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Monitoring Evaluation Report for the Ottawa National Forest

Fiscal years 2016-2023



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Executive Summary

Monitoring and evaluation of Forest Plan implementation is required by the National Forest Management Act and its implementing regulations (36 CFR 219). This report discloses the results of the Ottawa National Forest's biennial monitoring and evaluation of the 2006 Land and Resource Management Plan (Forest Plan).

Results of this process inform the Forest Service, stakeholders and the public about whether the desired outcomes of land management planning are being achieved. The collection and review of data, and other observations recorded, can identify needed adjustments in Forest Plan management direction (such as desired conditions, goals, objectives, standards and guidelines). Maintaining this proactive approach also allows managers to ensure that the scientific validity and appropriateness of assumptions used to develop management direction remains current under changing conditions. New scientific understanding and technology; changes in law, policy and resource conditions; as well as growing concerns, trends and/or changing societal values can influence Forest Plan adjustments. This adaptive management approach is a critical step in the process of keeping Forest Plans dynamic, relevant and useful.

Summary of Findings

This section provides a summary of the Monitoring Questions addressed in this report. Due to personnel capacity issues, the Forest is unable to answer the following questions during this reporting period: Monitoring Questions 6, 14, 16 and 29. All data presented in this report is approximated; and numbers presented in tables have been rounded.

Monitoring Question 1: How do actual outputs and services compare to those outputs and services in the Forest Plan?

Finding: This monitoring question is specific to allowable sale quantity. In Fiscal Years (FYs) 2019 through 2023, The five-year average volume sold is more than the five-year average volume harvested, which has resulted in an increase of 19.8 million board feet (MMBF) of uncut volume under contract (470 MMBF total uncut volume). The five-year average acres harvested is 7,490 acres or 45% of projected Forest Plan annual acres. Due to the COVID-19 pandemic there was a decrease in timber harvesting in FY 2020 due to mill-related closures and decrease in pulp and paper demand, which contributed to the increase of uncut volume under contract.

Monitoring Question 2: How do actual outputs and service compare to those outputs and services projected in the Forest Plan?

Finding: This monitoring question ensures the Ottawa remains consistent with meeting Forest Plan goals and objectives in a financially responsible manner. Over the 5-year period, the volume sold increased, resulting in an annual average of 82.4 MMBF at a cost of \$52.37. This cost is more than what was projected in the Forest Plan for this amount of volume, which was anticipated to be about \$40.00 per hundred cubic feet (CCF). During the reporting period, the Ottawa spent an average of \$6.9 million to plan, prepare and administer timber sales. The average volume sold during that time was 82.4 MMBF. The average amount spent per CCF sold was \$52.37, which is more than what was projected in the Forest Plan for a similar volume, 80 MMBF.

Monitoring Question 3: To what extent do output levels and the mix of sawtimber and pulpwood compare to those levels projected?

Finding: This monitoring question discloses trends in timber volume sold by product and payments to counties. Payment in Lieu of Taxes and Secure Rural Schools Act and Community Self-Determination Act payments are discussed. Management actions have increased the volume sold over the last four fiscal years has resulted in an average volume of 13.4 MMCF (or 82.1 MMBF), which is about 61% of the total projected harvest for the second decade. This is an increase of about 50% or 4.5 MMCF (27.6 MMBF) from the previous reporting period. Sawtimber volume increased from 1.6 MMCF (8.4 MMBF) the previous reporting period, to 3.2 MMCF or (17.3 MMBF) which is about 63% of the projected annual sawtimber sold. Pulpwood volume also increased from 7.3 MMCF (46.0 MMBF) the previous reporting period to 10.2 MMCF or (64.8 MMBF), which is about 61% of the projected annual pulpwood harvest.

Monitoring Question 4: Are insect and disease population levels compatible with objectives for restoring or maintaining healthy forest conditions?

Finding: This monitoring question discloses trends in the severity of current insect and disease levels and anticipated impacts associated with potential infestations. Since the 2019 Monitoring Evaluation Report, changes in survey methodologies and survey reports have changed. In 2024, remote sensing and a new remote sensing program known as Tree Cap began to be utilized to detect changes in tree canopy condition. Emerald ash borer (EAB) trap tree monitoring halted in 2018 and is no longer being conducted. In 2012, the Ottawa had about 39,640 acres determined to be susceptible to greater than 25% tree mortality. As of 2018, there has been approximately a 10% reduction in highly susceptible acres to 35,626 due to vegetation management activities, natural disturbance, fires or insect/disease outbreaks. Current insect and disease levels on the Ottawa are compatible with restoring and maintaining healthy forest conditions.

***It is recommended that the question and monitoring indicators are changed to enhance the Ottawa's ability to improve the current forest health conditions.**

Monitoring Question 7: Are harvested lands adequately restocked after 5 years?

Finding: This monitoring question measures whether adequately stocked forested conditions are present post-harvest. Adequate stocking was found in 100% of final timber harvest-certified acres. This monitoring question ensures the Ottawa remains consistent with essential reforestation silvicultural practices for maintaining adequately stocked forest conditions. The Ottawa performs stocking surveys to monitor the success of natural and artificial regeneration on all final timber harvests. Stands that are adequately stocked with suitable tree species are usually certified by the fifth year after a final harvest.

Monitoring Question 8b: To what extent are timber management activities occurring on lands suited for timber production?

Finding: This monitoring question ensures the Ottawa remains consistent with the number of acres harvested by land suitability class. Of the 38,177 acres harvested (annual average of 7,635 acres) between FYs 2019 and 2023, 37,459.5 acres were located on lands deemed suitable for timber production. About 717 acres harvested (annual average of 143 acres) were located on lands classified as unsuited. During the reporting period, annual average of reforestation activities on suitable lands occurred on 225 acres (artificial regeneration), 1,580 acres (natural regeneration with site preparation) and 3,398 acres (natural regeneration without site preparation). Annual average of reforestation activities on unsuitable lands

occurred on 12.4 acres (artificial regeneration), 25 acres (natural regeneration with site preparation) and 56 acres (natural regeneration without site preparation). The implementation of harvests and reforestation activities have had beneficial restorative effects across the Forest.

Monitoring Question 8b: To what extent are timber management activities occurring on lands suited for timber production?

Finding: This monitoring question evaluates the change in land suitability classification between “not suitable” and “suitable” for timber production. Currently the Ottawa has approximately 546,699 acres classified suitable for timber production. It is anticipated that minor fluctuations in suitable land will continue to occur through Forest Plan implementation. There has been a net gain in old growth allocation of 5,191 acres that has resulted in a decrease in suitable acres. the Ottawa also has had a net gain of approximately 3,582 acres through land acquisitions and exchanges. Of this acreage, about 1,469 acres are now being managed as part of the suitable land base. The remaining acres are located on lands classified as “unsuitable”.

Monitoring Question 9: To what extent, and under what circumstances, are clearcuts and other openings created by even-aged management exceeding 40 acres?

Finding: The Ottawa has been creating temporary openings over 40 acres in size for Kirtland’s warbler habitat and aspen regeneration since implementation of the Forest Plan began. The five-year average annual harvest for aspen is about 44% of the Forest Plan direction. The number and size of the resulting openings have been overestimated during the planning process compared to the acreage of opening created during project implementation. All the temporary openings greater than 40 acres from FY 2019 to FY 2023 were reviewed and approved by the Regional Forester. Without this exception, opportunities to create larger-sized openings are typically limited because stands on the Forest’s landscape are inherently small due to years of implementing the 40-acre limitation. These larger-size openings support Kirtland’s warbler habitat management, early successional habitat restoration goals and to address areas experiencing negative effects from insects and/or disease.

Monitoring Question 10: Is Forest Plan implementation resulting in impacts that may substantially and permanently impair the productivity of the land?

Finding: This monitoring question ensures the Ottawa soil resource can support and sustain desired forest conditions and remain ecologically healthy. Since new monitoring was implemented on the Ottawa in 2010, post-harvest and harvest activity monitoring has been conducted on 92 payment units. On average, results show that 85% of the monitored payment units are in an undisturbed condition, while 11% show some low-level disturbance. Average detrimental disturbance during the reporting period was determined to be 2%. On average, 96% of the post-harvest monitoring data collected since 2010 indicate monitored payment units had little to no disturbance and only 2% were determined to be detrimentally disturbed. Therefore, many of the impacted soils would be expected to return to a naturally functioning condition within approximately 20 years.

Monitoring Question 11: Are northern hardwood forest management activities promoting the regeneration of mid-tolerant tree species, specifically green and white ash, American basswood, Eastern white pine, Northern red oak and yellow birch?

Finding: Data collected shows that there are more mid-tolerant seedlings and saplings in the understory of managed stands than in unmanaged stands. This is the result of removing trees from the overstory through timber harvest, which allows daylight to reach the forest floor and results in soil disturbance (removal of organic matter and exposing mineral soil). This results in preparing a seedbed for the germination and growth of tree seeds. The number of mid-tolerant saplings decrease over time in the unmanaged stands, due to inadequate sunlight penetrating the dense overstory, resulting in suppression and mortality of the mid-tolerant saplings. Conducting more shelterwood harvesting and other even-aged management practices in northern hardwoods would produce stands with higher tree species diversity and favor mid-tolerant species.

Monitoring Question 12a: To what extent is Forest Plan implementation contributing or responding to non-native invasive plant species?

Finding: This monitoring question ensures the Ottawa remains consistent with our Forest Plan and national policy for prevention and management of invasive plant species. The intent of the Ottawa non-native invasive plant management program is to reduce the ecological harm they cause from spreading on the landscape, including loss of biodiversity. At the landscape scale, invasive plants will continue to become more abundant. Forest management activities do contribute to the spread of NNIP. Certain invasive species are favored by the increase in sunlight when tree canopy is removed. Many invasive species also are spread along roads and trails created and maintained by the Forest. Treatment of invasive plant infestations is often successful in reducing the abundance of the target species and sometimes can eradicate small infestations. Control efforts have resulted in marginal and fair results. The Forest continues to monitor and treat priority infestations.

***It is recommended that Indicator (c) is removed because Indicator (a) can adequately measure trends for this question.**

Monitoring Question 12b: To what extent is Forest Plan implementation contributing or responding to non-native invasive animal species?

Finding: This monitoring question aims at evaluating the how the Ottawa is remaining consistent with the Forest Plan and national policy for prevention and management of invasive animal species. The intent of our non-native invasive animal management is to reduce and mitigate the ecological harm they cause from spreading on the landscape, including loss of biodiversity and tree mortality from forest animal pests. Although the Forest is aware of some new species of exotic animals, they are not considered priority invasive species and are not expected to harm other resources. Except for emerald ash borer, no other new harmful invasive animal species have established on the Ottawa since 2005. The spread of invasive animals will continue, and the Ottawa has limited ability to treat widespread non-native invasive species such as rusty crayfish and the now quickly spreading emerald ash borer. Forest management activities do indirectly contribute to the spread of invasive animals, but Forest roads and boat launches that facilitate invasive species dispersal remain monitored. We remain alert for new species such as hemlock woolly adelgid and Asian longhorned beetle.

Monitoring Question 15: To what extent is the Forest meeting its Federal Indian trust responsibility, including but not limited to, meeting the requirements of the memorandum of understanding (MOU), consulting with Tribes for forest management and actively seeking collaborative opportunities?

Finding: This monitoring question discloses trends in implementing the Tribal MOU through information sharing and the consultation process. The direction of the Forest Plan has assisted with implementing the 1999 *Forest Service Memorandum of Understanding with Tribes*. This MOU requires consultation with Native American Tribes and coordination with the Great Lakes Indian Fish and Wildlife Commission regarding the effects of natural resource management decisions on the ability of Native American Tribes to exercise fishing, hunting, and gathering rights. Most communication with Tribal governments is to share information regarding the location, and protection of cultural resources from proposed and authorized activities. Formal government-to-government consultations are part of this process.

Monitoring Question 17: To what extent is Wild and Scenic River (WSR) management contributing to the protection and enhancement of the WSR values?

Finding: This monitoring question ensures the Ottawa remains consistent with the National Wild and Scenic Rivers Act of 1968 the established a nationwide system of outstanding free-flowing rivers on the Forest. The Act requires administering agencies to protect and enhance values, known as Outstandingly Remarkable Values for which the rivers were designated. The Forest remains committed to provide habitat for native and desirable non-native plants and animals that enhance those values. This includes habitat for the lake sturgeon and wood turtle, both species listed as a Regional Forester's Sensitive Species (RFSS). Lake sturgeon was petitioned for listing under the Endangered Species Act in 2018; a decision by United States Department of Interior Fish and Wildlife Service (USDI FWS). The Sturgeon River lake sturgeon population is considered a stronghold for the Western Basin of Lake Superior and portions flowing through Ottawa lands are important for sustaining a spawning population and likely expanding population. Relative to the conservation, restoration and recovery of lake sturgeon is not generally achievable in the short-term due to the extended time to maturity indicating that rehabilitation of the Ontonagon River population may take several decades. The results from 19 years of wood turtle monitoring reveal the wood turtle population in the western Upper Peninsula is relatively stable, although it fluctuates slightly.

Monitoring Question 18: To what extent are forest management activities restoring vegetation composition and spatial landscape patterns and moving toward desired conditions at the Forest, management area and other appropriate landscape scales?

Finding: This monitoring question ensures the Ottawa is working towards the desired forest type composition by management area. Since implementation of the Forest Plan began in 2006, there has been little change in the vegetative composition percentages across the Forest. Meeting these desired conditions is a long-term goal that will take several decades and likely more than one planning period to accomplish, especially for larger management areas. Active management (timber harvesting) allows the opportunity to work towards and maintain desired conditions of forest type groups, even though these activities may take multiple entries to accomplish desired conditions in some management areas.

Monitoring Question 19: To what extent are old growth forest conditions being classified consistent with management area objectives?

Finding: This monitoring question ensures the Ottawa remains consistent with classification of old growth is consistent with management objectives. Old growth areas can contribute to species viability by providing ecosystem components which are not present in younger forests. Old growth forests also provide recreational opportunities. The Forest is moving towards the desired conditions for old growth. Acres of old growth have increased across all

management areas since the previous reporting period. As management proceeds into the management areas that are below the desired condition, emphasis should be placed on moving towards the desired old growth conditions.

Monitoring Question 20: To what extent are permanent upland openings being created and maintained to move towards desired conditions?

Finding: This monitoring question ensures the Ottawa remains consistent with Forest Plan direction regarding available open habitat to wildlife and plant species. All management areas, except management area 2.1, have shown a slight decrease in acres and percentage of upland openings. This was expected due to the discrepancies found in the database of record. There is a need for better data management to better represent conditions on the ground. Site surveys reveal that anywhere between 30-70% of actual open habitat has been reclaimed by trees when compared to the spatial data of record. The Ottawa is falling short on maintaining a percentage of permanent upland openings within the desired range for management areas 2.1, 4.1a and 6.1. The Forest is currently working to coordinate timber harvest designated open habitat areas to increase the pace of restoration. Focus for intensive rehabilitation will be on sites with adequate access for on-going maintenance and enhancement activities.

Monitoring Question 21: To what extent are northern hardwood forest types being managed to work toward the desired mix of even-aged and uneven-aged stands?

Finding: This monitoring question ensures the Ottawa remains consistent with favoring uneven-aged treatments while using even-aged management to maintain or increase diversity of tree species and to promote mid-tolerant trees such as yellow birch, white ash, green ash, American basswood and Northern red oak. All vegetation management decisions have specified goals pertaining to northern hardwood structure and composition through implementation of a variety of silvicultural activities. Silvicultural practices and implementation of project design criteria will improve growing conditions within stands, enhance adaptive capabilities, bolster the health and resilience of the Forest, regenerate mature stands to more vigorous younger stands and improve quality. Compared to the previous reporting period, the number of even-aged treatments increased by 2% and the number of uneven-aged treatments decreased by 2%. The Forest has averaged about 816 acres annually of intermediate treatments (even-age treatments) in northern hardwoods annually during the reporting period. The Forest has regenerated a very modest acreage annually, 60 acres of even-aged hardwoods, during the same timeframe.

Monitoring Question 22: To what extent are aspen forest type acres being maintained through regeneration activities to meet Forest-wide and management area objectives?

Finding: This monitoring question ensures the Ottawa remains consistent with regenerating aspen at the Forest-wide scale and maintaining acres in the 0-9-year age class. Aspen regeneration is an important early, seral vegetative condition in the forest landscape. It provides the bulk of the temporary openings and early successional habitat on the Ottawa. Aspen is also an important commercial timber product important in supporting the socio-economic goals of the Forest Plan. The five-year average for aspen volume harvested was 3.1 MMCF (20 MMBF). During the reporting period, 1 MMCF (7 MMBF) more aspen volume was sold (under contract) than was harvested. The five-year average annual harvest of 1,316 acres of aspen. Compared to the previous reporting period, this is an increase of approximately 500 acres in the five-year average, an increase from the previous reporting period of 5%. Over the past five years the Ottawa has harvested a total of 6,581 acres, which

is an increase of 1,669 acres or 34% increase from the previous reporting period. These acres will help maintain the 12,000 acres in the 0–9-year age class Forest-wide.

Monitoring Question 23: To what extent are long-lived conifer forest types being increased or maintained through regeneration activities to meet Forest-wide and management area objectives?

Finding: This monitoring question ensures the Ottawa remains consistent with increasing the acreage of long-lived conifers at a modest rate. The current acreage of long-lived conifer types on the Forest is 89,382 acres, a decrease of 365 acres, or 0.5%, from the last reporting period. The Forest continues to increase the long-lived conifer type with the planting of approximately 138 acres of blister rust (*Cronartium ribicola*) resistant white pine annually on suitable acres. This has resulted in a decrease in long-lived conifer planting from the prior reporting period of 82 acres (decrease of approximately 37%). This is largely due to planting not occurring in Fiscal Year 2020 due to implementing COVID-19 pandemic protocols. The Forest continues to seek opportunities to implement post-harvest activities such as releasing hemlock, red pine or white pine, which will increase the prevalence of naturally regenerated long-lived conifer on the Forest.

Monitoring Question 24: To what extent are short-lived conifer forest types being maintained through regeneration activities to meet Forest-wide and management area objectives?

Finding: This monitoring question ensures the Ottawa remains consistent with regeneration of short-lived conifer to meet Forest-wide and management area objectives. The current acreage of short-lived conifer groups on the Forest is about 160,302, which is a decrease of 130 acres from the previous reporting period. This decrease is likely due stand conversion due to the outbreak of spruce budworm the Ottawa. During this reporting period, the Ottawa has planted an average of 102 acres of jack pine and naturally regenerated an average of 36 acres per year. The amount of jack pine regenerated, both naturally and artificially, is expected to increase in the coming years with projects currently being implemented. The amount of balsam fir is expected to increase through retention of non-merchantable balsam fir in clearcut treatments.

Monitoring Question 25: To what extent is natural regeneration favored over artificial reforestation to meet Forest-wide and management area objectives?

Finding: This monitoring question ensures the Ottawa remains consistent with Forest Plan direction of favoring natural regeneration over artificial reforestation. The Forest averaged 4,566 acres annually of regeneration (all types) since 2019. The average acres of site preparation to promote natural regeneration decreased by 310 acres or 26% from the previous reporting period. Artificial regeneration (planting) increased by 50 acres or 27% from the previous reporting period mainly due to an increased effort to increase species diversity. Regeneration, with no follow up treatments, increased by 963 acres or 38% increase from the previous reporting period, mainly due to implementing vegetation management project areas with a heavy northern hardwood composition. In 2022, the Forest started planting species that are increasingly resilient to climate change like Northern red oak and bur oak.

Monitoring Question 26a: To what extent are we moving riparian areas towards desired conditions?

Finding: This monitoring question ensures the Ottawa remains consistent with the goal of providing for ecologically healthy watersheds by enhancing the diversity and structural composition of long-lived tree species within riparian areas. Between 2005 and 2016, approximately 179,600 seedlings were planted over 421 acres. Planting continued between 2017 and 2023 where a total of 458,735 tree seedlings were planted across 1,669 acres. Since 2005, a total of 638,335 tree seedlings were planted on 2,090 acres helping to move the Forest closer to the desired condition outlined in the Forest Plan. On average the survival rate for first-year survival monitoring is 90-95% and third-year monitoring has been between 50-70%. Underplanting riparian ash sites has resulted in lower survival rates, between 1-10%, due to hydrologic stress drowning out seedlings. To promote better survival, release efforts took place at approximately 13 planting sites between 2015 and 2021. The riparian planting program is helping move the Ottawa toward the desired condition in riparian areas across the Forest.

Monitoring Question 26b: To what extent are we restoring aquatic habitat connectivity?

Finding: This monitoring question ensures the Ottawa remains consistent with Forest Plan direction of removing aquatic organism passage barriers to maintain the integrity of the physical-hydrological processes of a river system and the interconnectedness of its resource patches and habitats. The Ottawa has removed one or more barriers in most years since 2010. The number of stream miles reconnected has varied from 0.1 to 88.5 miles. This large range in miles reconnected is due to the natural variation in the amount of available upstream miles from the barrier removal site and potentially inconsistent analysis of the amount of accessible habitat upstream of project sites.

The Forest will continue to replace road-stream crossing barriers with structures that simulate a natural stream channel or allow for aquatic organism passage to create stream connectivity resulting in a healthier aquatic ecosystem.

Monitoring Question 26c: Does the relative abundance, density and species richness of aquatic macroinvertebrates within sampled reaches indicate plan objectives for stream water quality and habitat are being obtained?

Finding: This monitoring question ensures the Ottawa remains consistent with providing high quality stream habitat and maintaining functional streams and rivers. The orders of *Ephemeroptera* (mayflies), *Plecoptera* (stoneflies), and *Trichoptera* (caddisflies) are sensitive to changes in water temperature, dissolved oxygen, and sedimentation. Sampling for these species can assess habitat suitability and shift away from insects at multiple sites or a noticeable reduction in taxa richness within a subbasin, may indicate impacts to cold-water stream habitat. The average population estimate for monitoring sites was similar over the reporting period indicating that forest management activities have not had an apparent negative impact on habitat suitability for these sensitive populations of mayflies, stoneflies and caddisflies.

Monitoring Question 27a: How is drought duration, severity, geographic extent or timing changing across the planning area on an annual basis?

Finding: This monitoring question discloses trends in drought conditions on the Ottawa. The Ottawa has been experiencing periods of dry or drought conditions periodically throughout the observed period from 2000 through 2023. This could become problematic, adversely

impacting forest resources, if drought conditions persist or worsen in coming successional years. Although periods of abnormally dry conditions appear to be cyclical and occur regularly. Insufficient time has evolved at the time of this reporting to observe long-term trends in drought conditions that may be due to climate change.

Monitoring Question 27b: How are the timing and duration of winter weather conditions changing across the planning area on an annual basis?

Finding: This monitoring discloses trends in the duration of winter weather conditions on the Ottawa National Forest. Winter severity can affect winter logging operations. Portions of the Ottawa have soil conditions that require winter or frozen ground harvesting. Winter conditions are an important component of forest management and changes in those conditions would affect management options across the Ottawa. The accumulated winter season severity index incorporates several elements into one site-specific value that defines the severity of a particular winter, especially when examined in the context of climatological values for that site. This information can be used as a baseline with which innumerable impact-based data can be examined and can help the Ottawa monitor winter severity trends for managing recreation. Winter severity has been variable from year to year. Trends are not apparent due to insufficient length of time for data collection.

***It is recommended that the monitoring indicators reliant upon snowmobile data should be removed from the monitoring program as these indicators cannot be sufficiently answered with current monitoring trends of snowmobile trails in the state of Michigan, which have a set period of opening and closing of trails that is not dependent upon winter severity.**

Monitoring Question 28: To what extent is Forest Plan implementation affecting streams, lakes, ponds and wetlands and their associated riparian ecosystems?

Finding: This monitoring question discloses results of the best management practices (BMP) monitoring program, which determines if these practices are implemented correctly and are effective. The Forest needs to improve upon implementing water quality protection measures fully and correctly. We were mostly or fully successful at implementing BMPs to protect aquatic resources at most sites. Most road construction and maintenance sites monitored were mostly effective or effective at protecting waterbodies. Monitoring results show the best overall performances were in ground-based timber harvesting and prescribed fire. During the reporting period, monitoring results indicate that water quality and riparian areas are adequately protected when the BMPs are correctly implemented.

Monitoring Question 30: To what extent is Forest management contributing or responding to the conservation of Species of Viability Concern (such as Regional Foresters Sensitive Species) and moving toward desired habitat conditions for these species?

Finding: This monitoring question ensures the Ottawa remains consistent with Forest Plan direction regarding management of habitat types suitable to RFSS and Species of Viability Concern (SVC). Managing for suitable habitat helps to maintain viable populations within the Forest. Since the last reporting period, the tri-colored bat, which was previously on the RFSS list, was elevated to “Proposed” for Federal listing and the monarch butterfly is currently a candidate for listing. The Kirtland’s warbler was removed from the Federal endangered

species list in 2019 and subsequently was added to the RFSS list. One new species, the golden-winged warbler, was added to the RFSS list. In 2023, populations, habitat and hydrology protections already established in the Forest Plan were deemed sufficient to remove the four-toed salamander from the RFSS list. Providing high quality habitat for all RFSS and SCV on the Forest focuses on restoring ecological connectivity in aquatic ecosystems, maintaining open habitat, enhancing sub-surface large woody debris in waterbodies and supplemental tree planting.

Monitoring Question 31: To what extent is forest management contributing to the conservation of threatened and endangered species and moving toward desired habitat conditions and population trends for these species?

Finding: This monitoring question discloses trends from the implementation of management practices that provide for, and protect, Federally endangered gray wolf, Federally endangered northern long-eared bat (NLEB) and the tri-colored bat (proposed for listing). Two other threatened and endangered species, the Canada lynx and the red knot shorebird are not considered to be present on the Ottawa. Since its discovery in New York in 2006, white nose syndrome extirpated the once common NLEB across much of their eastern range, including the Ottawa. Tri-colored bats are extremely rare and are not known to occupy habitat in the Upper Peninsula of Michigan. Five of seven bat species known to occur on the Forest have been detected at all stationary acoustic survey sites during all years of the reporting period. A single NLEB was detected at two sites in 2022. No tri-colored bats were detected at any of the six stationary survey stations in any year. Ongoing studies suggest that colder temperature mines, like those found on the Ottawa, may inhibit to some degree, the growth of the deadly white nose syndrome, thereby allowing bats on the Forest to have slightly better chance of survival than other warmer locations in the eastern United States. Forest management on the Ottawa is contributing to the conservation of threatened and endangered species and meets desired habitat conditions for bats. Approximately 50% of the Ottawa is not managed for timber production that further promotes both larger-sized, and abundance of, snags in unmanaged stands that provide essential habitat for bats. Regardless of ongoing and past human recreational activity and forest harvesting on both private and Federal lands, the wolf's population and range has expanded and appears stable (approximately 12% annual population growth) throughout the Upper Peninsula. As of 2022, there are 631 wolves in the Upper Peninsula, which is close to three times the minimum population that biologists consider to be viable in this state.

***It is recommended that Indicators 31a and 31b are removed from this monitoring question due to the change in status of the Kirtland's Warbler.**

Monitoring Question 32: To what extent is forest management affecting the density of open roads within the Remote Habitat Area, and moving towards the Forest density objective of less than 1.0 mile/square mile?

Finding: This monitoring question ensures the Ottawa remains consistent with balancing the need for access with the need to manage and protect the Ottawa's resources. The Forest is continually monitoring the miles of road open to passenger vehicles within the RHA during project proposals to make sure that the number of road miles does not exceed 1 mile/square mile (mi/mi²). Road density has been below 1 mile/mi² since the Forest Plan was adopted. The road density has remained relatively stable from a density of 0.68 (mi/mi²) in 2006 to 0.69 in 2023. Road density has fluctuated within the last ten years by 0.01 or 0.02 mi/mi². The

fluctuations primarily come from roads in vegetation management projects being modified to better suit administrative needs. Not all roads are open year-round as some are permitted to be used seasonally to reduce resource concerns like erosion or due to lack of funding to conduct continual road maintenance.

Monitoring Question 33: To what extent is forest management contributing to the development and maintenance of foraging and denning habitat, and connectivity of habitats for Canada Lynx?

Finding: This monitoring question ensures the Ottawa remains consistent with its commitment to provide habitat for native and desirable non-native plants and animals as mandated by the NFMA. The Canada lynx is a Federally threatened species. Due to the low probability of Canada lynx populating the Ottawa, habitat characteristics were evaluated to see if the Forest is meeting habitat targets identified in the Forest Plan. These habitats support the primary prey of lynx, the snowshoe hare. These habitats provide foraging habitat for lynx, which is very important if connectivity habitat is to be maintained for dispersing lynx. The Ottawa is providing a fair amount of foraging habitat in both jack pine and lowland conifer habitat types. Aspen habitat types need to be improved as they are at the low end of desired condition thresholds described in the Forest Plan. If these habitat types were within current objectives, it would enhance the foraging habitat for lynx but would not solely create optimal foraging habitat. Forest management is the ideal instrument for increasing early successional aspen habitat.

Monitoring Question 34: Is the Forest providing minerals and mineral materials to help support economic growth?

Finding: This monitoring question addresses authorizations and permits for Federal mineral exploration, permits issued for gravel use and the Notice to Proceed when dealing with private mineral exploration. Most of the mineral resources beneath the Ottawa are not owned by the Federal government but are in private or State of Michigan ownership. The laws and regulations regarding exploration and exploitation of those minerals are highly variable and depend on the ownership. During this reporting period, no exploration occurred for Federal minerals, no Notices to Proceed were received for exploring private and/or State-owned minerals and no support for economic growth, in terms of this question, occurred during this timeframe. The Ottawa has several gravel pits that provide for internal and external uses, such as free use by county road commissions and sales to private individuals. During FY 2016, test holes were completed to locate new gravel sources and to also expand current gravel sources. As a result, four pit expansions and one pit development were identified as part of the North Zone Gravel Pits Project. During FY 2017 and 2018, work has continued to update gravel pit plans, which will help to ensure consistency among plans to support future operations.

Monitoring Question 35: Has land ownership adjustment facilitated Forest Plan implementation?

Finding: This monitoring question ensures the Ottawa remains consistent with the Forest Plan for land adjustments to facilitate restoration, protection and management of resources. During the reporting period, several land adjustment cases were processed and executed. There was a net gain of 3,581.1 acres. The addition of these acres provided new opportunities for recreation and protection of critical waterbodies occurring on the Ottawa.

Monitoring Question 36: To what extent is forest management meeting hazardous fuels objectives?

Finding: This monitoring question ensures the Ottawa remains consistent with Forest Plan direction to utilize naturally occurring wildland fire, prescribed and mechanical fuel treatments to enhance ecosystem resiliency and function, lower hazardous fuel levels, protect public and private resources and values and provide for public and firefighter safety. Ottawa's Fire Management program views several actions as removing excessive fuels accumulations to achieve results for reducing the risk of intense wildland fire. This includes, but is not limited to, tree removal as part of timber harvest, addressing post-harvest slash, broadcast burning and other actions to prepare sites for regeneration of desired tree species, wildlife habitat creation and tree removal as part of transportation system maintenance. These types of actions are supported by the Forest Plan direction for timber, fire management, wildlife habitat and transportation resources. The acres treated address not only hazard and risk of accumulating fuels, but also focus on ecosystem health as well as local, cultural and economic values.

Monitoring Question 37: To what extent is wildland fire (natural and prescribed) used to maintain or mimic natural processes, and/or restore natural processes and functions to ecosystems?

Finding: This monitoring question measures implementation towards the use of fire as part of the Ottawa's efforts to re-introduce the benefits of fire on the landscape. Fire use as part of fuel reduction is a primary, or active management, target for the Forest Service. Having the flexibility to use fire (natural and prescribed) is important because there are variety of actions that can be used to achieve management objectives. There were no opportunities to allow naturally occurring wildfire, such as fire originating from lightning to be managed for resource benefit, however we have had two natural ignition fires that we managed with a modified suppression strategy. A total of 545 acres were treated using prescribed fire during the reporting period. Broadcast and low intensity under burning was used for ecosystem health on 466 total acres during the period. Prescribed fire was used to treat eight acres of upland opening to regenerate grass species and address woody encroachment to enhance wildlife habitat. Within the openings, pile burning of material was also used on 71 acres during the period. Prescribed fire in these openings, such as those in the sand plains, encourages the growth of native grasses and blueberries.

Monitoring Question 38: To what extent are unneeded roads being decommissioned?

Finding: This monitoring question ensures the Ottawa remains consistent with the Forest Plan and Travel Management Rule (36 CFR 212) direction for transportation management. This monitoring question measures the number of road miles that the Ottawa decommissions per fiscal year. Decisions to decommission roads need to be weighed carefully based on current and future needs for both administrative uses and the public transportation system. there was a decline in decommissioned route miles completed in FY 2017 and FY 2018. This is due, in part, to a shift in the Ottawa's priorities for work accomplishment and funding. Throughout the remainder of the reporting period, route decommissioning has remained a priority for the Forest, averaging 28.6 miles per fiscal year.

Introduction

The Ottawa National Forest comprises over one million acres within the western end of Michigan's Upper Peninsula. The Ottawa resides in the transition between the northern boreal forests and eastern deciduous forest. The area provides a great diversity of species, both flora and fauna, and a wide variety of recreation opportunities. The Forest's boundary encompasses National Forest System lands within the following counties: Baraga, Gogebic, Houghton, Iron, Marquette and Ontonagon.

Purpose

The purpose of this biennial monitoring evaluation report is to facilitate the determination by the Responsible Official of whether a change in plan components or other plan content that guide management of resources on the plan area may be needed (36 Code of Federal Regulations (CFR) 219.12(a)(1)). This report represents one part of the Forest Service's overall monitoring program for this Forest unit. Monitoring and evaluation are continuous learning tools that form the backbone of adaptive management (36 CFR 219.12(d)(2)).

This report is not a decision document. It evaluates the Monitoring Questions and indicators presented in the Monitoring Program chapter of the Ottawa's 2006 Land and Resource Management Plan (Forest Plan), using the direction from the separate Monitoring Guide, in relation to management actions carried out in the plan area, and in conjunction with the Region's Broader-scale Monitoring Strategy.

This is the ninth written report since the 2006 Ottawa Forest Plan was finalized. It is the second report prepared since the monitoring program was modified to respond to the requirements of the 2012 Planning Rule (36 CFR 219.12(a)(5)). This report indicates whether a change to the Forest Plan, management activities, or to the monitoring program may be needed, or whether a new assessment may be warranted based on the new information.

