USDA United States Department of Agriculture
Forest Service
Chippewa National Forest
Supervisor's Office
200 Ash Avenue Northwest
Cass Lake, MN 56633
218-335-8600
FAX: 218-335-8637

File Code: 1940
Date: September 20, 2016

This Monitoring and Evaluation Report covers the monitoring activities, results and recommendations for Fiscal Year 2015.

The report addresses the monitoring questions in the Chippewa National Forest Plan, (Chapter 4 Monitoring and Evaluation) for the following resource areas: Tribal Rights and Interests, Timber, Regeneration, Wildlife and Plants, Insects and Disease, Off-Road Vehicles, Non-native Invasive Species Plants, Watershed Health, Soils, Temporary Openings, Unit Monitoring, Costs and Agreements, Climate Change, and Species Composition, Age Class Distributions and Objectives.

This report also provides a listing of all the Forest Plan Amendments and Corrections since the Revised Forest Plan was signed in 2004.

This is the Forest's last annual Monitoring and Evaluation Report. In accordance with direction provided in the 2012 Planning Rule (36 CFR Part 219.12), our reports will be published biennially. Our next report is expected in 2018.

For more information about the contents of this report, please contact Sharon Klinkhammer at 218-335-8660 or Jim Gries at 218-335-8649 (jgries@fs.fed.us).

Sincerely,

DARLA LENZ
Forest Supervisor

Enclosure

USDA

United States Department of Agriculture

CHIPPEWA NATIONAL FOREST

MONITORING AND EVALUATION REPORT
FY 2015

USDA Forest Service | Eastern Region
Milwaukee, Wisconsin
August, 2015

For More Information:
Sharon Klinkhammer
Chippewa National Forest
200 Ash Avenue, NW | Cass Lake, MN 56633
218.335.8660 | sklinkhammer@fs.fed.us

FISCAL YEAR 2015
MONITORING AND EVALUATION REPORT

APPROVAL AND DECLARATION OF INTENT

I have reviewed the FY 2015 Monitoring and Evaluation Report for the Chippewa National Forest that was prepared by forest employees. I am satisfied with the findings and intend to consider recommendations made during project development and plan revision. The Monitoring and Evaluation Report meets the intent of both the Forest Plan (Chapter 4) as well as the 36 CFR 219.

This report is approved:

Darla Lenz — 9/26/16

DARLA LENZ
Forest Supervisor

Date

In accordance with Federal civil rights law and U.S. Department of Agriculture (USDA) civil rights regulations and policies, the USDA, its Agencies, offices, and employees, and institutions participating in or administering USDA programs are prohibited from discriminating based on race, color, national origin, religion, sex, gender identity (including gender expression), sexual orientation, disability, age, marital status, family/parental status, income derived from a public assistance program, political beliefs, or reprisal or retaliation for prior civil rights activity, in any program or activity conducted or funded by USDA (not all bases apply to all programs). Remedies and complaint filing deadlines vary by program or incident.

Persons with disabilities who require alternative means of communication for program information (e.g., Braille, large print, audiotape, American Sign Language, etc.) should contact the responsible Agency or USDA's TARGET Center at (202) 720-2600 (voice and TTY) or contact USDA through the Federal Relay Service at (800) 877-8339. Additionally, program information may be made available in languages other than English.

To file a program discrimination complaint, complete the USDA Program Discrimination Complaint Form, AD-3027, found online at http://www.ascr.usda.gov/complaint_filing_cust.html and at any USDA office or write a letter addressed to USDA and provide in the letter all of the information requested in the form. To request a copy of the complaint form, call (866) 632-9992. Submit your completed form or letter to USDA by: (1) mail: U.S. Department of Agriculture, Office of the Assistant Secretary for Civil Rights, 1400 Independence Avenue, SW, Washington, D.C. 20250-9410; (2) fax: (202) 690-7442; or (3) email: program:intake@usda.gov .

USDA is an equal opportunity provider, employer and lender.

TABLE OF CONTENTS

Executive Summary

The following information consists of key points from resource areas included in this Monitoring and Evaluation Report for fiscal year 2015. More detail that supports these statements can be found in the document.

1. Tribal Interests and Rights

- The Forest continues its efforts to uphold Federal Trust responsibilities. A Memorandum of Understanding (MOU) signed by LLBO and the CNF expresses the will of each to work together to conserve resources significant to the Band's way of life and cultural identity. The Forest has provided employment opportunities; interacts with tribal program staff in an effort to work in a government to government manner; and protects tribal lands, assets, resources, and rights in land management decisions to sustain American Indian's way of life.

2. Timber

- The Forest is meeting assigned timber targets for volume sold even though acres harvested are below Forest Plan estimates.
- Ratio of sawtimber to pulpwood (26:74) is lower than proposed for decade 1 in the Forest Plan (32:66). Further, the goal for Decade 2 increases this ratio to 43:57. An increase in sawtimber percentage will be difficult to achieve based upon current harvesting prescriptions and management direction.
- The northern long-eared bat was listed as threatened with the 4(d) final rule. Some minor adjustments in reserve areas and season of harvest may be required if occupied, maternity roost trees are located within timber sale boundaries.
- The Forest should continue to utilize stewardship contracting and expand Good Neighbor Authority as a tool to accomplish restoration work.

3. Regeneration

- Adequate restocking of regeneration harvest stands was met on 66% of the acres harvested in FY 2010 by the end of FY 2015.
- As of late 2015, there were 763 sites forest-wide (14,158 acres) that had regeneration harvests completed and that are currently in some stage of reforestation leading to certification.

4. Wildlife and Plants

RFSS, MIS and T&E

- Projects analyzed either had no impact or were not likely to cause a trend to federal listing or loss of viability on the Forest.
- Monitoring documented successful implementation of all Forest Plan Standards and Guidelines on the ground.
- The Forest contributed toward the conservation and recovery of the Canada lynx, gray wolf, and northern long-eared bat through habitat and access management practices, collaboration with other federal and state agencies, as well as researchers, tribal bands and non-governmental partners.
- The Forest participated in a partnership with the Superior NF, University of Minnesota and Minnesota DNR in learning more about the status of the Northern Long Eared Bat which was listed as a threatened species in May of 2015.

Breeding Birds

- Most breeding bird species within the Forest we are capable of monitoring and detecting trends for are either increasing or stable in populations. Several species such as the Connecticut Warbler and Yellow-bellied Flycatcher continue to have trends that remain a concern.

5. Insects and Disease

- Tamarack is being damaged by eastern larch beetle and larch casebearer. Both insects have increased in recent years. Increase awareness of the condition of the tamarack resource and initiate possible management actions. There is the potential to salvage dead trees and regenerate sites with tamarack/black spruce.
- Emerald ash borer could potentially impacts thousands of acres on the Forest. The Forest is proactively working with partners and research projects to diversity ash wetlands and build resilience in ash stands before infestation.

6. Off-Road Vehicles (ORV)

- Public education and information is critical to successfully manage ORV use within the Forest and reduce illegal use.
- Through collaboration with the counties and MnDNR, additional ORV opportunities are identified and may be open to ORV use after the appropriate analysis is completed.
- There continues to be a workload associated with identifying roads to be opened or closed to ORV use, and roads to be decommissioned.

7. Non-native Invasive Species (NNIS) Plants

- Hand and mechanical treatments of NNIS plants appear to be effective. Some species such as garlic mustard that have a large existing seedbank will continue to emerge from this seed source in subsequent years and require future treatment.
- Bio-control releases were not very successful on spotted knapweed. Weevils generally keep infestations stable rather than decreasing the populations.
- Releases of beetles for control of purple loosestrife are much more effective, and in some smaller infestations, they are reducing the size of loosestrife populations or dramatically decreasing the density of plants.
- New NNIS plant sites consist mainly of low and medium ecological risk species.

8. Watershed Health

BMPs

- BMPs were generally well-documented, implemented, and effective for the ground-based skidding and harvesting and utility sites.
- Effective implementation of BMPs and Forest Plan standards and guidelines are moving the Forest toward desired conditions and objectives.
- Very few of the BMPs documented for the grazing site were actually implemented. The future of grazing on the CNF should be re-evaluated.
- More detail in the planning documents and operation and maintenance plans may improve implementation and effectiveness of BMPs.

Seasonal Ponds

- Of the digitized seasonal pond points, 73% were accurately identified as seasonal wetlands; 84% were some type of wetland.
- Knowing the locations of seasonal ponds within the Guthrie Till Plain supports both planning and implementation efforts across the area and facilitates adequate protection of seasonal wetlands consistent with Forest Plan standards, guidelines, and BMPs.
- The success of mapping seasonal pond reinforces the need to continue this effort and expand it to other landscapes. The goal is to have a corporate data layer of seasonal ponds across the Forest.

Wetland Restoration

- Restoration of hydrology and wetland vegetation appears to be progressing well at each of the impoundment removal sites. The Forest is moving towards the desired conditions and objectives through effective implementation of relevant best management practices (BMPs) and Forest Plan standards and guidelines (S&Gs). The project met all

laws and regulations pertinent to wetland restoration and results are consistent with management expectations.

- Monitoring methodology adequately assessed the changes in hydrology and plant communities after restoration (impoundment removal) and is recommended for similar monitoring projects in the future.
- Continued survival surveys are recommended to adequately assess reforestation efforts.

Dam Removals and Aquatic organism passages

- Hydrologic connectivity and function is being restored; habitat and aquatic organism passage objectives are being met.

Road closures and decommissioning

- The effectiveness of road closures and decommissioning is mixed. Most effective is a combination of berm, slash, and rocks. More sampling is needed to determine the most reliable and effective barriers and closure types.

9. Soils

- In the *pre-harvest* stands, there was little evidence of disturbance. The *post-harvest* stands had an average of 57% in Class 0 disturbance (no evidence of disturbance) and 10% in Class 3 Disturbance (highly disturbed after harvest). There were no indicators that any of the sites had detrimental soil effects.
- Further monitoring of pre-harvest and post-harvest stands needs to occur to develop a representative data set.
- Forest Plan standards and guidelines, and best management practices (BMPs) are being met.

10. Temporary Openings

- Opportunities to create larger temporary openings over 300 acres in size through management activities need to be explored if Forest Plan expectations for larger openings are to be met at the end of decade 2 or beyond.

11. Unit Monitoring

- Monitoring of **harvest units** indicated that treatments planned were appropriate, realistic, and implementable. Objectives, standards and guidelines and mitigation measures for soils, wildlife, and vegetation were met.
- **Wetlands/Seasonal Ponds** monitoring shows that overall the Forest is doing well in avoiding impacts. There have been some impacts to wetlands during harvest, but the percentage is low and the types of impacts are avoidable.

- For **Patches,** Wildlife biologists are working on identifying/defining components of quality patches.
- With **roads and trails,** clear direction and better communication is needed on the process the Forest will use for addressing transportation needs, recording roads and trails in appropriate databases or on GIS maps, their intended use, and effectiveness of closures or decommissioning.
- **Stewardship contracts** are effective in accomplishing a variety of service work projects such as hydro-axing, fuels reduction along roads, and tree spading of larger trees. Road resurfacing, and asphalt removal worked well and was beneficial for Forest and for purchaser. For future Stewardship contracts, allow more time for coordination with resource areas and identification of other service projects.

12. Costs and Agreements

- Grants and agreements make an important contribution to provide work opportunities and to achieve resource accomplishments.
- Joint Chiefs Upper Mississippi Headwaters Restoration Project has increased collaboration and partnerships across all ownerships and resulted in the accomplishment of several successful projects. Projects include non-native invasive weed control, seeding of native grasses, hazardous fuels reduction, site preparation for tree seedling planting, creation of early successional habitat for birds, aquatic organism passage restoration.

13. Climate Change

- The Spruce and Peatland Responses under Climatic and Environmental Change Experiment (SPRUCE) Project looks at the responses of peatland ecosystems to changed climate. After six years of planning and construction, the experiment officially began late summer 2015 when the climate chambers throughout the facility were turned on.
- The development of the LANDIS II model is complete and supports the Northwoods Ecosystem Vulnerability Assessment for the Chippewa NF.
- The Forest continues to address forest adaptation for climate change in our major vegetation projects using an approach in *Forest Adaptation Resources: Climate Change Tools and Approaches for Land Managers* (Gen Tech Rpt NRS-87, 2012).
- An element to monitor climate change has been added to the Forest Plan (Chapter 4 Monitoring and Evaluation).
- Adaptive Silviculture for Climate Change on the Chippewa National Forest is progressing. Harvest is complete. Planting with a variety of tree species is planned for spring 2016.

The study will look at responses of silvicultural treatments to resistance, resilience, and adaptability to climate change.

- Another cooperative study looks at managing black ash forests in the face of emerald ash borer (EAB) and climate change. Preliminary results indicate that group selection harvest coupled with a planting strategy appear to be a viable technique to convert the black ash stands to a different composition while minimizing risks of altered hydrology.

14. Species Composition, Age Class Distributions and Objectives

- With the exception of the Dry Pine Landscape Ecosystem, the Forest is below the Decade 2 objectives for the amount of 0-9 age class even with the blowdown event of 2012. This trend continues well into decade 2 (2021) which takes into consideration treatments that are planned and under decision but have yet to be harvested. This trend holds true for all the LEs. The focus on commercial thinning of red pine stands contributes in part to these results.
- The amount of mature/older forest on the landscape has steadily increased since 2003. However, results vary by LE as to whether MIH objectives to increase, maintain, or decrease mature and older forest are being met.
- Jack pine and spruce-fir forest types are well below decadal objectives and contribute to an overall decline in the amount of conifer on the landscape.
- Amount of aspen on the landscape has declined since 2003 yet still exceeds the objectives for all LEs. Additional decreases in aspen are desired.
- Northern hardwoods exceed objectives due to stand re-delineation and typing and recent stand data. Further increases in this forest type are expected due to regeneration treatments, particularly in aspen stands, that promote the release of young hardwoods in stands.

I. INTRODUCTION

This report is compiled under the 2004 Chippewa National Forest Plan signed by Regional Forester, Randy Moore, on July 30, 2004. The Monitoring and Evaluation Report covers the monitoring activities, results and recommendations for Fiscal Year 2015.

This report uses Chapter 4 of the 2004 Forest Plan (Monitoring and Evaluation) as its framework. That chapter provides a list of monitoring questions to evaluate tied to resource areas. There are also legally required monitoring items that include specific compliance requirements. Reference Chapter 4 of the Forest Plan for a more complete overview and details.

In addition to the information summarized and presented in this report, the data compiled, methodologies used, and supporting documents are part of the project file and are available upon request at the Supervisor's Office in Cass Lake, MN.

Chapter II of this report consists of a report summary for the resource areas. Each resource section has the following discussion:

- Monitoring Question. This question is the same as identified in Chapter 4 of the Forest Plan. The questions are tied to monitoring drivers that consist of the desired conditions, objectives, standards and guidelines specified in the Forest Plan for that resource. The monitoring drivers are not included in this report but can be found in the project file. Similarly, the monitoring methods are in the project file. They consist of methods used, locations, timing, and processes of monitoring data collection.
- Results. This section captures the progress in implementing Forest Plan direction, reaching objectives, goals, desired conditions and producing goods and services. This section may also address the effectiveness of standards and guidelines, specific management practices, design features, or mitigation measures.
- Implications. This section discusses the interpretation of the data and describes what the results mean.
- Recommendations. Identifies recommendations for ongoing or future projects, particularly if there is a shift or adjustment in direction. Included are any potential changes to existing Forest Plan direction.

Chapter III addresses amendments and corrections to the Forest Plan. A complete listing of all the changes made since 2004 are provided.

Chapter IV is a list of the Forest Service employees that provided information contained in this report. The report incorporates information gathered by resource specialists for the most part from the Chippewa National Forest.

This report and past reports are posted on our Forest website:
http://www.fs.usda.gov/detail/chippewa/maps-pubs.

II. RESOURCE REPORTS

1. Tribal Rights and Interests

This section includes three monitoring questions related to tribal rights and interests. The first addresses sustaining American Indian's way of life, followed by a discussion on our government to government relationship, and finally some information on facilitating the right of the Tribes to hunt, fish, and gather.

Official emblem & flag
www.llobjibwe.org

Approximately 43% of the National Forest Lands are within the Leech Lake Reservation boundary. Nearly all Leech Lake Reservation lands are located within the proclamation boundary of the Chippewa National Forest. Eleven Indian communities make up the Leech Lake Reservation and all are within the proclamation boundary of Chippewa National Forest.

Key Points

- The Forest continues its efforts to uphold Federal Trust responsibilities. A Memorandum of Understanding (MOU) signed by LLBO and the CNF expresses the will of each to work together to conserve resources significant to the Band's way of life and cultural identity. The Forest has provided employment opportunities; interacts with tribal program staff in an effort to work in a government to government manner; and protects tribal lands, assets, resources, and rights in land management decisions to sustain American Indian's way of life.

Monitoring Question

Is Forest management helping to sustain American Indians' way of life, cultural integrity, social cohesion, and economic well-being?

Background

There are numerous locations throughout the Forest that have traditional, cultural, and spiritual significance to the Leech Lake Band of Ojibwe (LLBO). The use and protection of these areas is essential to maintaining traditional links to past generations.

The continued availability of traditionally utilized natural resources is crucial to Ojibwe culture. Now, as in the past, many places throughout the landscape are visited during a yearly cycle to collect food, medicinal plants, and other materials, as well as for religious practices and social gatherings. Plants and animals gathered from openings, aquatic environments, and forests provide sustenance. The traditions of gathering these and other natural resources continue to

be economically and spiritually important. Because of their concern with the continuation of this aspect of Ojibwe culture, the Band takes an active role in the protection and restoration of many species of plants, animals, and fish. The Band also emphasizes that access to these resources and traditional cultural places is an inherent right.

Results

The Forest has worked with the tribe in a variety of ways to improve the American Indian's way of life, cultural integrity, social cohesion, and economic well-being. This has been primarily through contracts and agreements to help support local crew work through stewardship contracts, grants and agreements, and training. We have also coordinated with the Tribe by providing training, working together to complete ecosystem restoration, prescribed burning, impoundment management, road maintenance, management of heritage resources, lands review, and public affairs.

Stewardship Contracts

- A Master Stewardship Agreement with the LLBO paves the way to expand our partnership opportunities with the Tribe.
- The FS collaborated with LLBO on a stewardship contract to treat areas and deliver firewood to LLBO. This integrated resource timber contract includes the removal of timber in exchange for a variety of service work on the Forest. The collaboration and negotiation process used was beneficial to both the Forest and LLBO for future work on the Forest through stewardship contracts and agreements.

Grants and Agreements

The following table displays some of the various grants and agreements with LLBO, some of which have been in place for several years.

Table 1-1. Various agreements with LLBO.

TYPE OF AGREEMENT	PURPOSE OF AGREEMENT/RESULTS
Participating	Tree Planting
Participating	Internship Agreement with Tribal College
Participating	Non-native Invasive Plant Species Management
Stewardship	Master Stewardship Agreement
Participating	Berry Patch Restoration – Non-Forest Service Lands
Participating	Egg Lake Restoration Project
Participating	Roadside Hazardous Fuels Reduction
Participating	Hazardous Fuels Reduction -- Onigum
Participating	Impoundment Maintenance
Cooperative Agreement	Road Maintenance

Participating	Heritage Surveys
Participating	Illegal Dump Cleanup

Tribal Forest Protection Act Project

- Forest staff consulted with the LLBO Department of Resource Management (DRM) in the development of a Tribal Forest Protection Act (TFPA) proposal that would encompass thinning of red pine stands for purposes of achieving fuels reduction, ecosystem restoration, and mitigation of bark beetle infestation. The Forest continues to consult with LLBO on implementation of the TFPA which will likely include utilizing stewardship contracting authorities directly with LLBO.

Tribal Timber Sale Coordination

- Our timber staff has been working cooperatively with DRM on tribal timber sales. This coordination has included access, designation of miscellaneous federal timber to facilitate access, road permit review, property line location and coordination with purchasers for biomass utilization on tribal land.

Ottertail Transmission Line Mitigation

- We continued our work planting fruiting shrubs on both Forest and Tribal lands. Several areas were planted that will enhance future berry picking opportunities for the LLBO.

Ecosystem Restoration

- The Forest and LLBO worked together in planting red and white pine seedlings in areas on the Forest.
- The LLBO DRM continues to work on Hazardous Fuels projects commonly known as "Stevens' Funds". The $225,000.00 Onigum Vicinity Hazardous Fuels Reduction Fuels Project grant treats 580 acres in the Onigum area of the Leech Lake Reservation. This project includes thinning, brushing and possibly prescribed burning.
- LLBO participated with prescribed burning at Federal Dam and several other areas on the Forest with burning projects.
- LLBO participated in staffing during high fire danger occurrences.
- LLBO completed a Forest Service funded Community Wildfire Protection Plan for the Reservation.
- Under agreement, the Forest has trained and employed band members in the identification and eradication of invasive plant species. The crew received training on identification of various invasive plant species, as well as observing exotic earthworm infestations, at sites across the forest. The crew conducted hand and mechanical invasive plant control treatment on both tribal and National Forest lands.

- The Forest also partnered with Leech Lake Tribal College on a wetland mapping and assessment project.

Engineering

- Forest implemented Egg Lake Impoundment decommissioning project with LLBO.
- Forest coordinated routine maintenance work at Impoundments under the LLBO impoundment agreement.
- Forest updated the road maintenance cooperative agreement with LLBO to blade and snowplow many roads.
- Forest completed a number of stewardship road proposals, including road re-establishment, blading, etc.
- LLBO assisted the Forest with a road emergency flooding issue when we were shorthanded.
- Forest assisted LLBO with emergency culvert supply.

Heritage Resources Coordination

- The Heritage Survey Participating Agreement with LLBO for archaeological survey of vegetation management projects and archaeological survey of resorts was signed and now is in effect.
- Forest prepared documentation on approximately 10 projects requiring Section 106 consultation with the Tribal Historic Preservation Officer. Projects include vegetation management, wildlife habitat, and road repair.
- Forest worked with the tribe in response to tribal cemeteries.
- Further coordinated NAGPRA issue involving the Forest and the University of Michigan.
- Forest completed a National Register evaluation of an archaeological site as well as National Register documentation of another archaeological site.

Lands/Recreation

- The Forest assisted LLBO with review of nearly 17,000 acres of National Forest System lands acquired through Secretarial Transfer Authority. LLBO is pursuing legislation to transfer the parcels from National Forest System status to Indian Trust Lands.
- The Forest accommodated free camping for tribal members as requested.
- LLBO held two youth program events at the Forest's Norway Beach Recreation Area in June and August of this year.

Public Affairs

- The Forest worked closely with LLBO with regards to the coordination of the 2014 U.S. Capitol Christmas Tree. By building on current relationships, we were able to generate significant connections to both governments and programs.

Youth Employment

- The Forest shared information with local Indian Communities to outreach for YCC job opportunities for high school youth. As a result, the Forest hired tribal members as YCC employees.

Monitoring Question

Are government to government relationships functional?

Background

Consultations occur on National and Regional issues and on local Forest projects. Consultation on Forest level projects impacting Treaty Rights has been an emphasis. The Director of the DRM is authorized by Tribal Council Resolution to serve as the point of contact for the LLBO on all matters concerning the Forest Service. Line officers consult with DRM Director or delegated staff. Planning Team members and Line Officers on the Forest attend Local Indian Council meetings to provide and solicit information from Tribal communities on Forest Service projects planned within the reservation boundaries.

Results

- The Forest consulted with LLBO on the development and execution of a Joint Memorandum of Understanding (MOU) concerning firewood gathering that was executed in FY 2015.
- The Tribal Relations Strategy provides Forest employees with tips and resources about consultation and processes used regularly between the Forest and LLBO.
- With regard to the major vegetation management projects on the Forest, consultations are a matter of routine business. Planning team members and Line Officers meet with DRM and attend Local Indian Council (LIC) meetings to provide and solicit information from tribal communities on Forest projects.
- Consultation on major vegetation projects included the Tribal Forest Protection Act (TFPA) project, Laurentian Vegetation Management, Collaborative Ash Diversification, Forest-wide Ash Diversification, and Shingobee Vegetation Management projects.
- The Forest also consulted with LLBO on the MOA topics on firewood, camping, and other specific hunting or gathering issues.

- The Forest Line Officers and Team Leaders hold quarterly coordination meetings with the Director and DRM Staff. They address emerging issues, updates and priorities within each agency's fire, forestry, watershed, wildlife, botany, and heritage programs.
- With the retirement of Forest's Tribal liaison in late 2014, alternative approaches are being considered. The vacant tribal liaison position has created gaps in program continuity.

Monitoring Question

Is the Forest facilitating the right of the Tribes to hunt, fish, and gather as retained via Treaty?

Results

Information provided for the previous monitoring questions contribute to facilitating the right of the Tribe to hunt, fish, and gather.

Firewood Gathering Coordination

In FY 2015, the Forest and DRM met on several occasions to develop the wording for a tribal firewood ordinance. The ordinance is being reviewed by the LLBO legal staff and is planned for consideration by the Tribal Council. In addition, the Forest and DRM have been working on a Tribal Firewood MOA as part of our more comprehensive MOU.

Forest Timber staff has been working with LLBO to provide areas for firewood collection by the Day Labor Program. The Day Labor Program has been harvesting firewood from storm damaged trees in areas on the forest.

Recommendations

- Continue to work with the LLBO and employees of the Forest to strengthen cultural awareness, consultation, communication, employment and outreach, partnerships, and resource management.
- Continue efforts that facilitate greater involvement of all Tribal members in Forest programs and activities afforded the general public.
- Continue connecting leaders from both governments to help address key issues that may have potential to disrupt relations.

2. Timber

Key Points

- The Forest is meeting assigned timber targets for volume sold even though acres harvested are below Forest Plan estimates.
- Ratio of sawtimber to pulpwood (26:74) is lower than proposed for Decade 1 in the Forest Plan (32:66). Further, the goal for Decade 2 increases this ratio to 43:57. An increase in sawtimber percentage will be difficult to achieve based upon current harvesting prescriptions and management direction.
- The northern long-eared bat was listed as threatened with the 4(d) final rule. Some minor adjustments in reserve areas and season of harvest may be required if occupied, maternity roost trees are located within timber sale boundaries. Surveys for bats are occurring.
- The Forest should continue to utilize stewardship contracting and expand Good Neighbor Authority as a tool to accomplish restoration work.

Monitoring Question

To what extent does output levels and location of timber harvest and mix of sawtimber and pulpwood compare to those levels projected?

In response to this monitoring question, several different monitoring indicators will be presented. These include timber target, volumes, and acres; harvest by treatment method, revenues, ratio of sawtimber to pulpwood, and payments to counties. Several years are included to provide a sense of the trends. This information was compiled from actual sales that were offered and sold during Fiscal Years (FY) 2011, 2012, 2013, 2014 and 2015.

