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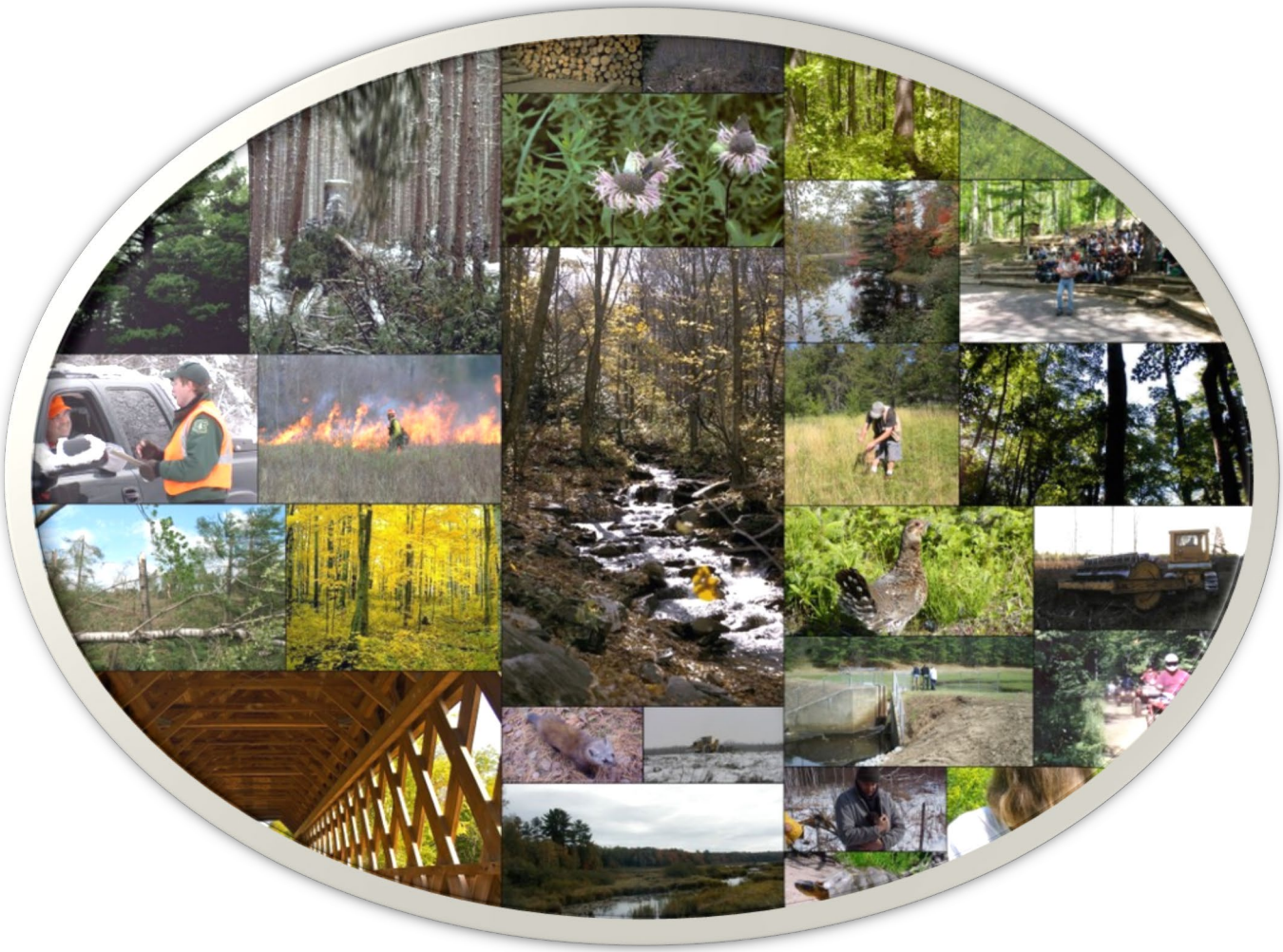
Chequamegon-Nicolet National Forests Land and Resource Management Plan

Monitoring and Evaluation Report: 2016 - 2017



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Executive Summary of Findings and Opportunities

This report presents findings from 25 monitoring items or questions for the 2016-2017 biennium and summarizes them in Table ES-1 below.

In total, the Forest examined 25 monitoring items. Generally speaking, 17 questions suggest that indicators are trending or progressing in the desired direction of Forest Plan desired conditions. Eight of the evaluations were inconclusive because data collected was not adequate to answer the questions.

If the evaluation was uncertain, the questions were grouped into three categories, including (A) interval of data collection is beyond this reporting cycle, (B) more time/data are needed to understand status or progress of the plan component, or (C) methods/results are inadequate to answer monitoring question. Below is the table that summarizes these findings.

The report also identified some gaps between desired future conditions for some natural resources. These included gaps between current and desired watershed conditions influenced by current flood events, gaps between current and desired tree species composition and in age class distributions for some forest communities and the need for more data to better understand trends in sensitive plants and animals populations.

The Forest will continue to implement projects to close these gaps and will continue to monitor the success of these efforts. The summary of findings and recommendations identified in the monitoring report are located in Table ES-1 boxes for each monitoring question in the report.

The 2016-2017 monitoring and evaluation report identifies a need to further assess and amend some monitoring questions to ensure that they remain relevant and useful for measuring management effectiveness and progress toward achieving or maintaining the Forest's desired future conditions. The next biennial monitoring and evaluation reporting period will include monitoring results for fiscal years 2018 and 2019.

Table ES-1. Summary of Suggestions for Forest Plan, management activities, assessment, monitoring, or other operations)

Monitoring Question #	Notes	Do monitoring results demonstrate intended progress or trend toward Forest Plan desired condition?*	Based on the evaluation of monitoring results, may changes be warranted?	If a change is warranted, where could it be needed? ‡
1) Sediment control and watershed improvement	-	Yes	Yes	Monitoring Program
2) Roads and trails located within Riparian Management Zones	-	Yes	No	-
3) Stream and lake habitats	-	Yes	No	-
4) Desired vegetation community condition	-	Yes	Yes	Monitoring Program
5) Coldwater stream communities (brook trout)	-	Yes	Yes	Monitoring Program
6) Threatened, Endangered, and Regional Forester's Sensitive Species	-	Uncertain (B & C)	Yes	Monitoring Program
7) Semi-primitive Non-motorized areas	-	Yes	Yes	Monitoring Program
8) ATV/UTV trail construction	–	Yes	Yes	Monitoring Program
9) Developed campgrounds	-	Yes	No	-
10) Remote campsites	Little data; capacity shortfall.	Uncertain (B)	Yes	Monitoring Program
11) 25-mile 4WD ORV trail	-	Yes	No	-
12) Wilderness and potential wilderness	-	Uncertain (B)	No	-
13) Non-native invasive species	-	Uncertain (B & C)	Yes	Monitoring Program
14) Weather, insect outbreaks, and disease disturbance events	-	Yes	NO	-
15) Prescribed burning effects on Class 1 and 2 air sheds	-	Yes	Yes	Monitoring Program
16) Heritage resources	-	Uncertain (C)	Yes	Monitoring Program
17) Forest products and harvest level sustainability	-	Uncertain (C)	Yes	Monitoring Program; Management Practices
18) Demand for mineral resources and environmental soundness	-	Yes	No	-
19) Hazardous fuels and communities at risk	-	Yes	Yes	Monitoring Program
20) Tribal Memorandum of Understanding	-	Uncertain (B)	No	-
21) Road densities	-	Yes	No	-

Monitoring Question #	Notes	Do monitoring results demonstrate intended progress or trend toward Forest Plan desired condition?*	Based on the evaluation of monitoring results, may changes be warranted?	If a change is warranted, where could it be needed? ‡
22) Land ownership patterns	-	Yes	No	-
23) Soil productivity	-	Yes	No	-
24) Impacts from off-road and off-trail motorized use	-	Uncertain (C)	Yes	Monitoring Program
25) Resource impacts from 4WD ORV trail	-	Yes	Yes	Monitoring Program

* If uncertain, interval of data collection is beyond this reporting cycle (A); or more time/data are needed to understand status or progress of the plan component (B); or methods/results are inadequate to answer monitoring question (C).
‡ see body of the report for more details regarding any specific suggestions/recommendations for change.

Introduction

Purpose

The purpose of this monitoring and evaluation report is to help inform a decision about whether or not a change is needed in direction or monitoring strategy outlined in the Chequamegon-Nicolet National Forests Land and Resources Management Plan (henceforth known as the Forest Plan). This monitoring and evaluation report represents one part of the Chequamegon-Nicolet National Forest's (referred to as the "Forest" henceforth) overall monitoring program. This biennial report is not a decision document—it evaluates the answers to monitoring questions and the values of indicators presented in the Monitoring and Evaluation Plan (Chapter 4 of the Forest Plan) to determine the effectiveness of management actions carried out in the plan area. Monitoring and evaluation are continuous learning tools that form the backbone of adaptive management. For this reason, the Forest will produce an evaluation report every two years. This document fulfills the requirements of 36 CFR 219.12 and serves as the Monitoring and Evaluation Report for the Forest's Fiscal Years (FY) 2016 and 2017. This and past Forest monitoring and evaluation reports are available on the Forest's planning web page: https://www.fs.usda.gov/main/cnnf/landmanagement/planning.

Objectives

This report has the following objectives:

- Assess the current conditions and trends of selected forest resources.
- Document implementation of the Forest Plan monitoring strategy to assess accomplishments and progress toward achievement of the selected Forest Plan components.
- Evaluate relevant assumptions, changed conditions, management effectiveness, and progress towards achieving objectives and selected desired conditions described in the Forest Plan.
- Document scheduled monitoring actions that have not been completed and the reasons and rationale for why they have not.
- Present any new information not outlined in the current plan monitoring program that is relevant to the evaluation of the selected monitoring questions.
- Present recommended Forest Plan direction or monitoring strategy changes to the responsible official.

How to use the report?

This report is a tool to assess the condition of forest resources in relation to Forest Plan direction and management actions. It is also a tool for the public to learn more about how the Forest Service is managing forest resources. The goal is to use the results of this and subsequent reports to identify potential changes to Forest Plan direction that will move the Forest towards the desired conditions as outlined in the Forest Plan. Further, the report will help identify potential changes to the monitoring strategy that will improve the adaptive management process by tying questions closer to Forest Plan direction and ensuring the continued feasibility of the monitoring program.

This monitoring and evaluation report is designed to inform the public, as well as federal, state, local government, and Tribal entities, about the overall monitoring program. It also serves to connect past and future monitoring reports to gain a better understanding of the resource trends on the Forest.

Public Participation

The Forest informed the public of the availability of the 2016-2017 monitoring report in May 2019, through letter and by posting on the Forest's website.

About the Forest Monitoring Program

Regulation changes and the Comparison of the 2011 and 2016-2017 reports

The process for the development and revision of existing forest plans, along with the required content of those plans, is outlined in the planning regulations, often referred to as the Planning Rule (36 Code of Regulations [CFR] 219). The current Planning Rule became effective May 9, 2012, and included direction on how each National Forest should create and implement a forest-wide monitoring program.

The Forest's previous monitoring program, outlined in Chapter 4 of the 2004 Forest Plan, was developed under the 1982 Planning Rule. This program was recently updated with the new 2012 Planning Rule; this update process was referred to as the Monitoring Transition, which occurred in 2017 for the Forest.

Current 2012 direction for the monitoring and evaluation of forest plans is designed to answer these questions:

- **Did we do what we said we were going to do?** This question answers how well the direction in the Forest Plan is being implemented. Collected monitoring information is compared to Forest Plan Objectives, Standards, Guidelines, and Management Area direction.
- **Did it work how we said it would?** This question answers whether the application of standards and guidelines is achieving objectives, and whether objectives are achieving goals.
- **Is our understanding and science correct?** This question answers whether the assumptions and predicted effects used to formulate the goals and objectives are valid.

The Chequamegon-Nicolet National Forest monitoring transition focus was to comply with the new 2012 rule requirements and update monitoring questions and associated indicators to better measure management effectiveness and progress toward achieving or maintaining the Forest Plan's desired conditions and objectives. This transition updated the Forest Plan's Chapter 4 (Monitoring Plan) with monitoring questions that took into account, at the time, capacity constraints, data constraints and duplication. Specifically, monitoring questions and indicators were reviewed and selected to inform the management of Forest resources. Not every Forest Plan component was determined necessary to monitor or track [36 CFR 219.12(a)(2)]. See the Rationale for Change tables for how the monitoring questions were selected and are consistent with the 2012 Planning Rule regulations at 36 CFR 219.12. You can find these tables at https://www.fs.usda.gov/Internet/FSE_DOCUMENTS/fseprd542066.pdf.

In addition to the monitoring program update, the 2012 Planning Rule requires National Forests to produce biennial monitoring and evaluation reports. This document is the first Chequamegon-Nicolet National Forest biennial monitoring and evaluation report under the 2012 Planning Rule and the Forest's revised monitoring questions.

As past public notices on the Forest's website have outlined, this monitoring report was intended to be completed much closer to the adoption of the 2012 Planning Rule. This monitoring report mitigates the effects of this reporting lag by displaying pertinent data from the years 2012-2017 when available. By

doing this, possible trends in data are available to evaluate the years in which the Forest did not have a monitoring and evaluation report published.

As referenced above, the last public monitoring report was the Fiscal Year 2011 Monitoring and Evaluation Report, finalized in November 2012. The 2011 report concluded that:

- Fiscal Year 2011 on the Chequamegon-Nicolet National Forest did not present some of the unpredictable events that affected delivery of Forest programs in prior years. Restocking of forested stands from which timber was harvested remained highly successful. Relative to the previous years, little blowdown or insect and disease outbreaks affecting National Forest lands occurred and salvage of wood products from events from previous years was largely complete. The actual outputs and services provided by the Forest remained well below those projected during development of the Forest Plan, but those deficits corresponded to lower-than-projected funding levels.
- Population trends of federally listed species, management indicator species, and Regional Forester Sensitive Species continued as expected and described in previous reports. Restoration of aquatic habitats, including lake habitats and road and trail stream crossings continued in 2011 at similar levels to the previous two years. Discoveries of infestations of invasive plant species continued to decline consistent with the trend since 2007. Similar amounts of acres were treated to control non-native plant infestations in 2011 when compared to previous years.
- Construction and designation of riding opportunities for All-Terrain Vehicles continued at a slow pace, consistent with the cautious approach described in the Record of Decision for the 2004 Forest Plan. In 2011, the Forest participated in the National Visitor Use Monitoring program that documented that the majority of visitors to the Forest are from Wisconsin. They come to the Forest to hunt, snowmobile, sightsee, camp and fish and are very satisfied with their visit.

In summary, the 2011 report outlined that there was no concerns with the management direction provided in the Forest Plan; thus, no significant Forest Plan amendments were recommended.

Monitoring Results for 2016-2017

The 2011 Monitoring and Evaluation Report was organized by required Forest Plan goals and objectives, and visitor use monitoring. This 2016-2017 monitoring report is organized differently, incorporating the updated monitoring questions and indicators and the organization brought forward from the 2012 Planning Rule.

There are eight sections of monitoring results (watershed condition, ecological condition, focal species, species of concern, recreation, climate change, desired future conditions, and land productivity) that correspond to the eight monitoring elements identified in the 2012 Planning Rule. These sections are not listed in any particular order. In this report, each section is numerically indexed (e.g., the watershed condition section is labeled with a "1," indicating the monitoring element from the Forest Plan). Each report section includes subsections for each relevant monitoring question. Each subsection is numerically indexed, indicating the monitoring question number (e.g. in the ecological subsection 2-*3*, this subsection discusses monitoring question number *3*). There are 25 monitoring questions.

The content of the 25 monitoring questions is organized under the following headings:

Monitoring Indicator(s) and Frequency: Description of what is being monitored and how often the indicator is measured.

Background and Driver(s): Description of the objective to be met.

Monitoring Indicator *X* Results and Discussion: Evaluation of progress toward implementing Forest Plan direction, based on the results above for indicator *X*.

Monitoring Question Summary Finding and Recommendations (if any): Summary of the findings and possible Forest Plan recommendations to consider going forward.

Evaluation of Monitoring Question and Indicator(s): Recommendations on improving the monitoring question and/or indicator(s).

Notable References: Specific notable references for the monitoring question. References are supplemental and external in nature and are intended to provide clarification to the documented results. The absence of references does not imply that references are purposely omitted; therefore, the 2004 Forest Plan, Final Environmental Impact Statement (EIS), and Record of Decision (ROD), and Forest Service Policy (Forest Service Manuals and Handbooks) are implied and are not specifically cited in this report.

1 – Watershed Conditions

1-1 Monitoring Question 1: What is the current status of sediment control and watershed improvement projects?

Monitoring Indicators and Frequency:
(1) Number of sediment control projects accomplished, including: road and trail stream crossing improvements, road and trail stream crossing eliminations, and fish passage improvements. Monitored annually.
(2) Miles of streams reconnected. Monitored annually.
(3) Number of watershed restoration projects. Monitored annually.

Background and Drivers: Question 1 and its associated indicators (1-3) address Planning Rule Topic 1 (watershed conditions) within 36 CFR 219.12(a)(5)(i). The Forest plan provides direction for road/trail stream crossings and roads and trails within riparian areas and wetlands through goals, objectives, standards, and guidelines. As part of Goal 1.3 for Aquatic Ecosystems, the Forest Plan directs management to provide for ecologically healthy streams, riparian areas, lakes and wetlands. Specifically, Objective 1.3a is addressed by the monitoring indicators.

> Objective 1.3a: Reduce the number of road and trail stream crossings. Reduce sedimentation and improve fish passage in existing road and trail stream crossings.

The total number of watershed improvement projects, road stream crossings replaced or removed or number of trail/road segments reconstructed provides the unit of measure to affectively demonstrate

how the Forest is addressing the aquatic ecosystems Forest Plan goal. The total number of stream miles reconnected demonstrates improvements to aquatic organism passage.

Monitoring Indicator 1 Results and Discussion: Individual road and trail stream crossing replacement project information for the 2015-17 reporting period is included in Appendix A. Annual summaries dating back to 2004 are plotted in Figure 1 below.

Sixty-seven stream crossing replacements/improvements were constructed during the last seven years. Undersized culverts were replaced with more appropriately sized, and structures were placed to ensure passage of aquatic organisms (e.g. fish, mussels, other aquatic invertebrates), restore channel morphology, reduce erosion and sedimentation, improve safety of roads and trails, and reduce maintenance costs and needs. The annual rate of project completion varies due to funding sources, site complexity, and overall project costs. Some road-stream crossing replacement structures can be more expensive when compared to others, affecting the total number of crossings replaced.

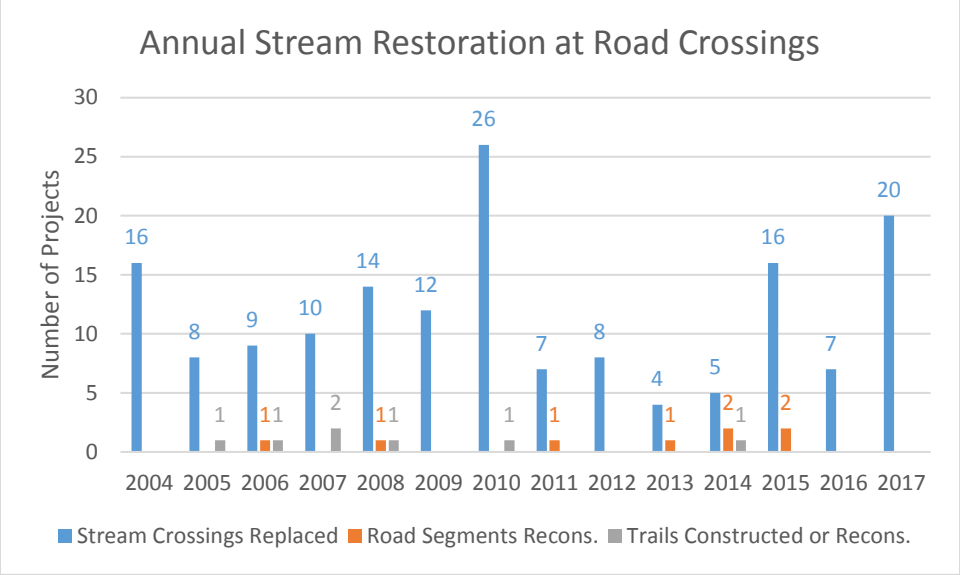

Figure 1. Annual stream crossing improvements from 2004-2017 on Forest.
Source: Watershed Improvement Tracking (WIT) database, Forest internal Hydrology database

Since 2010, the Forest has received funding through the Great Lakes Restoration Initiative. This funding is only for projects located within the Great Lakes watersheds thus limiting the location of project implementation. In addition, the Forest also received special funding from 2014 to 2016 as part of the Natural Resources Conservation Service/Forest Service Joint Chief's Landscape Restoration Partnership. This special initiative provided funding for projects located within the Lake Superior watershed (parts of Ashland and Bayfield Counties) where a number of road-stream crossing replacements were completed. In 2017, the Forest entered into an agreement with Trout Unlimited (TU) to collaborate on road-stream crossing replacement projects. Because of this partnership, 20 road-stream crossing replacements were completed in 2017.

These results show that the Forest is achieving Objective 1.3a, reducing or improving road stream crossings, which reduce sedimentation and increase fish passage ability. Several road and trail segments

have been reconstructed since 2011 to help reduce erosion, and two stream crossings were removed. No new road stream crossings were constructed.

Monitoring Indicator 2 Results and Discussion: Individual road and trail stream crossing replacement project information for 2015 through 2017 is included in Appendix A, which has been summarized in the chart below. Equivalent data are not available from the 2009-2010 monitoring report or from sites constructed in 2011-2014.

A total of 93.8 miles of stream habitat have been reconnected over the last three years through road and trail-stream crossing improvements. The annual rate of stream reconnection averages 31.3 miles, but varies each year based on the individual projects accomplished. These projects are meeting the intent of Objective 1.3a to improve fish passage in existing road and trail stream crossings.

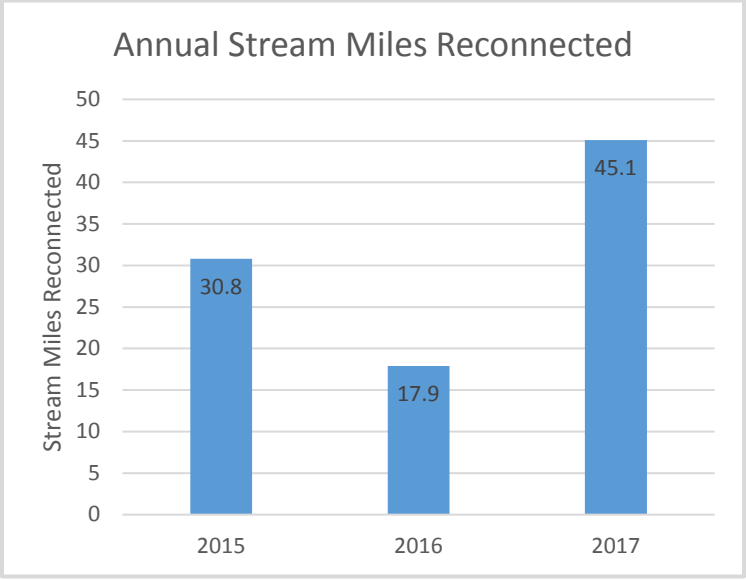

Figure 2. Stream miles reconnected by stream crossing replacement projects in 2015-17 on Forest.
Source: Watershed Improvement Tracking (WIT) database, Forest internal Hydrology database

Monitoring Indicator 3 Results and Discussion: Individual watershed restoration project information from 2011-17 is included in Appendix A, which has been summarized in the chart below. Equivalent data are not available for earlier years.

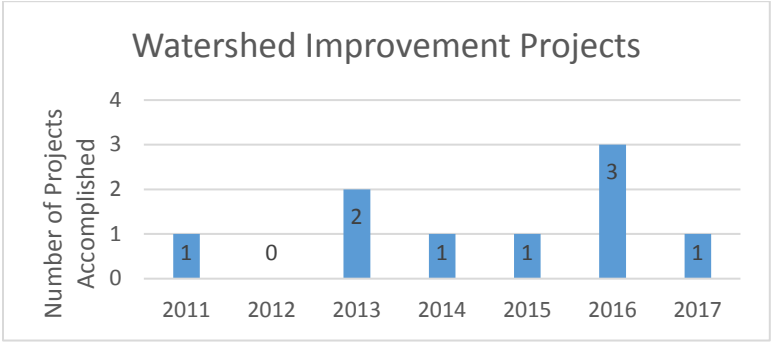

Figure 3. Watershed improvement projects completed from 2011-17 on CNNF.
Source: Watershed Improvement Tracking (WIT) database, Forest internal Hydrology database

Nine watershed improvement projects have been implemented in the last seven years. These projects included creek crossing removals, trail restorations, trail relocation, dam removals, and impoundment removal. Of these nine, three of these sites were monitored for best management practices (BMP) implementation and effectiveness during and after construction. The overall monitoring results were highly favorable to resource protection. These watershed restoration projects are not specifically associated with road or trail stream crossings, but also support Forest Plan Goal 1.3 to provide for ecologically healthy streams, riparian areas, lakes and wetlands, and serve to improve fish passage.

1-1 Summary of Findings and Recommendation: Watershed improvement projects are meeting Forest Plan Objective 1.3a and supporting Goal 1.3. The Forest is relocating trails and roads in problematic areas to new locations that reduce sedimentation at road-stream crossings. In fiscal years 2011 through 2017, 67 road and trail stream crossings were replaced, reducing sediment inputs and in that same period nine watershed improvement projects, which are not associated with road or trail stream crossings, were completed. From FY2014-2017, the Forest reconnected 93.8 miles of stream habitat for aquatic organism passage.

There are hundreds of road-stream crossings needing improvement work as well as other watershed improvements. Additionally, the episodic rainfall events of July 2016 and June 2018 primarily on CNNF lands in Ashland, Bayfield, and Sawyer Counties have created numerous and substantial watershed problems. The gap between existing conditions and desired future conditions remains large. The Forest will continue efforts to improve watershed conditions per Forest Plan direction.

1-1 Evaluation of Monitoring Question and Indicators: The indicators are inter-related and could be simplified and still answer the monitoring question. For example, the first indicator (Number of sediment control projects accomplished, including: road and trail stream crossing improvements, road and trail stream crossing eliminations, and fish passage improvements) addresses the monitoring question and the Forest Plan objective; this may be the only indicator needed for this monitoring question.

In addition, subsets of these sites are evaluated for project implementation and effectiveness of BMP related to water quality. On average 2-5 projects/year are monitored using the Forest Service national core BMP monitoring protocols completed as part of the Forest Service national BMP program. Based on monitoring results each site is given a composite score to document BMP performance. These site evaluations could provide valuable information for implementation and effectiveness monitoring on the Forest and may warrant amending the current monitoring question.

1-1 Notable References: Forest's Watershed Improvement Tracking (WIT) database

1-2 Monitoring Question 2: To what extent are roads and trails located within Riparian Management Zones?

Monitoring Indicators and Frequency:
(1) Miles of roads and trails in Riparian Management Zones (RMZ). Monitored annually.
(2) Miles of roads and trails relocated outside of RMZ or reconstructed inside RMZs. Monitored annually.

Background and Drivers: Question 2 and its associated indicator address Planning Rule Topic 1 (watershed conditions) within 36 CFR 219.12(a)(5)(i). The Forest Plan provides management direction for roads and trails within riparian areas through goals, objectives, standards and guidelines. As part of Goal 1.3 for Aquatic Ecosystems, the Forest Plan directs management to provide for ecologically healthy streams, riparian areas, lakes and wetlands. Specifically, Objective 1.3d is addressed by this monitoring question.

