 site monitored: 1 sub-population (Saxifrage Gully) DEC, 1 sub-population ST	NM	NM	NM	NM	NM	Unable to assess	Survey the site due for monitoring in 2027 and compare findings to 2019 to identify trend.
<i>Scheuchzeria palustris</i> ssp. <i>americana</i> Pod-grass (4)	NM	NM	NM	NM	NM	NM	Unable to assess	All extant populations overdue for monitoring; prioritize population last found in 2013 for survey.

Species (number of populations in parenthesis)	Monitoring Results by Fiscal Year						Trend	Recommended Action
	2019	2020	2021	2022	2023	2024		
<i>Schoenoplectus torreyi</i> (= <i>Scirpus t.</i>) Torrey's bulrush (2)	NM	NM	NM	NM	NM	NM	Unable to assess	Both populations overdue for monitoring.
<i>Selaginella apoda</i> Meadow spike-moss (1)	NM	NM	NM	NM	NM	NM	Unable to assess	Population overdue for monitoring.
<i>Selaginella rupestris</i> Rock spikemoss (3)	NM	NM	NM	NM	NM	1 hx population relocated (NF since 1996) - needs full survey	NA	Taken off RFSS list (sites believed hx). A hx population (NF since 1996) was relocated in 2024-needs full survey. Consider re-adding to next RFSS list.
<i>Sisyrinchium angustifolium</i> Pointed blue-eyed grass (7)	NM	NM	NM	NM	NM	2 populations monitored: 1 DEC; 1 INC	Unable to assess	4 sites overdue for monitoring: survey these and compare findings to previous surveys. Survey site where ID needs confirmation.
<i>Sisyrinchium atlanticum</i> Eastern blue-eyed grass (1)	NM	NM	NM	NM	NM	NM	Unable to assess	Due for monitoring: survey and compare findings to 2015 survey to identify trend.
<i>Solidago patula</i> Roundleaf goldenrod (3)	1 population monitored, invasives threatening.	1 site monitored: NF	NM	1 population monitored: ST	NM	1 population monitored: ST	Stable	Treat NNIP at EOID#3882 & evaluate NNIP.
<i>Solidago simplex ssp. randii</i> var. <i>monticola</i> Rand's goldenrod (5)	1 site monitored: 2 sub-populations surveyed, 1 new sub-population found.	NM	NM	NM	1 population monitored: ST	1 new population found; 1 population monitored: ST	Possibly increasing	EO#7 and EO#9 overdue for monitoring; monitor new population found in 2024 in connection with Escarpment Restoration project.
<i>Solidago squarrosa</i> Stout goldenrod (3)	2 sites monitored: ST	NM	NM	NM	1 population monitored: UNK	1 population monitored: INC	Stable	EO#3 and EOID#33199 due for monitoring. Site surveyed in 2024 is INDC keep this on a monitoring schedule to confirm this trend.
<i>Sparganium natans</i> (=S. <i>minimum</i>) Lesser bur-reeda (1)	NM	NM	NM	NM	NM	NM	Unable to assess	Population is overdue for monitoring; prioritize aquatics survey.

Species (number of populations in parenthesis)	Monitoring Results by Fiscal Year						Trend	Recommended Action
	2019	2020	2021	2022	2023	2024		
<i>Stellaria alsine</i> Bog chickweed (9)	1 site: plants depauperate/ sparsely flowering after local flooding: apparently ST	3 sites: found 1 new healthy population; 1 population ST; 10 sub-populations visited at EO11: ST.	2 populations (9 sub-populations at 1 site): apparently ST, although 1 population affected by roadside work	NM	NM	2 populations monitored: 1 INC; 1 UNC	Stable	Could be increasing; survey sites due for monitoring and compare findings to previous surveys to identify trend.
<i>Symphiotrichum prenanthoides</i> Crooked-stem aster (2)	2 sites monitored: 1 site INC, 1 new large population found.	3 sites: 1 of 7 sub-populations ST; 1 new sub-pop found; 1 new site found.	2 new populations found	NM	NM	NM	NA	None. Trend was increasing so species removed from RFSS list.
<i>Trillium cernuum</i> Nodding trillium or whip-poor-will flower (1)	NM	NM	NM	1 population monitored: ST	NM	1 population monitored: ST	Stable	Remap polygon in NRIS to include 2024 waypoints taken; keep on a regular monitoring schedule.
<i>Utricularia resupinata</i> Northeastern bladderwort (1)	NM	NM	NM	NM	NM	NM	Unable to assess	Site overdue for monitoring; prioritize aquatic plant survey.
<i>Uvularia perfoliata</i> Perfoliate bellwort (1)	1 site monitored: 1 sub-population NF with brief search. 1 sub-population found DEC	NM	NM	NM	NM	NM	Uncertain	Could be potentially declining; site due for monitoring; consider opening the canopy to benefit this species and other nearby RFSS at the site.
<i>Vaccinium uliginosum</i> Alpine bilberry (1)	NM	1 new plant found at only known site	NM	NM	1 population monitored: ST	1 population monitored: ST	Stable	Continue to keep on a regular monitoring schedule.
<i>Viburnum rafinesquianum</i> (= <i>V. r.</i> var. <i>r.</i>) Downy arrowwood (3)	1 site monitored, NF since 2004.	NM	NM	NM	NM	NM	Unable to assess	Sites due for monitoring. Monitor in connection with the Escarpment Restoration project.
<i>Woodsia glabella</i> Smooth woodsia (1)	Monitored, vulnerable to damage from rockfall, but less damage by climbers.	NM	NM	NM	NM	NM	Unable to assess	Site due for monitoring; note species has been found near NF land; survey this site in connection with Escarpment Restoration project.