How this Report is Different

Unlike previous monitoring reports, this 2016-2023 Report has purposefully re-incorporated the results from 2016 to 2018 to provide a foundation for a new report format going forward. New trend data is presented for years 2019 to 2023. Each future report will include all questions to provide a continued reporting of trend information, from year to year, and an evaluation based on all the information at hand. The 2016 date was chosen as a starting point because it was the year that the Ottawa established new monitoring program requirements as outlined in the 2012 Planning Rule. The dates of past, present and future evaluations are provided in Appendix 1.

Objectives

There are several objectives for this report, including:

- Assess the current condition (i.e., status) and trend of forest resources.
- Document implementation of the Monitoring Program, including changes.
- Evaluate relevant assumptions, changed conditions, management effectiveness, and progress towards achieving the desired conditions, goals and objectives described in the Forest Plan.

- Share the evaluation with stakeholders.
- Present change recommendation options to the responsible official.

Roles and Responsibilities in Implementing the Plan Monitoring Program

Trevor Hahka, Acting Forest Supervisor for the Ottawa National Forest, is the Responsible Official for the Forest Plan. This report will be provided to him so that he can determine whether changes are needed to the Monitoring Program or the Ottawa Forest Plan's direction.

Implementing the Monitoring Program requires a coordinated effort from many programs' resource specialists who collected the data, evaluated trend information, and disclosed findings in this document. The specialists' names and roles are disclosed for each monitoring question.

Summary of the Plan Monitoring Program Requirements

Monitoring and evaluation requirements have been established through the National Forest Management Act (NFMA) at 36 CFR 219.

Monitoring and evaluation are separate, sequential activities required by NFMA regulations. Monitoring involves answering a specific question through the repeated collection of data by observation or measurement. General types of monitoring include effectiveness, validation, and surveillance. Evaluation involves analyzing and interpreting monitoring data, usually in relation to an established goal or target. The information gained from monitoring and evaluation is used to determine how well the desired conditions, goals, objectives, and outcomes of the Forest Plan are being met. Monitoring and evaluation are critical steps in the process of keeping the Forest Plan responsive to changing conditions, including management direction by the Forest Service, thereby providing the feedback mechanism for an adaptive management framework. The Monitoring Program serves as the foundation for this evaluation.

Previous Monitoring Evaluation Reports

Monitoring of Forest Plan implementation began with the Ottawa's 1987 Forest Plan. A Monitoring Evaluation Report was released annually for years 1987 through 1996, 2001 and 2004. A compilation of information was released at two-year intervals for the 1997-1998, 1999-2000 and 2002-2003 fiscal years.

The current Forest Plan was revised under the 2005 Planning Rule (as permitted by 36 CFR 219.14[e], which allowed the use of 1982 Planning Rule regulations during the revision process). As part of this process, the Monitoring Program was also updated to reflect new Forest Plan direction. The Forest Plan became effective in June 2006, and the first Monitoring Evaluation Report was prepared soon after, which published a partial year of 2006 monitoring results. Monitoring Evaluation Reports were subsequently released annually in fiscal years 2007 to 2011.

A five-year evaluation of this information was planned to be released with the fiscal year 2012 Monitoring Evaluation Report. However, the regulations of the 2012 Planning Rule became effective in May 2012, which established new requirements for monitoring. Therefore, the Ottawa delayed the development of the fiscal year 2012 Monitoring Evaluation Report until implementing direction for the Planning Rule could be written (released by the Washington

Office in January 2013) and transition to the monitoring program elements of the 2012 Planning Rule could be completed (occurred in May 2016).

To be compliant with the 2012 Planning Rule, eight monitoring items (per 36 CFR 219.12) were required to be incorporated into the Ottawa's Monitoring Program (addressed in Questions 5, 10, 11, 18, 26, 27, 29 and 31). The Administrative Change 1 Project was completed, which incorporated these monitoring requirements into the Forest Plan as well as several other changes into the Monitoring Program. This information was disclosed in the 2017 Monitoring Evaluation Report, which addressed fiscal years 2012 through 2016.

The findings from the 2017 Monitoring Evaluation Report and new information led to additional changes needed for the Monitoring Program (pp. 230-233). These changes were established as part of the Administrative Change 2 Project (see Appendix 1). The 2019 Monitoring Evaluation Report resulted in no administrative changes to the Forest Plan or monitoring program.

Specific Requirement for the Biennial Monitoring Evaluation Report

Per the 2012 Planning Rule (36 CFR 219(d)(2)):

The monitoring evaluation report must indicate whether or not a change to the plan, management activities, or the monitoring program, or a new assessment, may be warranted based on the new information.

Potential changes that “may be warranted” are presented as a recommendation for Monitoring Questions as applicable. The results of this Monitoring Evaluation Report assist the Responsible Official to take this information into consideration and make necessary decisions for changing the Forest Plan, management activities or the monitoring program, or to begin an assessment. Changes to monitoring questions or an indicator are considered substantive changes to the monitoring program. This monitoring and evaluation report serves as the public notice and the 30-day comment period commences on the date of publication of this report to the Ottawa National Forest website per 36 CFR 219.16(c)(6). Comments or questions regarding changes to monitoring questions or indicators may be submitted for consideration to Acting Forest Supervisor Trevor Hahka by email at; sm.fs.Ottawa_NF@usda.gov

How to Use this Report

This biennial monitoring evaluation report is a tool and a resource for the Forest Service to assess the condition of forest resources in relation to Forest Plan direction and management actions. It is also a tool and a resource for the public to learn more about how the Forest Service is managing forest resources.

For the USDA Forest Service

Evaluation is the process of transforming data into a value-added information process. It is a process of synthesis that brings together value, judgment and reason with monitoring information to answer the question, “So what?” and perhaps, “Why?”. Evaluation requires context. A sense of the history of the place or the circumstances (temporal and spatial context) is important to the evaluation of management activities. Evaluation describes movement from a known point (baseline or reference condition) either toward or away from a desired

condition. The desired conditions may or may not ever be fully achieved, but it is important to know if management activities are heading in the right direction.

Evaluation produces information that is used to infer outcomes and trends: conclusions will be drawn from an interpretation of evidence. These conclusions are documented in this Biennial Monitoring Evaluation Report. Continuous updating and evaluation of monitoring data provides a means to track management effectiveness from year to year and to show the changes that have been made or are still needed. Tracking this information is useful as part of the adaptive management process to determine if changes are needed to maintain consistency with the 2012 Planning Rule; that is, changes to the Forest Plan, management activities or monitoring program; or if an assessment is warranted).

Key information displayed in the Biennial Monitoring Evaluation Report includes, but is not limited to:

- Forest accomplishments toward achieving multiple use objectives for providing goods and services.
- The degree to which on-the-ground management is maintaining or making progress toward the desired conditions and objectives for the Forest Plan.
- The effects of the various resource management activities on the productivity of the land.
- Conclusions and recommendations regarding the need to adjust monitoring or change the Forest Plan.
- Status of other agency/institution cooperative monitoring.
- Update of research needs.
- Documentation of any monitoring that has not been completed and the reasons and rationale (budget or staffing limitations or unexpected conditions, such as a severe fire season).

For Everyone Else

The term “public” used in this document is a broad term that includes private citizens, but also refers to local, state, regional and national government entities, Federally recognized Native American Tribes, formal collaborative groups, cooperating agencies, special interest groups, community group and others.

Members of the public can use this report to understand:

- How the Forest Service collected and evaluated monitoring data in the Forest Plan area and the basis for conclusions reached.
- Key steps in the overall monitoring program including upcoming opportunities for public participation; how the public will be informed of opportunities; and how public input will be used as implementation of the monitoring program progresses.
- The document’s relationship to past monitoring reports, future biennial monitoring evaluation reports and the broad-scale monitoring strategy.

A copy of this report can be downloaded from the Ottawa's website:
<https://www.fs.usda.gov/r09/ottawa/planning>.

Sharing this document with the Tribal, State and local governments, private organizations and the general public, allows the Forest Service to ensure transparency is maintained in terms of monitoring processes and how findings highlight the effectiveness of the Forest Plan and/or provides recommendations for the future. The remainder of this document describes the details of how monitoring data were collected, reported, and evaluated for the Monitoring Program to support the recommendation options. Each monitoring question includes a table similar to the example in Table 1.

The status represents the current condition, level or value of the indicator. The trend is the trajectory of the data over time. Targets are defined by the Forest Plan or by the Ottawa's Monitoring Team based on Forest Plan planning information and other data pertinent to the monitoring question. The current status and trend information are color coded as follows.

- Green (within target - positive current status and positive recent trend)
- Yellow (within target – positive current status and negative recent trend)
- Yellow (outside target – negative current status and positive recent trend)
- Red (outside target – negative current status and negative recent trend)

Table 1. Example of status and trend indicators

Indicators		Recent Trend	
<i>Applicable Indicator Listed Here</i>		<i>Towards Target</i>	<i>Away from Target</i>
Current Status	<i>Within Target</i>		
	<i>Outside Target</i>		

For each monitoring question addressed, the evaluation will indicate whether a change to the Forest Plan, management activities or monitoring program is needed. The recommendations contained within this report are not intended to be exhaustive and future reports may contain substantive changes. Additionally, monitoring results may highlight areas where a new assessment is warranted (36 CFR 219[d][2]).

Monitoring Question 1 — How do actual outputs and services compare to those outputs and services in the Forest Plan?

Context for this Evaluation

This monitoring question discloses trends in allowable sale quantity (ASQ). Specifically, the trends highlight the comparison between the actual amount that has been, and projected quantity of timber volume that could be, sold from suited timberland. The projected amounts were estimated as an average annual amount per decade of Forest Plan implementation through computer modeling (Appendix E).

Table 1. Background information for Monitoring Question 1

Drivers

The National Forest Management Act (NFMA) requires a quantitative estimate of actual performance through comparing the outputs and services with those projected by the Forest Plan.			
Primary Forest Plan Component Addressed	Monitoring Question Indicator		
Allowable Sale Quantity; Appendix E (p. E1-E2).	a. Comparison of the projected and actual timber volume sold by product.	b. Comparison of the projected and actual acres harvested by treatment method.	c. Comparison of the projected and actual acres of forest treated annually.
Who collected this data? Who is Responsible for analyzing this question?			
Michael Strieter, Forest Silviculturist			

When was this monitoring question last updated?

- Date of current evaluation: February 2024
- Date of previous evaluation: Monitoring Evaluation Report 2019

Table 2. Relationship of Monitoring Question 1 to other Forest Plan direction

Question 1	Key Forest Plan Components		
	<i>Desired Conditions</i>	<i>Goals and Objectives</i>	<i>Standards and Guidelines</i>
Indicators 1a, 1b and 1c	Desired Vegetative Compositions per Management Area (Forest Plan Tables 3-1, 3-4, 3-7, 3-10, 3-13, 3-16, 3-19, 3-22; pp. 3-4, 3-8, 3-13, 3-18, 3-23, 3-29, 3-57, and 3-63, respectively)	Goal 14: Provide a sustained yield of timber and Objective a, which provides for a mix of timber sale sizes and species/products (p. 2-6). Goals 15 through 17: Manage northern hardwood, aspen/paper birch, long-lived and short-lived conifer species where appropriate (p. 2-6). Objective 27a: Maintain at least 12,000 acres of 0–9-year aspen/paper birch (p. 2-8).	Guideline: Generally, manage forest types within the rotation age ranges specified (pp. 2-16 and 2-18 to 2-23)

**What monitoring activities have been conducted since the last monitoring evaluation?
What protocols were used to collect these data?**

Monitoring activities for this question have been gathered through database queries. No site-specific monitoring occurred.

The protocols used for Monitoring Question 1 and its indicators consisted of the following (see Monitoring Guide):

- The volume sold and harvested was obtained from the Timber Cut and Sold Report which is developed from information tracked in the Forest Products Financial System and Timber Information Management (TIM) databases.
- The Forest Service Activity Tracking System (FACTS) database was queried to determine the number of acres harvested by treatment method and fiscal year. Additionally, this information highlights the differences between the total, actual acres harvested through selection, thinning, shelterwood and clearcut silvicultural prescriptions per fiscal year in comparison to the acreage estimated for Forest Plan implementation.

What is the target, or range for the indicator being measured? Is there an alert level (such as a trigger or threshold), associated with the target that should be noted?

The target for this question's indicators is to align the actual wood volume harvested and sold to that projected in the Forest Plan as much as possible, in consideration of factors beyond the control of the Ottawa (such as market fluctuations, weather conditions and funding levels). Additionally, it is also an objective to progress the average annual harvest acres per silvicultural prescription closer to the Forest Plan's modeled outputs that were calculated based on existing conditions. Each of the three indicators plays a role in highlighting trends towards supporting the Ottawa's ASQ.

The Ottawa is currently within the second decade of implementation. The Forest Plan outlines that the average annual ASQ is projected to be 134.5 million board feet (MMBF). This translates to an annual average of 16,700 acres of timber harvest practices on suited land in the second decade of Forest Plan implementation. Given below-projected ASQ levels during the first decade of Forest Plan implementation, a continued decrease in ASQ or a maintained decrease below the Forest Plan estimate, should be noted.

Has any new Best Available Scientific Information (BASI) informed this monitoring question, indicators, or methodology? Where is the data for this monitoring question stored?

No new best available scientific information has been used to evaluate this monitoring question. However, information outlined in the tables below was obtained from the most current sources available.

Monitoring Question 1 - Results

Table 3. Status and trend of the indicator for Monitoring Question 1

Indicators	Recent Trend	
	<i>Towards Target</i>	<i>Away from Target</i>
<i>Indicator 1a:</i> Comparison of the projected and actual timber volume sold by product.		

Indicators		Recent Trend	
Current Status	<i>Within Target</i>		
	<i>Outside Target</i>	X	
<i>Indicator 1b: Comparison of the project and actual acres harvested by treatment method.</i>		Recent Trend	
		<i>Towards Target</i>	<i>Away from Target</i>
Current Status	<i>Within Target</i>		
	<i>Outside Target</i>	X	
<i>Indicator 1c: Comparison of the projected and actual acres of forest treated annually.</i>		Recent Trend	
		<i>Towards Target</i>	<i>Away from Target</i>
Current Status	<i>Within Target</i>		
	<i>Outside Target</i>	X	

What level of confidence is there in the accuracy and precision?

There is a high level of confidence in the quality and quantity of data collected because the same staff has been collecting and reporting this information, in the same manner, for several years. The Forest Plan states that the methods used for this monitoring question have a high degree of repeatability, reliability, accuracy and precision (p. 4-4).

Monitoring Question 1- Evaluation Discussion

This section (and throughout the remainder of the document) will indicate whether a change to the Forest Plan, management activities or monitoring program is needed. Additionally, monitoring results may highlight areas where a new assessment is warranted (36 CFR 219(d)(2)).

Forest Plan

Are the current Forest Plan components (desired conditions, goals, objectives) achievable in the timeframes described and does the Forest Plan provide sufficient direction (standards, guidelines, suitability, designated lands) to achieve these components?

The Forest Plan determined that 488,100 acres of land are suitable for timber production, which is about half of the nearly 1 million acres that comprise the Ottawa. The Forest Plan also set the ASQ of wood products at 21.8 million cubic feet (MMCF) per year, or 134.5 MMBF per year, for the second decade (p. 3-83). The ASQ is the quantity of timber that may be sold from the area of suitable land covered by the Forest Plan for a specified period, usually expressed as the average annual ASQ. The amount of timber that may be sold in a single year may exceed the average annual ASQ if the decadal total ASQ is not exceeded each decade.

The average number of acres projected to be harvested annually in the Forest Plan is 16,700 acres (FEIS, p. 3-80). The five-year average from FY 2019 to FY 2023 (see Table 6) is 7,490 acres which is about 45% of Forest Plan annual projections (16,700 acres). The average volume (see Table 4) that has been sold over the last five years has resulted in a wood volume of 13.3 MMCF (or 82.2 MMBF), which is about 61% of the annual ASQ (21.8 MMCF).

The land designated as suited for timber production is large enough to support the ASQ. However, the volume of timber offered annually is largely dependent on the funding from

Congress. The Ottawa has not been funded at a level necessary to meet the ASQ. Given these factors, a change to the Forest Plan’s desired conditions and/or management direction is not needed currently.

Forest Assessment

Is the status or trend of the monitoring indicators substantially different than described in the Forest Assessment, or was an assumption in the Forest Assessment proven to be invalid from the monitoring data?

The Ottawa has not met the ASQ established as part of the 2006 Forest Plan. Several factors are responsible for this gap, which are not all related to assumptions of the Forest Assessment (see the Monitoring Evaluation Discussion section).

Management Actions

Did any of the management activities potentially result in adverse or beneficial effects to the status and trend of the monitoring indicators?

The volume and number of acres harvested depend on the number of timber sales (and respective volume) under contract, the capability of the operators, wood volume calculated per acre, market conditions and operating conditions. This report shows trends from 2016 to the time of this writing but focuses on the most recent five year average.

The five-year average (2019-2023) volume sold is more than the five-year average volume harvested, which has resulted in an increase of 19.8 MMBF of uncut volume under contract (470 MMBF total uncut volume as of January 31, 2024) (see Table 4 and Table 5). The five-year average acres harvested is 7,490 acres or 45% (see Table 6) of projected Forest Plan annual acres. Due to the COVID-19 pandemic there was a decrease in timber harvesting in FY 2020 due to mill related closures and decrease in pulp and paper demand which contributed to the increase of uncut volume under contract.

Table 4. Wood volume sold by product type (FY 2016 to FY 2023)

Fiscal Year	Sawtimber		Pulpwood		Total	
	MMBF	MMCF	MMBF	MMCF	MMBF	MMCF
2016	7.4	1.4	38.9	6.1	46.3	7.5
2017	19.0	3.1	52.3	8.5	71.4	11.6
2018	23.9	3.9	60.6	9.8	84.4	13.7
2019	15.6	2.5	66.5	10.8	82.1	13.3
2020	15.2	2.5	50.2	8.1	65.4	10.6
2021	20.8	3.4	67.7	11.0	88.5	14.3
2022	20.0	3.2	69.9	11.3	89.8	14.6
2023	15.1	2.4	70.2	11.4	85.3	13.8
Average	17.1	2.6	54.7	9.6	70.9	11.5

Table 5. Wood volume harvest by product type (FY 2016 to FY 2023)

Fiscal Year	Sawtimber		Pulpwood		Total	
	MMBF	MMCF	MMBF	MMCF	MMBF	MMCF
2016	7.4	1.4	38.9	6.1	46.3	7.5
2017	11.3	1.8	57.9	9.4	69.3	11.2

Fiscal Year	Sawtimber		Pulpwood		Total	
	MMBF	MMCF	MMBF	MMCF	MMBF	MMCF
2018	16.5	2.7	54.9	8.9	71.4	11.6
2019	14.1	2.3	44.7	7.2	58.8	9.5
2020	10.1	1.6	30.9	5.0	41.0	6.6
2021	18.3	3.0	53.8	8.7	72.1	11.7
2022	21.3	3.4	58.9	9.5	80.2	13.0
2023	14.0	2.3	45.7	7.4	59.7	9.7
Average	13.2	2.1	43.4	7.0	56.6	9.2

Table 6. Actual harvest acres compared to Forest Plan annual estimate (FY 2016 to FY 2023)

Fiscal Year	Selection	Thinning	Shelterwood	Clearcutting	Totals
2016	2,552	848	308	745	4,153
2017	3,029	2,480	227	1,315	7,051
2018	4,594	3,782	137	1,473	9,986
2019	3,894	1,731	126	1,141	6,892
2020	1,875	2,499	135	1,063	5,572
2021	2,935	3,723	91	1,390	8,139
2022	4,676	3,390	95	1,587	9,748
2023	2,637	2,650	119	1,693	7,099
Average	2,955	2,532	116	207	6,811
Forest Plan Average Annual Estimate	8,600	3,900	1,000	3,200	16,700
% of Forest Plan Estimate	37%	72%	11%	43%	45%

Monitoring Program

Did the monitoring results provide all the information necessary to answer the monitoring question?

Yes, the data collection protocols and indicators adequately provide the necessary information to answer the monitoring question.

Monitoring Question 1 - Recommendations

There are no recommendations for changes to this question.

Table 7. Summary of monitoring recommendations for Monitoring Question 1

Changes may be warranted for the:	Yes	Maybe, not enough information to determine at this time	No
Forest Plan			☐
Forest Assessment			☐

Changes may be warranted for the:	Yes	Maybe, not enough information to determine at this time	No
Management Actions			☐
Plan Monitoring Program			☐

Monitoring Question 2 — How do actual outputs and services compare to those outputs and services projected in the Forest Plan.

Context for this Evaluation

This monitoring question ensures the Ottawa remains consistent with meeting Forest Plan goals and objectives in a financially responsible manner.

Table 8. Background information for Monitoring Question 2

Drivers	
NFMA: Documentation of costs associated with carrying out the planned management prescriptions as compared with costs estimated in Forest Plan. Goal 14 and Objectives 14a and 14b of the Forest Plan (p. 2-6).	
Primary Forest Plan Component Addressed	Monitoring Question Indicator
Provide a mix of timber sale sizes and species/products, which are consistent with the range of purchaser demands and are efficient to prepare and administer (Forest Plan, Goal 14, p. 2-6).	a. Comparison of the projected and actual timber management costs.
	b. Comparison of the projected and actual reforestation and timber sale improvement costs
Who collected this data? Who is Responsible for analyzing this question?	
Christopher Boroski, Timber and Silviculture Program Manager	

When was this monitoring question last updated?

- Date of current evaluation: May 2024
- Date of previous evaluation: 2017 Monitoring Evaluation Report

Table 9. Relationship of Monitoring Question 2 to other Forest Plan direction

Question 2	Key Forest Plan Components		
	<i>Desired Conditions</i>	<i>Goals and Objectives</i>	<i>Standards and Guidelines</i>
Indicator 1a and 1b	Desired Vegetative Compositions per Management Area (Forest Plan Tables 3-1, 3-4, 3-7, 3-10, 3-13, 3-16, 3-19, 3-	Goals 15 through 17: Manage northern hardwood, aspen/ paper birch, long-lived and short-lived conifer	Guideline: Generally, manage forest types within the rotation age ranges specified (p. 2-16 and 2-18 to 2-23)

Question 2	Key Forest Plan Components		
	<i>Desired Conditions</i>	<i>Goals and Objectives</i>	<i>Standards and Guidelines</i>
	22; pp. 3-4, 3-8, 3-13, 3-18, 3-23, 3-29, 3-57, and 3-63, respectively)	species where appropriate (p. 2-6). Goals 18-19: Emphasize natural regeneration over artificial reforestation (p. 2-7). Maintain or enhance the long-term viability and yield of special forest products while meeting integrated resource management objectives consistent with land capabilities (p. 2-7) Objective 27a: Maintain at least 12,000 acres of 0–9-year aspen/paper birch (p. 2-8). Goal 28: Manage Kirtland’s warbler jack pine habitat using ecosystem management principles that mimic/resemble historic conditions designing and configuring treatment blocks that mimic the regeneration effects of stand replacing wildfires (p. 2-9).	Appendix C – Harvest Cutting Methods (p. C1-C12) Appendix E – Proposed and Probable Practices, Goods Produced and Other Information (pp. E1-E2)

**What monitoring activities have been conducted since the last monitoring evaluation?
What protocols were used to collect these data?**

Financial spending reports and contract costs were used to generate the cost in US dollars (USD) per CCF sold as well as the cost per acre of silvicultural treatments. Actual costs were

averaged for the previous 5-year period (FY 2019 to FY 2023) to compare actual costs to the costs projected in the Forest Plan.

What is the target, or range for the indicator being measured? Is there an alert level (such as a trigger or threshold), associated with the target that should be noted?

The estimated cost per CCF for Timber Management is shown in Table 10 below. The estimated cost for silvicultural programs is shown in Table 11. These forecasted costs were estimated using the FY 2004 and FY 2005 Budget Formulation and Execution System (BFES) unit costs. Costs included overhead support rates, and all costs associated in support of each activity (timber sale planning, preparation, and administration as well as silvicultural contract preparation, contract costs, contract inspection, seedling and post activity monitoring). These costs were not adjusted for inflation.

Table 10. Unit costs for timber management projected in the Forest Plan

Volume Sold		Forest Plan Estimated Cost Per CCF (USD)
CCF	MMBF	
81,000	50	\$54.00
97,000	60	\$46.00
100,500	65	\$44.00
120,500	75	\$41.00
131,000	80	\$40.00

Table 11. Reforestation and timber stand improvement costs estimated by the Forest Plan

Activity	Forest Plan Estimated Cost (USD) Per Acre
Planting	\$525.00
Site Preparation for Natural Regeneration	\$86.00
Stocking Surveys	\$13.00
Plantation Release (TSI)	\$95.00

Has any new Best Available Scientific Information (BASI) informed this monitoring question, indicators, or methodology? Where is the data for this monitoring question stored? No new best available scientific information has been used to evaluate this monitoring question. The information used to answer this question is stored in the Ottawa's electronic records.

Monitoring Question 2 - Results

Table 12. Status and trend of the indicator for Monitoring Question 2

Indicators		Recent Trend	
<i>Indicator 2a:</i> Comparison of the projected and actual timber management costs.		<i>Towards Target</i>	<i>Away from Target</i>
Current Status	<i>Within Target</i>	X	

	<i>Outside Target</i>		
<i>Indicator 2b:</i> Comparison of the projected and actual reforestation and timber sale improvement costs		<i>Towards Target</i>	<i>Away from Target</i>
Current Status	<i>Within Target</i>		
	<i>Outside Target</i>	X	

Over the 5-year period, the volume sold increased, resulting in an annual average of 82.4 MMBF at a cost of \$52.37 (see Table 13). This cost is more than what was projected in the Forest Plan for this amount of volume, which was anticipated to be about \$40.00 per CCF (see Table 10).

Table 13. Timber costs, volume sold, and average dollars spent per CCF (FY 2016 to FY 2023)

	FY 16	FY 17	FY18	FY 19	FY 20	FY 21	FY 22	FY 23	Totals	Annual Average
Timber Management Costs (USD)	4,791,605	-	-	5,987,979	7,373,270	6,566,289	7,548,957	7,327,975	34,804,470	6,960,894
Volume Sold (MMBF)	671	-	-	82.1	65.6	88.5	90.2	85.7	412.1	82.4
Volume Sold (CCF)	110,161	-	-	133,942	107,705	145,482	147,958	139,517	674,603	134,921
USD/CCF Sold	\$43.50	-	-	\$44.71	68.46	45.13	51.02	52.52	N/A	52.37

Timber Sale Costs

The actual dollars that the Ottawa received for timber sale planning, preparation, and administration from 2016 to 2023 are displayed in Table 10. Timber management funding is primarily derived from dollars appropriated by Congress timber funding (NFTM) and watershed funding (NFVW funding). Based on the collection from the sale of timber on Federal lands, the budget is supplemented with dollars in permanent and trust funds (Cooperative Work, Knutson-Vanderberg, Regional Project [CWK2], Stewardship Retained Receipts [SSCC], Salvage Sale Fund [SSSS] and Timber Sale Pipeline [TPPS]). Over the 5-year period, there has been a semi-steady increase in dollars for timber management specifically in the Timber Management (NFTM) budget (see Figure 1). In 2021, a change in the budget process occurred and NFTM no longer was used to cover Forest Service salary and associated expenses. Beginning in 2021, the budget code ‘National Forest Salary and Expense’ (NFSE) was created. This change is shown in Table 13.

Projected timber management costs in the Forest Plan were based on estimates from FY 2004 and FY 2005-unit costs modeled by the BFES; the FY 2004 budget allocation and unit costs in the Forest Service Handbook 2409.18 (Timber Sale Preparation). In the Forest Plan, costs for timber sale planning, preparation and administration were all combined into one average cost per CCF sold. Costs also included overhead support costs. Unit costs per CCF sold are reduced as volume sold increases. The rates that were projected in the Forest Plan (not adjusted for inflation) are displayed in Table 10.

Discussion

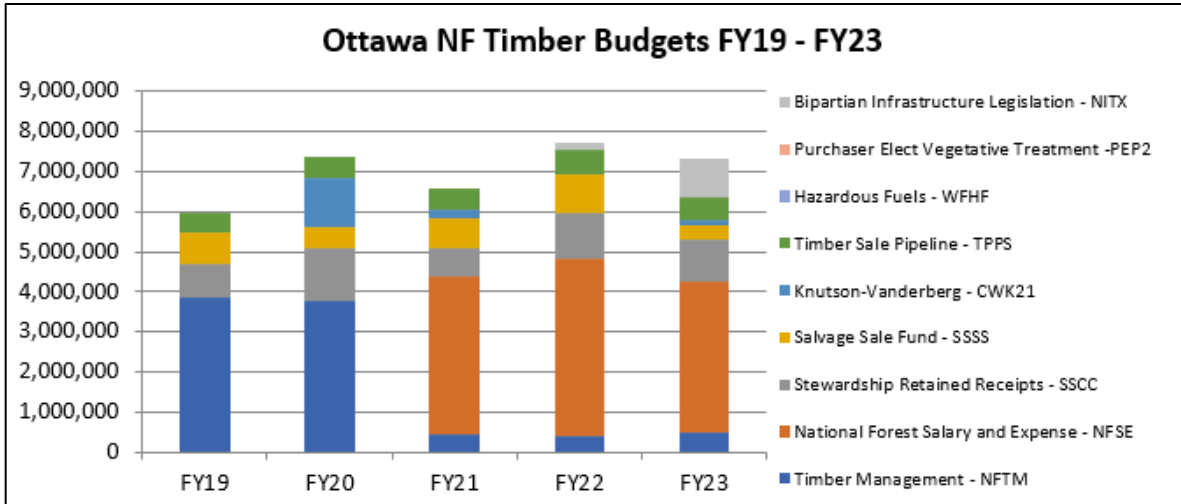


Figure 1. Ottawa timber funding sources (FY 2019 to FY 2023)

The total timber management costs, the volume of timber sold, and the dollars spent per CCF sold for FY 2019 to FY 2023 are shown in Table 13. During the reporting period, the Ottawa spent an average of \$6.9 million to plan, prepare and administer timber sales. The average volume sold during that time was 82.4 MMBF (134,921 CCF). The average amount spent per CCF sold was \$52.37, which is more than what was projected in the Forest Plan for a similar volume, 80 MMBF or 131,000 CCF (see Table 13 and Table 14). The budget has decreased over the reporting period (see Figure 1). The average planting costs, natural regeneration survey costs, timber sale improvement and site preparation costs are more than what was projected in the Forest Plan (see Table 11).

Reforestation and Timber Sale Improvement Costs

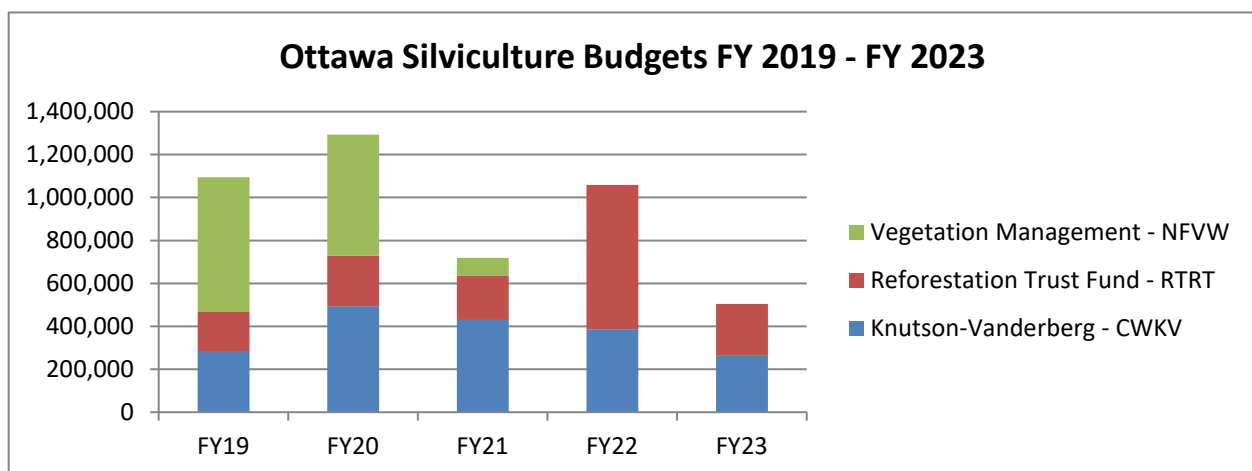


Figure 2. Silvicultural funding for reforestation and timber stand improvement (FY 2019 to FY 2023)

Table 14. Actual costs compared to Forest Plan estimated costs (FY 2019 to FY 2023)

Planting Costs Actual Average Costs (USD)/Acre	Cost/Acre*	Difference	Cost/Acre*	Difference **
Planting Contract (\$100), Seedlings (\$269) and Inspection (\$43)	\$525.00	(\$155.00)	\$792.05	\$112.05
Contract Preparation (\$30), Monitoring (\$43) and Overhead Costs (\$194)				
Total Costs (\$680)				
Natural Regeneration Survey Costs Actual Average Cost (USD)/Acre	Cost/Acre	Difference	Cost/Acre	Difference
First Year Surveys (\$10) and Third Year Surveys (\$10), Certification (\$4)	\$12.00	(\$21.00)	\$18.10	(\$16.00)
Overhead Costs (\$10)				
Total (\$34)				
Plantation Release Actual Average Cost (USD)/Acre	Cost/Acre	Difference	Cost/Acre	Difference
Release Contract (\$162), Inspection (\$12)	\$95.00	(\$169)	\$143.32	(\$121)
Contract Preparation (\$15) and Overhead Costs (\$75)				
Total Costs (\$264)				
Site Preparation Costs Actual Average Costs (USD)/Acre	Cost/Acre	Difference	Cost/Acre	Difference
Release Contract (\$177) and Inspection (\$6)	\$86.00	(\$191.00)	\$129.75	(\$147.25)
Contract Preparation (\$15) and Overhead Costs (\$79)				
Total Costs (\$277)				

*Forest Plan estimate

** Inflation calculated using the U.S. Bureau of Labor Statistics, Consumer Price Index Calculator for the period of January 2006 to January 2023. Site accessed on May 16, 2024.

Discussion

The Ottawa received an average of \$1.1 million dollars between 2019 to 2023 for reforestation and TSI). This funding is derived from CWKV (trust fund dollars collected from the sale of Federal timber), RTRT funds (dollars collected from fees for recreational fishing and boating permits, plus tariff fines), and NFVW funds. The actual dollars that the Ottawa received for reforestation and TSI work in 2019 to 2023 are displayed in Figure 2. There has been a slight decrease in the funding for reforestation and TSI since 2019.