> Objective 1.3d: Relocate some existing roads and trails out of RMZs. Where relocation is not feasible, reconstruct road and trail segments as needed to minimize erosion, sedimentation and hydrologic impacts.

Due to the Objective 1.3d wording in the Forest Plan, the miles of road and trails annually relocated outside the RMZs or reconstructed inside RMZs provides the unit of measure to effectively demonstrate how the Forest is addressing the related objectives.

Monitoring Indicator 1 and 2 Results and Discussion: During analysis for the Travel Management Rule in 2008, the Forest found 160 miles of roads and trails located within RMZs, as reported in the last published monitoring report. Supplying some context, the Forest has over 6,000 miles of open Forest Service roads (Forest Plan FEIS). The 160 miles of identified roads in RMZ include 74 miles of roads managed for travel in passenger cars; 64 miles of roads that are either closed to motorized traffic or suitable for only high clearance vehicles; and 22 miles of trails.

Since 2011, six road and trail segments were reconstructed within RMZs, totaling 2.06 miles. Great Divide Ranger District has planned and/or not fully completed many road and trail reconstruction projects in response to the damage cause by severe flooding in 2016. Many roads within RMZs are scheduled for obliteration or reconditioning because of this natural disaster. More detailed implementation data should be known for the next monitoring and evaluation report concerning this road-impacting disaster.

Most commonly, roads and trails within the RMZs are examined for restoration when there is a vegetation management activity nearby. As part of the analysis process for large vegetation management projects, all roads within the project area are evaluated to determine the need for decommissioning or reconstructing. This allows needed resources and analysis to occur in order to allow decommissioning or the reconstruction of roads and trails. Because of this, the pace of RMZ restoration or road and trail decommissioning or reconstruction occurs at a gradual pace where the most needed areas may not be the first addressed. However, this monitoring shows that implementation is achieving Forest Plan Objective 1.3d by reducing road and trail miles in RMZs.

In addition, roads negatively affecting watershed condition are addressed when brought to the Forest's attention. Some of these sections of road may cross through or lie directly within RMZs where erosion problems are evident. Due to the increased frequency of intense rain events over the past few years, substantial erosion problems (including the roadbed) have been occurring in RMZs. These are typically localized events where evaluation does not occur immediately after the event. For example, the Great Divide Ranger District experienced a large flood in 2016, where many road stream crossings washed out and created large craters in the road profile, creating impassable sections of roads.

1-2 Summary of Findings and Recommendation: Roads and trails within the RMZ continue to be removed or reconstructed to minimize erosion, sedimentation, and hydrologic impacts, consistent with Objective 1.3d. Specifically, there are 160 miles of roads and trails in RMZs and six road and trail segments (since 2011) that were reconstructed within RMZs, totaling 2.06 miles.

The quantity and timing of RMZ road projects are variable based on the extent that other vegetation projects intersect with RMZs. Many miles of roads within RMZs are scheduled for obliteration or reconditioning as a result of the 2016 flooding event on the Great Divide Ranger District. Districts on the Forest continue to remove or restore roads and/or trails within RMZs, adding stability to a trend toward Forest Plan objective attainment.

1-2 Evaluation of Monitoring Question and Indicators: Question and indicators seem to be appropriate measures of this resource because they are reasonably attainable, measureable, and outlined in our Forest Plan.

2 – Ecological Conditions

2-3 – Monitoring Question 3: What is the current status of stream and lake habitats?

Monitoring Indicators and Frequency:
(1) Miles of streams improved or restored. Monitored annually.
(2) Acres of lakes improved or restored. Monitored annually.
(3) Watershed Condition Framework scores for selected watersheds. Monitored annually.

Background and Drivers: Question 3 and its associated indicators address Planning Rule Topic 2 (ecological conditions) within 36 CFR 219.12(a)(5)(ii). The Forest plan provides direction for fisheries and aquatic habitat through goals, objectives, standards and guidelines. As part of Goal 1.3 for Aquatic Ecosystems, the Forest Plan directs us to provide for ecologically healthy streams, riparian areas, lakes and wetlands. Specifically, Objective 1.3e provides the monitoring indicators for this question.

Objective 1.3e – Improve or restore aquatic/riparian habitat in streams and lakes.

The total stream miles improved and lake acres improved provides the unit of measure to indicate how the Forest is addressing the aquatic ecosystem Forest Plan goal.

The Forest has two priority watersheds that were selected using the Watershed Condition Framework (WCF): Headwaters of Marengo and Twenty Mile (Ashland and Bayfield Counties). The WCF is a nationally developed methodology for reporting watershed condition that integrates current scientific understanding of watershed function and professional judgement into a core set of 12 watershed condition "indicators" (Forest Service 2011). Both of the Forests priority watersheds were rated as Class 2 (Functioning at Risk) during initial evaluation in 2011. Projects targeted for these priority watersheds are intended to improve the WCF scores with a goal of achieving classifications of Class 1 (Functioning Properly). The current WCF classification for the priority watershed serves as a measure of whether the actions are improving the watershed conditions. This classification includes outlining the watershed's condition, prioritizes restoration, develops watershed restoration action plans, outlines the implementation of integrated projects, tracks restoration accomplishments, and monitors and verifies the outcomes.

Monitoring Indicator 1 Results and Discussion:

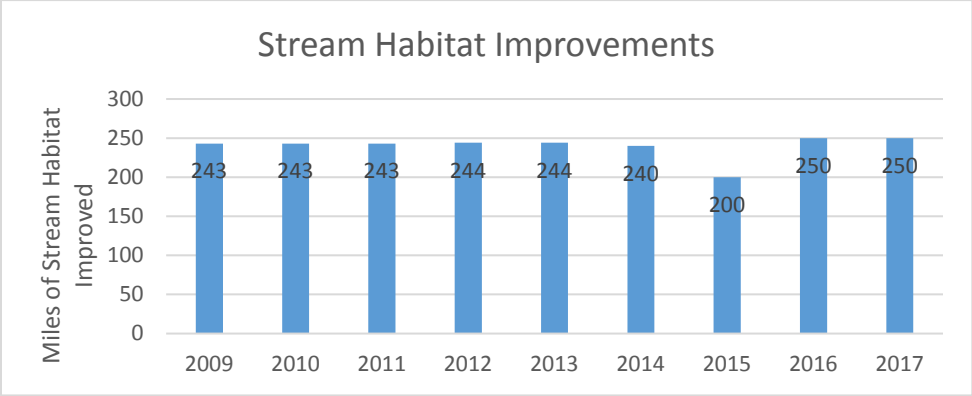

Figure 4. Stream habitat improvements during 2009-17 on the Forest.

Over the seven-year period (2009-2017), instream habitat restoration work occurred in many different types of streams across the Forest. The completed work consisted of a mixture of brush bundle placement, brushing of stream banks, and large wood placement. Much of the work was completed in partnership with local chapters of Trout Unlimited and the Wisconsin Department of Natural Resources. Beaver management on classified trout streams account for the majority of the stream miles improved. See monitoring question 5, further in the report for more detail.

Figure 4 depicts annual stream miles improved. Specifically, remnant fish hatchery structures were removed on two Class I trout streams during this period. A dam was taken out on Spring Brook (Ashland County), restoring one half mile of fish passage. Old raceways were removed in the Deerskin River (Vilas County). The project took a 100-foot section of braided channel and restored it to a single thread channel with improved width/depth ratios. Both structures were built in the late 1930s and only functioned as fish hatcheries for a couple of years before they were abandoned.

Monitoring Indicator 2 Results and Discussion: Figure 5 depicts the lake acres, which were improved with adding structures to (e.g., trees), or aeration of the lakes. Specifically, over the years between 2009 and 2017, large woody debris (structure) restoration occurred on multiple inland lakes. Lakes that needed habitat projects for improvement were identified during fish surveys. Structure improvements

included placing trees during ice-free conditions and allowing them to drop to the lake floor. In addition, liming a lake (e.g. Little Cub Lake) to provide more suitable water quality conditions for the stocked trout fishery has occurred.

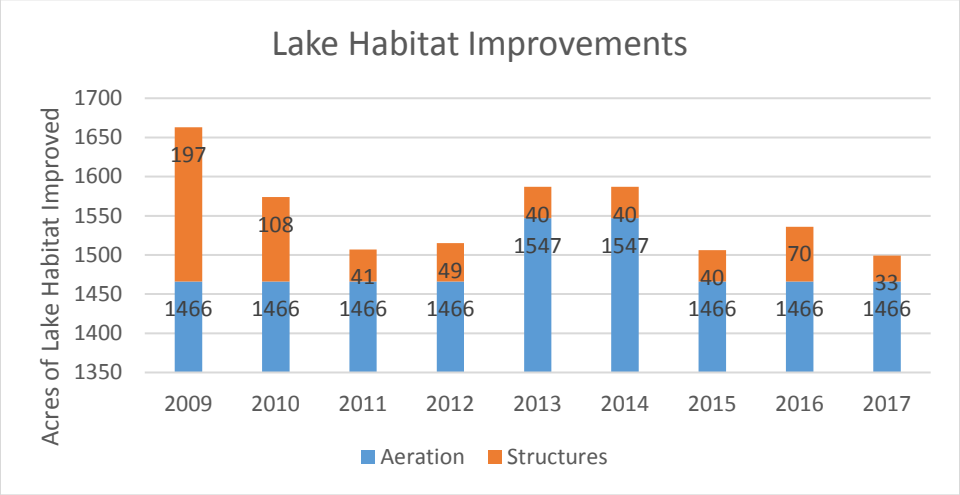

Figure 5. Lake Habitat improvements during 2009-17 on the Forest.

Many lakes on the Forest have low dissolved oxygen levels during the winter, which can result in fish kills. Winter aeration has been used to mitigate winterkill conditions, and is a major component of the Forest's lake habitat improvement program. Results from monitoring the winter dissolved oxygen levels helps determine aeration needs. Over the last seven years, there have been several harsh winters. The winter of 2013-14 was considered the worst, as many lakes across the Forest suffered significant winterkill due to early ice-up, heavy snow conditions, and later than normal ice-out. In 2016 and 2017, winters were considered mild.

Annually, dissolved oxygen levels have been monitored in the 12 aeration lakes, as well as over 25 additional water bodies, to measure the effectiveness of winter aeration. In summary, the 2013-14 winter was the only major fish kill during the seven-year time period, with many lakes still recovering from losses occurred that winter. Water levels in seepage lakes have recovered from the 7-year drought that ended in 2010, which helps fish survival. Relatively wet conditions over the last several years have led to recovery as well. Most species had at least one year of good to excellent population recruitment and average fall fingerling size.

Monitoring Indicator 3 Results and Discussion: Both priority watersheds are currently classified as Class 2 (Functioning at Risk); however, progress is being made on completing all the identified essential projects within both watersheds. Twenty Mile was 90 percent and Marengo was 40 percent complete. In 2016, the watersheds experienced a major flood (1,000+ year event) that negatively affected the watershed's health. The Forest is working on repairing the damage done by the event; thus, slowing progress in completing all essential projects within the two 'Functioning at Risk' watersheds.

2-3 Summary of Findings and Recommendation: Approximately 240 miles of stream has been restored and improved, around 1,500 acres of lakes per year have been improved, and progress is being made to improve two priority watersheds focused on by the Watershed Condition Framework. Thus, the status of the stream and lake habitats on the Forest can be seen as maintaining or improving.

In addition, overall fish community health continues to be maintained or improved. Aeration is providing favorable conditions in 11 lakes, sustaining recreational fisheries. Habitat work (in lakes and streams) is restoring needed habitat components for a viable aquatic community. If general fish health can be seen as stream and lake health indicators, past efforts have been improving water body health on the Forest. The Wisconsin Department of Natural Resources is the responsible agency for fish populations in the Forest's water bodies, making them a key partner in this successful management.

2-3 Evaluation of Monitoring Question and Indicators: The current indicators, tied directly to the Forest Plan, are sufficient and there is no immediate need to change them.

2-3 Notable References: Forest Service. 2011. Watershed Condition Framework. FS-977. May 2011. 34p.

2-4 – Monitoring Question 4: To what extent is forest management maintaining or restoring desired conditions of vegetative communities?

Monitoring Indicators and Frequency:
(1) Acres of vegetative communities in each Management Area (MA), compared to Desired Future Conditions (DFCs). Monitored annually.
(2) Acres of forest harvested compared to Forest Plan's Final Environmental Impact Statement (FEIS) projections. Monitored annually.
(3) Acres reforested compared to reforestation needs. Monitored annually.

Background and Drivers: Question 4 and its associated indicators address Planning Rule Topic 2 (ecological conditions) within 36 CFR 219.12(a)(5)(ii). The Forest plan provides management direction for vegetative communities through goals, objectives, standards and guidelines, including specific desired future conditions (DFCs) for each Management Area (MA). As part of Goal 1.4 for Terrestrial Ecosystems, the Forest Plan directs management to provide terrestrial ecosystems in healthy, diverse, and productive conditions. Specifically, Objective 1.4a addresses management of vegetation communities:

> Objective 1.4a – Maintain or restore vegetative communities to their desired conditions described in Chapter 3 emphasizing MA's 2B, 4B, and 8C.

The Management Area direction in Chapter 3 of the Forest Plan describes the DFC forest type composition for each MA. Achieving and maintaining the desired type composition within each MA is needed in order to provide the intended ecosystem attributes and mix of habitats outlined in the Forest Plan. Note Forest activities can move vegetation composition by converting forests on a stand-by-stand basis (which is the typical way the Forest goes about meeting desired future conditions), and these actions don't change vegetation type composition on a large scale, or very quickly.

Current acreage comparisons to plan DFCs are reasonable indicators of how well vegetation management is achieving the desired target conditions. The Forest Plan FEIS projected annual acreage of silvicultural treatments, based on the activities needed to meet the plan goals and objectives over multiple decades. The annual acreage of harvest compared to FEIS projections is an indicator of progress toward meeting the goals and objectives.

Certain harvest activities, as well as other events including wind throw, insect or disease outbreak, and fire, create a reforestation need. Reforestation treatments compared to reforestation need is an indicator of maintaining productive forest conditions.

Monitoring Indicator 1 Results and Discussion: Table 1 through Table 4 (below) display the Forest Plan's desired future condition and actual composition in 2004, 2010 and 2016 by Management Area. No tables are presented for MA 5 through MA 8G because the Forest Plan did not recommend a specific measureable species composition objective.

Table 1. Forest type composition (percentage of upland acres) by management area for MA 1A, 1B and 1C on CNNF in years 2004, 2010 and 2016, along with desired future condition (DFC).

Species Group	MA 1A				MA 1B				MA 1C			
	DFC	2004	2010	2016	DFC	2004	2010	2016	DFC	2004	2010	2016
Aspen	50-75	61.0	59.9	62.3	35-55	46.5	47.0	46.7	35-55	48.8	49.3	49.3
Balsam fir	0-10	3.0	3.0	3.0	0-10	1.7	1.3	1.5	0-10	1.9	2.0	2.0
Paper birch	0-5	5.4	**5.0^{+}**	4.4	0-5	7.2	**6.4^{+}**	**5.8^{+}**	0-10	3.0	2.6	2.7
Jack pine	0-2	0.3	0.5	1.1	0-10	4.1	3.7	3.6	0-5	1.0	1.1	0.9
Red pine/ White pine	5-15	4.3	**4.2^{-}**	**4.3^{+}**	5-30	16.2	16.6	16.4	5-20	6.9	7.1	7.0
Northern hardwoods	5-20	18.5	**19.7$^{\#}$**	**19.8$^{\#}$**	5-15	13.8	13.6	14.2	15-40	27.8	28.8	29.5
Oak	0-5	0.4	0.5	0.5	0-5	6.2	**7.1^{-}**	**8.2^{-}**	0-10	4.9	4.8	4.9
Permanent opening	1-4	1.4	1.6	1.3	1-4	2.8	2.4	1.9	1-4	2.0	1.9	1.7
Other forest types	0-5	5.8	**5.6^{+}**	3.2	0-10	1.6	1.8	1.6	0-10	3.6	2.4	2.0

Within each table the numbers without markings represent figures within the desired range, numbers in "-" are outside the desired range and trending away from the range, and numbers in "+" are outside the desired range and trending toward the range. Numbers in "#" are either outside the desired range and stable, or within the desired range but approaching the limits of the range.

Positive trends (+) within MA 1 (Table 1): There was a reduction in paper birch percent composition (hereafter referred to as "the amount of") in MA 1A and 1B. Paper birch in MA 1A is now within the

desired percent composition range (hereafter referred to as the "desired range"), and in MA 1B is closer to the desired range.

There was a reduction in the amount of "other forest types" (mainly white spruce) in MA 1A, which is now within the desired range.

There was a slight increase in the amount of red/white pine in MA 1A, where red/white pine continues to be below the desired range, but it is trending in the right direction.

Negative trends within MA 1 (Table 1): There was an increase for oak in MA 1B, where oak was already above the desired range. This was tied to the positive trend in paper birch reduction as some declining paper birch stands were converted to oak.

Trends to watch in MA 1 (Table 1): Northern hardwoods are approaching the upper limit of the desired range in MA 1A. The increase in northern hardwoods was partly due to some declining white spruce stands being converted to northern hardwoods, and partly due to conversion of some aspen stands to northern hardwoods either intentionally (to meet other objectives, e.g., visual) or through natural succession of aging stands.

Table 2. Forest type composition (percentage of upland acres) by management area for MA 2A, 2B and 2C on CNNF in years 2004, 2010 and 2016, along with desired future condition (DFC).

Species Group	MA 2A				MA 2B				MA 2C			
	DFC	2004	2010	2016	DFC	2004	2010	2016	DFC	2004	2010	2016
Aspen	5-20	21.3	**21.0^{+}**	**21.2^{-}**	0-10	20.5	**20.4^{+}**	**20.3^{+}**	15-30	30.7	**30.9^{-}**	**31.1^{-}**
Balsam fir	0-3	2.8	2.6	2.6	0-3	2.2	2.3	2.3	0-3	2.8	2.7	2.6
Paper birch	0-5	0.9	0.8	0.7	0-2	1.3	1.2	1.2	0-5	1.6	1.5	1.4
Jack pine	0-2	0.4	0.4	0.4	0-2	0.4	0.4	0.4	0-2	0.5	0.5	0.5
Red pine/ White pine	5-20	5.3	5.6	5.6	0-10	4.4	4.4	4.3	10-30	10.5	10.4	10.7
Northern hardwoods	40-70	64.1	64.5	64.7	50-80	65.8	65.9	66.5	30-50	45.8	46.3	47.0
Oak	0-5	0.3	0.3	0.4	0-3	0.3	0.4	0.4	0-10	1.3	1.3	1.3
Permanent opening	0-1	1.7	**1.8^{-}**	**1.6^{+}**	0-1	1.4	**1.4$^{\#}$**	**1.3^{+}**	1-2	1.7	2.0	**1.7^{+}**
Other forest types	0-15	3.3	3.0	2.8	0-15	3.7	3.6	3.3	0-15	5.3	4.4	3.7

Within each table the numbers without markings represent figures within the desired range, numbers in "-" are outside the desired range and trending away from the range, and numbers in "+" are outside the desired range and trending toward the range. Numbers in "#" are either outside the desired range and stable, or within the desired range but approaching the limits of the range.

Positive trends (+) within MA 2 (Table 2): There was a slight reduction for aspen in MA 2B, which still contains about twice as much aspen as desired. This should improve in coming years, however, as implementation commences on several large MA 2B projects that were delayed by litigation.

There was a slight decrease for permanent opening in MA 2A. Permanent openings in MA 2A and 2B are above the desired range, but both showed slight decreases towards the desired range. The Forest expects this decrease to continue gradually. As project-level NEPA decisions are implemented in MA 2A and 2B areas, only some of the previously maintained upland openings will be maintained as openings going forward, and the others will be allowed to gradually succeed or revert to brush and then natural hardwood regeneration.

Negative trends (-) within MA 2 (Table 2): There was a moderate increase for aspen in MA 2A and MA 2C, which are both slightly above the desired range. The spruce decline event had a significant impact on aspen composition in MA 2. Declining spruce stands with an aspen component were regenerated to aspen following the spruce salvage. The area of aspen would have been less across MA 2A, 2B and 2C had the spruce decline event not occurred.

Table 3. Forest type composition (percentage of upland acres) by management area for MA 3B and 3C on CNNF in years 2004, 2010 and 2016, along with desired future condition (DFC). There was no MA 3A selected in the Forest plan land allocation.

Species Group	MA 3B				MA 3C			
	DFC	2004	2010	2016	DFC	2004	2010	2016
Aspen	5-10	19.6	**18.9^{+}**	**18.2^{+}**	20-40	33.1	32.8	31.3
Balsam fir	0-3	3.4	**3.5^{-}**	**3.2^{+}**	0-5	0.7	1.0	0.8
Paper birch	0-10	3.0	2.2	2.2	0-10	4.5	3.8	3.0
Jack pine	0-5	0.3	0.4	0.5	0-5	3.2	3.6	3.4
Red pine/ White pine	10-25	13.6	15.0	15.4	5-15	13.9	13.5	14.0
Northern hardwoods	10-50	41.3	32.7	34.2	10-25	13.4	13.7	14.9
Oak	20-45	17.2	25.6	24.7	20-40	26.9	27.3	29.0
Permanent opening	1-2	1.4	**1.2$^{\#}$**	**1.1$^{\#}$**	1-3	3.9	**3.9$^{\#}$**	**3.2^{+}**
Other forest types	0-10	0.4	0.5	0.5	0-5	0.5	0.4	0.4

Within each table the numbers without markings represent figures within the desired range, numbers in "-" are outside the desired range and trending away from the range, and numbers in "+" are outside the desired range and trending toward the range. Numbers in "#" are either outside the desired range and stable, or within the desired range but approaching the limits of the range.

Positive trends (+) within MA 3 (Table 3): There was a reduction for aspen in MA 3B, although aspen remains above the desired range.

There was a slight decrease for balsam fir in MA 3B, where balsam fir was already above the desired range.

All species groups are within their desired ranges in MA 3C, other than permanent openings, which showed a moderate decrease to get closer to the desired range.

Table 4. Forest type composition (percentage of upland acres) by management area for MA 4A, 4B and 4C on CNNF in years 2004, 2010 and 2016, along with desired future condition (DFC).

Species Group	MA 4A				MA 4B				MA 4C			
	DFC	2004	2010	2016	DFC	2004	2010	2016	DFC	2004	2010	2016
Aspen	10-30	28.2	28.6	28.3	0-7	25.4	**25.8^{-}**	**26.0^{-}**	20-35	30.5	28.9	29.6
Balsam fir	0-3	1.4	1.3	1.3	0-3	1.7	2.1	2.0	0-3	0.0	0.0	0.0
Paper birch	0-5	2.7	2.1	2.1	0-5	6.5	**5.8^{+}**	**5.3^{+}**	0-5	2.6	2.0	2.0
Jack pine	0-35	12.2	11.7	11.4	3-6	10.9	**8.9^{+}**	**8.6^{+}**	35-50	32.0	**32.1^{+}**	**31.3^{-}**
Red pine/ White pine	10-50	35.9	36.3	37.2	45-70	30.1	**30.1$^{\#}$**	**30.9^{+}**	20-30	26.2	28.0	27.9
Northern hardwoods	0-25	7.3	8.0	8.1	0-10	12.3	**12.9^{-}**	**13.0^{-}**	0-10	0.2	0.2	0.2
Oak	0-25	8.2	8.1	8.3	10-25	10.3	11.5	12.0	10-20	7.0	**7.6^{+}**	**7.3^{-}**
Permanent opening	1-6	2.9	2.7	2.3	2-8	2.5	2.5	**1.9^{-}**	2-8	1.4	**1.1^{-}**	**1.4^{+}**
Other forest types	0-5	1.3	1.3	1.0	0-10	0.4	0.4	0.5	0-10	0.1	0.0	0.2

Within each table the numbers without markings represent figures within the desired range, numbers in "-" are outside the desired range and trending away from the range, and numbers in "+" are outside the desired range and trending toward the range. Numbers in "#" are either outside the desired range and stable, or within the desired range but approaching the limits of the range.

Positive trends (+) within MA 4 (in Table 4): There were reductions in the amount of paper birch and jack pine in MA 4B. Paper birch and jack pine are now closer to their desired ranges. The red pine and white pine community percent composition in MA 4B is well below the desired range, though it showed a moderate increase. This shortage of red pine and white pine corresponds with the amount by which aspen exceeds the desired range in MA 4B.

There was an increase for permanent opening in MA 4C, moving closer to the desired range.

Negative trends (-) within MA 4 (Table 4): There was an increase for aspen in MA 4B. The amount of aspen in MA 4B is about 3.5 times as much as desired. There was an increase in northern hardwoods in MA 4B, where hardwoods were already above the desired range. There were decreases in the amount of jack pine and oak in MA 4C, moving away from their desired ranges. The Forest does not have a clear explanation for these trends; however, in the case of aspen, this change could have been a local budworm infestation transitioning a balsam fir stand into an aspen stand.

In relation to other Management Areas on the Forest, MA 4B and 4C are not prevalent on the Forest. In other words, opportunities to influence this Management Area are small and the Forest has not had an opportunity recently to influence these management areas. Thus, minimal progress has been made in moving toward desired future conditions.

Monitoring Indicator 2 Results and Discussion: Detailed information on harvested acres by treatment type is available in Appendix A. Total acres harvested by year are summarized in Figure 6 below.

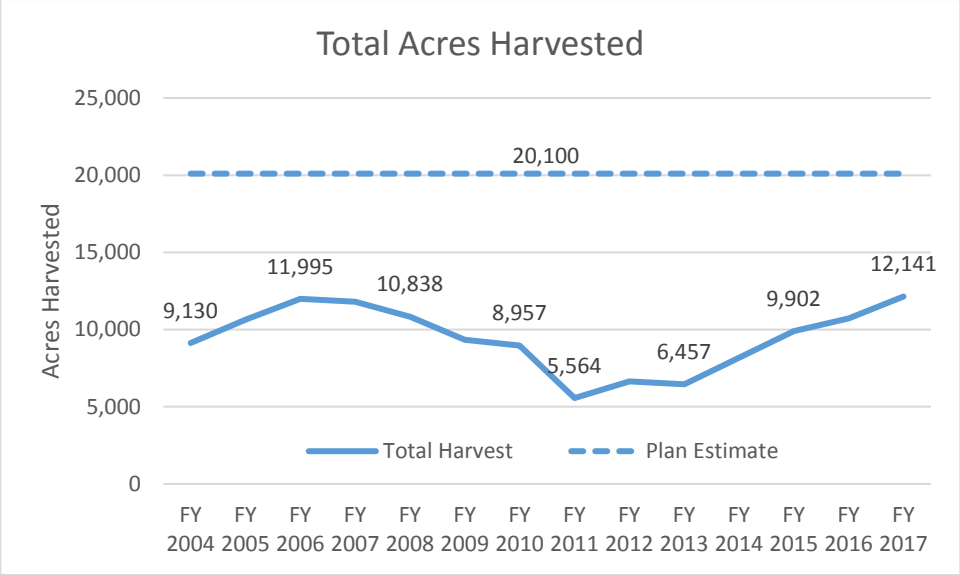

Figure 6. Total acres of harvest on Forest for 2004-2017, along with the estimated harvest area for decade 1 from the Forest Plan.

Forest harvesting did not occur at the pace and scale described in the Forest Plan to meet those restoration goals and desired vegetative conditions that require silvicultural treatment through commercial timber harvest. Age classes for even-aged forest types continue to deviate from stated guidelines leading to eventual changes in forest types and other conditions that were not fully anticipated in the Forest Plan. It appears intermediate treatments have not kept pace with projections leading to overstocked stands that are less resilient to ecosystem stressors including drought, diseases and insect infestations. Selection harvests have not been implemented at the rate projected, slowing down the development of some desired stand characteristics including large tree character and multi-storied stand conditions.