NONVASCULAR PLANTS

Species (number of populations in parenthesis)	Monitoring Results by Fiscal Year						Trend	Recommended Action
	2019	2020	2021	2022	2023	2024		
<i>Metzgeria crassipilis</i> a liverwort (1)	NM	NM	NM	NM	NM	NM	Unable to assess	Site due for monitoring; reconfirm ID.
<i>Sphagnum pulchrum</i> Sphagnum (2)	1 robust site monitored, needs more extensive survey; confirm ID	NM	NM	NM	NM	NM	Unable to assess	Both populations due for monitoring; confirm ID at 1 site; intentionally search for this moss when doing aquatic surveys where there is PRPH.

Appendix C: Rare or Uncommon Natural Communities

Table C-1 shows the rare or uncommon natural communities recognized as significant as listed in the Green Mountain National Forest - Land and Resource Management Plan (Forest Plan) Final Environmental Impact Statement, Table 3.11-6.

Table C-1. Rare or uncommon natural communities that are recognized as significant.

Site Name	Management Area Designation
Manchester Ranger District	
1. Beebe Pond	Ecological Special Area
2. Big Branch	Wilderness
3. Big Mud Pond	Wilderness
4. Bourn Pond	Wilderness
5. Branch Pond	Ecological Special Area
6. Colebrook Trail Swamp	Escarpment
7. Devil's Den	White Rocks National Recreation Area
8. Downer Glen	Wilderness
9. Fifield Pond	White Rocks National Recreation Area
10. French Hollow	Ecological Special Area
11. Glastenbury Mountain	Wilderness Study Area
12. Green Mountain Ridge	White Rocks National Recreation Area
13. Griffith Lake	White Rocks National Recreation Area
14. Grout Pond	Ecological Special Area
15. Little Mud Pond	Wilderness
16. Little Pond	Wilderness Study Area
17. Little Rock Pond	White Rocks National Recreation Area
18. Lost Pond Bog	Wilderness
19. Lye Brook Headwaters	Remote Backcountry
20. Lye Brook Ledge	Wilderness
21. McGinn Brook	Wilderness
22. Moses Pond	Diverse Forest Use
23. Mt. Tabor Work Center Swamp	Ecological Special Area
24. Peabody Hill	Ecological Special Area
25. Somerset Fen	Ecological Special Area
26. Stamford Meadows	Ecological Special Area
27. Stamford Stream Wetland Complex	Ecological Special Area
28. Stratton Mountain	Ecological Special Area
29. The Burning	Wilderness
30. Thendara Camp Fen	Ecological Special Area
31. Wallingford Pond	White Rocks NRA
32. West of Mt. Tabor	Wilderness
33. West River Headwater Cove	Diverse Forest Use

Site Name	Management Area Designation
34. White Rocks	White Rocks National Recreation Area
35. Winhall River Headwater Flowage	Wilderness/Remote Backcountry
Rochester and Middlebury Ranger Districts	
36. Beaver Meadows and Abbey Pond	Ecological Special Area
37. Blue Ridge Fen	Candidate Research Natural Area
38. Breadloaf Mountain	Wilderness
39. Bristol Cliffs	Wilderness/Escarpment
40. Bryant Mountain	Escarpment
41. Bryant Mountain Hollow	Ecological Special Area
42. Burnt Mountain	Escarpment
43. Chandler Ridge	Escarpment
44. Crystal Brook Glacial Kettle	Wilderness
45. Dutton Brook Swamp	Ecological Special Area
46. Elephant Mountain	Ecological Special Area
47. Gilmore Pond	Wilderness
48. Hat Crown/Silent Cliff	Wilderness
49. Leicester Hollow	Eligible Scenic River
50. Lincoln Ridge	Alpine Subalpine Special Area
51. Middlebury Gap	Wilderness Study Area
52. Monastery Mountain	Wilderness Study Area
53. Mount Abraham	Alpine Subalpine Special Area
54. Mount Moosalamoo	Escarpment
55. Mt. Horrid	Candidate Research Natural Area
56. Mt. Roosevelt to Mt. Wilson	Wilderness
57. North Pond	Diverse Backcountry Forest
58. Rattlesnake Point	Ecological Special Area
59. Skylight Pond	Wilderness
60. Texas Falls	Ecological Special Area
61. The Cape	Research Natural Area