Projected reforestation and TSI costs that were modeled in the Forest Plan were based on estimates from FY 2004 and FY 2005 BFES, unit costs and the FY 2004 budget allocation. Costs for reforestation and TSI were disclosed on a per acre basis in the Forest Plan, which included overhead support costs. The rates that were projected in the Forest Plan (not adjusted for inflation), and the costs incurred between FY 2019 and FY 2023 are displayed in Table 11. Costs include contract costs, contract preparation costs, contract inspection costs, the price of tree seedlings, monitoring costs to determine survival stocking after the first and third growing seasons and overhead costs.

What level of confidence is there in the accuracy and precision?

Actual costs of implementation of the Timber and Silviculture program accomplishments have been reported since 2006 utilizing the same reports and worksheet for computing the reported figures. Chapter 4 of the Forest Plan states that the Precision/Reliability Class rating for this question is Class A (p. 4-7). A Class A rating states that the results have a high degree of repeatability, reliability, accuracy and precision (p. 4-3)

Monitoring Question 2 - Evaluation Discussion

Table 15. Prior monitoring and evaluation indicator results

Fiscal Year	Analyzed Fiscal Years	Results
2011	FY 2006 through FY 2011	Timber Management and Regeneration Survey costs were below Forest Plan projection, TSI and site preparation costs were higher than Forest Plan projection.
2017	FY 2012 through FY 2016	Timber Management and Regeneration Survey costs were below Forest Plan projection, TSI and site preparation costs were higher than Forest Plan projection.

Past reports have shown that timber management and regeneration survey costs have remained below Forest Plan projected costs. TSI and site preparation costs, however, have been higher than Forest Plan projected costs in both previous reports.

Forest Plan

Are the current Forest Plan components (desired conditions, goals, objectives) achievable in the timeframes described and does the Forest Plan provide sufficient direction (standards, guidelines, suitability, designated lands) to achieve these components?

Yes, the Forest Plan components are achievable, and the Forest Plan does provide sufficient direction to achieve the components of Forest-wide Goal and Objective 14a and 14b (p. 2-6). The Ottawa's continues to provide a sustainable yield of timber while meeting integrated resource management objectives consistent with land capabilities. The level of activity to meet the Forest Plan components is a direct result of the available funding.

Forest Assessment

Is the status or trend of the monitoring indicators substantially different than described in the Forest Assessment, or was an assumption in the Forest Assessment proven to be invalid from the monitoring data?

The cost per unit assessed in the Forest Plan for timber management volume sold had a maximum volume of 130,000 CCF. The current 5-year average volume sold is 134,921 CCF. The trend in annual volume sold has exceeded the 130,000 CCF in Fiscal Years 2019, 2021, 2022 and 2023. Although the annual sold volume is exceeding the projected volume, the overall harvest volume is still below the ASQ as described in Monitoring Question 1.

The cost of reforestation and timber sale improvement costs continue to trend above Forest Plan projected costs as observed in the current and 2017 Monitoring Evaluation Report. This is due numerous factors including inflation, changes in contractor pools and changes in the scope of work conducted for included activities.

Management Actions

Did any of the management activities potentially result in adverse or beneficial effects to the status and trend of the monitoring indicators?

The monitoring indicators remain viable for measuring the cost of implementing the timber management and silvicultural activities.

Monitoring Program

Did the monitoring results provide all the information necessary to answer the monitoring question?

Yes, the Forest Plan direction is clear and concise while providing the necessary information to answer the monitoring question repeatedly and reliably.

Monitoring Question 2 - Recommendations

Table 16. Summary of monitoring recommendations for Monitoring Question 2

Changes may be warranted for the:	Yes	Maybe, not enough information to determine at this time	No
Forest Plan			☐
Forest Assessment	☐		
Management Actions			☐

Changes may be warranted for the:	Yes	Maybe, not enough information to determine at this time	No
Plan Monitoring Program			☐

Changes in how salary and expenses are accounted for have resulted in changes in appropriated funding allocations. The budget modernization change to NFSE has removed tracking of salary of individual employees at the individual unit level. The recommended change for this monitoring question pertains to the methodology for tracking salary and expenses. The recommendation is to track the cost of salary and expense for the timber program based on encumbered positions for the fiscal year using the cost per day for each employee that was charged to NFSE.

The Forest Plan projected costs did not include inflation. Inflation should be considered when comparing the cost of operations from 2006 to the average cost of the analysis period. Based on the U.S. Bureau of Labor Statistics Consumer Price Index (CPI) Inflation Calculator, the projected cost of selling 130,000 CCF of \$40 in January 2006 has a cost of \$60.35 in January 2023. This shows that the current average cost for the reporting period of \$52.37 (Table 13) is below the projected costs of the 2006 Forest Plan, if inflation was included. Furthermore, Table 14 shows how the actual costs compare to the Forest Plan projected costs for reforestation and timber sale improvement if inflation was considered.

Monitoring Question 3 — To what extent do output levels and the mix of sawtimber and pulpwood compare to those levels projected?

Context for this Evaluation

This monitoring question discloses trends in timber volume sold by product and payments to counties. Specifically, the trends in sold volume of hardwood and pine sawtimber and hardwood, pine and aspen pulpwood. This question will disclose the trends in Payment in Lieu of Taxes (PILT) and Secure Rural Schools Act (SRS) payments.

Table 17. Background information for Monitoring Question 3

Drivers
A quantitative estimate of performance comparing outputs and services with those projected by the Forest Plan and Goal 37 (p. 2-11).

Primary Forest Plan Component Addressed	Monitoring Question Indicator
The NFMA requires a quantitative estimate of performance comparing outputs and services with those projected by the Forest Plan. This monitoring question also measures trends toward achieving conditions outlined in Goal 14 of the Forest Plan (p. 2-6) that states, “provide a sustained yield of timber while meeting integrated resource management objectives consistent with land capabilities.” Objective 14(a) is also applicable (p. 2-6).	a: Timber volume sold by product.
	b: Payments to counties.
Who collected this data? Who is Responsible for analyzing this question?	
Michael Strieter, Forest Silviculturist	

When was this monitoring question last updated?

- Date of current evaluation: February 2024
- Date of previous evaluation: 2017 Monitoring Evaluation Report

Table 18. Relationship of Monitoring Question 3 to other Forest Plan direction

Question 3	Key Forest Plan Components		
	<i>Desired Conditions</i>	<i>Goals and Objectives</i>	<i>Standards and Guidelines</i>
Indicators 3a and 3b	Desired Vegetative Compositions per Management Area (Forest Plan Tables 3-1, 3-4, 3-7, 3-10, 3-13, 3-16, 3-19, 3-	Goal 7: Identify opportunities for the Ottawa to contribute to the social and economic vitality of	Guideline: Generally, manage forest types within the rotation age ranges specified (pp. 2-16 and 2-18 to 2-23).

Question 3	Key Forest Plan Components		
	<i>Desired Conditions</i>	<i>Goals and Objectives</i>	<i>Standards and Guidelines</i>
	22; pp. 3-4, 3-8, 3-13, 3-18, 3-23, 3-29, 3-57, and 3-63, respectively)	local communities (p. 2-4). Goal 14: Provide a sustained yield of timber while meeting integrated resource management objectives consistent with land capabilities (p. 2-6).	

What monitoring activities have been conducted since the last monitoring evaluation? What protocols were used to collect these data?

Monitoring activities for this question have been gathered through database queries. No site-specific monitoring occurred for FYs 2016 to 2023. The protocols used for Monitoring Question 3 and its indicators consisted of the following (see Monitoring Guide):

- The volume sold by product and contract group was obtained from the Timber Cut and Sold Report which is developed from information tracked in the Forest Products Financial System and Timber Information Management (TIM) databases.
- Payments in Lieu of Taxes (PILT) were obtained from the Department of Interior website (<https://www.doi.gov/pilt>).
- Payments to local counties through the Secure Rural Schools Program (SRS) and the 25% fund were obtained from U.S. Forest Service Secure Rural Schools website (<https://www.fs.usda.gov/working-with-us/secure-rural-schools/payments>).

What is the target, or range for the indicator being measured? Is there an alert level (such as a trigger or threshold), associated with the target that should be noted?

The target for this question's indicators is to align the actual wood volume harvested and sold to that projected in the Forest Plan as much as possible, in consideration of factors beyond the control of the Ottawa such as market fluctuations, changing weather patterns and funding levels.

Has any new Best Available Scientific Information (BASI) informed this monitoring question, indicators, or methodology? Where is the data for this monitoring question stored?

No new best available scientific information has been used to evaluate this monitoring question. The data for timber volume sold by product type is stored in the TIM databases. Data for PILT payments is tracked by the Department of Interior and available on the Payments in Lieu of Taxes website. SRS and 25% fund payment data is available on the

United States Department of Agriculture (USDA) Forest Service Secure Rural Schools website.

Monitoring Question 3 - Results

Table 19. Status and trend of the indicator for Monitoring Question 3

Indicators		Recent Trend	
<i>Indicator 3a:</i> Timber volume sold by product.		<i>Towards Target</i>	<i>Away from Target</i>
Current Status	<i>Within Target</i>		
	<i>Outside Target</i>	X	
Indicators		Recent Trend	
<i>Indicator 3b:</i> Payments to counties.		<i>Towards Target</i>	<i>Away from Target</i>
Current Status	<i>Within Target</i>	X	
	<i>Outside Target</i>		

What level of confidence is there in the accuracy and precision?

There is a moderate to high level of confidence in the quality and quantity of data collected because the same collection protocols and reporting standards have been in place for several years. The Forest Plan states that the methods used for this monitoring question have a high degree of repeatability, reliability, accuracy and precision (Forest Plan, p. 4-4).

Monitoring Question 3 - Evaluation Discussion

Forest Plan

Are the current Forest Plan components (desired conditions, goals, objectives) achievable in the timeframes described and does the Forest Plan provide sufficient direction (standards, guidelines, suitability, designated lands) to achieve these components?

The Forest Plan projected the annual harvest for the second decade to be 21.8 MMCF per year (or 134.5 MMBF per year). The Forest Plan categorized this volume by product group, 5.1 MMCF or 16.6 MMBF sawtimber and 16.8 MMCF or 104 million MMBF pulpwood (p. 3-83).

The average volume (see Table 21) that has been sold over the last five years has resulted in a total volume of 13.4 MMCF (or 82.1 MMBF), which is about 61% of projected annual harvest.

The land designated as suited for timber production is large enough to support the projected annual harvest. However, the volume of timber offered annually is largely dependent on the funding from Congress. The Ottawa has not been funded at a level necessary to meet the annual harvest. Given these factors, a change to the Forest Plan's desired conditions and/or management direction is not needed at this time.

Goal 7 of the Forest Plan states to "identify opportunities for the Ottawa to contribute to the social and economic vitality of the local communities" (p. 2-4). The Ottawa contributes to the

economic vitality of local communities is through PILT payments, 25% payments or SRS State Payments.

Forest Assessment

Is the status or trend of the monitoring indicators substantially different than described in the Forest Assessment or was an assumption in the Forest Assessment proven to be invalid from the monitoring data?

The Ottawa has not met the projected annual harvest established in the Forest Plan. Several factors are responsible for this gap, which are not all related to assumptions of the FEIS. Therefore, a new Forest assessment is not needed based on this question and/or its results.

There are three types of payments that are made each year to local units of government to partially offset funding shortfalls from untaxed National Forest lands in Michigan. These include Payment in Lieu of Taxes (PILT) payments, 25% Payment (Act of May 23, 1908) program and the Secure Rural Schools and Community Self-Determination Act payment program.

Management Actions

Did any of the management activities potentially result in adverse or beneficial effects to the status and trend of the monitoring indicators?

Management actions have increased the volume sold over the last four fiscal years has resulted in an average volume of 13.4 MMCF (or 82.1 MMBF), which is about 61% of the total projected harvest for the second decade (see Table 20). This is an increase of about 50% or 4.5 MMCF (27.6 MMBF) from the previous reporting period. Sawtimber volume increased from 1.6 MMCF (8.4 MMBF) the previous reporting period, to 3.2 MMCF or (17.3 MMBF) which is about 63% of the projected annual sawtimber sold. Pulpwood volume also increased from 7.3 MMCF (46.0 MMBF) the previous reporting period to 10.2 MMCF or (64.8 MMBF) which is about 61% of the projected annual pulpwood harvest.

The reduction of sold volume in FY 2020 was due to Michigan Department of Natural Resources (Michigan DNR) not selling any sales under the Good Neighbor Authority (GNA) due to being intermittently furloughed due to the COVID-19 pandemic.

Table 20 Wood volume sold by product type (FY 2019 to FY 2023)

Species/Product	Forest Plan Projected Avg Annual Harvest (Second Decade)		Volume Sold 2019		Volume Sold 2020		Volume Sold 2021		Volume Sold 2022		Volume Sold 2023		Avg Volume Sold 2019-2023		
	MMCF	MMBF	MMCF	MMBF	MMCF	MMBF	MMCF	MMBF	MMCF	MMBF	MMCF	MMBF	MMCF	MMBF	% of Plan Level
Hardwood Sawtimber	3.3	20.4	1.6	8.4	1.2	6.7	1.8	10	0.5	2.9	2.1	11.3	1.44	7.86	44%
Pine Sawtimber	1.6	9.9	1.3	6.9	1.5	8.2	1.9	10.4	3.1	16.6	0.6	3.4	1.68	9.1	105%
Other Softwood Sawtimber	0.2	1.2	0	0.2	0.1	0.4	0.1	0.4	0.1	0.4	0.1	0.4	0.08	0.36	40%
Sawtimber Total	5.1	16.6	2.9	15.5	2.8	15.3	3.8	20.8	3.7	19.9	2.8	15.1	3.2	17.32	63%
Aspen	4.7	29	2.9	18.4	2.1	13.8	3.1	19.7	4.7	29.7	2.9	18.8	3.14	20.08	67%
Hardwood Pulpwood	8.4	51.9	6.5	40.9	4.4	27.5	6.4	40.9	4	25.5	7.1	44.9	5.68	35.94	68%
Pine Pulpwood	1.1	6.8	0.8	5.1	0.7	4.5	0.6	3.7	1	6.6	0.5	3	0.72	4.58	65%
Other Softwood Pulpwood	2.6	16	0.3	2.1	0.7	4.2	0.5	3.3	1.3	8	0.5	3.5	0.66	4.22	25%
Pulpwood Total	16.8	104	10.5	66.5	7.9	50	10.6	67.6	11	69.8	11	70.2	10.2	64.82	61%
Totals	21.9	120.6	13.4	82	10.7	65.3	14.4	88.4	14.7	89.7	13.8	85.3	13.4	82.14	61%

*For future trend information, the 2016 results are not included in this discussion. The outcomes are as follows: Sawtimber (hardwood-0.9 MMCF/4.8MMBF; pine 1.7 MMCF/9.3 MMBF; other 0.1 MMCF/0.4 MMBF) and (pulpwood aspen 1.9 MMCF/12.4 MMBF; hardwood 4.2 MMCF/26.8 MMBF; pine 0.9 MMCF/5.8 MMBF; other 1.2 MMCF/7.6 MMBF) for a total of 8.3 MMCF/52.5 MMBF in 2016.

Payment in Lieu of Taxes (PILT)

These payments are annual federal payments to local governments that help offset losses in property taxes due to nontaxable Federal lands within their boundaries. PILT payments help local governments carry out such vital services as firefighting and police protection, construction of public schools and roads, and search-and-rescue operations. The PILT program provides a per-acre payment based on annual congressional appropriations and a formula that incorporates population, and income from other federal receipt sharing payments (such as the 25% fund). The Department of the Interior's Office of the Secretary has administrative authority over the PILT program.

The acreage subject to PILT payments is termed “entitlement acres,” i.e., those acres that were on the applicable county tax rolls when the lands were originally acquired by the Federal government. The counties that have the most acres of National Forest land within their boundaries, such as Gogebic and Ontonagon counties, generally receive the highest PILT payments. Between FYs 2019 and 2023, PILT payments to Michigan counties from the Ottawa averaged \$2.1 million annually, see Table 21.

Table 21. Payment in Lieu of Taxes payments (FY 2016, and FY 2019 to FY 2023)

County	PILT PAYMENTS						
	FY 2016	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023	Total FY19 - FY23
Baraga	\$76,345	\$82,074	\$83,744	\$81,171	\$90,806	\$96,979	\$434,774
Gogebic	\$549,924	\$599,345	\$621,547	\$635,153	\$669,318	\$709,500	\$3,234,863
Houghton	\$299,938	\$316,722	\$321,616	\$328,786	\$339,717	\$362,948	\$1,669,789
Iron	\$355,038	\$374,255	\$380,112	\$388,094	\$401,909	\$428,874	\$1,973,244
Marquette	\$40,366	\$43,952	\$44,776	\$45,889	\$47,177	\$50,002	\$231,796
Ontonagon	\$506,426	\$555,750	\$577,754	\$593,462	\$615,978	\$658,789	\$3,001,733
Total	\$1,787,671	\$1,972,098	\$2,029,549	\$2,072,555	\$2,164,905	\$2,307,092	\$10,546,199
Annual Average	\$297,945	\$394,419	\$405,909	\$414,511	\$432,981	\$461,418	\$2,109,239

* Information taken from U.S. Department of Interior web page. PILT payment listed is cumulative of all Federal agency land within a county.

In addition to PILT funds, local governments also elect to receive 25% Payments or Secure Rural Schools and Community Self-Determination Act (SRS Act) state Payments.

25% Payment (Act of May 23, 1908)

The 25% Payment is made to counties by the Forest Service under the Act of May 23, 1908 (35 Stat. 260). The intent of this Act is for the Forest Service is authorized to pay 25% of the annual average of receipts from applicable Forest Service revenues generated from specific land uses and activities to benefit public schools and public roads. Amended by the Emergency Economic Stabilization Act of 2008 (P. L. 110-343), the 25% payment is “an amount equal to the annual average of 25 percent of all amounts received for the applicable fiscal year and each of the preceding six fiscal years”. Payments are based on receipts from timber sales, campground fees, special use permit fees, and leases from minerals, oil and gas. The 25% Payment must be used for roads and schools. On the Ottawa, annual in 25% Payments is primarily due to fluctuations in the volume of timber harvested, the value of the timber harvested and the location of the timber sales that year. Two of six counties elect to receive 25% payments.

The Secure Rural Schools and Community Self-Determination Act (P. L. 106-393)

The SRS Act allows counties to elect either to receive a share of the 25% payment or to receive a share of the SRS Act state formula payment. The SRS Act was enacted to provide five years of transitional assistance to rural counties affected by the decline in revenue from timber harvests on Federal lands. The Act has been amended and reauthorized multiple times through FY 2015. Four of six counties elect to receive SRS Act payments.

Since 2000, Congress has reauthorized the Secure Rural Schools and Community Self-Determination Act through other laws. In 2021, the Infrastructure Investment and Jobs Act (P. L. 117-58) extended the SRS payments until 2023.

Table 22. SRS Act program payments (FY 2019 to FY 2022)

County	Revenue Sharing Payments			
	2019	2020	2021	2022
Baraga*	\$72,863	\$73,009	\$75,039	\$85,557
Gogebic*				
Title I	\$299,177	\$253,569	\$286,357	\$348,303
Title II	\$52,795	\$44,747	\$50,534	\$61,465
Total Payment	\$351,972	\$298,316	\$336,891	\$406,768
Houghton**	\$149,238	\$146,124	\$153,849	\$161,352
Iron**	\$168,918	\$165,359	\$174,096	\$182,519
Marquette*	\$13,504	\$13,343	\$14,983	\$16,437
Ontonagon*				
Title I	\$270,011	\$262,494	\$285,662	\$330,510
Title II	\$47,649	\$ 46,322	\$50,411	\$85,325
Total Payment	\$317,660	\$308,816	\$336,073	\$388,836

*These Counties receive payments under the Secure Rural Schools Act

**These Counties have elected to receive payments under the 1908 Act (amended) 25% payments.

Monitoring Program

Did the monitoring results provide all the information necessary to answer the monitoring question?

Yes, the data collection protocols and indicators adequately provide the necessary information to answer the monitoring question.

Monitoring Question 3 - Recommendations

There are no recommendations for changes to this question.

Table 23. Summary of monitoring recommendations for Monitoring Question 3

Changes may be warranted for the:	Yes	Maybe, not enough information to determine at this time	No
Forest Plan			☐
Forest Assessment			☐
Management Actions			☐
Plan Monitoring Program			☐

Monitoring Question 4 — Are exotic insect and disease impacting achievement of objectives for restoring or maintaining healthy forest conditions?

Context for this Evaluation

This monitoring question discloses trends in the severity of current insect and disease levels and anticipated impacts associated with potential infestations. For current trends, the type of damaging agents found, as well as the amount (acres) and severity of impacts to tree species observed are disclosed for the monitoring period.

Table 24. Background information for Monitoring Question 4

Drivers	
NFMA: The NFMA requires that destructive insects and disease organisms do not increase to potentially damaging levels following management activities.	
Primary Forest Plan Component Addressed	Monitoring Question Indicator
Reduce risk of insect and disease outbreaks through application of integrated pest management principles (Forest Plan, Goal 37, p. 2-11).	a: Extent and severity of exotic insect and disease population levels based on results of detection flights.
	b: Results of emerald ash borer trap tree monitoring.
Who collected this data? Who is Responsible for analyzing this question?	
Christopher Boroski, Timber and Silviculture Program Manager	

When was this monitoring question last updated?

- Date of current evaluation: May 2024
- Date of previous evaluation: FY 2019 Monitoring Evaluation Report

Table 25. Relationship of Monitoring Question 4 to other Forest Plan direction

Question 4	Key Forest Plan Components		
	<i>Desired Conditions</i>	<i>Goals and Objectives</i>	<i>Standards and Guidelines</i>
Indicator 4a and 4b	Forest Plan (p. 3-3, 3-7, 3-12, 3-17, 3-22 and 3-23, 3-28, 3-56, 3-62 and 3-63), the desired conditions include a foundation for incorporating Objective 37a (see column to the right)	Objective 14b: Recover timber volume from trees killed or damaged by insects or disease (p. 2-6). Objective 37a: Promote a diversity of forest types, age classes, and spatial arrangements (p. 2-11). Objective 37b: Consider using shorter rotations on forest types such as jack pine, paper birch, and aspen that have historically been prone to insect and disease outbreaks in older stands (p. 2-11). Objective 37b: Minimize the impacts of non-native invasive forest pests by monitoring for, and responding to, new introductions (p. 2-11).	Guideline(s): Use silvicultural practices and integrated pest management techniques to minimize forest susceptibility and vulnerability to forest pests, and to prevent insect and disease outbreaks from spreading to adjacent stands. (p.2-35)

**What monitoring activities have been conducted since the last monitoring evaluation?
What protocols were used to collect these data?**

The protocols used for Monitoring Question 4 and its indicators consisted of the following (see Monitoring Guide):

- The location and severity of insect and disease levels are found during annual pest detection flights conducted by the Northern Research Station.
- The results of EAB trap tree monitoring performed through cooperative agreements with the Michigan Department of Agriculture and Michigan Technological University.
- Remote sensing utilizing Tree Cap to detect changes in tree canopy condition conducted by the USDA Northern Research Station.

What is the target, or range for the indicator being measured? Is there an alert level (such as a trigger or threshold), associated with the target that should be noted?

The target for this question's indicators is to reduce the introduction and spread of forest pests and pathogens through management practices to improve or maintain forest health. Triggering factors outside the control of the Ottawa, such as natural and unnatural movement of pests or pathogens or drought and wind damage, can result in forest conditions being more susceptible to outbreaks. Diligence in addressing conditions after an extreme weather event, for example, can reduce these risk factors. Keeping aware of the movement of pathogens and pests, both on and off the Ottawa, can also help guide future management practices.

Has any new Best Available Scientific Information (BASI) informed this monitoring question, indicators, or methodology? Where is the data for this monitoring question stored?

Since the 2019 Monitoring Evaluation Report, changes in surveying methodologies and survey reports have changed. Annual Aerial Detection Survey (ADS) was conducted using fixed-wing aircraft to detect and monitor insect and disease outbreaks. The detailed reports provided to the Forest starting in 2019 and were published in FY 2019 and 2021. Due to the Covid-19 pandemic, ADS was unable to survey the forest in 2020 and 2022. Following 2022, ADS is not able to use fixed-wing aircraft for survey. In 2024, remote sensing and a new remote sensing program known as Tree Cap began to be utilized to detect changes in tree canopy condition. Ground truthing is then used to verify tree species and insect or disease presence. Furthermore, EAB trap tree monitoring halted in 2018 and is no longer being conducted.

The spatial data associated with the ADS flight and ADS aerial image detection information has been incorporated into the Ottawa's Geographic Information System (GIS) records. The results of EAB trap tree monitoring, 2019 and 2021 *Snapshot* reports, are stored in official files.

The USDA Forest Service Forest Health Advisory System can be used to determine insects or diseases of concern for the Ottawa and to determine acres that are susceptible to high risk (>25% tree mortality). The 2013 to 2027 National Insect and Disease Forest Risk Assessment was conducted to determine potential susceptibility to tree mortality caused by major forest pests (Krist, et al., 2015). According to the report, in 2012 the Ottawa had 39,640 acres determined to be susceptible to >25% tree mortality. As of 2018, there has been

approximately a 10% reduction in highly susceptible acres to 35,626 due to vegetation management activities, natural disturbance, fires or insect/disease outbreaks.

Monitoring Question 4 - Results

Table 26. Status and trend of the indicator for Monitoring Question 4

Indicators		Recent Trend	
<i>Indicator 4a:</i> Extent and severity of exotic insect and disease population levels based on results of detection flights.		<i>Towards Target</i>	<i>Away from Target</i>
Current Status	<i>Within Target</i>		
	<i>Outside Target</i>	X	
<i>Indicator 4b:</i> Results of emerald ash borer trap tree monitoring.		<i>Towards Target</i>	<i>Away from Target</i>
Current Status	<i>Within Target</i>		
	<i>Outside Target</i>		X

What level of confidence is there in the accuracy and precision?

The Forest Plan states that the methods used for this monitoring question have a high degree of repeatability, reliability, accuracy and precision (Forest Plan, p. 4-4). Although changes in sampling protocol and reporting have occurred, there is still a moderate to high level of confidence in the quality and quantity of data collected because the new methods will retain the same survey protocols and reporting standards as previously used during reporting periods and the new detection methods will still maintain the same level of repeatability, reliability, accuracy, and precision. Detection of impacts from insect and/or disease problems can still be found based on a variety of techniques, such as visual estimates and surveys.

Monitoring Question 4 - Evaluation Discussion

The Ottawa annually monitors the location and severity of insect and disease population levels on the Forest (Table 27). Since 2013, spruce budworm and defoliation have posed the greatest threat but have been on the decline during the reporting period (Figures 3 and 4). Environmental conditions such as precipitation, temperature, or natural disasters have also stressed trees, thereby making them more susceptible to other, secondary stressors like insects and disease outbreaks.

Current insect and disease levels on the Ottawa are compatible with restoring and maintaining healthy forest conditions. The Ottawa strives to maintain healthy forest conditions using silvicultural practices and integrated pest management techniques as described in the Forest Plan (p. 2-35).

Table 27. Acres of insect and disease damage (FY 2013 to FY 2022)

Year	Agent	Damage	Severity	Species Affected	Acres
2013	Tortix Moth	Defoliation	Moderate	Aspen	1,163
	Unknown	Defoliation	Moderate	All Hardwoods	823
	Unknown	Mortality	Moderate	Hemlock	444

Year	Agent	Damage	Severity	Species Affected	Acres
	Larch Beetle	Mortality	Moderate	Tamarack	61
	Spruce Budworm	Mortality	Severe	Spruce-fir	57,209
	Spruce Budworm	Defoliation	Moderate	Spruce-fir	24,135
2014	Unknown	Defoliation	Moderate	Aspen	571
	Larch Beetle	Mortality	Moderate	Tamarack	49
	Spruce Budworm	Mortality	Severe	Spruce-fir	127,996
	Wind/Tornado	Main Stem Broken	Severe	All Trees	13
2015	Larch Beetle	Mortality	Moderate	Tamarack	126
	Spruce Budworm	Defoliation	Moderate	Spruce-fir	10,652
	Spruce Budworm	Mortality	Severe	Spruce-fir	187,288
2016	Spruce Budworm	Defoliation	Moderate	Spruce-fir	16,230
	Spruce Budworm	Defoliation	Severe	Spruce-fir	7,558
	Spruce Budworm	Defoliation	Very Severe	Spruce-fir	860
	Wind/Tornado	Main Stem Broken	Moderate	All Trees	44
	Wind/Tornado	Main Stem Broken	Severe	All Trees	38
	Wind/Tornado	Main Stem Broken	Severe	All Trees	38
2018	Larch Beetle	Mortality	Moderate	Tamarack	155
	Tortix Moth	Defoliation	Moderate	Aspen	1,437
	Spruce Budworm	Defoliation	Moderate	Spruce-fir	6,184
	Spruce Budworm	Defoliation	Severe	Spruce-fir	860
	Spruce Budworm	Defoliation	Very Severe	Spruce-fir	17
2019	Spruce Budworm	Defoliation	Moderate	Spruce-fir	14,871
	Spruce Budworm	Defoliation	Severe	Spruce-fir	178
	Forest Tent Caterpillar	Defoliation	Moderate	Aspen/Birch	4,544
	Eastern Larch Beetle	Mortality		Tamarack	553
	Unknown	Mortality		Red Pine	4
	Unknown	Mortality		Red Pine	4
2020	Wind/Tornado	Blowdown	Severe	All	140
2021	Spruce Budworm	Defoliation	Moderate	Spruce-fir	17,213
	Tortix Moth	Defoliation	Moderate	Aspen	12,669
	Forest Tent Caterpillar	Defoliation	Moderate	Sugar Maple/ Aspen/ Birch	1,730
	Eastern Larch Beetle	Mortality		Tamarack	0.5
	Unknown	Mortality		Red Pine	0.8

Year	Agent	Damage	Severity	Species Affected	Acres
	Unknown	Defoliation	Moderate	Unknown Hardwoods	780.9
	Wind/Tornado	Main Stem Broken	Severe	All	270
2022	Spongy Moth	Defoliation	Moderate	Aspen / Birch	17,948
	Spruce Budworm	Defoliation	Moderate	Spruce-fir	7,390
	Tortix Moth	Defoliation	Moderate	Aspen	263

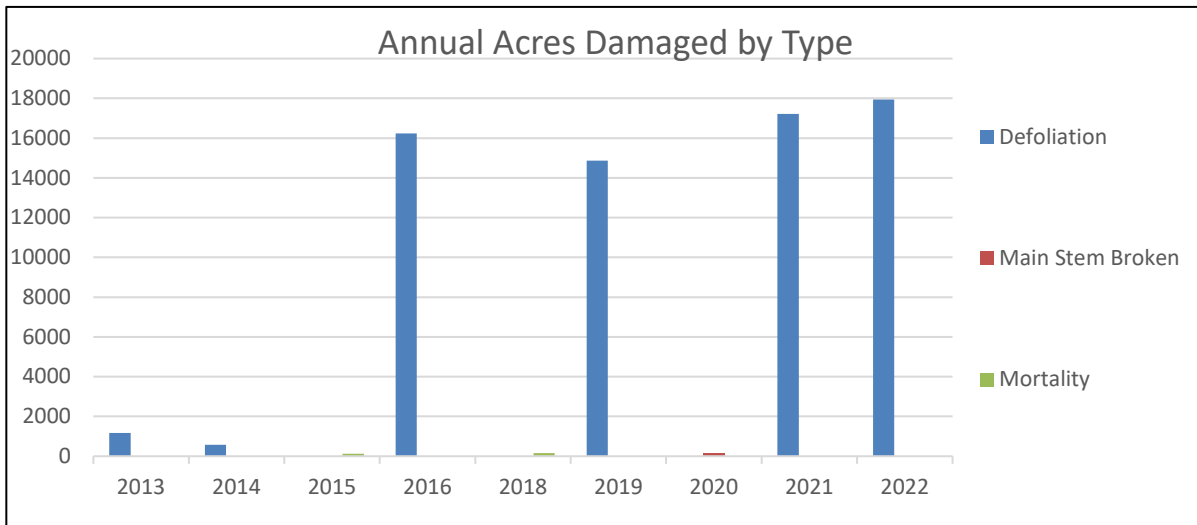


Figure 3. Annual acres reported damaged for all agents from 2013 through 2022. Source Northern Research Station, Eastern Region Aerial Detection Survey.

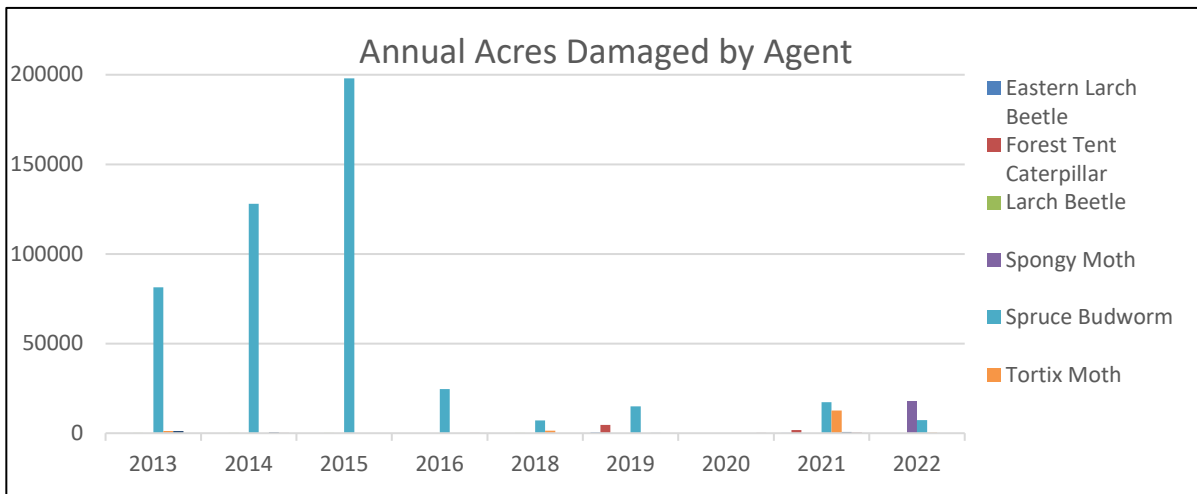


Figure 4. Annual acres reported damaged by type from 2013 through 2022. Source Northern Research Station, Eastern Region Aerial Detection Survey.

Monitoring Indicator 4b: Results of emerald ash borer trap tree monitoring.