Results

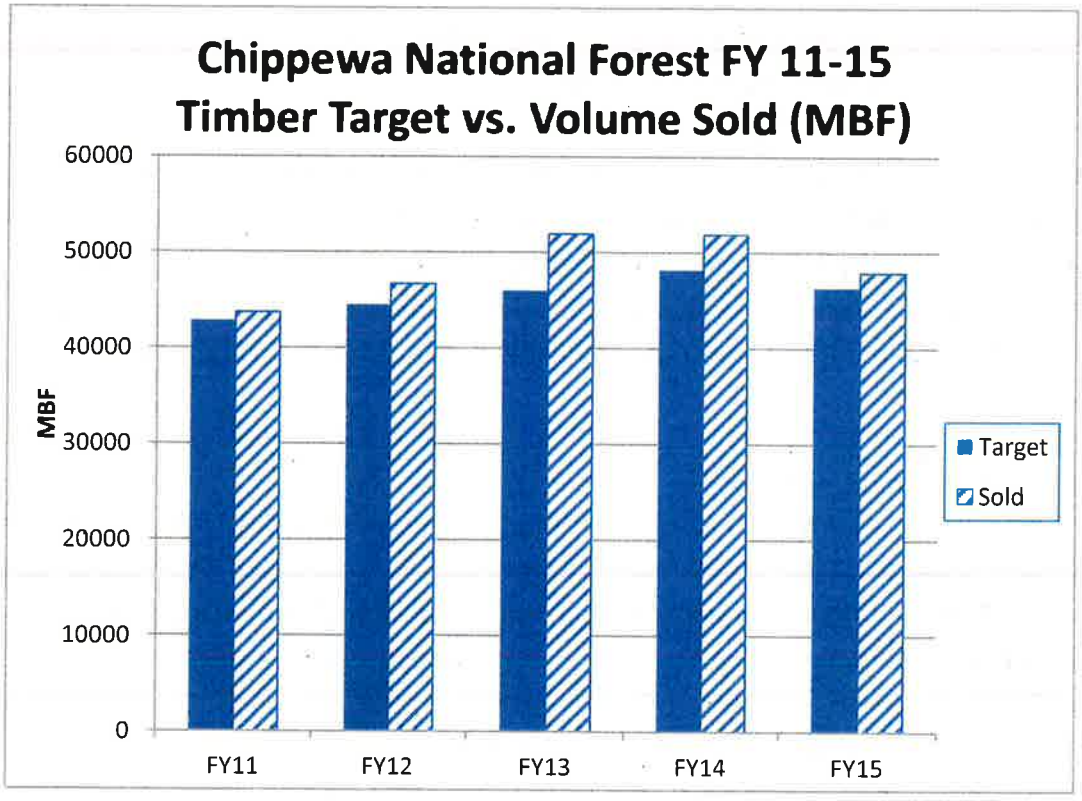
Timber target, volumes, and acres

Types of information monitored include the timber target, volume sold, volume harvested, uncut volume under contract, and number of acres sold and harvested. The volume sold is further broken down into sawtimber and pulpwood. The annual timber target for sell is negotiated each year with the Regional Office. Information provided in Table 2-1 and Table 2-2 is derived from the Annual Bid Monitoring Report (FY 2011-2015) and the Timber Cut and Sold Report (Timber Sale Accounting Program FY 2011-2015).

Table 2 -1. Timber Target, Volume Offered & Sold, Volume Harvested, and Uncut Volume under contract, and acres sold and harvested by FY.

	FY 2011	FY 2012	FY 2013	FY 2014	FY 2015
Timber Target (MBF)	42,810	44,500	46,000	48,200	46,350
Volume Sold (MBF)	43,706	46,695	51,982	51,884	47,927
Volume Harvested (MBF)	34,803	33,756	49,132	48,204	53,920
Uncut volume under contract (MMBF)	109.8	122.5	125.4	130.6	125.1
Acres Sold	4,980	5,950	6,434	5,847	5,581
Acres Harvested	3,943	4,967	5,782	5,717	5,698

The timber sell target assigned to the Forest has increased since 2011 going from 42,810 to 46,350 MBF in 2015, an 8% increase. Volume sold has steadily increased from 43,706 MBF in FY 2011 to 47,927 MBF in 2015, a 10% increase. From FY 2011 to FY 2015, volume sold has been slightly above the assigned target. Acres sold have fluctuated from 4,980 acres in FY 2011 to 5,581 acres in FY 2015. As a result of the 2012 wind storm, there was a pulse of salvage and damaged acres sold that resulted in a peak of 6,434 acres in FY 2013.



Volume harvested has increased from 34,803 MBF in FY 2011 to 53,920 MBF in FY 2015. The increase in harvest volume can be explained by the improved economic conditions and the 2012 blowdown event on the Chippewa. Local mills including Norbord, Sappi and Potlatch have made significant investments to upgrade and modernize equipment. This has resulted in increased capacity and more demand for stumpage.

Uncut volume under contract increased in FY 2011 from 109,800 MBF to 125,100 MBF in FY 2015. This increase in uncut volume can be attributed to several factors. A significant factor is the 2012 blowdown event. Many purchasers switched to harvesting salvage sales in an effort to capture the wood products before disease and rot had a significant impact to wood quality. As a result, many of the purchasers have requested additional time on their regular green timber sales due to time lost on salvage sale operations.

The number of acres harvested has increased steadily from 3,943 acres in FY 2011 to 5,698 acres in FY 2015 (Table 2-1). Again, the blowdown event of 2012 has had a significant impact on the number of acres harvested due to salvage timber sales. In addition, the recent rebound of stumpage prices and economic conditions has created incentive for purchasers to harvest timber.

Seasonal weather variations can also affect the amount of timber harvested. Extended cold winters in 2012 and 2013 had a positive impact on the acres harvested. Operating conditions during the winter of 2014-2015 were ideal for logging with minimal snow and an extended late spring break-up.

Stronger markets and prices will drive more purchasers to continue with harvest plans. Economic forecasters are calling for flat to declining wood production in Canada and dramatic reductions in exports from Russia and China. As the housing market in the U.S. continues to rebound and demand for housing units in China is booming at 15 to 17 million units in 2011, the demand and prices for softwood lumber will be strong (Wilent 2014). In Minnesota, the strengthening of the economy, including the housing industry, has allowed several of the primary mills to make capital investments during 2012-2013 which provides for improved efficiencies, expanded product markets and increased production (Minnesota Forest Resources Report 2014).

Harvest by Treatment Method

The Forest utilizes a variety of silvicultural systems to accomplish Forest Plan objectives. For Decade 1 (2004-2014), thinning treatments have exceeded the planned acres while clearcutting treatments are below planned acres (Table 2-2). Overall, total acres treated for Decade 1 (39,500 acres) are 51% of planned treatment acres (77,139 acres).

For Decade 2 (2015-2025), the total probable acres treated rises to 82,222 (Table 2-3) compared to 77,139 for Decade 1. For FY 2015, total acres treated was 5,698, which is 69% of planned treatment acres on a per year basis (82,222/10 = 8,222 acres per year).

Table 2-2. Decade 1 (2004-2014) Probable and actual acres of timber harvest by treatment method from Forest Plan Table APP-D2 Administrative Correction 9/14/2007.

Treatment	Proposed Decade 1 Acres	Decade 1 Actual Acres Treated	Probable Decade 1 % acres treated	Decade 1 Actual Treated % acres
Thinning	16,000	18,130	21	46
Clearcut	29,866	12,777	39	32
Shelterwood	11,149	4,750	14	12
Uneven-aged	20,124	3,843	26	10
Totals	**77,139**	**39,500**	**100%**	**100%**

Table 2-3. Decade 2 (2015-2025) Probable and actual acres of timber harvest by treatment method from Forest Plan Table APP-D2 Administrative Correction 9/14/2007.

Treatment	Probable Decade 2 Acres	Decade 2 Actual Acres Treated (FY15 Data Only)	Probable Decade 2 % acres treated	Decade 2 Actual Treated % acres (FY15 Data Only)
Thinning	11,578	1,943	14	34%
Clearcut	30,881	2,217	38	39%
Shelterwood	11,101	655	14	11%
Uneven-aged	28,662	884	35	16%
Totals	**82,222**	**5,698**	**100%**	**100%**

Allowable Sale Quantity (ASQ)

The ASQ is the maximum amount of volume that may be offered and sold during a given decade of Forest Plan implementation from land identified as suitable for timber management (2004 CNF Land and Resource Management Plan). For decade 1, ASQ is 580 million board feet or 58 million board feet per year. The average volume sold from FY 2011-FY 2015 is 48 million board feet per year or 83% of the allowable sale quantity (Table 2-1). For decade 2, ASQ increases to 600 million board feet or 60 million board feet per year.

Revenues

Overall revenue for timber offered and sold increased from FY 2011 to FY 2015 with a decrease specific to FY 2013 (Table 2-3). The 9 year average value of timber sold on the Chippewa National Forest is $2,796,453 (FY 2007-FY 2015). In FY 2015, 26% of the total volume sold was sawtimber. This was an increase from previous years. Much of the sawtimber volume in FY 2013 was reclassified and sold as pulp product due to breakage and stain from the blowdown event. The sawtimber percentage should remain steady or slighty increase as all of the salvage volume from the 2012 blowdown event has been sold.

Table 2 -3. Value of stumpage offered and sold by the Forest by FY.

Fiscal Year	Total Value ($)	Value $/mbf	Value $/ccf	Aspen pulpwood $/mbf	Sawtimber (80%+pine) $/mbf
FY 2011	3,073,538	70.32	43.24	66.97	111.79
FY 2012	3,204,198	68.62	42.02	73.81	115.90
FY 2013	2,386,483	45.91	28.34	43.98	132.14
FY 2014	3,662,593	70.59	43.10	58.47	159.52
FY 2015	4,169,868	87.00	52.96	84.44	160.66

Prior to 2013, there had been a steady increase in sawtimber and pulpwood prices, although there have been variations for specific species. The decrease in aspen prices in FY 2013 can be explained by salvage sales and discounted prices. Sawtimber revenues for conifer species remained steady or increased from FY 2011 to FY 2015 (Table 2-3). Sawtimber prices have increased 44% from FY 2011 to FY 2015. The increase in sawtimber prices is a result of the economic recovery and the increase in demand for softwood dimensional lumber, mainly for construction purposes.

Competition in bidding by purchasers for federal timber has remained steady. In FY 2015, there were 20 different bidders with an average of 2.7 bidders per sale. The Forest attracts some of the largest purchasers operating in the state of Minnesota due to large volume sales and good operating conditions throughout the year.

The Forest is offering a mix of sales, from small sales to larger ones in terms of volume. Due to the mix of state, county, private and federal stumpage available, there does not appear to be a shortage of wood delivered to the mills or to meet the needs of the purchasing public. However, there has been significant investment by several mills recently and the increased efficiency and capacity may result in more pressure for the Forest to provide additional volume, especially pine sawtimber.

Ratio of Sawtimber to Pulpwood

As illustrated in Table 2-4, the ratio of sawtimber to pulpwood is lower than what was predicted in the Forest Plan. One of the reasons for this is the increased amount of thinning in pine stands and the removal of small diameter material. With the 2007 administrative correction, proposed thinning acres increased from 6,749 acres to 16,000 acres.

In FY 2015, the ratio of sawtimber to pulpwood increased to 26:74 compared to a ratio in FY14 of 23:77 (Table 2-4).

Table 2-4. Ratio of sawtimber to pulpwood volume sold.

	Decade 1 (Proposed)	**Actual Ratio FY 2011**	**Actual Ratio FY 2012**	**Actual Ratio FY 2013**	**Actual Ratio FY 2014**
Sawtimber:Pulpwood	32:68	18:82	19:81	14:86	23:77
	Decade 2 (Proposed)	**Actual Ratio FY 2015**	**Actual Ratio FY 2016**	**Actual Ratio FY 2017**	**Actual Ratio FY 2018**
Sawtimber:Pulpwood	43:57	26:74	N/A	N/A	N/A

Payments to the Counties

The federal government makes payments to states to cover some of the cost of local government services on tax-exempt National Forest System lands. The states pass those payments on to the counties in which National Forests are located. Payments in Lieu of Taxes (PILT) payments are calculated and made by the Department of Interior, Bureau of Land Management. These payments are appropriated annually by Congress based on available funding and formulas that take into account the population in the affected counties, the number of acres of federal land in those counties, and other payments received by the counties based on federal land payments.

The Secure Rural Schools and Community Self- Determination Act (SRS) was enacted in 2000 and since then has been reauthorized several times. In a recent reauthorization, the FS requested states and counties to elect either to receive a share of the 25% rolling average payment or to receive a share of the Secure Rural Schools State (formula) payment. A county electing to receive a share of the State payment that is greater than $100,000 annually was required to allocate 15-20 percent of its share for one or more of the following purposes: projects under Title II of the Act, Projects under Title III; or return the funds to the Treasury of the United States. Under the Secure Rural Schools Act additional money was made available to be used for projects recommended by local resource advisory committees (RAC) to maintain infrastructure, improve the health of watersheds and ecosystems, protect communities, and strengthen local economies. Payments to Counties for FY 2014 and FY2015 are displayed below in tables 2-5 and 2-6.

Table 2-5. Payments to Counties for FY 2014.

FY 2014		Payment in Lieu of Taxes (PILT)	SRS Title I Funds	SRS Title II Funds	Grand Total
County	FS Acres	Total $	Total $	Total $	Total $
Beltrami	62,339	114,443	88,076	15,543	218,062
Cass	287,366	591,996	265,251	46,809	904,056
Itasca	306,437	573,602	389,388	36,648	999,638
Total	656,142	1,280,041	742,715	99,000	2,121,756

Table 2-6. Payments to Counties for 2015.

FY 2015		Payment in Lieu of Taxes (PILT)	SRS Title I Funds	SRS Title II Funds	Grand Total
County	FS Acres	Total $	Total $	Total $	Total $
Beltrami	62,339	$114,726	$81,223	$14,333	$210,282
Cass	287,366	$594,287	$252,941	$44,637	$891,865
Itasca	306,437	$575,123	$364,943	$34,348	$974,414
Total	656,142	$1,284,136	$699,107	$93,318	$2,076,561

Implications

- Volume offered, sold and harvested are within the Forest Plan expectation levels. The Forest is meeting assigned timber targets for volume sold. The Forest Plan allowable sale quantity (ASQ) for decade 1 is 580 million board feet or 58,000 MBF per year (Appendix D Forest Plan). For decade 2, ASQ increases to 600 million board feet or 60,000 MBF per year. The average volume sold from FY 2011-FY 2015 is 48,439 MBF per year or 83% of the allowable sale quantity (Table 2-1).
- The Forest Plan estimates that in decade 1 approximately 77,139 acres will be treated or approximately 7,713 acres/year (Administrative Correction 9 dated 09/14/2007 Table APP-D2). In decade 2, the planned treated acres increase to 82,222 or 8,222 acres per year. For decade 1, the actual total acres treated by timber harvest are 39,500 acres or 51% of the planned acres of 77, 139 (Table 2-2). Prior to the next Forest Plan Revision, harvest prescriptions for forest types and expected volumes per acre need validation.
- The ratio of sawtimber to pulpwood is lower than proposed for decade 1 in the Forest Plan (Table 2-4). The 2012 blowdown event has increased the percentage of pulpwood being offered for sale. This is due to the breakage and damage in timber and the products being reduced from sawtimber to pulpwood to attract purchasers of salvage sales in an effort to restore sites.
- Revenues generated from timber sales were on the rise from FY 2011 to FY 2012 (Table 2-3). The 2012 blowdown event negatively impacted timber revenues in FY 2013 due to reduced salvage sale prices. Stumpage revenues overall have rebounded in FY 2015 and are forecasted to continue to remain steady. It can be expected that revenues from green timber sales will rise as economic conditions continue to improve and demand for public stumpage in Minnesota remains strong. The exception to stronger stumpage prices recently has been with pine sawtimber. A tariff on Canadian softwood lumber expired in October 2015 and this has created an economic disadvantage for Minnesota softwood lumber as Canadian wood is flooding the local markets currently.
- In decade 2 (2015-2025), the Forest Plan ratio of sawtimber to pulpwood is 43:57 (Table 2-4). This increase in sawtimber percentage will be difficult to achieve based upon current harvesting prescriptions and management direction.

Other considerations

Retention of Adequate Canopy Cover

The Forest Plan standards and guidelines require 50-70% canopy cover for large patches, goshawk, goblin fern, wetlands in northern hardwood stands, and riparian areas. Although TES (Threatened, Endangered, Sensitive species) locations were considered and included in the modeling for the revision process (FEIS, Appendix B, p. B-4), the number of RFSS (Regional

Forester Sensitive Species) locations has increased. It is unclear how much this has impacted harvest treatments and acres or how this compares to the outputs modeled. In addition, wetlands in northern hardwood stands are a common occurrence resulting in stands being dropped during project planning or implementation. Some of these stands were dropped from treatment during the revision modeling process but again it is unknown how planned versus actual numbers compare.

Northern Long Eared Bat

In April 2015, the northern long-eared bat was federally listed as a threatened species under the Endangered Species Act (USFWS News Release April 2015). Along with the listing, a final 4(d) rule was published on February 16, 2016.

The final 4(d) rule prohibits incidental take as a result of tree removal activities under the following circumstances:

- Activity occurs within 0.25 miles from a known, occupied hibernacula,
- Activity cuts or destroys a known, occupied maternity roost tree within a 150 foot radius from the maternity roost tree during the pup season (June 1-July 31),

On-going litigation may change the status of the final rule. If known and occupied roost trees are found within timber sale boundaries on the Chippewa, there will be some impact. Adjustments may need to be made in the season of harvest and the buffer requirements around known, occupied roost trees.

Stewardship

The Forest has been actively utilizing stewardship contracting authority in recent years to accomplish a wide variety of restoration work on the Forest. The primary form of stewardship contracting utilized is the integrated resource timber contract (IRTC) which exchanges the value of timber (goods) for service work (services).

The Forest signed a master stewardship agreement with the LLBO in 2014 for future stewardship agreement work. Recently, stewardship agreements were approved and signed with Itasca and Cass counties for forest road maintenance work on the Chippewa. In addition, a stewardship agreement with MNDNR for restoration work near boat ramp areas throughout the Chippewa will be approved in FY16.

The Forest has executed 16 different stewardship contracts on the Forest. The overall value of goods exchanged for services is approximately $3.6 million to date. This tool is an effective method for completing high priority restoration work on the ground while returning timber

revenues locally to the communities and employing local contractors.

Good Neighbor Authority

In the 2014 Farm Bill, Congress made the Good Neighbor Authority (GNA) permanent which allows state agencies to work directly on National Forest lands through an agreement. A Master GNA Agreement was signed by Regional Forester Kathleen Atkinson with the MN DNR Division of Forestry in February 2016 covering both the Superior and Chippewa National Forests in MN. The first GNA project on the Chippewa will include the thinning of 80 acres of red pine and the selective harvest and diversification of a 19 acre black ash stand.

Tribal Forest Protection Act (TFPA)

In June 2014, the Leech Lake Band of Ojibwe (LLBO) proposed a project to diversify red pine stands on the Forest under the Tribal Forest Protection Act. Approval for this TFPA project was signed by Regional Forester Kathleen Atkinson. A decision memo for Lydick West was signed in July 2015. The first TFPA project on the Forest will include the thinning of 50 acres of red pine, the reduction of fuels, and diversification of the treated stands through a stewardship contract with LLBO.

Recommendations

- The Forest is meeting assigned timber targets for volume sold even though acres harvested are below Forest Plan estimates.
- The frequency of thinning in red pine as well as the timing of thinning at younger ages should be analyzed and considered. On National Forest lands within the Chippewa, red pine occupies 71,769 acres. This represents over 11% of the total red pine acreage in the state of Minnesota. Of this total, over 27,000 acres of red pine are in the age class 41-80 years.
- Ratio of sawtimber to pulpwood (26:74) is lower than proposed for decade 1 in the Forest Plan (32:66). Further, the goal for Decade 2 increases this ratio to 43:57. An increase in sawtimber percentage will be difficult to achieve based upon current harvesting prescriptions and management direction.
- The northern long-eared bat was listed as threatened with the 4(d) final rule. Some minor adjustments in reserve areas and season of harvest may be required if occupied, maternity roost trees are located within timber sale boundaries.
- The Forest should continue to utilize stewardship contracting and expand Good Neighbor Authority as a tool to accomplish restoration work.

3. Regeneration

National Forest Management Act (NFMA) (1976) requires harvested lands be adequately restocked within five years after harvest. Therefore, stands with a regeneration harvest in 2010 should be adequately stocked by 2015. Regeneration may occur naturally or by planting or seeding. Stocking surveys on regenerated stands are conducted the first, third and fifth years after harvest to assess stocking levels.

Key points

- Adequate restocking of regeneration harvest stands was met on 66% of the acres harvested in FY 2010 by the end of FY 2015.
- As of late 2015, there were 763 sites forest-wide (14,158 acres) that had regeneration harvests completed and that are currently in some stage of reforestation leading to certification.

Monitoring Question

Are harvested lands adequately restocked after five years?

Results

Reporting of harvests, reforestation activities, stocking surveys, and certification occurs in FACTS (Forest Activity Tracking System), our corporate database.

In FY 2015, 12,777 acres received reforestation or silvicultural treatments (Table 3-1). Approximately 1.5 million seedlings were planted on 1,536 acres; 109 acres were seeded; and 992 acres were regenerated naturally. Bud capping (animal damage control) was done on 5,816 acres. Approximately 3,187 acres were released from competitive vegetation.

Table 3-1. Acres of accomplishment in FY 2015 for reforestation activities.

Reforestation Accomplishments	
Activity	**Acres**
Planting	1,536
Seeding	109
Site Prep for Natural	411
Certification of Natural Regeneration without Site Preparation	581
Site Prep for Planting or Seedling	1,137
Release	3,187
Animal Damage Control	5,816

Regeneration harvests were accomplished on 1,631 acres (Table 3-2). These acres will need regeneration treatments and certifications by the end of FY 2020.

Table 3-2. Acres of reforestation created by timber harvests in FY 2015.

Reforestation Need Created by Regeneration Harvests	
Activity	**Acres**
Clearcut	860
Seed Tree Cut	316
Selection Cut	509
Total	1,631

Reforestation Monitoring

Table 3-3. FY 2010 regeneration harvests.

Harvest Type	FY 2010 Regen Harvests	FY 2010 Regen Harvest Acres	FY 2010 Regen Harvest Acres Certified by FY 2015 End	Summary
Coppice Cuts	13	254	222	87% NFMA Compliance
Clearcuts	72	1,029	762	74% NFMA Compliance
Selection Cuts	16	315	118	37% NFMA Compliance
Seed Tree Cuts	6	144	42	29% NFMA Compliance
All Regeneration Harvests	**107**	**1,742**	**1,144**	**66% NFMA Compliance**

In FY 2010, 107 stands (1,742 acres) received treatment by regeneration harvests which created a reforestation need (Table3-3). NFMA compliance was met on 66% of these acres by their being fully stocked and certified by the end of FY 2015.

Seed tree cuts showed the lowest success with only 29% of these sites being certified within 5 years following the close of the sales. Coppice cuts, where regeneration relies on sprouts and suckers, showed the greatest success with 87% of the acres being certified at the end of FY 2015.

Table 3-4. NFMA compliance for FYs 2010 – 2015.

Certifications Reported for Fiscal Year	NFMA Compliance Five Years after Harvest
2010	99.5%
2011	69.9%
2012	80.7%
2013	86.6%
2014	52.3%
2015	65.7%

The Forest has worked very hard to meet its goal of 100% NFMA compliance. Despite these efforts, some difficult challenges remain. First, with tremendous competition from hazel brush on many sites, coupled with no use of herbicides to control competition, all release must be done by hand cutting. The brush grows back quickly from cutting and is potentially denser than initial conditions. Three treatments of hand release are planned on all sites to give desired trees a competitive edge. The development of a disc in 2008 (the "Chippewa Harrow") to do site preparation has proven to reduce competition from brush, therefore reducing the number of entries required for hand release. This type of site prep work increased our efficiency and ability to meet NFMA requirements from previous years but there is still considerable work required to regenerate sites. Use of herbicides to control competition from sedge and grass in not currently a treatment option.

The second major challenge comes from deer that browse every species of conifer on the Forest (jack pine, white pine and white cedar are preferred). In the past, the Forest sprayed repellants in an attempt to discourage deer from eating seedlings. Over time, as deer adapted to the repellents, this approach became ineffective. In recent years, the Forest switched to bud capping which protects the terminal buds. Bud capping is labor intensive and not 100% effective. It does however appear to be more successful than repellants at this time.

Currently, we only use hand release from competition on the Chippewa. This works to a degree with woody competition (hazel, raspberry, and aspen) and is repeated two or three times during the establishment phase. In FY15 the Chippewa released 2,850 acres. In the future herbicides may be considered during the development of NEPA projects, on locations off the Reservation, to reduce reforestation costs and improve survival.

Stake Row (Seedling Surviva)l Surveys

Each year the Forest assesses survival and causes of mortality of planted trees by using staked sample trees. To meet a minimum sampling error of ± 10 percent, the major species of seedlings planted are staked and then checked after the 1st and 3rd growing seasons for survival and likely causes of mortality. These are referred to as Stake Row Surveys. This information is then compiled and submitted for Regional and National reporting.

The following results are for the stake row surveys conducted in FY 2015 after the 1st and 3rd growing season. More than 10,000 seedlings were planted for each of the species listed.

Table 3-5. Survival of staked seedlings.

	1st year –Percent survival	3rd year – Percent survival
Yellow birch	54	
Jack pine	78	48
Red pine	64	40
Red oak	60	
Balsam fir		63
Tamarack		65
White spruce		57
White pine		64

For jack pine, after the 1st growing season 78% of the seedlings staked survived. After the 3rd season, only 48% survival occurred. The 3rd year percent survival results indicate that depending on the species, anywhere from 35-60% of the planted trees died. The most frequently cited reason for mortality is deer browse. The second most common cause is competition from both woody vegetation and grass/sedge sod. Drought was not a factor in survival for this period.

The Forest bud capped 6,027 acres in FY 2015 to protect seedlings from deer browse. With high deer densities browse continues to be the leading cause of seedling mortality despite this effort. Both competition and browse increased as a cause of mortality in the third year. Tree

seedlings grew taller making them more easily found by deer. More time passed since the initial site preparation, so vegetation had more time to recover and provide competition.

The majority of trees planted are conifers. Forest Plan standard S-TM-4 (pg 2-19) specifies that five years after harvest, clearcut, seedtree, or shelterwood stands must be adequately restocked. In the conifer forest type, a minimum of 400 trees per acre is needed. To achieve this given the deer browse and vegetative competition, sites may need to be planted 2-3 times. Often times the first planting is at high densities of about 1000 trees per acre, in hopes of not having to invest in follow-up plantings. With mortality rates of 40-60% by the 3rd year, stocking may be well below the desired stocking level by year five. Deviation from the Plan standard for stocking levels would require a Forest Plan amendment.

Implications

- Adequate restocking of regeneration harvest stands was met on 66% of the acres harvested in FY 2010 by the end of FY 2015. Stands not yet certified continue to be tracked and surveyed and will be certified as soon as establishment is complete.
- As of late 2015, there were 763 sites forest-wide (14,158 acres) that had regeneration harvests completed and that are currently in some stage of reforestation leading to certification.
- With the 2012 blowdown event, there was increased harvesting and the reforestation program and workload grew without a commensurate increase in staff.

4. Wildlife and Plants

Key Points

RFSS, MIS and T&E

- Projects analyzed either had no impact or were not likely to cause a trend to federal listing or loss of viability on the Forest.
- Monitoring documented successful implementation of all Forest Plan Standards and Guidelines on the ground.
- The Forest contributed toward the conservation and recovery of the Canada lynx, gray wolf, and northern long-eared bat through habitat and access management practices, collaboration with other federal and state agencies, as well as researchers, tribal bands and non-governmental partners.
- The Forest participated in a partnership with the Superior NF, University of Minnesota and Minnesota DNR in learning more about the status of the Northern Long Eared Bat which was listed as a threatened species in May of 2015.

Breeding Birds

- Most breeding bird species within the Forest we are capable of monitoring and detecting trends for are either increasing or stable in populations. Several species such as the Connecticut Warbler and Yellow-bellied Flycatcher continue to have trends that remain a concern.

A. Regional Forester Sensitive Species (RFSS)

Monitoring Question

To what extent is Forest management contributing to the conservation of sensitive species and moving toward short term (10-15 years) and long-term (100 years) objectives for their habitat conditions?

Background

Meeting this objective will involve two basic and complementary strategies that would be implemented based on species' habitat requirements and distribution, individual site conditions, expected management impacts, and other multiple use objectives. These strategies include:

a. Landscape level (or coarse filter) management strategies: Addressing species' needs through integrated resource management at large landscape scales including, but not limited to: Landscape Ecosystem or Landtype scales for vegetation and management

indicator habitat objectives; watersheds for aquatic and riparian condition objectives; and Management Areas for desired or acceptable levels of human uses.

b. Site-level (or fine filter) management strategies: Addressing species' needs by managing specifically for high quality potential habitat or known locations of sensitive species.

Results

Surveys

The Forest surveys for sensitive species every year, primarily in the area of upcoming vegetation management projects. In 2015, the Forest submitted 11,063 acres for RFSS surveys for future vegetation management projects. The Forest's Monitoring, Inventory and Survey Team (MIST) was responsible for the screening of habitat and completion of surveys for all sixty RFSS for the acres submitted. Results from the surveys drive the District interdisciplinary teams in project design through development of mitigation measures for those species identified.

Table 4.1 Summary of RFSS additions to Forest records from 2011-2015.

Category	2011	2012	2013	2104	2015
Bird	43	26	74	78	52
Plant	346	280	309	147	122
Mammal	0	1	0	0	0
Total	**389**	**307**	**383**	**225**	**174**

The number of new locations recorded in the corporate database continues to increase which suggests our understanding of where and when to search for these species is improving. The most common RFSS species found in 2015 were the bald eagle, ternate grapefern, Canada yew, white adder's mouth and bluntlobe grapefern. No new species were found and identified in 2015.