There has been an increased number of acres in FY 2016 and 2017 timber sales with projections for continued increases due to fuller use of Stewardship Authority and Good Neighbor Authority. Acres harvested are projected to increase beyond the FY 2017 level in Figure 4 starting in FY 2018.

Monitoring Indicator 3 Results and Discussion: Annual reforestation *needs* and reforestation *treatments* have been nearly equal on the Forest each year. Regeneration has been completed as expected. The increased reforestation need at the beginning of FY 2017 is a direct result of the increased regeneration harvests in FY 2016. In 2015, regeneration harvests (selections, shelterwoods and clearcuts) totaled 4,631 acres whereas in 2016 regeneration harvests totaled 7,013 acres.

Table 5. Acres of reforestation need and reforestation treatments on the Forest for 2011-2017.

	2011	2012	2013	2014	2015	2016	2017
Reforestation need at beginning of FY	13,775	13,775	11,139	9,829	5,655	5,268	7,100
Reforestation treatments during FY	4,512	3,387	4,958	4,702	5,582	5,196	7,063
Reforestation needs carried into next FY	9,134	11,349	9,829	7,042	5,268	7,100	8,892

FY = fiscal year

2-4 Summary of Findings and Recommendation: The Forest implemented timber management activities at a slower rate than the Forest Plan projected or prescribed with capacity playing a large role in driving that outcome. Hardwood management was the Forest's focus over that last decade and because of that, many acres of Aspen stands were left, creating the deviations from desired future conditions outlined above in this section. However, current implementation levels have increased roughly by 25 percent in the past two years. This means more acres are planned to be transitioned to desired future conditions outlined above and in the Forest Plan; the trend in restoration acres accomplished will increase in the coming years, as well.

Overall, the majority of tree species or forest composition is within Forest Plan desired conditions with a few exceptions. Regenerating forested stands has kept up with the needs of the Forest, reducing any concerns about altering existing regeneration practices.

Age class distribution and intermediate treatment implementation is not noted above and may be beneficial to consider in future monitoring reports because it might show attainment of desired future conditions of the Forest Plan. We, therefore, may qualitatively monitor whether age class distributions for even aged forest types are deviating from Forest Plan age class guidelines, which could lead to different vegetative habitats developing and affecting the attainment of Forest Plan desired conditions. Also, intermediate treatment implementation appears to be lagging behind Forest Plan needs, possibly leaving overstocked stands that are less resilient to ecosystem stressors including drought, diseases and insect infestations (further reducing desired future condition attainment). Monitoring intermediate treatment schedules may help in painting a clearer picture when evaluating this monitoring question.

2-4 Evaluation of Monitoring Question and Indicators: Question and indicators seem to be an appropriate measure of this resource because it is reasonably attainable, measureable and outlined in the Forest Plan. However, the Forest recommends additional indicators like age-class distribution and intermediate treatment implementation monitoring to bring even more clarity to this monitoring question.

3 – Focal Species

3-5 – Monitoring Question 5: What is the current status of coldwater stream communities, especially streams with brook trout present?

Monitoring Indicators and Frequency:
(1) Miles of Class I, Class II, and segments of Class III trout streams and their tributaries maintained and restored to free-flowing condition. Monitored annually.
(2) Population index of brook trout on selected streams. Monitored annually.

Background and Drivers: Question 5 and its associated indicators address Planning Rule Topic 3 (focal species) within 36 CFR 219.12(a)(5)(iii). The status of coldwater stream communities is an indicator of ecosystem integrity. The Forest Plan provides direction for ensuring healthy and sustainable ecosystems in Goal 1, with emphasis on aquatic ecosystems in Goal 1.3. Specifically, Objective 1.3g addresses the protection and restoration of coldwater stream communities.

> Objective 1.3g – Protect and restore coldwater stream communities by maintaining Class I, Class II, and segments of Class III trout streams and their tributaries in a free-flowing condition.

A free-flowing condition means there are no impediments like beaver dams slowing or stopping the flow of the stream. The Forest uses the Wisconsin DNR's stream classification system as a basis for the monitoring indicator. All of the State's trout waters, or water bodies that support trout, are classified using the Trout Stream Classification of Class I, II, or III. The following definitions are taken from "Wisconsin Trout Streams," WDNR, pub 6-3600 (2002 update).

> CLASS I: These are high quality water bodies, and have sufficient natural reproduction to sustain populations of wild trout at or near carrying capacity. Consequently, streams in this category require no stocking of hatchery trout.
>
> CLASS II: Streams in this classification may have some natural reproduction, but not enough to utilize available food and space. Therefore, stocking is required to maintain a desirable sport fishery.
>
> CLASS III: These waters are marginal trout habitat with no natural reproduction occurring. They require annual stocking of trout to provide trout fishing.

The Forest contains more than 2,000 miles of perennial streams, of which 1,072 miles are considered Class I and II trout streams. Of the 1,200 miles on the Nicolet land base, over 1,000 miles are classified as Class I and II streams. There are over 800 miles of perennial streams on the Chequamegon land base; 211 miles of that are considered trout sustaining waters. The characteristics that make all these streams Class I or II are not readily influenced or changed.

The Forest is unable to collect complete information on free-flowing conditions for all miles of Class I and Class II trout streams. Because beaver dams are the primary inhibitor of free flowing conditions on these streams, the Forest tracks beaver colonies annually on 1,800 miles of streams. The number of active colonies serves as an indicator of free-flowing stream conditions across the Forest.

The Forest and the State have surveyed brook trout populations in numerous trout streams on the Forest for many years. Stations are sampled annually on a rotating basis. Sampling stations vary from 100-2,000 feet in length. Full population estimates are done on a certain set of streams where others just have general presence/absence surveys completed.

Monitoring Indicator 1 Results and Discussion: Currently, the Forest and WDNR maintain approximately 566 miles of trout stream in a free-flowing condition on the Forest, with 113 miles on the Chequamegon land base and 453 on the Nicolet land base. Annual removal of beaver colonies through trapping conducted by the USDA Animal Plant Health and Inspection Service is the primary method for restoring trout streams to free-flowing conditions. Dams constructed by beavers deteriorate after the beavers are removed.

Figure 7 displays the number of active beaver colonies on the 1,800 stream miles surveyed. Numbers have fluctuated over time with minor overall reductions.

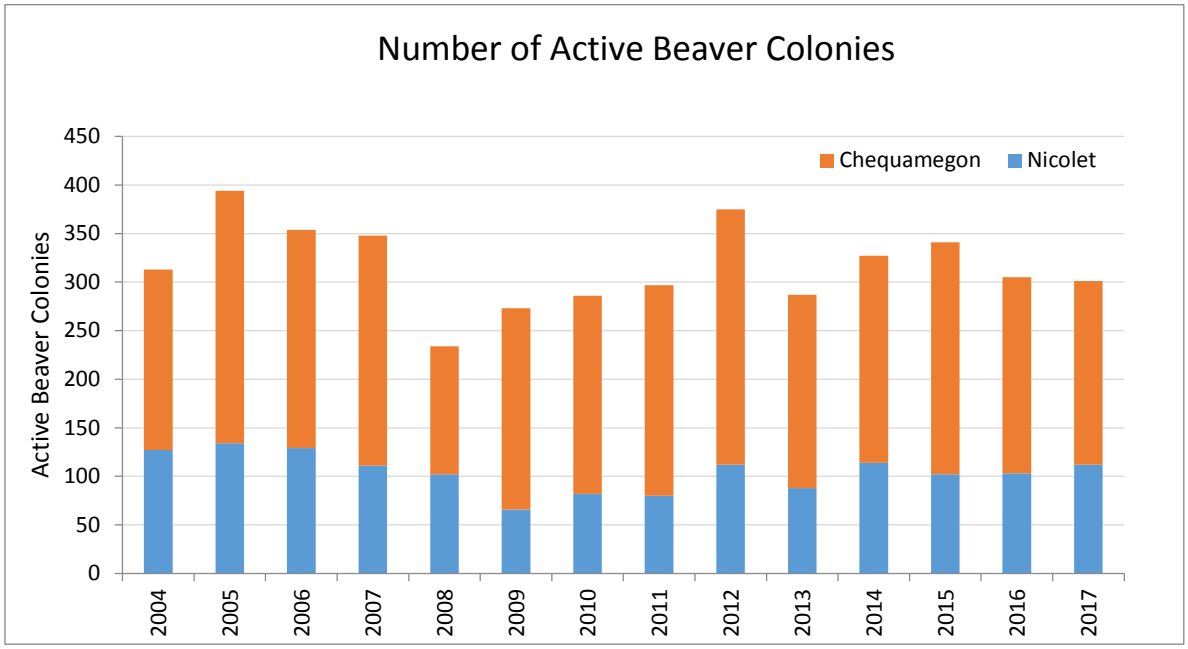

Figure 7. Number of active beaver colonies on the CNNF fall survey flights 2004-2017.

Annual removal of beaver colonies has resulted in numbers remaining low on the Nicolet land base where the majority of trout sustaining water bodies occur. On the Chequamegon land base streams, removal of beaver colonies has not resulted in reductions in the annual colony numbers. In FY 2016 and FY 2017 there was a slight decline in beaver colonies on Chequamegon land base streams. Annual removal of beaver appears to remain necessary in order to maintain the miles of trout streams in free-flowing conditions.

Monitoring Indicator 2 Results and Discussion: Figure 8 illustrates brook trout trends over time in two Class I trout streams on the Forest. Foulds Creek is a small isolated Class I trout stream in Price County that flows into the Pike/Round chain of lakes. Allen Creek is a Class I trout stream that flows into the Brule River in Florence County. Over the years, both systems have received various instream restoration treatments, including beaver control. Both systems support naturally reproducing brook trout populations and, because of this, these streams are the focus of our brook trout population monitoring.

Brook trout are a cold-water species; optimal water temperature for brook trout survival is 22 degrees Celsius or colder. The presence of brook trout in a stream usually indicates that the system is predominately groundwater driven and has cold clear water throughout the year, allowing this species to give us some idea of the cold-water stream health on the Forest. During the mid-1990s, a Forest wide water temperature-monitoring program was developed to help identify those trout streams that have temperature issues to help prioritize instream habitat restoration work, as well as help to refine the group of streams that are in the beaver management program. Brook trout populations in water bodies with less groundwater feeding into them have seen population recovery from the recent drought that ended in 2010. To be expected, brook trout populations in heavily fed groundwater water bodies have remained stable.

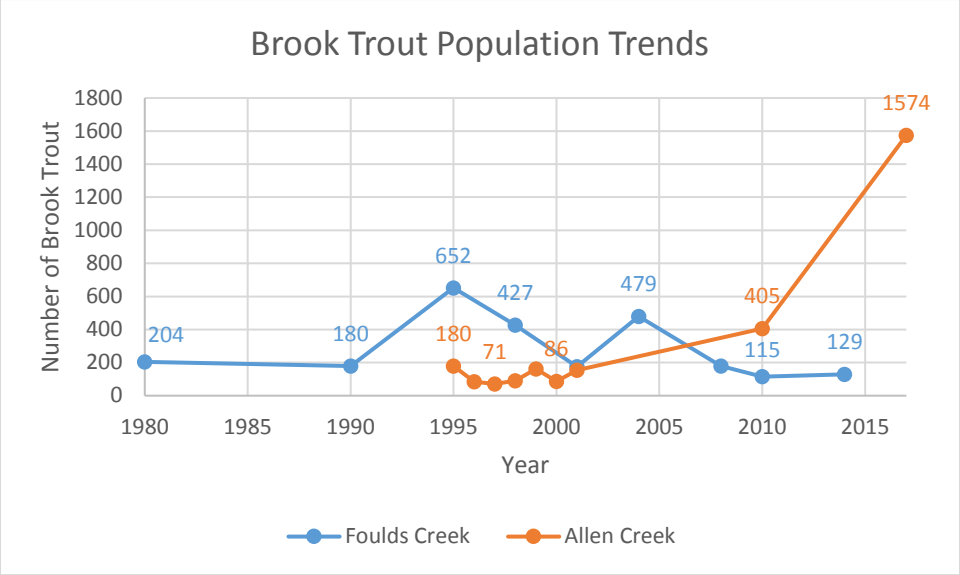

Figure 8. Population indices for Foulds Creek and Allen Creek within CNNF.

3-5 Summary of Findings and Recommendation: Free-flowing cold water stream communities continue to be affected by beaver populations. Annual removal of beaver colonies appears to be an important management treatment to keep them in free-flowing conditions. Beaver numbers remain low on the Nicolet landbase where the majority of trout sustaining water bodies occur. The last two years showed slightly declining numbers of colonies on the Chequamegon landbase. Brook trout populations in cold water streams vary due to numerous factors. Trout populations in some streams are likely increasing as habitat improvement occurs.

The Forest recommends continuing current efforts in improving stream communities and continuing beaver colony management in order to maintain the current, free-flowing status of the Forest's streams.

3-5 Evaluation of Monitoring Question and Indicators: The current indicators and data collected for this monitoring question allow a partial evaluation of the question. There are many other facets of the coldwater stream community status that are not explained through the beaver management data and brook trout population data in two streams. The Forest recommends either to focus the monitoring question (e.g., a new question could state "Is Forest Plan implementation contributing to maintenance of trout stream free-flowing condition, especially those with brook trout present?) or possibly develop indicators that explore a more robust evaluation of the current monitoring question.

4 – Species of Concern

4-6 – Monitoring Question 6: Is Forest Plan implementation contributing to the recovery of federally listed threatened and endangered species and improving habitat conditions for species of conservation concern?

Monitoring Indicators and Frequency:
(1) Management actions that support federally listed threatened and endangered species (T&ES). Regional Forester's Sensitive Species (RFSS) populations are targeted for monitoring every 1-5 years, depending on the species.
(2) Population index (e.g. population, suitable habitat, area occupied, and trends) for federally listed and species of conservation concern. RFSS populations are targeted for monitoring every 1-5 years, depending on the species.

Background and Driver(s): Question 6 and its associated indicators address Planning Rule Topic 4 (species of concern) within 36 CFR 219.12(a)(5)(iv). The Forest plan provides direction for conserving or restoring populations of endangered, threatened and sensitive species in Goals 1.1. Specifically, Objectives 1.1a and 1.1b address the conservation strategies for threatened, endangered and species of conservation concern.

> Objective 1.1a – Under the Endangered Species Act, implement established recovery or conservation strategies.
>
> Objective 1.1b – Improve habitat conditions for Regional Forester Sensitive Species.

The Forest is host to four federally listed threatened and endangered species and 26 animal and 49 plant Regional Forester Sensitive Species. Complete lists of federally listed species and RFSS present on the Forest are listed in Table 6 and Table 7.

Table 6. Federally listed Threatened and Endangered Species that occur on the CNNF.

Threatened & Endangered Species (T&ES)		
Classification	**Species**	**Common Name**
Mammals	*Canis lupis*	Gray Wolf
Mammals	*Lynx canadensis*	Canada Lynx
Birds	*Setophaga kirtlandii*	Kirtland's Warbler
Plants	*Oxytropis campestris var. chartacea*	Fassett's Locoweed

Table 7. Regional Forester Sensitive Species (RFSS) that occur on the CNNF.

Regional Forester Sensitive Species (RFSS)		
Classification	**Species**	**Common Name**
Mammals	*Eptesicus fuscus*	Big Brown Bat
Mammals	*Martes americana*	American Marten
Mammals	*Myotis lucifugus*	Little Brown Myotis
Mammals	*Perimyotis subflavus*	Tri-colored Bat

Regional Forester Sensitive Species (RFSS)		
Classification	**Species**	**Common Name**
Birds	*Ammodramus leconteii*	Le Conte's Sparrow
Birds	*Bartramia longicauda*	Upland Sandpiper
Birds	*Buteo lineatus*	Red-shouldered Hawk
Birds	*Falcipennis canadensis*	Spruce Grouse
Birds	*Haliaeetus leucocephalus*	Bald Eagle
Birds	*Oporornis agilis*	Connecticut Warbler
Birds	*Picoides arcticus*	Black-backed Woodpecker
Birds	*Setophaga cerulea*	Cerulean Warbler
Birds	*Tympanuchus phasianellus*	Sharp-tailed Grouse
Reptiles	*Glyptemys insculpta*	Wood Turtle
Fish	*Acipenser fulvescens*	Lake Sturgeon
Fish	*Moxostoma valenciennesi*	Greater Redhorse
Fish	*Notropis anogenus*	Pugnose Shiner
Insects	*Callophrys henrici*	Henry's Elfin
Insects	*Danaus plexippus*	Monarch
Insects	*Gomphus viridifrons*	Green-Faced Clubtail
Insects	*Oeneis chryxus*	Chryxus Arctic
Insects	*Ophiogomphus anomalus*	Extra-striped Snaketail
Insects	*Ophiogomphus howei*	Pygmy Snaketail
Insects	*Pieris virginiensis*	West Virginia White
Insects	*Plebejus idas nabokovi*	Northern (Nabokov's) Blue
Bivalves	*Venustaconcha ellipsiformis*	Ellipse
Plants	*Amerorchis rotundifolia*	Roundleaf Orchid
Plants	*Arabis missouriensis v. deamii*	Missouri Rock-cress
Plants	*Asplenium trichomanes-ramosum*	Green Spleenwort
Plants	*Astragalus alpinus*	Alpine Milkvetch
Plants	*Botrychium minganense*	Mingan Moonwort
Plants	*Botrychium mormo*	Little Goblin Moonwort
Plants	*Botrychium oneidense*	Bluntlobe Grapefern
Plants	*Botrychium pallidum*	Pale Moonwort
Plants	*Botrychium rugulosum*	Ternate Grapefern
Plants	*Callitriche hermaphroditica*	Autumnal Water-starwort
Plants	*Callitriche heterophylla*	Twoheaded Water-starwort
Plants	*Calypso bulbosa*	Fairy Slipper
Plants	*Carex backii*	Rocky Mountain Sedge
Plants	*Carex livida var radicaulis*	Livid Sedge
Plants	*Carex michauxiana*	Michaux's Sedge
Plants	*Carex sychnocephala*	Many-headed Sedge
Plants	*Cypripedium arietinum*	Ram's-Head Lady's Slipper

Regional Forester Sensitive Species (RFSS)		
Classification	**Species**	**Common Name**
Plants	*Diplazium pycnocarpon*	Glade Fern
Plants	*Dryopteris expansa*	Spreading Woodfern
Plants	*Dryopteris filix-mas*	Male Fern
Plants	*Eleocharis olivacea*	Bright Green Spikerush
Plants	*Eleocharis quinqueflora*	Few-flowered Spikerush
Plants	*Equisetum palustre*	Marsh Horsetail
Plants	*Eriophorum chamissonis*	Russet Cotton-grass
Plants	*Huperzia selago*	Fir Clubmoss
Plants	*Juglans cinerea*	Butternut
Plants	*Juncus stygius*	Moor Rush
Plants	*Leucophysalis grandiflora*	Large-flowered Ground-cherry
Plants	*Littorella uniflora*	American Shoregrass
Plants	*Mellica smithii*	Smith's Melicgrass
Plants	*Moehringia macrophylla*	Largeleaf Sandwort
Plants	*Panax quinquefolius*	American Ginseng
Plants	*Parnassia palustris*	Marsh Grass-of-Parnassus
Plants	*Piptatheropsis canadensis*	Canadian Ricegrass
Plants	*Poa paludigena*	Bog Bluegrass
Plants	*Polemonium occidentale ssp lacustre*	Western Jacob's Ladder
Plants	*Polystichum braunii*	Braun's Holly-fern
Plants	*Potamogeton confervoides*	Algae-like Pondweed
Plants	*Potamogeton hillii*	Hill's Pondweed
Plants	*Pyrola minor*	Snowline Wintergreen
Plants	*Ranunculus gmelinii*	Gmelin's Buttercup
Plants	*Rhynchospora fusca*	Brown Beakrush
Plants	*Sparganium glomeratum*	Northern Bur-reed
Plants	*Streptopus amplexifolius*	Clasping Twisted-stalk
Plants	*Tiarella cordifolia*	Heart-leaved Foam-flower
Plants	*Vaccinium cespitosum*	Dwarf Huckleberry
Plants	*Valeriana uliginosa*	Marsh Valerian
Non-vascular Plants	*Caloplaca parvula*	Firedot Lichen Species
Non-vascular Plants	*Usnea longissima*	Beard Lichen

The acres of habitat managed provide a measure of the implementation of conservation strategies for the listed species and their habitat. Conservation strategies can include active management or protection measures. The population indices or areas of occurrence provide measures of the strategies effectiveness that have been implemented. Identifying cases where conservation measures are not supporting the species populations may suggest underlying assumptions for the conservation strategies that warrant further scientific study. Declines in species populations despite implementation of

conservation strategies could indicate that the measures were not effective, or could indicate factors beyond the Forest's control affecting the species.

Monitoring Indicator 1 Results and Discussion:

Canada lynx management actions:

- Monitoring for occurrence.

Kirtland's warbler management action:

- Monitoring for occurrence. A proposed rule has been published to the Federal Register (83 FR 15758; April 18, 2018) by the U.S. Fish and Wildlife Service. This rule would remove the Kirtland's warbler from the endangered species list due to recovery.

Gray wolf management action:

- Monitoring population trends in partnership with the Wisconsin Department of Natural Resources.
- Protecting known den and rendezvous sites through restriction of land use activities.
- Maintaining low densities of open roads with higher traffic levels (Maintenance Levels [ML] 3 through 5 and some ML 2 roads).

Fassett's locoweed management action:

- Protecting shorelines at known sites through exclusion of all land use activities.
- Treating to eliminate NNIS at known sites.
- Surveying suitable habitat for new populations and monitoring existing populations.
- Educating lake landowners about Fassett's locoweed.

The Forest continues to meet the requirements of the Endangered Species Act of 1973 (as amended) by monitoring populations of federally listed species, and implementing management actions consistent with species recovery plans.

Monitoring Indicator 2 Results and Discussion:

<u>Federally Listed Species:</u>

Canada lynx population index: No verified occurrence on the Forest.

Kirtland's warbler population index: Individuals have been observed, but no breeding populations have been confirmed on the Forest.

Gray wolf population index: The wolf population is exceeding the Eastern Timber Wolf Recovery Plan's goal of three packs/30 animals (U.S. Fish and Wildlife Service 1992) across the Forest. The statewide minimum population count for 2017 was 925, in 232 packs (Wiedenhoeft et al. 2017). The Forest sustains large acres of forest habitat that contain abundant prey and limited human interactions. Wolves currently occupy 80 percent or more of the suitable wolf habitat on the Chequamegon portion of the Forest and approximately 40 percent of the Nicolet portion, where human encounters are more likely due to an increased mixed-ownership pattern. Thus, habitat is not limiting for this species.

Fassett's locoweed population index: Fassett's locoweed has a naturally limited range and is present on just two lakeshores within the Forest. Numbers of plants varies annually because it is adapted to

habitats with wide fluctuations in water levels. Due to recent high water levels, the Fassett's locoweed population is currently very low. Most of the plants are underwater at Mountain Lake and all appear to be underwater at Pigeon Lake. There were 10-50 plants at Mountain Lake. At Pigeon Lake (2015), the Forest found no Fassett's locoweed (there was very little habitat available due to high water). Approximately 5,000 plants were reported in 2010 when water levels were lower.

Information for the wildlife threatened and endangered species suggests the populations or habitat affinities for them are stable. No appreciable declines in habitat or populations have been detected during the monitoring period for which these species have been evaluated. Note that stable does not mean that there are not habitat or population challenges for these species. However, it appears that sufficient suitable habitat conditions existed for the monitoring period, such that no change either negative or positive was detected.

RFSS Plants:

Species population trends were assessed for all RFSS plants and Fassett's locoweed (T&ES), as decreasing, stable or increasing. 30 percent of the species are decreasing and twelve species have populations that are too small to detect trends or did not have enough monitoring to determine a trend in the populations. If we remove these 'undetermined' species from the percentages, 39 percent would be decreasing, 53 percent would be stable, and 8 percent would be increasing. The full list of species and their trend categorization is available in Appendix A. Figure 9 below summarizes the trends across the 50 plant species.

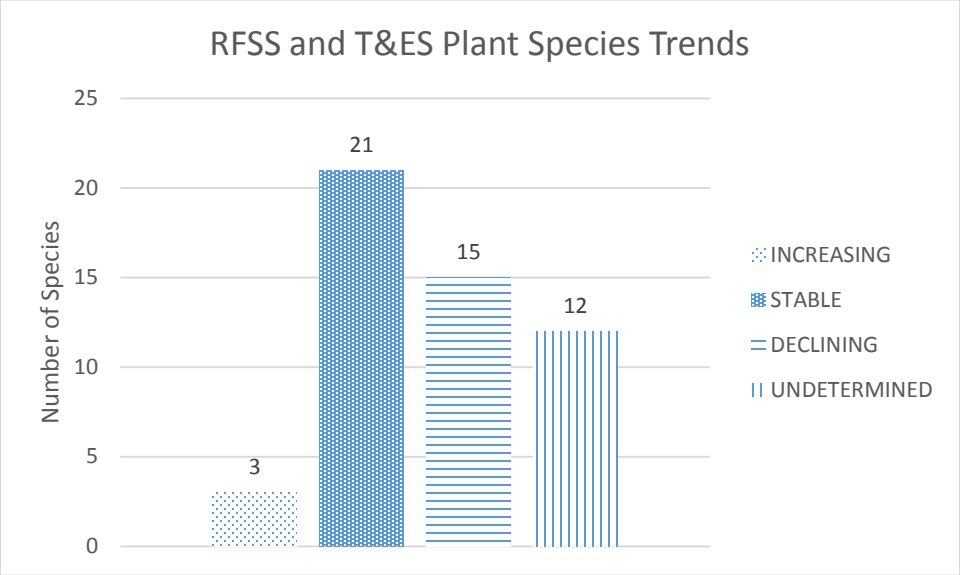

Figure 9. Species population trends (over two years) for 50 plant species that are RFSS or T&ES on the Forest.

RFSS Animals:

Species habitat and population trends were assessed for all RFSS animals and T&ES, as decreasing, stable or increasing. The full list of species and their trend categorization is available in Appendix A. Figure 10 below summarizes the trends across the 29 animal species.

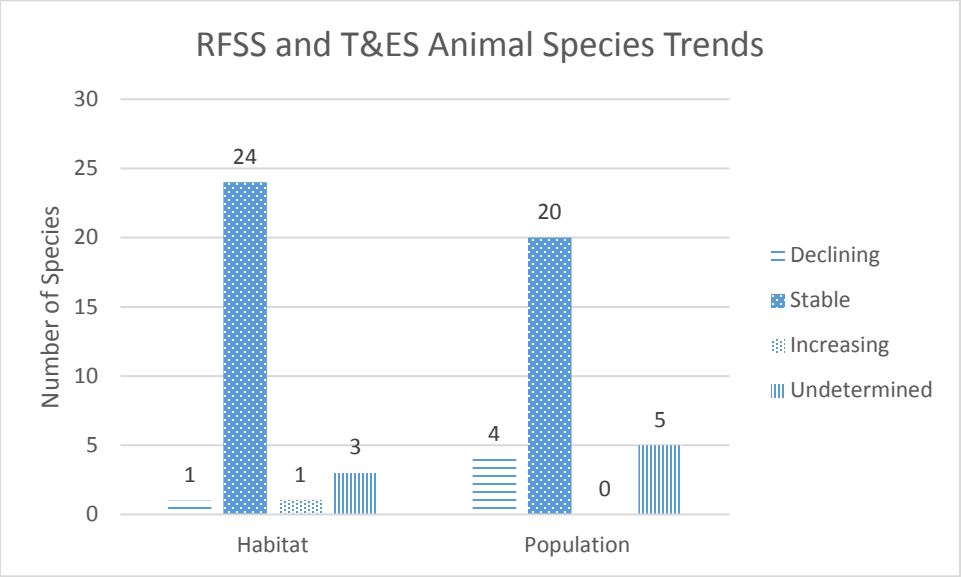

Figure 10. Species habitat and population trends (over two years) for 29 animal species that are RFSS or Threatened & Endangered Species on the Forest.