The EAB trap tree monitoring program ended in 2018. Monitoring across the Forest has continued in coordination with the USDA Northern Research Station. The Forest Plan did not state a specific threshold for this monitoring indicator and therefore the assumption at this time is that the goal was to keep emerald ash borer from establishing on the Ottawa. Since EAB was detected in 2020 and has since established and spread, the monitoring indicator result is that we have moved away from the desired condition of keeping emerald ash borer from establishing on the Forest.

2024 List of Concerning Agents provided by the USDA Northern Research Station

Balsam Woolly Adelgid	Eastern Spruce Budworm
Asian longhorned beetle	Maple Decline
Hemlock Woolly Adelgid	Oak Decline
Mountain Pine Beetle	Spongy Moth
European Spruce Bark Beetle	Eastern Larch Beetle
Red-haired Bark Beetle	Jack Pine Budworm
Tortix Moth	Forest Tent Caterpillar
Dutch elm Disease	Sirex Woodwasp
Emerald Ash Borer	Heterobasidion Root Disease
Oak Wilt	

Forest Plan

Are the current Forest Plan components (desired conditions, goals, objectives) achievable in the timeframes described and does the Forest Plan provide sufficient direction (standards, guidelines, suitability, designated lands) to achieve these components?

The Forest Plan desired conditions and management direction focus on providing and maintaining healthy forest conditions. The Forest Plan provides for addressing forest conditions to reduce the risk of outbreaks using silvicultural practices and integrated pest management techniques (p. 2-35). This direction calls for reducing risk of introduction and spread of insect and/or disease outbreaks in areas that have, and have not, been affected. Currently, Forest Plan direction has a sufficient foundation to address forest health.

Forest Assessment

Is the status or trend of the monitoring indicators substantially different than described in the Forest Assessment, or was an assumption in the Forest Assessment proven to be invalid from the monitoring data?

The status and trend of indicators are not substantially different than anticipated in the Forest Assessment. Based on the assessment for the Forest Plan, the Forest Silviculturist states that forest health conditions would be maintained due to the integrated approach of silvicultural practices and pest management techniques (FEIS, p. 3-73). These practices directly affect the health or vigor of trees to provide conditions that can better handle insect and pathogen attacks. Additionally, quick recovery rates are seen in those forest types that evolved with native insects and diseases (FEIS Administrative Record, Document 621). In terms of EAB, a

continued emphasis in visitor awareness and education may assist to reduce the spread (FEIS, p. 3-68); visitor observations may assist us to identify EAB occurrence in the future.

Management Actions

Did any of the management activities potentially result in adverse or beneficial effects to the status and trend of the monitoring indicators?

The 2013 to 2027 National Insect and Disease Forest Risk Assessment was conducted to determine potential susceptibility to tree mortality caused by major forest pests. According to the report, in 2012 the Ottawa had 39,640 acres determined to be susceptible to >25% tree mortality (Krist, 2014). As of the 2018 update, there has been approximately a 10% reduction in highly susceptible acres to 35,626 due to vegetation management activities, natural disturbance, fires, or insect/disease outbreaks (Krist, 2014). Since the Ottawa has not had any significant wildfires, natural disturbances, or insect or disease outbreaks large enough to account for this change, the beneficial effects of reducing acres with >25% mortality are likely due to forest management activities.

Monitoring Program

Did the monitoring results provide all the information necessary to answer the monitoring question?

Yes, the data collection protocols and indicators adequately provide the necessary information to answer the monitoring question.

Monitoring Question 4 – Recommendations

It is recommended that the question and monitoring indicators be changed to enhance the Ottawa's ability to improve the current forest health conditions.

The proposed change to the monitoring question is remove the word "*exotic*" to include all pests and pathogens that could negatively impact the objective of restoring or maintaining healthy forest conditions.

Recommended New Question: Are insects and disease impacting our ability to restore or maintain healthy forest conditions?

Monitoring Question Indicator 4a should be updated to remove the word "flight". Changes in science have resulted in new methodologies for detection and aerial detection flights are not the only method of detection. This indicator should be broadened to include all methods of detection.

Recommended Monitoring Indicator 4a: Extent and severity of detected pests or pathogens.

There is a need to replace Indicator 4b. The current indicator was based upon tree trap placement and monitoring for EAB presence and in 2018 this program ceased. It is recommended that Monitoring Question Indicator 4b be replaced to list potential pests and pathogens that are being monitored as potential future threats. The USDA Forest Service,

Forest Health Advisory System in conjunction with the UDSA Northern Research Station can provide the agents of concern for the Ottawa National Forest.

Recommended Monitoring Indicator 4b: Identify potential pests or pathogens that pose a threat to restoring or maintaining healthy forest conditions.

Changes in available data for monitoring and reporting: Annual aerial flights will not be conducted, and National Agriculture Imagery Program (NAIP) imagery is collected every two years resulting in remote sensing change detection mapping being provided every two years. It is recommended that the reporting period change from annual to bi-annual following the production of an updated change detection map and a more detailed analysis of the forest health condition of the forest. USDA Forest Service Eastern Region Health Protection staff and Forest staff will continue to conduct annual monitoring surveys. If a severe biotic or abiotic event occurs, Forest Health Protection staff will assist and provide a map of the damaged areas on a case-by-case basis.

Table 28. Summary of monitoring recommendations for Monitoring Question 4

Changes may be warranted for the:	Yes	Maybe, not enough information to determine at this time	No
Forest Plan			☐
Forest Assessment			☐
Management Actions			☐
Plan Monitoring Program	☒		

Monitoring Question 5 — What is the status of visitor use and visitor satisfaction?

Due to personnel capacity issues, the Forest is unable to answer this question during this reporting period. However, results will be reported in the next biennial report.

Monitoring Question 6 — How effective are forest management practices in managing in off-highway vehicle (OHV) use for the protection of forest resources?

Due to personnel capacity issues, the Forest is unable to answer this question during this reporting period. However, results will be reported in the next biennial report.

Monitoring Question 7 — Are the lands adequately restocked after 5 years?

Context for this Evaluation

This monitoring question ensures the Ottawa remains consistent with essential reforestation silvicultural practices for maintaining adequately stocked forest conditions.

Table 29. Background information for Monitoring Question 7

Drivers	
The NFMA requires that National Forest System lands are adequately restocked as specified in the Forest Plan.	
Primary Forest Plan Component Addressed	Monitoring Question Indicator
Restore and maintain Great Lakes forested ecosystems using timber management and silvicultural practices as tools, and to enhance values associated with the Great Lakes Ecosystem pursuant to Executive Order 13340 (Forest Plan, Goal 13, p. 2-5).	Number of acres certified as adequately restocked.
Who collected this data? Who is Responsible for analyzing this question?	
Michael Strieter, Forest Silviculturist	

When was this monitoring question last updated?

- Date of current evaluation: May 2024
- Date of previous evaluation: FY 2019 Monitoring Evaluation Report

Table 30. Relationship of Question 7 to other Forest Plan direction

Question 7	Key Forest Plan Components		
	<i>Desired Conditions</i>	<i>Goals and Objectives</i>	<i>Standards and Guidelines</i>
Indicator 7	In each “Desired Condition of the Land” section of Management Areas where forest types are managed (pp. 3-3, 3-7, 3-12, 3-17, 3-22 and 3-23, 3-28, 3-56, 3-62 and 3-63), the desired conditions include a foundation for Goal 13.	Goal 2: Provide for ecosystems that are healthy, resilient, diverse, and functioning in a sustainable and productive manner (p. 2-2). Goal 14: Provide a sustained yield of timber while meeting integrated resource management objectives consistent with land capabilities (p. 2-6).	Guidelines: An opening will no longer be considered an opening when the re-established stand has reached a height that is 20% of the surrounding trees (p. 2-23). Guidelines (Timber Management – natural regeneration/supplemental seeding/planting): aspen (pp. 2-16 and 2-17), balsam fir, hemlock (p. 2-17); jack pine (p. 2-18), lowland hardwoods (p. 2-19), northern hardwoods, Northern red oak (p. 2-20);

Question 7	Key Forest Plan Components		
	<i>Desired Conditions</i>	<i>Goals and Objectives</i>	<i>Standards and Guidelines</i>
		Goal 18: Emphasize natural regeneration over artificial reforestation including Objectives 18a and 18b (p. 2-7).	paper birch, red pine (p. 2-21); white pine (p. 2-22), and white spruce (p. 2-23).

What monitoring activities have been conducted since the last monitoring evaluation? What protocols were used to collect these data?

Monitoring activities for this question have been obtained through first and third stocking surveys (see Monitoring Guide). The protocols used for Monitoring Question 7 and its indicator consist of the following:

To be certified as a stocked stand, surveyors use desired stocking levels for artificial and natural regeneration from silvicultural prescriptions. Surveys are conducted to determine if the minimum number of trees present meet the stocking requirements outlined by the silviculturist.

What is the target, or range for the indicator being measured? Is there an alert level (such as a trigger or threshold), associated with the target that should be noted?

Triggering factors or thresholds are dependent upon the forest type. The target for this question's indicators is to achieve 100% of adequately stocked stands after a final harvest associated with clearcut, selection or shelterwood silvicultural treatment. Specifically, if stocking surveys find that a forested stand has not reached the minimum average number of trees per acre as prescribed by the silviculturist as required by Agency guidance, the Forest takes appropriate measures to fully stock the site.

Has any new Best Available Scientific Information (BASI) informed this monitoring question, indicators, or methodology? Where is the data for this monitoring question stored?

Monitoring data is collected annually through stocking surveys, and therefore, the information presented is the most current for FYs 2016 through 2023. The results of stocking surveys and reforestation certifications are entered into the FACTS database.

Monitoring Question 7 - Results

Table 31. Status and trend of the indicator for Monitoring Question 7

Indicators		Recent Trend	
<i>Indicator 7:</i> Number of acres certified as adequately restocked.		<i>Towards Target</i>	<i>Away from Target</i>
Current Status	<i>Within Target</i>	X	
	<i>Outside Target</i>		

What level of confidence is there in the accuracy and precision?

There is a moderate to high level of confidence in the quality and quantity of data collected because the same collection protocols and reporting standards have been in place for several years. The Forest Plan states that the methods used for this monitoring question have a high degree of repeatability, reliability, accuracy and precision (Forest Plan, p. 4-4).

Monitoring Question 7 - Evaluation Discussion

The Ottawa regularly monitors the conditions within forested stands that receive a final harvest through a prescribed treatment of shelterwood, selection or clearcut. Conditions are evaluated to determine if managed stands are adequately restocked with regenerating trees. Stands are considered adequately stocked when they meet the requirements for the minimum average number of trees per acre, by forest type, as outlined in Forest guidance.

The Ottawa performs stocking surveys to monitor the success of natural and artificial regeneration on all final timber harvests. Stands that are adequately stocked with suitable tree species are usually certified by the fifth year after a final harvest. Oftentimes, additional treatment is needed to improve stocking levels, such as site preparation to prepare an adequate seed bed, seeding and/or planting. These treatments are planned after the timber harvest; after the first-year stocking survey effort; or after the third-year stocking survey if the surveys indicate a need. Final harvests, site preparation, stocking surveys and regeneration certification information are recorded in the FACTS database. Table 32 outlines the acres certified as adequately stocked in FACTS database for FY 19 through FY 23.

Table 32. Acres certified as adequately stocked (FY 2016 to FY 2023)

Fiscal Year	Acres (100% adequately stocked)
2016	3,039
2017	3,775
2018	3,618
2019	2,891
2020	7,047
2021	3,921
2022	6,868
2023	4,634

Forest Plan

Are the current Forest Plan components (desired conditions, goals, objectives) achievable in the timeframes described and does the Forest Plan provide sufficient direction (standards, guidelines, suitability, designated lands) to achieve these components?

Forest Plan direction provides for artificial and natural regeneration silvicultural practices for all forest types. Therefore, Forest Plan direction does address adequately restocked forested conditions five years post-harvest.

Forest Assessment

Is the status or trend of the monitoring indicators substantially different than described in the Forest Assessment, or was an assumption in the Forest Assessment proven to be invalid from the monitoring data?

The status and trend of the indicator is not substantially different than anticipated in the analysis for the Forest Plan. The FEIS analysis included a projected, annual regeneration target of 9,750 acres (artificial and natural) (p. 3-80); albeit the acreages in Table 32 are lower than estimated. It should be noted that this discrepancy is based on the number of acres treated per year, which is acknowledged to be lower than projected.

Management Actions

Did any of the management activities potentially result in adverse or beneficial effects to the status and trend of the monitoring indicators?

No. As Table 32 highlights, by the fifth-year post-harvest, 100% of acres are adequately restocked. If supplemental activities were necessary on any of these acres, the silvicultural practices implemented were successful by the fifth year.

Monitoring Program

Did the monitoring results provide all the information necessary to answer the monitoring question?

Yes, the data collection protocols, and indicator adequately provide the necessary information to answer the monitoring question.

Monitoring Question 7 - Recommendations

There are no recommendations for changes to this question.

Table 33. Summary of monitoring recommendations for Monitoring Question 7

Changes may be warranted for the:	Yes	Maybe, not enough information to determine at this time	No
Forest Plan			☐
Forest Assessment			☐
Management Actions			☐
Plan Monitoring Program			☐

Status of Suited Lands (Questions 8a and 8b)

Monitoring Question 8a — To what extent are timber management activities occurring on lands suited for timber production?

Context for this Evaluation

This monitoring question ensures the Ottawa remains consistent with the number of acres harvested by land suitability class.

Table 34. Background Information for Monitoring Question 8a

Drivers	
The NFMA requires that Forest Plans identify lands not suited for timber production considering physical, economic and other factors. Through this process, the Forest Plan also identifies land that is deemed suitable for timber production. This monitoring question measures trends toward achieving conditions outlined in Goal 14 (p. 2-6) that states: “provide a sustained yield of timber while meeting integrated resource management objectives consistent with land capabilities”.	
Primary Forest Plan Component Addressed	Monitoring Question Indicator
Provide a sustained yield of timber while meeting integrated resource management objectives consistent with land capabilities (Forest Plan, Goal 14, p. 2-6).	Number of acres managed by timber suitability class.
Who collected this data? Who is Responsible for analyzing this question?	
Michael Strieter, Forst Silviculturist	

When was this monitoring question last updated?

- Date of current evaluation: February 2024
- Date of previous evaluation: FY 2017 Monitoring Evaluation Report

Table 35. Relationship of Monitoring Question 8a to other Forest Plan direction

Question 8a	Key Forest Plan Components		
	<i>Desired Conditions</i>	<i>Goals and Objectives</i>	<i>Standards and Guidelines</i>
Indicator 8a	On the suitable land base harvest 16,700 acres annually (Forest Plan p. E-2)	Goal 14, Objectives: a) Provide a mix of timber sale sizes and species/products, which are consistent with the range of purchaser demands and are efficient to prepare and administer. b) Recover timber volume, in alignment with MA	Standards: Timber Management all standards are applicable (p. 2-16 – 2-23). Guidelines: Aspen: Regenerate existing aspen or convert another forest type to aspen by clearcutting. Balsam Fir: Regenerate existing balsam fir stands or convert other types to

Question 8a	Key Forest Plan Components		
	<i>Desired Conditions</i>	<i>Goals and Objectives</i>	<i>Standards and Guidelines</i>
		prescriptions, from trees killed or damaged by insects, disease, or other disturbance events (p. 2-6).	balsam fir by clearcut, shelterwood, or selection methods. Hemlock: Regeneration is usually done with the two-cut or three-cut shelterwood method. Site preparation may be needed to prepare an adequate seed bed. Jack Pine: Regenerate existing jack pine stands or convert other types to jack pine by clearcutting. Lowland Hardwoods: Regenerate using the two-cut shelterwood method. Northern Hardwoods: Regenerate existing northern hardwood stands or convert another type to northern hardwood stands with either uneven-aged or even-aged management methods. Northern Red Oak: Regenerate northern red oak stands using the two-cut or three-cut shelterwood method.

Question 8a	Key Forest Plan Components		
	<i>Desired Conditions</i>	<i>Goals and Objectives</i>	<i>Standards and Guidelines</i>
			Paper Birch: Regenerate existing paper birch stands or convert other types to paper birch using the two-cut shelterwood method. Red Pine: Regenerate existing red pine stands or convert other types to red pine by clearcutting, seed tree and shelterwood. White Pine: Regenerate existing white pine stands or convert other types to white pine, usually by a two-cut or three-cut shelterwood method. White Spruce: Regenerate existing white spruce stands or convert other types to white spruce by clearcut, shelterwood, or selection methods.

What monitoring activities have been conducted since the last monitoring evaluation? What protocols were used to collect these data?

Monitoring activities for this question have been obtained from the FACTS database. Queries were completed using FACTS activity codes and land suitability codes.

What is the target, or range for the indicator being measured? Is there an alert level (such as a trigger or threshold), associated with the target that should be noted?

The Forest Plan has an estimated annual harvest target (16,700 acres) on suitable land base (p. E-2). Unsuitable land base does not have a target or range. Thresholds would vary, dependent on land suitability class. Any harvest on the unsuited land base is conducted for activities for a variety of resource values, such as addressing forest health needs; reducing unnaturally elevated levels of insect and disease; salvaging dead and dying timber; studying different methods to regenerate hemlock; meeting wildlife habitat objectives; enhancing values in Special Interest Areas; and enhancing or maintaining the outstandingly remarkable values for recreational and scenic segments of WSR corridors.

Has any new Best Available Scientific Information (BASI) informed this monitoring question, indicators, or methodology? Where is the data for this monitoring question stored?

Monitoring data is collected annually based on actual harvest activity, thus the information presented is the most current for FYs 2019 through 2023. The harvest activity is entered into the FACTS database monthly.

Monitoring Question 8a - Results

Table 36. Status and trend of the indicator for Monitoring Question 8a

Indicators		Recent Trend	
<i>Indicator 8a:</i> Number of acres managed by timber suitability class.		<i>Towards Target</i>	<i>Away from Target</i>
Current Status	<i>Within Target</i>		
	<i>Outside Target</i>	X	

What level of confidence is there in the accuracy and precision?

There is a moderate to high level of confidence in the quality and quantity of data collected because the same collection protocols and reporting standards have been in place for several years. The Forest Plan states that the methods used for this monitoring question have a high degree of repeatability, reliability, accuracy and precision (p. 4-4).

Monitoring Question 8a - Evaluation Discussion

Of the 42,337 acres harvested between FYs 2016 and 2023, the majority (41,365 acres) were located on lands deemed suitable for timber production. About 717 acres harvested were on unsuitable lands with WSR corridor management area emphasis. The acres were not tracked for 2017 and 2018; the 3,905 acres are presented for 2016 for future trend information.

Table 37. Timber harvested by land suitability class (FY 2016, and FY2019 to FY 2023)

Fiscal Year	Suitable Acres	Unsuitable Acres	Total Acres
2016*	3,905	255	4,160
2019	6,797.5	381.9	7,179.4
2020	5,577	7	5,584
2021	8,154	74	8,228
2022	9,846	62	9,908
2023	7,085	192	7,277
Total Acres	41,365	972	42,337
Annual Average Acres	6,894	162	7,056

Table 38. Reforestation by land suitability class (FY 2016 and FY2019 to FY2023)

Fiscal Year	Acres of Artificial Regeneration (Planting)			Acres of Natural Regeneration with Site Preparation			Acres of Natural Regeneration without Site Preparation		
	Suited Land	Unsuitable Land	Total Acres	Suited Land	Unsuitable Land	Total Acres	Suited Land	Unsuitable Land	Total Acres
2016	163	0	2,609163	791	9	800	2,085	246	2,331
2019	120	0.1	120	142	0	142	2,739	0	2,739
2020	9	0	9	2,738	0	2,738	4,276	0	4,276
2021	332	12	344	1,099	5	1,104	2,695	98	2,793
2022	374	35	409	2,179	0	2,179	4,505	181	4,686
2023	289	15	304	1,741	120	1,861	2,773	0	2,773
Total Acres	2,473	136	2,609	8,690	134	8,824	19,073	525	19,598
Annual Average Acres	412	23	435	1,448	22	1,103	3,178	88	3,266

Table 39. Timber stand improvement by land suitability class (FY 2016 and FY2019 to FY2023)

Fiscal Year	Acres of Tree Release			Acres of Pre-Commercial Thinning			Acres of Pathologic Pruning		
	Suited Land	Unsuitable Land	Total Acres	Suited Land	Unsuitable Land	Total Acres	Suited Land	Unsuitable Land	Total Acres
2016	602	0	602	0	0	0	0	0	0
2019	0	0	0	0	0	0	0	0	0
2020	50	0	50	0	0	0	0	0	0
2021	87	0	87	0	0	0	0	0	0
2022	269	0	269	0	0	0	28	0	28
2023	31	0	31	0	0	0	0	0	0
Total Acres	1,039	0	1,039	0	0	0	28	0	28
Annual Average Acres	173	0	173	0	0	0	5	0	5

Discussion

Per the Forest Plan, 488,000 acres were considered suitable land for timber production (approximately 50% of the total forested acres on the Ottawa) (Appendix A). Timber harvest generally occurs on those acres considered suitable for timber production. Unsuitable land is defined as areas that are not appropriate for timber production and are reserved to provide other ecosystem services. Table A-8 of the FEIS identifies old growth, wetland forest types, hemlock and upland northern white cedar as unsuitable (p. A-19). Water, non-forested areas, wilderness, and wild segments of designated wild and scenic rivers are also eliminated from the suitable land base. During the analysis for the FEIS, an ecological landtype phase 3 analysis was also conducted to better refine acres with their capabilities to support management practices, which resulted in the exclusion of additional acres.

As outlined in Table 37, timber harvest occurred on approximately 42,337 acres, with an annual average of 7,056 acres. Table 38 identifies the acres of reforestation (artificial and natural regeneration) and Table 39 shows the acreage of TSI (plantation release, pre-commercial thinning, and pathological pruning) that occurred after timber harvest activities, between fiscal years 2016 and 2023. These activities are paid for through timber management appropriated funds, and therefore typically only invested on lands considered suitable for timber production.

Approximately 972 acres of timber harvest occurred on lands classified as unsuitable for timber production between 2016 and 2023, for an annual average of 162 acres. All 717.3 acres of timber harvest occurred within WSR corridors, and therefore management was aligned to the prescriptions and/or standards and followed guidelines in the Forest Plan for a given river segment (CRMP, pp. 3-71 to 3-81.9). Although reforestation is primarily applied on lands considered suitable for timber production, 125 acres of site preparation was completed in the WSR corridor. This treatment was implemented to provide aspen regeneration and establishment to meet wildlife habitat objectives. Natural tree regeneration without site preparation was determined an appropriate for restoration in the remaining 279 acres (see Table 38). There were 62 acres of artificial regeneration on the unsuitable land base between 2019 and 2023 (annual average of 12.4 acres) including 11.5 acres for campground rehabilitation, 1.4 acres for rehabilitation of non-native invasive species sites, 34.1 acres for riparian rehabilitation and 15 acres for wildlife habitat rehabilitation within the WSR corridor. No TSI was conducted on unsuitable land base.

Forest Plan

Are the current Forest Plan components (desired conditions, goals, objectives) achievable in the timeframes described and does the Forest Plan provide sufficient direction (standards, guidelines, suitability, designated lands) to achieve these components?

The Ottawa is consistently working towards achieving Forest Plan direction; however, the Forest has limited control and oversight on timber markets that drive harvest levels. The Ottawa strives to meet the estimated annual harvested acres directed in the Forest Plan even with a level of uncertainty to do market and economic factors.

Forest Assessment

Is the status or trend of the monitoring indicators substantially different than described in the Forest Assessment, or was an assumption in the Forest Assessment proven to be invalid from the monitoring data?

The Ottawa FEIS analysis included a projected annual harvest acreage of 14,400 (p. 3-80). The acreages in Table 38 are lower than estimated. It should be noted that this inconsistency is based on the number of acres treated per year, which is acknowledged to be lower than projected.

Management Actions

Did any of the management activities potentially result in adverse or beneficial effects to the status and trend of the monitoring indicators?

Management activities did not result in any adverse effects. Implementing harvests and artificial regeneration have beneficial restorative effects across the Forest.

Monitoring Program

Did the monitoring results provide all the information necessary to answer the monitoring question?

Yes, the data collection protocols and indicators adequately provide the necessary information to answer the monitoring question.

Monitoring Question 8a - Recommendations

There are no recommendations for changes to this question.

Table 40. Summary of monitoring recommendations for Monitoring Question 8a

Changes may be warranted for the:	Yes	Maybe, not enough information to determine at this time	No
Forest Plan			☐
Forest Assessment			☐
Management Actions			☐
Plan Monitoring Program			☐

Monitoring Question 8b — To what extent are timber management activities occurring on lands suited for timber production?

Context for this Evaluation

This monitoring question evaluates the change in land suitability classification between “not suitable” and “suitable” for timber production.

Table 41. Background information for Monitoring Question 8b

Drivers	
The NFMA requires that Forest Plans identify lands not suited for timber production considering physical, economic and other factors. Through this process, the Forest Plan also identifies land that is deemed suitable for timber production. This monitoring question measures trends toward achieving conditions outlined in Goal 14 (p. 2-6) that states, “provide a sustained yield of timber while meeting integrated resource management objectives consistent with land capabilities.”	
Primary Forest Plan Component Addressed	Monitoring Question Indicator
Provide a sustained yield of timber while meeting integrated resource management objectives consistent with land capabilities (Forest Plan, Goal 14, p. 2-6).	Change in the number of acres determined to be “suitable” for timber production.
Who collected this data? Who is Responsible for analyzing this question?	
Michael Strieter, Forst Silviculturist	

When was this monitoring question last updated?

- Date of current evaluation: April 2024
- Date of previous evaluation: FY 2017 Monitoring Evaluation Report

Table 42. Relationship of Monitoring Question 8b to other Forest Plan direction

Question 8b	Key Forest Plan Components		
	<i>Desired Conditions</i>	<i>Goals and Objectives</i>	<i>Standards and Guidelines</i>
Indicator 8b	On the suitable land base harvest 16,700 acres annually (Forest Plan p. E-2)	Goal 14, Objectives: a. Provide a mix of timber sale sizes and species/products, which are consistent with the range of purchaser demands and are efficient to prepare and administer. b. Recover timber volume, in alignment with MA prescriptions, from trees killed or damaged by insects,	Standards: Timber Management all standards are applicable (p. 2-16 – 2-23). Guidelines: Aspen: Regenerate existing aspen or convert another forest type to aspen by clearcutting. Balsam Fir: Regenerate existing balsam fir stands or convert other types to balsam fir by clearcut, shelterwood, or selection methods.

Question 8b	Key Forest Plan Components		
	<i>Desired Conditions</i>	<i>Goals and Objectives</i>	<i>Standards and Guidelines</i>
		disease, or other disturbance events (p.2-6).	Hemlock: Regeneration is usually done with the two-cut or three-cut shelterwood method. Site preparation may be needed to prepare an adequate seed bed. Jack Pine: Regenerate existing jack pine stands or convert other types to jack pine by clearcutting. Lowland Hardwoods: Regenerate using the two-cut shelterwood method. Northern Hardwoods: Regenerate existing northern hardwood stands or convert another type to northern hardwood stands with either uneven-aged or even-aged management methods. Northern Red Oak: Regenerate northern red oak stands using the two-cut or three-cut shelterwood method. Paper Birch: Regenerate existing paper birch stands or convert other types to paper birch using the two-cut shelterwood method.

Question 8b	Key Forest Plan Components		
	<i>Desired Conditions</i>	<i>Goals and Objectives</i>	<i>Standards and Guidelines</i>
			Red Pine: Regenerate existing red pine stands or convert other types to red pine by clearcutting, seed tree and shelterwood. White Pine: Regenerate existing white pine stands or convert other types to white pine, usually by a two-cut or three-cut shelterwood method. White Spruce: Regenerate existing white spruce stands or convert other types to white spruce by clearcut, shelterwood, or selection methods.

What monitoring activities have been conducted since the last monitoring evaluation? What protocols were used to collect these data?

Monitoring activities for this question have been obtained from Field Sampled Vegetation (Feig) geodatabase queries and data from Monitoring Question 35.

What is the target, or range for the indicator being measured? Is there an alert level (such as a trigger or threshold), associated with the target that should be noted?

The Forest Plan has an estimate of 488,100 acres of land suitable for timber production (FEIS p. 3-78). The 2017 Monitoring Evaluation Report referenced a range utilized during modeling of 73,000 to 415,000 acres (2017 ME Report, p. 38). If the suitable land base would fall below the 73,000 acres, then the lower end threshold would be met.

Has any new Best Available Scientific Information (BASI) informed this monitoring question, indicators, or methodology? Where is the data for this monitoring question stored?

Yes. The land suitability class is updated during environmental analysis processes and changes are documented in the database of record. The geodatabase queries mentioned under the protocol section provide information for future planning purposes on where specific types of actions can and cannot occur. With each project implemented, additional updates to the suitable land base originally modeled during Forest Plan revision. .

Monitoring Question 8b - Results

Table 43. Status and trend of the indicator for Monitoring Question 8b

Indicators		Recent Trend	
<i>Indicator 8b:</i> Number of acres determined to be suited for timber production		<i>Towards Target</i>	<i>Away from Target</i>
Current Status	<i>Within Target</i>	X	
	<i>Outside Target</i>		

What level of confidence is there in the accuracy and precision?

There is a moderate to high level of confidence in the quality and quantity of data collected because the same collection protocols and reporting standards have been in place for several years. The Forest Plan states that the methods used for this monitoring question have a high degree of repeatability, reliability, accuracy and precision (p. 4-4).

Monitoring Question 8b - Evaluation Discussion

The Forest Plan FEIS disclosed methods for determining the acres included in the suitable land base (pp. 3-78 to 79). Suitable land is the area that is biologically and physically capable of producing timber. Information is also presented under Monitoring Indicator 8a. Although there has been some change in the number of suited acres since 2006, this change has not affected the amount of suitable land the Ottawa uses during planning and implementation efforts.

Forest lands tentatively identified as appropriate for timber production were calculated by taking the Ottawa's total acreage and subtracting 1) lands withdrawn from timber production; 2) lands not producing crops of industrial woods; 3) lands not physically suited; and 4) lands where information is inadequate (FEIS Volume II, p. A-15). The alternative chosen for implementation of the 2006 Forest Plan included 488,100 acres of suited land (FEIS Volume II, p. A-19).

Changes in Suitable Acres

One amendment to the Forest Plan has occurred since implementation began in 2006. This amendment was specific to incorporating the Wild and Scenic River Comprehensive River Management Plan (CRMP), which included a refinement of Management Area (MA) 8.1. The decision included reassigning about 7,180 acres of land from other management areas into the WSR corridors. However, this change was not simply a subtraction of 7,100 acres from the suited land base. A portion of lands incorporated into the WSR corridors were previously considered unsuitable, such as wetlands, lowland forest types and classified old growth. Prior to incorporating the 7,100 acres into MA 8.1, only 750 acres (> 10%) were harvested as part of suitable land base.

Monitoring Question 19 discloses that a change in the amount of old growth has occurred from 2016 to 2023. Some stands have been classified as old growth and therefore added to the unsuitable land base, while other stands have been declassified, and the acreage is now being managed as suitable for timber production. There has been a net gain in old growth allocation of 5,191 acres that has resulted in a decrease in suitable acres.

As outlined in Monitoring Question 35, the Ottawa also has had a net gain of approximately 3,582 acres through land acquisitions and exchanges. Of this acreage, about 1,469 acres are now being managed as part of the suitable land base. The remainder are in areas on the unsuitable land base included in MA 8.1 and MA 8.3.

Any other changes in the suitable land base have occurred at the project level, which involves updating the vegetation geodatabase due to rather small, localized events (e.g. flooding) or refining mapping. These changes are likely to provide relatively minor changes at the Forest-wide scale.

Currently the Ottawa has approximately 546,699 acres classified suitable for timber production. It is anticipated that minor fluctuations in suitable land will continue to occur through Forest Plan implementation. The Ottawa will continue to conduct landscape analysis based upon the acres deemed suitable for timber production as analyzed in the FEIS.

Forest Plan

Are the current Forest Plan components (desired conditions, goals, objectives) achievable in the timeframes described and does the Forest Plan provide sufficient direction (standards, guidelines, suitability, designated lands) to achieve these components?

Yes, as described above, the Forest Plan does not specify an actual range that is needed to be maintained. The Forest Plan gives ample direction for the classification of land suitability, which are utilized to classify new land acquisitions.

Forest Assessment

Is the status or trend of the monitoring indicators substantially different than described in the Forest Assessment, or was an assumption in the Forest Assessment proven to be invalid from the monitoring data?

No, all assumptions and assessments have proven to be valid.

Management Actions

Did any of the management activities potentially result in adverse or beneficial effects to the status and trend of the monitoring indicators?

Through reclassification, the Forest has been able to assign the proper land suitability classes to current and newly acquired parcels. By reclassifying land to reflect correct suitability status allowed the Forest to protect sensitive resources while maintaining a suitable land base for timber production.

Monitoring Program

Did the monitoring results provide all the information necessary to answer the monitoring question?

Yes, the data collection protocols and indicators adequately provide the necessary information to answer the monitoring question.

Monitoring Question 8b - Recommendations

There are no recommendations for changes to this question.

Table 44. Summary of monitoring recommendations for Monitoring Question 8b

Changes may be warranted for the:	Yes	Maybe, not enough information to determine at this time	No
Forest Plan			☐
Forest Assessment			☐
Management Actions			☐
Plan Monitoring Program			☐

Monitoring Question 9 — To what extent and under what circumstances are clearcuts and other openings created by even-aged management exceeding 40 acres?

Context for this Evaluation

This monitoring question discloses trends in temporary openings greater than 40 acres. Specifically, if the implementation of these stands followed Forest Plan direction (Forest Plan pp. 2-23).

Table 45. Background information for Monitoring Question 9

Drivers	
The NFMA requires that maximum size limits for harvest areas are evaluated to determine whether such size limits should be continued. A Forest Plan Standard holds temporary openings from even-aged silvicultural practices at 40 acres or less. Exceptions include during the creation of Kirtland's warbler (KW) habitat (<550 acres) or responding to natural events, such as fire, insect and disease or windstorm (Forest Plan, p. 2-23). This monitoring question measures trends toward achieving these habitat conditions outlined in Goal 28 (Forest Plan, p. 2-9) that states, "manage Kirtland's warbler jack pine habitat using ecosystem management principles that mimic/resemble historic conditions and disturbance regimes". Objectives 1b (p 2.2), 16a (p. 2-6), 28a and 28b (p. 2-9) are also applicable.	
Primary Forest Plan Component Addressed	Monitoring Question Indicator
Manage Kirtland's warbler jack pine habitat using ecosystem management principles that mimic/resemble historic conditions and disturbance regimes. Develop habitat by designing and configuring treatment blocks that mimic the regeneration effects of stand replacing wildfires (Forest Plan, Goal 28, p. 2-9)	Number of temporary openings created by the application of even-aged silviculture greater than 40 acres.