Table 4.2 Total acres surveyed for RFSS from 2011-2015.

Survey	2011	2012	2013	2014	2015
Northern Goshawk	43,375	36,757	38,655	22,778	34,294
Red-Shouldered Hawk	9,625	13,628	11,288	5,920	2889
Songbirds	2,628	815	1,428	915	427
Plants	14,834	15,957	14,130	4,721	7,997
Total Acres Surveyed	**72,473**	**69,169**	**67,514**	**36,348**	**47,622**

In 2015, the Forest completed over 37,611 acres of call point surveys for RFSS bird species (goshawk and red shouldered hawk) on all ownerships including unsuitable habitat within the call zone. Raptor call point surveys are conducted from designated points in or proximate to suitable habitat for the respective species. The broadcast radii are inferred as being 1,320 feet (1/4 mile) for our recordings and broadcast equipment. This yields an approximate sample area of 125 acres for each call point. Given such a large sample area, unsuitable habitats fall within the sample area. Additionally, placement of points sometimes results in small amounts of overlap of sample areas

Including all four plant survey seasons, surveys were completed on 7,997 stand acres. By using our screening criteria, conducting recon prior to survey seasons, and tracking the history of past survey efforts, we were able to dismiss 2,469 acres from the survey efforts in 2015.

Because these are simple detection surveys and because there is no repeatability between years of submissions, (what is submitted one year can be considerably different from another year), it is difficult to infer trends.

RFSS Location Monitoring

The Forest also actively monitors known locations of RFSS on an annual basis to determine if changes may have occurred at each of the locations. Efforts were also made to review and update old data and records to accurately reflect the locations of RFSS species and potential changes to the habitat.

Rare Plant Monitoring

In 2015, plant surveyors re-visited 43 sites across the Forest to look for previously noted occurrences of RFSS plants. Revisits occurred at the appropriate detection periods for each RFSS plant between late April and early September.

Plants re-located:

RFSS plants were relocated at 30 of the 43 sites (69%). The vast majority of these plant populations remained stable and intact (LaPlant and Cable 2015). For the sites monitored in 2015, the known populations of *Botrychium lanceolatum, B. pallidum, B. rugulosum, Cypripedium arietinum, Dryopteris goldiana, Erythronim albidum, Platanthera clavellata, Pseudocyphellaria crocata, Sticta beauvoisii,* and *Taxis canadensis* were found to have approximately the same number of plants and intact habitat as compared to the description from the previous detection(s) (LaPlant pers comm 2016). This suggests some degree of stability for these populations. However, our sample sizes were small for most species, so it is difficult to draw inferences regarding species population trends or stability on the Forest.

- Goblin fern (*Botrychium mormo*): Notable changes occurred at one goblin fern site where only 1 plant was detected in 2015, compared to an estimated 200+ plants in 2012.

  In total, 9 goblin fern records were checked in 2015. Six apparently were extirpated or nearly so. Two did not display significant changes. The final site did not have a significant change, but a satellite colony of 15 plants was located nearby. This was attributed to missing the satellite colony in the past and was not regarded as an expansion of the population (LaPlant pers comm 2016). Monitoring of all 9 goblin fern records continued to affirm the alarming trend of this species failing in the face of invasion by non-native earthworms.

Plants not re-located:

At 13 other sites, surveyors did not relocate the RFSS plants.

- 5 goblin fern (*Botrychium mormo*) sites had evidence of severely wormed habitat reflected in the lack of humus layer, the presence of bare mineral soil, earthworm castings and middens. These are important parts of the evidentiary trail implicating non-native earthworms to contributing to the decline of this species. Given that *Botrychium mormo* requires a humus layer, this result is not surprising. We are working to increase public understanding of the impact of worms but beyond education, there is little additional response we can take.
- At one pale moonwort (*Botrychium pallidum*) site with a dense population of poison ivy, the species was not relocated.
- At a bluntlobe grapefern (*Botrychium oneidense*) site, plants were just emerging so positive identification was not possible.
- At 2 limestone oak fern (*Gymnocarpium robertianum*) sites, surveyors found appropriate habitat but no plants.
- At a bog adders-mouth (*Malaxis paludosa*) site, there was excellent quality habitat but no plants noted.
- At 2 sites of white adder's-mouth orchid (*Malaxis brachypoda*), there were no visible plants in 2015. Surveyors noted habitat changes in tree species at one location and possibly too much water at another locale.
- For the only known site of squirrel-corn (*Dicentra canadensis*) on the Forest which was verified by botanist Welby Smith, (MN DNR) , surveyors found plants of the common look alike species, Dutchman's breeches (*Dicentra cucullaria*) but did not find the squirrel-corn. The two species differ only by flower shape.

RFSS Habitat Risk Assessments

The Monitoring and Inventory Survey Team continues to make improvements to the screening process in surveying various RFSS on the Forest. In 2015, risk assessments and reviews were completed for Connecticut warbler and bay-breasted warbler. The Connecticut warbler review resulted in a simplified screening criteria which eliminated subjective interpretation of field data. The bay-breasted warbler review affirmed the recommendation to no longer survey for this species on the Forest. Plant risk assessments were deferred due to seasonal conflicts.

Moonwort Disturbance Ecology

In 2014, as part of a Moonwort Disturbance Ecology project with Dr. Cindy Johnson, Ph.D. of Gustavus Adolphus College, the Forest initiated a Baseline Study to establish a series of above ground permanent plots in an area relatively undisturbed by worms near Pigeon Lake Dam. Additionally, collection of below ground soil samples were also taken.

Baseline Study Pigeon Lake Dam

The goal of the projects above ground plots are to monitor *Botrychium* moonwort populations and other plant species composition to allow for analysis of trends over an extended period. Four permanent plots were established and baseline data recorded during July 2014. Several species of *Botrychium* occurred on one or more plots -- *Botrychium crenulatum, Botrychium ascendens*, and *Botrychium mormo*.

In 2015, monitoring of all four above ground plots occurred in late June.

In summary, observation of 1 to 7 new *Botrychium* plants occurred in three of the four plots. Conversely, based on previously recorded plant locations, all of the plots had 1-8 missing plants. Overall *Botrychium* numbers within the plots had mixed results due to missing and new plants. In addition, it was noted that some *Botrychium* plants decreased in size, but overall, there was a size increase for the majority of the plants observed in 2015.

Johnson (2015a) stated that moonwort populations vary widely annually depending on moisture and other factors. A minimum of five years of monitoring is recommended for analysis of trends.

Moonwort Longevity

Little is known about how long moonworts persist below ground, either as sporophytes (roots, rhizomes), or by gametophytes or gemmae in the soil (Johnson 2015b). To investigate moonwort longevity, 31 below ground soil plugs samples were examined. Some of the oldest samples from the Superior and Chippewa National Forests were collected in 1997. Since then they have been refrigerated in zip lock bags.

The Chippewa collection sites are the same sites investigated in the disturbance study (Johnson 2015a). Evidence of plants (root fragments, gametophytes) were found in samples 14 years old which were collected on the Chippewa in 2001. Many of the root segments appeared healthy or slightly desiccated. The persistence of plants in the refrigerated soil plugs attest to the longevity of these plants with minimal deterioration. That said, conditions in the field are clearly different so it is difficult to conclude that plants persist this long in their natural environment. Given the mycorrhizal nature of these plants, it seems likely that they can persist for long periods below ground during unfavorable conditions (Johnson 2015b).

Goblin Fern (*Botrychium mormo*) Monitoring

In 2015, the Leech Lake Band of Ojibwe (LLBO), Division of Resource Management (DRM) and the Forest began a partnership project to monitor 80 randomly selected goblin fern (*Botrychium mormo*) sites. All of the locations are within the boundaries of the Leech Lake Reservation and the Forest. The primary intent is to relocate previously documented *Botrychium mormo*, record data on habitat, canopy coverage, population characteristics, evaluate non-native worm presence, and worm effects on the surrounding habitat. Discovery dates of the *Botrychium mormo* ranged from the 1990s to 2013.


Bing.com images

There were 10 sites where *Botrychium mormo* was relocated at the documented population locations. In some instances, new locations were found enroute to the documented population sites or in nearby locations.

At sites where *Botrychium mormo* still existed, conditions ranged from relatively undisturbed habitat by exotic worms to sites with only patches of unaffected habitat. The average canopy cover at these sites which was measured using a densitometer was 95%. Generally, all of these sites consist of a multilayered and mature forest, most often of sugar maple/basswood trees or inclusions of this habitat within other forest stand types.

At sites without any *Botrychium mormo,* there is evidence of worm impacts that reduced or resulted in the loss of litter and duff. The majority of these locations are either severely wormed or they retain only areas of marginal habitat regarding the existing litter and duff layer. The canopy cover ranged from 90 – 96%, with an average of 95%. There are some sites with relatively good habitat with lesser worm impacts, but these areas do not have the same depth of litter and duff as is present at the sites where *Botrychium mormo* was observed. The biggest threat to goblin fern habitat seems to be from exotic worms destroying the leaf and organic

layers. Roads and road use near these sites increases the expansion of worms and reducing the canopy cover at these sites would accelerate the demise of goblin fern.

Botrychium moonwort populations, including *Botrychium mormo*, can vary widely in numbers of visible plants observed annually, as they often will not emerge above the ground depending on moisture and other factors. In 2015, the spring and early summer was relatively dry, so it is possible subsequent monitoring will find plants at site locations when more favorable climate conditions occur. Conversely, for many of the severely wormed sites, it is likely that the habitat is so degraded the *Botrychium mormo* plants no longer exist at these locations. According to the project protocol, monitoring will continue for at least three years, even for those severely impacted sites, before a determination is made that the plants no longer exist at the site.

B. Management Indicator Species (MIS) and Threatened and Endangered (T&E) Species

Monitoring Questions

What are the population trends of management indicator species and Threatened and Endangered Species?

To what extent is Forest Management contributing to the conservation of threatened, endangered, and sensitive species and moving toward short term (10-15 years) and long-term (100 years) objectives for their habitat conditions?

Background

This resource area monitors and evaluates population trends of designated Management Indicator Species (MIS). Management Indicator Habitats (MIH) were also identified for the Forest and along with MIS used to analyze the potential effects of management practices on wildlife habitats and populations.

MIS are defined as species monitored over time to assess the effects of management activities on their populations and the populations of other species with similar habitat requirements (Forest Service Manual 2620.5). The rationale underlying the MIS concept is that by managing for and conserving the habitats in which MIS occur, other species that depend on these habitats would also be provided for.

The Forest has identified four MIS:

- gray wolf,
- bald eagle,
- northern goshawk, and
- white pine.

The gray wolf and bald eagle were designated as MIS under the 1986 Forest Plan. As MIS, they have been monitored for the past 30 years. The northern goshawk and white pine were added as MIS to the 2004 Forest Plan.

Gray wolf (MIS and RFSS)


Bing.com images

The Minnesota Department of Natural Resources (MN DNR) has monitored its statewide wolf population since the late 1970s. These surveys are expected to obtain data on wolf distribution and abundance in Minnesota. Surveys have taken place at 10-year intervals (1978-79, 1988-89, and 1997-98, 2007-2008). The most recent surveys were completed in the winter of 2014 (Erb 2014). Population estimates from this survey indicated that there are about 438 packs in Minnesota. This is 13% fewer packs than during the last survey in the winter 2007-08. After accounting for the assumed 15% lone wolves in the population, we estimate the 2014-15 mid-winter wolf population at 2,221 wolves, or 3.2 wolves per 38 sq. miles of occupied range. The 90% confidence interval was approximately +/- 500 wolves, specifically 1,789 to 2,719. There has been no statistically significant change in the size of the statewide mid-winter wolf population over the past 3 years.

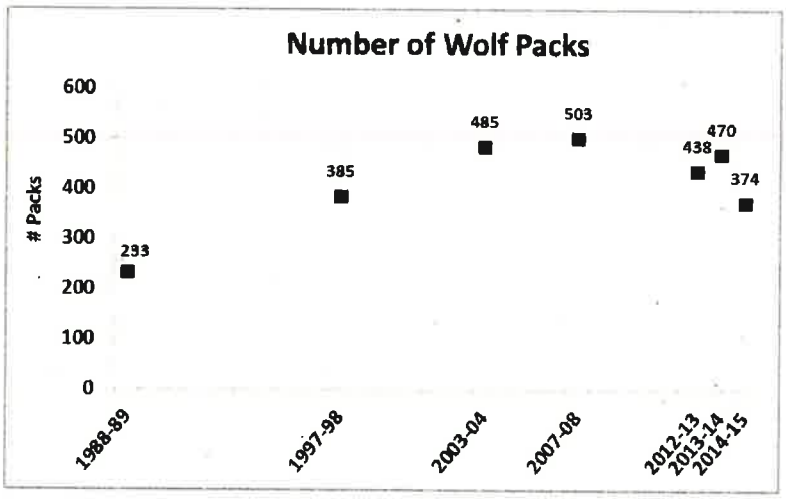


Figure 4-1. Estimated number of wolf packs in Minnesota at periodic intervals from 1989 to 2015.

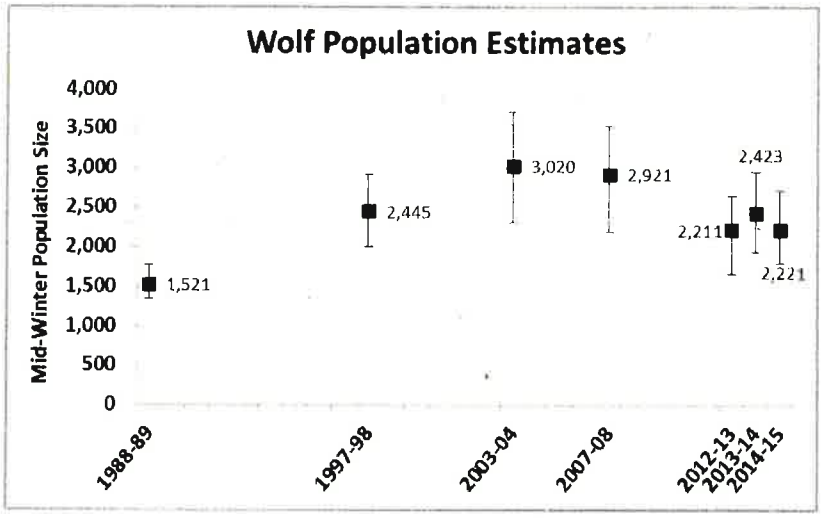


Figure 4-2. Wolf population estimates from periodic standardized surveys in Minnesota from 1989 to 2015.

Wolf populations in the western Great Lakes have exceeded federal recovery goals for numerous years. This information led to actions to remove the species from the federal list of threatened and endangered species, and in February 2007, the western Great Lakes gray wolf population, which includes Minnesota, was de-listed. However, in September 2008, a Federal Court vacated the final rule and remanded the decision by the USFWS to delist the gray wolf. The wolf was delisted again in 2011. In December 2014, a Federal Court once again vacated the final rule of delisting and remanded the decision by the USFWS. The wolf was federally listed again in 2015.

Bald eagle (MIS)

The Forest has been monitoring bald eagle populations within its proclamation boundary for over 30 years. In recent years (2010-2015) monitoring flights have concentrated on inventorying nests that have not been checked in recent years as well as monitoring the nests within the 2012 blowdown area that runs through the middle of the Forest for about 40 miles along Hwy 2.

Bing.com images

Survey data from 1987 to 2007 indicate a population that peaked in the mid-1990s and then dropped to approximately about 120-160 active nesting pairs. During this time period, the Forest averaged 153 active nesting pairs per year. It appears that the number of active territories on the Forest is decreasing. This may be in part due to less frequent monitoring and the level of intensity of the monitoring efforts, or the loss of large pine nest trees to decadence or blowdown. It may also be that habitat on the Forest has reached its carrying capacity to support bald eagles. At the landscape scale, Forest Plan objectives for the

red/white pine MIH are to increase these forest types which would improve bald eagle habitat over the long-term.

Efforts in 2015 included monitoring activity and productivity of known nests. Additionally, monitoring sought 73 nests not found or reported for the preceding three years or more. At the end of 2015, there were 413 extant known eagle nests Forest-wide.

Following are findings for 2015 with 2014 data provided for comparison. These findings do not necessarily indicate population changes but may be more a product of monitoring emphases and intensity.

Table 4-3. Findings from eagle nest surveys.

	2014	2015
Active Eagle Nests	96	95
Average chicks per active nest	1.1	1.2
New nests found	51	40
Nest no longer exist		4

The bald eagle was delisted in 2007. The US Fish and Wildlife Service provided new management guidelines as a result of the delisting. In 2013, per request by the LLBO DRM, the Forest made the decision not to update Forest Plan Standard S-WL-3 to the most recent bald eagle nest management guidelines (USFWS 2007), but to continue to follow the Northern States Bald Eagle Recovery Plan (USFWS 1983) as it applies to seasonal buffers around active nests.

Northern goshawk (MIS)

Bing.com images

Individual known goshawk nest sites occurring on the Forest have been monitored for about 18 years in order to determine if the nest structure still exists, the nest site is active, and the pair was successful at fledging young. This monitoring has been and continues to be an important aspect in assessing northern goshawk populations and habitat conditions on the Forest, in Minnesota, and in the western Great Lakes region. Three types of surveys are conducted during the monitoring season: occupancy surveys, nesting surveys, and nesting success surveys.

These surveys have been conducted by Forest and MN DNR personnel as well as goshawk researchers from the University of Minnesota. The known goshawk territories on the Forest have been monitored as part of the Northern Goshawk Monitoring Project undertaken by the MN DNR non-game program. This project has been on-going since 2003 and its primary objective is to assess occupancy and productivity of known goshawk territories in northern

Minnesota. This productivity data is stored, maintained, and shared with other agencies by MN DNR.

The Forest Plan includes an objective of sustaining 20-30 breeding pairs of northern goshawks. Over the past seventeen years, the cumulative number of known goshawk breeding territories has risen steadily from 11 known in 1997 to 63 known in 2015. This is generally believed to be a product of increased management activity in goshawk habitat and a higher interest in monitoring goshawk populations, nesting activities and habitat conditions in northern Minnesota. However, 36 of the 63 territories are deemed no longer occupied with some of the remaining 27 suspected as no longer occupied, but not yet meeting the criteria for dismissal. Monitoring data collected from 2011-2015 indicate that the number of known active territories ranged from 11-20 breeding territories. Based on the monitoring results, the number of breeding pairs falls below the objective established in the Forest Plan. The graph below provides breeding territory information over the past eighteen years.

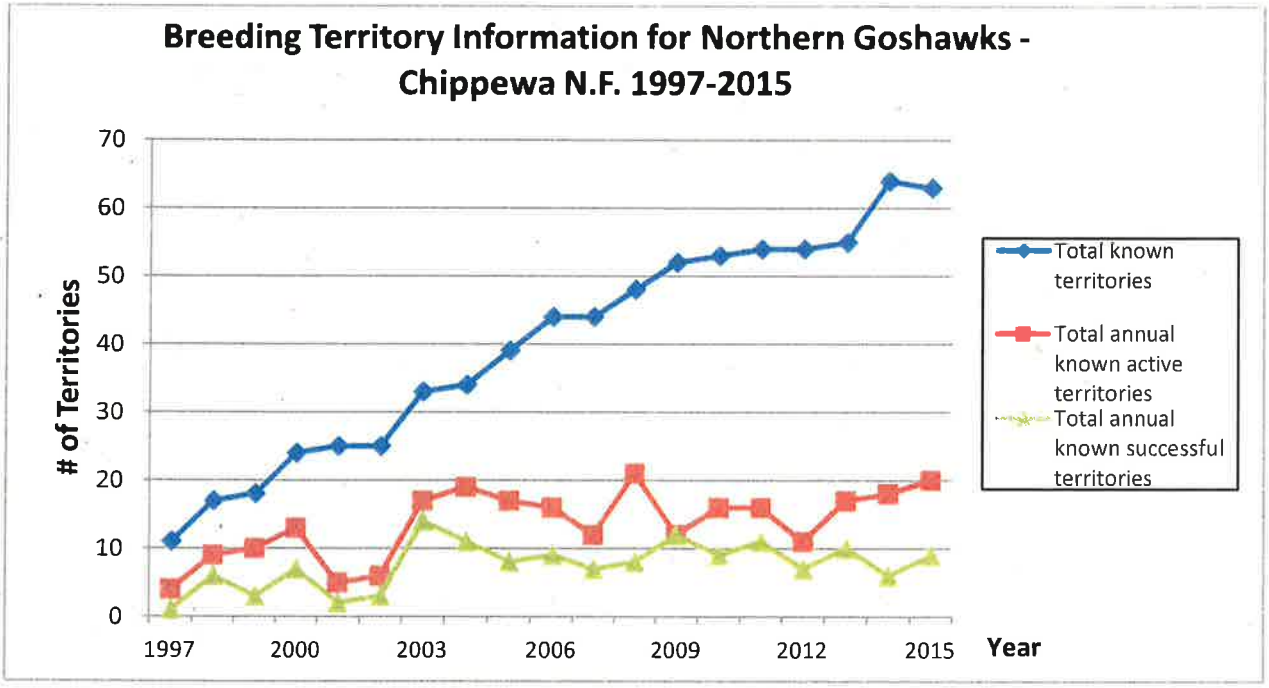


Figure 4-3. Northern goshawk breeding territory information on the Forest.

The population dynamics of the goshawk in northern Minnesota continues to not be clearly understood at this time. The data provided is primarily based upon goshawk territories discovered during on-going field operations on the Forest. Nest counts within goshawk territories are steadily increasing as new nests are found each year.

Currently, there is no systematic assessment of goshawk population trend or stability on the Chippewa or in the Western Great Lakes Region. Even though there are 18 years of data on the Chippewa Forest, comparable survey or monitoring efforts have not occurred from each year. Consequently, it is difficult to determine if goshawk population is increasing, decreasing or is stable. The forest breeding population likely falls within the range of 12 to 39 breeding pairs based on estimated habitat occupancy on the Chippewa (Bruggeman, et al., 2009) and known territory size (Boal et al 2010). Nest activity, success, and productivity are variable by year.

Based on the continued implementation of Forest Plan direction, the number of breeding pairs and suitable habitat conditions are expected to be stable or increase over time. Habitat within known nesting and post-fledging zones is expected to be maintained per Forest Plan Standards and Guidelines through the current planning period. Uncertainty over consistent guideline implementation, the distribution of habitat outside of post fledging areas, and forest management on other ownerships pose a risk to this species.

Canada Lynx (TES):

In 2000, the U.S. Fish and Wildlife Service designated the Canada lynx as a "Threatened" species in the lower 48 states. Since 2000, the Forest contributes toward the conservation and recovery of the Canada lynx through habitat and access management practices, collaboration with other federal and state agencies, as well as researchers, tribal bands and non-governmental partners.

Bing.com images

Monitoring for Canada lynx involves a variety of methods which include field data collection by Forest personnel, collaboration with other federal agencies, MN state natural resource departments, researchers, and contributions from private individuals. The MN DNR is responsible for keeping track of Minnesota lynx sightings in and around the Forest. Lynx sightings are based on field observations and information from the National Forests snow-trailing, incidental take, or other observations.

White Pine (MIS)

The objective for white pine is to increase the amount of white pine to be more representative of native plant communities. This can be accomplished by planting or naturally regenerating white pine trees in white pine forest types and in other upland deciduous, mixed, and conifer forest types.

Bing.com images

We used common stand exam plots to assess the results of white pine occurrence and management. There are currently 62,016 plots in FSVeg (corporate database) distributed across every forest type on National Forest lands. For the purposes of this analysis, plots are divided into two strata. One strata represents stands that are generally mature and not in a regeneration state (non-regeneration plots). The other strata represent regeneration harvests (regeneration plots) with an objective of establishing regeneration. Regeneration plots occur in clearcuts, shelterwood cuts with reserves, and selection harvests. Regeneration methods include planting of seedlings, artificial seeding and natural seeding. Overstory trees are present on some of the regeneration plots depending on the type of harvest and location of the plot. White pine is often a reserve species in harvests and provides a source of natural seed.

Frequency of white pine in each stratum was calculated and is presented in Table 4-4.

Table 4-4. Frequency of white pine (WP) on regeneration and non-regeneration plots.

	Total Plots	Plots with WP	Frequency
Regeneration Plots	9,527	2,253	24%
Non-regeneration Plots	59,912	7,434	12%

According to the data, the Forest is regenerating white pine at a frequency twice that found on the landscape in general (stands without recent management activities). This is due to the Forest's efforts to plant, seed, and tend white pine seedlings. White pine requires animal damage control and release from competition to successfully become established.

Table 4-5 displays the number of white pine seedlings planted each year starting with 2004 when the current Forest Plan was implemented.

Table 4-5. White pine planted or sown.

Year	Planted	Seed Sown
2004	218,500	
2005	194,000	
2006	221,350	
2007	168,200	
2008	137,000	
2009	214,810	
2010	289,000	

2011	166,000	51.22 pounds
2012	150,000	50.9 pounds
2013	319,000	6 pounds
2014	473,500	
2015	370,000	43.16 pounds
Total	**2,921,360**	**151.28**

Northern Long Eared Bat (TES)

In 2015, the U.S. Fish and Wildlife Service designated the northern long eared bat (NLEB) a "Threatened" species throughout its geographic range in the lower 48 states. In 2015, the Forest started the conservation of the NLEB through habitat management practices, collaboration with other federal and state agencies, as well as researchers, and the Leech Lake Band of Ojibwe.

Since 2011, the Forest has monitored for NLEB and other bat species on the Forest. Species monitoring included acoustic surveys on seven routes across the Forest, and beginning in 2015 mist netting and telemetry surveys to identify maturity roost trees across the Forest.

White-nose Syndrome (WNS) in Minnesota

WNS was confirmed at two hibernacula in MN during the winter of 2015-2016. The closest of these is the Soudan mine, near Tower, MN. Given the limited number of known hibernacula in MN, this is likely to be the hibernacula used by many of the bats that summer on the Chippewa. The Forest has been working closely with US Fish and Wildlife Service, the Superior and Chequamegon-Nicolet NFs to collaborate on WNS response, project planning and effectively meeting consultation responsibilities.

Acoustic Surveys

Six acoustic mobile transects across the Forest were surveyed in 2015 (Little Turtle, Mud Lake, East Boundary, Third River, Pimushe, Sucker Bay). A seventh route was not completed. Each route was surveyed three times during June and July, with the exception of Pimushe which was surveyed twice. The acoustic data collected during 2015 and all previous years since 2011 was submitted for analysis in a combined contract with the Superior NF and Chequamegon-Nicolet NF. The contractor identified each bat call to species using four different software packages (BCID, Echoclass, Sonobat and Kaleidoscope Pro), as well as expert ID. Of the 3,283 bat calls analyzed, the most common species identified was the eastern red bat. The big brown/silver-haired bat species group and little brown bats were also commonly identified. Very few northern long-eared bats and no eastern pipistrelles were identified by expert ID. The only species that showed an overall downward trend from 2011 to 2014 was the little brown bat.

These results differ from 2015 bat netting data in which the majority of bats captured were little brown and northern long-eared bats, highlighting that the two surveys sample the bat community differently, and provide complementary information.

Netting and Telemetry

The Forest participated in the first field season of the Minnesota Bat Project, a three-year partnership project to develop a knowledge base of northern long-eared bat distribution and habitat across the state of MN. In 2015, a total of 206 bats of six species were captured during 39 nights of mist-netting across eastern and northern MN. Twenty-four adult female northern long-eared bats were fitted with radio-transmitters, and tracked daily to their roosts. This effort led to the identification of 73 total roosts. Roosts were located in at least 17 species of trees, and were most often in trees showing evidence of decline or decay. Ecologists from MN DNR will be studying these roosts and the surrounding stands to learn more about the roosting requirements of northern long-eared bats.