4-6 Summary of Findings and Recommendation:

Plants:

It would be beneficial for the Forest to look closely at the possible reasons why one third of the RFSS plants on the CNNF are declining. Four of these species are members of the genus *Botrychium*. Habitats associated with these species have become notably degraded (more sedge, little to no organic material, reduced floristic diversity). These changes are likely a result of an interaction between earthworms, disturbance and deer. Three of the declining species are orchids. Orchid populations are declining elsewhere outside the Forest. Monitoring of orchids from 1975-2017 on a property in Oconto County, just south of the Nicolet land base, found five species are now absent, and two others have declined (Judziewicz pers. comm). The causes of orchid decline include deer herbivory and possibly loss of pollinators.

In addition, it would be beneficial for the Forest to actively encourage researchers to take an in-depth look at some of the decreasing species to help us further understand the reasons for decline, and to identify actions to foster recovery. Additional surveys could be targeted towards the species in the "Unknown" trend category; however, limited funds make this challenging. Aquatic plant species are more difficult to monitor, and make up a large proportion of the "Unknown" category.

Animals:

The Forest recommends continuing to evaluate RFSS species such as the American marten and the northern blue butterfly, which continue to struggle to increase in numbers on the Forest. The American marten was extirpated and reintroduced into the Forest. This species requires complex habitat conditions within large tracts of northern hardwood systems (Management Area 2) to adequately increase the population.0 Concerning management of our northern hardwood forest systems, marten may benefit from increasing the complexity of coarse woody debris, sustaining the conifer pockets that are present, and providing sufficient cavity and subnivean habitat conditions within the species' range.

For northern blue butterflies, it appears to be important that the Forest continue to evaluate and manage northern dwarf bilberry patches (host plant for this species). Additionally, continuing to evaluate patch connectivity on the landscape to allow for undetected or transplanted populations of this species to move from patch to patch in a manner to meet its life requisites is important to understand population numbers. Isolated populations, whether natural or transplanted, have significant risks of extirpation due to the lack of immigration from other patches and increases the chances that a stochastic event could occur that could extirpate a population or segment of a population. Currently, it appears our patches may lack sufficient connectivity to benefit this species.

Wood turtles present a significant challenge to the Forest to determine population size(s), vital rates, and viability. This species is very difficult to census or track and is currently considered to live in disjunct population segments with high natal mortality (eggs and hatchlings). Its cryptic coloration, affinity for terrestrial movements from adjacent streams, and low population levels make monitoring this species difficult to impossible. Hence, any changes to seasonal intensity of management activities could increase the likelihood of effects to this species on the Forest. Currently, Northern Research Station, Wisconsin DNR, and University of Wisconsin-Madison continue to conduct research to determine many of these life facets that will help the CNNF make better assessments of the species population status. However, with that information being a year or more from conclusion, the Forest recommended caution when operating near suitable wood turtle streams, using a timing restriction buffer when undertaking mechanical work near streams until an adequate assessment can be made. This temporary direction is supplying an interim protection for the turtle.

Nearly one third of the RFSS plant species are declining, while three are increasing. The remainder are either stable (14 species) or have trends that are unknown (due to the need for additional monitoring and not having many species sites to monitor (1-3), it is currently difficult and almost impossible to determine trends.

For wildlife species, five species are declining in population or habitat, or reside in a condition where viability is a concern and they require further investigation and habitat evaluations. The remaining species are considered stable, but challenges remain to ensure sustainability. Habitat needs that are currently stable can quickly be influenced by natural and man-made factors such that gains or losses in the next 1-5 years could quickly lead to declines or improvements to viability of these species.

4-6 Evaluation of Monitoring Question and Indicators: Questions appear adequate to monitor resource; however, as the Forest obtains more data, other indicators that better predict population trends may surface.

4-6 Notable References: Iedenhoeft, J. E., D. M. MacFarland, N. S. Libal, J. Bruner. 2017. Wisconsin gray wolf monitoring report. Wisconsin Department of Natural Resources, Bureau of Wildlife Management.

5 – Recreation

Planning Rule Topic 5 (recreation) within 36 CFR 219.12(a)(5)(v) addresses "the status of visitor use, visitor satisfaction, and progress toward meeting recreation objectives." The National Visitor Use Monitoring (NVUM) program provides reliable authoritative information about recreation visitor use and satisfaction for national forest system managed lands at the national, regional and forest level. Therefore, the monitoring requirements for visitor use and satisfaction are met by the publication of the NVUM results, which occurs every five years. The other monitoring questions for recreation address progress toward meeting the Forest Plan recreation objectives.

National Visitor Use Monitoring

The most recent NVUM report for CNNF is based on data collected in 2016. The complete 2016 report for CNNF can be found online:
https://apps.fs.usda.gov/nvum/results/ReportCache/2016_A09013_Master_Report.pdf

Additional NVUM reports for other National Forests and for previous years can be generated with the online report tool: https://apps.fs.usda.gov/nvum/results/

5-7 – Monitoring Question 7: What is the current status of semi-primitive non-motorized (SPNM) areas?

Monitoring Indicators and Frequency:
(1) Miles of roads and trails open to motorized use within SPNM areas, including over snow vehicle use. Monitored annually.
(2) Miles of roads decommissioned in SPNM areas. Monitored annually.

Background and Drivers: Question 7 and its associated indicators address Planning Rule Topic 5 (recreation) within 36 CFR 219.12(a)(5)(v). The Forest Plan provides direction for recreation opportunities in Goal 2.1. Specifically, Objective 2.1a relates to SPNM:

> Objective 2.1a – Improve the quality of SPNM areas by increasing the opportunity for quiet and remote experiences and by promoting activities that provide natural-appearing vegetation.

The current monitoring question for this resource replaced the previous questions, "has the feeling of quiet and remoteness increased in SPNM areas?" and "where activities have occurred in SPNM areas, does the resulting vegetation appear more natural?" These questions were generalized into the above

question, i.e., "What is the current status of SPNM areas?," because this question would allow indicators to be more quantitatively and consistently measured over time.

Semi-Primitive Non-Motorized Areas designated in the 2004 Forest Plan were not completely free of motorized use; some areas had open roads and motorized trails. Miles of open roads, motorized trails, and decommissioned roads are measures of the potential for motorized activity within SPNM areas. In addition, many corridors are temporarily open to motorized use during winter months as trails, but these corridors are not open as roads or to other vehicle use during the summer season. Thus, snowmobile trails are generally discussed below. Over time, all these indicator results should display whether plan implementation is improving the quality of SPNM areas as directed by Objective 2.1a.

Monitoring Indicator 1 Results and Discussion: Roads remaining open in SPNM areas total 6.65 miles, combined across MA 6A (SPNM Low Disturbance) and 6B (SPNM Moderate Disturbance). Detailed information regarding open roads by Management Area and district is available in Appendix A. Many open roads are a result of providing private land access, local road jurisdiction outside of Forest Service management, and access to recreation sites or features; thus, these roads have a low probability of being altered to increase the semi-primitive non-motorized character.

There are no trails open to non-snow motorized vehicles within SPNM areas. Some trails that are not designated for year-round motorized travel are open to over-snow vehicle use. The total miles of trail open to over-snow vehicle use within SPNM areas is 28.5 miles (Chequamegon landbase) and 25.7 miles (Nicolet landbase).

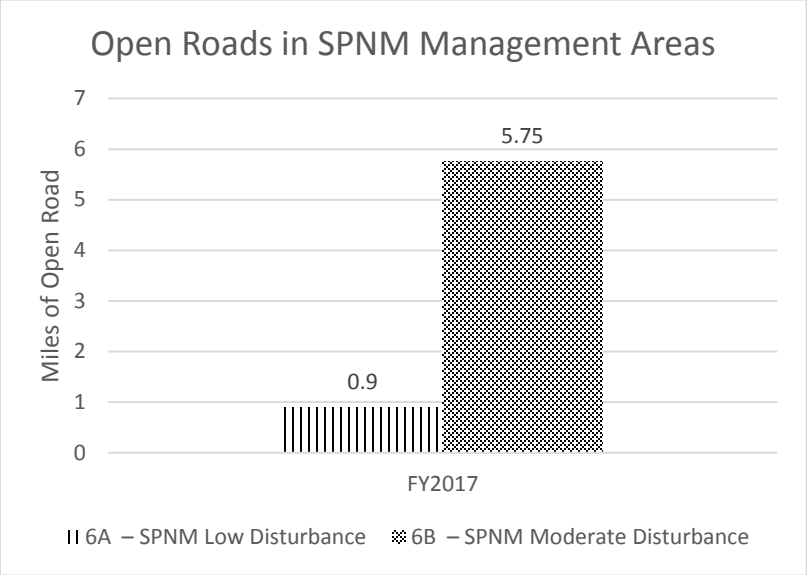

Figure 11. Length of open roads within Semi-Primitive Non-Motorized Management Areas on Forest in 2017.

Further reduction of open roads within SPNM areas is difficult unless private inholdings are acquired by the Forest Service, eliminating the need for private land access, a local township surrenders jurisdiction of a roadway, or a recreation site within a SPNM is closed in the future. The snowmobile trail data for the Forest is not considered comprehensive for this monitoring report cycle; however, it is anticipated this information will be refined with the completion of an Over-Snow Vehicle Use Map (OSVUM) under 36 CFR Part 212, Subpart C.

Monitoring Indicator 2 Results and Discussion: A total of 1.5 miles of road have been decommissioned in SPNM areas during the monitoring period (FY 2015-2017), entirely on the Washburn District. An additional 3.52 miles of road is planned to be decommissioned in the future.

Identification of roads for decommissioning is not done comprehensively, but rather as opportunities arise. Roads are analyzed within project areas and planned for decommissioning when project funds or other means become available.

5-7 Summary of Findings and Recommendation: The semi-primitive non-motorized character in the SPNM areas appear to be increasing, albeit at a slow pace. Many roads have a low probability of being altered due to their jurisdiction and continued value to the local communities, local recreation resources, or local landowners. However, roads continue to be strategically evaluated and altered to reduce motorized use in these unique areas.

5-7 Evaluation of Monitoring Question and Indicators: All indicators work adequately to outline the status of the SPNM areas. However, this question could include a third indicator to splice out over-snow vehicle use. Many corridors are open temporarily during winter months as trails; these corridors are not open as roads or to other vehicle use during the summer season. Therefore, having a specific over-snow indicator in the future might allow us to understand a seasonal dimension to these SPNM areas. When the Forest finishes it's Over-Snow Vehicle Use Map (OSVUM) under 36 CFR Part 212, Subpart C, this indicator would be more developed.

5-8 – Monitoring Question 8: What is the current status of the All-Terrain Vehicle (ATV) and Utility Terrain Vehicle (UTV) trail and route system on the Forest?

Monitoring Indicators and Frequency:
(1) Miles of open ATV/UTV trails by Nicolet and Chequamegon land base. Monitored annually.
(2) Miles of designated ATV/UTV routes by Nicolet and Chequamegon land base. Monitored annually.

Background and Drivers: Question 8 and its associated indicators address Planning Rule Topic 5 (recreation) within 36 CFR 219.12(a)(5)(v). The Forest Plan provides management direction for ATV/UTV recreation through goals, objectives, standards and guidelines. As part of Goal 2.1, the Forest Plan provides direction for maintaining and enhancing recreation opportunities. Specifically, Objectives 2.1d and 2.1e relate to ATV and UTV trails and the monitoring program:

> Objective 2.1d – Construct up to 85 miles of ATV trails on the Nicolet land base.
>
> Objective 2.1e – Construct up to 100 miles of ATV trails on the Chequamegon land base.

The miles of open ATV/UTV trails and routes are indicators of the potential for motorized recreation activities on the Forest, and over time, indicate how plan implementation is maintaining and enhancing recreation opportunities for ATV/UTV use.

UTV monitoring was added to this monitoring question because of the ATV and UTV similarities in Forest management. They utilize similar trail conditions and ride on many of the same trails on the Forest.

Monitoring Indicator 1 and 2 Results and Discussion:

Table 8. Miles of trails and roads open to ATV and UTV use on the Nicolet and Chequamegon land bases of CNNF.

	Nicolet	Chequamegon
ATV/UTV Trails	5.5	198
ATV/UTV Routes	17	524

Appendix A contains additional information about new trail construction and reconstruction by year.

The Forest Plan included specific objectives (Objectives 2.1d and 2.1e) to construct up to 185 miles of ATV trails. While the Forest is well short of this level for ATV trail construction (13.05 miles constructed), the overarching goal (Goal 2.1) for these objectives is to maintain or enhance the diversity and quality of recreation experiences within acceptable limits of change to ecosystem stability and condition. The desired recreation experience regarding motorized trail use has been focused on allowance of UTVs 65" or less. Considering the miles of Forest Service roads opened to ATV/UTVs since 2014 (541 miles), as well as the miles of new and existing ATV trails converted to the standard of UTVs 65" or less (203.5 miles), the CNNF has far exceeded the 185 mile level by making approximately 745 miles of trail available for use.

5-8 Summary of Findings and Recommendation: While the Forest is below the level of *constructing* 185 new miles of total ATV trail, the intent behind the goal of maintaining and enhancing recreation opportunities and objective regarding motorized trails is largely being met. The Forest has opened 541 miles of road to ATV/UTV since 2014 and converted 203.5 miles of trail to UTVs (65" or less) adding 744.5 miles available for ATV/UTV use.

5-8 Evaluation of Monitoring Question and Indicators: Question and indicators are adequate to monitor the status of the ATV and UTV trail and route system on the Forest. However in future monitoring plans, the Forest recommends possibly adding an indicator that addresses, more clearly, the quality and availability of existing or added trails.

5-9 – Monitoring Question 9: What is the status of developed campgrounds?

Monitoring Indicators and Frequency:
(1) Number and percentage of campgrounds managed to standards (Forest Service Manual [FSM] 2332). Twenty percent of campgrounds and associated buildings are surveyed yearly to meet the objectives of INFRA (database of record). In addition, campgrounds are inspected yearly as required in FSM 2332.

Background and Drivers: Question 9 and its associated indicators address Planning Rule Topic 5 (recreation) within 36 CFR 219.12(a)(5)(v). The Forest Plan provides direction for recreation opportunities in Goal 2.1. Specifically, Objective 2.1i relates to developed campgrounds:

> Objective 2.1i: Provide well-maintained developed campgrounds that meet Forest Service guidelines.

Policies that apply to the operation and maintenance of developed recreation sites are set forth in FSM 2332. Each public recreation site is to be inspected annually before the beginning of the managed-use season. For cleanliness requirements, "Cleaning Recreation Sites" (SDTC 9523-1206) is to be followed. INFRA requires developed sites to be surveyed once every five years or 20 percent per year. FSM 2332 requires operations and maintenance plans for each campground or district to be prepared annually. The number of campgrounds that meet the agency criteria of maintenance (following necessary corrective actions) serves as an effective measure of how well the Forest Plan implementation is meeting Objective 2.1i.

Monitoring Indicator 1 Results and Discussion: As of 2016, there are 49 campgrounds on the Forest, including one group campground and two horse camps. Several campgrounds have had temporary closures in recent years, but these campgrounds are still considered open in the INFRA database and are included in this result. Of the 49 campgrounds, 41 of them (84 percent) are currently managed to standards. The remaining eight campgrounds are temporarily closed on the ground. The Forest expects to examine these campgrounds in the near future and make a decision to bring these eight campgrounds back to standard or decommission them (removing them from the database of record [INFRA]).

5-9 Summary of Findings and Recommendation: Most (84 percent) of the Forest's 49 developed campgrounds are currently managed to meet standards. The future of developed campgrounds on the Forest will be determined by a Recreation Site Analysis that is currently underway. It is recommended to complete the Recreation Site Analysis to determine the viability of maintaining certain developed campgrounds; this will influence what recreation sites would be monitored in the future.

5-9 Evaluation of Monitoring Question and Indicators: Question and Indicators are adequate to monitor achievement of these Forest Plan objectives.

5-10 – Monitoring Question 10: What is the status of remote campsites?

Monitoring Indicators and Frequency:
(1) Number of damaged remote campsites. Monitored annually.
(2) Number of damaged remote campsites that have been addressed. Monitored annually.

Background and Drivers: Question 10 and its associated indicators address Planning Rule Topic 5 (recreation) within 36 CFR 219.12(a)(5)(v). The Forest Plan provides direction for recreation opportunities in Goal 2.1. Specifically, Objective 2.1j relates to remote campsites:

> Objective 2.1j: Inventory and manage remote campsites to minimize environmental impacts of recreation use.

Dispersed sites are not part of a designated campground and usually do not include picnic areas or beaches. Dispersed sites sometimes have improvements such as designated parking, fire rings, picnic tables, and rest rooms. Although most dispersed sites are single isolated sites, some have four to six campsites grouped together. Some dispersed campsites are located along well-maintained roads while others are accessible only by foot or horse travel. The indicators for this question focus on the damaged remote campsites since the Forest Plan objective is focused on environmental impacts from recreational use and it can be reasonably assumed that non-damaged campsites have minimal to no environmental impacts. Monitoring the number of damaged remote campsites is an indicator of how well the Forest Plan implementation is meeting Objective 2.1j.

Monitoring Indicator 1 and 2 Results and Discussion: The Forest has not had the capacity to monitor remote campsites annually. Only anecdotal information is available.

5-10 Summary of Findings and Recommendation: No conclusions can be made for this indicator. Anecdotal evidence suggests that most dispersed sites are in acceptable condition. However, some sites have issues associated with trash and human waste, erosion or soil compaction, or damaged vegetation.

5-10 Evaluation of Monitoring Question and Indicators: Limiting capacity and the remoteness of many dispersed sites make it difficult to collect this monitoring data and adequately evaluate the monitoring question. It may be beneficial to amend this monitoring question in the future using a sampling versus census approach or consider omitting it.

It may be beneficial to change the monitoring question to, "How many sites were closed to address environmental impacts or public safety concerns?" or "How many sites required implementation of mitigation measures (e.g., installation of barriers, warning signs, upgrading fire rings or tables) to change site use and to reduce resource impacts?" Gathering a baseline regarding dispersed recreational use and asking these questions would provide more information that could lead to development of management direction and monitoring protocol for remote recreation sites.

5-11 – Monitoring Question 11: What is the status of the 25-mile 4-wheeled drive (4WD) off-road vehicle (ORV) Trail?

Monitoring Indicators and Frequency:
(1) Miles of 4-wheeled drive off-road vehicle (ORV) trail closed. Monitored annually.
(2) Miles of replacement trail constructed. Monitored annually.

Background and Drivers: This question's associated indicators address Planning Rule Topic 5 (recreation) within 36 CFR 219.12(a)(5)(v). The right-of-way along an American Natural Resources (ANR) natural gas pipeline near the eastern edge of the Lakewood-Laona Ranger District includes a designated off road vehicle (ORV) trail. The trail has a history of deteriorating trail conditions that has included exposure of the pipeline and extreme rutting. The Forest Plan specifically provides direction for this trail in Objective 2.1l:

> Objective 2.1l: If maintenance methods prove ineffective and monitoring confirms unsafe conditions or unacceptable resource damage, close and rehabilitate the existing 25-mile 4-wheel-drive off road vehicle trail. Then construct one replacement trail up to 25 miles in length elsewhere on the Forest, providing an agreement with a non-Forest Service entity is developed to do trail condition monitoring and maintenance.

Concerns over safety of users and environmental degradation because of excessive amounts of erosion led to the inclusion of this question and indicators.

Monitoring Indicator 1 and 2 Results and Discussion: The total length of open trail is 12.1 miles as of Fiscal Year 2017, which is the result of cumulative closings of 12.9 miles of trail due to safety and environmental damage concerns. In 2013, ANR closed a section of the trail with fencing because of excessive erosion that nearly exposed the nearby gas pipeline, and this section was targeted for a 2015 rehabilitation and erosion control project. The decision for this project indicates this section of the trail would remain closed to recreational traffic to allow vegetation growth to become established, which would reduce future erosion problems along these slopes.

No new trail has been constructed to replace the closed trail; however, new user-created trails have been established off the designated trail. Damage continues to occur on the open section, and more segments are recommended for closure in 2018 and beyond. Closures have proven partially effective through monitoring. Unauthorized users, on occasion, have tried to break through the closure device but more typically, they find or create another route. Up to 5 miles of user-developed travel-ways have been observed from recent monitoring, which indicates that although closure devices are mostly effective at specific locations, they are not a compete deterrence and cannot be totally relied upon for stopping all unauthorized use.

5-11 Summary of Findings and Recommendation: Approximately 12.1 miles of the ORV trail are still open for use; no additional authorized trails have been constructed. New unauthorized, user-created trails are starting to be developed. Ongoing public safety and environmental degradation issues suggest that the current approach is not meeting the objective. Development of new approaches to the management of this trail would be beneficial to the Forest.

5-11 Evaluation of Monitoring Question and Indicators: Question and indicators are adequate to monitor achievement of Forest Plan objectives.

5-12 – Monitoring Question 12: What is the status of wilderness and potential wilderness?

Monitoring Indicators and Frequency:
(1) Percentage of wilderness meeting desired conditions. Annually monitored.
(2) Annual Wilderness Stewardship Performance rating. Annually monitored.

Background and Drivers: Question 12 and its associated indicators address Planning Rule Topic 5 (recreation) within 36 CFR 219.12(a)(5)(v). The Forest Plan provides guidance for providing wilderness recreation opportunities in Goal 2.3 and Objective 2.3:

> Goal 2.3 – Wilderness Opportunities - Provide opportunities for recreational, aesthetic, and educational experiences within Wilderness and Wilderness Study Areas that are consistent with the values of those areas.
>
> Objective 2.3: Allow decommissioning of roads that divide wilderness areas or that occur between Wilderness and Wilderness Study Areas to improve the wilderness experience.

In 2015, the Forest Service began a new monitoring approach called Wilderness Stewardship Performance (WSP), defined by the Wilderness Stewardship Performance Guidebook. This follows the Chief's 10-year Wilderness Stewardship Challenge by allowing greater flexibility in the selection of elements of local concern, linking the performance measures and wilderness character, and providing modified elements in response to lessons learned over the previous decade. Within the WSP framework, CNNF has chosen the following 10 elements for calculating the ratings:

- Invasive Species
- Air Quality Values
- Water
- Recreation Sites
- Trails
- Agency Management Actions
- Opportunities for Solitude
- Workforce Capacity
- Education
- Wilderness Character Baseline

The results of the WSP element ratings for each wilderness area serve as effective measures of whether Forest Plan implementation is achieving the goals and objectives for wilderness recreation opportunities. The implementation of this rating system is in its infancy and may not paint an accurate picture until the Forest experiences more years of data collection and implementation.

Monitoring Indicator 1 Results and Discussion: The metric for judging stewardship acceptable levels were set in 2015; this level was set as the standard. Since then, many efforts have been employed to meet and exceed minimum standards; however, due to environmental, fiscal, and operational challenges, monitoring these efforts was not completed. Thus, the Forest doesn't have monitoring data for the minimum stewardship level for each Forest wilderness area (Rainbow Lake, Blackjack Springs, Whisker Lake, Porcupine Lake, and Headwaters), allowing us to see the percentage of wilderness meeting desired conditions. The efforts to meet and exceed standards are currently underway (i.e., no preliminary results are available) and will be accounted for in subsequent monitoring reports.

Monitoring Indicator 2 Results and Discussion: Currently, all wilderness areas on the Forest are scoring 22/104 on Wilderness Stewardship Performance Elements in 2015 through 2017. Most of those points were scored with current documented baseline data and data management.

The Forest successfully completed the Chief's 10-year Wilderness Stewardship Challenge, and embarked on the new WSP monitoring approach in 2015. Because of the new requirements, the Forest wilderness scores have dropped from above 60 points (minimum management level) to just about 20 points. This change is common across all wilderness areas; currently, less than 10 percent of Region 9 Wilderness Areas are managed to standard (greater than or equal to 60 points). Efforts to improve the Wilderness Stewardship Performance rating are currently underway, and will be accounted for in subsequent monitoring reports.

5-12 Summary of Findings and Recommendation: It is too early in implementing the new Wilderness Stewardship Performance standards to draw conclusions. The implementation began in 2015 and 2016. The evaluation method is functional and proficient, but the time to achieve management level was not sufficient. The Forest recommends allowing more time for efforts to meet and exceed standards currently underway.

5-12 Evaluation of Monitoring Question and Indicators: This method of monitoring is a simple and an effective way to obtain a snapshot of the Forest's progress toward "managing to standard" as defined by the Wilderness Stewardship Performance Guidebook.

6 – Climate Change and Other Stressors

6-13– Monitoring Question 13: To what extent is Forest Plan implementation contributing or controlling populations of Non-native Invasive Species (NNIS)?

Monitoring Indicators and Frequency:
(1) Number of patches and patch extent of NNIP.

Surveys are targeted toward areas likely to become infested such as recreation areas and roadsides. These sites are surveyed every one to three years on average. Very few project stands are pro-actively surveyed for non-native invasive plants (NNIP) unless the area needs a survey because there is a potential for T&ES species.

(2) Number of patches and patch extent of NNIP treated.

Monitoring of existing patch treatment data is collected as sites are treated and estimation of percent cover, patch size, and density are recorded in *TESP- Invasive Species*.

Background and Drivers: This question's associated indicators address Planning Rule Topic 6 (climate change and other stressors) within 36 CFR 219.12(a)(5)(vi). Climate change is increasing the length of the growing season and increasing ecosystem disturbances through episodic weather events (e.g. rainfall, wind). In addition to changes in precipitation, these variables will allow more southern invasive species to survive in northern Wisconsin. According to Dukes et al. (2009), likely non-native invasive plants (NNIP) responses to climate change include: increase in severity of infestations and impacts,

greater abundance and more widespread, range expansion (other factors may facilitate such as storms, floods, tree mortality), and increased competition for resources with native plants (some NNIP make better use of $C0_2$ and NO_2 than natives do). There remains uncertainty in both climate change scenarios and in how invasive species will respond to climate change. The Forest Plan provides guidance for controlling non-native invasive plants in Objective 1.4g:

> Objective 1.4g: Annually treat non-roadside and roadside NNIS acres. Develop an NNIS strategy to guide amounts and locations of treatments.

The NNIP increase has influenced ecosystem health and recreation use, which has resulted in changes in forestry, wildlife and recreation management practices. Invasive plants have the potential to reduce tree regeneration and growth as well as disrupt the food chain of both rare and common species of insects, birds and other wildlife. Invasive species could negatively affect recreation experiences on the Forest, such as a recreation area infested with blister-causing parsnip. The Forest monitors the occurrences of NNIP because it is an influential Forest stressor. The number of patches and patch acres serve as the unit of measure for how frequently NNIP occur on the Forest. The number of sites and area treated for NNIP serve as the unit of measure for how the Forest is controlling known occurrences of NNIP.

Monitoring Indicator 1 Results and Discussion: 6,299 sites (i.e., patches) and 3,445 infested acres (entire extent) have been recorded as of October 2017. Almost 4,000 sites are less than a tenth of an acre in size (42 percent of all sites). 5,705 sites are less than an acre in size (90 percent of all sites). Less than one percent of the sites are more than 10 acres (50 total sites).