Who collected this data? Who is Responsible for analyzing this question?
Michael Strieter, Forest Silviculturist

When was this monitoring question last updated?

- Date of current evaluation: February 2024
- Date of previous evaluation: FY 2017 Monitoring Evaluation Report

Table 46. Relationship of Monitoring Question 9 to other Forest Plan direction

Question 9	Key Forest Plan Components		
	<i>Desired Conditions</i>	<i>Goals and Objectives</i>	<i>Standards and Guidelines</i>
Indicator 9	Temporary openings will be 40 acres or less, except: On a case-by-case basis after 60 days' public notice and review by the Regional Forester. In MAs 4.1a and 4.2a to create Kirtland's warbler habitat; or When the size of the area is harvested, it is the result of a natural catastrophic condition such as fire, insect and disease attack, or windstorm (p. 2-23).	Goal 16: Provide for a mix of age classes within the aspen/paper birch vegetation type to support conservation, economic and social objectives associated with early successional habitats. Objective(s): a. Emphasize regeneration harvests of mature and over mature aspen within the next 10 to 20 years to ensure the aspen type is maintained within the desired vegetation composition range for the management area (p. 2-6) Goal 27: Provide adequate habitat for Management Indicator Species: American marten, ruffed grouse, cutleaf toothwort, and mayfly-stonefly-caddisfly suite. Objective a:	Guideline: Regenerate existing aspen or convert another forest type to aspen by clearcutting (p. 2-16). Regenerate existing jack pine stands or convert other types to jack pine by clearcutting (p. 2-18). A stand of at least the minimum stand size, normally 10 acres, should separate openings that are greater than 40 acres (p. 2-23). Standards: Temporary openings will be 40 acres or less, except: •On a case-by-case basis after 60 days' public notice and review by the Regional Forester; •In MAs 4.1a and 4.2a to create Kirtland's warbler habitat; or •When the size of the area harvested is the result of a natural catastrophic condition such as fire,

Question 9	Key Forest Plan Components		
	<i>Desired Conditions</i>	<i>Goals and Objectives</i>	<i>Standards and Guidelines</i>
		Maintain at least 12,000 acres of 0–9 year aspen/paper birch regeneration, for ruffed grouse habitat, well-distributed on lands suited for timber production (p. 2-8).	insect and disease attack, or windstorm (p. 2-23).

What monitoring activities have been conducted since the last monitoring evaluation? What protocols were used to collect these data?

Monitoring activities for this question have been gathered through database queries using FACTS. No site-specific monitoring occurred for FYs 2017 or 2018.

What is the target, or range for the indicator being measured? Is there an alert level (such as a trigger or threshold), associated with the target that should be noted?

The Ottawa has been creating temporary openings over 40 acres in size for Kirtland’s warbler habitat and aspen regeneration since implementation of the 2006 Forest Plan began (see Monitoring Question 31). The number and size of the resulting openings have been overestimated during the planning process compared to the acreage of opening created during project implementation. All the temporary openings greater than 40 acres from FY 2019 to FY 2023 were reviewed and approved by the Regional Forester.

Has any new Best Available Scientific Information (BASI) informed this monitoring question, indicators, or methodology? Where is the data for this monitoring question stored?

No new best available scientific information has been used to evaluate this monitoring question.

Monitoring Question 9 - Results

Table 47. Status and trend of the indicator for Monitoring Question 9

Indicators		Recent Trend	
<i>Indicator 9: Acres of temporary opening, managed to exceed 40 acres in size, by forest type.</i>		<i>Towards Target</i>	<i>Away from Target</i>
Current Status	<i>Within Target</i>	X	
	<i>Outside Target</i>		

What level of confidence is there in the accuracy and precision?

There is a high level of confidence in the quality and quantity of data collected because the same staff has been collecting and reporting this information, in the same manner, for several years. The Forest Plan states that the methods used for this monitoring question have a high degree of repeatability, reliability, accuracy and precision (p. 4-4).

Monitoring Question 9 - Evaluation Discussion

Table 48. Openings exceeding 40 acres in size (FY 2016, and FY2019 to FY 2023)

Fiscal Year	Forest Type	Number of Openings	Largest Size of Opening Created per Year
2016	Aspen and Jack Pine	1	53
2019	Aspen	3	96
2020	Aspen	8	69
2021	Aspen	6	75
2022	Aspen	9	58
	Jack Pine	1	41
2023	Aspen	6	85

*2016 is added for trend information in future but not included in the report's 5 year discussion.

Forest Plan

Are the current Forest Plan components (desired conditions, goals, objectives) achievable in the timeframes described and does the Forest Plan provide sufficient direction (standards, guidelines, suitability, designated lands) to achieve these components?

The Forest Plan includes a standard that limits the creation of temporary openings above 40 acres in size in certain MAs when applying even-aged silvicultural practices.

Deviations from this standard are allowed on a case-by-case basis, but only after a review by the Regional Forester and public notice. However, the Forest Plan does allow temporary openings to exceed 40 acres in size for the management of KW habitat in MAs 4.1a and 4.2a. A pair of KWs requires at least 8 acres of young jack pine forest but usually needs 30 to 40 acres to raise young (FEIS Volume I, p. 3-129). The Forest Plan states that in MAs 4.1a and 4.2a the maximum opening size shall not exceed allows a maximum 550 acres (p. 2-23).

Openings exceeding 40 acres in size were implemented to contribute to early successional habitat objectives, especially for aspen and jack pine, as outlined in the following examples.

- The Redboat Vegetation Management Project (January 2014 Decision) authorized up to 13 complexes for aspen habitat regeneration, ranging in size from 41 to 122 acres. One 47-acre temporary opening was completed between 2019 to 2023.
- The Aspen Management Project (March 2016 Decision) authorized harvest of an average of 1,700 acres of mature and over-mature aspen per year, up to 30,000 total acres. The decision also allows for the creation of 10 temporary openings per year, ranging from 41 to 100 acres in size. From 2019 to 2023 33 complexes have been established, ranging from 41 to 96 acres.
- The Pori Junction Vegetation Management Project (January 2014 Decision) authorized one stand for jack pine regeneration (43 acres). This stand was harvested in 2022 totaling 41 acres harvested.

Monitoring Question 22 illustrates that the Ottawa has struggled to maintain young aspen on the landscape. The five-year average annual harvest for aspen is about 44.3% of the Forest Plan direction. The projects listed above will help to address this discrepancy through allowing increased clearcut sizes (see Table 48). Without this exception, opportunities to create larger-sized openings are typically limited because stands on the Forest's landscape are inherently small due to years of implementing the 40-acre limitation.

Forest Assessment

Is the status or trend of the monitoring indicators substantially different than described in the Forest Assessment, or was an assumption in the Forest Assessment proven to be invalid from the monitoring data?

Although there is a trend in implementing temporary openings greater than 40-acres, requests for exceeding 40 acres will remain more of an exception than a rule during project implementation. It is expected that larger than 40-acre openings will continue to occur to maintain KW habitat, early successional habitat restoration goals, and to address areas experiencing negative effects from insects and/or disease. According to the Forest Plan, in most situations, stands 10-acres in size should separate openings that are greater than 40-acres and may be comprised of one or more adjacent stands. An opening will no longer be considered an opening when the re-established stand has reached a height of 20% of the surrounding trees (p. 2-23).

Management Actions

Did any of the management activities potentially result in adverse or beneficial effects to the status and trend of the monitoring indicators?

These management activities did not result in any adverse effects. Through the implementation of these activities there were beneficial effect on the Forest's ability to work towards maintaining at least 12,000 acres of aspen in the 0-9-year range of aspen/paper birch regeneration for ruffed grouse habitat (Forest Plan, pp. 2-8). It also allowed the Forest to regenerate mature and over mature aspen to ensure the aspen type is maintained within the desired vegetation composition range for the management area (Forest Plan p. 2-6).

Monitoring Program

Did the monitoring results provide all the information necessary to answer the monitoring question?

Yes, the data collection protocols and indicators adequately provide the necessary information to answer the monitoring question.

Monitoring Question 9 - Recommendations

To better assist with planning efforts, additional requests for Regional Office exemptions for the creation of temporary openings exceeding 40-acres in size should be considered. This is especially true where efforts to harvest smaller stands (purposely left unharvested) are constrained. The Forest Plan that states, “Regeneration of the aspen forest type is the first priority where delay of harvesting would result in the forest type loss due to natural succession” (p. 3-10, 3-12, 3-20, 3-25, 3-60 and 3-65).

Table 49. Summary of monitoring recommendations for Monitoring Question 9

Changes may be warranted for the:	Yes	Maybe, not enough information to determine at this time	No
Forest Plan			☐
Forest Assessment			☐
Management Actions			☐
Plan Monitoring Program			☐

Monitoring Question 10 — Is Forest Plan implementation resulting in impacts that may substantially and permanently impair the productivity of the land?

Context for this Evaluation

This monitoring question ensures the Ottawa soil resource can support and sustain desired forest conditions and remain ecologically healthy.

Table 50. Background information for Monitoring Question 10

Drivers	
The 2012 Planning Rule (36 CFR 219.12(a) (5) (viii)): The effects of each management system to determine that they do not substantially and permanently impair the productivity of the land (16 USC 1604(g) (3) (c)). NFMA: Documentation of the measured prescriptions and effects, including significant changes in productivity of the land.	
Primary Forest Plan Component Addressed	Monitoring Question Indicator
Provide for ecosystems that are healthy, resilient, diverse, and functioning in a sustainable and productive manner (Forest Plan, Goal 2, p. 2-2).	Extent of soil disturbance affecting soil function and soil productivity on managed lands.

Who collected this data? Who is Responsible for analyzing this question?
Amy Amman, Forest Soil Scientist

When was this monitoring question last updated?

- Date of current evaluation: May 2024
- Date of previous evaluation: FY 2017 Monitoring Evaluation Report

Table 51. Relationship of Monitoring Question 10 to other Forest Plan direction

Question 10	Key Forest Plan Components		
	<i>Desired Conditions</i>	<i>Goals and Objectives</i>	<i>Standards and Guidelines</i>
Indicator 10	To the extent practical, timber management will seek to restore ecological structure, function, and processes, and will emulate naturally occurring disturbances (p. 1-9). Prescribed fire will be used alone or with silvicultural treatments to mimic the effects of natural fire. Management-ignited fire and lighting-caused fire will help maintain, enhance and restore ecological processes (p. 1-9).	Goal 13: Restore and maintain Great Lakes forested ecosystems using timber management and silvicultural practices as tools, and to enhance values associated with the Great Lakes Ecosystem (E.O. 13340) (p. 2-5). Goal 20: Provide for ecologically healthy watersheds, soils, riparian areas, and streams to support viable populations of native and desired non-native species, and to restore and enhance values associated with the Great Lakes System (E.O. 13340) (p. 2-7). Objective 20a: Maintain soil productivity (p. 2-7).	While the Standards and Guidelines included in the Forest Plan all generally apply to the desired condition that this monitoring question seeks to address, the 2400 Timber Management Standards and Guidelines (p 2-16 to 2-24) are the most directly related.

**What monitoring activities have been conducted since the last monitoring evaluation?
What protocols were used to collect these data?**

The Forest Soil Disturbance Monitoring Protocol (FSDMP) (Page-Dumroese et al. 2009a & 2009b) was utilized to collect this data.

Since the time of the last monitoring report on this question, the FSDMP has been utilized to collect additional pre- and/or post-harvest data on 72 timber sale payment units.

What is the target, or range for the indicator being measured? Is there an alert level (such as a trigger or threshold), associated with the target that should be noted?

The Region 9 Soil Quality Standards (USDA Forest Service, 2012) direct the Forests to utilize adaptive management for evaluation risks to soil quality. Observing soil property change indicators provides the context to determine how such changes may affect an ecosystem, and ultimately, help determine how management activity is affecting movement toward or away from a desired condition. The Region 9 Regional Soil Quality Standards state that monitoring shall address soil disturbance related to compaction, displacement, puddling/rutting, burning, erosion, ground cover, and mass movement. Risks to the soil resource are included in project level Environmental Analyses. Former Regional direction set a 15% detrimental¹ disturbance limit (USDA Forest Service, 2005).

In addition to the Forest Plan direction, the Ottawa National Forest 2020 Strategic Plan suggests that a total of 15 to 20 pre-harvest and post-harvest timber sale payment units would be monitored annually with the results aiding in determining the effectiveness of Ecological Classification System (ECS) based protection measures (typically included as project design criteria) for forest management activities while addressing Regional Soil Quality Standards. The Strategic Plan also indicates a 15% detrimental disturbance threshold (USDA, 2020).

Has any new Best Available Scientific Information (BASI) informed this monitoring question, indicators, or methodology? Where is the data for this monitoring question stored?

The monitoring question, indicators and methodology are current, and they have been utilized for collecting the FSDMP data. The monitoring data is housed in the Natural Resource Manager (NRM) database, as well as in Ottawa electronic records.

¹ Detrimental is defined by *Page-Dumroese, D. S., Abbott, A. M., and Rice, T. M. (2009b)* as Page-Dumroese, D. S., Abbott, A. M., and Rice, T. M. (2009b). as a 15% increase in the natural bulk density; wheel ruts at least 2 inches in wet soils; removal of greater than one inch of any surface horizon from a continuous area greater than 100 square feet; physical and biological changes to the soil resulting from high-intensity burns; surface erosion noted by gullies, pedestals and soil deposition; and any mass soil movement caused by management activity.

Monitoring Question 10 – Results

Table 52. Status and trend of the indicator for Monitoring Question 10

Indicators		Recent Trend	
<i>Indicator:</i> Extent of soil disturbance affecting soil function and soil productivity on managed lands.		<i>Towards Target</i>	<i>Away from Target</i>
Current Status	<i>Within Target</i>	X	
	<i>Outside Target</i>		

What level of confidence is there in the accuracy and precision?

There is a moderate to high level of confidence in the quality and quantity of data collected. The Forest Plan states that the methods used for this monitoring question are well accepted for modeling or quantitatively measuring the resource or condition, and have a high degree of repeatability, reliability, accuracy and precision (p. 4-4).

All sites are set using a 75% confidence interval and an interval width of ten. Results are summarized and reported annually. This report is a synthesis of those annual reports.

Additional information about the field FSDMP methodology is available in the Page-Dumroese, et. al. 2009 publications.

Monitoring Question 10 - Evaluation Discussion

All forest management activities have the potential to create soil disturbance, which has the potential to negatively impact the soil resource. Through all activities, soil disturbance should be managed so that Forest land productivity is sustained (USDA Forest Service, 2010). The FSDMP (Page-Dumroese et al. 2009a & 2009b) offers an efficient methodology of using visual disturbance classes to describe the degree of change from pre-activity conditions to those resulting from management activities. The data can be utilized to evaluate the effectiveness of Ottawa management and mitigation practices, and where necessary, changes can be implemented should those practices prove to be ineffective in protecting the soil resource during operations and thus, soil productivity in the longer term.

Prior to the implementation of the FSDMP, the Ottawa began implementing then-regional handbook direction (USDA Forest Service, 2005) for Soil Quality Monitoring (SQM) in 2003. On an annual basis, areas with forest management activity were randomly selected within the strata of landform and season of harvest. Ocular estimating techniques were applied to determine the level(s) of soil disturbance in each selected payment unit. To validate the ocular estimates and to further analyze payment units of higher concern, transect data may have also been collected and compared to ocular estimate values. This method of monitoring was conducted until 2009, when the new national FSDMP replaced the SQM direction (USDA Forest Service, 2012). The Ottawa implemented the FSDMP in 2010.

The FSDMP is very similar to SQM in that it utilizes visual indicators to determine soil disturbance. However, the FSDMP provides a more consistent and statistically sound method to assess and report soil disturbance resulting from various management activities. The visual indicators used in the FSDMP include forest floor impacts, topsoil displacement, rutting,

burning, compaction and structure. The visual indicators are defined and grouped into soil disturbance classes (Class 0 [lowest] to Class 3 [highest]), which can then be used as a proxy to determine whether observed soil disturbances could be considered detrimental to soil productivity or hydrologic function (Page-Dumroese, 2009b). Soil disturbance classes included in the FSDMP can be found in the Page-Dumroese, et. al. 2009 publications.

Under the FSDMP, pre-harvest and harvest activity monitoring was implemented with the idea that future post-activity monitoring would be conducted on those units. Until the pre- and post-activity balance was attained, the FSDMP would be carried out on post-activity units that had not been monitored prior to the activity taking place. In all cases, areas with active or proposed forest management were randomly selected within the strata of landform and season of harvest. Payment units selected for monitoring were subject to a rapid assessment, requiring that a minimum of 30 sample plots per unit be assessed for soil disturbance. Typically, site variability is such that more points are required to ensure statistical viability of the data.

Soil disturbance classes are determined for each sample site within an activity area, after which a determination is made on whether the disturbance is detrimental. None of the disturbance classes automatically imply that a site is detrimental. That determination is dependent upon the site and soil characteristics where the disturbance has occurred. Upon completion of the protocol, the monitoring information can be aggregated to determine how much detrimental soil disturbance is present. This decision considers the intended harvest management objectives paired with the evaluator's judgement of the site's ability to restore ecological soil productivity, which varies by soil type. Areas that are detrimentally disturbed are not expected to return to a naturally functioning condition within a reasonable time (approximately 18 years) (NCASI, 2004). The earlier SQM effort did not include a detrimental determination.

Between 2003 and 2009, approximately 1,185 payment units were operated forest wide. Across all landforms and harvest types, approximately 180 of these units were monitored under SQM, representing a sample of roughly 15%. Results showed that, for normal harvest operations, undisturbed ground ranged from approximately 60% to 100%, while potentially detrimental disturbance generally ranged from 0% to 12% (Table 53 and Figure 5). Results of the monitoring indicate that, on average, within payment units nearly 90% of the ground surface was considered undisturbed while potentially detrimental disturbance (thought of as class 3 with SQM) averaged 2%, with small percentages of low to moderate soil disturbance. At that time, Region 9 soil quality standards had set a 15% detrimental disturbance limit (USDA Forest Service, 2005).

Table 53. SQM results (all post-activity/harvest) (sample size: 183)

	Disturbance Classes			
	Class 0	Class 1	Class 2	Class 3
Average Percent 2003-2009	89%	6%	4%	2%
Range (low)	2%*	0%	0%	0%
Range (high)	100%	19%	75%* (18.7%)	13%* (12%)

** Denotes disturbance from a unit that was scarified (anchor chained). Monitoring results met the desired intent of the scarification work. Number in parenthesis shows the extent of the range for normal harvest operations.*

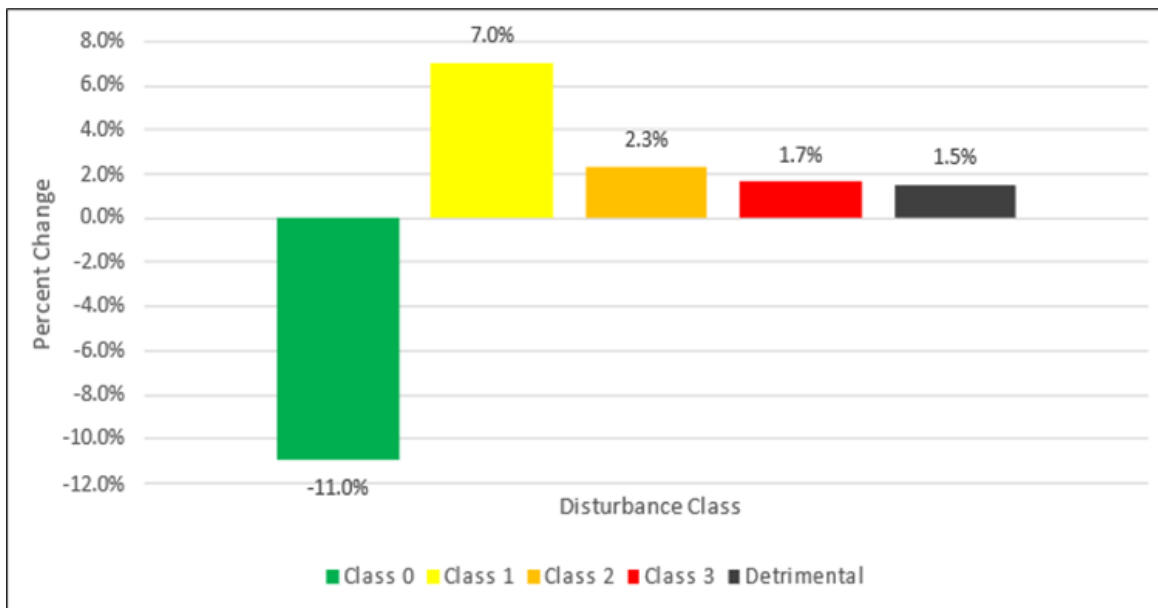


Figure 5. Change in disturbance class average percent pre-activity/harvest to post-activity/harvest Monitoring (FSDMP)

Since FSDMP was implemented on the Ottawa in 2010, post-harvest and harvest activity monitoring has been conducted on 92 payment units (Table 54). On average, results show that 85% of the monitored payment units are in an undisturbed condition, while 11% show some low-level disturbance. The higher disturbance categories (2 and 3) average 3% and 2%, respectively. However, the upper range for both of those disturbance classes is 13% and 19%, which is nearly at and above the detrimental disturbance threshold of 15% (disturbance classes do not automatically indicate a detrimental soil condition). Although the average detrimental disturbance was determined to be 2%, the highest amount found in an activity unit was 16%.

Table 54. FSDMP post-activity/harvest results (sample size: 83)

	Disturbance Classes				
	Class 0	Class 1	Class 2	Class 3	Detrimental
Average % 2010-2023	85%	11%	3%	2%	2%
Range (low)	15%^	0%	0%	0%	0%
Range (high)	100%	84%^	13%	19%	16%

[^] denotes disturbance from a unit that was burned using prescribed fire. Monitoring results met the desired intent which was a light burn. Number in parenthesis shows the extent of the range for normal harvest operations.

To date, utilizing FSDMP, a total of 68 activity units has been monitored with both pre- and post-activity/harvest monitoring. Those results show how the soil disturbance class averages have changed due to the Ottawa's land management activities (Figure 5). On average, the soils that were found to be in the class 0 disturbance group have decreased approximately 11% after activities have occurred, while soil disturbance in classes 1 through 3 have increased by approximately 7%, 2.3%, and 1.7%, respectively. Detrimental disturbance increases by 1.5% as well. Category 3 disturbance and detrimental disturbance averages both remained well below a 15% threshold.

Forest Plan

Are the current Forest Plan components (desired conditions, goals, objectives) achievable in the timeframes described and does the Forest Plan provide sufficient direction (standards, guidelines, suitability, designated lands) to achieve these components?

There is no timeframe described for this component of the Forest Plan. The Forest Plan direction is general, but addresses maintaining soil productivity, as well as providing for ecologically healthy soils into the future.

Forest Assessment

Is the status or trend of the monitoring indicators substantially different than described in the Forest Assessment, or was an assumption in the Forest Assessment proven to be invalid from the monitoring data?

The trend of the monitoring indicators supports the analysis and anticipated outcomes for the Forest Plan. The FEIS analysis concluded that soil impacts were anticipated to be minor, provided soil protection measures remained in effect during forest management activities, and the monitoring results show agreement with that conclusion.

Management Actions

Did any of the management activities potentially result in adverse or beneficial effects to the status and trend of the monitoring indicators?

No, Regional soil quality standards call for consideration of ecological response to soil property changes as measured by reference conditions. On average, 96% of the post-harvest monitoring data collected since 2010 indicate monitored payment units had little to no disturbance (Category 1 and 0, respectively), and only 2% were determined to be detrimentally disturbed. Therefore, many of the impacted soils would be expected to return to a naturally functioning condition within approximately 20 years (NCASI, 2004; Page-Dumroese, 2021).

Monitoring Program

Did the monitoring results provide all the information necessary to answer the monitoring question?

Yes, utilization of the FSDMP protocol for the Ottawa soil monitoring program has shown that management activities are generally meeting the guidelines set forth in the Region 9 Soil Quality Standards and Forest Plan.

Monitoring Question 10 - Recommendations

The average results from the SQM and FSDMP efforts confirm the effectiveness of the incorporation of project design criteria in protecting soil quality and soil productivity on the Ottawa. However, they do show that there is room for improvement, as the high boundary of the range for disturbance classes 2 (13%) and 3 (19%), as well as the detrimental component (16%), are too high. The high results were from timber harvest activity units with a normal

objective (i.e. no scarification, etc.). Note that similar patterns were also reported in the 2017 Monitoring and Evaluation report.

Soil monitoring contributes to the development of management practices that ensure continued soil productivity on the Ottawa through synthesis of the FSDMP data with management objectives and an understanding of productivity qualities as they relate to long-term sustainability, site resilience and hydrologic function. Moving forward, the Ottawa should continue to utilize the FSDMP to monitor land management activities to ensure that the soils on the Ottawa remain productive.

Table 55. Summary of monitoring recommendations for Monitoring Question 10

Changes may be warranted for the:	Yes	Maybe, not enough information to determine at this time	No
Forest Plan			☐
Forest Assessment			☐
Management Actions			☐
Plan Monitoring Program			☐

References

National Council for Air and Stream Improvement, Inc. (2004). Effects of heavy equipment on physical properties of soil and on long-term productivity: A review of literature and current research. *Technical Bulletin No. 887*. Research Triangle Park, NC: National Council for Air and Stream Improvement, Inc.

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Monitoring Question 11 — Are northern hardwood forest management activities promoting the regeneration of mid-tolerant tree species, specifically basswood, red oak, white pine and yellow birch?

Context for this Evaluation

This monitoring question ensures the Ottawa remains consistent with the 2012 Planning Rule requirement for monitoring a Focal Species² on each National Forest. The Ottawa chose a suite of mid-tolerant tree species as the Focal Species due to the important habitat niches these tree species provide, which include helping forest communities adapt to stressors such as the effects of climate change (increased catastrophic weather events and invasive species outbreaks).

Table 56. Background Information for Monitoring Question 11.

Drivers	
2012 Planning Rule - 36 CFR 219.12(a)(5)(iii): The status of focal species to assess the ecological conditions required under 36 CFR 219.9. This question is responsive to one of the eight required monitoring elements prescribed by the 2012 Planning Rule.	
Primary Forest Plan Component Addressed	Monitoring Question Indicator
The trend towards enhancement or maintenance of mid-tolerant forest types within northern hardwood forests to provide tree species diversity and vegetative composition diversity.	a. Difference in the number of seedling/sapling-sized, mid-tolerant tree species in managed and unmanaged northern hardwood forest stands.
	b. Comparison of the seedling/sapling-sized, mid-tolerant tree species component in the understory and overstory of managed stands.
Who collected this data? Who is for analyzing this question?	
Darren Thornbrugh, Regional Analyst for the USDA Forest Service Eastern Region; Christopher Boroski, Timber and Silviculture Program Manager	

When was this monitoring question last updated?

- Date of current evaluation: May 2025
- Date of previous evaluation: 2017 Monitoring Evaluation Report

² Focal Species are key species or assemblages selected by each USDA Forest Service planning unit to represent a specific aspect of ecological integrity or management plan effectiveness. They serve as indicators for monitoring whether forest and grassland management is maintaining or restoring healthy ecosystems.

Table 57. Relationship of Question 11 to other Forest Plan direction

Question 12a	Key Forest Plan Components		
	<i>Desired Conditions</i>	<i>Goals and Objectives</i>	<i>Standards and Guidelines</i>
Indicators a and b	Management Area (MA) desired vegetative compositions	Goals 1, 2, 3, 20, 23, 27, 32, and 34; Objectives 1b-1e, 2a-2d, 2f, 3a, 15a-15e, 20e, 27a, and 32a (pp. 2-2, 2-3, 2-6, 2-7, 2-8 and 2-10.	Forestwide and MA Guidelines: 2400 Timber Management Guidelines for each Management Area

**What monitoring activities have been conducted since the last monitoring evaluation?
What protocols were used to collect these data?**

This data is collected by the research branch of the USDA Forest Service using standardized methods consistent across the nation and through time. This data represents the best available dataset on growth, harvest and mortality of forest conditions available in the United States. The Ottawa worked with the research branch at Forest Inventory and Analysis (FIA) and the Eastern Region's Inventory and Monitoring staff to develop queries of the Ottawa's FIA plots that address the monitoring indicators. The Ottawa uses a "triple-intensity"³ level of monitoring frequency of the FIA plots to increase the level of growth and mortality data; within more frequent cycles and at an increased number of plots. The Ottawa worked with the Regional Office staff to develop a set of decision rules for using data from the 439 FIA plots, so that a differentiation could be made for plots managed for timber production vs. plots not managed for timber production.

Over the course of one year, 20% of the FIA plots are measured, so that all 439 plots are re-measured every 5 years. The data used for analysis included the period from 2004 to 2021, with "snapshots" of data from the 439 plots taken at 5-year intervals. Locations of FIA plots are not disclosed. Throughout these analyses, the Ottawa was, and still is, unaware of the geographic locations of the 439 plots. This is important to maintain, to ensure credibility in the data, so that the Forest staff do not manage around the 439 plots differently than any other location on the Forest. The next 5-year interval of monitoring is scheduled for 2026, which is when the next evaluation of data trends will be analyzed.

What is the target, or range for the indicator being measured? Is there an alert level (such as a trigger or threshold), associated with the target that should be noted?

³ Triple intensity is a three-stage systematic sample of sites across all forested lands. Phase 1 identifies where forested land is located. Phase 2 consists of one field sample site for every 6,000 acres of forest, where field crews collect data on forest type, site attributes, tree species, tree size, and overall tree condition. Phase 3 measures for a broader suite of forest health attributes including tree crown conditions, understory vegetation, down woody debris, and soil attributes.

Seedling and sapling-sized, mid-tolerant tree species remain persistent in the overstory and understory of managed and unmanaged northern hardwood forests. As forested areas grow older and become denser, shade tolerant species like sugar maple increase and can lead to a decrease in mid-tolerant tree species.

Has any new Best Available Scientific Information (BASI) informed this monitoring question, indicators, or methodology? Where is the data for this monitoring question stored?

The online Forest Inventory and Analysis Database – Application Programming Interface (FIADB-API) was utilized to query and summarize the necessary data using R and Python programming languages. All data used in this report were derived from the Forest Inventory and Analysis Database. The monitoring question and associated information is stored in the Ottawa’s official records.

Monitoring Question 11 - Results

Table 58. Status and trend of the indicator for Monitoring Question 12a

Indicators		Recent Trend	
<i>Indicator 11(a):</i> Difference in the number of seedling/sapling-sized, mid-tolerant tree species in managed and unmanaged northern hardwood forest stands.		<i>Towards Target</i>	<i>Away from Target</i>
Current Status	<i>Within Target</i>	X	
	<i>Outside Target</i>		
<i>Indicator 11(b):</i> Comparison of the seedling/sapling-sized, mid-tolerant tree species component in the understory and overstory of managed stands.		<i>Towards Target</i>	<i>Away from Target</i>
Current Status	<i>Within Target</i>	X	
	<i>Outside Target</i>		

What level of confidence is there in the accuracy and precision?

Sampling error is associated with the natural and expected deviation of the sample from the true population mean. This deviation is susceptible to a mathematical evaluation of the probability of error. Sampling error, expressed in percent, and associated confidence intervals around the sample estimate are provided for most of the data presented in this report. The confidence interval is the range of values for which there is a two-out-of-three (67 percent) chance that the range includes the true population value obtained from a 100 percent census. Higher levels of confidence would widen the intervals around estimates.

Monitoring Question 11 - Evaluation Discussion

The FIA data supporting this analysis is based on the Ottawa’s focal species, a suite of mid-tolerant tree species, contrasted with two other species groups for northern hardwood forest

types on the Ottawa. These three species groups are: (1) mid-tolerant trees (eastern white pine, white ash, green ash, American basswood, yellow birch and northern red oak); (2) maples (sugar and red); and (3) other (all species not named above).

Most of northern hardwood forest of the Ottawa is in a second-growth condition, with stands typically comprised of similar aged trees. Management practices influence the number of seedlings and saplings in the understory of northern hardwood types across the Ottawa. Data collected reveals that managed stands produce higher numbers of seedlings and saplings of all species, and that periodic harvest enables the persistence of mid-tolerant tree saplings over time.

A subset of all FIA plots was selected based upon forest type to define northern hardwoods. The forest types included were those in the *maple-beech-birch*, *elm-ash-cottonwood* and *oak-hickory* forest-type groups, plus the *eastern white pine-northern red oak-white ash* forest type from the oak-pine group. Compared with all plots, the sample size used for the northern hardwood subset was reduced by one third for the Managed group and by almost one half for the Not Managed category. The forest area distribution for all detailed forest types included in this analysis is displayed in Figure 6. The sugar maple forest type, with a component of yellow birch is the most common forest type on both managed and not managed land classes in the latest FIA collection effort. The forest types groups are defined at the Regional level; the Ottawa does not have all the species listed, such as American beech.

Table 59. Number of FIA sample plots in Managed and Unmanaged land classes, Ottawa National Forest, 2004, 2009, 2014, 2019, and 2021

Land Class	Fiscal Year				
	2004	2009	2014	2019	2021
Managed	354	263	312	319	318
Not Managed	186	1366	165	180	182
All Land Classes	540	399	477	499	500

Table 60. Number of FIA years covered for each sampling panel for years covered in report for Ottawa National Forest, 2004, 2009, 2014, 2019, and 2021

Year	FIA Sampling Panel
2004	2000; 2001; 2002; 2003; 2004
2009	2005; 2006; 2007; 2008; 2009
2014	2009; 2010; 2011; 2012; 2013; 2014
2019	2013; 2014; 2015; 2016; 2017; 2018; 2019
2021	2015; 2016; 2017; 2018; 2019; 2020; 2021

Managed vs. Unmanaged Forest

Figures 6 and 7 highlight how the distribution of forest area within the two management classes differs by forest-type group and stand-age class. Generally, forests in the Managed class are concentrated in the maple/beech/birch, aspen/birch and white/red/jack pine forest-type groups. In contrast, the Unmanaged class has significant concentrations of forest area in spruce/fir and elm/ash/cottonwood in addition to the groups listed for Managed. The age-class distributions for both management classes show the highest concentrations of area between 60 and 100 years; however, the Managed class has more young stands and the Unmanaged class has higher percentages of stands greater than 100 years old.