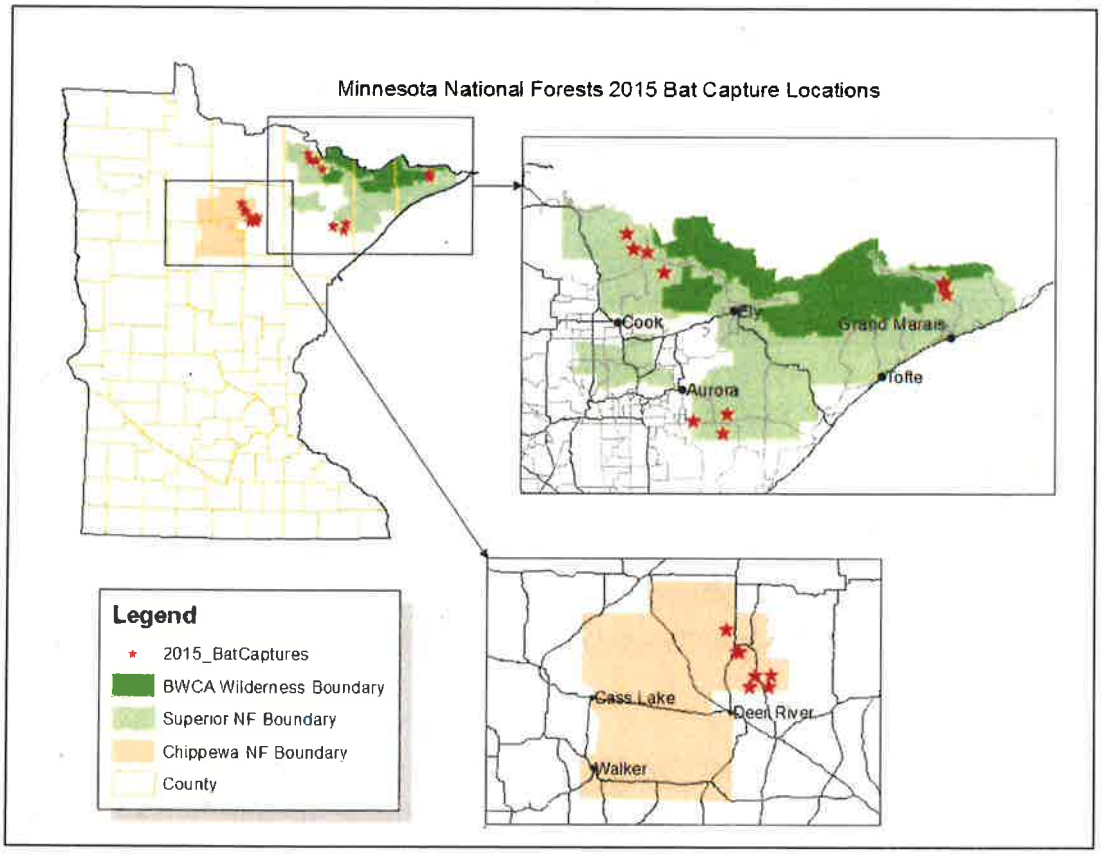


Figure 4-4. 2015 Bat netting locations on the Chippewa and Superior National Forests.

Figure 4-5. Northern Long-eared bat with transmitter.

As part of this project, netting was conducted at 7 sites on the east side of the Forest (Deer River District), resulting in capture of 59 bats. On the Forest, 57.6% of the captured bats were little brown bats (n=34), 33.9% were northern long-eared bats (n=20), and 8.5% were big brown bats (n=5). No tri-colored, hoary, silver-haired, or eastern red bats were captured on the Chippewa. Captured bats were identified, measured, banded and evaluated for evidence of WNS wing damage. Transmitters were attached to nine pregnant or lactating northern long-eared bats, which were then tracked daily to roost trees for the life of the transmitter. The average distance bats moved from the capture site to a roost was 0.3 miles. The farthest distance any bat with a transmitter was located between any roosts and/or the capture site was 0.98 miles.

Table 4-6. Roost trees of northern long-eared bats on the Chippewa National Forest.

Species	Common Name	No.	% Use	DBH Range (in.)	Mean (in.)	Std dev
Acer saccharum	Sugar maple	8	38%	8.5 – 21.0	14.8	4.4
Populus tremuloides	Trembling aspen	5	24%	13.5 – 22.2	18.5	3.3
Acer rubrum	Red maple	4	19%	9.3 – 14.4	11.7	2.3
Betula papyrifera	Paper birch	1	5%		12.1	N/A
Populus grandidentata	Big-tooth aspen	1	5%		11.8	N/A
Tilia americana	Basswood	1	5%		12.7	N/A
Unknown	Unknown	1	5%		8.9	N/A
Grand Total		**21**			**14.8**	**4.1**

Northern long-eared myotis roosts were located in 21 trees of 7 species (Table 4-6). Trees were predominantly sugar maple and aspen, followed by red maple, paper birch, big-tooth aspen, basswood, and an unknown species. DBH's ranged from 8.5 to 22.2 inches. The condition and structure of roost trees was categorized using the decay class definitions for Indiana bat (USDI FWS 2015, Figure 6.). Decay classes ranged from 1 (live tree) to 7 (decomposed) on the Forest. Emergence surveys at roost trees documented between 1 and 79 bats using a given roost tree on a particular night.

In addition to data collected for this project, we also collected tissue samples from 85 bats for a study of white-nose syndrome microbiome and population genetics at the Northern Research Station in Rhinelander, WI. We also saved collected hair samples from several bats for a pilot study of the mercury levels in insectivorous bats as a bio-indicator, being conducted at the University of Wisconsin - La Crosse.

Implications

- All management activities were completed within 2004 Forest Plan direction for TES and Regional Forester Sensitive Species. Projects that were analyzed either had no impact or were not likely to cause a trend to federal listing or loss of viability on the Forest. In addition, all Forest Plan Standard and Guidelines were successfully implemented on the ground.
- The Forest contributed toward the conservation and recovery of the Canada lynx, gray wolf, and northern long-eared bat, through habitat and access management practices, collaboration with other federal and state agencies, as well as researchers, tribal bands and non-governmental partners.
- The Forest has made a concerted effort to increase the amount of white pine on the landscape.

Recommendations

- Monitor to determine the effectiveness of measures to protect RFSS species and/or habitat.
- Continue to gather site specific data on all RFSS and T&E species at the pre and post projects levels.
- Support inventory and monitoring efforts to better define northern long-eared bat summer habitat in Minnesota.

C. Other Species

Monitoring Question

To what extent is Forest management providing ecological conditions to maintain viable populations of native and desired non-native species?

Breeding Bird Monitoring

In 1991, the Chippewa and Superior National Forests (NF) initiated a forest bird monitoring program designed to detect trends for a substantial number of birds that nest within the respective forests. The impetus for the program was due to the concern for many forest birds, especially many neotropical migrants, as well as the mandate to monitor management indicator species within the NF system (Manley 1993). The breeding bird communities of the western Great Lakes region are among the most diverse breeding bird communities in North America (Green 1995, Howe et al. 1997, Rich et al. 2004). The importance of this diversity and concerns with potential declines of some species has led to a strong interest in monitoring forest bird populations in the region. The relatively heavily forested landscapes of northern Minnesota and

Wisconsin are considered to be population 'sources' for many forest bird species and may be supplementing population 'sinks' in the agricultural landscapes of the lower Midwest (Robinson et al. 1995, Temple and Flaspohler 1998). Analysis of population trends is used as an 'early-warning system' of potential problems in a species population and serves as a measure of the ecological condition of the environment (Niemi and McDonald 2004).

Results

A total of 326 existing forest stands were surveyed for breeding birds including 135 and 191 stands (953 survey points) in the Chippewa and Superior National Forests (NFs), respectively in 2015. Trends in relative abundance were calculated for 74 bird species, including 65 species in the Chippewa Forest for 21 years from 1995 to 2015.

The Chippewa had 17 species that increased, 7 species that significantly decreased, and 41 species that were relatively stable from 1995 to 2015. Hence, 89% of the species (58/65 species) with adequate trend information are estimated to be stable or increasing over the past 21 years in the Forest.

Seven species increased on both Forests, including Black-and-White Warbler, Black-throated Green Warbler, Blue Jay, Cedar Waxwing, Nashville Warbler, Pine Warbler, and Red-breasted Nuthatch.

The Connecticut Warbler and Chipping Sparrow were the only species with significantly declining trends in both Forests. However, nine species had significantly declining *regional* trends--Chipping Sparrow, Common Loon, Connecticut Warbler, Eastern Wood-Pewee, Mourning Warbler, Red-eyed Vireo, Song Sparrow, Winter Wren, and Yellow-bellied Flycatcher.

Implications

- The overall trend information indicates that most breeding bird species within the Forest we are capable of monitoring and detecting trends for are either increasing or stable in populations. Several species such as the Connecticut Warbler and Yellow-bellied Flycatcher continue to have trends that remain a concern. Both species are commonly found in conifer-dominated forests, especially lowland coniferous forests.

Recommendations

- Continue the NRRI bird monitoring surveys across the Forest. This long-term study is vital in determining changes to biological diversity due to forest management and climate change. Expand survey efforts of golden winged warbler on the Forest by

focusing on lowland brush habitats to help further determine population trends of that species.

Barren Strawberry

In 1994, the Forest developed a monitoring plan for a large population of barren strawberry (*Waldsteinia fragarioides*) located near the Cutfoot Sioux area on the Deer River Ranger District. At that time, the plant was on the Regional Forester Sensitive Species (RFSS) list (Cable 1994), and reportedly, botanists considered this site as the western most extent of the species. The Cutfoot Sioux was one of two known populations on the Chippewa.

The plants primarily occur in red pine forests, with some occurring in jack pine and other tree species. Most of the plants occur in scattered clumps in fairly dry, sandy soils with an understory of mostly hazel and some willows. Barren strawberry occurred in portions of contiguous stands covering approximately 130 acres. The canopy cover varied from about 60-80%. There was concern about the increase in hazel following winter thinning activities.

To assess the sensitivity of *Waldsteinia fragarioides* to changes in the light regime the monitoring plan established three 1-acre units. One unit was the control. In another unit hazel removal would occur by manual methods. In the last unit burning would occur.

The plan called for conducting three burn treatments which occurred in 1995, 1996, and 1997. Establishment of 25 permanent 1-meter by 1-meter plots occurred within the burn unit. Recording the number of *Waldsteinia fragarioides* plants and other associated plant species within each plot began in 1994.

Following the 1994 pre-burn data collection, subsequent monitoring of the 25 burn plots occurred in 1996 (only Plots 1-7), 1998, 1999, 2000, and 2005. In 2015, monitoring of the plots resumed after an extended break of time.

Results

The first prescribed burning had occurred in the burn unit in 1995, but the planned 1996 burning had not yet occurred when Forest staff monitored the plots in 1996. The 1996 monitoring (only 7 plots) revealed a reduction in the mid-shrub canopy cover to 0% in all plots. Staff recorded a reduction in the canopy coverages for all plots, but noted having problems in reading the values with the spherical densitometer. Following the burning, 5 of 7 plots (71%) had an increase in *Waldsteinia fragarioides* plants, and all 7 plots had a decrease in associated plants located within the plots.

Table 4-7. Summary of results (1998-2015) after 3 burns. 1994 reflects numbers and cover prior to burn treatments.

Year	# barren strawberry plants	barren strawberry	# of other plant species
1994	1,133		
1998	652	19-Decrease 6 - Increase	25-Decrease
1999	396	16-Decrease 5 - Increase 4-Same	Continued decrease
2000	569	7 - Increase	
2005		12-Increase 4- Same	
2015	1,272	15 - Increase 4- Same	20-Increase 5-same

1998 is compared to pre-burn data collected in 1994. Years 1999, 2000, 2005, and 2015 are compared to 1998 values.

The monitoring done in 1998 was the first year Forest staff compiled data on all 25 plots. All three prescribed burning activities had occurred in the burn unit. The burning reduced the mid shrub layer over 80% of the plots, and conditions stayed virtually the same for the other 5 plots because they were already in an open condition. Canopy cover values were equal to or about the same in 72% of the plots, increased in 16%, and decreased in 12%. The total number of *Waldsteinia fragarioides* plants had decreased in 19 plots or 76 percent from the values recorded in the pre-burn year of 1994. Three of the plots had an equal number of *Waldsteinia fragarioides* plants and 3 plots had a decrease in plants. In 1998, the total number of *Waldsteinia fragarioides* plants in all plots was 652 and had substantially decreased compared to the number of plants (1,133) observed in 1994. The numbers of other associated plant species recorded also decreased in all 25 plots.

As indicated, all of the prescribed activities had occurred and Forest staff had compiled the first complete set of monitoring data in 1998. Therefore, by using the 1998 data, it provides a second baseline for comparing subsequent monitoring values in future years. In 1999, because of possible lingering effects due to the prior burning, the downward trend continued for a decrease in *Waldsteinia fragarioides* observed within the majority of the plots (16 of 25 or 64%). Likewise, the total number of *Waldsteinia fragarioides* plants observed in all 25 plots was now 396. Five plots did show an increase in species numbers (20%) and 4 plots (16%) stayed the same as the 1998 data. The 1999 monitoring data represents the low point in terms of the species numbers for plots with decreasing values, and for the overall number of the species.

In 2000, the numbers with increasing amounts of *Waldsteinia fragarioides* plants in plots began to rebound slightly (7 plots or 28%), and the overall total of all plants in the plants increased to 569. Similarly, after five years, the 2005 monitoring data revealed a further increase in plots (12 or 48 %) with greater numbers of the species observed. In 2000 and 2005, 4 plots had equal values (16%) to the 1998 data, including 2 plots for both years where the Forest staff also observed no plants in the plots for 1998 and in 1994.

In 2015, the Forest once again conducted monitoring of the 25 plots. The 2015 monitoring revealed that 15 or 60% of the plots had increased amounts of *Waldsteinia fragarioides* plants as compared to the 1998 data set. After this extended length of time, the number of *Waldsteinia fragarioides* plants had significantly increased within individual plots and for the overall number of plants in all 25 plots (1,272). The total number of plants in all plots now exceeded the numbers from the initial monitoring done in 1994 by 139 plants. The greatest increase in individual plots with *Waldsteinia fragarioides* plants increasing from the 1998 data was as much as 118 plants (in 2 plots), and looking at the 1994 data, the largest increase was in one plot of 113 plants. A large majority of the plots with increasing amounts of *Waldsteinia fragarioides* plants grew by numbers well beyond an increase of 20 or more plants. In prior monitoring years, most of the increases were in single digit numbers. In 6 of the 7 plots where the number of *Waldsteinia fragarioides* plants decreased from the 1998 data, the mid shrub canopy cover over the plots had increased. The range of mid shrub canopy cover for these plots ranged from 2 to 95% as compared to prior values of either 1 or 2%. The numbers of other observed associated plant species within each plot showed an increase from the 1998 data set in 20 plots (80%), and for the remaining 5 plots (20%) the number of recorded plants in 2015 was equal to the prior data in 1994.

Implications

- Although the prescribed burning did an excellent job at removing hazel, other shrubs, and competing herbaceous species, the *Waldsteinia fragarioides* population and the number of the species in the plots decreased. The combined effects of the three prescribed burns affected the vigor and species numbers recorded within the plots for many years.
- The plant population did rebound slightly above 1994 pre-burn plant levels by 2015. Many of the *Waldsteinia fragarioides* plants are still increasing and the population may continue to expand because of the project burning. Conversely, species numbers are declining at some locations due to hazel and other shrubs increasing in size and shade which appears to cause a decline in *Waldsteinia fragarioides* plants. Prescribed burning

appears to be an effective tool to remove competing vegetation such as hazel which ultimately causes an apparent negative affect to the species and its habitat.

Recommendations

- Analyze data for control plots and mechanically brushed plots.
- Analyze data for the other species, and canopy cover to assess trends for other species, overall diversity over time relative to treatments, especially burning.

5. Insects and Disease

Key Points

- Tamarack is being damaged by eastern larch beetle and larch casebearer. Both insects have increased in recent years. Increase awareness of the condition of the tamarack resource and initiate possible management actions. There is the potential to salvage dead trees and regenerate sites with tamarack/black spruce.
- Emerald ash borer could potentially impact thousands of acres on the Forest. The Forest is proactively working with partners and research projects to diversity ash wetlands and build resilience in ash stands before infestation.

Monitoring Question

Are insects and diseases populations compatible with objectives for restoring or maintaining healthy forest conditions?

Results

Since the early 1950s, aerial surveys have been a valuable tool for monitoring the status of forest insects and pathogens across the 16 million acres for forest land in Minnesota. For the past 15 years, these surveys have been accomplished through the partnership of the Minnesota DNR Forest Health and Resource Assessment Unit and USFS, State and Private Forestry.

The Chippewa National Forest's forest health survey results are displayed in Tables 5-1, 5-2, and 5-3 with summaries following.

Table 5-1 shows the agents causing the most damage in 2015. Figures are included since 2005 to show the trends. Not included in the table are "0" acres of aspen defoliation, jack pine budworm, porcupine damage, two lined chestnut borer, large aspen tortrix, or Dutch elm disease. These agents have all had "0" acres for a number of years.

Table 5-1. Forest damage (newly affected acres) acres by agent for all ownerships within the Forest boundary.

AGENT NAME	2015	2014	2013	2012	2011	2010	2009	2008	2007	2006	2005
Forest tent caterpillar	8,638	34,064	207,001	39,053	2,382	399	0	0	0	0	0
Unknown	0	48	137	67	520	10	8	1,148	1,685	509	198
Spruce Budworm	1,110	263	0	2	339	73	0	0	837	0	0
Larch casebearer	1,291	1,314	512	667	749	2,787	1,387	785	378	255	351
Eastern larch beetle	1,430	1,109	447	39	266	12	136	416	142	250	0
Ash decline	0	0	519	0	0	593	0	179	102	0	0
Flooding/ Beaver	144	0	278	301	147	11	64	30	47	148	258
Bark beetles	216	82	2	1	2	30	92	0	0	4	0
Rx Fire & Wildfire	0	507	0	0	91	117	54	79	0	0	0
Wind Damage	0	0	0	4,603	0	0	0	1	0	0	0
Decline	4,787	823	942	1,702	351	0	883	0	0	0	0

Table 5-2. Damage by Forest Type for all ownerships within the Forest boundary.

HOST FOREST TYPE	2015	2014	2013	2012	2011	2010	2009	2008	2007	2006	2005
Aspen	3,246	274	942	1,641	646	0	769	129	5,107	0	912
Balsam Fir	207	263	0	0	13	9	0	346	626	42	0
Black Ash	688	550	519	154	225	593	149	179	102	0	0
Hardwoods	9,520	34,064	207,012	39,785	2,382	399	32	640	1,469	411	75
Jack Pine	0	0	1	0	1	14	35	143	243	2,322	1,346
Red Pine	37	510	2	317	91	125	110	10	0	13	24
Softwoods	174	2	249	521	134	12	32	30	242	141	0
Tamarack	2,722	2,423	959	706	1.015	2,805	1,522	1,200	519	560	733
White pine		0	0	50	0	0	8	0	0	0	0
White Spruce	1,053	126	149	7	339	76	1	1	0	0	0
Both Hdwds & Softwoods	0	0	5	3,254	-	-	-	-	-	-	-
TOTAL	17,647	38,212	209,838	46,435	4,847	4,045	2,667	2,680	8,519	3,489	3,432

There was "0" damage to birch, black spruce, elm, oaks, unknown forest types.

Table 5-3. Forest damage by severity rating (newly affected acres) for all ownerships within the Forest boundary.

SEVERITY	2015	2014	2013	2012	2011	2010	2009	2008	2007	2006	2005
Trace (5% - 25% affected)	2,932 16%	20,250 53%	187,155 89%	23,383 50%	937 19%	1,862 46%	171 6%	663 25%	2,152 25%	673 19%	257 7%
Light (26% - 50% affected)	1,424 8%	630 2%	1,529 3%	1,313 3%	673 14%	1,095 27%	95 4%	1,299 48%	6,328 74%	541 16%	3,133 91%
Moderate (51% - 75% affected)	11,205 64%	17,307 45%	20,990 10%	16,419 35%	1,893 39%	383 9%	1,382 52%	511 19%	39 0%	2,246 64%	12 0%
Heavy (>75% affected)	2,085 12%	25 0%	164 0%	5,320 11%	1,344 28%	705 17%	1,019 38%	207 8%	0 0%	29 1%	30 1%
TOTAL	17,646 100%	38,212 100%	209,838 100%	46,435 100%	4,847 100%	4,045 100%	2,667 100%	2,680 100%	8,519 100%	3,489 100%	3,432 100%

Summaries

The following brief discussions highlight the greatest areas of concern.

Bing.com images

On the Chippewa NFS lands, there are 16,261 acres of tamarack forest type. Tamarack occurs as a component in lowlands, as well as upland cover types. Tamarack damage/mortality has been on the rise since monitoring began under the 2004 Forest Plan. The majority of this damage has been from two insects: larch casebearer and eastern larch beetle.

The non-native **larch casebearer** is essentially a defoliator that stresses tamarack by reducing its ability to photosynthesize. Repeated defoliation can weaken and may eventually kill a tree through secondary attacks.

Eastern larch beetle is a native bark beetle. Larch beetles overwinter under the bark as larvae, pupae and adults in tamarack trees. Adult beetles emerge from the trees in the spring, seek out and bore into suitable live trees (those already under attack by casebearers are good candidates) or fresh logging slash. There they construct galleries and lay eggs. Larvae hatch from the eggs, feed in the inner bark and eventually pupate and change into adults. Larva feeding in the inner bark girdle and kill the trees. Even healthy tamarack can be attacked and killed by this beetle. Since 1970, extensive outbreaks have been recorded throughout North America. Only species of larch are attacked by the larch beetle. Salvage harvest of stands with high mortality is recommended.

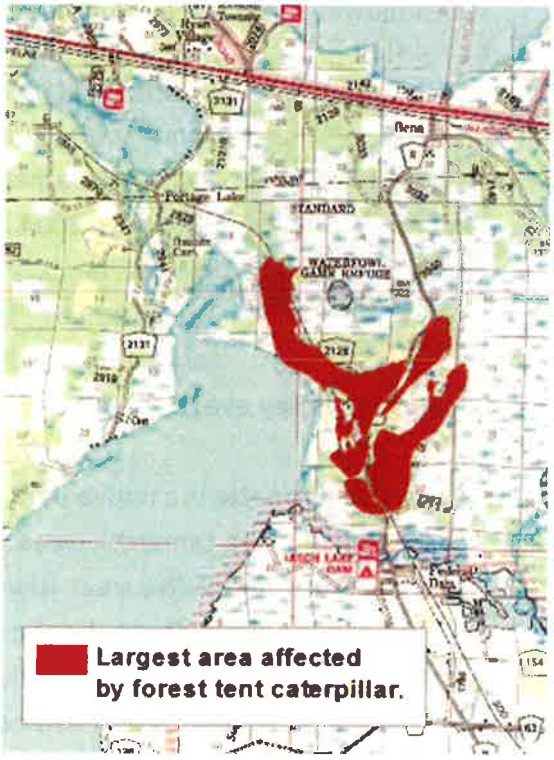
Defoliation (from the larch casebearer) is thought to be a major factor that predisposes tamarack to attack by the eastern larch beetle[1]. In 2015, 1,430 acres of new damage occurred on the Forest from larch beetle. On 820 of these acres at least 75% of the mature trees were killed. On another

377 acres at least 50% of the mature trees were killed. The Forest is losing its tamarack resource. According to University of Minnesota researchers, the likely reason eastern larch beetle is abundantly active is because warm springs and summers allow them to increase the number of generations they produce in a year, increasing their populations and adding pest pressure to tamaracks.[2] It's likely these conditions will continue. Un-infested mature tamarack stands should be regenerated before they are infested. Regenerating mature stands will replace them with young tamarack that is not susceptible to eastern larch beetle.

Bing.com images

Forest tent caterpillar: (FTC), *Malacosoma disstria*, incidence went from "0" acres in 2009 to 207,000 acres in 2013. It was expected that populations would continue to expand in 2014 – 2015, based on historic outbreaks. Outbreaks occur at intervals of 10 to 16 years and run for 3 to 5 years. The last major outbreak was in 2001.

Acres damaged in 2015 dropped to 8,638. Past sampling in NE Minnesota revealed that cocoons were highly parasitized by a native parastic fly that kills pupae (up to 90% in some samples). In 2014, populations of FTC took a downturn on the Forest, dropping from 201,000 acres in 2013 to 34,064 acres in 2014. The decline continued in 2015.



All of the acres affect by FTC on the Chippewa in 2015 were in hardwoods. Eighty-six percent of the total acres has a severity of "moderate", meaning that 51% - 75% of the canopy was eaten by the insect. When a deciduous tree loses over half of its leaves early in the growing season, it will produce a second set of leaves. This process is very resource intensive which is stressful for the tree. If it happens several years in a row, it may set the tree up for secondary problems.

The largest area affected on the Forest in 2015 was 2,182 acres in size. This area is located along Co. Rd. 8 just north of Federal Dam (see map). The severity in this area was "moderate".

Bing.com images

Emerald ash borer (EAB): EAB, *Agrilus planipennis* Fairmaire, is an exotic beetle that was discovered in southeastern Michigan near Detroit in the summer of 2002. On May 13, 2009, an EAB population was found in St. Paul, Minnesota. In August, 2013, EAB was discovered in the city of Superior, Wisconsin. This is the nearest established population, to the Chippewa National Forest, discovered to date. The area surrounding Superior, WI (Douglas County) was immediately quarantined. Quarantined counties in Minnesota are currently Anoka, Dakota, Fillmore, Hennepin, Olmsted, Ramsey and Winona.

This pest will reach the Forest in time. When it does, the ash resource will decimate over the next few decades. The Forest is acting proactively through coordinated partnerships, diversification of ash wetlands, and research projects to be able to respond. Building resilience in its ash resource before infestation and slowing the spread of EAB once it arrives are the two primary objectives for the Forest concerning emerald ash borer.

Bing.com images

Gypsy moth (GM): Most gypsy moths trapped in Minnesota have been collected in northeastern Minnesota's St. Louis, Lake and Cook Counties (the Superior National Forest) and in the SE Minnesota county of Houston.

Trapping on the Forest has been conducted by both the MDA and the USDA Animal and Plant Health Inspection Service (APHIS). MDA sets traps on a grid system that rotates through the State, focusing on the eastern edge of the State as GM expands westward from Wisconsin. APHIS works on the Forest as well, through the Leech Lake Band of Ojibwa (LLBO), using the Division of Resource Management as their "feet on the ground" to set and remove traps. Over the past few years individual moths have been caught on the Forest, usually as single catches in traps. Delimited trapping generally yields no moths the second year. To date no known populations have been established on the Forest. In 2015 the eastern side of the Forest was within the MDA trapping grid, which essentially amounts to the Deer River District. Seven moths were caught in Itasca County, with two of these moths being caught on the Forest (yellow dots on the 2015 map).

Based on the 2015 survey results, the MDA, in collaboration with federal, state, and local partners, is proposing to slow the spread of GM populations in five distinct areas where 2015 monitoring traps caught high numbers of moths. The proposal is to treat a total of 1,135 acres with a biological insecticide called *Bacillus thuringiensis* var. *kurstaki* (Btk). These locations are at: Ely in St. Louis County, Two Harbors in Lake County, and Houston, Mound Prairie, and Reno, in Houston County.