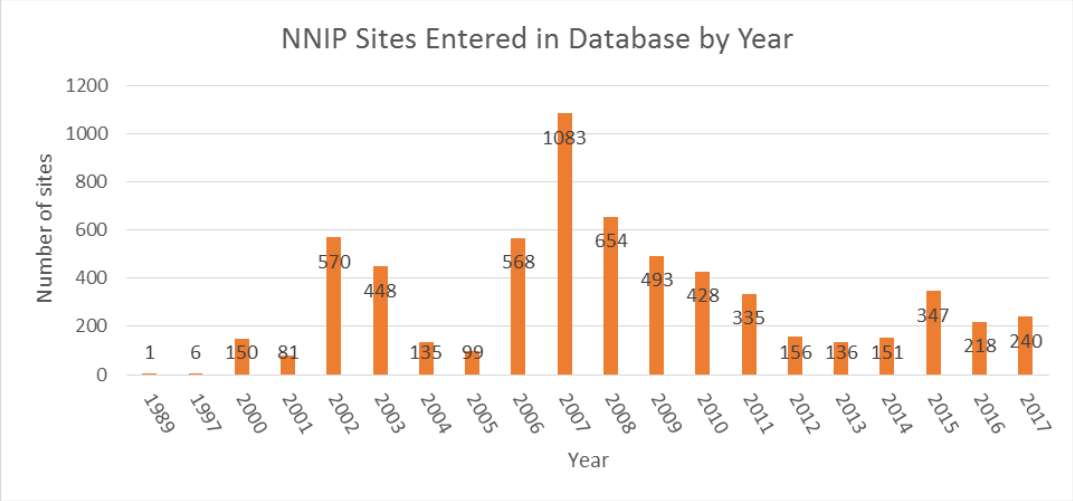

Figure 12. Number of new non-native invasive plant (NNIP) sites discovered on Forest by year.

The acres of NNIP sites have increased in total over the years; however, the number of sites detected annually has decreased (Figure 12). It is uncertain if the reduction in the number of new sites detected annually is due to a lower infestation rate or variability in survey and reporting efforts. The total acres of NNIP has increased over the years (Figure 13). Patch density may show a different pattern, but this metric has been unable to be quantified from the TESP-IS data, the repository of NNIP monitoring data. The assumption is that patches of NNIP are reduced due to treatment. Early detection and rapid treatment have prevented the spread of new patches.

Several NNIP whose range was initially further south have been found on the Forest (e.g., Japanese hedge parsley, black locust, bristly locust, and solidstem burnet saxifrage). These species may or may not have any range limitations due to growing season length or cold hardiness.

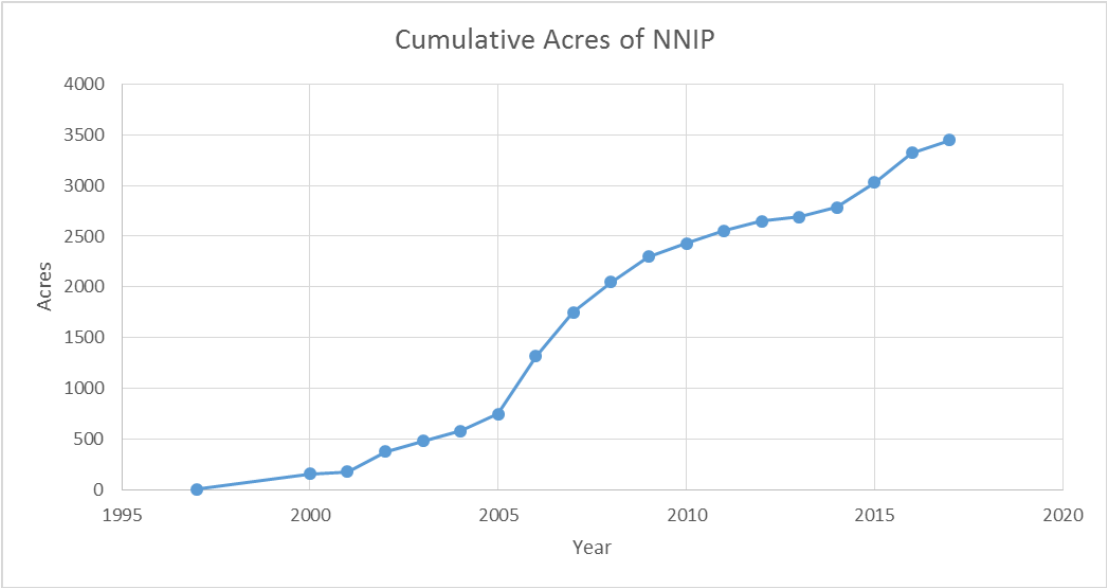

Figure 13. Cumulative acres of non-native invasive plants (NNIP) on CNNF, 1997 to 2017.

Anecdotally, field biologists on the Forest have found an increasing number of garlic mustard sites in the past few years. They have also noticed an approximate two-week shift in the timing of average flowering of garlic mustard. For example in 2012, garlic mustard flowered the first week in April, whereas in the past, it typically flowered the 3rd week of April.

Monitoring Indicator 2 Results and Discussion: Invasive plant sites are treated and recorded in our FACTS database every year. Some of these treatments were repeat treatments of the same infested areas, increasing effectiveness.

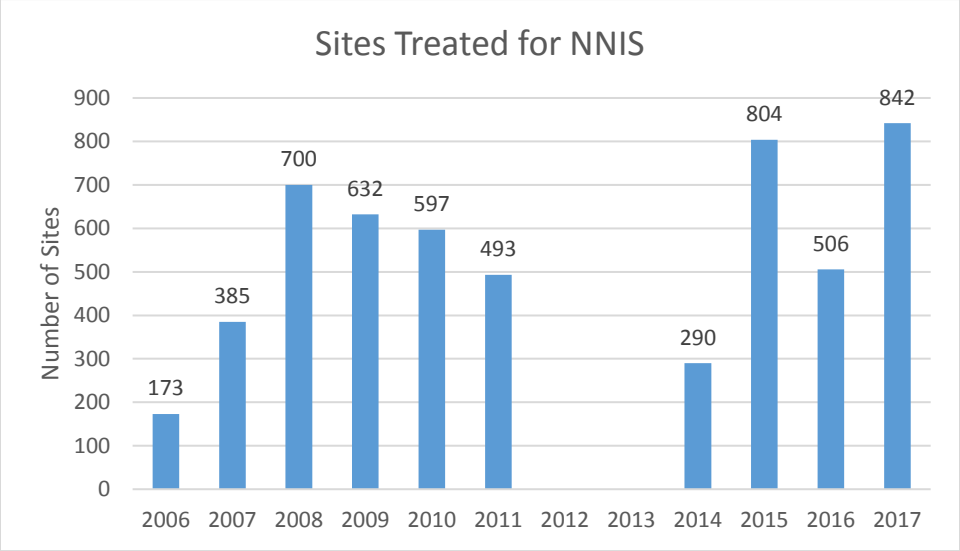

Figure 14. Annual number of sites treated for NNIS during FY 2006-2017 on CNNF.

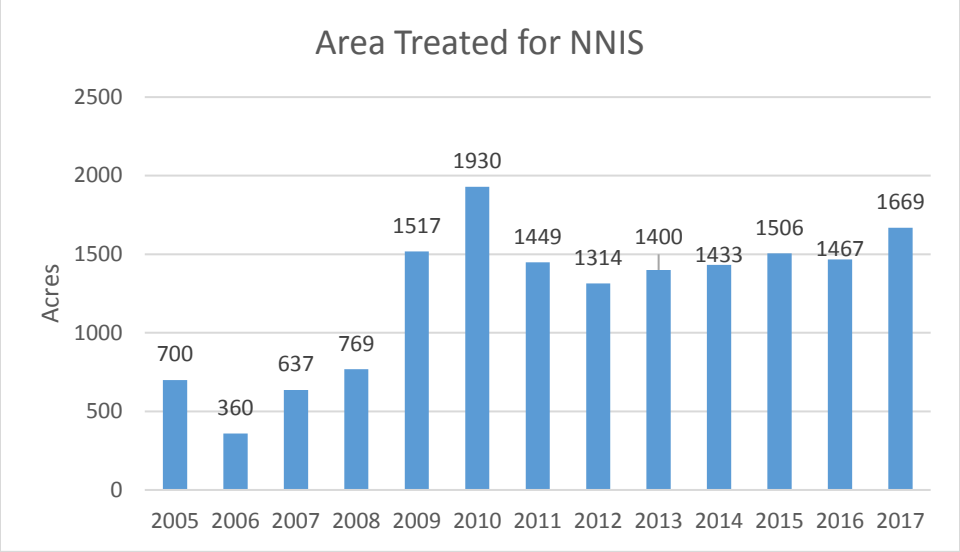

Figure 15. Annual area treated for NNIS during FY 2005-2017 on CNNF.

The Forest is able to treat about half of all the infested acres on the Forest (see Appendix A for more details). The density of infested sites is being reduced due to the treatment activities and many re-treatments. The current database shows 144 sites (of the 6,299) have zero percent cover or NNIS have been eradicated.

6-13 Summary of Findings and Recommendation: New NNIP site numbers have been decreasing; acres of NNIS infestation has increased but there is a consistent trend when looking at past years. Infested sites treated have been above the normal average when compared to years past and acres treated remain consistent with recent years. The Forest has been successful at eradicating NNIP on some sites.

Not measured here, but it is important to note that most timber sales have NNIP present. The Forest may find it beneficial to develop a monitoring indicator to evaluate this possibly important transportation of NNIP, especially as acres treated through timber harvesting increases.

In addition, it would be beneficial to monitor and evaluate NNIP site density over time. Having this capability would allow the Forest to determine if treatment is reducing NNIP at a local scale and provide more detail to the interpretations of the above information. This increase detail would allow the Forest to better evaluate how current management activities or public recreation activities may influence NNIP numbers.

6-13 Evaluation of Monitoring Question and Indicators: The question and indicators fall short in answering, "To what extent is Forest Plan implementation contributing or controlling populations of NNIS?" More time and data could bring more clarity to the evaluation of this question; the Forest recommends changing the question indicators, possibly adding an NNIP density indicator if feasible.

6-13 Notable References:

Dukes et al. 2009. Responses of insect pests, pathogens and invasive plant species to climate change in the forests of northeaster North America: What can we predict? Canadian Journal of Forest Resources Vol 39, 2009.

Hellman, J.J. et al. 2007. Five potential consequences of climate change for invasive species. Conservation Biology, Vol 22, No. e, pp. 534-543.

6-14 – Monitoring Question 14: To what extent are large disturbance events (over 100 acres) occurring on the Forest, including those related to weather, insect outbreaks, and disease? (Objective 1.4i)

Monitoring Indicators and Frequency:

(1) Number, severity and size of large (> 100 acres) forest disturbances by type of disturbance (wind, flood, wild fire, insect, disease). Annually monitored.

(2) Acres salvaged by type of disturbance. Annually monitored.

Background and Driver(s): Question 14 and its associated indicators address Planning Rule Topic 6 (climate change and other stressors) within 36 CFR 219.12(a)(5)(vi). Changing climate has the potential to alter the disturbance regimes affecting the Forest. As the climate warms, large-scale disturbances (especially wind, flood and wild fire events) are expected to occur more frequently, in part because warmer air can hold more moisture. Increases in large-scale disturbances (whether caused by climate change or other drivers) may need to be taken into account in deciding how the Forest manages resources. Large-scale disturbances may affect forest resources including forest products and terrestrial and aquatic ecosystems.

The Forest Plan provides direction for providing healthy, diverse and productive terrestrial ecosystems as part of Goal 1.4. Specifically, Objective 1.4i addresses the salvage of forest resources following large disturbance events.

> Objective 1.4i – When large disturbance events (more than 100 acres) occur within forested areas, maintain a portion of the damaged vegetation to provide additional site level structure and coarse woody debris

The number, intensity and size of large disturbances serve as the measure for identifying changes in the forest disturbance regimes that have the potential for large impacts to forest resources. The acres salvaged serve as the measure to determine if the Forest is meeting Objective 1.4i in response to large disturbances.

Monitoring Indicator 1 Results and Discussion:

Wind Storms

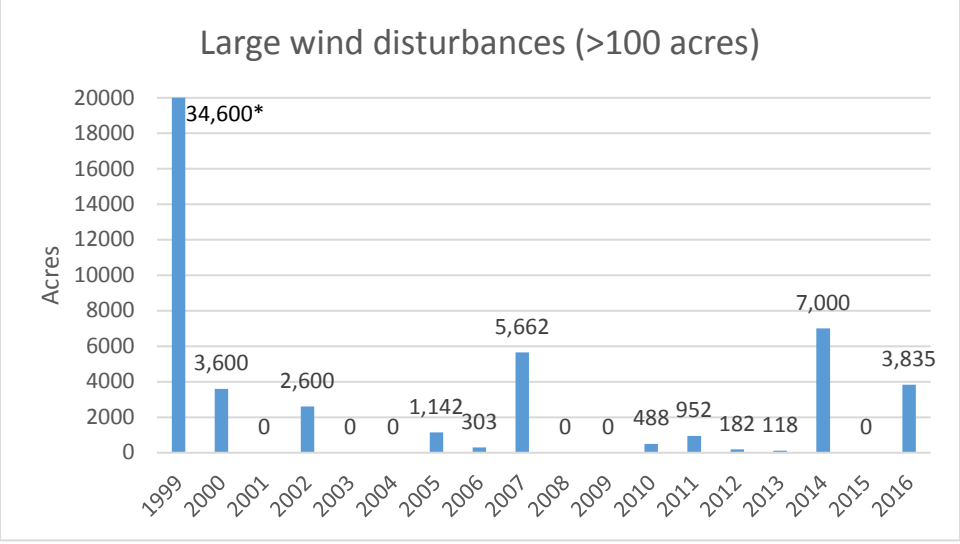

Figure 16. Area of large wind disturbances by year on Forest for 1999-2017.
*This dramatic rise in disturbance acres was attributed to the Delta-Drummond and Eagle River-Florence Blowdown events.

Since 1999, large wind events have occurred at a rate of about 12 events per decade. There is no clear trend in the area affected by large wind events over time. The larger wind events (Delta-Drummond, Salvage Blowdown, Park Falls Blowdown, Gilman Tornado, Quad County Tornado, Independence Salvage, Chequamegon Salvage, and Twin Lakes) accounted for the vast majority of the acres, about

57,000 acres affected (22,000 acres were salvaged). The interval between these major events averages 2.4 years, or about four events per decade. The thirteen smaller events totaled about 2,950 acres, or about 227 acres each. This does not include seven storms for which fewer than 100 acres were affected.

Flood

There was one flood event (greater than 100 acres) during the monitoring period of 2011 through 2017. A broad swath of severe weather moved across northwestern Wisconsin on July 11, 2016, heavily affecting eight counties. The Forest sustained damage in Ashland, Bayfield and Sawyer counties, with most of the damage occurring on the Great Divide Ranger District. Rainfall totals ranged between 9-13 inches during a six-hour timespan causing severe flash flooding that damaged roads, bridges and trails. The Forest sustained an estimated $15 million of damage from the storm. Peak water flows approached and exceeded a 500-year flood level, causing massive destruction of transportation infrastructure within and surrounding the Forest.

The Forest has more than 1,500 road-stream crossings. Since 1998, the Forest has replaced 257 crossings and invested over $12 million, focusing on minimizing impacts to stream channel morphology and constructing appropriate aquatic organism passages. Of the 206 crossings the Forest replaced since 2000, 22 were located in the area impacted by the 2016 flood. Of these, 18 survived the flood (81 percent). These crossings survived this, in excess of, 500-year flood (many being overtopped by water) due to the prior work of the Forest, which in turn reduced further infrastructure impacts and downstream resource impacts.

Wildfire

Since the establishment of the Forest Plan in 2004, there has been one wildfire that exceeded 100 acres. The Pioneer Fire on the Great Divide Ranger District started burning in late April 2007. The fire burned a total of 1,270 acres, of which 670 acres were on the National Forest, 80 acres were on the St. Croix National Scenic Riverway, and 520 acres were on private land.

Insect & Disease

Several non-native insect and diseases are currently affecting national forest lands, including gypsy moth and oak wilt, each affecting more than 100 acres per year (or have in the past). Emerald ash borer is a destructive non-native insect that is affecting nearby lands and forests south and east of the Forest, but this insect has yet to be detected on the Forest.

a. Gypsy Moth

Although the CNNF treated thousands of acres annually from 2005 to 2013 with either pheromone flakes or BtK (a biological insecticide) as part of the Gypsy Moth Slow-the-Spread program (see Appendix A), there have been no aerial applications of pheromone flakes or BtK since 2013. In short, the gradual westward moving front of the gypsy moth infestation has passed the Forest and is considered a low probability for the Chequamegon-Nicolet National Forest. Although low populations of gypsy moth are present on the Forest, no significant gypsy moth defoliation was mapped during annual pest detection flights this reporting cycle, i.e. in 2015, 2016, or 2017.

b. Oak Wilt

New pockets of oak wilt continue to be discovered in the Waubee Lake vicinity on the Lakewood-Laona Ranger District (northern Oconto County). The total number of oak wilt pockets on the Forest is about 250. All have been treated one or more times since 2001 (see Appendix A). The average size of an oak wilt pocket is about one acre.

Treatment involves harvesting infected trees and then upturning the rootwads with an excavator to sever root grafts, thereby preventing underground spread of the disease. Healthy oaks that are close enough that root graft connections are likely also need to be treated. On average, about 20 oak wilt pockets (containing about 2,000 trees) have been treated annually since 2001.

c. Emerald Ash Borer (EAB)

Emerald Ash Borer (EAB) has not yet been found on the Chequamegon-Nicolet National Forest. However, the EAB quarantine now includes the entire state. This pest has the potential to kill virtually all ash on the Forest within the next decade. The majority of the ash resource on the Forest are in lowland hardwoods, i.e., black ash swamps, many of which are not productive and all of which are difficult for timber operations to occur. Due to the inoperability and risk assessment of EAB impacts, the Forest has not taken steps to pre-salvage ash stands or to diversify lowland hardwood stands, ahead of EAB arrival.

Monitoring Indicator 2 Results and Discussion:

Wind Storms

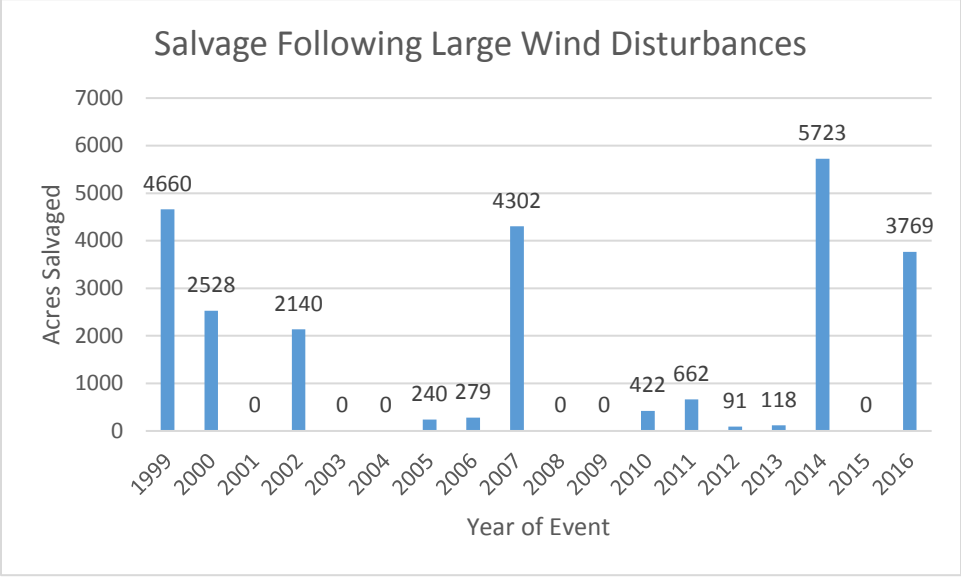

Figure 17. Annual area of salvage following large wind events (> 100 acres) on Forest, 1999-2017.

Flood

No salvage projects have occurred (or have been completed) following large flood events between 2011 through 2017.

Wild Fire

Of the 670 acres burned on the Forest from the Pioneer Fire, approximately 220 acres were salvaged (33 percent salvaged).

Insect & Disease

No salvage projects occurred following large insect and disease events during the current monitoring period (2011-2017). Previous monitoring reports included salvage harvests for spruce decline.

Of the 60,482 acres disturbed by the large wind events, 24,934 acres were salvaged, rate of approximately 41 percent. This implementation monitoring shows that the Forest is consistent with Objective 1.4i, maintaining a portion of damaged vegetation to provide additional site level structure and coarse woody debris following large disturbance events. In most cases, a portion of the affected timber was not salvaged for one or more reasons: a) It was in Management Area 8E, 8F, or 8G where salvaging is done only when the downed timber poses a threat to adjacent lands; b) It was desired to leave a certain amount of large woody debris for wildlife habitat; c) It was in inoperable lowlands; or d) Access to the stand was problematic.

6-14 Summary of Findings and Recommendation: The most frequent large scale natural disturbance on the Forest is wind events. The data collection methods for monitoring these events may miss small areas of blowdown; however, the Forest believes this is a small, inconsequential number due to the Forest's active timber salvage program following the majority of the past wind events. In addition, utilizing NEPA decisions in this data collection method is the most practical and sustainable way to evaluate this monitoring question.

Large scale wind events average about 5,000 acres and occur about every 2.5 years. On average, about 41 percent of wind damaged acres are salvaged. The Forest is meeting Forest Plan Objective 1.4i by leaving and salvaging portions of the aftermath of these disturbance events. No Forest Plan changes are recommended.

6 -14 Evaluation of Monitoring Question and Indicators: The Forest recommends continuing with existing monitoring methods because they are the most practical and sustainable when considering workforce shortfalls. In addition, the Forest suggests being proactive on future disturbance events that haven't been monitored or events that haven't yet occurred at devastating scales but are looming, possibly including ash forest monitoring for the occurrence of emerald ash borer disturbance events.

7 – Desired Future Conditions

7-15 – Monitoring Question 15: What are the effects of prescribed burning on Class I and Class II air sheds?

Monitoring Indicators and Frequency:
(1) Acres treated by prescribed fire.
(2) Air quality measurements before, during and after prescribed fire.
(3) Rainbow Lake Wilderness area air quality measurements.

Air quality is monitored annually and evaluated every 5 years.

Background and Driver(s): This monitoring question's associated indicators address Planning Rule Topic 7 (desired future conditions) within 36 CFR 219.12(a)(5)(vii). The Forest Plan provides guidance for air quality in Goal 1.6:

> Goal 1.6 – Air Quality: Forest ecosystems are not adversely affected by air pollution; forest management activities are conducted to protect or maintain air quality.

Smoke from prescribed fires is monitored to provide information to the public in a timely manner so that they can make decisions based on their health. The number of acres treated by prescribed fire serves as a measure of how much burning is being conducted by CNNF, which provides context for how much potential smoke could be affecting air quality. Specific monitoring of air quality in areas affected by prescribed fire demonstrates the level and duration of impacts surrounding a burn. The Clean Air Act gives special air quality and visibility protection to national wilderness areas larger than 5,000 acres that were in existence when it was amended in 1977. These protected areas are "Class I" areas, and all other areas are "Class II". Rainbow Lake Wilderness is the only Class I air shed on the Forest, and is separately monitored for air quality indicators.

Monitoring Indicator 1 Results and Discussion:

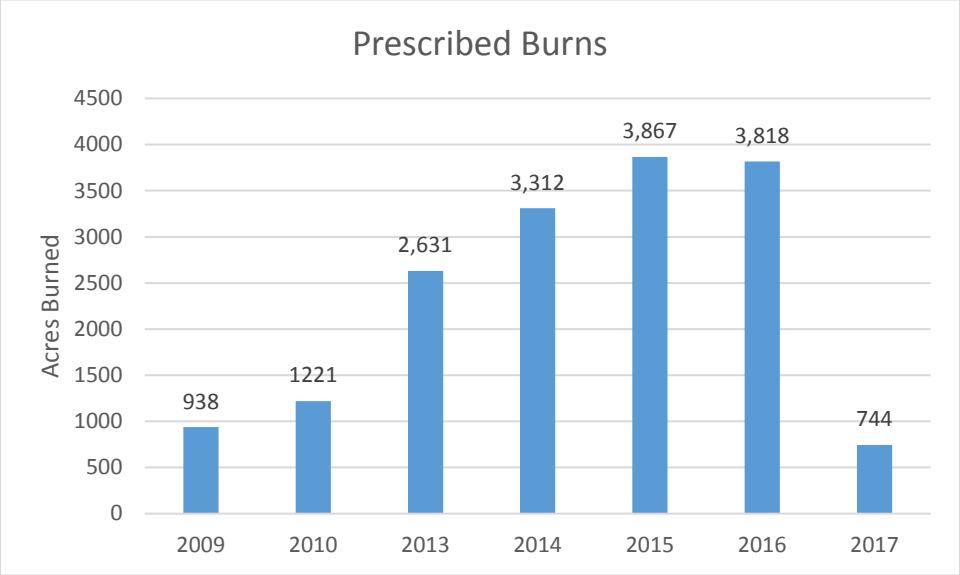

Figure 18. Acres of prescribed fire by year on CNNF for the periods 2009-10 and 2013-2017.

The acreage of prescribed burns has increased in recent years compared to the areas in the 2010 monitoring report. The trend for acreage production reflects an increased emphasis on using prescribed fire as an appropriate management tool in fuels reduction, wildlife habitat maintenance and improvement, and ecological restoration. The notable decrease in burn area in 2017 was a result of weather conditions that prevented the execution of large planned burns.

Monitoring Indicator 2 Results and Discussion: Smoke monitoring on the Moquah Barrens burns was started in 2011. This is the only location on the Forest where smoke monitoring has taken place because the Barrens burns are the largest on the Forest and near sensitive receptors. The main purpose of the smoke monitoring is to determine the magnitude of smoke impacts and communicate this information to the public. The following is a typical example of the impact of a burn in the Barrens (data from USFS Air Resource Management Program). This burn occurred over a one-day duration.

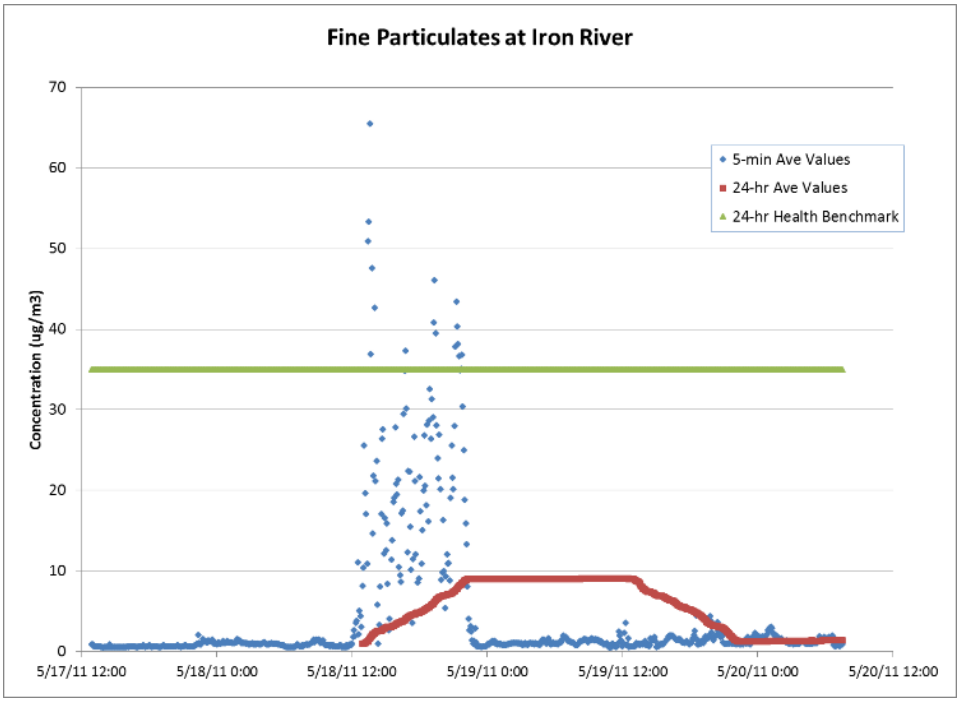

Figure 19. Twenty-four hour fine particulate concentrations at Iron River, WI (near prescribed Moquah Barrens burns) in May 2011.