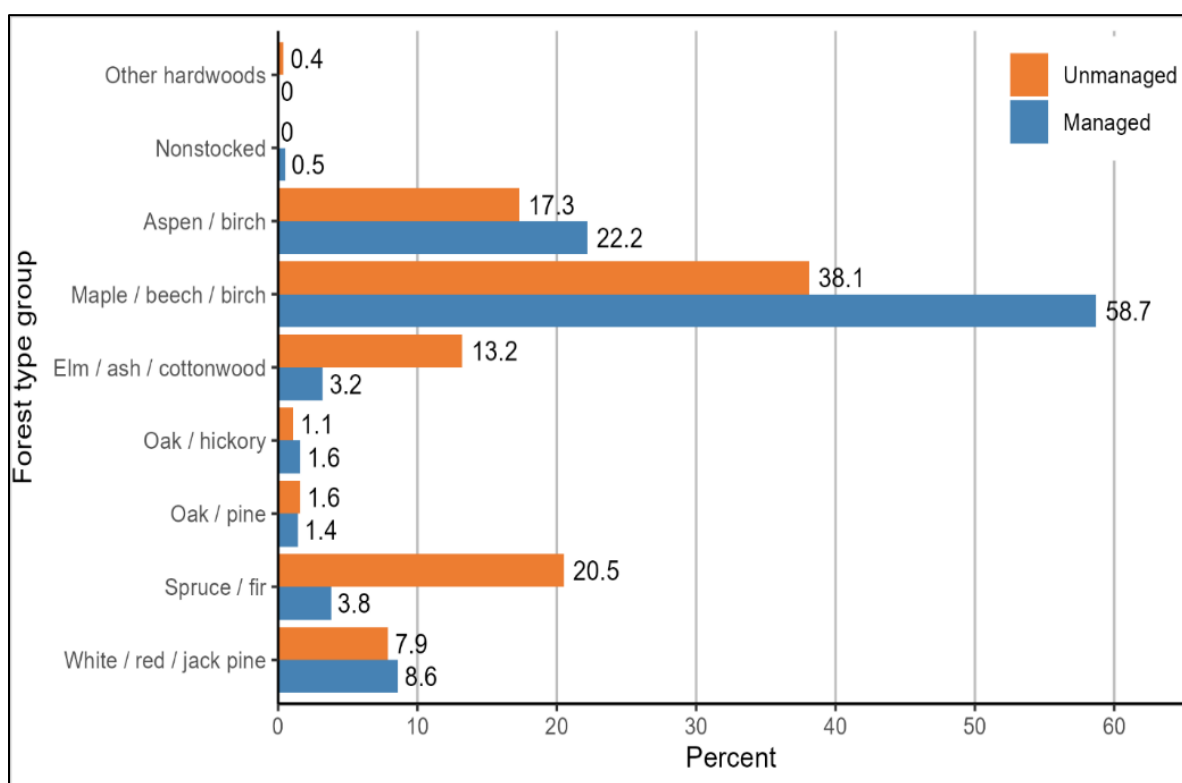


Figure 6. Distribution of forest area by forest-type group, Managed and Unmanaged land classes, Ottawa National Forest, 2021.

Mid-tolerant Species

For four tree size classes, a change index was computed for base years 2009, 2014, and 2019 showing abundance changes relative to the beginning time period (i.e., 2009, Figs. 8 and 9). A value of 100 is assigned to the base year. A value of 110 in a subsequent year would indicate a 10% reduction. Separate charts for seedlings and trees ≥ 1.0 inch dbh are presented for clarity purposes due to the large number of seedlings per acre relative to larger trees. All error bars depict 1 standard deviation. Figures 7 and 8 show changes for three separate dbh classes for Managed and Unmanaged forests respectively

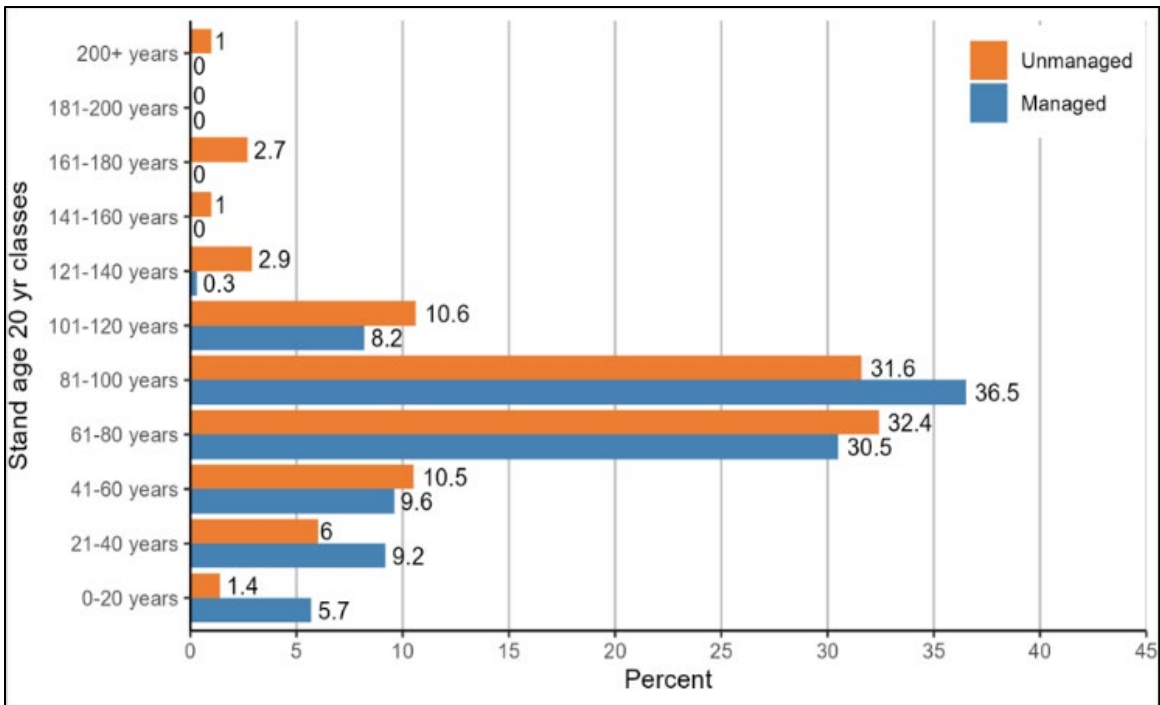


Figure 7. Distribution of forest area by stand-age class. Managed and Unmanaged land classes. Ottawa National Forest 2021

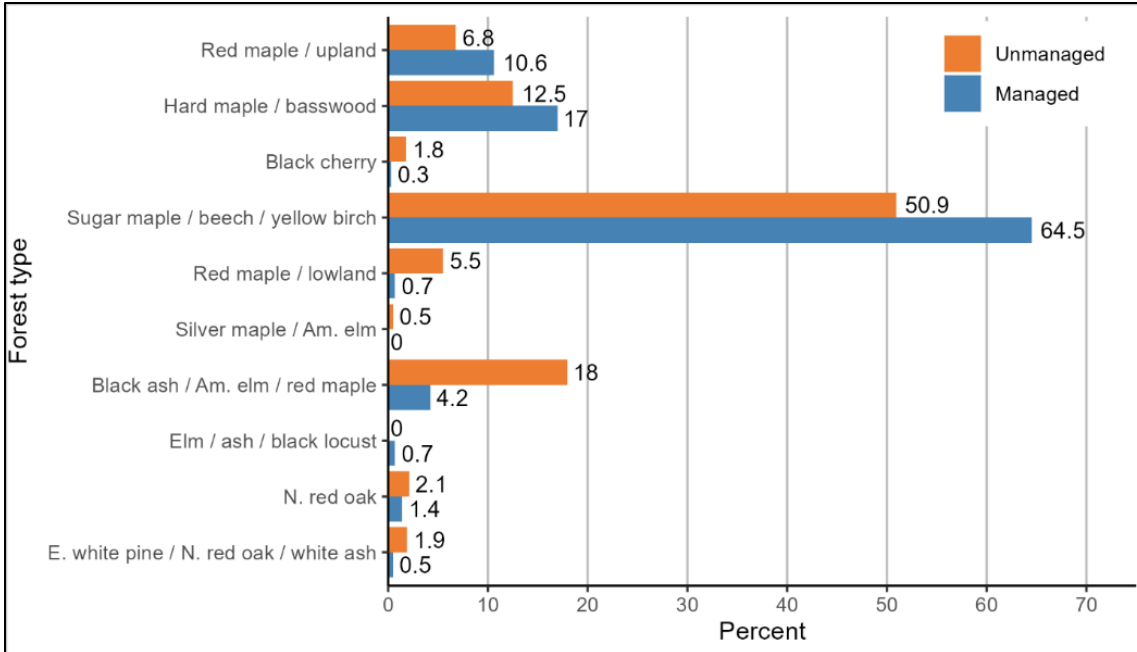


Figure 8. Distribution of northern hardwood forest area by detailed forest type, Managed and Unmanaged land classes, Ottawa National Forest, 2021

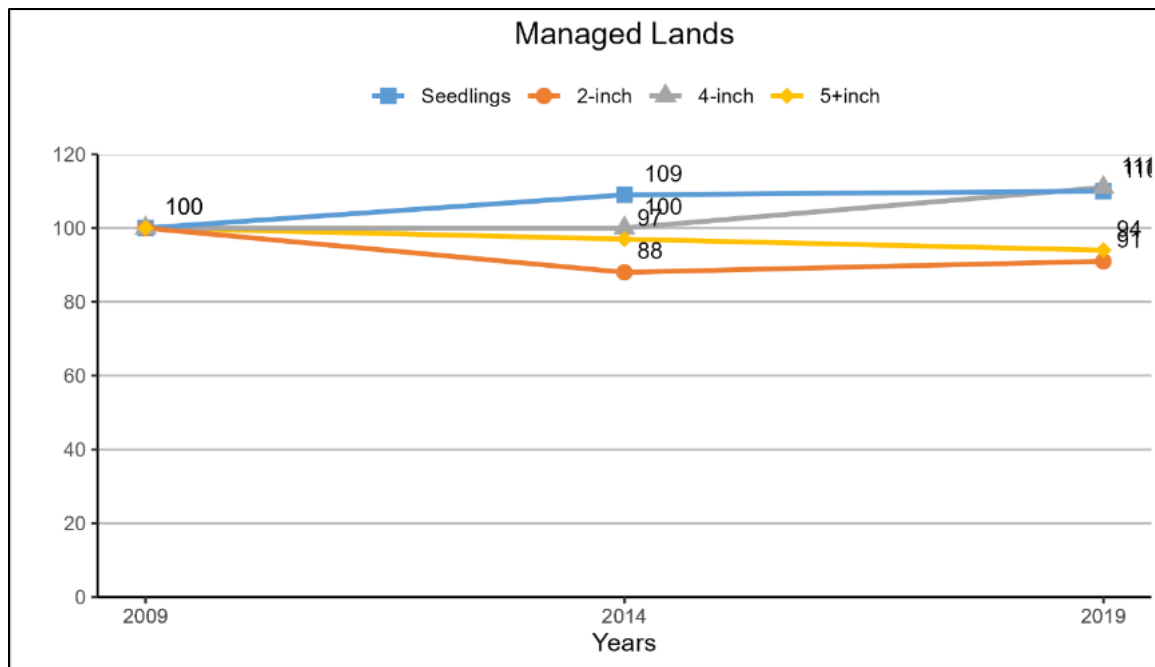


Figure 9. Change index (2009 = 100) for number of mid-tolerant stems per acre by size class, on managed lands 2009, 2014, and 2019

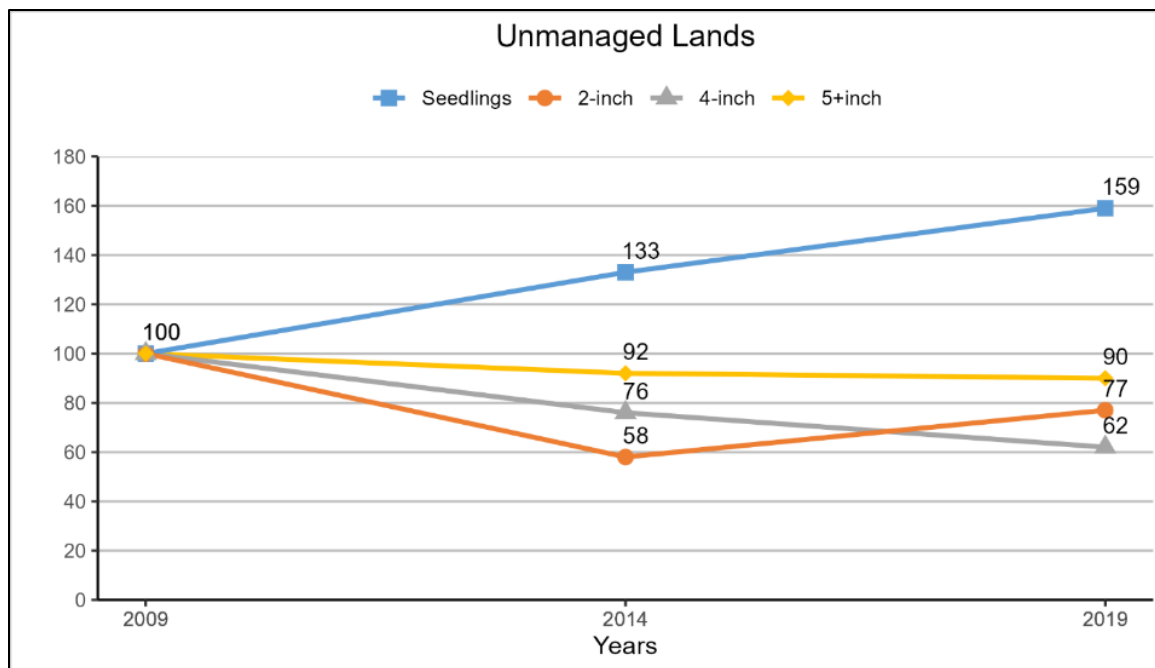


Figure 10. Change index (2009 = 100) for number of mid-tolerant stems per acre by size class, on Unmanaged lands 2009, 2014, and 2019.

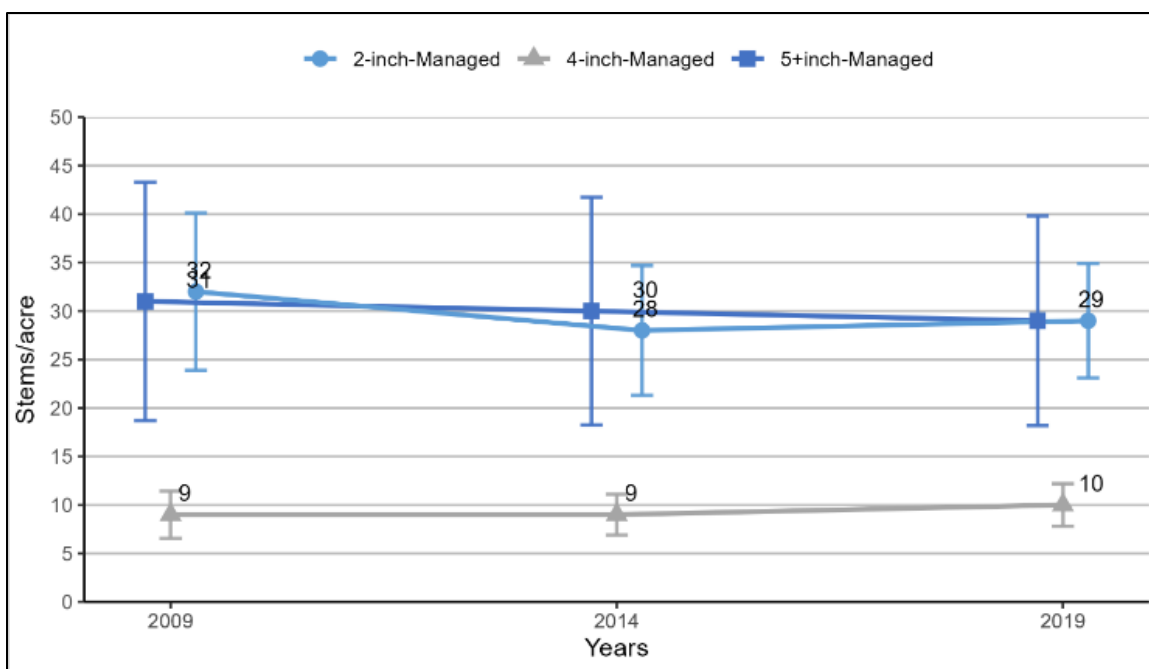


Figure 11. Number of mid-tolerant seedlings per acre by management class, 2009, 2014, and 2019 (error bars depict 1 standard deviation)

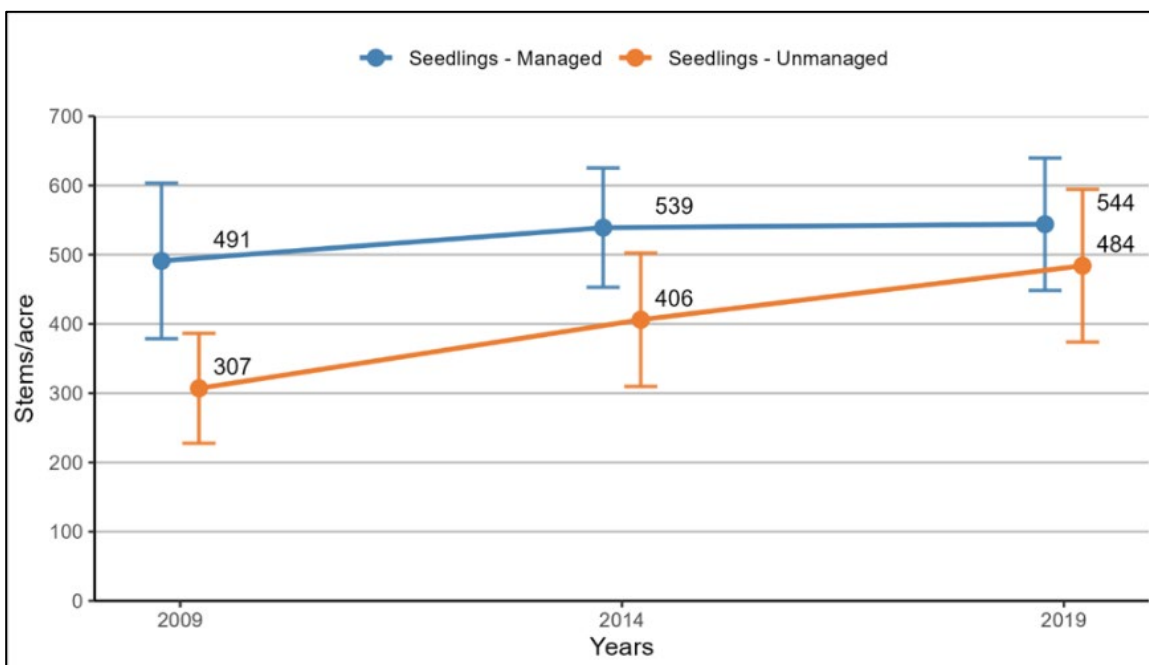


Figure 12. Mean number of mid-tolerant seedlings per acre in the managed and unmanaged categories, by dbh group, 2009, 2014, and 2019 (error bars depict 1 standard deviation)

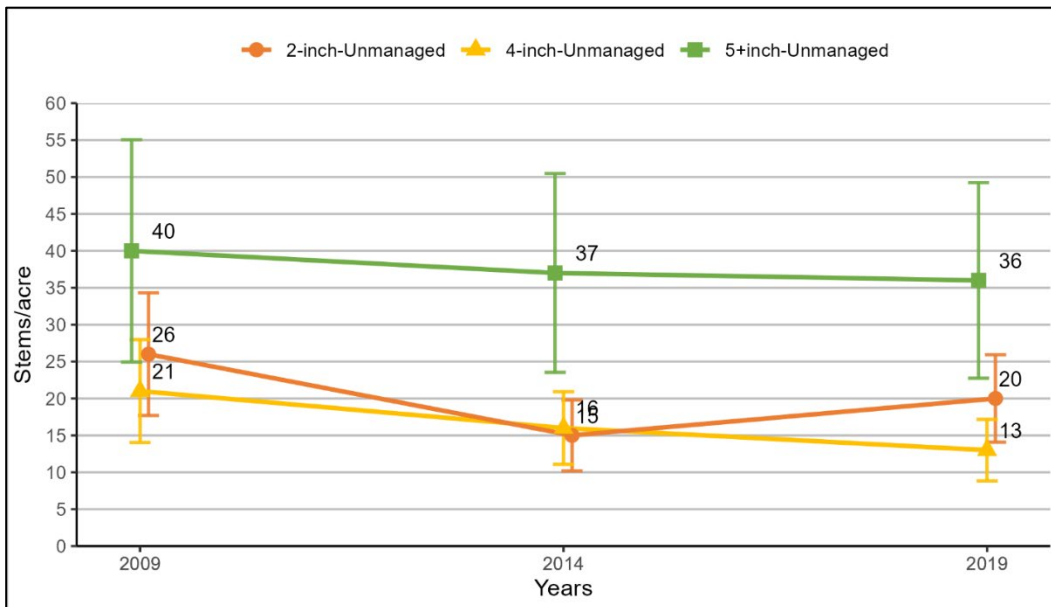


Figure 13. Change index (2004 = 100) for number of maple stems per acre by size class, on Managed lands 2009, 2014, and 2019

The number of mid-tolerant saplings decrease over time in the unmanaged stands due to inadequate sunlight penetrating the dense overstory, resulting in suppression and mortality of the mid-tolerant saplings. Figures 11, 12 and 13 display the number of mid-tolerant stems per acre for seedlings and saplings. Separate charts for seedlings and trees 1.0-inch diameter at breast height (dbh) and larger are presented for clarity purposes due to the substantial number of seedlings per acre relative to larger trees.

These figures show that there are more seedlings and saplings in the understory of managed stands. This is the result of removing trees from the overstory through timber harvest, which allows daylight to reach the forest floor. Furthermore, understory development in managed stands occurs due to soil disturbance, removal of organic matter and exposing mineral soil, which occurs during timber harvest, especially in areas where harvest occurs without snow cover. Sunlight and preparation of a seedbed (e.g., exposure of mineral soil) results in the germination and growth of tree seeds originating from the overstory canopy. Comparing Figures 12 and 13 shows that the number of mid-tolerant saplings remains constant over time in the managed stands due to fewer overstory trees per acre, resulting in more sunlight for understory saplings.

Maple Species

For four tree size classes, change index was computed for base years 2009, 2014, and 2019 showing abundance changes relative to the beginning time period (i.e., 2009), for Managed (Figure 14) and Unmanaged lands (Figure 15). A value of 100 is assigned to the base year. A value of 110 in a subsequent year would indicate a 10% rise in the estimate for number of stems per acre; conversely, a value of 90 would indicate a 10% reduction.

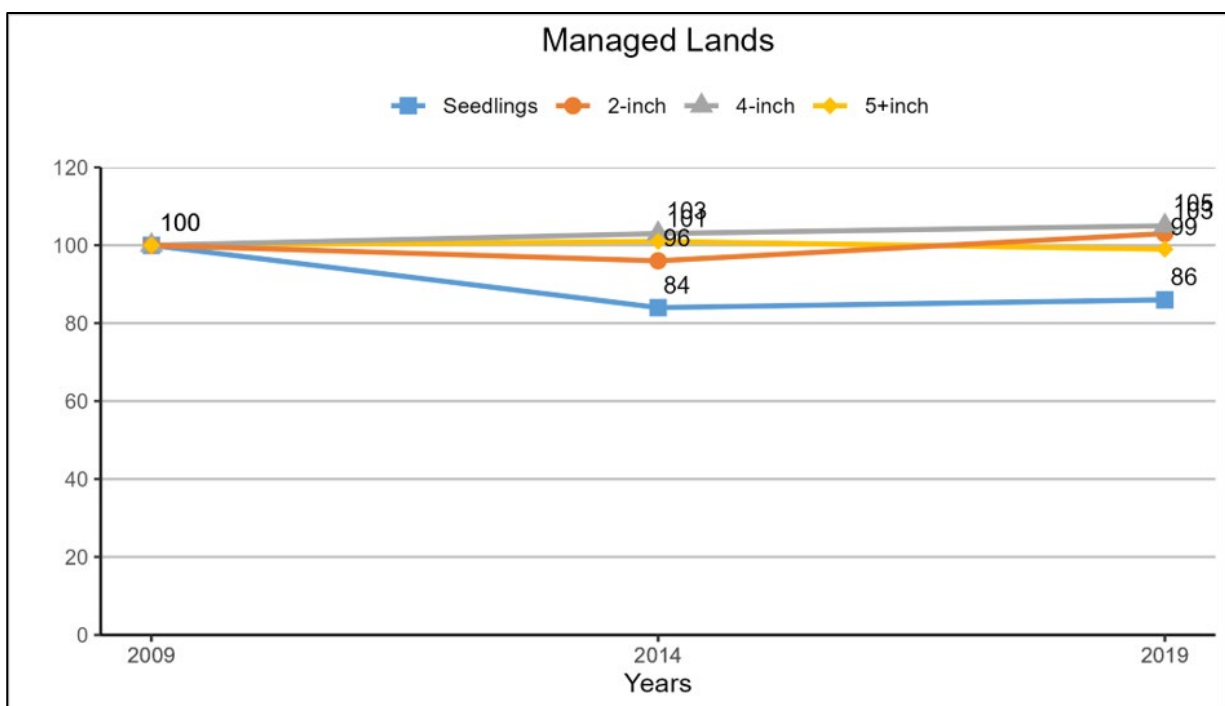


Figure 14. Change index (2004 = 100) for number of maple stems per acre by size class, on Managed lands 2009, 2014, and 2019

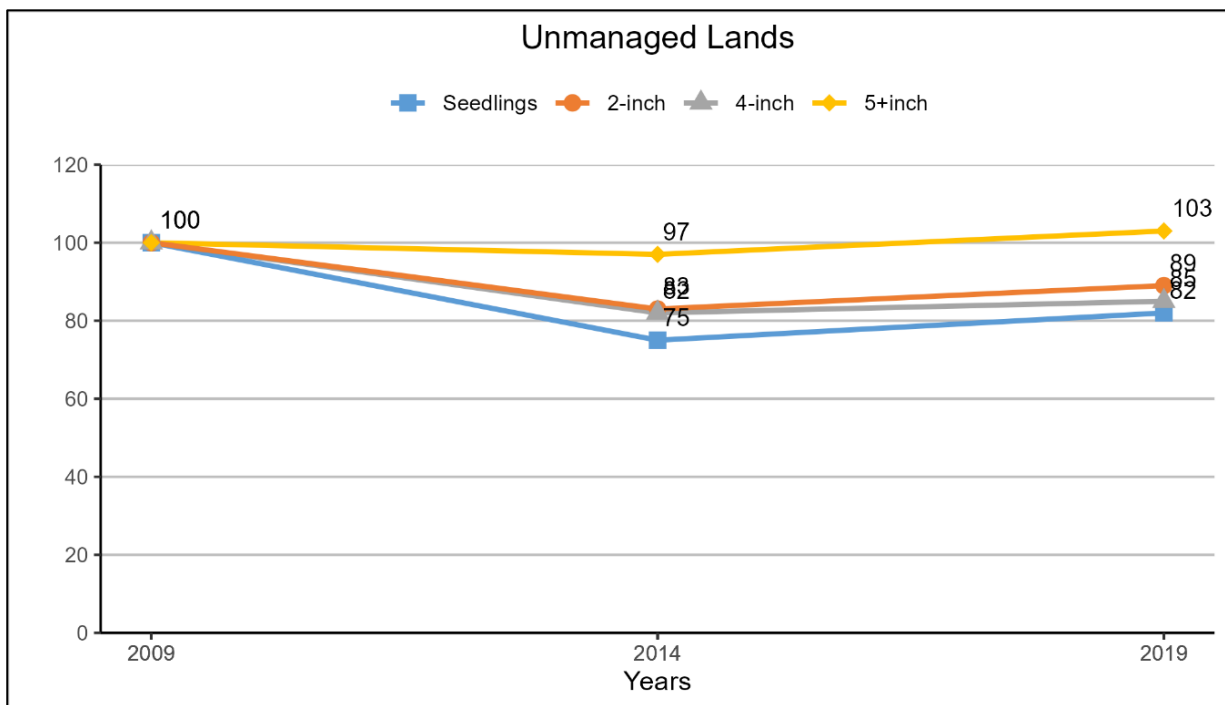


Figure 15. Change index (2004 = 100) for number of maple stems per acre by size class, on Unmanaged lands 2009, 2014, and 2019



Figure 16. Mean number of maple seedlings per acre in the Managed category, by dbh group, 2009, and 2014 (error bars depict 1 standard deviation)

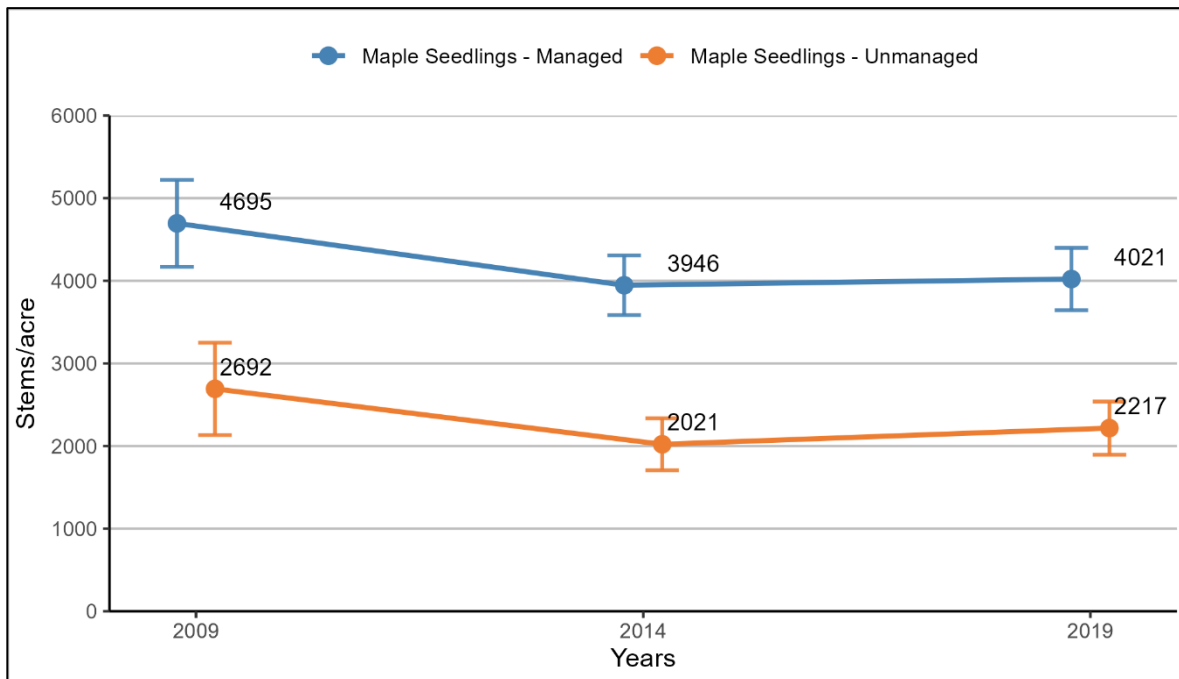


Figure 17. Mean number of maple seedlings per acre by management class, 2009, and 2014 (error bars depict 1 standard deviation)

Managed and Unmanaged land classes are compared in paired charts. Changes were found to be negligible over time. There is a trend on the Ottawa towards dominance by sugar and red maple. The *Historical Context of the Ottawa National Forest* outlines these trends and the ecological consequences of this trend; this document is incorporated by reference. Part of this analysis focuses on the number of maple seedlings and saplings that exist in northern hardwood stands across the Ottawa; on both Managed and Not Managed lands.

Both Managed and Not Managed land classes have abundant maple seedlings and saplings in the understory. However, the density of seedling maples appears to be declining on the Not Managed lands. One likely reason is lack of sunlight due to the complete canopy closure overhead, resulting in suppression mortality of all trees seedlings, even the shade-tolerant sugar maples. Another probable reason for the overall decline in seedlings is due to herbivory from deer, hares and small mammals (i.e. girdling under the snow). Data from FIA plots located in Managed and Not Managed areas of the Ottawa. Separate charts for seedlings and trees 1.0-inch dbh and larger are presented for clarity purposes due to the substantial number of seedlings per acre relative to larger trees. These figures show that management practices influence the number of seedlings and saplings in the understory of northern hardwood types across the Ottawa. The FIA data collected reveals that managed stands hold higher numbers of seedlings and saplings of all species, and that periodic thinning and selection harvest enables the persistence of mid-tolerant tree saplings over time.

Comparing Figures 16 and 17 allows a visual comparison of the persistence of mid-tolerant saplings in the managed stands, compared to the steady decline in numbers of mid-tolerant saplings in the dense, over-crowded conditions of unmanaged stands. Most of northern hardwood forest on the Ottawa is in a second-growth condition, with single-aged growing space. Mid-tolerant species are at a competitive disadvantage in this environment during the seedling and sapling stages of growth. Due to its shade-tolerance, sugar maple has the advantage in this environment. It is important to the long-term retention stands.