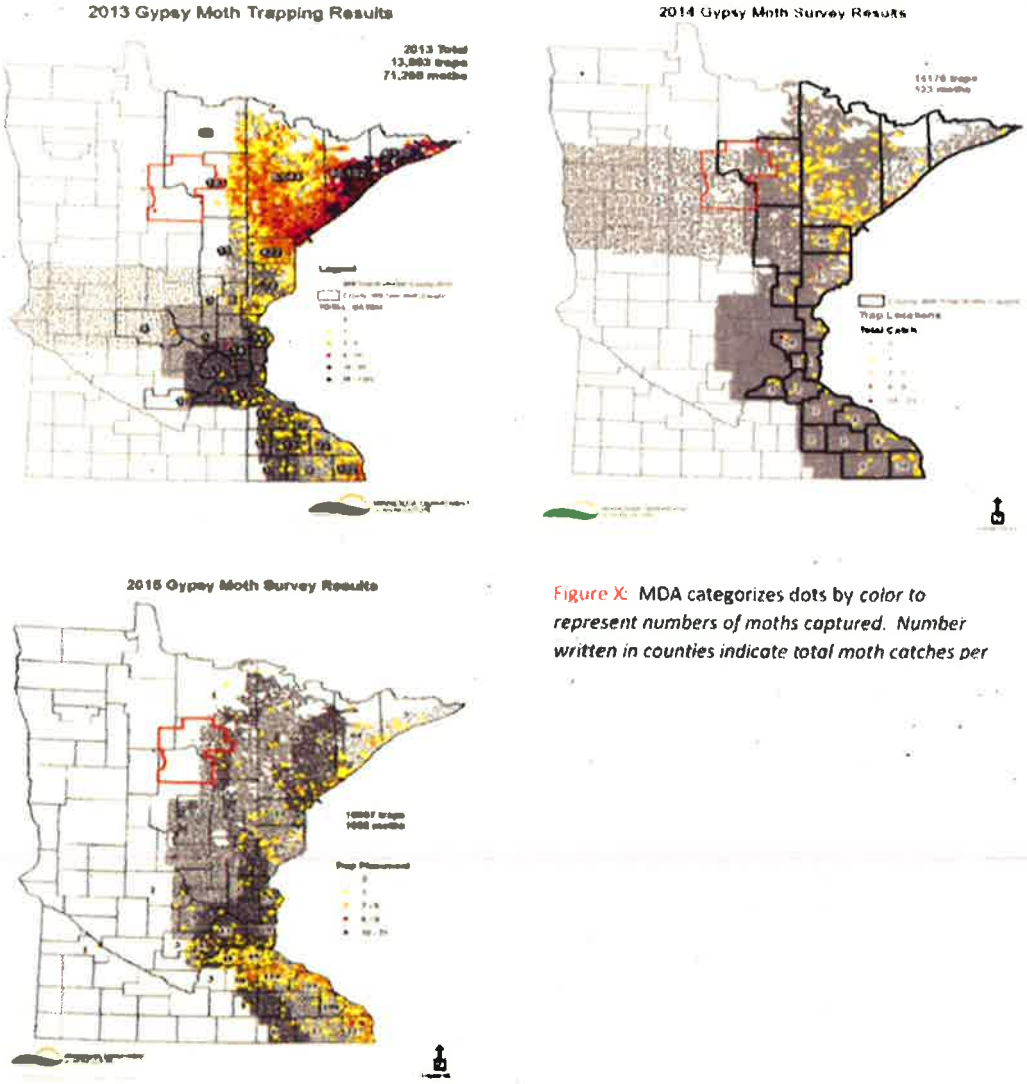


Figure X: MDA categorizes dots by *color to represent numbers of moths captured. Number written in counties indicate total moth catches per*

Spruce Budworm has made appearances over time with new acres affected from 2 acres in 2012 to a high of 1,110 acres in 2015. This is a 76% increase from 2014. Twelve locations are involved on the Forest. Two sites are in balsam fir (129 acres) and ten sites are in white spruce (982 acres). Nine sites (891 acres) are classified as "heavy" damage (75%+ defoliation), while three sites (220 acres) are classed as "moderate" damage (50%-75% defoliation).

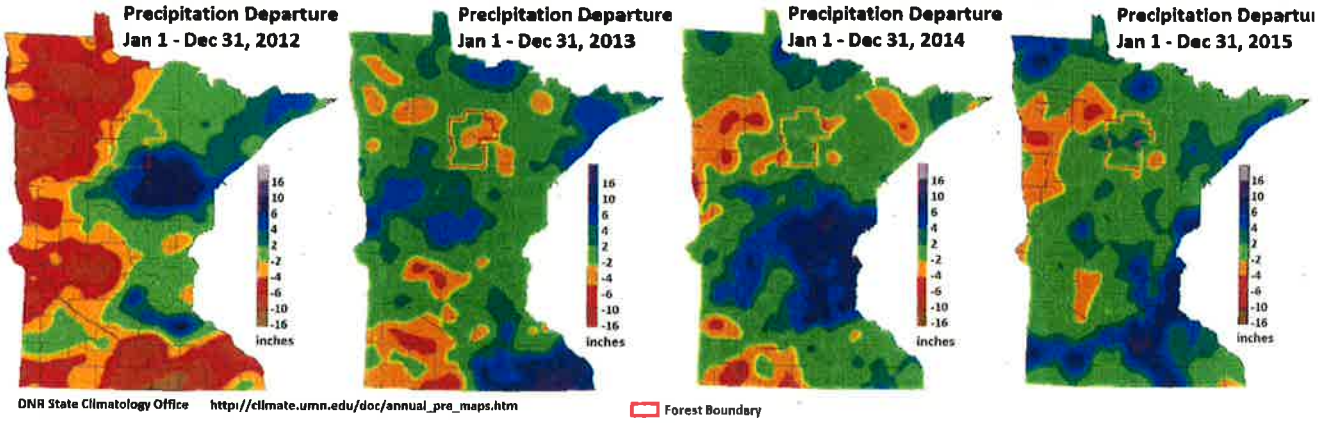
Decline jumped nearly 6 fold from 2014 to 2015, from 823 to 4,787 acres. Three forest types were involved. Decline is often caused by insect pests and diseases that are related to unfavorable site conditions or old age. Aspen made up 3,122 of the decline acres. Black ash decline totaled 660 acres and hardwoods made up 882 acres. Sites experiencing decline should

be investigated and considered for harvest when found in project area during the project planning process.

Bark beetles were found on 38 sites in 2015, increasing total acres to 216, from 82 acres in 2014. Over 80% of this was in pine, while 20% was in white spruce. All of the damage was associated with the 2012 blowdown corridor where all but 4 acres showed a mortality of 50% or more. Rarely do conifer bark beetles in Minnesota cause significant damage in a stand or across a landscape. Damage is usually associated with drought or management activities such as thinning pine in the summer and leaving logs decked in or near the stand for more than five weeks. In the case of the damage on the Chippewa in 2015, it appears it is related to timber that was damaged in the blowdown event of 2012. Trees that were damaged (broken tops or tipped) and have 'hung on' until now are probably experiencing stress and are susceptible to bark beetle attack.

Drought

Drought is monitored using the State Climatology, University of Minnesota, website as well as the U.S. Drought Monitor website.



Many agents affecting forest health are opportunistic. Trees stressed by drought are more vulnerable to these agents. Conversely, adequate or abundant precipitation can provide the resources needed by a tree to fight, or recover from, insect attack. In 2011, the Forest was on the tail end of a drought. Conditions improved in 2012 and in 2013 with precipitation being normal to slightly below the historical normal. In 2014 precipitation continued to improve and was at normal, to slightly above normal at the end of September. In 2015, precipitation on the Forest was normal to above normal. (http://climate.umn.edu/doc/annual_pre_maps.htm). Drought stress has not been a factor on the Chippewa NF for the past few years.

Forest Health Workshops: Every winter the Forest hosts and coordinates an interagency Forest Health Workshop. Attendance is free, and has grown each year. The eleventh annual Workshop was held in February, 2015, with over 130 resource managers attending from the Forest Service (Superior NF, Chippewa NF and NRS), Minnesota DNR (Forestry, Rec., and Wildlife), BIA, LLBO, Fond du Lac Forestry, MDA, UMN, Aitkin, Beltrami, Carlton, Cass, Clearwater, Crow Wing, Hubbard, Itasca, Kanabec, Sherburne Counties, Greg Cook Logging, Potlatch, UPM-Blandin, Minnesota Forestry Association, and several private forestry consultants.

Forest health specialists from USDA State & Private Forestry, the Minnesota DNR, Minnesota Dept. of Agriculture, and the University of Minnesota made up the cadre. Subjects presented included an update on Minnesota forest insect and disease problems, gypsy moth trapping results and update on new quarantines, *Diplodia*, oak wilt, *Heterobasiodion*, spruce budworm, EAB, and the historic role of insects and diseases in northwest Minnesota.

Recommendations

- Tamarack is being damaged by eastern larch beetle and larch casebearer. Both insects have increased in recent years. Increase awareness of the condition of the tamarack resource and initiate possible management actions. There is the potential to salvage dead trees and regenerate sites with tamarack/black spruce.

[1] Forest Insect & Disease Leaflet 175, U.S.D.A. Forest Service, 2002.
[2] 2015 Forest Health Highlights, MnDNR, Division of Forestry, Forest Health Unit, 2015.

6. Off-Road Vehicles (ORV)

Key points

- Public education and information is critical to successfully manage ORV use within the Forest and reduce illegal use.
- Through collaboration with the counties and MnDNR, additional ORV opportunities are identified and may be open to ORV use after the appropriate analysis is completed.
- There continues to be a workload associated with identifying roads to be opened or closed to ORV use, and roads to be decommissioned.

Monitoring Question

To what extent is the Forest providing ORV opportunities, what are the effects of ORVs on the physical and social environment; and how effective are forest management practices in managing ORV use?

Background

Monitoring information is used to implement the Forest Plan (2004) and the National Travel Management Rule (2006). The Travel Management Final Rule provides expectations for ORV travel access management on the National Forests. The intent of the Rule is to provide regulation of ORVs as a result of the tremendous increases in the number and power of ORVs; and widespread environmental and social impacts from unmanaged recreation while recognizing that motorized recreation is a legitimate use of National Forest system lands in the right places. The 2007 decision on *Off-Highway Vehicle Road Travel Access* resulted in access rules and policy for roads on the Chippewa National Forest.

The 2004 Chippewa National Forest Land and Resource Management Plan (Volume I, Section 3.8.3), identified the following indicators to be used in measuring the ORV resources.

- New Motorized Trails for Summer Use
- System Roads Open for ORV Use
- ORV and Snowmobile Cross-Country Travel Opportunities
- Consistency Among Public Land Agencies

Monitoring also occurs through public contacts, law enforcement, and the development of Motor Vehicle Use Map (MVUM). These results are summarized below.

Results

The Forest continues to monitor potential change in the management of ORV in the context of the Forest Plan over time. The following table displays the indicators over time.

Table 6-1. ORV Indicators 2011-2015.

Indicator	2011	2012	2013	2014	2015
New Motorized Trails for Summer Use (Miles)	0.0	0.0	0.0	0.0	0.0
System Roads Open for ORV Use (Miles)	1431	1431	1431	1431	1431
ORV and Snowmobile Cross-Country Travel Opportunities	Prohibited	Prohibited	Prohibited	Prohibited	Prohibited
Consistency Among Public Land Agencies	No	No	No	No	No

New motorized trails

There have been no new motorized trails designated for summer use. The Soo Line Motorized Trail is currently the only designated ORV trail on the Forest. It is approximately 20 miles in length and designated for ORV use during the summer and snowmobiling in the winter. Blackduck has identified approximately 1.5 miles of ORV designated trail through NEPA analysis and decision. Resources have not yet been allocated for construction and maintenance of this new trail.

A local club and Cass County have been working for a few years to create a MnDNR Grant-In-Aid trail in the Walker District between the communities of Hackensack, Whipholt, and Longville. Approximately 10 miles of trails is proposed to be added to the Forest system. Upon receipt of an application, the Forest will review the information, conduct the appropriate analysis, and make a decision.

Local clubs and Itasca County have also been collaborating to identify potential ORV trail sites to be added to the Forest System. Recreation staff are meeting with the County and local clubs to review the potential trail locations. A final application by the County has not been received. Approximately 10 miles of trails is proposed to be added to the Forest system.

Forest Service System Roads for ORV Use

Decisions made by District Rangers based on analysis in environmental assessments and minor editorial correction to the Motor Vehicle Use Map, are the main drivers for change in the quantity of roads open to ORV use. In 2015 there were 1,431 miles of Forest Service System Roads that were available to ORV riding.

The Forest continues to maintain signage along ORV roads that include a forest road number, ORV placard, and mileage of the road. These signs correspond to the MVUM and aid the rider in knowing where they can legally ride. Periodic sign maintenance is needed to replace vandalized signs, or to make modifications base on changes to the road system in environmental assessments and annual MVUM updates.

Road closures and decommissioning continue to be implemented based on decisions resulting from environmental assessments. Road closures can include gates, rock, and berms (earth and debris). These closure devises can be effective. The exceptions are areas with destinations behind the closure such as a desirable fishing lake; these closures tend to be ineffective. ORV users simply travel through the brush and around the closure. Road decommissioning is more effective than closures, as culverts and other road improvements are removed, and typically the first "seen" portion of the road is obliterated or scarified. This action greatly improves the success of deterring illegal use. More details are provided in the Watershed Health section under the Road Closures/Decommissioning .

ORV and Snowmobile Cross-country Travel Opportunities

Cross-country travel remains prohibited. Illegal cross-country use continues to be a significant resource problem that seems to be growing. This use is often associated with illegal permanent hunting stands or recreation riding (getting from point A to B). Forest staff continue to identify illegal cross-country use and close or decommission these areas as resources become available to perform the work.

Consistency among Public land Agencies

The State of Minnesota, Beltrami, Cass, Itasca Counties and the Leech Lake Band of Ojibwe have differing policies regarding ORV use. For the purposes of monitoring, there is not consistency between the county, state, federal and tribal governments for ORV use.

Motor Vehicle Use Map (MVUM)

The CNF Motor Vehicle Use Map (MVUM) identifies roads and trails designated for motor vehicle use, including ORVs. The MVUM is the legal reference and indicates the routes that ORVs may legally drive. The first edition of the MVUM was distributed in 2009 with over 6,500 maps given to forest visitors. In 2015, the Forest ordered 2,000 maps with roughly 1,500 distributed. Public comments combined with Forest staff review of the existing ORV and other motor vehicle use opportunities have resulted in proposals to change motor vehicle access on some roads.

Monitoring through Public Contacts

Informing the public about ORV policy and more specifically about which system roads are designated open is the focal point of ORV education. Users continue to inquire about which roads are open for ORV travel. The majority of these contacts occur throughout the summer but peak during the hunting season. To augment the higher level of interest, district staff make hunter contacts during the hunting season. Having information at forest offices, on the web, and knowledgeable staff is critical to educating the ORV public.

Monitoring through Law Enforcement

There are two law enforcement officers and 19 forest protection officers on the Forest. Enforcement of forest orders and other appropriate 36 CFR regulations occurs as needed on the Forest. For many years there has been a Cooperative Law Enforcement (CLE) agreement with Cass and Itasca Counties that provides for a county deputy to work a certain number of days per year that are concentrated on National Forest land. However, the CLE was primarily set up for cooperating deputy sheriffs to patrol in the fee campgrounds after hours, not to enforce ORV regulations. Over the past few years, the CLE program funding has been declining and has not been adequate in offering consistent support to FS law enforcement efforts for ORV regulation.

Law enforcement personnel (including Forest Service, State, Counties, Local and Tribal officers) monitor and respond to activities and behavior on the National Forest and adjoining lands. The primary intent of law enforcement contacts continues to be education with an emphasis on issuing violation notices for illegal riding. The following table shows criminal ORV offenses by year as recorded in the Law Enforcement Annual Report (LEIMARS records).

Table 6-2. Summary of Law Enforcement Reports Related to ORVs 2011-2015.

	2011	2012	2013	2014	2015
Incidents	17	41	34	44	41

ORV offenses may be included in 1) occupancy and use offenses, and 2) travel management restrictions on roads. The trend from 2011 to 2015 shows a steady occurrence of ORV incidents. Fluctuations reflect a change in priorities of the law enforcement officers and a change in the numbers of forest protection officers. Qualitative information from Forest Service employees indicates no decrease in the illegal use of ORVs on the Forest.

The Law Enforcement Agenda and Action Plan for FY 2015 includes continuing to assist Forest managers with the implementation of the travel management decisions through public education, review and revision of Forest Supervisor's orders, design and placement of road closures and postings. The Patrol Captain will coordinate with the CNF to ensure ORV rules are incorporated into widely dispersed documents such as the various hunting regulation booklets. The Law Enforcement Officers will also assist Districts with the inventory and monitoring of unauthorized roads and trails.

Recommendations

The following emphasis areas should be incorporated into future work planning for implementation:

- Educate users on the Chippewa National Forest ORV rules and regulations.
- Annually update the MVUM to accurately reflect resource conditions.
- Increase law enforcement efforts to take action on illegal ORV use.
- Continue to evaluate the forest transportation system through project level environmental assessments and implement these decisions (road closures / decommissioning).
- Obliterate unauthorized user created ORV trails.
- Meet with the MnDNR to discuss analysis conducted since the 2004 Forest Plan. Specifically look for analysis of projected need and what is available on surrounding public lands for all types of recreational vehicles.
- Continue to improve and make available electronic trail mapping data in order for users to have instant mapping capabilities on electronic devices such as smart phones and I-pads.
- Allocate resources to construct and maintain approximately 1.5 miles of ORV designated trail on the Blackduck district.
- Work collaboratively with Itasca County to add 10 miles of ORV designated trails in the Deer River District area. Conduct the appropriate level of analysis to designate the trails as ORV.

7. Non-native Invasive Species (NNIS) Plants

Key Points

- Hand and mechanical treatments of NNIS plants appear to be effective. Some species such as garlic mustard that have a large existing seedbank will continue to emerge from this seed source in subsequent years and require future treatment.
- Bio-control releases were not very successful on spotted knapweed. Weevils generally keep infestations stable rather than decreasing the populations.
- Releases of beetles for control of purple loosestrife are much more effective, and in some smaller infestations, they are reducing the size of loosestrife populations or dramatically decreasing the density of plants.
- New NNIS plant sites consist mainly of low and medium ecological risk species.

Monitoring Question

To what extent is Forest management contributing or responding to population of terrestrial or aquatic non-native species that threatened native ecosystems?

Monitoring Results

In 2015, the Forest accomplished about 475 acres of non-native invasive species (NNIS) plant control treatments. Generally, yearly NNIS treatments occur in areas that require follow-up work to control the infestations. Treatment emphasis is on the 5 plant species designated as high ecological risk species on the list of Chippewa Priority Non-native Species of Concern. These invasive species represent the highest threat to natural communities because of their high invasive ability and impacts on ecosystem processes. These species are

- garlic mustard (*Alliaria petiolata*),
- leafy spurge (*Euphorbia esula*),
- glossy buckthorn (*Frangula alnus*),
- Bell's bush honeysuckle (*Lonicera x bella*), and
- common buckthorn (*Rhamnus cathartica*).

Treatments also continue on medium risk species such as spotted knapweed (*Centaurea stoebe spp. micranthos*), purple loosestrife (*Lythrum salicaria),* Siberian peashrub (*Caragana aborescens),* wild parsnip (*Pastinaca sativa),* a low risk species--common tansy (*Tanacetum vulgare*), and new recent invader flowering rush (*Butomus umbellatus*). Manual treatments such as hand pulling or bio-control beetle releases are commonly used because herbicide use is restricted within the boundary of the Leech Lake Reservation.

National Forests are required to monitor 50% of the treatment acres in succeeding years to determine effectiveness of treatments. The Forest monitored approximately 60% of the invasive plant treatments in 2015.

Garlic mustard --The Forest continues to focus on hand pulling garlic mustard by Forest staff and a seasonal work crew through an existing partnership agreement with the Leech Lake Band of Ojibwe (LLBO) - Division of Resource Management (DRM). Hand pulling of scattered infestations on about 83 acres on National Forest and tribal lands occurred multiple times throughout the year in the Stoney Point Campground and near Onigum. The estimated control of garlic mustard was considered primarily good (76-90%) at 3 infestation sites and excellent (91-99%) at another infestation.

Common buckthorn--Approximately 185 acres in several areas across the forest (Pomroy, White Oak, south of Walker) were treated and monitored. Treatments consisted of cut stump/herbicide hand daubing, hand pulling seedlings, and girdling smaller saplings. Initial monitoring control treatments from 2015 and the previous year show excellent results (91-99% effective) with no re-sprouting noted as of early spring 2016.

Bell's bush honeysuckle--The DRM crew removed a small infestation of Bell's bush honeysuckle near Bena by cutting and digging. Monitoring determined the control results to be excellent (91-99%).

Purple loosestrife—Treatments consisting of bio-control releases of *Galerucella* beetles at 2 sites (approximately 10 acres) and hand pulling plants (about 9 acres) were done by the DRM crew. Monitoring at these sites has not yet occurred.

The Forest continues to work in a partnership for control of purple loosestrife in Itasca County. The treatment and monitoring is done through the Itasca County Soil and Water Conservation District. Workers released *Galerucella* beetles at 7 sites with dense infestations. These sites included Bowstring Lake (2 sites), Bowstring River (1), Little Long Lake (1), Little Turtle Lake (2), and Turtle lake (1). The crew also monitored 10 lakes on the Forest treated in prior years. The monitoring revealed that purple loosestrife is not present at two lakes (Little Jessie, Rush Island). On Turtle Lake most of the infestations are eradicated or reduced to a few re-sprouts from the residual seedbank. At Sand Lake a few plants are still present. Other lakes with larger infestations had significant beetle evidence on plants, a dramatic decline in the infestation, or extensive damage to purple loosestrife. On Smith Lake the infestations remain steady, but in areas of past treatment the purple loosestrife is reduced. On the Little Turtle Lake, there is a steady population of beetles on the purple loosestrife in the SW corner of the lake, and the crew will return to re-evaluate the sites later.

Siberian peashrub --The DRM crew conducted follow-up treatment of Siberian peashrub (*Caragana aborescens*) at 3 sites on tribal and NFS lands for about 6 acres. Effectiveness of cutting is poor to moderate but over time the seed production is being reduced and the resulting seedbank. Multiple cuttings may reduce or eliminate some of the shrubs.

Wild parsnip--The DRM crew mowed about 61 acres of wild parsnip (*Pastinaca sativa*) on tribal lands within the Forest. Some of these infestations also contain common tansy (*Tanacetum vulgare*), a low risk species, which received the same treatment.

Spotted knapweed--The DRM crew also treated about 3 acres of spotted knapweed in an area by Bena through a combination of hand pulling, burning, and seeding with native grasses.

Forest staff treated about 170 acres of roadside spotted knapweed by releasing seedhead weevils on 34 sites across the Forest. Efficacy treatment monitoring at each release site determined the weevils were poor in control (6-25%) based on decreasing the size of the infestations. However, the releasing of weevils is effective at keeping the relative sizes of the spotted knapweed infestations stable. Sites do not appear to be increasing in size.

Flowering rush--The crew hand-pulled flowering rush (*Butomus umbellatus*), a new invader on Spider Lake. Monitoring in 2015 did not find any more plants.

NNIS Plant Surveys

In 2015, the plant survey crews located 54 new NNIS infestations across the Forest. Among these were new detections of high ecological risk species. Surveys identified two sites of common buckthorn (*Rhamnus buckthorn*) and one site of Bell's bush honeysuckle (*Lonicera X bella*).

Plant surveyors found many new detections of medium risk species such as spotted knapweed (*Centaurea stoebe spp. micranthos*) (12 sites), orange hawkweed (*Hieracium aurantiacum*) (3), wild parsnip (*Pastinaca sativa*) (6), and meadow hawkweed (*Hieracium caespitosum*) (2). Low risk species found include Canada thistle (*Cirsium arvense*) (4) and common tansy (*Tanacetum vulgare*) (22). Surveyors found one site of celandine (*Chelidonium majus*), which is the only known occurrence of this invasive plant on the Forest. They also found one site of bird's foot trefoil (*Lotus corniculatus*) which is a Watch List invasive plant species for the Forest. There are likely numerous locations along US 2 and other major roads that have yet to be surveyed.

Implications

- Hand and mechanical treatments of NNIS plants appear to be highly effective. Some species, such as garlic mustard, that have a large existing seedbank will continue to emerge from this seed source in subsequent years and require future treatment.
- Bio-control releases on spotted knapweed were not very successful. Weevils generally keep infestations stable rather than decreasing the populations.
- Releases of beetles for control of purple loosestrife are much more effective. In some smaller infestations, they are reducing the size of loosestrife populations or dramatically decreasing the density of plants.
- New NNIS plant sites mainly consist of low and medium ecological risk species.

Recommendations

- Continue efforts to conduct invasive control on those NNIS plants that represent a high ecological risk to natural communities.
    - Garlic mustard treatment in the Stony Point Campground area is an emphasis and includes plans to treat some spots with herbicide.
    - For common buckthorn infestations, continue cut stump/herbicide treatment in the Pomroy area, and begin herbicide use at other infestations where feasible and appropriate.
    - For Bell's bush honeysuckle, relocate earlier infestations and find new sites, especially small isolated populations to treat.
- Continue efforts to control medium/high risk species such as purple loosestrife and Siberian peashrub. Past treatment involved releasing beetles for control of purple loosestrife and cutting of Siberian peashrub. Future control of these infestations may include applying herbicides where allowable and feasible.
- Continue treatments of medium risk species on the Forest such as releasing weevils for bio-control of spotted knapweed at all prior release sites. Look to expand release sites in appropriate areas, and initiate herbicide control in selected gravel pits. Other treatments would continue at prior control sites for wild parsnip. Where low risk species such as common tansy are intermingled with medium risk plants, treatments would include removal of these plants as well.
- Continue NNIS work with and through our partnerships.
    - The LLBO-DRM crew would continue to perform most of the NNIS surveys, treatment work, and some of the monitoring on the Forest.
    - Continue partnership with the Conservation Corps of Minnesota and Iowa for continued treatment work on common buckthorn and garlic mustard, as well as new projects for herbicide treatments of NNIS in gravel pits.

    - Collaborate with the Itasca County Soil and Water Conservation District for control of purple loosestrife.
    - Continue participation and collaboration with the Itasca County Cooperative Invasive Management Area.
    - Continue coordination of NNIS control with the Minnesota Department of Transportation and Beltrami County Noxious Weed Program.
- Continue to monitor at least 50% of the NNIS acreage treated annually.
- Continue to apply the standard equipment-cleaning clause in timber sale contracts during project implementation in those areas of known infestations or newly observed invasive plant populations to mitigate the potential for spreading invasive plants to any uninfested locations. Other prevention measures would include avoiding placement of log landings or major skid trails in areas of known populations of NNIS plants or newly observed infestations.

8. Watershed Health

Key Points

BMPs

- BMPs were generally well-documented, implemented, and effective for the ground-based skidding and harvesting and utility sites.
- Effective implementation of BMPs and Forest Plan standards and guidelines are moving the Forest toward desired conditions and objectives.
- Very few of the BMPs documented for the grazing site were actually implemented. The future of grazing on the CNF should be re-evaluated.
- More detail in the planning documents and operation and maintenance plans may improve implementation and effectiveness of BMPs.

Seasonal Ponds

- Of the digitized seasonal pond points, 73% were accurately identified as seasonal wetlands; 84% were some type of wetland.
- Knowing the locations of seasonal ponds within the Guthrie Till Plain supports both planning and implementation efforts across the area and facilitates adequate protection of seasonal wetlands consistent with Forest Plan standards, guidelines, and BMPs.
- The success of mapping seasonal pond reinforces the need to continue this effort and expand it to other landscapes. The goal is to have a corporate data layer of seasonal ponds across the Forest.

Wetland Restoration

- Restoration of hydrology and wetland vegetation appears to be progressing well at each of the impoundment removal sites. The Forest is moving towards the desired conditions and objectives through effective implementation of relevant best management practices (BMPs) and Forest Plan standards and guidelines (S&Gs). The project met all laws and regulations pertinent to wetland restoration and results are consistent with management expectations.
- Monitoring methodology adequately assessed the changes in hydrology and plant communities after restoration (impoundment removal) and is recommended for similar monitoring projects in the future.
- Continued survival surveys are recommended to adequately assess reforestation efforts.

Dam Removals and Aquatic organism passages

- Hydrologic connectivity and function is being restored; habitat and aquatic organism passage objectives are being met.

Road closures and decommissioning

- The effectiveness of road closures and decommissioning is mixed. Most effective is a combination of berm, slash, and rocks. More sampling is needed to determine the most reliable and effective barriers and closure types.

Monitoring Question

To what extent is Forest Management affecting water quality, quantity, flow timing and the physical features of aquatic riparian, or wetland ecosystems?

The Forest monitored several different aspects in addressing this question.

- Best Management Practices (BMPs)
- Seasonal Ponds, and
- Wetland Restoration projects
- Dam removals
- Road Closures/Decommissioning

A. Best Management Practices

Beginning in 2014, all national forests were required to monitor water quality best management practices (BMPs) annually for activities that occur on National Forest System Lands. The monitoring program was developed to improve accountability and performance in managing water quality consistent with the Federal Clean Water Act (CWA) and State water quality programs (USDA 2012). For the last two years, the Forest has selected projects to evaluate core water quality BMP implementation and effectiveness. In 2015, the Forest was assigned 6 BMP categories associated with grazing, ground-based skidding and harvesting, construction or operation and maintenance of utilities, and campground wells (Table 8-1).

Table 8-1. Location of core National Water Quality BMPs evaluated on the Forest in 2015.