The pattern in Figure 19 is typical of the fine particulate trends monitored near the Moquah Barrens prescribed burns. The pattern shows some short-term high values (e.g., 5-minute average data in the graph), while the daily average impacts (red line) are below national health benchmarks. The length of impact is generally limited to the day of the burn and possibly the day after.

Monitoring Indicator 3 Results and Discussion: Smoke monitoring has been conducted in the immediate vicinity of the burns and not at Rainbow Lake. Visibility is not a protected value at Rainbow Lake, but other Air Quality Related Values are, such as: injury to plants, precipitation chemistry and water chemistry. Precipitation chemistry for Rainbow Lake is measured in Spooner, WI, because it is the closest site with a suitable air monitoring station. There is a long-running water chemistry-sampling program from lakes in the wilderness. Trends in these datasets reflect regional transport of air pollution

from source regions such as Chicago and points to the south (LADCO 2008). In addition, the impacts of a burn are very short-term and highly unlikely to affect these datasets.

The impacts on Rainbow Lake from prescribed burning activities are minor if measurable at all. In the future, smoke from a prescribed burn could drift into Rainbow Lake if it was close enough. If this does occur, it needs to be put in the context of what amount of wildfire smoke would naturally be in the wilderness.

7-15 Summary of Findings and Recommendation: There are nominal impacts to surrounding airsheds as a result of prescribed fire activities. Lasting effects on Class I and II air sheds are very minor, if measurable at all. Acres treated by prescribed fire are sustainable at current levels and are expected to continue into the foreseeable future. If there are deviations to the acreage burned, it is because of weather-related burn opportunities.

The current monitoring activities appear to be adequate to capture the impacts of smoke on the Forest. Any site specific changes can be dealt with in burn plan preparation.

7-15 Evaluation of Monitoring Question and Indicators: The monitoring question and indicators are adequate for the monitoring program. However, improvements could be made. There might be benefit in revising the monitoring question to ask only about Class 1 airsheds and not Class 2, where maintaining "attainment" status is key.

7-15 Notable References:

Lake Michigan Air Directors Consortium. 2008. Regional Haze in the Upper Midwest: Summary of Technical Information (Version 2.2, February 2008), accessed on 10/18/17 at http://www.ladco.org/reports/rpo/consultation/products/regional_haze_in_the_upper_midwest_summary_of_technical_information_v2.2_feb_22_2008.pdf

7-16 – Monitoring Question 16: What is the current status of heritage resources?

Monitoring Indicators and Frequency:
(1) Acres of phase I surveys. Monitored annually.
(2) Number of sites monitored. Monitored annually.
(3) Number and description of cooperative heritage resource studies. Monitored annually.

Background and Driver(s): This monitoring question's associated indicators address Planning Rule Topic 7 (desired future conditions) within 36 CFR 219.12(a)(5)(vii). The Forest Plan provides direction to manage heritage resources in Goal 2.4 (Manage cultural heritage to provide future generations an opportunity to appreciate and experience the Forest's diversity of human history, American heritage, and the delicate ecological relationship between people and the land). The monitoring program specifically ties this question to Forest Plan Objective 2.4a: Promote the scientific study of a selected heritage resource, primarily through public participation and institutional/governmental partnerships.

Tracking or surveying the prehistoric or pre-contact Forest use allows the agency to protect heritage resources prior to project implementation and involve public participation and institutional partnerships. The area surveyed for heritage resources and the numbers of monitoring sites recorded serve as the unit of measure regarding heritage resources available for future studies.

Monitoring Indicator 1 Results and Discussion:

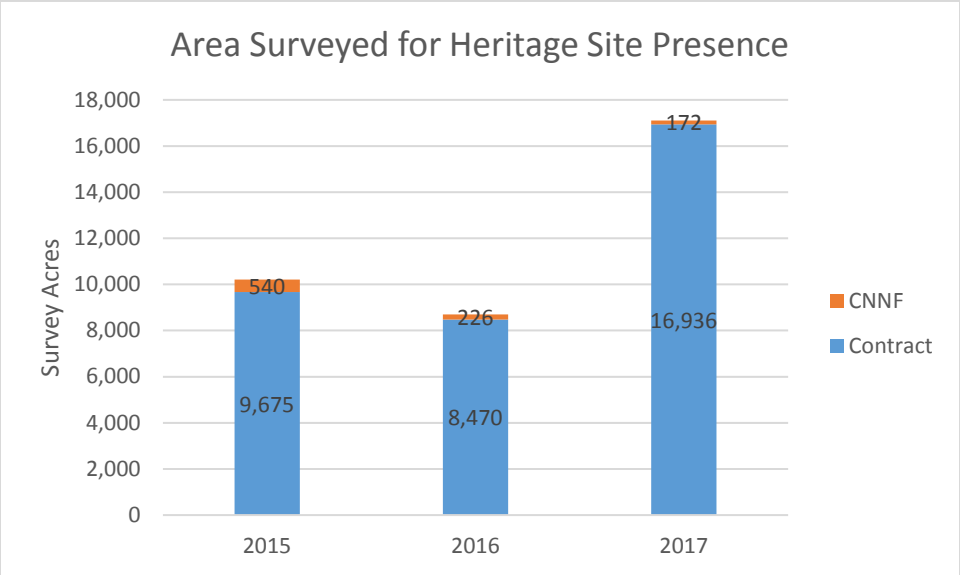

Figure 20. Acres surveyed for heritage site presence by external contract and internal Forest personnel by year for the monitoring period 2015-17.

The area of survey completed (by contract) has been increasing while the area of survey completed by Forest personnel has been declining. The proportion of survey acres completed by contract was approximately 97 percent during the three-year period. The majority of survey contracts are completed through timber projects, so the general increase in contract survey acres in recent years is largely due to similar increases in timber activities. The monitoring activities include surveying for heritage sites, making sure the activity impacts are known and minimized.

Monitoring Indicator 2 Results and Discussion:

Table 9. Number of sites monitored per year during 2015-17 on CNNF.

Year	Sites Monitored
2015	23
2016	28
2017	37

Due to the interdepartmental relationship of the heritage program, an increase in monitoring can be largely due to the requirements from other departments, primarily timber. For example, when timber executes new activities, heritage personnel survey potential heritage sites and monitor known sites in and near the new activities to minimize impacts. The number of monitored sites has been increasing.

Looking beyond timber implementation influence, the number of sites monitored also varied by site types (pre-contact or historic). The Forest tends to monitor more pre-contact sites when compared to historic sites because the pre-contact Native American sites often have a bigger layout than a historic site. In response to interest by the Native American community, the Forest tries to focus on the pre-historic sites due to their history and nature.

Monitoring Indicator 3 Results and Discussion: There have not been any cooperative heritage resource studies during the monitoring report period (2016-2017). These resource studies are largely long-term actions that are not initiated on a regular basis.

7-16 Summary of Findings and Recommendation: The area of Phase 1 surveys and the number of heritage sites monitored increased during the reporting period. However, no specific cooperative heritage resource study took place during this two-year monitoring period. The Forest has no recommendations to change management practices in the heritage program regarding increasing heritage studies at this time.

7-16 Evaluation of Monitoring Question and Indicators: It may be beneficial to re-look at the monitoring question, "What is the current status of heritage resources?" Monitoring the status of the hertiage resources is vague and difficult to draw conclusions from. The Forest may consider evaluating the quality of heritage site protection or mitigations, monitoring a heritage site before and after project implimentation (answering if the site changed or was the site quality degraded).

Cooperative heritage resource studies are largely long-term actions that are not initiated on a regular basis, and may not be suitable for biennial report monitoring. It may be more beneficial to monitor restoration projects instead.

In addition, it may be beneficial to consider indicators that measure the quality of tribal consultation when heritage sites are involved. In addition, the Forest could increase the level of site monitoring by measuring the number of sites altered during project implementation. Doing so may increase the understanding of activity impacts, or lack thereof, on heritage resources.

Ultimately, it is recommended that the Forest increase the alignment between monitoring indicators, monitoring questions, and Forest Plan goals and objectives, so that the trends to Forest Plan objective attainment can be better understood.

7-17 – Monitoring Question 17: To what extent is Forest Plan implementation harvesting forest products, and are harvest levels sustainable?

Monitoring Indicators and Frequency:
(1) Volumes of forest products harvested by silvicultural method and product type. Monitored annually.
(2) Quantity of special forest products harvested/permitted. Monitored annually.

Background and Drivers: This monitoring question's associated indicators address Planning Rule Topic 7 (desired future conditions) within 36 CFR 219.12(a)(5)(vii). The Forest Plan provides direction for forest commodities (wood products and special forest products) in Goal 2.5.

> Goal 2.5: Contribute toward satisfying demand for wood products and special forest products through environmentally responsible harvest on National Forest System lands.

The Forest Plan identifies decadal limits of allowable sale quantity (ASQ) in Forest Plan Appendix GG. The plan analysis that produced the ASQ values included the principle of long-term sustained yield timber capacity. Therefore, harvest quantities that do not exceed ASQ (over a decade) can be considered sustainable.

Special forest products are plant or fungi materials gathered for personal use, barter, commercial resale, and sale as craft products. The Forest Plan provides specific direction for special forest products in Objective 2.5: ensure that harvest levels of special forest products are within sustainable levels.

There is no credible inventory of special forest products, and no reasonable way to estimate sustainable and ecologically sound harvest levels. Therefore, trends in special forest product gathering provide the best available method for identifying specific products that may have sustainability concerns. The Forest tracks harvesting of special products through the issuance of permits that serves as the unit of measure for monitoring trends in special forest product harvest. Additional gathering of special forest products on CNNF lands is done outside of the Forest permit process by tribal members exercising their treaty rights under the Memorandum of Understanding regarding Tribal-USDA Forest Service Relations on National Forest Lands within the Ceded Territory in Treaties 1836, 1837 and 1842. The Great Lakes Indian Fish and Wildlife Commission (GLIFWC) issues the permits for gathering forest products to tribal members. The number of permits issued by GLIFWC serves as an additional metric for monitoring trends in special forest product harvesting.

Monitoring Indicator 1 Results and Discussion:

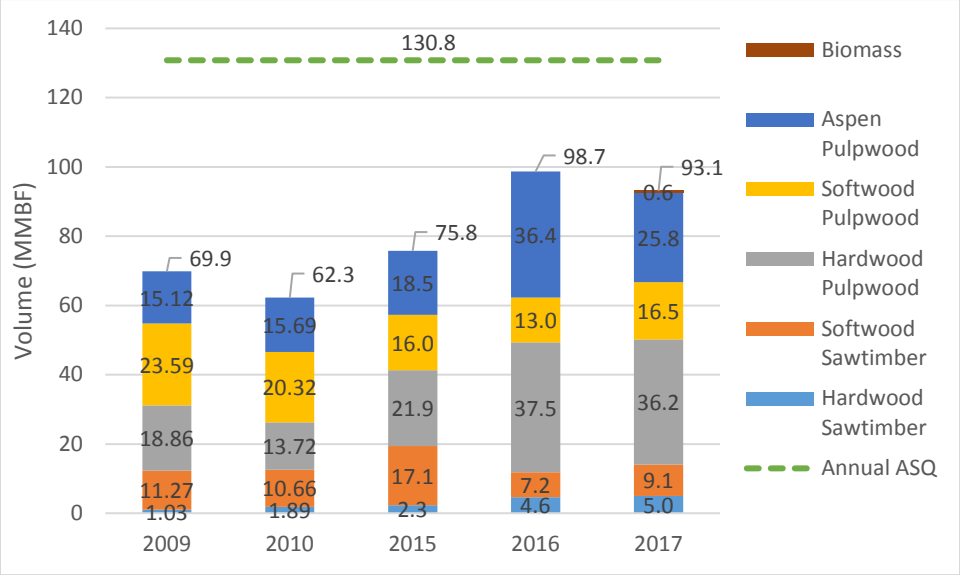

Figure 21. Annual volume of forest products harvested the monitoring periods 2009-10 and 2015-17, and the annualized plan Allowable Sale Quantity (ASQ; decade ASQ /10).

Implementation of the Forest Plan is resulting in the harvest of commercial forest products below the ASQ estimated by the plan analysis. Harvest volumes below ASQ (at the decade scale) are considered sustainable. Data reported for FY 2015-2017 indicate that 52 percent of the projected acres were harvested; however, this harvest yielded 68 percent of the volume projected. This indicates that per acre harvest volumes are, on average, greater than those projected during Forest planning.

Monitoring Indicator 2 Results and Discussion:

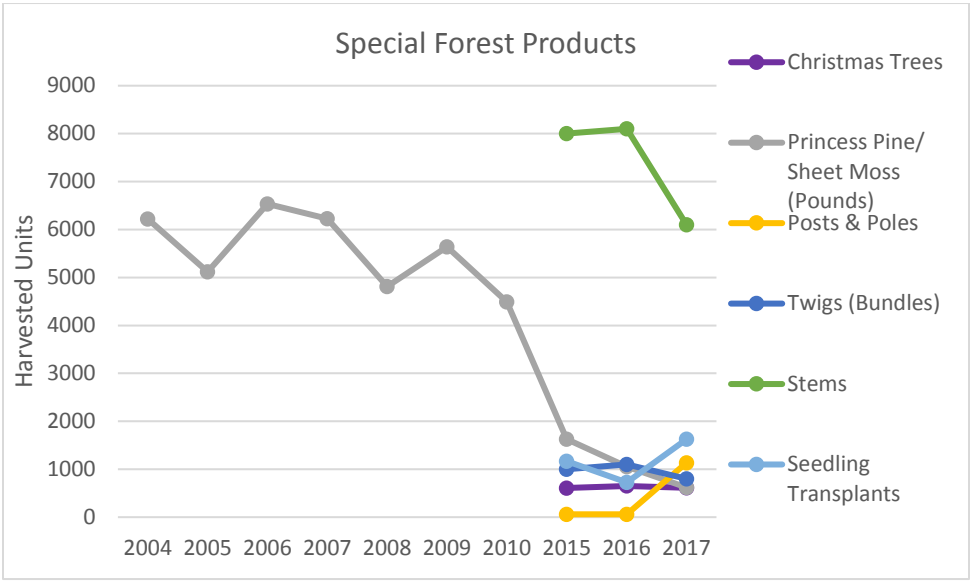

Figure 22. Special forest product harvest quantities based on CNNF permits, 2004-2017.

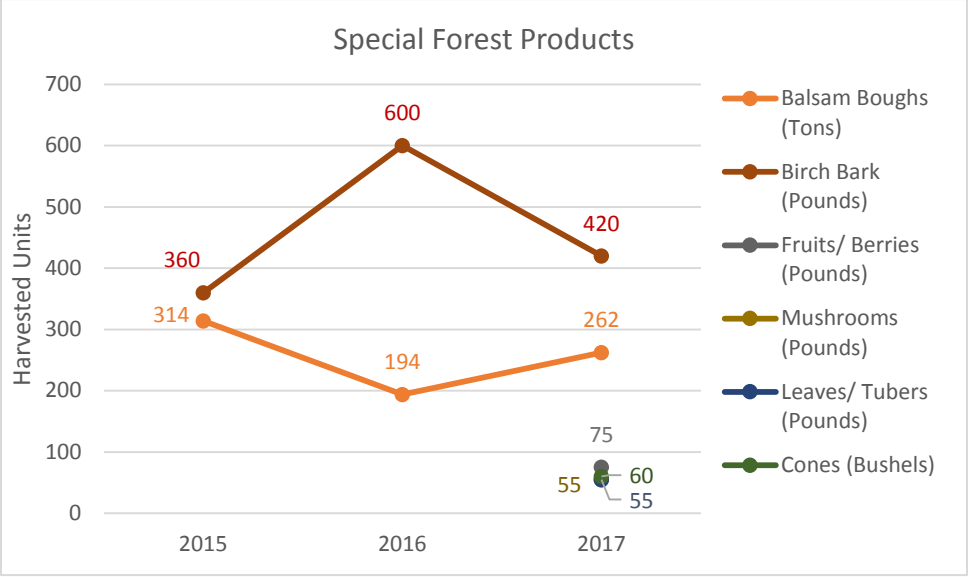

Figure 23. Special forest product harvest quantities based on CNNF permits, 2015-17. Source: Timber Information Manager (TIM) Database

Special forest products gathered by tribal members are not represented in the data above. Permits are not issued for the gathering of small amounts of minor products such as cones, berries, mushrooms, boughs, or acorns for personal use.

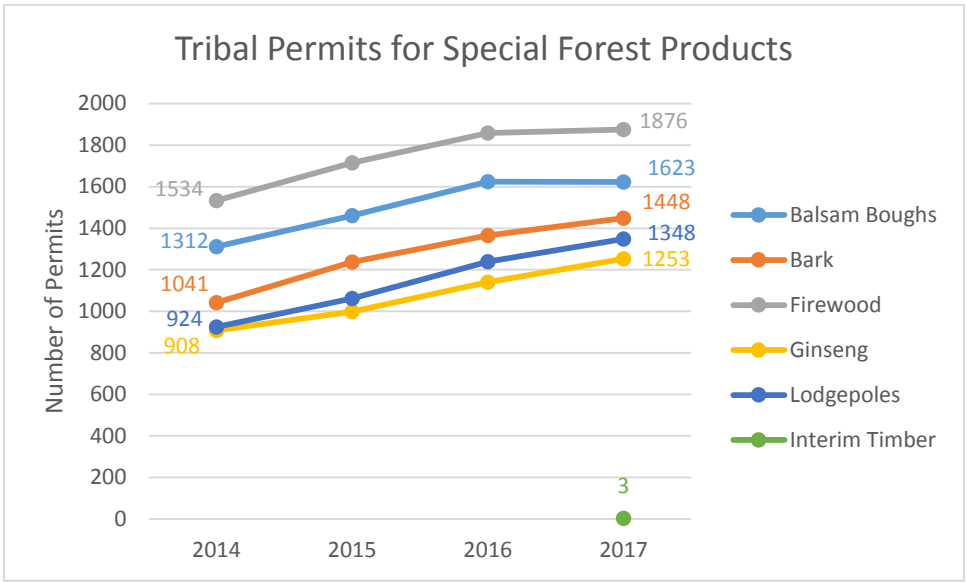

Figure 24. Tribal permits issued for non-timber forest products and wild plants for National Forests and select Wisconsin state properties. Source: Wrobel 2014, Wrobel 2015, Wrobel 2016, Wrobel 2017

A 2014-15 Great Lakes Indian Fish and Wildlife Commission (GLIFWC) survey indicated approximately 22 percent of tribal permit holders reported harvesting from the Forest (Wrobel 2015). GLIFWC reports prior to 2014 do not provide permit numbers specific to special forest products.

Princess pine and sheet moss harvest was the only special forest product reported in the 2010 monitoring report, and harvest levels have declined for 2015-2017 compared to levels in 2010. Several additional special forest products have been monitored during the current monitoring period. Of the newly monitored products, stems show a declining trend, while posts and poles and seedling transplants show increasing trends.

Tribal harvest reports show generally increasing trends across all of the special forest products. This data reflects the numbers of permits issued and do not necessarily reflect the quantities actually harvested. Only a portion of tribal permit holders actually harvest from CNNF lands, so the numbers of permits do not directly indicate impacts to the Forest. However, assuming the proportion of harvesting that occurs on the CNNF is relatively constant, the trends in forest product permits will be similar on CNNF as on the wider landscape.

7-17 Summary of Findings and Recommendation: Timber harvest volumes have consistently been lower than ASQ, well within sustainability limits. Quantities of available special forest products have not been estimated. Current acreage impacted by special forest product harvest can be assumed to be small scale based on permits issued in relation to the acreage of the Forest.

There appears to be a discrepancy between the harvest volume per acre treated compared to projections during Forest planning. If this pattern remains consistent, the actual acres treated may continue to fall below Forest Plan projections, even if ASQ targets were met. If Forest Plan implementation focused on area rather than volume targets, the Forest could possibly increase accuracy in monitoring ecosystem conditions and better understand how those conditions are maintained through timber harvest.

Sustainable harvest levels of special forest products gathered under the terms and conditions of issued permits have not been assessed in detail. Should the Forest have concerns about the sustainability of special forest product harvesting, investments may be needed to develop a methodology to collect additional data to quantitatively assess what constitutes sustainable levels of harvest and number of permits issued. The existing monitoring indicators can identify trends in harvest levels, but does not directly answer the question of sustainability.

7-17 Evaluation of Monitoring Question and Indicators: The existing monitoring indicators can identify trends in harvest levels, but does not directly answer the question of sustainability. The Forest recommends aligning questions further with indicators.

7-17 Notable References: FACTS and TIM databases

Wrobel, A. 2014. Tribal wild plant gathering on National forests and Wisconsin state lands during the 2013-2014 season. Great Lakes Indian Fish and Wildlife Commission. Administrative Report 14-10.

Wrobel, A. 2015. Tribal wild plant gathering on National forests and Wisconsin state lands during the 2014-2015 season. Great Lakes Indian Fish and Wildlife Commission. Administrative Report 15-11.

Wrobel, A. 2016. Tribal wild plant gathering on National forests and Wisconsin state lands during the 2015-2016 season. Great Lakes Indian Fish and Wildlife Commission. Administrative Report 16-14.

Wrobel, A. 2017. Tribal wild plant gathering on National forests and Wisconsin state lands during the 2016-2017 season. Great Lakes Indian Fish and Wildlife Commission. Administrative Report 17-05.

7-18 – Monitoring Question 18: To what extent is Forest Plan implementation contributing toward satisfying demand for mineral resources and ensuring environmentally sound development of mineral resources?

Monitoring Indicators and Frequency:
(1) Number of permits and plans of operations completed to standard. Monitored annually.
(2) Number of acres available for mineral development to meet demand. Monitored annually.

Background and Drivers: This monitoring question's associated indicators address Planning Rule Topic 7 (desired future conditions) within 36 CFR 219.12(a)(5)(vii). Hardrock prospecting and mineral material permits are important management activities on the Forest (note: the Forest has no known energy resources). Mineral materials are a limited resource and are important to the maintenance of Forest infrastructure (specifically, gravel). Hardrock prospecting and development of mineral material sites can have environmental impacts that must be mitigated. Regulations require environmental protection measures such as: storm water control, groundwater and surface protections, and final reclamation of developed mineral material sites. The Forest Plan provides management direction for mineral resources through goals, objectives, standards and guidelines. As part of Goal 2.6 for Mineral and Energy Resources, the Forest Plan directs management to contribute towards satisfying the demands for mineral and energy resources through environmentally sound, responsible development on Forest Service lands. Specifically, Objective 2.6 provides the monitoring indicators for this question.

> Objective 2.6: Ensure that reclamation provisions and environmental protection measures of operating plans and surface use plans of operations are completed to standard in field operations.

The benchmark of "completed to standard" indicates that all permit terms and conditions are verified as completed through inspection and the permit(s) can be officially closed. Inspection requirements for mineral material permits, operating plans and gravel crushing contracts ensure that operational requirements and mitigation measures are implemented and provide an opportunity for determining effectiveness. Wisconsin Pollution Discharge Elimination System permit inspection requirements ensure monitoring of implementation and effectiveness of storm water control. This monitoring ensures that mineral material resource sites (i.e., sand and gravel pits) are managed to efficiently utilize the resource and to mitigate other resource impacts, control storm-water, and ensure final reclamation of mineral material sites. The Forest assesses the acres available to meet the demands for mineral material resources to supply Forest cooperators and for internal uses for road and trail maintenance and other infrastructure needs.

Monitoring Indicator 1 Results and Discussion: From FY 2015- 2017, there were 16 mineral material permits and plans of operation administered to standard, and 16 gravel-crushing contracts completed.

In 2009 and 2010, there were a total of 32 and 23 internal and external permits issued, respectively, for cooperative road maintenance activities, timber sales and recreation facility maintenance.

The Forest has a large mineral material program. Most mineral materials are used for cooperative road maintenance agreements with approximately 32 towns and cooperators. Most mineral materials are used in maintenance of the existing road transportation network.

The Forest has four Bureau of Land Management hardrock prospecting permits for exploration of the hardrock mineral resource (primarily gold and copper). There was no active exploration work during the monitoring period of this report.

Monitoring Indicator 2 Results and Discussion: Approximately 26 percent of the CNNF land base is allocated into management areas such as Semi-Primitive Non-motorized and Wilderness that prohibit the development of new sand and gravel pits; 74 percent is available for mineral materials development. These acres have been meeting the current demand, and existing management practices are sufficient to meet Forest goals and objectives.

Meeting the demand for mineral material resources requires access to the land base for exploration and development and an economical haul distance to where the mineral materials are needed. Meeting demand for mineral material resources in the future could be affected if haul distances are increased. This is not projected to occur in the near term.

7-18 Summary of Findings and Recommendation: Demand for mineral material resources was met from FY 2015-2017. Approximately 32 mineral material permits and gravel crushing contracts were completed to standard for gravel pit management and environmental protection requirements.

It may be beneficial to complete a Forest-wide analysis of mineral material resource supply and access for new source development. This would help meet future demand for mineral material resources.

7-18 Evaluation of Monitoring Question and Indicators: All questions and indicators are adequate for the monitoring program.

7-19 – Monitoring Question 19: What is the status of hazardous fuels in communities at risk?

Monitoring Indicators and Frequency:
(1) WUI and non-WUI acres treated for hazardous fuels by method. Monitored annually.

Background and Drivers: This monitoring question's associated indicator address Planning Rule Topic 7 (desired future conditions) within 36 CFR 219.12(a)(5)(vii). The National Fire Plan and subsequent national Cohesive Wildland Fire Management Strategy direct us to reduce hazardous fuels in the country's forests and rangelands, particularly in the Wildland Urban Interface (WUI) of communities at risk. Hazardous fuels reduction is closely monitored at the national level. The Forest Plan provides

guidance for fire management under Goal 2.8. Specific direction regarding hazardous fuels reduction is provided by Objective 2.8c:

> Objective 2.8c: Reduce hazardous fuels within communities at risk, in cooperation with local, federal and state agencies.

The acres of hazardous fuels treatments in WUI and non-WUI areas, by method (prescribed fire or mechanical), serves as the unit of measure to track to what degree the plan implementation is achieving Objective 2.8c.

Monitoring Indicator 1 Results and Discussion: The following table draws data from the Forest Service Activity Tracking System (FACTS) and shows acres of hazardous fuels reduction forest-wide for each of the past six fiscal years. The acres are displayed as WUI and non-WUI with treatment method categorized by prescribed fire or mechanical means.

Table 10. WUI and non-WUI acres treated for hazardous fuels by method on Forest, for years 2012-17.

	WUI		Non-WUI		Total
Fiscal Year	**Prescribed Fire**	**Mechanical**	**Prescribed Fire**	**Mechanical**	
2012	187	2,216	796	1,464	4,663
2013	152	2,229	2,524	2,143	7,048
2014	198	689	3,231	2,827	6,945
2015	101	513	3,562	3,435	7,611
2016	207	1,343	3,507	5,618	10,675
2017	358	1,635	301	5,481	7,775
Total:	1,203	8,625	13,921	20,968	44,717

The Forest's hazardous fuels program relies heavily on fuels reduction that is a secondary benefit derived from timber sales. Timber activities account for the bulk of mechanically treated acres. Timber sales are not designed and/or located with the primary intent of accomplishing fuels reduction or with WUI in mind; rather, sale locations are based on timber management needs. A small subset of the mechanically treated acres represents direct fuels reduction through means such as mastication or hand clearing of ladder fuels.