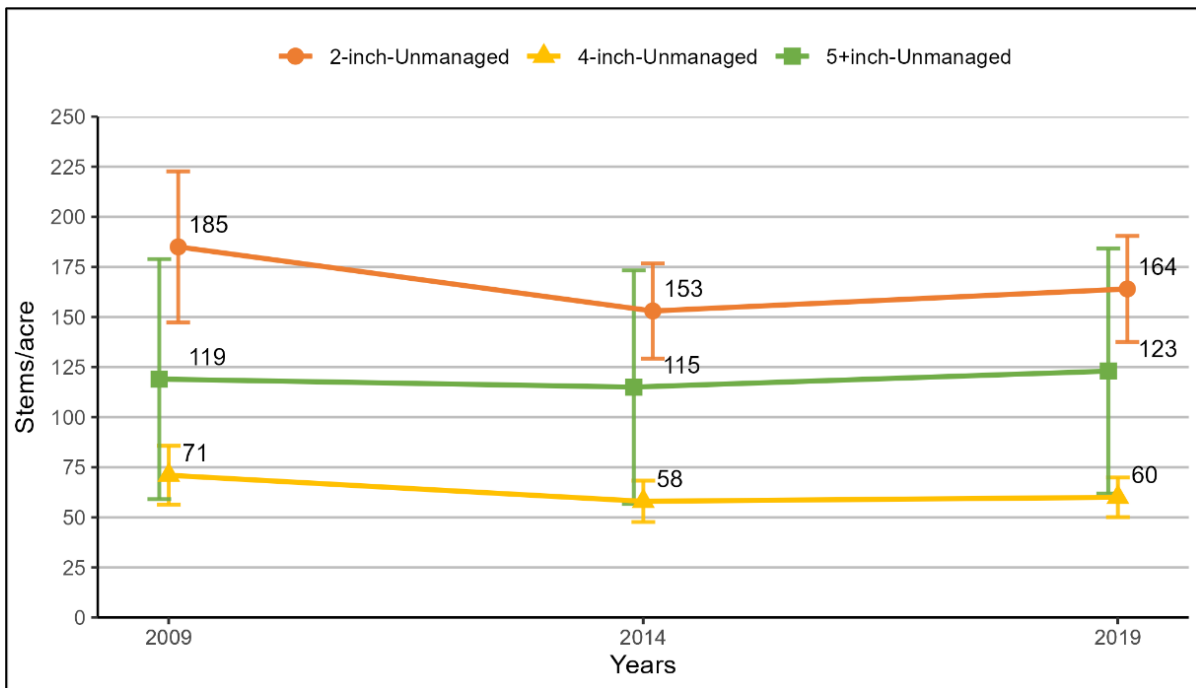


Figure 18. Mean number of maple trees per acre in the Unmanaged category, by dbh group, 2004, 2009, and 2014 (error bars depict 1 standard deviation)

Other Species Stems Per Acre

For four tree size classes, a change index was computed for base years 2009, 2014, and 2019 showing abundance changes relative to the beginning time period (i.e., 2009), for Managed (Figure 19) and Unmanaged lands (Figure 20). A value of 100 is assigned to the base year. A value of 110 in a subsequent year would indicate a 10% rise in the estimate for number of stems per acre; conversely, a value of 90 would indicate a 10% reduction. Managed and Unmanaged land classes are compared in paired charts (Figs. 19 and 20). Changes were found to be negligible over time. Separate charts for seedlings and trees 1 dbh $\geq$ 1-inch dbh are presented for clarity purposes due to the large number of seedlings per acre relative to larger trees. Also, comparisons were made for three diameter classes for managed and unmanaged stands. Error bars depict 1 standard deviation.

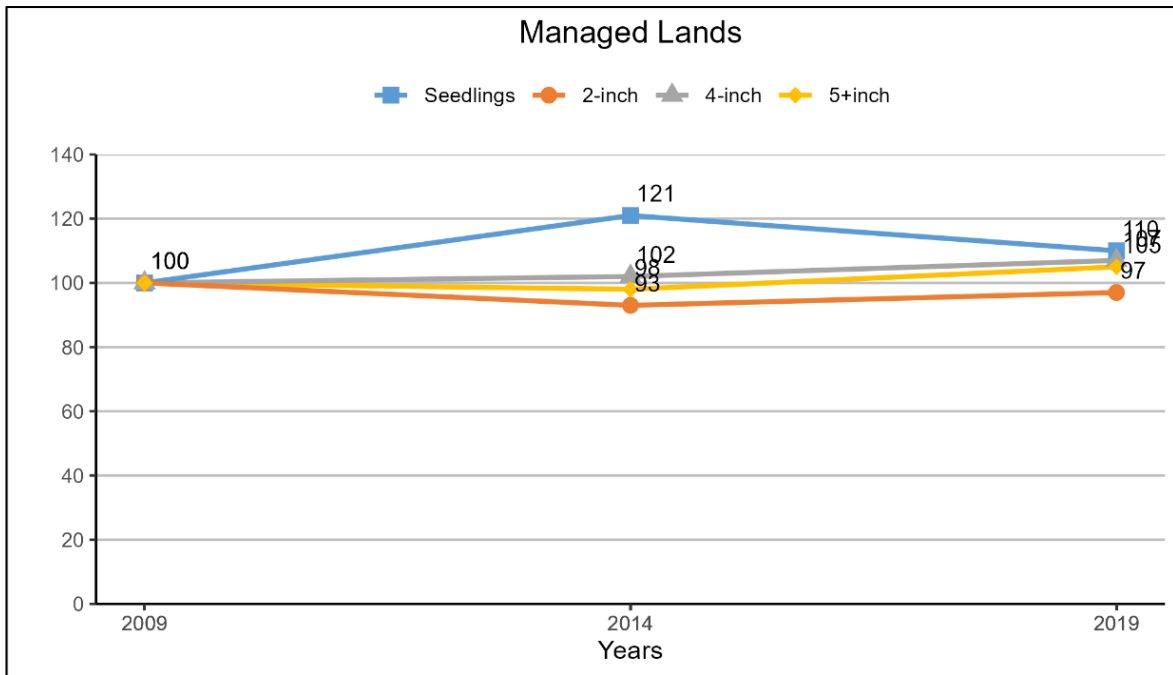


Figure 19. Change index (2004 = 100) for number of Other Species stems per acre by size class, on Managed lands 2009, 2014, and 2019.

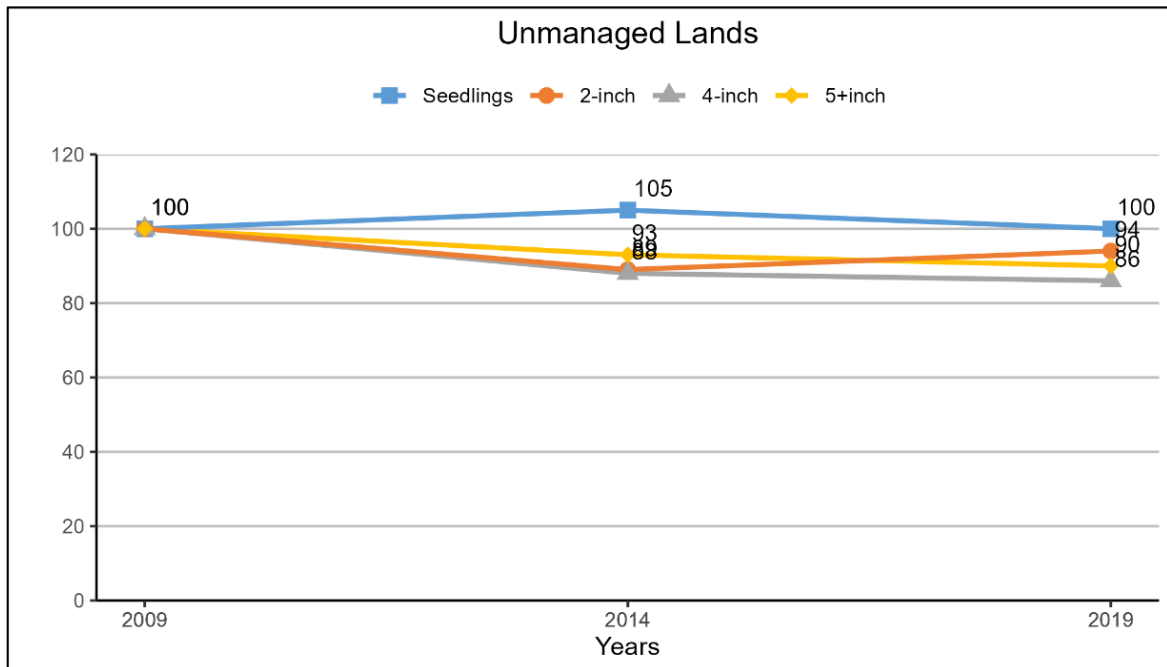


Figure 20. Change index (2004 = 100) for number of Other Species stems per acre by size class, on Unmanaged lands 2009, 2014, and 2019

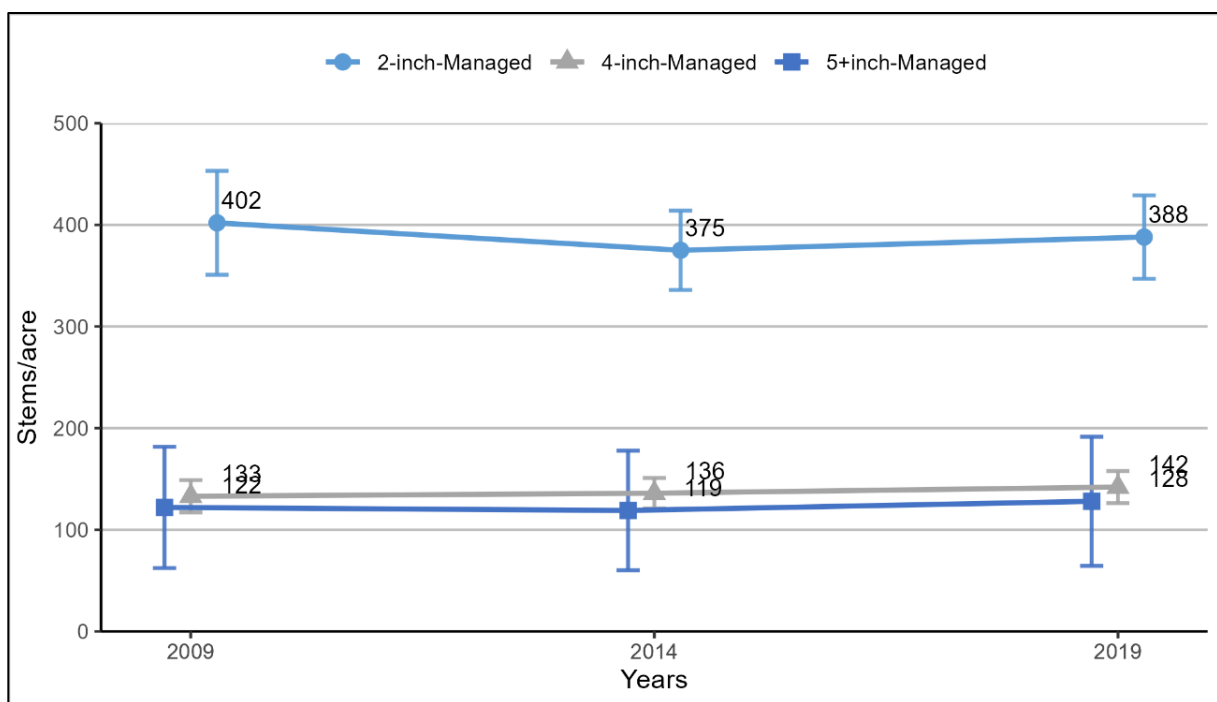


Figure 21. Mean number of Other Species seedlings per acre by management class, 2009, 2014, and 2019 (error bars depict 1 standard deviation).



Figure 22. Mean number of Other Species trees per acre in the Managed category, by dbh group, 2009, 2014, and 2019 (error bars depict 1 standard deviation)

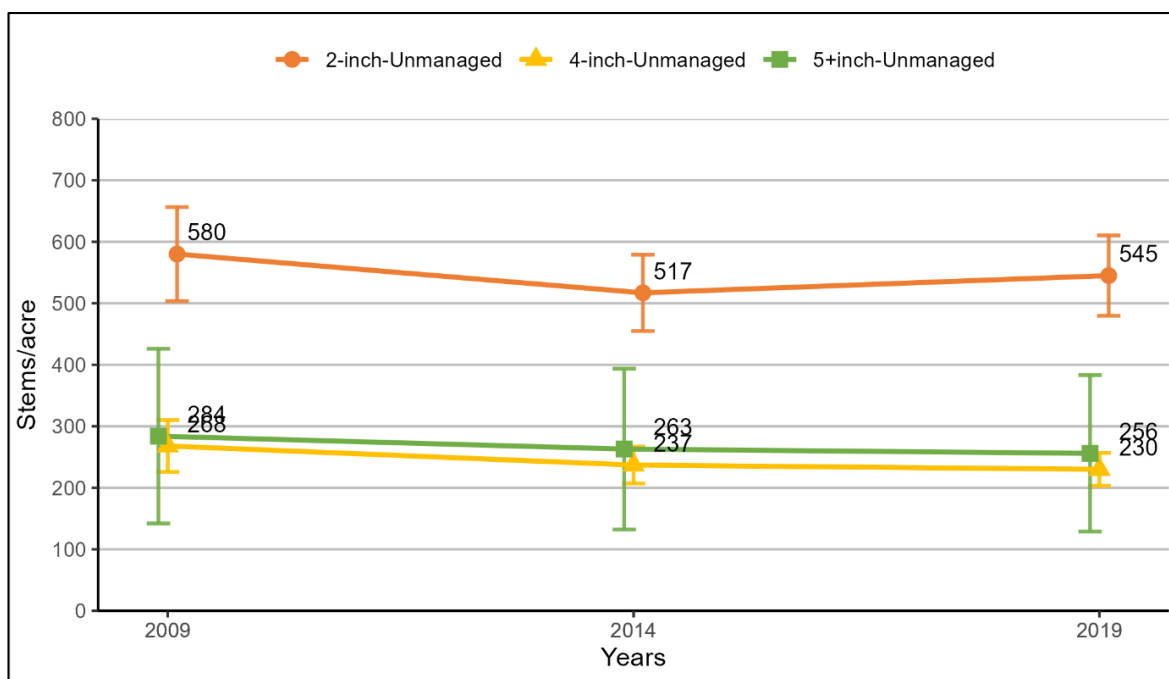


Figure 23. Mean number of maple trees per acre in the Unmanaged category, by dbh group, 2004, 2009, and 2014 (error bars depict 1 standard deviation)

Mid-tolerant Species Relative Frequency in the Understory and Overstory

In this section, the FIA variable Crown Class Code is used to stratify trees into vertical crown categories and examine the degree of occurrence of each mid-tolerant species across the vertical strata from the understory layers to the canopy. The following crown classes, shown with definitions, are collected by FIA for trees ≥ 1 -inch dbh:

The following charts (Figs. 24 and 25) illustrate the frequency of occurrence of each of the mid-tolerant species in four vertical strata—Seedling, Overtopped, Intermediate, and Overstory. Dominant and codominant trees would normally be considered as forming the overstory of most relatively undisturbed stands, so these two crown classes are combined for the Overstory designation. The Overtopped, Intermediate, and Seedling classes could be combined to represent the Understory if desired. For now, they are left separate to illustrate changes as vertical position changes. This analysis is for the northern hardwoods' subset of all Ottawa National Forest samples.

Comparing Figures 24 and 25 shows that Managed land classes have more mid-tolerant tree diversity than the Not Managed lands. The managed stands have more basswood and green ash in all crown classes, and more yellow birch in most crown classes. However, white pine is more prevalent in stands Not Managed. This result is unexpected because the Ottawa refrains from harvesting white pine in most northern hardwood areas due to white pine's high ecological value.

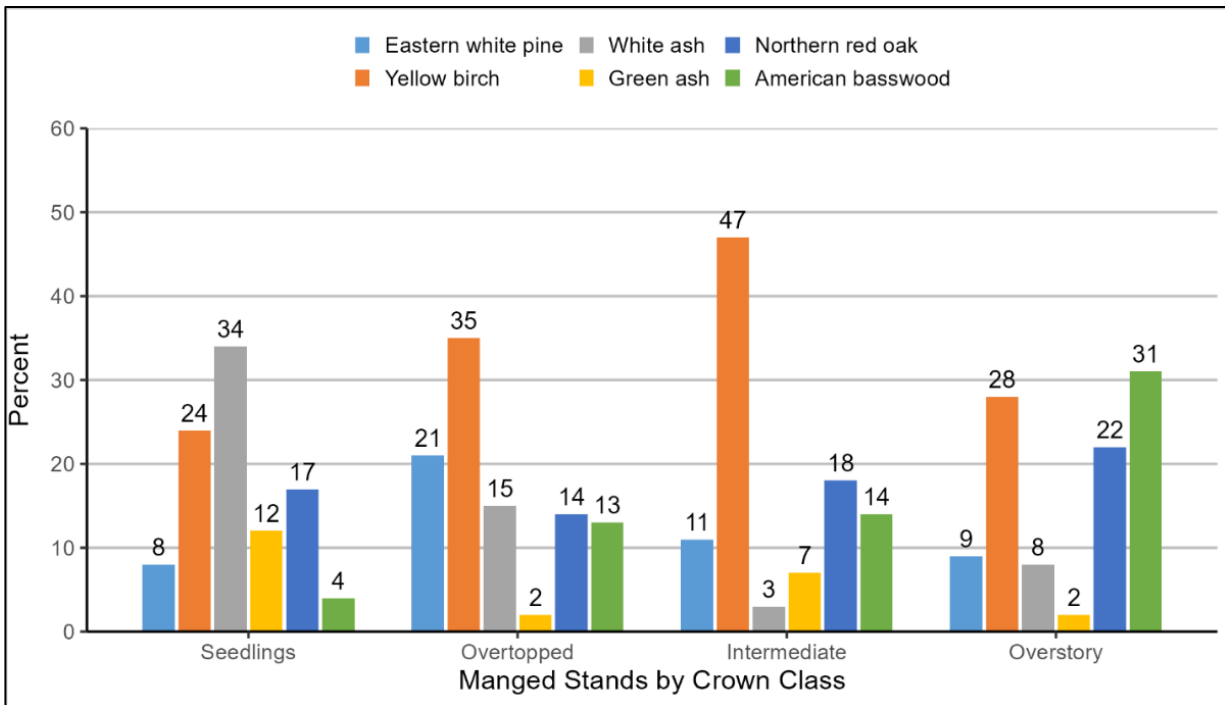


Figure 24. Relative frequency of each of the Mid-tolerant Species in the Managed by Crown Class, northern hardwood stands, Ottawa National Forest, 2019

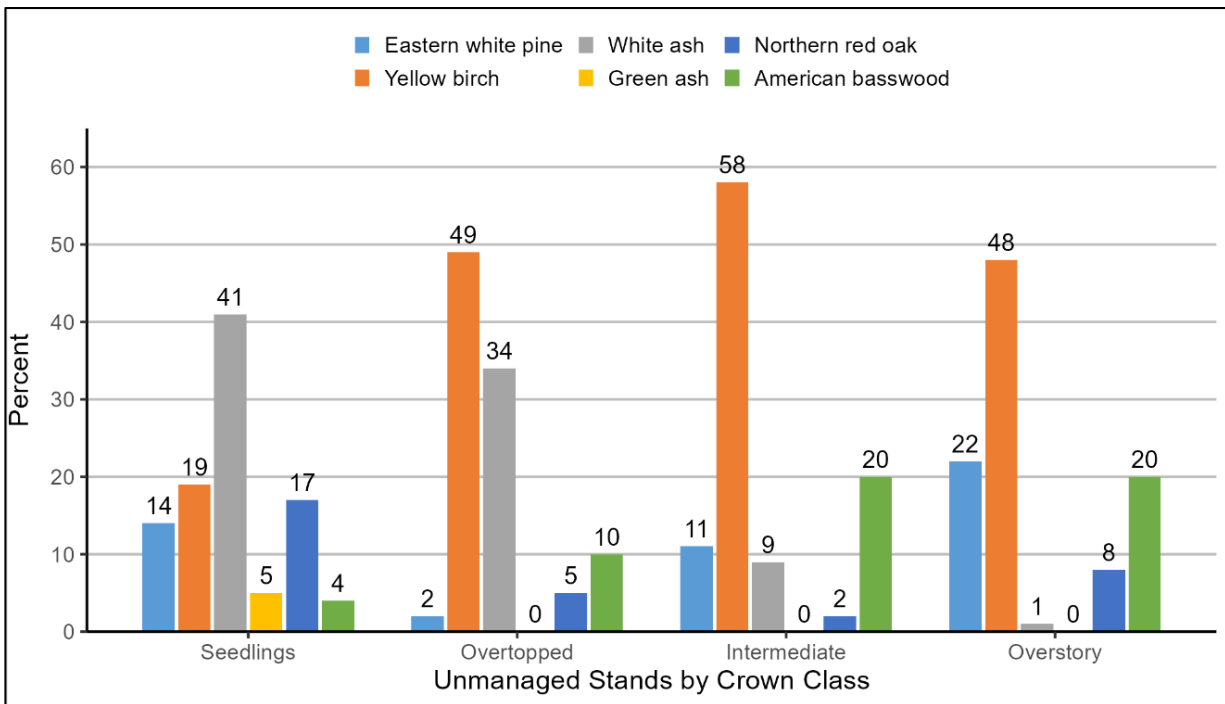


Figure 25. Relative frequency of each of the Mid-tolerant Species in the Unmanaged by Crown Class, northern hardwood stands, Ottawa National Forest, 2019

Forest Plan

Are the current Forest Plan components (desired conditions, goals, objectives) achievable in the timeframes described and does the Forest Plan provide sufficient direction (standards, guidelines, suitability, designated lands) to achieve these components?

Yes, the desired conditions, goals, and objectives are all achievable.

Forest Assessment

Is the status or trend of the monitoring indicators substantially different than described in the Forest Assessment, or was an assumption in the Forest Assessment proven to be invalid from the monitoring data?

The indicators are not different than described in the Forest Plan analysis; that is, more mid-tolerant species available in areas where sun reaches the forest floor and fewer mid-tolerant tree species in the overstory and understory where there is a closed canopy.

Management Actions

Did any of the management activities potentially result in adverse or beneficial effects to the status and trend of the monitoring indicators?

Managed stands through timber harvest would thin the canopy and encourage the growth of mid-tolerant seedlings and future saplings.

Monitoring Program

Did the monitoring results provide all the information necessary to answer the monitoring question?

Yes, however, there are only five cycles of monitoring data available, which may not be enough to adequately define where survival is best. Future data collected will allow the USDA Forest Service to determine whether this effort is successfully measuring for the monitoring program indicators over time.

Monitoring Question 11 – Recommendations

No recommendations at this time. Future cycles of FIA plot monitoring will continue to provide trend information. This will allow us to show commonalities or differences between managed and unmanaged stands for regeneration/survival of mid-tolerant tree seedlings and saplings in northern hardwood forests.

Table 61. Summary of monitoring recommendations for Monitoring Question 10

Changes may be warranted for the:	Yes	Maybe, not enough information to determine at this time	No
Forest Plan			☐
Forest Assessment			☐

Changes may be warranted for the:	Yes	Maybe, not enough information to determine at this time	No
Management Actions			☐
Plan Monitoring Program		☐	

References

Forest Inventory and Analysis Database User Guide;
<https://research.fs.usda.gov/understory/forest-inventory-and-analysis-database-user-guide-nfi>).

The Design and Analysis Toolkit for Inventory and Monitoring (DATIM) Spatial Intersection Tool (SIT; https://research.fs.usda.gov/sites/default/files/2024-03/wo-6-sit_user-guide_arcgis_pro_v18.1.pdf)

The online Forest Inventory and Analysis Database – Application Programming Interface (FIADB-API; <https://apps.fs.usda.gov/fiadb-api/>)

Monitoring Question 12a — To what extent is Forest Plan implementation contributing or responding to non-native invasive plant species?

Context for this Evaluation

This monitoring question ensures the Ottawa remains consistent with our Forest Plan and national policy including the 2004 Forest Service *National Strategy and Implementation Plan for Invasive Species Management* and the 2013 Forest Service *National Strategic Framework for Invasive Species Management*. The intent of the Ottawa non-native invasive plant management program is to reduce the ecological harm they cause from spreading on the landscape, including loss of biodiversity.

Table 62. Background information for Monitoring Question 12a

Drivers	
Forest Service direction, including a national strategy and Forest Service Manual, Chapter 2900, calls for prevention and control of invasive species within National Forests. This monitoring question also measures trends toward achieving conditions outlined in Goal 8 of the Forest Plan (p. 2-4) that states, “through implementation of appropriate prevention, control and eradication measures for nonnative invasive species, maintain intact ecosystems to prevent the displacement, decreased viability, or extirpation of native species”.	
Primary Forest Plan Component Addressed	Monitoring Question Indicator
Through implementation of appropriate prevention, control and eradication	a: Number of acres with known nonnative invasive plant infestations

measures for non-native invasive species, maintain intact ecosystems to prevent displacement, decreased viability, or extirpation of native species (Forest Plan, Goal 8, p. 2-4).	b: Number of infested acres treated by species.
	c: Acres of new nonnative invasive plants found, by species.
	d: The average effectiveness score of invasive plant treatment.
Who collected this data? Who is Responsible for analyzing this question?	
Ian Shackleford, Botanist	

When was this monitoring question last updated?

- Date of current evaluation: May 2024
- Date of previous evaluation: 2017 Monitoring Evaluation Report

Table 63. Relationship of Question 12a to other Forest Plan direction

Question 12a	Key Forest Plan Components		
	<i>Desired Conditions</i>	<i>Goals and Objectives</i>	<i>Standards and Guidelines</i>
Indicators a, b, c, d	The Forest Service will use the best available science-based methods to prevent and reduce the unacceptable impacts caused by invasive species and thereby sustain the integrity and resilience of the Nation's forest and grassland ecosystems. (USDI FWS 2013)	Goal 8. Through implementation of appropriate prevention, control and eradication measures for non-native invasive species, maintain intact ecosystems to prevent the displacement, decreased viability, or extirpation of native species (p. 2-4).	Guideline: Maintain a prioritized list of NNIS. Treat infestations as appropriate, with the priority being new and isolated infestations. Maintain intact native plant communities as far as practical. Utilize a variety of prevention practices, including public and employee awareness. See pages 2-12 to 2-13 of the Forest Plan.

**What monitoring activities have been conducted since the last monitoring evaluation?
What protocols were used to collect these data?**

We continue recording locations of invasive plants and monitoring the effectiveness of our treatments, as called for in the 2013 Forest Service National Strategic Framework for Invasive Species Management. Protocols are given in the *National Forest System Data Recording Protocols and Requirements for Invasive Species Survey, Inventory, and Treatment* (USDA, 2014a and 2014b).

What is the target, or range for the indicator being measured? Is there an alert level (such as a trigger or threshold), associated with the target that should be noted?

Although not explicitly stated in the Forest Plan or past Monitoring Evaluation Reports, we hope that the impacts from invasive plants will remain consistent with what was presented in the FEIS. There is no specific threshold, but the disclosed impacts could potentially be exceeded if new species were to be introduced or new discoveries were made about harm from existing species.

Has any new Best Available Scientific Information (BASI) informed this monitoring question, indicators, or methodology? Where is the data for this monitoring question stored?

We seek to be aware and mindful of new scientific publications concerning invasive plants in our area. New BASI often influences how we prioritize and manage invasive plants, but no new BASI has led to changes in this monitoring question, our indicators or monitoring methodology. Data for this monitoring question is stored in the Forest Service national “Threatened Endangered and Sensitive Plants – Invasive Species” (TESP-IS) application. Invasive species location and treatment data is publicly available online at <https://data.fs.usda.gov/geodata/edw/index.php>.

Monitoring Question 12a - Results

Table 64. Status and trend of the indicator for Monitoring Question 12a

Indicators		Recent Trend	
<i>Indicator 12a(a):</i> Number of acres with known high and medium priority non-native invasive plant infestations.		<i>Towards Target</i>	<i>Away from Target</i>
Current Status	<i>Within Target</i>		X
	<i>Outside Target</i>		
<i>Indicator 12a(b):</i> Number of infested acres treated by species.		<i>Towards Target</i>	<i>Away from Target</i>
Current Status	<i>Within Target</i>		
	<i>Outside Target</i>		X
<i>Indicator 12a(c):</i> Acres of new non-native invasive plants found by species.		<i>Towards Target</i>	<i>Away from Target</i>
Current Status	<i>Within Target</i>		X
	<i>Outside Target</i>		
<i>Indicator 12a(d):</i> The average effectiveness score of invasive plant treatment.		<i>Towards Target</i>	<i>Away from Target</i>
Current Status	<i>Within Target</i>		
	<i>Outside Target</i>		X



Figure 26. Japanese barberry, a high priority non-native plant on the Ottawa

We consider Indicator (a) to be in alignment with the FEIS (within target), but we say it is moving away from target as the number of infested acres is increasing. At the landscape scale, invasive plants will continue to become more abundant. We will continue to prioritize sites to prevent unacceptable impacts. Each year, we are able to eradicate a few sites and reduce the cover of invasive plants in many other sites, but this is usually offset by new acres discovered elsewhere.

We consider Indicator (b) to be Outside Target and trending further Away from Target. The FEIS identified some species as high priority that we now consider to be medium priority and are not attempting to treat across the Forest. Specifically, this refers to European swamp thistle, crown vetch, leafy spurge, Dame's rocket, curlyleaf pondweed and common valerian. We consider this to be normal adaptive management as we learn more about the species and management.

We consider Indicator (c) to be within target but moving away from target. The FEIS acknowledged that new invasive plants would likely be introduced and discovered on the Forest (page 3-88). As seen in Table 66, in recent years Forest staff are typically finding between 20 and 255 acres of new invasive plants per year. This was expected, but we would prefer lower acre totals than what we are finding most years.

Indicator (d) measures the effectiveness of our invasive plant treatments. Certainly, if the Forest invests the time and resources to control an infestation, we hope there be few or no target plants when we return to the treated areas. As seen in Table 66, our scores vary year-to-year and range between 37% (a marginal rating) and 75% (a fair rating). Although not explicitly stated anywhere, it would be reasonable to say that our target would be at least a "Good" rating (76% to 90% efficacy). The Ottawa is not currently within that range and indicator (d) shows no trend towards the target.

What level of confidence is there in the accuracy and precision?

There is a moderate level of confidence in the quality and quantity of the data collected. We are confident the data does indeed show that priority Non-native invasive plants (NNIP) are spreading on the Ottawa. However, we suspect many priority infestations remain undiscovered across the Forest. We are less confident in the data for Indicator (d). As seen in Table 66, the average effectiveness score varies year-to-year. Personnel collecting the data are interpreting the scores differently, or variations in the sites selected for monitoring.

Monitoring Question 12a - Evaluation Discussion

Table 65. Non-native plants on the Ottawa listed by priority for treatment

Priority for Treatment	Common name	Scientific name
High	Garlic mustard	<i>Alliaria petiolata</i>
High	Japanese barberry	<i>Berberis thunbergii</i>
High	Glossy buckthorn	<i>Frangula alnus</i>
High	Bell's honeysuckle	<i>Lonicera × bella</i>
High	Morrow's honeysuckle	<i>Lonicera morrowii</i>
High	Tartarian honeysuckle	<i>Lonicera tartarica</i>
High	Purple loosestrife	<i>Lythrum salicaria</i> *
High	Eurasian watermilfoil	<i>Myriophyllum spicatum</i> *
High	Common buckthorn	<i>Rhamnus cathartica</i>
New Invader/High	Siberian peashrub	<i>Caragana arborescens</i>
New Invader/High	Houndstongue	<i>Cynoglossum officinale</i>
New Invader/High	Paradise plant	<i>Daphne mezereum</i>
New Invader/High	Cutleaf teasel	<i>Dipsacus laciniatus</i>
New Invader/High	Autumn olive	<i>Elaeagnus umbellata</i>
New Invader/High	Giant hogweed	<i>Heracleum mantegazzianum</i> **, *
New Invader/High	Paleyellow iris	<i>Iris pseudacorus</i>
New Invader/High	Purple moor grass	<i>Molinia caerulea</i>
New Invader/High	Common reed	<i>Phragmites australis</i>
New Invader/High	Burnet-saxifrage	<i>Pimpinella saxifraga</i>
New Invader/High	Japanese knotweed	<i>Polygonum cuspidatum</i> *
New Invader/High	Giant knotweed	<i>Polygonum sachalinense</i>
New Invader/High	Curlyleaf pondweed	<i>Potamogeton crispus</i> *
New Invader/High	Tansy ragwort	<i>Senecio jacobaea</i>
New Invader/High	Japanese hedgeparsley	<i>Torilis japonica</i>
Medium	Bishop's goutweed	<i>Aegopodium podagraria</i>
Medium	Wild chervil	<i>Anthriscus sylvestris</i>
Medium	European swamp thistle	<i>Cirsium palustre</i>

Priority for Treatment	Common name	Scientific name
Medium	Leafy spurge	<i>Euphorbia esula</i>
Medium	Dames rocket	<i>Hesperis matronalis</i>
Medium	Flat pea	<i>Lathyrus sylvestris</i>
Medium	Sweet-clover	<i>Melilotus officinalis</i>
Medium	Wild parsnip	<i>Pastinaca sativa</i>
Medium	Reed canarygrass	<i>Phalaris arundinacea</i>
Medium	Scots pine	<i>Pinus sylvestris</i>
Medium	Crown-vetch	<i>Securigera varia</i>
Medium	Garden valerian	<i>Valeriana officinalis</i>

**This table is different from the list in the FEIS and past ME Reports, as we gather new information and adapt our priorities.*

Table 66. Non-native Invasive Plan work on the Ottawa (FY 2005 to FY 2023)

Year	Acres of known Exotic Plants (Indicator a)	Number of known Sites	Acres Treated	Average Effectiveness Score (Indicator d)	New Acres Found
2005	4,108	1373	177.8	NA	2,297
2006	5,008	1440	365.8	NA	900
2007	5,730	1555	146.4	56%	722
2008	8,455	1695	183.6	37%	2,725
2009	8,973	1849	1004.4	54%	154
2010	9,344	1941	1121.7	53%	92
2011	9,615	2127	1130.6	75%	186
2012	9,755	2226	1104	60%	99
2013	10,476	2349	1433.6	NA	123
2014	10,581	2407	1099	53%	58
2015	10,662	2448	1111.1	51%	41
2016	10,830	2515	1223.1	72%	67
2017	11,145	2618	1527.9	62%	103
2018	11,371	2760	589.1	70%	142
2019	11,499	2813	630.5	64%	53
2020	13,041	2946	720.7	57%	133
2021	13,419	3274	411.4	57%	328
2022	13,594	3371	481	62%	97
2023	13,871	3470	280.7	48%	99

Table 67. Number of acres treated by species*

Species	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Garlic mustard	38	44	40	38	24	70	49	35	44	46	44	52
Wild chervil	31	57	0.3	1	3	4	0	0	0	0	0	0
Japanese barberry	322	643	445	415	489	574	53	144	168	40	128	59
Eur. swamp thistle	182	310	159	209	329	267	89	51	50	49	61	55
Crown vetch	234	79	10	36	23	35	27	25	22	0	0	0
Glossy buckthorn	118	17	122	81	84	87	99	66	68	36	21	29
Exotic honeysuckle	106	170	165	208	98	193	150	71	80	97	165	29
Purple loosestrife	9	30	19	22	31	12	23	15	4	7	8	2
Mix of species	12	19	76	13	33	179	15	139	212	106	41	21
Eur. watermilfoil	13	3	1	9	27	70	11	18	4	11	5	12
Other species	14	26	23	33	23	2	8	14	14	11	8	9
Common buckthorn	0.1	0.1	0.0	0.0	1	2	0	1	5	2	0	13
Tansy ragwort	16	10	19	26	43	20	47	43	37	7	0	0
Garden valerian	8	24	20	20	16	13	18	8	8	0	0	0
TOTAL	1104	1434	1099	1111	1223	1528	589	631	716	411	480	281

**This corresponds to Indicator b.*

Table 68. Acres of new non-native invasive plants found by species

Species	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Garlic mustard	0.1	3.9	0.1		1.5	1.7	7.5	0.3	0.7	1.2	1.9	1.3
Wild chervil	1.7	5.6			0.3						0.1	0.1
Japanese barberry	6.1	3.1	2.5	1.5	4.2	3.1	4.4	5.9	15.9	3.2	3.6	5.7
Eur. swamp thistle	15.8	8.4	1.8	7.5	0.5	1.0	4.0	0.5	1.4	0.5		0.1
Crown vetch	4.1	26.7	0.1	0.1	0.2	0.4	0.1	0.7	0.7	1.7		0.4
Glossy buckthorn	6.5	2.9	38.0	126.2	0.7	37.1	11.0	0.3	52.9	6.4	2.2	25.6
Exotic honeysuckle	35.0	200.0	8.7	102.4	9.5	51.8	35.8	6.0	7.0	84.9	9.6	50.6
Purple loosestrife	0.4	0.1	0.3	1.2	0.1	3.6	2.7	0.7	0.6	0.1	0.6	
Mix of species	1.3		1.4		14.6	0.5	0.1			0.1	0.1	
Eur. watermilfoil	2.2			0.3	0.2		0.4	0.4	0.3	0.4	3.4	
Other species	0.2			8.6	0.1	4.7	0.4	0.1	143.4	0.6	0.6	
Common buckthorn	0.3	0.6		91.5	3.1	1.1	10.3	12.7	30.6	3.0	1.7	167.5
Tansy ragwort	10.8	0.1			0.2	8.9	0.4					
Garden valerian				0.1		1.0	0.4	0.1	0.1			
Estimated Total	84.5	251.3	53.0	339.4	35.1	114.8	77.5	27.6	253.7	102.1	23.8	251.3

Forest Plan

Are the current Forest Plan components (desired conditions, goals, objectives) achievable in the timeframes described and does the Forest Plan provide sufficient direction (standards, guidelines, suitability, designated lands) to achieve these components?