BMP Category	Project Location
Grazing	Allotment – Blackduck District, Cmpt. 4, Stand 2
Ground-based skidding and harvesting	Bigfork Sale PU#13 – Deer River District, Cmpt. 4013, Stand 92
Utilities	Great Lakes Gas pipeline – Moss Lake (T145 R31 S35) and Camp Lake (T145 R31 S36) crossings on FR2137
Campground wells	East Seelye Bay (T147 R27 S22) and Webster Lake (T148 R39 S29) campgrounds

Monitoring Method(s)

Completed projects were selected randomly for all sites except grazing which is the only allotment on the Forest. All projects had some interaction with the Aquatic Management Zone,

an administrative zone adjacent to streams and other waterbodies (USDA 2012). Site location, project description, guidance documents (e.g. Forest Plan, EAs, operating and maintenance plans), photos, and BMP implementation and effectiveness were gathered and input in to a national FS database.

Results

Based on the documentation that was available and observations on the ground, water quality BMPs were generally well-documented and implemented for the ground-based skidding and harvesting and utility sites. Very few of the BMPs documented for the grazing site were actually implemented. There was not enough information available to make an assessment on the campground wells (Table 8-2).

Table 8-2. Monitoring results from core National Water Quality BMPs evaluated on the CNF in 2015.

Core BMP	Implementation	Effectiveness	Composite Score
Grazing	Marginally implemented	Not Effective	Poor
Ground-based skidding and harvesting	Mostly implemented	Effective	Excellent
Utilities	Fully implemented	Effective	Excellent
Campground wells	No documentation	Effective	Good

The BMPs implemented appeared to be effective on all but the grazing site. Decades of cattle grazing in and adjacent to riparian areas within the allotment has led to significant water resource degradation. Portions of a stream flowing through the allotment are barely visible now and natural flow patterns have been altered. Cattle trampling of the streambank and adjacent wetlands had led to soil compaction, erosion and sediment runoff to the stream, and has altered native vegetation within the riparian area. Very little of impacts appear to have occurred during the last 10 years. Fencing around the riparian areas was notably absent during the 2015 summer monitoring, but FS staff managing the allotment indicated that had just occurred earlier in the spring. The permittee planned to reinstall the fence later in the summer.

Implications

- Although the intent of the monitoring is focused on Clean Water Act accountability at a higher level in the FS organization, results also provide the Forest with insight into its forest management practices.
- Aside from the grazing site, the Forest is moving toward the desired conditions and objectives through effective implementation of relevant best management practices (BMPs) and Forest Plan standards and guidelines (S&Gs). Most of the projects were in compliance with the Clean Water Act and consistently met other pertinent laws and regulations regarding water quality. Results were generally consistent with management expectations. Despite the grazing site not fully meeting management

direction and expectations, current practices are helping to minimize water quality impact.

Recommendations

- Although most of the sites evaluated had some level of BMP documentation, the Forest would be well served to add more detail to its planning documents and operation and maintenance plans. The grazing site is a good example of how marginal documentation can lead to poor implementation of BMPs. Without an adequate picture of past management practices, it's difficult to assess the best approach to move from current to desired conditions. Keeping cattle out of the riparian area is a good first step, but there should be some consideration whether range management is a practice that the Forest should continue. Efforts to restore the grazing site could be quite costly and have a significant effect on the livelihood of the permittee. However, to fully meet Forest Plan direction, a management decision will be necessary.

B. Seasonal Ponds

Starting in 2014, staff from the Forest, Northern Research, and Natural Resources Research Institute (NRRI) embarked on a joint venture to map seasonal ponds on the Forest in an effort to assist in location and identification of ponds in the field. Northern Research is interested knowing seasonal pond locations within the Pike Bay Experimental Forest (PBEF) to further their study and understanding how seasonal ponds function within the context of forest ecosystems. The Forest is interested in knowing the location of seasonal ponds to assist in their protection during management activities, particularly harvesting. Seasonal ponds and wetlands are often obscured during the winter because the depressions may be small and quickly fill in with snow. They can be easily overlooked during timber sale layout that occurs during the winter. As a result, it is sometimes difficult to meet the seasonal pond management guideline "*In northern hardwoods forest types, generally maintain a closed canopy (70% or greater where possible) of mature forest vegetation in a minimum 200 foot zone surrounding seasonal ponds.*" (Forest Plan 2004, G-TM-6, p.2-19).

Monitoring Method(s)

One of the methods used to identify seasonal pond locations consists of digitizing the location of seasonal ponds using aerial photography and then inputting points on a corporate GIS layer.

Seasonal pond mapping and assessment was completed for the Guthrie Till Plain (Gtp) Landtype Association (LTA) in 2015. The Gtp, a 114 sq. mi. area north and east of Leech Lake (Figure 8-1), was selected as a starting point for mapping because it fully contains the Pike Bay Experimental Forest and it is also a landscape well-known to have a high density of seasonal ponds (Palik 2003). The predominant forest type in the Guthrie Till Plain is mesic northern hardwood.

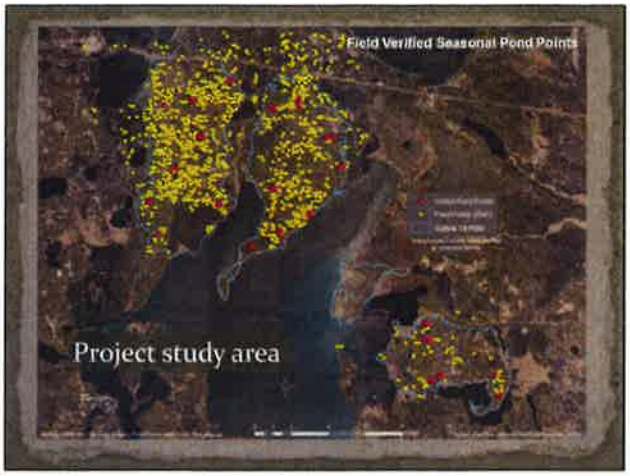


Figure 8-1. Seasonal pond mapping study area on the CNF in 2015 (Toczydlowski 2015).

Research plans to verify the locations of all seasonal ponds within the Pike Bay Experimental Forest by 2016. Should the pond location methodology be reliable, the Forest envisions using it for other Forest landscapes.

Results

The digitized seasonal pond locations from aerial photos were field checked to determine if identification and mapped locations of seasonal ponds correspond with the location of seasonal ponds on the ground. A total of 169 seasonal ponds (10% of the digitized points) were visited in 2015. Of those points, 124 (or 73%) were accurately identified as seasonal ponds, 18 (or 10%) were other wetland types, and 27 (or 17%) were either duplicate points or not a wetland.

Data collected at each seasonal pond included GPS coordinates, physical characteristics of the pond, and vegetation and land use disturbance within a 30-meter area around the pond. The data is stored in a corporate dataset.

Eighteen of the 129 seasonal ponds (or 14%) had visible signs of harvest disturbance. Other signs of disturbance included roads bisecting the pond, rutting, soil exposure, and sedimentation in the pond, but they were notably less frequent (Figure 8-2). On average, 8 of the 18 seasonal ponds with observed harvest disturbance (or 44%) had less than 70% canopy closure. Notably, the dominant forest cover in all 8 sites was mesic northern hardwoods (Toczydlowski 2015). Mesic northern hardwoods is the targeted forest type for retaining 70% canopy closure

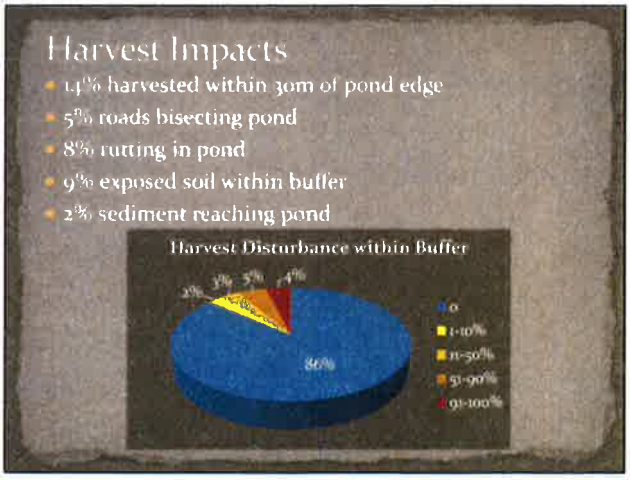


Figure 8-2. Harvest disturbance within 30 meters of seasonal ponds in the Gtp (Toczydlowski 2015).

around seasonal ponds (Forest Plan 2004, G-TM-6, p.2-19). It should be noted that most of the disturbance appeared to have occurred some time ago. Field monitoring of wetlands since implementation of the 2004 Forest Plan has encountered little or no ground disturbance, although inadequate canopy retention in northern hardwood stands around seasonsl ponds has been noted in some instances. Further sampling needs to be done to obtain a better representation of impacts on ponds and wetlands from management activities.

Based on the mapping of seasonal ponds, there are an estimated 1,527 ponds (or 22 ponds/sq.mi.) within the Guthrie Till Plan which is very close to a past estimate in a similar landscape context (Palik 2003).

Another approach to identifying seasonal ponds is a model developed by NRRI to predict seasonal pond locations using ArcGIS tools and other third-party software. The accuracy of the NRRI model within the Pike Bay Experimental Forest has not been confirmed, but early estimates indicate about 90% validation (Olker 2015).

Implications

- The digitized mapping of seasonal ponds was successful. Knowing the locations of seasonal ponds within the Gutherie Till Plain supports both planning and implementation efforts across the area and facilitates adequate protection of seasonal wetlands consistent with Forest Plan standards, guidelines, and BMPs.
- There are a lot of seasonal wetlands on the forest. Percentages of damage to seasonal ponds is low but still occurs and damage may persist for a long time. Future impacts can be avoided.
- Further sampling needs to be done to determine if Forest Plan standards, guidelines, and BMPs are consistently being met and if adequate canopy closure is occurring in northern hardwoods forest types.

Recommendations

- The success of mapping seasonal pond reinforces the need to continue this mapping effort and expand it to other landscapes. The goal is to have a corporate data layer of seasonal ponds across the Forest. Success in identifying the location of seasonal ponds will likely increase with the NRRI seasonal pond mapping model. Pending final results, the model will likely improve mapping efficiency and reduce the amount of time necessary to map the Forest. Plans for 2016 include finishing the mapping of Pike Bay Experiment Forest and begin field validation for another landtype association, the Bemidji Sand Plain.
- The data collection protocol used in 2016, will include beta testing of an I-pad application called ArcCollector. ArcCollector allows for field data entry on an I-pad or

Android-equivalent device, later to be directly uploaded to the corporate database. If successful, it will significantly improve the efficiency of data collection and minimize risk of data loss. It may also allow for multiple government agencies and organizations that have been or will become involved to work with the same dataset and procedure for data collection.

C. Wetland Restoration

Between 2011 and 2014, the Forest removed five wildlife impoundments and restored them to wetlands. This was compensation for wetlands impacted by Ottertail Power transmission line project installed in 2011.

Monitoring Method(s)

Observations were made by Forest staff before and after impoundment removal. During the 2015 growing season, staff re-evaluated wetland soils, hydrology, and vegetation at predefined sites within Bag Lake, Ketchum, and West Banks 1 impoundments. Soil saturation, depth of water, and dominant wetland vegetation data were collected, and wetland plant communities were classified using keys from a Corps of Engineers report (Eggers and Reed 2011). Geo-referenced photographs were taken at each site as well as seed and seedling survival, presence of noxious or invasive plant species, and wildlife use. Results from the monitoring were compared to conditions prior to the impoundment removals to determine change over time.

Results

The removal of five impoundments restored natural water levels and flow and reconnected aquatic and riparian habitat for a range of plant and animal species. Hydrologic restoration and hand seeding and planting of native, lowland conifer species led to a successful restoration of the functions and values in over 100 acres of wetlands.

Signs of restored hydrology which are indicative of natural hydrologic patterns prior to impoundment construction were found near Bag Lake, Ketchum, and West Banks 1 impoundments. Intermittent and perennial channels extended across the entirety of Bag Lake and Ketchum impoundments. Ephemeral drainage and groundwater upwelling were found in portions of West Banks 1 Impoundment.

The vegetative response following impoundment removal was rapid. Plant communities were quite dense and diverse, shifting from deeper to shallower water habitats as the water levels returned to more natural levels (Figure 8-3). Invasive plant species were found in each impoundment, but excluding cattail which was in decline, none were present in abundance or distribution to give cause for concern.

Figure 8-3. Example of vegetation change, over time, after removal of Bag Lake Impoundment. The photo on the left is a deep marsh before removal, and the photo on the right shows the same site shifting to a sedge meadow, one growing season after removal (photos collected by David Morley in the summer of 2015).

Overall, restoration of wetland vegetation and hydrology appears to be progressing well at each impoundment. The expectation is that each basin will become more diverse in native plant species over time as hydrologic conditions further stabilize. Hand seeding and planting efforts will require longer-term survival surveys to adequately assess reforestation success, but initial observations indicate trends are moving in the right direction (Morley 2015).

Implications

- The Forest is moving towards the desired conditions and objectives through effective implementation of relevant best management practices (BMPs) and Forest Plan standards and guidelines (S&Gs). The project met all laws and regulations pertinent to wetland restoration and results are consistent with management expectations.
- The monitoring protocol developed to assess change in wetland hydrology and vegetation following impoundment removal was effective. This was successfully done by establishing baseline conditions prior to impoundment removal to which conditions after removal could be compared. The Eggers and Reed 2011 reference, a guide commonly used by the COE for wetland plant community assessment, was useful for plant identification and rapid community assessment.
- Hydrology has a strong influence on wetland vegetation, so noting the changes in geomorphic features was also helpful in determining project success.

Recommendations

- The monitoring protocol developed and used is recommended for monitoring similar projects in the future.

- Longer-term survival surveys are necessary to assess reforestation success. In the future, a well-defined reforestation implementation and monitoring plan should be part of monitoring efforts.

More detailed information on best management practices, seasonal ponds, and wetland restoration is available in the project file.

D. Dam Removals

Two Forest Service dams were removed in 2015. Reasons for removal include poor functional stability, water quality concerns, aquatic organism passage (AOP) problems and safety issues. The restoration of these sites was also driven by the Forest Plan watershed direction and aligns with many Forest Plan desired conditions, objectives, and goals.

Portage Creek Dam

The Portage Creek Dam was removed in September 2015 and replaced with a rock arch rapids and a 40 foot modular bridge. The removal of the dam restored hydrologic connectivity in Portage Creek between Leech and Portage Lakes. Warm water fish species such as walleye, largemouth bass, northern pike and white suckers all use the passage way during spawning activities in the spring.

Figure 8-4. Portage Creek Dam

Figure 8-5. Portage Creek Rock Rapids and Bridge

Knutson Dam

The Knutson Dam Replacement Project was began in early fall of 2015 and was completed during the winter of 2015-2016. This project removed the Knutson Dam located on the main stem of the Mississippi River and replaced it with a rock arch rapids. The removal of the dam restored the hydrologic function and connectivity on the Mississippi River and the Cass Lake Chain of Lakes. Aquatic organism passage was restored on over thirty-five miles of the

Mississippi River tributaries and over ninety thousand acres of lake habitat in Cass Lake and Lake Winnibigishosh.

Figure 8-6. Knutson Dam

Figure 8-7. Knutson Rock Arch Rapids

Past Aquatic Organism Passage (AOP) Improvement Sites

Aquatic monitoring during the spring of 2015 was conducted at the Pigeon River and Six Mile project sites. The Six Mile Lake outlet dam was removed in 2012. The Pigeon Impoundment was removed in 2010. Both structures were replaced with rock arch rapids. Visual surveys at each of the sites document continued fish migration activity. Numerous warm water species including northern pike, white suckers, walleye and various species of shiners were seen migrating through the areas. The results, along with prior year's results, indicate that habitat and AOP objectives are being met at this site.

E. Road Closures/Decommissioning

In the summer of 2015, Chippewa personnel monitored 94 road closure sites across the Forest to assess the effectiveness of the closure method. Closure sites were randomly selected. Approximately two thirds of these sites were designated as having been closed within the last five years while the remaining were designated eagle closures.

Table 8-3 Effectiveness of barrier and active closure type.

Barrier Type	Number monitored	Number Effective	%
Natural/No Barrier	41	23	56%
Gate/Posts	25	15	60%
Any single or combination of Berm/slash or rock	28	25	89%
Total:	**94**	**63**	**67%**

Active Closure Type	Number Monitored	Number Effective	%
Rock	6	6	100%
Berm	9	6	67%
Posts	1	0	0%
Berm/Slash	3	3	100%
Slash	3	3	100%
Berm/Rocks	7	7	100%
Total:	**29**	**25**	**86%**

Results

There were mixed results in our findings. Many sites were inadequately closed, had no evidence of closure attempt, or had the gates open. The active closures had performed better than expected when compared to previous monitoring efforts. Ineffective sites were berm only sites (3) and a post barrier. Combinations of berm, slash and rock had an observed 100% effective rate, although more sampling is required to provide a more accurate rate. The Forest has begun prescribing site specific closure designs based on site needs that should lead to a high success while being cost effective.

Figure 8-8. Ineffective closure method

Recommendations

- Continue to assess the effectiveness of the various closure methods implemented on the Forest. This monitoring will help determine the most effective closure methods for future road closure activities and improve forest road management on the Forest.

References Cited

Best Management Practices

Forest Plan. 2004. *Chippewa National Forest, Land and Resource Management Plan*. Ch. 2, 4. U.S. Forest Service, Chippewa National Forest. Cass Lake, MN.

FSM (Forest Service Manual). 2004. *Watershed and Air Management, Watershed Protection and Management*. Ch. 2520. U.S. Forest Service, National Headquarters. Washington, DC.

USDA. 2012. *National Best Management Practices for Water Quality Management on National Forest System Lands*. FS-990a. U.S. Dept. of Ag., Forest Service. Washington, DC.

Seasonal Ponds

Forest Plan. 2004. *Chippewa National Forest, Land and Resource Management Plan*. Ch. 2, 4. U.S. Forest Service, Chippewa National Forest. Cass Lake, MN.

FSM (Forest Service Manual). 2004. *Watershed and Air Management, Watershed Protection and Management*. Ch. 2520. U.S. Forest Service, National Headquarters. Washington, DC.

Olker, Jennifer. 2015. Personal communication. Natural Resources Research Institute, University of Minnesota Duluth. Duluth, MN.

Palik, Brian, Richard Buech, and Leanne Egeland. 2003. *Using an Ecological Land Hierarchy to Predict Seasonal-Wetland Abundance in Upland Forests*. U.S. Forest Service, North Central Research Station. Grand Rapids, MN.

Toczydlowski, Alan. 2015. *Seasonal Wetland Mapping*. MS PowerPoint presentation. U.S. Forest Service, Chippewa National Forest. Walker, MN.

Klinkhammer, Sharon (Ed.). 2014. *Monitoring and Evaluation Report, FY 2011-2013*. U.S. Forest Service, Chippewa National Forest. Cass Lake, MN. Chapter 7.

Wetland Restoration

Eggers, Steve D. and Donald M. Reed. 2011. *Wetland Plants and Plant Communities of Minnesota and Wisconsin*. U.S. Army Corps of Engineers. St. Paul, MN.

Forest Plan. 2004. *Chippewa National Forest, Land and Resource Management Plan*. Ch. 2, 4. U.S. Forest Service, Chippewa National Forest. Cass Lake, MN.

FSM (Forest Service Manual). 2004. *Watershed and Air Management, Watershed Protection and Management*. Ch. 2520. U.S. Forest Service, National Headquarters. Washington, DC.

Morley, David A. 2015. *Wetland Mitigation Monitoring, Bemidji to Grand Rapids Transmission Line Project*. U.S. Forest Service, Chippewa National Forest. Walker, MN.

Rutten, Luke. 2011. *Bemidji to Grand Rapids Transmission Line Project Mitigation Plan for Corps' Section 404 Permit, USEPA Section 401 Certification within the Leech Lake Reservation, and MNPCA Section 401 Certification outside the Leech Lake Reservation*. U.S. Forest Service, Chippewa National Forest. Cass Lake, MN.

9. Soils

The physical, chemical and biological characteristics of a soil determine how it performs its biologic, hydrologic and other ecological functions. Assessment of the soil properties contributes to an understanding of how soil productivity is affected by management activities.

Key points

- In the *pre-harvest* stands, there was little evidence of disturbance. The *post-harvest* stands had an average of 57% in Class 0 disturbance (no evidence of disturbance) and 10% in Class 3 Disturbance (highly disturbed after harvest). There were no indicators that any of the sites had detrimental soil effects.
- Forest Plan standards and guidelines, and best management practices (BMPs) are being met.
- Further monitoring of pre-harvest and post-harvest stands needs to occur to develop representative data sets.

Monitoring Question

Are the effects of Forest management, including prescriptions, resulting in significant changes to productivity of the land?

Background

A national protocol, the Forest Soil Disturbance Monitoring Protocol (FSDMP) (Gen. Tech. Report WO-82b, September 2009), was used for monitoring. This protocol is designed to quickly assess changes to some soil properties by evaluating:

- Forest floor depth
- Forest floor impacted
- Live plant
- Fine Woody (< 7cm)
- Coarse Woody (> 7cm)
- Bare Soil
- Rock
- Topsoil displacement
- Erosion
- Rutting (< 5cm, 5-10cm, > 10cm)
- Burning (light, moderate, severe)
- Compaction (0-10 cm, 10-30cm, 10-30cm)
- Platy/Massive/Puddled structure (0-10cm, 10-30cm, or > 30cm)

Since the Forest does not have a strong history of completing soil monitoring, during 2015, the goal was to begin sampling pre and post-harvest sites so that we can develop a forest dataset that allows the prediction of impacts in the future.

The monitoring protocol requires a minimum of 30 points per sampling unit. However, the form calculates the final number of points needed per site based on the variability of the

collected data and the confidence interval and interval width established prior to sampling (Page-Dumroese et. al 2009b). Each monitoring point was assigned a disturbance class based on the greatest degree of disturbance in any parameter ranging from Class 0 (no evidence of disturbance) to Class 3 (severe disturbance). Although areas classified as Class 3 are obviously the most disturbed, they may or may not be detrimentally disturbed for some ecological systems. The evaluator used professional judgment to decide if each sampling location had been detrimentally impacted.

Additional details on the methodology, sampling design, and results are explained in the soils report in the project file.

Results

During the 2015 field season, the Monitoring and Inventory Survey Team (MIST) evaluated 16 sites consisting of post-harvest monitoring on 11 stands and pre-harvest monitoring on 5 stands.

Pre-Harvest Monitoring Results

Five pre-harvest stands were evaluated. Use of this data is to help understand baseline conditions both for the Forest overall and specifically for these stands before harvesting. We plan to resample these stands after the scheduled harvest is complete to determine specifically the impacts to soil from the harvest activities and other site treatments.

Table 9-1: Summary for the Five Pre-Harvest Stands Monitored

	Proportion Class 0	Proportion Class 1	Proportion Class 2	Proportion Class 3	Detrimental Proportion
Average	0.94	0.00	0.05	0.01	0.00

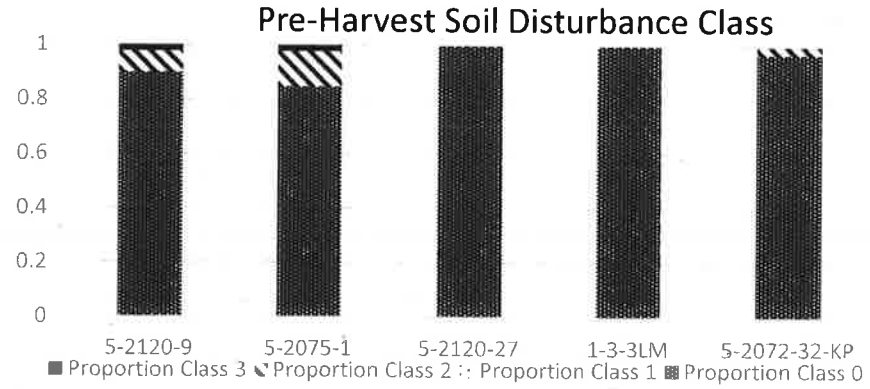


Figure 9-1. Distribution of Disturbance Class for the Pre-Harvest Stands Monitored

Note that pre-harvest soil disturbance is low, but not actually zero as some disturbance was noted. This could be the result of previous harvest operations, site preparation, or natural events (windthrow, etc.).

Post-Harvest Monitoring Results

In order to assess overall condition of soil disturbance monitoring, all of the post-harvest sites were combined. Summary statistics are shown in Table 9-2 below.

Table 9-2: Summary Statistics for the 11 Post-Harvest Stands Monitored

Summary Statistic	Portion Class 0	Portion Class 1	Portion Class 2	Portion Class 3
Average	0.57	0.15	0.19	0.10
Min	0.03	0.07	0.04	0.01
Max	0.76	0.27	0.38	0.32
Standard Deviation	0.20	0.07	0.11	0.09
95% Confidence Interval Range	0.44 to 0.69	0.11 to 0.19	0.12 to 0.25	0.04 to 0.15

The post-harvest stands had an average of 57% in Class 0 disturbance (no evidence of disturbance) and 10% in Class 3 Disturbance (highly disturbed after harvest).

Additional information regarding stand history needs to be evaluated to see what factors were involved in the amount of disturbance for each of these stands. A cursory review of the stand treatment history information found that two of the stands (District 3, Compartment 149 Stand 23 and District 1, Compartment 2032, Stand 7) had undergone site preparation treatments in 2014. Therefore it may not be appropriate to lump these stands in with the stands that has of the sampling period were only been harvested without other site preparation.

Minor rutting and topsoil displacement appear to be the most commonly noted disturbances in the field. There were no indicators that any of the sites had detrimental soil disturbance.

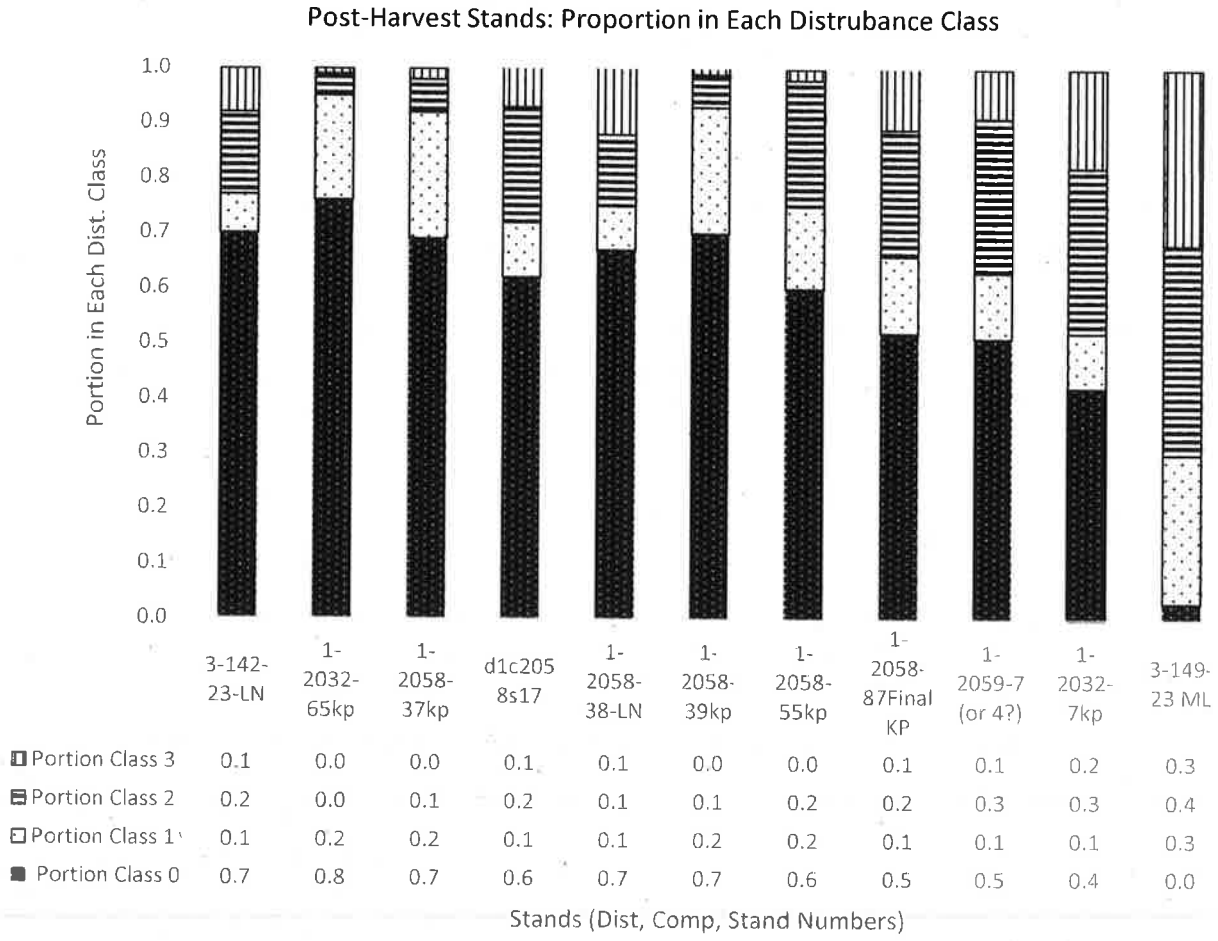


Figure 9-2. Distribution of disturbance class by stands monitored

Figure 9-3 shows a visual representation of the average disturbance class. As expected, there is generally lower percentages of the harvested stands in the higher disturbance classes. Further, note from the standard deviation bars that there is more variation at the lower levels of disturbance.