The Forest increased acres treated in its prescribed burning program in 2011 with the return of aerial ignition to the Moquah Barrens. Since that time, prescribed fire has climbed above 3,000 acres/year. Years with fewer prescribed fire acres are indicative of weather patterns that thwarted prescribed burning. Prescribed burning is largely carried out in the wildlands, rather than the WUI, where large tracts of burnable acres exist.

7-19 Summary of Findings and Recommendation: The Forest treated 565 acres using prescribed burns and mechanically treated 2,978 acres in WUIs during the reporting period FY 2016-2017. Also, the Forest treated thousands of acres outside of the Wildland Urban Interface. By doing this, the Forest Plan Objective 2.8c has been accomplished for this reporting cycle.

7-19 Evaluation of Monitoring Question and Indicators: The monitoring question is somewhat vague in asking about the "status" of hazardous fuels in communities at risk. More importantly, it may be better to understand how well the Forest is targeting fuels reduction treatments in the WUI of communities at risk. Further, the existing indicator only looks at a subset of fuels reduction and follows the assumption that fuels reduction is most valid in the WUI. The Forest is most effective in using timber harvest to reduce hazardous fuels and will continue to leverage efficiencies from timber harvests in order to achieve fuels reduction in an integrated manner. Monitoring for non-WUI in addition to WUI may be an effective management tool.

With the more recent, overarching emphasis on developing fire-adapted communities and fire-resilient landscapes, the concept of fuels reduction begs more of a landscape perspective and needs to consider both WUI and non-WUI and to look at acres of prescribed fire applied (a practice aimed at restoration of fire-dependent ecosystems). Options presented in the National Cohesive Wildland Fire Management Strategy: Northeast Regional Action Plan provides a set of goals addressing the wildland fire management practices most relevant in the Northeast. It would be beneficial if these goals were to be incorporated into the monitoring question.

7-19 Notable References:

USDA Forest Service, Northeastern State and Private Forestry. 2015. National Cohesive Wildland Fire Management Strategy: Northeast Regional Action Plan. NA-PR-01-15. Newtown Square, PA.

7-20 – Monitoring Question 20: Are the Tribal MOUs being satisfactorily applied?

Monitoring Indicators and Frequency:
(1) Tribal feedback during annual MOU meeting. Monitored annually.

Background and Driver(s): Question 20 and its associated indicator address Planning Rule Topic 7 (desired future conditions) within 36 CFR 219.12(a)(5)(vii). The Forest shares in the United States' trust responsibility and treaty obligations to work with federally recognized Tribes on a government-to-government basis to protect the Tribes' ceded territories on lands administered by the Forest Service. The Forest outlines its policies and responsibilities on tribal relations in Memorandum of Understanding (MOUs) with the Tribes. The Forest currently maintains two MOUs regarding tribal relations: a 1999 MOU (amended in 2012) with tribes of the Lake Superior Chippewa Indians, and a 2016 MOU with the Forest County Potawatomi Community.

Annually in October, Forest Service leadership meets with the Lake Superior Chippewa MOU tribal signatories to discuss MOU implementation, to facilitate on-going communication and to discuss issues arising under the MOU. Some activities include implementation of the Tribal Timber Harvest Framework, notification of birch bark gathering opportunities, implementation of camping fees, length of stay waivers and implementation of an off-reservation National Forest gathering code. The feedback from the tribes during the annual meeting (recorded in official meeting minutes) provides an effective measure for whether the MOU is being applied satisfactorily.

On December 14, 2016, the Forest signed a MOU with the Forest County Potawatomi Community (FCPC) to allow for more cooperation and communication. This MOU is not based on off-reservation treaty

rights. There has not been any feedback collected with this MOU during this reporting cycle (2016-2017) because this MOU is relatively new and the feedback collection process is still being developed.

Monitoring Indicator 1 Results and Discussion: For the MOU with the Bands of Lake Superior Chippewa Indians, annual meeting minutes for FY 2012-2017 indicate that the core principles of the MOU are being applied successfully – consultation with the Tribes on programs and projects that affect treaty resources and the ability of tribes to implement their treaty rights and tribal self-regulation of permitted activities on National Forest lands. There have been no annual meetings with the FCPC tribe to discuss MOU implementation. Initial work on access to tribally owned lands within the boundaries of the CNNF has been successful.

7-20 Summary of Findings and Recommendation: Feedback and information shared during annual MOU meetings has been positive and productive indicating successful implementation. The treaty rights tribes utilize the Forest more and more each year for various gathering uses, including firewood, bark, syrup and wild plants. For the MOU with the Forest County Potawatomi Community, not enough time has elapsed to evaluate the application of the MOU.

No recommendations for change have surfaced during this evaluation, but additional time and data would aid in evaluating this question.

7-20 Evaluation of Monitoring Question and Indicators: Question and indicator are adequate to address monitoring need.

7-20 Notable References:

The MOU regarding tribal – USDA Forest Service relations on National Forest Lands within the territories ceded in treaties of 1836, 1837, and 1842; Executive Order 13175; USDA Departmental Regulation 1350-002; Forest Service Manual 1563.

7-21 – Monitoring Question 21: To what extent is Forest Plan implementation maintaining or reducing road densities?

Monitoring Indicators and Frequency:
(1) Average open and total road densities within areas displayed on the Road Density Map. Continuously monitored.
(2) Forest-wide average road density. Continuously monitored.

Background and Driver(s): Question 21 and its associated indicators address Planning Rule Topic 7 (desired future conditions) within 36 CFR 219.12(a)(5)(vii). The Forest Plan provides direction for capital infrastructure as part of Goal 3.1:

> Goal 3.1: Build and maintain safe, efficient, and effective infrastructure that supports public and administrative uses of National Forest System lands. Retain and progress toward the Forest-wide average total road density goal of 3.0 miles per square mile established in 1986.

Additional direction regarding road densities is provided by Objective 3.1:

> Objective 3.1 - Reduce average open and total road density on the Chequamegon-Nicolet National Forest. Use [Forest Plan] Appendix BB, "Guide for Reducing Open and Total Road Density" and Road Density Map in Map Packet to focus efforts.

Open road density is defined as "Miles of road per square mile of National Forest open to public use. Does not include roads under another jurisdiction." Open roads are designated on the MVUM as "open to the public." Total road density is defined as the "total miles of open and closed roads per square mile of National Forest land… [m]ay include roads under another jurisdiction." The calculation of road density does not include non-Forest Service property.

The Forest-wide open and total road density serves as the measure for determining if Forest Plan implementation is achieving the benchmarks stated in Goal 3.1 and Appendix BB. The benchmark road densities in the Forest Plan are upper limits to the densities and not goals.

Monitoring Indicator 1 Results and Discussion:

Table 11. Open and total road densities on CNNF by density class in the Road Density Map, in 2010 and 2017.

Open Road Density (mi/mi^2)			Total Road Density (mi/mi^2)		
Density Class	**2010**	**2017**	**Density Class**	**2010**	**2017**
0	≤ 0.2	0.68	**0**	≤ 3.0	1.06
Up to 2.0	1.6	1.54	**Up to 3.0**	3.5	3.67
Up to 4.0	1.9	1.93	**Up to 4.0**	3.8	3.96
TOTAL		1.68	**TOTAL**		2.74

Across the Forest, open road density is well within the allowable upper density limits for each associated density class. With continued project-level decision implementation, numbers are anticipated to stay within these limits. Data stewardship quality control has and will contribute to changes in the calculated road densities without any actual changes to on-the-ground road densities across the Forest.

Monitoring Indicator 2 Results and Discussion: Total road density Forest-wide for 2017 is 2.74 per square mile; 3,950.88 miles of road are open to motorized public access. Open road density for 2017 is 1.68 miles per square mile.

The total road density is slightly below 3.0 miles per square mile, which is stated as a Forest-wide goal.

7-21 Summary of Findings and Recommendation: Across the Forest, open road density is well within the allowable upper density limits for each associated management area and it is anticipated to be maintained at that level or stay within these limits. Total road density is below the Forest Plan goal of 3.0 miles per square mile.

There are no recommendations to note.

7-21 Evaluation of Monitoring Question and Indicators: Monitoring question and indicators are adequate to measure Forest Plan achievement.

7-22 – Monitoring Question 22: What is the current status of land ownership patterns?

Monitoring Indicators and Frequency:

(1) Acres of land conveyances, purchases, or exchanges by purpose:

[1] Protection of T&E and RFSS species;

[2] Consolidating wilderness;

[3] Increase public ownership on lakes and rivers;

[4] Unique ecological, cultural, or recreational values;

[5] More efficient land management.

(2) Acres of MA designation for acquired lands.

Background and Drivers: Question 22 and its associated indicators address Planning Rule Topic 7 (desired future conditions) within 36 CFR 219.12(a)(5)(vii). The Forest Plan provides direction for consolidating land ownership patterns as part of Goal 3.2. Additionally, Objective 3.2 addresses the high priority areas for acquisition:

> Objective 3.2 – Convey, purchase or exchange lands where needed, and on a willing buyer and willing seller basis. High priority areas for acquisition include those lands, that:
>
> - Protect Threatened, Endangered, or Regional Forester Sensitive Species
> - Consolidate federal ownership within Wilderness
> - Increase in public ownership on lakes and rivers
> - Provide unique ecological, scientific, heritage, or recreational qualities, and
> - Consolidate land ownership for efficient resource management purposes.

Reporting the acres of lands being acquired or exchanged that meet the stated priorities provides an effective measure of whether Plan implementation is meeting Objecting 3.2. Reporting the MA designation of acquired lands provides an effective means for communicating this information to the public.

Monitoring Indicator 1 Results and Discussion:

Table 12. Recent land conveyances, purchases and exchanges by CNNF that meet acquisition priorities.

Name	Popple River / Rat Lake	Hart / Lost Lake
Acres	560	144
Year	2015	2016
Purpose of acquisition:		
Protection of T&E	Yes	No
Consolidating Wilderness	No	No
Increase public ownership on lakes and rivers	Yes	Yes
Unique ecological, cultural, or recreational values	Yes	No
More efficient land management	Yes	Yes

Recent land acquisitions have all met multiple acquisition priorities, consistent with Forest Plan Objective 3.2.

Monitoring Indicator 2 Results and Discussion:

Table 13. Acres designated to each Management Area (MA) by year of edit, for new land acquisitions by the Forest.

	Year							
MA	2007	2008	2009	2012	2013	2014	2017	Grand Total
1A	289	66			420			775
1B	78							78
1C	624				106			730
2A	479	27		40	1,727		23	2,296
2B	1,567				550	85	44	2,246
2C	1,088				2,010			3,098
3B					167			167
3C	1,387				135			1,522
4A	210	33	15		556			814
4B	205				169			374
5B					15			15
6A		38			125			163
8D	222	1			39			262
8E	95							95
8F	94				928	130	28	1,180
8G	98	40			649	49	28	864
Total	**6,436**	**205**	**15**	**40**	**7,596**	**264**	**123**	**14,679**

The designation of management areas for acquired lands can lag behind the actual acquisition, sometimes by several years. MA designations have tended to occur in pulses over time, based on the timing of land acquisitions and the process of MA designation that often considers multiple acquisitions

at the same time. Since 2007, more than 14,600 acres have been designated into MAs, with the greatest acreage added to MA 2C, 2A and 2B, outlined above in Table 13.

7-22 Summary of Findings and Recommendation: All recent land acquisitions have met multiple acquisition priorities, consistent with Objective 3.2. The designation of management areas for acquired lands can lag behind the actual acquisition, sometimes by several years. Since 2007, more than 14,600 acres have been designated into MAs, with the greatest acreage added to MA 2C, 2A and 2B.

Because monitoring shows that the Forest Plan objective is being met, the Forest does not have any further recommendations.

7-22 Evaluation of Monitoring Questions and Indicator(s): This method of monitoring ensures that lands conveyed, purchased, or exchanged meet the best use of limited resources, so questions and indicators are adequate.

8 – Land Productivity

8-23 – Monitoring Question 23: To what extent is implementation of the Forest Plan maintaining or improving soil productivity?

Monitoring Indicators and Frequency:
(1) Percentage of detrimental soil disturbance after management actions. Monitored annually.

Background and Drivers: Question 23 and its associated indicator address Planning Rule Topic 8 (land productivity) within 36 CFR 219.12(a)(5)(viii). The Forest Plan provides management direction for soils productivity through Goal 1.7.

> Goal 1.7: Provide desired physical, chemical, and biological soil processes and functions on the Forests to maintain and/or improve soil productivity.

Regional Soil Quality Standards as outlined in FSM R9RO 2550-2012-1, provide guidance on defining thresholds for acceptable detrimental soil disturbance <1 year post-harvest. Detrimental disturbance is defined as soil disturbance that results in decreased long-term (> 20 years) site productivity. The Forest monitors soil disturbance Forest-wide following the Forest Soil Disturbance Monitoring Protocol on a small subset of semi-randomly chosen locations for each ground disturbing management decision, as instructed in all NEPA-related soil resource reports. The average percentage of detrimental disturbance following harvest provides the unit of measure to demonstrate impacts of forest management on soil quality. Comparing monitoring results to the Regional Soil Quality Standards thresholds demonstrates how well Forest Plan implementation is achieving Goal 1.7

Monitoring Indicator 1 Results and Discussion:

Table 14. Detrimental soil disturbance results at <1 year post-harvest on CNNF, 2006-2017. Thresholds are defined by Regional Soil Quality Standards.

Year	Average Detrimental Disturbance (% Area)	Threshold (% Area)
2006-2015	1.6	15
2016	1.1	8
2017	1.9	8

In 2017, in addition to the <1 year post harvest monitoring, soil disturbance recovery effects were monitored as a chronosequence, going back to sites harvested 10, 20 and 30 years earlier (Figure 25). This practice involves revisiting sites that were previously harvested and assessing the current area disturbed and the area of detrimental disturbance. Evaluating the disturbance percentages at sites previously harvested assesses natural soil recovery response rates associated with current soil management practices.

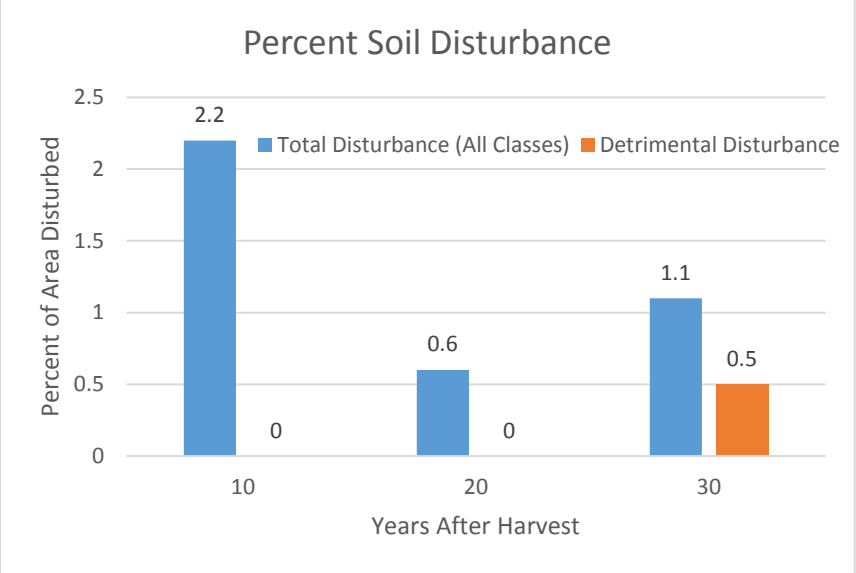

Figure 25. Soil disturbance percentages for sites 10, 20, and 30 years post-harvest on CNNF, 2017.

In 2017, current (<1 year post harvest) management practices resulted in a 1.9 percent total area of detrimental disturbance, which is well below the threshold of 8 percent. Across all monitoring years (2006-2017), the rate of detrimental disturbance has been relatively consistent.

Results of the 30-year chronosequence (Figure 25) showed a steady natural recovery rate from soil disturbance. For harvests occurring in the last 20 years, the detrimental disturbance has completely recovered within 10 years, and the total area of disturbance has consistently declined with time since the harvest. Recovery was slightly less at sites harvested 30 years ago, likely due to practices that were more destructive prior to modern soil protection measures under the current Forest Plan. These 30-

year results showed both effectiveness of soil protection measures implemented under the current Forest Plan as well as an overall positive soil recovery rate.

8-23 Summary of Findings and Recommendation: Current management practices resulted in a 1.9 percent total area of detrimental disturbance (< 1 year post harvest), which is well below the threshold of 8 percent. Thirty-year results showed both effectiveness of soil protection measures implemented under the current Forest Plan as well as an overall positive soil recovery rate. The Forest does not have any recommendations for changes at this time.

8-23 Evaluation of Monitoring Question and Indicators: This method of monitoring which utilizes the Forest Soil Disturbance Monitoring Protocol is an effective and statistically sound approach for quantifying post-harvest soil disturbance; thus, no changes are needed.

8-24 – Monitoring Question 24: To what extent are off-road and off-trail motorized use causing resource damage?

Monitoring Indicators and Frequency:
(1) Number and miles of unauthorized roads and trails (user created and/or not on MVUM). Monitored annually.
(2) Number and miles of new unauthorized roads and trails by district. Monitored annually.

Background and Drivers: Question 24 and its associated indicators address Planning Rule Topic 8 (land productivity) within 36 CFR 219.12(a)(5)(viii). The Forest Plan provides direction for off-road and off-trail motorized use through goals, objectives, standards and guidelines. As part of Goal 2.1 for Recreation Opportunities, the Forest Plan directs management to maintain or enhance the diversity and quality of recreation experiences within acceptable limits of change to ecosystem stability and condition. Specifically, Objectives 2.1c provides the monitoring indicator for this question.

> Objective 2.1c: Reduce, and strive to eliminate, unacceptable changes in resource conditions due to off-road, off-trail motorized use.

Off-road and off-trail vehicle use can have negative impacts on the environment, including soil compaction, trampling plants, disturbing wildlife, transporting weeds and increasing erosion. The Forest Plan Record of Decision eliminated cross-country all-terrain vehicle (ATV) travel and restricted ATV use to designated trails and system roads. Starting in 2009, the Motor Vehicle Use Map (MVUM) reduced the miles of authorized roads available to highway-legal vehicles. Both of these decisions have helped reduce resource damage from off-road or off-trail vehicle use because cross-country travel was restricted. Through public education and law enforcement, the Forest continues to work on reducing unauthorized off-road or off-trail vehicle use, reducing resource damage.

The Forest Plan decision to restrict motorized use to designated trails and roads made strides in meeting Objective 2.1c, eliminating resource damage due to off-road and off-trail motorized use. Evaluating

existing and new unauthorized trails and roads should allow the Forest to measure Forest Plan Objective 2.1c attainment.

Monitoring Indicator 1 Results and Discussion:

Roads:

Number and miles of unauthorized roads

- 16,732 unique roads of varying lengths
- 3,400 miles

The Forest has approximately 3,400 miles of unauthorized roads with varying degrees of resource impacts. The Forest uses miles of unauthorized road as an indicator of resource impacts because the Forest has not surveyed every road segment, assessing resource impacts. However, hundreds of miles of unauthorized roads are typically analyzed annually within vegetation management projects (specifically, travel analysis within those projects), and the Forest usually decides to authorize (and therefore maintain them) or restore them to a natural condition, reducing resource damage. Thus, the Forest expects the mileage of unauthorized roads to decrease annually.

Trails:

The Forest does not currently have an inventory of unauthorized or user-defined trails due to work capacity limitations. Often unauthorized trails are located on Maintenance Level 1 and 2 roads that are not typically well defined and limitedly used. Because of this, the natural resource impact and public use are low. User-defined trails have a range of possible impacts depending on how the defined corridor is being traveled by the user (e.g. motorized vs. non-motorized use).

Many miles of unauthorized trails, similar to unauthorized roads, are evaluated regularly within the travel analysis portion of vegetation management projects. After these evaluations occur these trails are restored to a natural state, closed, added to the National Forest System Roads database, or transitioned to something similar to these actions.

Monitoring Indicator 2 Results and Discussion:
There is currently no data for new unauthorized (or user-created) roads and trails (number or miles). Neither engineering nor the recreation departments have resources to monitor the entire Forest acreage for these roads and trails. The number of unauthorized and user-created trails and roads are in constant flux as the public develops and abandons them.

Similar to Indicator 1, new unauthorized and user-created trails typically are identified and evaluated when the Forest is conducting a vegetation management project and completing a travel analysis in the surrounding area. Thus, the number of new unauthorized and user-created trails likely decreases with implementation of each vegetation project.

8-24 Summary of Findings and Recommendation: The Forest has many unauthorized roads and trails. The Forest recommends continuing to address unauthorized roads through the Forest's travel analysis process, keeping in mind the limited resources to maintain roads and trails on the Forest. In addition, the indicators fall short in answering "to what extent are off-road and off-trail motorized use causing resource damage."

8-24 Evaluation of Monitoring Question and Indicators: There are varying degrees of resource impacts with a mile of unauthorized (or user-created) road or trail on an old roadbed versus a mile through the general forest. Thus, the current road and trail indicators may not adequately reflect resource impacts from unauthorized or user-created roads and trails, but they do give the Forest an idea of the scale of resource damage. For example, a new indicator could look at road or trail miles that are properly maintained or do not have proper closures in place since road and trail resource damage typically is reduced when proper maintenance is implemented or closures are constructed. The Forest suggests looking at these indicators and possibly changing them if appropriate.

8-25 – Monitoring Question 25: How effective are management actions to minimize or avoid unacceptable resource damage on the 4WD ORV trail?

Monitoring Indicators and Frequency:
(1) Occurrences of breeched closures along the trail. Monitored annually.
(2) Acres of soil/watershed impairment along the trail. Monitored annually.
(3) Miles of unauthorized trail created along the trail. Monitored annually.
(4) Miles and/or acres of damage to adjacent roads along the trail. Monitored annually.

Background and Drivers: The right-of-way along an American Natural Resources (ANR) natural gas pipeline near the eastern edge of the Lakewood-Laona Ranger District includes a designated off road vehicle (ORV) trail. The trail has a history of deteriorating conditions that has included exposure of the pipeline and extreme rutting. Question 25 and its associated indicators address Planning Rule Topic 8 (land productivity) within 36 CFR 219.12(a)(5)(viii). The Forest Plan specifically provides direction for this trail in Objective 2.1l:

> Objective 2.1l: If maintenance methods prove ineffective and monitoring confirms unsafe conditions or unacceptable resource damage, close and rehabilitate the existing 25-mile 4-wheel-drive off road vehicle trail. Then construct one replacement trail up to 25 miles in length elsewhere on the Forest, providing an agreement with a non-Forest Service entity is developed to do trail condition monitoring and maintenance.

Concerns over safety of users and environmental degradation because of excessive amounts of erosion led to the inclusion of this question and indicators.

Monitoring Indicator 1 through 4 Results and Discussion: (1) Closures in the form of steel fencing and gates are 100 percent effective in reducing access to closed areas along the trail. (2) One stretch of the

line with steep slopes and exposed rock outcrop, which is approximately ½ acre in size, is still experiencing active soil displacement and erosion. Mitigations will be implemented in the future to bring this area back to productive land. (3) Currently, there is approximately 5 miles total of unauthorized user-developed travel-ways according to on-going monitoring. (4) Total acres of damage to adjacent roads are estimated at 3 acres based on monitoring.

Closures have proven effective in reducing access to closed trails. According to Forest monitoring, unauthorized users, on occasion, have tried to breech a mechanical closure devise but more typically they find or create a different route. Up to 5 miles of user-developed travel-ways have been observed from recent monitoring which indicates that although closure devices are mostly effective at specific locations, they are not a compete deterrence and cannot be relied upon for stopping all unauthorized use. Past fencing and mitigation to soil/watershed impacts has been effective; currently there is approximately one-half of an acre that needs mitigation. The damage to adjacent roads continues to occur and is estimated to be about three acres in size.

8-25 Summary of Findings and Recommendation: The Forest may have data deficiencies because resources are not available to sufficiently collect data for this question. Available data indicates current management is reducing resource impacts. The Forest recommends continued monitoring to evaluate effectiveness of existing measures.

8-25 Evaluation of Monitoring Question and Indicators: This monitoring question has many similarities to question 10 above, monitoring the 4WD ORV. Because of this, the Forest suggests merging this question with Monitoring Question 11.

Conclusion

This report provides results for 25 monitoring questions with corresponding recommendations. Results from 17 questions suggest that indicators are trending or progressing in the desired direction per Forest Plan decisions. Eight of the evaluations were inconclusive because the data collected was not adequate to answer the question because either more time/data is needed to understand the progress or methods/results are inadequate to answer monitoring questions.

Portions of the evaluation were carried out to determine if the monitoring indicators and questions remain useful. For five questions, the report concludes that the monitoring methods/results were inadequate to answer the monitoring question. In addition, some type of changes were suggested for the monitoring program for 14 questions. This includes altering the monitoring questions or indicators to make progress or trends clearer towards Forest Plan implementation. Lastly, one management practice change was suggested regarding vegetation management.

The purpose of this 2016-2017 monitoring and evaluation report was to aid the Forest's responsible official in determining whether a change is needed in the Forest Plan direction, monitoring strategy, or management action. Because conclusions from analyzing trends for indicators resulted in ambiguous answers to some monitoring questions, the Forest plans to take a hard look at the monitoring program

and make appropriate changes such that its purpose is more achievable. The next biennial monitoring report is scheduled to be completed after September 2019 (the end of the next monitoring cycle).

APPENDIX A: Supplemental Information

This appendix supplements the information provided in the 2016-2017 Monitoring and Evaluation Report for the Chequamegon-Nicolet National Forest. The tables and figures in the appendix provide additional detailed information that has otherwise been summarized in the main report. Most of these supplemental tables and figures do not include background information or the evaluation of data, which can be found in the main report. Appendix A is organized according to the monitoring questions in Section 5 (Monitoring Results) of the main report. The appendix only includes sections for questions with supplemental information.

Monitoring Question 1: What is the current status of sediment control and watershed improvement projects?

Table 15. Stream restoration at road crossings during FY 1998-2017 on CNNF.

FY	TRTR, HTAP, CMLG, etc. Funding	Stream Crossings Replaced	Road Segments Recons.	Trails Constructed or Recons.
1998	$999,000	25		
1999	$640,000	26	11	1
2000	$414,000	7		1
2001	$375,000	7	1	1
2002	$140,000	3		
2003	$750,000	27		1
2004	$327,000	16		
2005	$270,000	8		1
2006	$338,000	9	1	1
2007	$375,000	10		2
2008	$788,000	14	1	1
2009	$524,000	12		
2010	$2,001,000	26		1
2011	$812,000	7	1	
2012	$465,000	8		
2013	$130,000	4	1	
2014	$375,000	5	2	1
2015	$647,000	16	2	
2016	$806,000	7		
2017	$832,000	20		
Total	**$12,008,000**	**257**	**15**	**10**

Data Source: Watershed Improvement Tracking (WIT) database, CNNF internal Hydrology database.

Note: Funding sources included:

2009: $50,000 stewardship
2010: ARRA, 5 Xings, $650,000; GLRI, 7 xings, $138,000 and CMLG, 14 xings, $1,183,000
2011: $50,000 stewardship, $410,000 GLRI, $382 GMLG
2012: $356,000 CMLG, 6 xings; $113,000 GLRI, 2 xings
2013: $100,000 CMLG, 3 xings; $30,000 GLRI, 1 xing
2014: $235,000 GLRI, 1 xing; $65,000 FNVW03, 2 xings, 2 rd seg; $30,000 NFVW, 1 tr seg; $45,000 CMRD, 2 xing

2015: $223,000 GLRI+$49,000 TNC, 5 xings; $301,000 FNVW03, 9 xings, 2 rd seg; $74,000 CMLG, 2 xings
2016: $317,000 GLRI, 2 xings; $250,000 FNVW03, 2 xing; $105,000 NFWF, 1 xing; $89,000 CMLG, 1 xing, $45,000 CWK2, 1
2017: $455,000 GLRI, 11 xings; $170,000, CMRD, 4 xings; $97,000 CMLG, 4 xings, $110,000, TU 1+ xing

Table 16. Specific road and trail stream crossing replacements during FY 2015-2017 on CNNF.