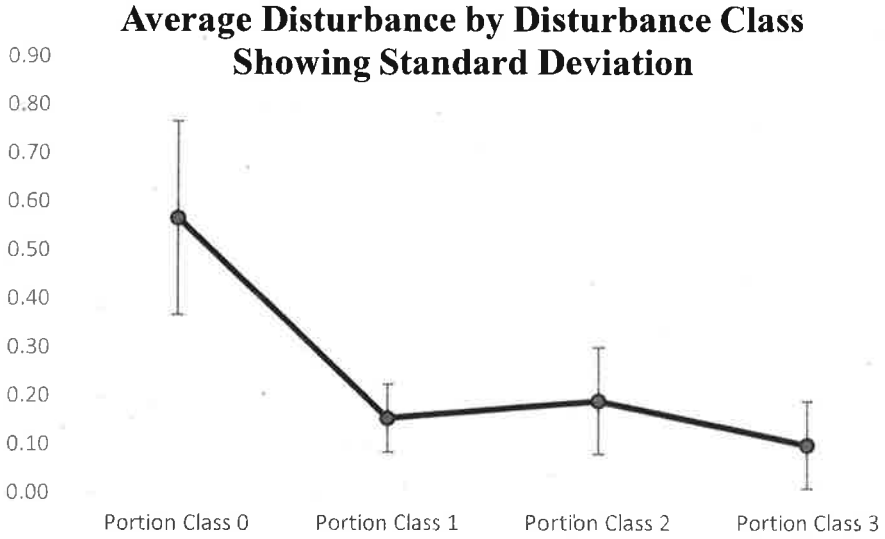


Figure 9-3: Average percent in each disturbance class at the post-harvest stands

Implications

- This was the first year that pre-harvest and post-harvest monitoring occurred. There were 5 pre-harvest stands and 11 post-harvest stands monitored. Because of the small sample size, we need to be careful about extrapolating this data. Further monitoring needs to occur to develop a representative data set.
- Forest Plan standards and guidelines, and best management practices (BMPs) are generally being met.
- Since the stands selected for pre-harvest monitoring are scheduled for another entry, our soils may not be recovering between entries. However, from the limited data available we cannot determine if this is an isolated issue or broader in scope.
- This was the Forest's first effort of soil disturbance monitoring by the MIST group. Continued experience with monitoring methodology and pre-field work components should increase efficiencies and accomplishments.
- Additional data collected was not analyzed at this time. This would include further descriptions of what parameters are being impacted, if soil or season of operation is a factor in disturbance, and how management could be altered to ensure soil productivity.

Recommendations

- Further monitoring needs to occur to develop a representative data set of soil disturbance in pre-harvest and post-harvest stands.
- Although the general level of soil disturbance is low, several of the pre-harvest treatments had some soil disturbance. Further evaluation should be done to ensure that soil disturbance is not affecting the long-term viability of these systems.

References

Page-Dumroese, Deborah, Ann Abbott, Tom Rice. 2009. Forest Soil Disturbance Monitoring Protocol, Volume I: Rapid Assessment. United States Department of Agriculture, Forest Service. General Technical Report WO-82a.

Page-Dumroese, Deborah, Ann Abbott, Tom Rice. 2009b. Forest Soil Disturbance Monitoring Protocol, Volume II: Supplementary Methods, Statistics, and Data Collection. United States Department of Agriculture, Forest Service. General Technical Report WO-82b.

USDA Forest Service, Eastern Region. 2005. FSH 2509.18 Soil Management, Chapter 2 Soil Quality Monitoring. R9RO 2509.18-2005-1. February 23, 2005.

10. Temporary Openings

The Forest Plan has an objective of increasing the average size of temporary openings (O-VG-24). Prior to the 2004 Forest Plan, management direction generally limited temporary opening size to 40 acres or less which created a landscape of fragmented habitat and small openings. The 2004 Forest Plan direction supports a shift in management necessary to increase temporary opening sizes.

Key Points

- Opportunities to create larger temporary openings over 300 acres in size through management activities need to be explored if Forest Plan expectations for larger openings are to be met at the end of decade 2 or beyond.

Monitoring Question

To what extent is Forest management, natural disturbances, and subsequent recovery restoring vegetation spatial landscape patterns and moving conditions toward both short-term (1-15 years) and long-term (100 years) objectives at Landscape Ecosystem, Management Area, and other appropriate scales?

Background

Temporary openings represent early successional stages of forested communities. They are defined as areas of grass/forbs and shrubs usually resulting from timber harvest that will be replaced by tree saplings over a period of a few years (FP, Glossary – 28). Openings most often are a result of even-aged regeneration harvests (clearcut, seed tree and some shelterwoods) that reduce the overstory stocking to a point where the age of the stand is set to "0" following harvest. Temporary openings are no longer considered open then the trees reach 10 feet (FP, Pg. 2-19).

The Forest Plan FEIS included an analysis on the size and amount of large, young forest patches. In doing so, it looked at forest spatial patterns that were large (> 300 acres), young (0-9 years) forest patches (FEIS, P 3.2-51). Large patches are combinations of contiguous forest stands 300 acres or larger. (FEIS, p. 3.2-55).

The Forest Plan allows the Forest to create openings up to but not to exceed 1000 acres. Larger temporary openings are appropriate because fire disturbance on drier site LEs (Dry Pine, Dry Mesic Pine, Dry Mesic Pine/Oak) included stand replacement fires that created patches 10-100s of acres in size. Thoughtful management (e.g. clustering of harvests) can begin to establish larger patches for the future and help to reestablish spatial patterns and wildlife habitats once

more common. The Forest Plan includes objectives to increase the average size of forest openings to reduce the amount of edge and increase the amount of interior forest O-VG-24, pg. 2-24).

The average size of harvest on the Forest at the time of revision was 18 acres (FEIS, 3.2-55). A recent analysis (for LANDISS II) showed the average stand size in 2015 as 21 acres.

Results

A query of stands in the 0-9 age class identified temporary openings. This reflects what is currently on the landscape today (2015) and what is expected in 5 years (2021). The latter assumes that all the stands currently with decisions to be harvested will be done in 5 years. The numbers also include severely damaged stands from the July 2012 windstorm that were not harvested but where more than 60% of the stand was damaged. For these stands the age was set to "0".

Based on stand size, upland patch sizes were evaluated using the following categories: 1- 40 acres, 41-100 acres, 101-300, 301-500 acres, and greater than 500 acres.

Table 10- 1. Summary of temporary openings on National Forest lands on the Chippewa NF.

	Number of Temporary Openings by size category						
Year	< or = 40	41 - 100	101 - 300	301-500	>500	Total Number	Largest patch (ac)
2004	1,123	141	22	3	1	1289	756
2011	650	88	13	0	0	751	250
2016	668	116	11	2	2	799	676
2021	1006	140	10	1	2	1159	676

The numbers in the above table provide a look at the changes since 2004 when the existing Forest Plan went into effect. According to the FEIS, Mod Alt E (FSP-3, p. 3.2-65), the Forest Plan projected 3 patches of 0-9 greater than 300 acres for a total of 1200 acres in Decade 2 and thereafter. Although Forest Plan direction is to increase the overall stand size, there were no projections for openings less than 300 acres.

In 2004, there were 1,289 temporary openings on the Forest landscape primarily from harvests during 1996-2004. There were 4 openings greater than 300 acres; the largest of these was 756 acres. There were a total of 33,612 acres in temporary openings.

In 2011, prior to the 2012 wind event, there were 751 temporary openings totaling 17,800 acres from harvests during 2002-2011. There were no openings larger than 300 acres. The largest opening was 250 acres. There are fewer openings, about a 40% reduction, in every size

class when compared to 2004. The total number of acres of temporary openings acres on Forest decreased to 17,800 acres.

Reflected in the numbers for 2016 are the effects of a 2012, July wind storm that extensively damaged stands through the central portion of the Forest. Salvage harvests on about 10,000 acres followed shortly thereafter. The combination of the storm and harvest activity created four openings from 301 – 676 acres which will persist until about 2025 or when they grow into the next age or size class. Three of these openings occur just east of Pike Bay; the 4th is east of Lake Winnibigoshish. There was a jump in the number of 41-100 acre openings. Numbers for openings less than 40 acres and 101-300 acres did not change much. Total acres in openings is approximately 21,000.

The numbers for 2021 reflect the openings that will be created as stands under decision are harvested. It is assumed that they will be harvested in five years or by 2021. Management activities result in increased numbers in both the less than 40 and the 40-100 acre openings. Number of openings greater than 100 acres decrease slightly. The three openings larger than 300 acres range from 434-676 acres. Overall there is an increase in the total acres of openings to almost 27,000 acres.

Both 2011 and 2016 meet the projected Forest Plan outcomes of 3 patches of 0-9 greater than 300 acres for a total of 1200 acres in Decade 2. There are 3 and 4 patches and a total of 1966 and 1670 acres for 2011 and 2016, respectively. These patches are in the central part of the Forest and coincide with the 2012 storm corridor.

Implications

- There is a question as to whether or not it is appropriate to create larger temporary openings given the number of openings created by the 2012 wind event. By 2025 existing openings will have grown into the next age and size class and no longer qualify as large temporary openings.

- One of the most ecologically suitable areas to create larger patches is in the Lydick area just north of Hwy 2 in the western portion of the Forest. This area was dominated by mature jack pine the majority of which was harvested in the 1990's. Given the few pockets left of mature jack pine, there are virtually no opportunities to create larger patches in this area.

- Opportunities to consolidate or create larger sized openings are limited because stands on today's landscape are smaller (due to 40 acre limitation in the 1986 Plan) and

represent a range of age classes. To create larger openings may entail even-aged regeneration harvests in adjacent young or immature stands. Because of past investments in these stands, there is hesitancy to regenerate stands before they mature.

- To create larger temporary openings through harvest requires planning teams to think ahead several years to identify opportunities so that stand inventories and TES surveys are conducted by the time the NEPA process begins. Because of the lag between planning and implementation, it may take 10 years or more for temporary openings to actually appear on the landscape.

Recommendations

- Opportunities to create larger temporary openings over 300 acres in size through management activities need to be explored if Forest Plan expectations for larger openings are to be met at the end of decade 2 or beyond.

11. Unit Monitoring

Key Points

- Monitoring of **harvest units** indicated that treatments planned were appropriate, realistic, and implementable. Objectives, standards and guidelines and mitigation measures for soils, wildlife, and vegetation were met.
- **Wetlands/Seasonal Ponds** monitoring shows that overall the Forest is doing well in avoiding impacts. There have been some impacts to wetlands during harvest, but the percentage is low and the types of impacts are avoidable.
- For **Patches,** Wildlife biologists are working on identifying/defining components of quality patches.
- With **roads and trails,** clear direction and better communication is needed on the process the Forest will use for addressing transportation needs, recording roads and trails in appropriate databases or on GIS maps, their intended use, and effectiveness of closures or decommissioning.
- **Stewardship contracts** are effective in accomplishing a variety of service work projects such as hydro-axing, fuels reduction along roads, and tree spading of larger trees. Road resurfacing, and asphalt removal worked well and was beneficial for Forest and for purchaser. For future Stewardship contracts, allow more time for coordination with resource areas and identification of other service projects.

Monitoring Question

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

Monitoring Methods

Employees from across the forest spent a day in the field looking at and discussing recent management actions associated with wetlands/seasonal ponds, patches, road decommissioning and closures, service activities in a stewardship contract, and harvest activities in one unit.

The harvest unit monitored was damaged in a 2012 wind storm. A selection harvest was completed in April 2015. Mechanical site preparation, planting and release is planned. Only designated trees were to be harvested. The road to access this unit was already in place and re-opened to harvest this unit and other adjacent units.

Vegetation, wildlife, soils, fire/fuels treatments were reviewed to determine consistency with direction as planned in the Environmental Assessment (EA), implementation of Forest Plan standards and guidelines, mitigation measures, and effectiveness. Additional details are available in the project file.

Results

Harvest Unit monitoring:

- **Soils** --Landing locations and size were acceptable. Skid trails may have been close to or slightly over to the 15% threshold due to the small stand size. Slash was retained on skid trails. Adequate amount of slash, tops and limbs were retained and well-distributed, although some of this will later be piled during mechanical site preparation. An adequate amount of ground cover was maintained. Harvest operations occurred during dry soil conditions.
- **Silviculture and Vegetation** – Prescription called for harvest of damaged merchantable trees and then removing suppressed and intermediate trees. In areas with basal area over 90 sq. ft. per acre, basal area was to be reduced. The prescription was consistent with planned treatments in the Blowdown Restoration EA. Marking guides were followed. Several large white pine remained in the unit. Scattered residuals met objectives for basal area, tree species, and desired future condition and were achievable.
- **Wildlife** – No legacy patches were needed due to the small size of the unit. Green tree residuals were mostly undamaged super canopy white pine and red pine along with subcanopy hardwoods. A high number of snags of different classes were left. Even though snags are especially difficult to leave in small units due to operations, the sale administrator did a good job of working with the purchaser to leave snags.
- **Wetlands** – There were no wetlands within or adjacent to the unit.
- **Fire/Fuels** – No concerns noted. Unit will have mechanical site preparation which will redistribute concentrations of fuels.

Wetlands/Seasonal Ponds:

- Monitoring shows that overall the Forest is doing well in avoiding impacts to wetlands and ponds. Although some impacts to wetlands during harvest have occurred, the percentage is low and types of impacts are avoidable. (Refer to Section 8, Seasonal Ponds, for more details).

- LiDAR promises to be an effective tool to identify wetlands and ponds that could be used during planning and implementation.

Patches:

- Wildlife biologists are working on identifying/defining components of quality patches.
- Different prescriptions to increase stand complexity will be tried in the future. These prescriptions will likely increase the cost of marking stands.

Roads

- There is a wide range of perspectives and understanding on road management across the resource disciplines and by employees.
- Clear direction and better communication is needed on the process the Forest will use for addressing transportation needs, recording roads and trails in appropriate databases or on GIS maps, their intended use, and effectiveness of closures or decommissioning.
- Purchaser credits for road maintenance, closure, or decommissioning is a tool the Forest is currently not using that could potentially help accomplish some roads work.

Stewardship Contracts

- Service work for road resurfacing, and asphalt removal worked well and was effective. It was beneficial for Forest and for purchaser.
- Other service projects in the contract also were effective and met objectives. Activities included hydro-axing, fuels reduction along several roads, and tree spading of larger trees at entrance of Norway Beach recreation area.
- In the future, allow more time for coordination with resource areas and identification of other service projects.

12. Costs and Agreements

This section looks at trends in budget allocation and presents information on agreements and partnerships.

Key Points

- Grants and agreements make an important contribution to provide work opportunities and to achieve resource accomplishments.
- Joint Chiefs Upper Mississippi Headwaters Restoration Project has increased collaboration and partnerships across all ownerships and resulted in the accomplishment of several successful projects. Projects include non-native invasive weed control, seeding of native grasses, hazardous fuels reduction, site preparation for tree seedling planting, creation of early successional habitat for birds, aquatic organism passage restoration.

Monitoring Question

How close are projected costs with actual costs?

Results

Annual Budget allocations

The budget allocations have remained relatively stable in recent years. There is roughly a $515,000 difference between the low in 2012 and the high in 2014.

Table 12-1. Budget allocations for the Chippewa National Forest for FY 2011 through FY 2015.

Fiscal Year	Total Budget
2011	$ 13,150,337
2012	$ 12,840,897
2013	$ 13,078,914
2014	$ 13,355,300
2015	$ 13,302,865

Not reflected in total budget numbers are the annual fluctuations in program areas, often times fairly substantial depending on National and Regional emphasis areas. The dollars received do not necessarily align with the identified workload and have posed challenges. Note that the dollar figures in the above table have not been adjusted for inflation. Further, the Forest Plan does not project annual budgets that can be used as a comparative basis.

2005-2015 Grants and Agreements

Forest collaboration with external partners has been on the rise since 2005. The Grants & Agreements program on the Forest has seen an increase in the number of new partnership agreements in recent years. The table below represents the number of new agreements issued between 2005 and 2015 as well as the number of modifications to existing agreements during that time period.

Table 12-2. Number of agreements from 2005-2015.

Year	Number of New Agreements	Number of Modifications to Existing Agreements	Total Value of Agreements
2005	19	11	$331,148
2006	32	11	$611,830
2007	37	20	$663,887
2008	37	23	$549,769
2009	51	44	$3,254,482*
2010	34	43	$2,926,967*
2011	38	45	$2,249,482
2012	36	42	$2,551,755
2013	38	39	$1,904,806
2014	40	56	$2,493,773
2015	36	42	$1,830,881

*includes ARRA

Since 2005, the Forest has seen an increase in the number of partnerships with the Leech Lake Band of Ojibwe that benefit natural resource management on lands within the Forest and the Leech Lake Reservation. New agreements in 2015 involved the following projects: heritage resource surveys, sweetgrass propagation and a new Master Road Agreement. Additional funding was added to prior year agreements to continue partnership opportunities for non-native invasive species management, fruiting shrub enhancement and tree planting.

The July 2, 2012 windstorm impacted the Forest in numerous ways. One aspect of the blowdown has been the need to reforest the areas affected by the windstorm. The Forest received funding in 2015 from the National Arbor Day Foundation and the National Forest Foundation to help purchase seedlings for reforestation efforts.

In 2015, the Forest received funding from the Minnesota Department of Natural Resources, USDI, US Fish & Wildlife Service and the Leech Lake Band of Ojibwe to help implement the Knutson Dam Modernization project.

The Forest is fortunate to be able to provide internship and job training opportunities to students attending local colleges and universities. In 2015, we renewed our partnership agreement with Itasca Community College to serve as a host location for their internship program; this provides students participating in the Wildland Firefighting Program with 135 hours of job training as part of their internship. Other partnership agreements that provided job training opportunities in 2015 were agreements with The Student Conservation Association, the Leech Lake Tribal College, Conservation Corps Minnesota and Iowa, and a new agreement with the Geological Society of America – GeoCorps America Program.

Also in 2015, the Forest entered into a new partnership agreement with the Edge of the Wilderness Discovery Center, a local non-profit organization, to provide services as the Forest's Interpretive Association. The Interpretive Association operates the bookstores at the Supervisor's Office, Ranger Districts and the Visitor Information Centers located on the Forest. Using the new Expanded Partnership Authority for the Cooperative Funds and Deposits Act Authority, we were able to enter into this partnership agreement with the non-profit organization to provide expanded services to our public.

Joint Chiefs: Upper Mississippi Headwaters Restoration Project

In 2014, the Chippewa National Forest and Minnesota NRCS were awarded one of 13 Joint Chiefs Awards across the nation. The goal of this restoration project is to improve the health and resiliency of forest ecosystems across a large landscape regardless of ownership. This project is designed to build on existing projects with local partnerships within the headwaters of the Mississippi River.

The Mississippi Headwaters area includes the Chippewa National Forest, tribal and trust lands of the Leech Lake Band of Ojibwe (LLBO), and is interspersed with private, county, and state forest landowners.

2015 Accomplishments

The second year of this three-year project resulted in many successful undertakings.

Table 12-3. 2015 accomplishments on the Forest.

Activity Type	2015
Seedlings for Reforestation (number)	111,000
Site Preparation for Reforestation	507 ac
Non-native Invasive Species (NNIS) Control	72 ac
Fuel Treatments (Mastication, & pile and burn fuels)	281 ac
Aquatic Organism Passage (Knutson Dam) restored	60 miles

- One of the many success stories is the creation and funding of a Leech Lake Band of the Ojibwe (LLBO) "weed crew" to conduct inventories of new NNIS infestations, confirm older documented locations, and begin treatment.
- Native grasses were seeded in areas of recent NNIS treatments.
- Informative posters on invasive species were placed along trails.
- Site preparation occurred in areas impacted by a 2012 windstorm to expedite the reforestation of these lands.
- Joint Chiefs funding contributed to the removal of the existing Knutson Dam structure which was replaced with a more natural water control called a rock arch rapids. Besides better control of water levels, the rock arch rapids provides passage for all native aquatic species, increases public safety, and reduces long term maintenance and replacement costs.
- On Tribal lands, additional planting was done in several old fields. Much of this planting was of fruiting shrubs to increase future gathering opportunities.
- NRCS increased their technical assistance and financial support to private lands. This work with private landowners created additional early successional habitat for species such as the Golden Winged Warbler, fuel treatments in the wildland urban interface, reduced the fire hazard in locations to increase public safety, and reduced the risk of catastrophic wildfire in areas with heavy fuel loading due to the 2012 storm.

13. Climate Change

Climate change is an issue that has grown in interest and scientific understanding since the 2004 Forest Plan was issued. In recent years, the Forest has been involved in several studies designed to provide insight on the potential effects of climate change and been active to help prepare for future ecological changes.

Key Points

The Forest is involved with several studies designed to provide insight into the effects of climate change.

- The Spruce and Peatland Responses under Climatic and Environmental Change Experiment (SPRUCE) Project looks at the responses of peatland ecosystems to changed climate. After six years of planning and construction, the experiment officially began late summer 2015 when the climate chambers throughout the facility were turned on.
- The development of the LANDIS II model is complete and supports the Northwoods Ecosystem Vulnerability Assessment for the Chippewa NF.
- The Forest continues to address forest adaptation for climate change in our major vegetation projects using an approach in *Forest Adaptation Resources: Climate Change Tools and Approaches for Land Managers* (Gen Tech Rpt NRS-87, 2012).
- An element to monitor climate change has been added to the Forest Plan (Chapter 4 Monitoring and Evaluation).
- Adaptive Silviculture for Climate Change on the Chippewa National Forest is progressing. Harvest is complete. Planting with a variety of tree species is planned for spring 2016. The study will look at responses of silvicultural treatments to resistance, resilience, and adaptability to climate change.
- Another cooperative study looks at managing black ash forests in the face of emerald ash borer (EAB) and climate change. Preliminary results indicate that group selection harvest coupled with a planting strategy appear to be a viable technique to convert the black ash stands to a different composition while minimizing risks of altered hydrology.

The Spruce and Peatland Responses under Climatic and Environmental Change Experiment (SPRUCE) Project is designed to develop an understanding of the responses of carbon-rich peatland ecosystems to changed climate. The Department of Energy and the USFS Northern Research Station collaborate in research efforts located on the Marcell Experimental Forest located on the Chippewa National Forest. After six years of planning and construction, the experiment officially began late summer 2015 when the climate chambers throughout the facility were turned on. This study increases temperature and CO_2 above and belowground in

an attempt to understand the effect of a range of climatic conditions on carbon rich peatland ecosystems.

Development of the LANDIS II model was completed through efforts with Portland State University (lead agency), Northern Research Station (Rhinelander, WI), and the Forest. The model will be used to simulate forest disturbance and succession in response to anticipated climate, natural disturbance, forest management, and their interactions across all land ownerships in the Chippewa National Forest landscape. The project supports the Northwoods Ecosystem Vulnerability Assessment by providing key components of the Northwoods Climate Change Response Framework for the Forest.

The Forest is addressing forest adaptation for climate change using an approach in *Forest Adaptation Resources: Climate Change Tools and Approaches for Land Managers* (Gen Tech Rpt NRS-87, 2012). The Forest Adaption Resources document includes a menu of adaption strategies and a workbook to incorporate climate change into existing management on the ground. Recent vegetation projects are taking into consideration species that are considered to be "winners" or "losers" with climate change and introducing or increasing species diversity into stands where appropriate.

To comply with the 2012 Planning Rule, the Forest added a monitoring question and indicator to the Forest Plan (Chapter 4 Monitoring and Evaluation) that addresses climate change. The Forest will be assessing how the frost-free season is changing across the plan area on an annual basis by looking at the period of time between the last frost of spring and the first frost of fall when the air temperature drops below the freezing point of 32 degrees (Fahrenheit). Researchers have been collecting this data on the Marcell Experimental Forest for decades, so changes and trends can be determined.

The Adaptive Silviculture for Climate Change (ASCC) on the Chippewa National Forest is part of a National program. The goals of this project are to test different silvicultural approaches to climate change adaptation that will serve as useful examples across the country. Research in red pine stands on the Cut Foot Experimental Forest will study the effects of applied silvicultural treatments to increase forests resistance, resilience, and adaptability to climate change. The decision for this project was signed in July 2014. Harvest occurred during the 2014-2015 winter. Planting of seedlings for a variety of tree species is planned for the spring 2016. Their survival and establishment success will be monitored in upcoming years. This cooperative project involves the Northern Research Station, the University of Minnesota, Michigan Technological University, the Northern Institute of Applied Climate Science (NIACS), and Chippewa National Forest.

The Forest also has a study underway in black ash lowlands that will provide predictions of how emerald ash borer (EAB) will affect northern Minnesota's forests, provide critical information for management aimed at mitigating the impacts of this exotic insect, and identify potential replacement tree species that my help transition and adapt these ecosystems to a future climate. The goal is to determine how the loss of ash will impact native plant communities, the spread of invasive species, and site hydrology. Four acre treatments plots (control, clearcut, girdle, and group selection) to simulate EAB-induced ash mortality were implemented during the winter 2012. Planting with a variety of species occurred in 2013. Preliminary results indicate that group selection harvest coupled with a planting strategy appear to be a viable technique to convert the black ash stands to a different composition while minimizing risks of altered hydrology. The project is in cooperation with Northern Research Station, the University of Minnesota, and the Chippewa National Forest.

Education of employees on climate change is ongoing. There have been formal training sessions, web-based training, and training that accompanies our involvement with some of the studies, model development, and projects mentioned above. Forest leadership and resource specialists have had various levels of involvement in the projects discussed above. Along with their participation comes resource specific training and explanations from the researcher coordinating the projects. This involvement increases knowledge and understanding of how our activities can respond to climate change.

The Forest has also steadily been making progress on the Climate Change Scorecard. Nationally, the Forest Service has developed a Climate Change Scorecard which requires Forests to address their progress in incorporating climate change into the Forest's daily operations. The Scorecard is organized around areas like integrating climate change into employee education, program management, and partnerships. The Scorecard also encourages forest managers to better understand which of their natural resources are most vulnerable to climate change and how forests can operate more sustainably. During this time, we have reinstated our Climate Change Charter group to help increase awareness and move us forward on Climate Change and Sustainability issues.

14. Species Composition, Age Class Distributions and Objectives

Key Points

- With the exception of the Dry Pine Landscape Ecosystem, the Forest is below the Decade 2 objectives for the amount of 0-9 age class even with the blowdown event of 2012. This trend continues well into decade 2 (2021) which takes into consideration treatments that are planned and under decision but have yet to be harvested. This trend holds true for all the LEs. The focus on commercial thinning of red pine stands contributes in part to these results.
- The amount of mature/older forest on the landscape has steadily increased since 2003. However, results vary by LE is to whether MIH objectives to increase, maintain, or decrease mature and older forest are being met.
- Jack pine and spruce-fir forest types are well below decadal objectives and contribute to an overall decline in the amount of conifer on the landscape.
- Amount of aspen on the landscape has declined since 2003 yet still exceeds the objectives for all LEs. Additional decreases in aspen are desired.
- Northern hardwoods exceed objectives due to stand re-delineation and typing and recent stand data. Further increases in this forest type are expected due to regeneration treatments, particularly in aspen stands, that promote the release of young hardwoods in stands.