Ranger District	Stream	Road	Stream Miles Reconnected	Year Accomplished
Lakewood-Laona	Spencer Creek	FR 3220	5.2	2017
Lakewood-Laona	Halley Creek	FR 2141	7.2	2017
Eagle River-Florence	SB Popple River	FR 2162a	8.8	2017
Lakewood-Laona	Chickadee Up & Dn	FR 2102	0.6	2017
Lakewood-Laona	UNT Chickadee	FR 2338	0.6	2017
Lakewood-Laona	UNT Caldron Falls	FR 2102	0.6	2017
Lakewood-Laona	Shabodock Creek	FR 2136	4.1	2017
Lakewood-Laona	UNT Hay Creek	FR 2320	3.3	2017
Lakewood-Laona	UNT Armstrong Creek	FR 2163	0.6	2017
Eagle River-Florence	SB Popple River	FR 2398	3.6	2017
Lakewood-Laona	Armstrong Creek	Milan	1.8	2017
Lakewood-Laona	Copper Creek	FR 2174	0.3	2017
Lakewood-Laona	UNT Copper Creek	FR 2174	0.1	2017
Lakewood-Laona	SB Oconto River	FR 2122	3.3	2017
Eagle River-Florence	Haymeadow Creek	FR 2205	1.9	2017
Washburn	UNT Long Lake Br	FR 224	1.2	2017
Great Divide	UNT Marengo	FR 194	0.5	2017
Great Divide	UNT Marengo	FR 196	1.3	2017
Great Divide	Crystal Lake Outlet	FR 211	0.1	2017
Great Divide	UNT Spring Brook	FR 187	0.4	2016
Great Divide	Mineral Lake Inlet	FR 187	2.1	2016
Great Divide	Red Ike Creek	FR 208	3.1	2016
Great Divide	UNT Brunet	FR 311	0.4	2016
Eagle River-Florence	NB Peshtigo River	FR 2174	2.2	2016
Medford-Park Falls	East Fork Hay Creek	FR 153	9.7	2016
Great Divide	UNT Marengo	FR 377	0.8	2015
Great Divide	Hay Creek	FR 271	1.5	2015
Lakewood-Laona	Rose Creek	FT	1.1	2015
Lakewood-Laona	Mary Creek	FR 2122	3.7	2015
Eagle River-Florence	NB Peshtigo River	FR 2174	0.5	2015
Eagle River-Florence	Lilypad Creek	FR 2424	8.5	2015
Eagle River-Florence	Wilson Creek	FR 2172	1.2	2015
Medford-Park Falls	UNT Elk River	FR 136	1.2	2015
Great Divide	UNT Twentymile Creek (3 xings)	FT 400	2.0	2015
Great Divide	UNT Hawkins (west)	FR 383B	* 0.0	2015
Great Divide	UNT Hawkins (east)	FR 383B	* 0.0	2015
Great Divide	UNT Whiskey Creek	FR 198	0.1	2015
Great Divide	UNT Morgan Falls Creek	FT 209	0.8	2015
Lakewood-Laona	South Branch Oconto River	FR 2104	9.4	2015

* Zero connectivity because in the headwaters.
UNT = Unnamed Tributary; FR = Forest Road; FT = Forest Trail
Data Source: Watershed Improvement Tracking (WIT) database, CNNF internal Hydrology database.

Table 17. Watershed improvement projects implemented during FY 2011-2017 on CNNF.

Project	Ranger District	Year Accomplished
Whiting Creek Crossing Removal off FR 2099	Lakewood-Laona	2011
20 Mile Creek @ FR 202a (old Railroad grade)-crossing removal	Great Divide	2013
LWLA 4x4 Trail/Pipeline Trail restoration	Lakewood-Laona	2013
FR 1335 Trail relocation out of wetland	Great Divide	2014
LWLA 4x4 Trail/Pipeline Trail restoration	Lakewood-Laona	2015
Spring Brook Dam removal	Great Divide	2016
Deerskin Creek raceway removal	Eagle River-Florence	2016
Ike Impoundment remediation	Great Divide	2016
Lower Camp Four Springs Dam removal	Medford-Park Falls	2017

Data Source: Watershed Improvement Tracking (WIT) database, CNNF internal Hydrology database.

Monitoring Question 2: To what extent are roads and trails located within Riparian Management Zones?

A geographic information system (GIS) analysis to determine the length of roads and trails in riparian management zones was conducted for the Travel Management Rule in 2008. That analysis used the CNNF's GIS layers for roads and trails and a 100-foot buffer around all stream, lakes and ponds using the 1:24,000 scale hydrography layer. Based on that analysis, there are 160 miles of road and trail located within riparian management zones on the CNNF (Table 5.1-2-1).

Table 18. Length of roads and trails in riparian management zones (RMZ) in CNNF from 2008 analysis.

Maintenance level	Miles in RMZ
1 (Road closed to motorized traffic) low traffic	25
2 (Road suitable and open for high clearance vehicles; passenger car traffic not a consideration) low traffic	39
3 (Road open and maintained for passenger car travel, i.e., single lane with spot surfacing) moderate traffic	11
4 (Road open for travel at moderate speeds with moderate convenience) high traffic	34
5 (Road open and provides high degree of user convenience; i.e., double lane paved) high traffic	29
Trail/other	22
Total	160

Data Source: Internal GIS analysis

Table 19. Road reconstruction and decommission projects within Riparian Management Zones (RMZ) implemented during FY 2011-2017 on CNNF.

Project	Road	Associated Stream	Miles of Activity	Year Accomplished
Whiting Creek Crossing removal and road removal in RMZ	Off FR 2099	Whiting Creek	0.154 miles	2011
Stream crossing removal- UNT NB Oconto @ Snowmobile Trail (near Hwy 64)	Snowmobile trail	UNT NB Oconto River	0.04 miles	2013
Road re-location out of wetland and reconstruction	1335	Wetland and Unnamed stream	0.1 mile	2014
Twenty-mile Creek crossing removal and removal of railroad grade fill in RMZ	FR 202A	Twentymile Creek	0.04 miles	2014
Road reconstruction - road lies within floodplain	FR 383	Adjacent to UNT Hawkins Creek	1.48 miles	2015
Road stabilization to prevent erosion on steep slopes draining to UNT Twenty-mile Creek	FR 378A	UNT Twentymile Creek	0.25 miles	2015

Notes: UNT = Unnamed tributary; NB = North Branch
Data Source: Watershed Improvement Tracking (WIT) database, internal database.

Monitoring Question 3: What is the current status of stream and lake habitats?

Table 20. Summary of stream and lake restoration activities implemented during FY 2015-2017 on CNNF.

Improvement/restoration activities	2015	2016	2017
Acres of lake habitat improved	40	70	33
Miles of streams habitat improved	200	250	250
Number of lakes and streams monitored - fishery	34	34	5
Aeration acres (11 lakes)	1547	1547	1547

Data source: Watershed Improvement Tracking (WIT) database, internal database.

Monitoring Question 4: To what extent is forest management maintaining or restoring desired conditions of vegetative communities?

The Forest uses Project Effect Tables (PET) to monitor the cumulative effects of on-going projects. Each district has at least one PET table, containing a separate tab for each vegetation project, to track the timing and magnitude of harvests, regeneration and other effects. Summarization of the PET tables for the years 2015, 2016 and 2017 yielded the following forest type conversions:

Table 21. Forest type conversions during FY 2015-2017 on CNNF. This table was generated as a summary of Project Effect Tables (PET).

MA	Acres	FROM Forest Type	TO Forest Type	Comments
1A	62	Paper birch	Upland hardwoods	Overstory removal to release established regeneration
1B	46	Aspen	Open	Rx burn, ESHI
8C	211	Shrubs, aspen	Open	Rx burn, Riley Wildlife Management Area

Table 22. Acres harvested by treatment during FY 2004-2017 on CNNF. The Forest Plan estimate for Decade 1 is included for reference.

Treatment Type	Plan Estimate	FY 2004	FY 2005	FY 2006	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013	FY 2014	FY 2015	FY 2016	FY 2017
Clearcuts	3,980	897	1682	2314	2323	2234	4051	2003	1014	1500	1700	1393	1596	2,806	2,324
Shelterwood Cuts	1,490	621	471	1093	1258	673	749	311	281	330	488	129	774	610	764
Selection Cuts	7,530	1209	2808	1923	1616	968	635	1459	779	1527	1109	2576	2487	3,597	3,458
Thinning	7,100	6400	5688	6666	6605	6963	3906	5184	3490	3251	3119	4030	5032	3458.1	4954.4
Harvest w/out restocking														173	599
Land Clearing		3	4		5					33	42	46	13	75	42
TOTAL	20,100	9,130	10,653	11,995	11,807	10,838	9,341	8,957	5,564	6,641	6,457	8,175	9,902	10,720	12,141

Monitoring Question 6: Is Forest Plan implementation contributing to the recovery of federally listed threatened and endangered species and improving habitat conditions for species of conservation concern?

Population Trends

- Canada yew (MIS): Stable. 275 Yew sites reported in 2014. 273 sites documented in 2016. Two previously documented Canada Yew sites now have no plants.

- Fassett's locoweed (TES): Due to high water levels, the Fassett's locoweed population is currently very low. Most of the plants are underwater at Mountain Lake and all appear to be underwater at Pigeon Lake. There were 10-50 plants at Mountain Lake. At Pigeon Lake (2015), the Forest found no Fassett's Locoweed (there was very little habitat available). 5,000 plants were reported in 2010.
- Dwarf huckleberry (RFSS): Number of sites with plants: 13 reported in 2012; 20 sites in 2015.

Table 23. RFSS and T&ES plant species trends during FY 2015-2017 on CNNF.

Increasing: 3 species (6%)	**Stable: 20 species (40%)**	**Decreasing: 15 species (30%)**	**Unable to determine: 12 species (24%)**
Smith's Melicgrass	Alpine Milkvetch	Roundleaf Orchid	Autumnal Water-starwort
Braun's Holly-fern	American Ginseng	Green Spleenwort	Firedot Lichen Species
Dwarf Huckleberry	Pale Moonwort	Little Goblin Moonwort	Rocky Mountain Sedge
	Michaux's Sedge	Mingan Moonwort	Bright Green Spikerush
	Glade Fern	Bluntlobe Grapefern	Marsh Horsetail
	Twoheaded Water-starwort	Ternate Grapefern	Moor Rush
	Male Fern	Fairy Slipper	Bog Bluegrass
	Missouri Rock-cress	Livid Sedge	Western Jacob's Ladder
	Many-headed Sedge	Ram's-Head Lady's Slipper	Algae-like Pondweed
	Spreading Woodfern	Butternut	Brown Beakrush
	Fir Clubmoss	Large-flowered Ground-cherry	Northern Bur-reed
	American Shoreweed	Fassett's Locoweed (T&ES)	Beard Lichen
	Largeleaf Sandwort	Canadian Ricegrass	
	Snowline Wintergreen	Claspleaf Twistedstalk	
	Gmelin's Buttercup	Marsh Valerian	
	Heartleaf Foamflower		
	Few-flowered Spikerush		
	Hill's Pondweed		
	Marsh Grass-of-Parnassus		
	Russet Cottongrass		

*Fassett's patches are declining in size in 2015 but were drastically increased when water levels were low- in 2012-13.

T&ES = Threatened and Endangered Species

RFSS = Regional Forester Sensitive Species

Table 24. Federally-listed Threatened and Endangered Species (T&ES) and Regional Forester Sensitive Species (RFSS) animals on CNNF, global and state conservation rankings, conservation status and estimated habitat condition and population trends.

Species	Common Name	Global Rank	State Rank	Status	Habitat Trend *	Estimated Population Trend *
T&ES						
Canis lupis	Gray (Timber) Wolf	G4	S2	ST	⇔	⇔
Dendroica kirtlandii	Kirtland's warbler	G1	SNA	SC, FE	⇳	⇳
Lynx canadensis	Canada lynx	G5	SNA	SC, FE	⇔	⇔
RFSS – Animals						
Acipenser fulvescens	Lake Sturgeon	G3G4	S3	SC	⇔	⇔
Ammodramus leconteii	Le Conte's Sparrow	G4	S2B	SC	⇔	⇔
Bartramia longicauda	Upland Sandpiper	G5	S2B	SC	⇧	⇔
Buteo lineatus	Red-shouldered Hawk	G5	S3S4B	ST	⇔	⇔
Callophrys henrici	Henry's Elfin	G5	S2	SC	⇔	⇔
Danaus plexippus	Monarch	G4	SU	SC	?	?
Dendroica cerulea	Cerulean Warbler	G4	S2S3B	ST	⇔	⇔
Eptesicus fuscus	Big Brown Bat	G5	S2S4	ST	?	?
Falcipennis canadensis	Spruce Grouse	G5	S1S2B	ST	⇩	⇔
Glyptemys insculpta	Wood Turtle	G4	S3	ST	⇔	⇩⇔
Gomphus viridifrons	Green-faced Clubtail	G3	S3	SC	⇔	⇔
Haliaeetus leucocephalus	Bald Eagle	G4	S3B	SC	⇔	⇔
Martes americana	American Marten	G5	S3	SE	⇔⇩	⇳
Moxostoma valenciennesi	Greater Redhorse	G4	S2S3	ST	⇔	⇔
Myotis lucifugus	Little Brown Myotis	G5	S2S4	ST	⇔	⇔⇩
Notropis anogenus	Pugnose Shiner	G3	S2S3	ST	⇔	⇔
Oeneis chryxus	Chryxus Arctic	G5	S2	SC	⇔	⇳
Ophiogomphus anomalus	Extra-striped Snaketail	G3	S1	SE	⇔	⇔
Ophiogomphus howei	Pygmy Snaketail	G3	S3	ST	⇔	⇔
Oporornis agilis	Connecticut Warbler	G4	S3B	SC	⇔⇩	⇩⇔
Perimyotis subflavus	Tri-colored Bat	G5	S1S3	ST	⇔	⇔
Picoides arcticus	Black-backed Woodpecker	G5	S2B	SC	⇔	⇔
Pieris virginiensis	West Virginia White	G3G4	S2	SC	⇔	⇔
Plebejus idas nabokovi	Northern (Nabokov's) Blue	G5	S1	SE	⇔	⇩
Tympanuchus phasianellus	Sharp-tailed Grouse	G4	S2B	SC	⇔⇧	⇩
Venustaconcha ellipsiformis	Ellipse	G3G4	S2	ST	⇔	⇔

Global rank, state rank and status code definitions are available from the Wisconsin Natural Heritage Inventory Program: https://dnr.wi.gov/topic/nhi/wlist.html

*⇔ Population/habitat conditions considered stable
*⇳ Population habitat conditions considered increasing or decreasing (uncertain)
* ⇩ Population/habitat conditions considered declining
*⇧ Population/habitat considered to be increasing
* ? Population/habitat condition cannot be determined

Monitoring Question 7: What is the current status of Semi-primitive Non-motorized (SPNM) areas?

Table 25. Road miles open and decommissioned within Semi-primitive Non-motorized (SPNM) areas by Management Area (MA) during FY 2015-2017 on CNNF.

MA 6A – SPNM Low Disturbance	**Miles Open**	**Miles Decommissioned**
MPF -- Wabasso	0	0
GD -- Rock Lake (*)	0	0
GD -- St. Peters Dome	0	0
GD -- Marengo (*)	0	0
ERFL -- Anvil (*)	0	0
LKLN -- Wabikon-Riley	0.9	0
LKLN -- Jones Springs (*)	0	0
WA -- Flynn Lake Addition	0	1.5
Total	**0.9**	**1.5**
MA 6B – SPNM Moderate Disturbance	**Miles Open**	**Miles Decommissioned**
MPF -- Elk River (*)	0	0
MPF -- Round Lake (*)	0.15	0
GD -- Rock Lake II	0	0
GD -- Brunsweiler (*)	0	0
GD -- Porcupine NW (portion on WA)	0	0
ERFL -- Lauterman (*)	0.06	0
LKLN -- Ed's Lake (*)	0	0
LKLN -- Honey Creek	2.95	0
LKLN -- McComb Lake	0.09	0
WA -- Big Brook (*)	0.75	0
WA -- Star Lake (*)	1.75	0
Total	**5.75**	**0**

Monitoring Question 8: What is the current status of the ATV/UTV trail and route system on the Forest?

Table 26. Miles of ATV trail constructed annually by district and summarized by Forest unit and Forest total for FY 2004-2017 on CNNF.

Year	MPF	GD	WB	ERFL	LKLN	Chequamegon Total	Nicolet Total	Forest Total
2004	0	0	0	0	0	0	0	0
2005	0	0	0	0	0	0	0	0
2006	0	0	0	0	0	0	0	0
2007	0	0	0	0	0	0	0	0
2008	1.5	0	0	0	0	1.5	0	1.5
2009	0	0	0	0	0	0	0	0
2010	0	0	0	1.71	0	0	1.71	1.71
2011	0	0	0	0	0	0	0	0
2012	0	0	0	0.9	0	0	0.9	0.9
2013	0	0	0	3.1	0.24	0	3.34	3.34
2014	0	0	0	0	0.2	0	0.2	0.2
2015	0	0	0.25	1.6	0.25	0.25	1.85	2.1
2016	0	0	0	0.9	0	0	0.9	0.9
2017	2.4	0	0	0	0	2.4	0	2.4
Total	**3.9**	**0**	**0.25**	**8.21**	**0.69**	**4.15**	**8.9**	**13.05**

Table 27. Annual miles of existing ATV trails reconstructed and opened to UTVs 65" or less, by district and Forest total for FY 2012-2017 on CNNF.

Year	MPF	GD	WB	ERFL	LKLN	Forest Total
2012	0	0	0	0	0	0
2013	0	0	0	0	0	0
2014	0	0	0	0	0	0
2015	74	35	0	0	0	74
2016	0	0	0	0	0	0
2017	22.9	63	0	0	0	22.9
Totals	**96.9**	**0**	**0**	**0**	**0**	**96.9**

Monitoring Question 12: To what extent is Forest Plan implementation contributing or controlling populations of NNIS?

Table 28. Frequency of non-native invasive plant (NNIP) sites on CNNF by size.

	Count	Percentage of all sites
Sites < 0.1 acre	3,989	42%
Sites < 1 acre	5,705	90%
Sites > 10 acres	50	<1%

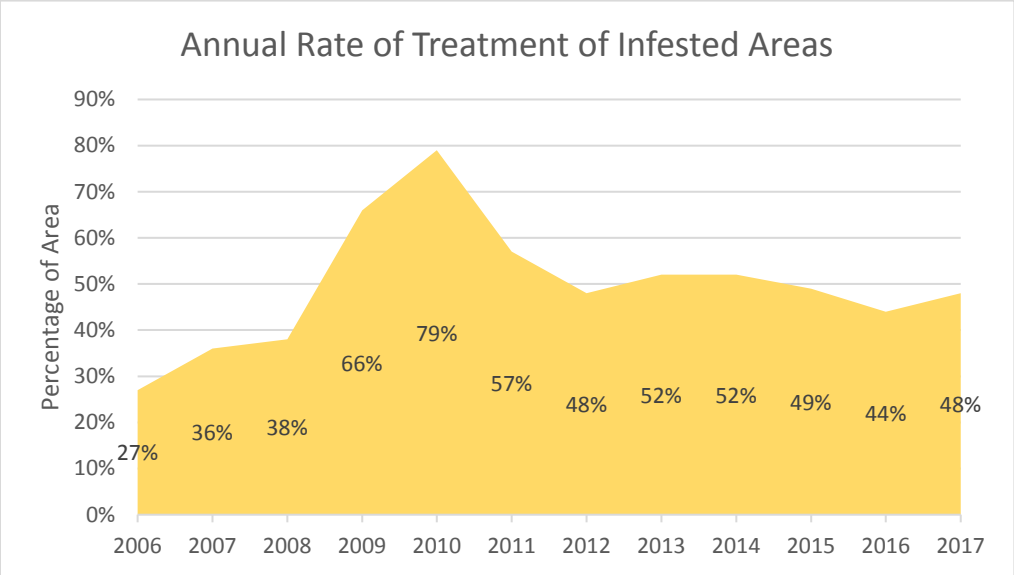

Figure 26. Annual percentage of non-native invasive plant infested acres that are treated for FY 2006-2017 on CNNF.

Monitoring Question 13: To what extent are large disturbance events (over 100 acres) occurring on the Forest, including those related to weather, insect outbreaks and disease?

Table 29. Large windstorm events (> 100 acres) and area salvaged on CNNF for 1999-2016.

Event	District	Storm Date	NEPA Decision	Affected Acres	Salvage Acres
Delta-Drummond	WB	7/4/1999	FONSI 6/29/2000	17,000	3,640
Salvage Blowdown	ERFL	7/30/1999	FONSI 3/9/2001	17,600	1,020
Park Falls Blowdown	MPF	8/13/2000	FONSI 6/5/2002	3,600	2,528
Gilman Tornado	MPF	9/2/2002	FONSI 8/4/2003	2,600	2,140
Blackwell Blowdown	LKLN	7/6/2005	DM 12/1/2005	140	140
Lake Owen Blowdown	WB	9/13/2005	DM 10/5/2006	800	100

Event	District	Storm Date	NEPA Decision	Affected Acres	Salvage Acres
Adeline Lake Blowdown	GD	9/13/2005	-	202	0
Hay Creek Blowdown	GD	7/30/2006	DM 7/31/2007	303	279
Quad County Tornado	LKLN	6/7/2007	FONSI 9/7/2007 & Contract mod	5,500	3,890
RMH Salvage			DM 11/9/2009		250
Hunter City Salvage	ERFL	7/2007	DM 9/30/2004	162	162
Dragon Salvage	LKLN	7/2010	DM 9/15/2010	190	190
Morse Blowdown	GD	7/27/2010	DM 11/12/2010 & Contract mod	298	232
Mr. Burns Tornado	ERFL	4/12/2011	DM 7/6/2011	292	237
Independence Salvage	WB	7/1/2011	FONSI 4/10/2012	660	425
Long Bow Blowdown	ERFL	9/1/2012	Contract mod	182	91
Pioneer Road Salvage	GD	8/2013	DM 8/15/2014	118	118
2014 Red Pine Salvage	GD, MP	9/4/2014	DM 10/28/2014	7,000	226
Chequamegon Salvage			FONSI 9/8/2015		5,497
Grandma Lake Salvage	ERFL	7/11/2016	DM 8/9/2016	227	227
North Reservoir Salvage	ERFL	7/2016	DM 9/22/2016	232	232
North Boundary Salvage	MPF	7/2016	DM 10/13/2016	226	226
Artemis Salvage	WB	7/21/2016	DM 10/19/2016	3,150	240
Twin Lakes Restoration			FONSI PENDING		2,844
18-YEAR TOTALS				**60,482**	**24,934**

*The majority of these 21 blowdown events involved less than 250 salvage acres and were analyzed with a CE. However, 94 percent of the total damage and 88 percent of the salvage acres, are associated with the eight events too large for a Categorical Exclusion, for which an Environmental Assessment was required.

Table 30. Large blowdown events with salvage requiring an Environmental Assessment on CNNF, 1999-2016.

Event	Affected Acres	Salvage Acres	Year of Event	Interval (Years)
Delta-Drummond	17,000	3,640	1999	-
Salvage Blowdown	17,600	1,020	1999	0

Event	Affected Acres	Salvage Acres	Year of Event	Interval (Years)
Park Falls Blowdown	3,600	2,528	2000	1
Gilman Tornado	2,600	2,140	2002	2
Quad County Tornado	5,500	3,890	2007	5
Independence Salvage	660	425	2011	4
Chequamegon Salvage	7,000	5,497	2014	3
Twin Lakes	3,150	2,844	2016	2
Total	**57,110**	**21,984**		
Average	**7,139**	**2,748**		**2.4**

Table 31. Annual gypsy moth Slow the Spread Program (aerial application of pheromone flakes and BtK) area on CNNF.

Year	Acres Treated	Notes
2005	2,151	1,314 acres treated with pheromone flakes: 837 acres treated with BtK
2006	4,420	all pheromone flakes
2007	675	all pheromone flakes
2008	38,622	38,598 acres treated with pheromone flakes: 24 acres treated with BtK
2009	8,330	all pheromone flakes
2010	7,663	all pheromone flakes
2011	8,312	all pheromone flakes
2012	0	No treatments on CNNF in 2012
2013	7,636	Pheromone flakes on 7,636 ac; 572 of these ac also treated with Btk
2014	0	No treatments on CNNF in 2014
2015	0	No treatments on CNNF in 2014
2016	0	No treatments on CNNF in 2014
2017	0	No treatments on CNNF in 2014
Total	**77,809**	

Table 32. Oak wilt treatments on CNNF, 2001-2016.

Treatment FY	Sites Treated	Trees Removed	Acres
2001	9	1,061	
2002	21	444	
2003	0	0	
2004	0	0	
2005	87	7,700	
2006	31	2,757	
2007	35	3,679	
2008	19	1,559	

Treatment FY	Sites Treated	Trees Removed	Acres
2009	14	909	
2010	27	2,815	
2011	17	2,714	
2012	24	1,482	
2013	28	1,986	
2014	11	2,400	48*
2015	28	2,446	
2016	21	852	
Total	**372**	**32,804**	

* In 2014, several individual pockets which had previously been treated individually coalesced into one 48-acre treatment block.

Monitoring Question 14: What are the effects of prescribed burning on Class I and Class II air sheds?

Table 33. Number and size of prescribed fires on CNNF, 2009-10 and 2013-17.

Year	Burns	Acres
2009	19	938
2010	31	1,221
2013		2,631
2014		3,312
2015		3,867
2016		3,818
2017		744

Monitoring Question 15: What is the current status of heritage resources?

Table 34. Heritage sites identified and monitored in FY 2015-2017 on CNNF.

Year	Sites Identified	Sites Monitored
2015	29	23
2016	28	28
2017	47	37

Monitoring Question 16: To what extent is Forest Plan implementation harvesting forest products and are harvest levels sustainable?

Table 35. Volume of forest products harvested (MMBF) during FY 2015-2017 on CNNF. The Forest Plan estimate for decade one is included for reference.

Forest Product	Plan Estimate	FY 2015	FY 2016	FY 2017
Hardwood Pulp	53.2	21.9	37.5	36.1
Aspen Pulp	31.3	18.5	36.4	22.6
Softwood Pulp	29.9	16	13	11.5
Softwood Saw	8.8	17.1	7.2	7.4
Hardwood Saw	7.6	2.3	4.6	4.9
TOTAL	130.8	75.8	98.7	82.5

Table 36. Special forest product harvest quantities on CNNF for FY 2015-2017.

Special Forest Products	Unit of Measure	FY15	FY16	FY17
Christmas Trees	Each	609	650	610
Balsam Boughs	Tons	314	194	262
Princess Pine/Sheet Moss	Pounds	1,625	1,050	620
Posts & Poles	Each	60	60	1,135
Twigs	Bundles (50/bundle)	1,000	1,100	800 Aspen
Stems	Each	8,000	8,100	3,000 Paper Birch 3,100 Aspen
Birch Bark	Pounds	360	600	420
Fruits/Berries	Pounds	N/A	N/A	75
Mushrooms	Pounds	N/A	N/A	55
Leaves/Tubers	Pounds	N/A	N/A	55
Cones	Bushels	N/A	N/A	60
Seedling Transplants	Each	1,170	725	1,625