Section A. presents summaries of Forest-wide figures for the 0-9 and mature /older age classes. Section B. presents a summary of forest types and trends. More detailed information on species composition and age classes for each of the Landscape Ecosystems (LEs) is contained in Section C.

Numbers were calculated in January 2016 based on data in FACTS (corporate database) and stand data. Decade 1 ended in 2014, 10 years after signing of the 2004 Forest Plan Revision. Decade 2 spans 2015-2024.

A. Summary of young (0-9) and mature/older age classes

- Numbers for young (0-9) were calculated based on harvest activities recorded in our database. In instances where the harvest was clearcut or coppice, age class is set back to "0" and these acres then contribute to the 0-9 age class. Stands with a basal area of 50 sq. ft. or greater did not contribute to the 0-9 age class.

- All planned but unaccomplished harvests were assumed to be completed in 5 years – by 2021.
- The July 2012 windstorm created a pulse of 0-9 due to extensive damage in some stands that was followed by salvage harvest. In addition, all stands with more 60% damage that were not harvested were assigned to the 0-9 age class for this analysis.
- Acres of mature and older have increased since 2004. Age class tables for each LE, presented later in Section C., provide more detail on LEs with shortages and surpluses.
- Acres and percentages may not be accurate if databases are not up to date and reflect the amount of even-aged regeneration harvest completed.
- The following data and discussion is for uplands because there has been minimal harvest activity in lowlands.

Table 14-1. Summary of 0-9 age class objectives for uplands by LE.

Landscape Ecosystem Uplands	LE Total (acres)	0-9 Age Class in 2003		0-9 Age Class 2016		Objectives		2021	
						Decade 1	Decade 2		
		Acres	%	Acres	%	%	%	Acres	%
Dry Pine	12,300	1,800	14	1455	12	12	10	1279	10
Dry Mesic Pine	82,300	6,800	8	4093	5	9	9	5432	7
Dry Mesic Pine Oak	157,800	12,700	8	9832	6	9	9	12819	8
Boreal Hdwd Conifer	100,100	8,900	9	6394	6	9	10	8063	8
Mesic No. Hdwd	65,000	5,300	8	1968	3	5	6	2237	3
Tamarack Swamp	19,400	1,200	7	509	3	7	8	772	4
White Cedar Swamp	12,900	1400	11	581	4	6	6	528	4
Total	**449,800**	**38,000**	**8**	**24,832**	**5.5**	**8**	**8**	**31,130**	**<7**

Objectives taken from FP, pp. 2-59 through 2-79.

Results

- For the 3 largest LEs: Dry Mesic Pine, Dry Mesic Pine Oak, and Boreal Hardwood Conifer, the 2004 Forest Plan projected for Decade 1 and 2 as much or more than the 2003 numbers for 0-9. The 2003 numbers reflect 1986 Forest Plan direction which was heavy to clearcutting.
- In spite of the 2012 blowdown event, the amount of 0-9 decreased for all LEs since 2003. Without the blowdown, the departure would have been even greater.
- In 2016, the total of 0-9 is roughly 5.5% of the total forest upland acres compared to a projected amount of 8%.
- For 2021, over half way through Decade 2, the amount of 0-9 is projected to be below objectives for Decade 2. Even so, this is an improvement over the amount of 0-9 in 2016. Mesic Northern Hardwood, Tamarack Swamp, and White Cedar Swamp are anticipated to greatest departure from Forest Plan Decade 2 Objectives.

Table 14-2. Summary for upland forest for mature and older forest by LE.

Landscape Ecosystem Uplands	LE Total (acres)	2003 Upland Mature	Existing Upland Mature 2016	Anticipated 2021 Upland Mature
		Acres	Acres	Acres
Dry Pine	12,300	4,400	4,678	5,381
Dry Mesic Pine	82,300	43,000	45,115	46,814
Dry Mesic Pine Oak	157,800	82,600	83,685	87,760
Boreal Hdwd Conifer	100,100	40,600	43,427	43,690
Mesic No. Hdwd	65,000	35,300	38,001	39,483
Tamarack Swamp	19,400	8,200	10,752	11,209
White Cedar Swamp	12,900	2,900	3,034	3,385
Total	449,800	217,000	228,692	237,722

Numbers were from MIH summaries by LE for young, sapling, mature and old.

Results

- For mature and older (Table 14-2), acres were taken from Management Indicator Habitat (MIH) outputs for each of the LEs. Generally, for upland conifers (red, white, spruce/fir) and aspen, mature and older stands are 50 yrs or older. The exception is jack pine which is considered to be mature at age 40. Upland northern hardwood stands are considered to be mature at age 60. (Forest Plan, Table APP-C2, pg. C-2). Age class tables for each LE presented later provide more detail.
- Mature and older has increased by 11,000 acres since 2003 and is expected to increase by another 9,000 acres in the next five years.
- Results vary by LE as to whether MIH objectives to increase, maintain, or decrease mature and older forest are being met for each of the Management Indicator Habitats.

B. Summary of Forest types

Table 14-3 provides a summary for each of the major forest types. It includes a summary of the acres in the 0-9 and the mature and older age classes, and the total forest type acres in 2004, 2016, and projected decadal acres. Some key points are highlighted in the "Trends for Forest Type" column.

Results

- Overall upland conifer which is comprised of jack pine, red and white pine, and spruce - fir has decreased on the Forest landscape. Decreases in jack pine and spruce-fir are opposite the objectives to increase acres. Acres of red and white pine (combined) have

been consistent but an increase is desired. The amount of young conifer in each of these forest types has declined since revision.

- The amount of aspen is decreasing; further decreases are desired.
- Northern hardwood acres have increased substantially and exceed decadal objectives due to succession, re-typing forested stands, and recent stand data. Further increases are expected. This trend was not projected in the Forest Plan.
- Jack pine, spruce-fir, and aspen are projected to decrease on the landscape according to climate change models which is not reflected in our Forest Plan.

Table 14-3. Summary of Forest type acres and trends.

Forest Type		2004 acres	2016 acres	Decade 1 objective	Decade 2 objective	Trends for Forest Type
Jack Pine	0-9	5,100	1,712			• Downward trend in acres since 2004 • At less than half of decadal objectives for acres
	Mature/older	7,700	3278			
	Total acres	14,500	9776	19,500	23,300	
Red & White Pine	0-9	3,800	3,768			• 0-9 acres fairly consistent since 2004 • Total acres well below decadal objectives
	Mature/older	41,000	49,478			
	Total acres	77,200	78,328	84,000	90,000	
Upland spruce-fir	0-9	3,400	662			• Downward trend in acres since 2004 & well below decadal objectives • FEIS projects low levels of 0-9
	Mature/older	12,000	8433			
	Total acres	22,300	19608	34,000	37,100	
Aspen-birch	0-9	38,600	14,897			• Decrease in both 0-9 and mature/older since 2004 as desired
	Mature/older	101,000	86,129			
	Total acres	264,700	243,934	237,700	214,700	
Northern Hardwoods	0-9	1500	3,771			• Currently exceeds decadal objectives • Expect future increases due to aspen conversion to hardwoods
	Mature/older	55,000	81,376			
	Total acres	60,000	93,909	64,300	69,000	
Upland Conifer	0-9		6144			• The 0-9 upland conifer makes up 1.3% of upland forest acres in 0-9. At the time of FP revision, 0-9 upland conifer was approximately 2.1% of all upland forest on the Chippewa (FEIS,3-3.1-10). Mature/old upland conifer is 24% of upland forest, an increase from 13.9% at the time of revision (FEIS,3-3.1-10).
	Mature/older		61,188			
	Total acres		107,712			
Upland Forest	0-9		24,811			• About 5% in 0-9 age class • Approx. 51% of upland forest acres are in the mature and older age class
	Mature/older		228,692			
	Total acres		445,552			

Numbers are based on 2016 MIH tables by LE for young, sapling, mature, and older acres. Decade 1 and 2 objectives were calculated based on Table DLP-2 (FP, p 2-57).

C. Species Composition and Age Class objectives by Landscape Ecosystem

Species composition and age class acres and percentages for 2016 are compared to Decade 2 objectives for each LE. The 2003 numbers are taken from tables in the Forest Plan on pages 2-60 through 2-74 and are included to provide a context for the shift and trends since the 2004 FP went into effect. The 2016 acres and percentages reflect what is accomplished and on the ground. For the age class tables, the 2021 column captures acres planned for harvest that are yet to be accomplished. It is assumed they will be accomplished in 5 years. Lowlands are not discussed because so little harvest has occurred in them. Shifts in all forest types tend to be a function of succession, re-typing, and stand inventory rather than active management.

Dry Pine Landscape Ecosystem

Table 14-4. Species acres and percent.

Forest Type	FP 2003		2016		Objectives	
					Decade 1	Decade 2
UPLANDS	Acres	%	Acres	%	%	%
Jack Pine	3300	27	2423	20	35	41
Red Pine	4900	41	4924	41	39	37
White Pine	200	1	341	3	2	2
Spruce-fir	200	1	132	1	1	2
Oak	400	3	441	4	3	3
Northern Hdwds	100	1	461	4	1	1
Aspen	2700	23	2841	24	16	12
Paper Birch	300	2	371	3	2	2
TOTAL	12,100	100	11965	100	100	100
LOWLANDS						
Black Spruce	300	71	115	32	71	71
Tamarack	100	13	46	13	13	13
Lowland Hdwds	100	13	18	5	13	13
White Cedar	<100	3	186	51	3	3
TOTAL	400	100	365	100	100	100
Non-forest						

The Dry Pine LE is the smallest LE on the Forest containing the smallest amount of upland acres of any of the LE's.

Table 14-5. Age class composition in acres and percentages.

Age Class	2003		2016		Objectives		2021	
					Decade 1	Decade 2		
UPLANDS & LOWLANDS	Acres	%	Acres	%	%	%	Acres	%
0-9	1800	14	1455	12	12	10	1279	10
10-39	5000	40	4513	37	45	45	4276	35
40-79	4700	37	3592	29	24	28	3754	30
80-179	1100	8	2766	22	19	17	3017	24
180+	0	0	3	0	0	0	4	0
TOTAL	12,500	100	12329	100	100	100	12329	100
Non-forest			1749					

To meet objectives:

- Increase jack pine acres which can only be accomplished by conversions of red pine, paper birch and aspen to jack pine.
- Decrease aspen. Converting these acres to jack pine would be ideal but this is economically and technically difficult to accomplish.

- The 0-9 age class was met for Decade 1 primarily because of the July 2012 blowdown event. The amount of 0-9 declines by 2021 yet would meet the Decade 2 objectives.
- The 80-179 age class tends to be over-represented.

Dry-Mesic Pine Landscape Ecosystem

Table 14-6. Species acres and percent.

Forest Type	FP 2003		2016		Objectives	
					Decade 1	Decade 2
UPLANDS	Acres	%	Acres	%	%	%
Jack Pine	1200	1	630	1	1	1
Red Pine	13000	15	12142	15	15	16
White Pine	800	1	1108	1	4	6
Spruce-fir	4000	5	2624	3	8	9
Oak	5100	6	3772	5	6	6
Northern Hdwds	12300	15	19226	23	15	15
Aspen	38800	46	36733	45	41	37
Paper Birch	9100	11	6062	7	10	10
TOTAL	84,300	100	82298	100	100	100

LOWLANDS						
Black Spruce	3600	53	2669	36	53	53
Tamarack	600	9	753	10	9	9
Lowland Hdwds	1600	24	2196	30	24	24
White Cedar	900	13	1752	24	13	13
TOTAL	6700	100	7369	100	100	100

Table 14-7. Age class composition in acres and percentages.

Age Class	2003		2016		Objectives		2021	
					Decade 1	Decade 2		
UPLANDS	Acres	%	Acres	%	%	%	Acres	%
0-9	6800	8	4093	5	9	9	5432	7
10-39	29900	36	23315	28	37	40	20680	25
40-79	29700	35	24035	29	27	22	22771	28
80-179	17800	21	30807	37	27	29	33373	41
180+	<100	0	47	0	0	0	47	0
TOTAL	84,300	100	82298	100	100	100	82303	100
LOWLANDS								
0-9	<100	0	10	0	4	4	27	0
10-39	300	4	291	4	3	5	255	3
40-79	1200	18	898	12	7	5	747	10
80-119	3800	57	3878	53	57	45	3606	49
120-179	1300	19	2161	29	28	38	2602	35
180+	100	1	131	2	2	2	132	2
TOTAL	6700	100	7369	100	100	100	7369	100

To meet objectives:

- The largest species shifts need to be increases in spruce-fir, white pine, and paper birch acres.
- Both the northern hardwoods and aspen exceed objectives. Aspen acres will require substantial decreases through conversions to meet decadal objectives.
- Increases are needed in the upland 0-9 age class which can only be accomplished through even-aged harvest.
- 80-179 age class increased substantially by 2016 and even more so by 2021, almost doubling the number of acres since 2003.
- Acres exceed objectives in the 40-79 and 80-179 age group.

Dry-Mesic- Pine/Oak Landscape Ecosystem

Table 14-8. Species acres and percent.

Forest Type	FP 2003		2016		Objectives Decade 1	Objectives Decade 2
UPLANDS	Acres	%	Acres	%	%	%
Jack Pine	9200	6	6024	4	9	11
Red Pine	48900	30	48750	31	31	33
White Pine	2500	2	2944	2	2	2
Spruce-fir	7000	4	4735	3	5	4
Oak	2900	2	4450	3	2	2
Northern Hdwds	13300	8	18151	12	10	11
Aspen	65700	40	61883	39	34	30
Paper Birch	13700	8	10892	7	7	7
TOTAL	163,200	100	157829	100	100	100
LOWLANDS						
Black Spruce	10100	52	7508	37	52	52
Tamarack	2800	15	3423	17	15	15
Lowland Hdwds	3500	18	3574	18	18	18
White Cedar	2900	15	5674	28	15	15
TOTAL	19,200	100	20,179	100	100	100

Table 14-9. Age class composition in acres and percentages.

Age Class	2003		2016		Objectives Decade 1	Objectives Decade 2	2021	
UPLANDS	Acres	%	Acres	%	%	%	Acres	%
0-9	12700	8	9832	6	9	9	12819	8
10-39	58400	36	45503	29	35	34	38930	25
40-79	45600	28	48953	31	24	25	48474	31
80-119	41500	25	45029	29	27	24	46284	29
120-179	4400	3	7647	5	5	8	10387	7
180+	700	0	864	1	1	1	993	1
TOTAL	163,200	100	157829	100	100	100	157887	100
LOWLANDS								
0-9	100	1	172	1	2	3	260	1
10-39	800	4	922	5	4	5	793	4
40-79	3300	17	3955	20	10	6	3307	16
80-119	11200	58	8676	43	53	38	7925	39
120-179	3600	19	6308	31	30	46	7586	38
180+	100	1	146	1	1	2	309	2
TOTAL	19,200	100	20179	100	100	100	20179	100

To meet objectives:

- Increase upland jack pine acres to more than double the existing amount. This is difficult and expensive to accomplish given that surpluses are in aspen.
- Increase upland red pine and spruce-fir.
- Decrease upland aspen.

- Continue to increase the upland 0-9 age class.
- Decrease the upland 40-79 age class acres.
- Closely evaluate the amount of upland 80-119 during project development. Projected amounts are close to objectives and are needed to contribute to the 120-179 age class.

Boreal Hardwood/Conifer Landscape Ecosystem

Table 14-10. Species acres and percent.

Forest Type	FP 2003		2016		Objectives	
					Decade 1	Decade 2
UPLANDS	Acres	%	Acres	%	%	%
Jack Pine	500	0	423	0	0	0
Red Pine	3700	4	3600	4	4	4
White Pine	600	1	597	1	3	4
Spruce-fir	11000	11	7518	8	12	13
Oak	100	0	386	0	0	0
Northern Hdwds	11800	11	17525	18	13	13
Aspen	68400	66	64653	65	63	60
Paper Birch	6900	7	5423	5	6	6
TOTAL	102,900	100	100124	100	100	100
LOWLANDS						
Black Spruce	14800	49	11898	39	49	49
Tamarack	2400	8	2910	9	8	8
Lowland Hdwds	9800	32	10851	35	32	32
White Cedar	3300	11	4977	16	11	11
TOTAL	30,300	100	30636	100	100	100

Table 14-11. Age class composition in acres and percentages.

Age Class	2003		2016		Objectives		2021	
					Decade 1	Decade 2		
UPLANDS	Acres	%	Acres	%	%	%	Acres	%
0-9	8900	9	6394	6	9	10	8063	8
10-39	48700	47	39277	39	47	45	34706	35
40-79	28800	28	27436	27	25	23	27795	28
80-179	16500	16	27003	27	19	22	29563	30
180+	0	0	15	0	0	0	15	0
TOTAL	102,900	100	100124	100	100	100	100143	100
LOWLANDS								
0-9	200	1	340	1	4	4	677	2
10-39	1400	5	1420	5	5	8	1434	5
40-79	5100	17	3297	11	9	4	2285	7
80-119	16800	56	15248	50	52	40	13158	43
120-179	6500	22	10027	33	29	42	12667	41
180+	200	1	303	1	1	2	423	1
TOTAL	30,300	100	30636	100	100	100	30644	100

To meet objectives:

- Increase upland white pine and spruce-fir.
- Decrease aspen. Convert to white pine or spruce/fir where feasible.
- Upland northern hardwoods are over-represented.

- Increase upland 0-9 age class which is below decadal objectives even with the blowdown event of 2012.
- Decreases in the 40-79 and the 80-179 age classes are needed to meet Decade 2 objectives.

Mesic Northern Hardwood Landscape Ecosystem

Table 14-12. Species acres and percent.

Forest Type	FP 2003		2016		Objectives Decade 1	Objectives Decade 2
UPLANDS	Acres	%	Acres	%	%	%
Jack Pine	100	0	102	0	0	0
Red Pine	2100	3	1962	3	3	3
White Pine	500	1	431	1	1	1
Spruce-fir	4000	6	2656	4	6	7
Oak	800	1	767	1	1	1
Northern Hdwds	20300	31	24737	38	32	37
Aspen	32000	48	29408	45	47	43
Paper Birch	6800	10	4834	7	10	8
TOTAL	66,400	100	64898	100	100	100
LOWLANDS						
Black Spruce	3100	52	2314	36	52	52
Tamarack	500	8	527	8	8	8
Lowland Hdwds	1900	31	2492	39	31	31
White Cedar	500	9	1051	16	9	9
TOTAL	6000	100	6384	100	100	100

Table 14-13. Age class composition in acres and percentages.

Age Class	2003		2016		Objectives Decade 1	Objectives Decade 2	2021	
UPLANDS	Acres	%	Acres	%	%	%	Acres	%
0-9	5300	8	1968	3	5	6	2237	3
10-39	2200	33	19325	30	35	28	15386	24
40-79	24300	37	15934	25	24	26	16434	25
80-119	12800	19	24812	38	32	33	26926	41
120-189	2000	3	2767	4	5	8	3822	6
190+	100	0	92	0	0	0	92	0
TOTAL	66,400	100	64898	100	100	100	64898	100
LOWLANDS								
0-9	<100	0	50	1	1	2	47	1
10-39	100	2	154	2	1	2	135	2
40-79	1400	23	803	13	12	6	550	9
80-119	3300	55	3655	57	57	51	3612	57
120-179	1200	20	1687	26	28	39	1950	31
180+	<100	0	35	1	0	1	91	1
TOTAL	6100	100	6384	100	100	100	6384	100

To meet objectives:

- Increase spruce-fir. Decrease aspen.

- Increase 0-9 age class which is below decadal objectives even with the 2012 blowdown event.
- Decrease the 80-119 age class through regeneration harvest although some of this is needed to provide ingrowth into the 120-189 age class to meet Decade 2 objectives.

Tamarack Swamp Landscape Ecosystem

Table 14-14. Species acres and percent.

Forest Type	FP 2003		2016		Objectives	
					Decade 1	Decade 2
UPLANDS	Acres	%	Acres	%	%	%
Jack pine	200	1	152	1	1	1
red pine	1300	7	1347	7	8	9
white pine	<100	0	138	1	1	1
spruce-fir	1900	11	1619	8	16	21
oak	200	1	360	2	0	0
Northern Hdwds	2000	11	3061	16	11	11
aspen	10800	61	11382	59	56	49
paper birch	1400	8	1357	7	6	5
TOTAL	17,800	100	19417	100	100	100
LOWLANDS						
tamarack	8400	27	8965	29	27	27
Black spruce	14400	47	11092	36	47	47
white cedar	4800	15	6741	22	15	15
lowland hdwds	3200	11	4168	13	11	11
TOTAL	30800	100	30966	100	100	100

Very little harvest has occurred or is planned in this LE. Shifts have occurred in age class as a result of ingrowth into the next older age class, and as a result of more recent stand data, photo re-delineation and stand typing.

Table 14-15. Age class composition in acres and percentages.

Age Class	2003		2016		Objectives		2021	
					Decade 1	Decade 2		
UPLANDS	Acres	%	Acres	%	%	%	Acres	%
0-9	1200	7	509	3	7	8	772	4
10-39	6500	36	6417	33	42	41	5135	26
40-79	6400	36	5505	28	23	25	5799	30
80-119	3400	19	5612	29	23	19	5924	31
120-189	400	2	1364	7	4	6	1764	9
190+	<100	0	10	0	0	0	23	0
TOTAL	17,800	100	19417	100	100	100	19717	100
LOWLANDS								
0-9	300	1	173	1	4	4	223	1
10-39	1300	4	1302	4	4	6	1002	3
40-79	5600	18	4495	15	11	8	3920	13
80-119	17300	56	15005	48	47	35	13088	42
120-179	6100	20	9797	32	34	46	12460	40
180+	200	1	193	1	1	1	274	1
TOTAL	30,800	100	30966	100	100	100	30966	100

White Cedar Swamp Landscape Ecosystem

Table 14-16. Species acres and percent by LE.

Forest Type	FP 2003		2016		Objectives	
					Decade 1	Decade 2
UPLANDS and LOWLANDS	Acres	%	Acres	%	%	%
Jack pine			22	0		
red pine	0	0	12	0	0	0
spruce-fir	500	3	323	2	6	8
oak	0	0	2	0	0	0
No. hardwoods	200	1	571	4	2	2
aspen	8100	62	7872	61	57	52
paper birch	0	0	220	2	0	0
black spruce	1100	8	899	7	8	8
tamarack	100	1	109	1	1	1
lowland hdwds	2300	18	2000	15	18	18
white cedar	800	6	893	7	9	11
TOTAL	13,900	100	12923	100	100	100

Table 14-17. Age class composition in acres and percentages.

Age Class	2003		2016		Objectives		2021	
					Decade 1	Decade 2		
	Acres	%	Acres	%	%	%	Acres	%
0-9	1400	11	581	4	6	6	528	4
10-49	4400	34	5513	43	46	49	5198	40
50-79	2900	22	1745	14	11	6	1402	11
80-109	2500	19	2304	18	16	12	2563	20
110-139	1300	10	2012	16	4	18	2305	18
140+	600	4	767	6	6	9	927	7
TOTAL	13,100	100	12923	100	100	100	12923	100

Very little harvest has occurred or is planned in this LE. Shifts have occurred in age class as a result of time resulting in ingrowth into the next older age class, and as a result of more recent stand data, , photo re-delineation, and stand typing.

III. ADMINISTRATIVE CORRECTIONS AND AMENDMENTS TO THE FOREST PLAN

The Chippewa National Forest Land and Resource Management Plan (Forest Plan) was revised in 2004 in accordance with the 1982 Planning Rule. Since 2000, a number of planning rules have been in effect. Administrative corrections were made in accordance with the Planning Rule (PR) in effect at the time of the change. The most recent change, the 2012 Planning Rule, went into effect on March 23, 2012.

All of the changes to the Forest Plan thus far have been minor in scope.

Table 1 . Listing of Forest Plan amendments, corrections, or errata.

Type of Change	Date	Content
Amendment 1	11/15/2007	Change to Guideline on prohibited OHV use (G-ORV-1)
Amendment 2	06/04/2009	Change to North Winnie SPNM Boundary
Amendment 3	07/19/2013	Project Specific amendment for mature and older jack pine forest (S-WL-10)
Administrative Correction 1	08/17/2006	Change to Glossary definitions
Administrative Correction 2	08/30/2006	Change to Monitoring Plan
Administrative Correction 3	08/18/2006	Change to Timber Management Guideline (G-TM-7)
Administrative Correction 4	08/18/2006	Change to Heritage, Recreation, and Access Guideline (G-WSR-7)
Administrative Correction 5	08/18/2006	Correction to Executive Summary Table
Administrative Correction 6	08/18/2006	Change to Watershed Health, Riparian Areas and Soil Resources Table (Table G-WS-8a)
Administrative Correction 7	08/18/2006	Change to SIO Map
Administrative Correction 8	09/18/2006	Change to National ORV Definitions
Administrative Correction 9	09/14/2007	Change to Proposed and Probable Practices
Administrative Correction 10	08/10/2009	Change to Boundary of Candidate Research Natural Area, Sunken Lake
Administrative Change 11	04/28/2016	Chapter 4 Monitoring and Evaluation Change
Errata 1	08/18/2006	Change to Record of Decision (ROD)

Changes to the monitoring program (Forest Plan, Chapter 4) to bring it into alignment with direction provided in the 2012 Planning Rule (36 CFR Part 219.12) were implemented in early 2016. There are three primary points related to the Chippewa National Forest's monitoring

program where changes were made.

First, the new Planning Rule, which provides direction for the development and revision of Forest Plans, went into effect in March 2012. Although we are several years away from another Plan revision, the 2012 Planning Rules requires that our monitoring program contain monitoring questions and indicators that address eight elements. Of the eight elements, our existing monitoring program addressed most of these. Three new monitoring questions have been added to address: ecological conditions (3), visitor use and satisfaction (5), and climate change (6).

Second, the Forest took the opportunity to review our existing monitoring program presented in Chapter 4 of the Forest Plan. Because of this review, several questions have been modified and others dropped.

Third, 2012 Planning Rule direction supersedes the 1982 Rule, which the Forest used during the 2004 Forest Plan revision process. References to the 2012 PR replace references in Chapter 4 to the 1982 Planning Rule, as appropriate. Because of the 2012 Planning Rule, the following changes also took place—

- A biennial report instead of an annual report. Our first report is expected in 2018.
- An evaluation report every 5 years is no longer required.
- The monitoring of population trends of Management Indicator Species (MIS), i.e., goshawk, eagle, white pine, and lynx for the Chippewa NF, is no longer required.

The public had an opportunity to provide comments on the proposed changes to our monitoring program in early 2016. The Forest Supervisor considered comments prior to making any monitoring program changes. Final changes to the monitoring program go into effect prior to the May 9, 2016 transition date specified in the 2012 Planning Rule. This action was not be subject to administrative review as it is considered an administrative change to the Forest Plan (36 CFR 219.13(c)) rather than a Plan Amendment. Information on the monitoring program changes can be found on our public website: http://www.fs.usda.gov/chippewa.

The amendments, administrative corrections, as well as the corrected pages from the set of Plan documents can be found at: http://www.fs.usda.gov/main/chippewa/landmanagement/planning. We encourage people to use this resource for accessing the most up to date information on amendments and administrative corrections. Future amendments will also be listed in the Chippewa NF *Schedule of Proposed Actions* which is distributed quarterly. We will continue to provide opportunity for public involvement at the project level and during any substantive changes to the Forest Plan.

IV. LIST OF PREPARERS

The following people collected, evaluated, or contributed time and/or data for this Monitoring and Evaluation Report.

Name	Discipline
Sharon Klinkhammer	Forest NEPA Coordinator/ Planner
James Gubbels	Forest Timber Program Manager
Gary Swanson	Forest Silviculturist
Christine Brown	Recreation and Lands Program Manager
Todd Tisler	Fish & Wildlife Program Manager
Cory Mlodik	Blackduck District Wildlife Biologist
Jeremy Cable	Monitoring, Inventory & Survey Team Supervisor
Dave Morley	Walker District Hydrologist
Kim Jenkins	Budget & Accounting Officer
Brenda Frenzel	Grants Management Specialist
John Rickers	Resource Information Manager
Sean Dunham	Heritage Program Manager
Eric Raitanen	Fisheries Biologist
Kirk Larson	Forest Botanist and NNIS Program Manager
Jim Gries	Natural Resource Team Leader