Yes, the modest but realistic desired conditions, goals, and objectives are all achievable.

Forest Assessment

Is the status or trend of the monitoring indicators substantially different than described in the Forest Assessment, or was an assumption in the Forest Assessment proven to be invalid from the monitoring data?

The status of the monitoring indicators remains as described the FEIS. NNIP are here and spreading on the Forest. However, the trend is “Away from Target.” For example, the Forest is no longer attempting widespread control of several of the plant species identified on pages 3-89 and 3-90 of the FEIS (European swamp thistle, Eurasian watermilfoil, glossy buckthorn, crown vetch, leafy spurge, Dame’s rocket and Common valerian). In some cases, such as crown vetch and leafy spurge, we found they are not invading natural areas as much as we feared, are mostly found along roads, and are not causing harm. In other cases, such as glossy buckthorn, we are simply unable to bring such an abundant NNIP under control across the Forest. Another change to our management is the control of new species, such as Paradise plant, Cutleaf teasel and burnet-saxifrage.

Management Actions

Did any of the management activities potentially result in adverse or beneficial effects to the status and trend of the monitoring indicators?

As disclosed in the FEIS, forest management activities do contribute to the spread of NNIP. Species such as Japanese barberry and exotic honeysuckle are favored by the increase in sunlight when tree canopy is removed. Many species of NNIP also are spread along roads and trails created and maintained by the USDA Forest Service. Treatment of invasive plant infestations is often successful in reducing the abundance of the target species and sometimes can eradicate small infestations.

Monitoring Program

Did the monitoring results provide all the information necessary to answer the monitoring question?

Yes, however, data for monitoring Indicator (d) could be improved. As shown in Table 66, the average effectiveness score varies from year-to-year. The Forest would prefer high numbers; we do not think our effectiveness varies so much year-to-year. Reporting monitoring of more treatment sites would help improve Indicator (d). We should also be more explicit on how to score effectiveness for large sites where the target plant was and remains at low abundance.

Monitoring Question 12a – Recommendations

In future Monitoring Evaluation reports, the necessity of indicator c should be evaluated. Currently both Indicator (a) and (c) monitor the spread of invasive species when, in reality, Indicator (a) is sufficient for doing this on its own.

Table 69. Summary of monitoring recommendations for Monitoring Question 10

Changes may be warranted for the:	Yes	Maybe, not enough information to determine at this time	No
Forest Plan			☐
Forest Assessment			☐
Management Actions			☐
Plan Monitoring Program		☐	

References

USDA Forest Service. 2013. Forest Service National Strategic Framework for Invasive Species Management. Washington, DC. <https://www.fs.usda.gov/managing-land/invasive-species-management/strategic-framework>

USDA Forest Service. 2014a. National Forest System Data Recording Protocols and Requirements for Invasive Species Survey, Inventory, and Treatment. Washington, DC.

USDA Forest Service. 2014b. National Forest System Invasive Species Management Record

Monitoring Question 12b — To what extent is Forest Plan implementation contributing or responding to non-native invasive animal species?

Context for this Evaluation

This monitoring question aims at evaluating the how the Ottawa is remaining consistent with the Forest Plan and national policy for prevention and management of invasive animal species. The intent of our non-native invasive animal management is to reduce and mitigate the ecological harm they cause from spreading on the landscape, including loss of biodiversity and tree mortality from forest animal pests.

Table 70. Background information for Monitoring Question 12b

Drivers
This monitoring question also measures trends toward achieving conditions outlined in Goal 3 of the Forest Plan that states, “Lakes, streams, other waterbodies, and wetlands are functioning appropriately and provide high quality habitat for plants and animals, as well as recreational opportunities. Water quality is high” (p. 2-3). Goal 8 states that “Through implementation of appropriate prevention, control and eradication measures for non-native invasive species, maintain intact ecosystems to prevent the displacement, decreased viability, or extirpation of native species” (p. 2-4).

Primary Forest Plan Component Addressed	Monitoring Question Indicator
Through implementation of appropriate prevention, control and eradication measures for non-native invasive species, maintain intact ecosystems to prevent displacement, decreased viability, or extirpation of native species (Forest Plan, Goal 8, p. 2-4).	a: Number of sites with known non-native invasive animal infestations
	b: Number of infested sites treated, by species
	c: New non-native invasive animals found by species.
Who collected this data? Who is Responsible for analyzing this question?	
Ryan Beatty, Fish Biologist and Ian Shackleford, Botanist	

When was this monitoring question last updated?

- Date of current evaluation: May 2024
- Date of previous evaluation: FY 2017 Monitoring Evaluation Report

Table 71. Relationship of Question 12b to other Forest Plan direction

Question 12b	Key Forest Plan Components		
	<i>Desired Conditions</i>	<i>Goals and Objectives</i>	<i>Standards and Guidelines</i>
Indicators a, b, and c.	The Forest Service will use the best available science-based methods to prevent and reduce the unacceptable impacts caused by invasive species and thereby sustain the integrity and resilience of the Nation's forest and grassland ecosystems. (USDA Forest Service, 2013)	Goal 8 Objectives: a. Use early detection and rapid response to identify new and limit the spread of non-native invasive species. b. Use integrated pest management in containment, control, or eradication efforts. c. Limit the spread of non-native invasive species, focusing on areas where these species have high potential for establishment and spread or for serious environmental effects.	Guideline: Maintain a prioritized list of NNIS. Treat infestations as appropriate. Maintain intact native plant communities as far as practical. Utilize a variety of prevention practices, including public and employee awareness, with a focus on transportation of firewood. Design management activities to avoid earthworm introduction. See pages 2-12 to 2-13 of the Forest Plan.

Question 12b	Key Forest Plan Components		
	<i>Desired Conditions</i>	<i>Goals and Objectives</i>	<i>Standards and Guidelines</i>
		d. Increase Forest Service public awareness of non-native invasive species (p. 2-4).	

What monitoring activities have been conducted since the last monitoring evaluation? What protocols were used to collect these data?

We continue recording locations of invasive animals across the Forest. Since the 2017 Monitoring Evaluation Report, EAB has arrived on the Forest and is causing widespread ash tree mortality on the east half of the Ontonagon Ranger District (see Monitoring Question 4). Monitoring protocols are found in the *National Forest System Data Recording Protocols and Requirements for Invasive Species Survey, Inventory, and Treatment* (USDA, 2014a and 2014b). In conjunction with periodic aquatic macroinvertebrate monitoring for *Ephemeroptera*, *Plecoptera* and *Trichoptera* (EPT) abundance at 40 established stream sites across the forest, we can detect some aquatic invasive species, such as New Zealand mudsnail, which are yet to be detected on the Ottawa. Specific monitoring for aquatic invasive animal species has not been conducted since 2017.

What is the target, or range for the indicator being measured? Is there an alert level (such as a trigger or threshold), associated with the target that should be noted?

Although not explicitly stated in the Forest Plan or past reports, we hope that the impacts from invasive animals will remain consistent with what was presented in the FEIS. There is no specific threshold, but the disclosed impacts could potentially be exceeded if new species were to be introduced or new discoveries are made resulting in harm to existing species.

Has any new Best Available Scientific Information (BASI) informed this monitoring question, indicators, or methodology? Where is the data for this monitoring question stored?

The Forest seeks to be aware and mindful of new scientific publications concerning invasive animals in our area. New BASI often influences how we prioritize and manage invasive species, such as EAB, but no new BASI has led to changes in this monitoring question, our indicators or monitoring methodology. Data for this monitoring question is stored in the Forest Service national “Threatened Endangered and Sensitive Plants – Invasive Species” (TESP-IS) application. Invasive species location and treatment data is publicly available online at <https://data.fs.usda.gov/geodata/edw/index.php>. Some of the invasive animals’ locations are being stored in geospatial data in Forest records.

Monitoring Question 12b - Results

Table 72. Status and trend of the indicator for Monitoring Question 12b

Indicators		Recent Trend	
<i>Indicator 12b(a):</i> Number of sites with known non-native invasive animal infestations.		<i>Towards Target</i>	<i>Away from Target</i>
Current Status	<i>Within Target</i>		
	<i>Outside Target</i>		X
<i>Indicator 12b(b):</i> Number of infested sites treated, by species.		<i>Towards Target</i>	<i>Away from Target</i>
Current Status	<i>Within Target</i>	X	
	<i>Outside Target</i>		
<i>Indicator 12b(c):</i> New non-native invasive animals found by species.		<i>Towards Target</i>	<i>Away from Target</i>
Current Status	<i>Within Target</i>	X	
	<i>Outside Target</i>		

What level of confidence is there in the accuracy and precision?

There is a moderate level of confidence in the quality and quantity of the data collected. We are confident the data does indeed show that priority invasive animals are spreading on the Ottawa (EAB). However, it is likely that many invasive animal infestations remain undiscovered across the entire Forest (such as additional sites of rusty crayfish and mystery snails).

Monitoring Question 12b - Evaluation Discussion

Although the Forest Plan and FEIS anticipated the arrival of EAB (pages 3-73 and 3-91), that species was not here at the time. For the purposes of this analysis, we assume that our target at that time was a forest without EAB. Now that it is on the Forest, and spreading rapidly, we disclose the serious effects to the Forest by scoring Indicator (a) as outside target and trending away from target (Table 72).



Figure 27. EAB larva and larval galleries at the first confirmed site of EAB on the Ottawa (2020)

The Ottawa seldom attempts to treat any sites for non-native invasive animal infestations; we do consider Indicator (b) to be within target (Table 72). Unfortunately, technology does not exist to effectively treat our non-native invasive animal species at the landscape scale. In collaboration with University of Notre Dame, between 2003 and 2010, intensive study of rusty crayfish abundance, trapping methods, macrophyte impacts and suppression strategies were conducted. In one experimental situation on Lake Ottawa, intensive trapping for rusty crayfish removal was conducted along with special angling regulations designed to increase the abundance, size and reproductive success of smallmouth bass, the most effective predator of rusty crayfish. As described in an annual report from this effort in 2007, “We believe that the Lake Ottawa Management plan is working. Based on the smallmouth bass population surveys, it is clear that the number of large smallmouth bass in Lake Ottawa is increasing. We expect to see more strong year classes of smallmouth bass due to decreased nest predation (due to fewer crayfish) and increased parental care (due to “no-kill” regulations protecting male smallmouth). We do not believe that the mechanical removal (trawling and trapping) has had much impact on the crayfish population because these methods have only removed approximately 0.5% of the total population (based on 2005 crayfish population estimates)”. Since 2005, the special bass regulation on Lake Ottawa has remained in place, largely due to angler support for the unique trophy smallmouth bass fishery it has created. However, this management action also continues to suppress rusty crayfish and potentially allow for macrophyte recovery to some extent.

Indicator (c) is also scored as within and towards target. Although we are aware of some new species of exotic animals within the Ottawa, they are not considered priority invasive species and are not expected to harm other resources. Except for EAB, no other new harmful invasive animal species have established on the Ottawa since 2005 (Table 73). We remain alert for new species such as hemlock woolly adelgid and Asian longhorned beetle.

Table 73. Non-native animals threatening the Ottawa

Common name	Scientific name	Status
Hemlock wooly adelgid	<i>Adelges tsugae</i>	Spreading in the Lower Peninsula of Michigan.
Emerald ash borer	<i>Agilus planipennis</i>	Discovered on the Ottawa in 2020. Spreading rapidly.
Asian longhorned beetle	<i>Anoplophora glabripennis</i>	No known sites in Michigan.
Spiny waterflea	<i>Bythotrephes cederstroemi</i>	Known to occur in 2005.
Chinese Mystery Snail	<i>Cipangopaludina chinensis</i>	Known to occur in 2005. Not a priority species.
Zebra mussel	<i>Dreissena polymorpha</i>	One observation from Hagerman Lake in 2014. Does not appear to have established there.
Eurasian ruffe	<i>Gymnocephalus cernuus</i>	Known to occur in 2005.
Spongy moth	<i>Lymantria dispar</i>	Known to occur in 2005.
Spotted lanternfly	<i>Lycorma delicatula</i>	Discovered in southeast Michigan in 2020.
Rusty crayfish	<i>Orconectes rusticus</i>	Known to occur in 1987.
Earthworms	Species of <i>Lumbricus</i> , <i>Eisenia</i> , <i>Apporectodea</i> , <i>Dendrobaena</i>	Known to occur in 2005.
Sea lamprey	<i>Petromyzon marinus</i>	Known to occur in 2005.
New Zealand mud snail	<i>Potamopyrgus antipodarum</i>	Found in Duluth Harbor in 2006.
Banded mystery snail	<i>Viviparus georgianus</i>	Known to occur in 2005. Not a priority species.

Table 74. Invasive animals known to occur on the Ottawa from 2005 to 2023*

Year	Number of sites with known non-native invasive animal infestations	Notes
2005	17	Five different tracked species: banded mysterysnail, Chinese mysterysnail, rusty crayfish, spiny waterflea, and spongy moth.
2006	19	Two new rusty crayfish sites.
2007	20	One new rusty crayfish site.
2008	20	
2009	22	New sites of zebra mussel and Chinese mysterysnail.
2010	25	Three new sites of mysterysnail.
2011	25	
2012	25	
2013	26	One new site of banded mysterysnail.
2014	26	

Year	Number of sites with known non-native invasive animal infestations	Notes
2015	26	
2016	26	
2017	26	
2018	26	
2019	26	
2020	27	Emerald ash borer discovered on ONF.
2021	28	One new site of spongy moth.
2022	28	
2023	29	One new site of spongy moth.

**Note we do not attempt to record sites of earthworms; they are widespread.*

Sea lamprey spawns on the Ottawa but is managed by the USDI FWS. Other exotic animals known to occur on the Ottawa include Western Dusky Slug, Bronze Ground Slug, Freshwater Jellyfish, Chestnut Slug, Threespine Stickleback, Asian Lady Beetle, Metallic Harpalus, Single-dotted Wave, Rainbow Smelt, House sparrow, Green Immigrant Leaf Weevil, Rain Beetles, Spring Harvestman, Roesel's Bush-Cricket, Stable Fly and European starling.

Table 75. Number of infested sites treated

Year	Number of sites treated	Projects
2005	1	Rusty crayfish trapping in Lake Ottawa and Perch Lake.
2006	1	Rusty crayfish trapping in Lake Ottawa, Pomeroy and Perch Lake.
2007	1	Rusty crayfish trapping in Lake Ottawa and Pomeroy Lake.
2008	2	Rusty crayfish trapping in Lake Ottawa, Tamarack Lake and Perch Lake.
2009	3	Rusty crayfish trapping in Lake Ottawa, Pomeroy Lake, and Perch Lake.
2010	1	Rusty crayfish trapping in Perch Lake.
2011	1	Rusty crayfish trapping in Pomeroy Lake.
2012 to 2023	0	No attempt to treat any invasive animal infestations.

Forest Plan

Are the current Forest Plan components (desired conditions, goals, objectives) achievable in the timeframes described and does the Forest Plan provide sufficient direction (standards, guidelines, suitability, designated lands) to achieve these components?

Yes, although only a few desired conditions, goals, and objectives for invasive animals are mentioned, all are achievable. As disclosed in the FEIS and past monitoring reports, the spread of invasive animals will continue, and the Ottawa has limited ability to treat

widespread non-native invasive species such as rusty crayfish and the now quickly spreading EAB.

Forest Assessment

Is the status or trend of the monitoring indicators substantially different than described in the Forest Assessment, or was an assumption in the Forest Assessment proven to be invalid from the monitoring data?

The status of the monitoring indicators remains as described the FEIS. As noted earlier, the EAB was anticipated in the FEIS and arrived in 2020. See Monitoring Question 4 for more information on that invasive animal. All assumptions in the FEIS remain valid.

Management Actions

Did any of the management activities potentially result in adverse or beneficial effects to the status and trend of the monitoring indicators?

As disclosed in the FEIS, forest management activities do indirectly contribute to the spread of invasive animals in that we maintain roads and boat launches that facilitate their dispersal (pages 3-93 and 3-96). Presumably some of the new sites of aquatic invasive animals are the result of people taking their boats from one lake to another. We hope that our work on invasive species education and prevention, including work by partners, has helped prevent the spread of invasive animals on the Forest. The spread of EAB is not a result of management actions. Rusty crayfish trapping from 2005 to 2011 had some beneficial effects, but acknowledge those benefits were likely temporary.

Restoring aquatic habitat connectivity throughout the watersheds on the Ottawa is a management priority, and generally is supported universally as genetic exchange, refugia and shifting thermal regimes necessitate connectivity among a variety of habitats to sustain priority aquatic species, especially cold-water species like native brook trout. However, existing barriers prioritized for removal may also be important to limiting the distribution of invasive species. When evaluating the benefits of barrier removal, the potential risks to expanding distribution of invasive species should also be considered. The best and most significant example of this management scenario on the Ottawa is related to sea lamprey. For example, the Lower Dam Removal Project on the East Branch Ontonagon River presented this dilemma, as the dam was a passage barrier and utilized as a control point to facilitate lampricide treatments to downstream ammocete populations. Relative to the Ottawa, the long-term benefits of removing Lower Dam outweighed the impacts of eight additional miles of potential sea lamprey habitat availability. While we do not expect our projects will noticeably affect the population of sea lamprey in Lake Superior, it will add additional habitat for the species leading to increase complexity of treatments and larval distribution assessments by USDI FWS. Communication about barrier removals will continue to be of importance to ensure the USDI FWS knows of barrier removals so they may monitor and treat new spawning areas in the future, upstream of where the Forest Service removed a barrier.

Regarding rusty crayfish, past management actions and collaborative research, have revealed that treating infestations with trapping and physical removal is likely ineffective and short term in nature. However, it did result in special angling regulations which may offer the most sustainable way to lessen ecosystem impacts of rusty crayfish, and this strategy may be considered by management agencies (e.g. MI DNR) in the future. Since 2005, the special bass

regulation on Lake Ottawa has remained in place, largely due to angler support for the unique trophy smallmouth bass fishery it has created. However, this management action also continues to suppress rusty crayfish and potentially allow for macrophyte recovery to some extent. While there is not an effective tool for eradication, this suppression strategy may be the best available tool, with benefits to bass anglers and as a potential climate adaptation tool in the future. The Forest Service does not solely establish fishing regulations, but we can make recommendations and will continue to identify and recommend lakes in which special regulations may facilitate the similar effects as what is occurring on Lake Ottawa.

Monitoring Program

Did the monitoring results provide all the information necessary to answer the monitoring question?

Yes, however, we suspect that some sites with rusty crayfish and mystery snails remain undiscovered on the Ottawa. Both rusty crayfish and mystery snails are fairly widespread and acknowledging this is sufficient for our management purposes. We remain vigilant for new sites of EAB and other forest pests.

Monitoring Question 12b – Recommendations

There are no recommendations for changes in this question.

Table 76. Summary of monitoring recommendations for Monitoring Question 12b

Changes may be warranted for the:	Yes	Maybe, not enough information to determine at this time	No
Forest Plan			☐
Forest Assessment			☐
Management Actions			☐
Plan Monitoring Program			☐

References

USDA Forest Service. 2013. Forest Service National Strategic Framework for Invasive Species Management. Washington, DC. <https://www.fs.usda.gov/managing-land/invasive-species-management/strategic-framework>

USDA Forest Service. 2014a. National Forest System Data Recording Protocols and Requirements for Invasive Species Survey, Inventory, and Treatment. Washington, DC.

USDA Forest Service. 2014b. National Forest System Invasive Species Management Record Keeping Business Rules and National Standards (v01.10.2014). Washington, DC.

Monitoring Question 13 – What amount of road routes and recreation trails are designated open for OHV riding and provide connections to other public trails?

Due to personnel capacity issues, the Forest is unable to answer this question during this reporting period. However, results will be reported in the next biennial report.

Monitoring Question 14 — Is Forest Plan implementation consistent with the Recreational Opportunity Spectrum objectives and desired conditions?

Is Forest Plan implementation consistent with the Recreational Opportunity Spectrum objectives and desired conditions?

Due to personnel capacity issues, the Forest is unable to answer this question during this reporting period. However, results will be reported in the next biennial report.

Monitoring Question 15 — To what extent is the Forest meeting its Federal Indian trust responsibility, including but not limited to, meeting the requirements of the memorandum of understanding (MOU), consulting with Tribes for forest management and activity seeking collaborative opportunities?

Context for this Evaluation

This monitoring question discloses trends in implementing the Tribal MOU through information sharing and the consultation process.

Table 77. Background information for Monitoring Question 15

Drivers	
This monitoring question links to the 2012 Planning Rule (36 CFR 219.12(a)(5)(vii)): Progress toward meeting the desired conditions and objectives in the plan, including providing for multiple use opportunities.	
Primary Forest Plan Component Addressed	Monitoring Question Indicator
Goal 5 of the Forest Plan that states “honor the U.S. Government trust responsibility and treaty obligations towards Native American Tribes within a government to government relationship” (p. 2-3).	a. Number of notifications and consultations (e.g., documentation of NEPA notifications and consultations; National Historic Preservation Act and Native American Graves Protection and Repatriation Act consultations). b. Number of consultation meetings. c. Number of collaborative meetings and discussions.
Who collected this data? Who is Responsible for analyzing this question?	
Terry Gokee, Tribal Relations Specialist, Greg Swallow, Archaeologist and Marlanea French-Pombier, Staff Officer	

When was this monitoring question last updated?

- Date of current evaluation: April 2025
- Date of previous evaluation: FY 2019 Monitoring Evaluation Report

Table 78. Relationship of Question 15 to other Forest Plan direction

Question 15	Key Forest Plan Components		
	<i>Desired Conditions</i>	<i>Goals and Objectives</i>	<i>Standards and Guidelines</i>
Indicators 15a, 15b and 15c	Forest Service recognizes Treaty rights as a matter of national policy and more locally on the Ottawa through a “1999 Memorandum of Understanding” with sovereign Federally recognized Tribes of Lake Superior Chippewa Indians.	Objective 5a: Nothing in this Forest Plan or its implementation is intended to modify, abrogate, or otherwise adversely affect Tribal reserved or treaty guaranteed rights applicable within the Ottawa (p. 2-3). Objective 5b: Per the Tribal MOU, consult with Native American Tribes and Great Lakes Indian Fish and Wildlife Commission on the effects of natural resource management decisions on the ability of Native American Tribes to exercise gathering rights (p. 2-4). Objective 5c: Inform local Native American Tribes about vegetative management projects, so they are aware of opportunities to gather special forest products (p.2-4). Objective 12b: In consultation with local Native American Tribes and Tribal Historical Preservation Officers (THPOs),	Guideline: Gathering of special forest products by Tribal members are guided by the MOU with Native American Tribes (p. 2-12). Guideline: The Forest Service will consult with state and Tribal agencies to determine archaeological resources eligibility under the standards and guidelines for historic preservation. Archaeological resources may be determined ineligible under the following: 1. Sites threatened by disturbance, deterioration, vandalism or forest use. 2. Sites that do not contribute to the Secretary of the Interior’s most recent standards and guidelines for archaeological preservation. 3. Sites eligible/ineligible that do not contribute to the Ottawa’s niche (p. 2-16)

Question 15	Key Forest Plan Components		
	<i>Desired Conditions</i>	<i>Goals and Objectives</i>	<i>Standards and Guidelines</i>
		provide opportunities for protection, restoration, and enhancement of culturally significant features (p. 2-5).	

What monitoring activities have been conducted since the last monitoring evaluation? What protocols were used to collect these data?

Monitoring activities for this question have been gathered through a records search by the Tribal Relations Specialist, Forest Archaeologist and project team leaders to determine the number of times that information is shared and/or the number of meetings/consultations with Tribal governments. The protocols used for Monitoring Question 15 and its indicators consisted of the following (see Monitoring Guide):

- Assess whether Forest Plan objectives, standards and guidelines are barriers to implementation of the Tribal MOU.

What is the target, or range for the indicator being measured? Is there an alert level (such as a trigger or threshold), associated with the target that should be noted?

The target for this question's indicator is to measure accomplishments towards meeting the parameters outlined for the Tribal MOU. Not following the MOU would be a threshold requiring correction to remain consistent with the American Indian Religious Freedom Act of 1978 (42 U.S.C. §§1996 et seq.), Archaeological Resources Protection Act of 1979 (6 U.S.C. §§470aa-470mm), Native American Graves Protection and Repatriation Act (25 U.S.C. §§3001 et seq.), National Historic Preservation Act of 1966 (54 U.S.C. §§300101 et seq.) and NEPA.

Has any new Best Available Scientific Information (BASI) informed this monitoring question, indicators, or methodology? Where is the data for this monitoring question stored?

There is no new scientific information available. However, information outlined in Table 74 was obtained from the most current sources available.

Monitoring Question 15 - Results

Table 79. Status and trend of indicators for Monitoring Question 15

Indicators		Recent Trend	
<i>Indicator 15a:</i> Number of notifications and consultations.		<i>Towards Target</i>	<i>Away from Target</i>
Current Status	<i>Within Target</i>	X	
	<i>Outside Target</i>		
<i>Indicator 15b:</i> Number of consultation meetings.		Recent Trend	
		<i>Towards Target</i>	<i>Away from Target</i>

Current Status	<i>Within Target</i>	X	
	<i>Outside Target</i>		
<i>Indicator 15c: Number of collaborative meetings and discussions.</i>		Recent Trend	
		<i>Towards Target</i>	<i>Away from Target</i>
Current Status	<i>Within Target</i>	X	
	<i>Outside Target</i>		

What level of confidence is there in the accuracy and precision?

The Forest Plan states that the methods used for this monitoring question have a high degree of repeatability, reliability, accuracy and precision (p. 4-4). There is a moderate to high level of confidence in the quality and quantity of data collected. The same collection protocols and reporting standards have been in place, but the collectors of the data can vary from year to year.

Monitoring Question 15 - Evaluation Discussion

The direction of the Forest Plan has assisted with implementing the 1999 *Forest Service Memorandum of Understanding with Tribes*. This MOU requires consultation with Native American Tribes and coordination with the Great Lakes Indian Fish and Wildlife Commission (GLIFWC) regarding the effects of natural resource management decisions on the ability of Native American Tribes to exercise fishing, hunting, and gathering rights.

Table 80. Project planning notifications and consultations (FY 2019 to FY 2023)

Tribal Government	Fiscal Year							
<i>Local Tribal Representatives</i>	2016	2017	2018	2019	2020	2021	2022	2023
Keweenaw Bay Indian Community	207	77	84	10	11	16	12	7
Lac Vieux Desert Band of Lake Superior Chippewa	117	53	61	10	11	16	12	7
<i>Other Tribal Representatives</i>								
Fiscal Year	2016	2017	2018	2019	2020	2021	2022	2023
Bad River Band of Lake Superior Chippewa	54	14	10	10	11	16	12	7
Bay Mills Indian Community	54	13	9	10	11	16	12	7
Great Lakes Indian Fish and Wildlife Commission	27	15	18	10	11	16	12	7
Lac Courte Oreilles Band of Lake Superior Chippewa	85	14	9	10	11	16	12	7

Tribal Government	Fiscal Year							
Lac du Flambeau Band of Lake Superior Chippewa	27	13	10	10	11	16	12	7
Red Cliff Band of Lake Superior Chippewa	54	12	9	10	11	16	12	7
Sokaogon Chippewa Community - Mole Lake Band of Lake Superior Chippewa	27	13	11	10	11	16	12	7
St. Croix Chippewa Indians of Wisconsin	54	12	8	10	11	16	12	7
Total¹	328	222	293	100	110	160	120	70

¹The total Tribal staff contacted is a factor of how many members receive mailings. Fiscal Years 2019-2023 do not include mailings to the Tribal Historic Preservation Officers from Archaeologists.

Table 81. Number of engagement meetings (FY 2016 to FY 2023)

Tribal Representatives	Fiscal Year							
	2016	2017	2018	2019	2020	2021	2022	2023
Keweenaw Bay Indian Community	5	2	2	2	2	0	0	0
Lac Vieux Desert Band of Lake Superior Chippewa	4	1	2	2	2	0	0	1
Total	9	3	4	4	4	0	0	1

Monitoring Indicator 15a

The Ottawa maintains a mailing list to assist in notifying interested and affected Tribes about proposed projects. Generally, notifications for smaller scale projects that are expected to have localized impacts are sent to local Tribal staff. Projects on the northern half of the Ottawa (e.g., Bergland, Kenton or Ontonagon Ranger Districts) are sent to the Keweenaw Bay Indian Community (KBIC). Projects on the southern half of the Forest (e.g., Bessemer, Iron River and Watersmeet Ranger Districts) are sent to the Lac Vieux Desert (LVD) Band of Lake Superior Chippewa. District Rangers are often invited to the LVD Band's Conservation Committee meetings to discuss projects and points of interest for both the Tribe and USDA Forest Service. Projects of larger scale and scope are sent to staff associated with all Tribal offices listed in Table 80. Some staff have specifically requested to receive the Forest's quarterly Schedule of Proposed Actions and therefore, these mailings are also incorporated. The Forest Archaeologist addresses all required consultations for each local Tribe according to applicable laws, regulations and policies.

Monitoring Indicator 15b

The Ottawa strives to meet at least once with the KBIC and the LVD Bands of Lake Superior Chippewa on an annual basis (see Table 81). The goal of these meetings is to update Tribal representatives about on-going projects. In addition to these meetings, the District Rangers

meet at other times one-on-one with Tribal representatives to discuss in detail issues, concerns and opportunities.

The Ottawa is meeting, and in some cases exceeding, its responsibilities to consult with Tribal Governments. Projects that have resulted from past consultation meetings, include the annual Camp Onji-Aking for grade school children and the LVD Natural Resources crew have benefited both the Forest Service and Tribes. Tribal representatives have engaged with interdisciplinary teams during field trips and office meetings as part of the team as well. This occurred in this timeframe for the Drumloid Vegetation Management Project in 2021.

Monitoring Indicator 15c

The 1999 *Forest Service Memorandum of Understanding with Tribes* is a document that outlines the relationships of sovereign and Federally-recognized Tribes of Lake Superior Chippewa Indians and of the Forest Service (Forest Plan, p. 1-3). This agreement establishes consistent standards by which the Forest Service and the Tribe interact across National Forest System lands within areas ceded in the Treaties of 1836, 1837 and 1842. National Forests in the ceded territory include the Ottawa and Hiawatha in the Upper Peninsula of Michigan, the Chequamegon-Nicolet in Wisconsin and the western part of the Huron-Manistee in Lower Michigan.

Annually, USDA Forest Service leadership meets with the Tribal signatories of the 1999 MOU to discuss implementation, facilitate on-going communication and to discuss other issues. Through provisions laid out in the MOU, projects and processes have been put into place without notable instances of complications. Some activities include notification of birch bark gathering opportunities, designation of sugarbush areas, implementation of fee and length of stay waivers for Tribal members staying in campgrounds while exercising Treaty rights and implementation of an off-reservation National Forest gathering effort.

Table 82. Number of consultation meetings and discussions (FY 2019 to FY 2023)

Topic	Tribal Representatives	Fiscal Year							
		2016	2017	2018	2019	2020	2021	2022	2023
1999 MOU	Voigt Intertribal Task Force	1	1	1	4	4	4	4	4
MOU Revision	KBIC, LVD	1	1	1	1	1	1	1	1
Total		2	2	2	5	5	5	5	5

There are several other Memoranda of Understanding and agreements with Tribal Governments (e.g., KBIC and LVD Bands of Lake Superior Chippewa) as well as Independent Tribal Organizations (e.g., GLIFWC and the Wisconsin Tribal Conservation Advisory Council [WTCAC]). However, MOU agreements are not monitored by the Forest Plan.

Forest Plan

Are the current Forest Plan components (desired conditions, goals, objectives) achievable in the timeframes described and does the Forest Plan provide sufficient

direction (standards, guidelines, suitability, designated lands) to achieve these components?

Forest Plan provides direction to address the use and protection of resources that may be of Tribal interest or covered under Tribal reserved rights. The Forest Plan is designed to supplement, not replace, treaties and trust responsibilities (p. 1-9). Direction pertaining to sharing information, consulting with Tribes and maintaining the 1999 MOU is appropriate for answering the monitoring indicators.

Is the status or trend of the monitoring indicators substantially different than described in the Forest Assessment, or was an assumption in the Forest Assessment proven to be invalid from the monitoring data?

The FEIS aligns with all applicable laws, regulations and policies, including Native American rights retained by trust and treaty with the United States (p. 2-2). The status of the monitoring indicators shows that the Ottawa is continuing to share information and build upon key relationships by engaging Tribes through formal and informal consultation.

Management Actions

Did any of the management actions potentially result in adverse or beneficial effects to the status and trend of the monitoring indicators?

Most communication with Tribal governments is to share information regarding the location, and protection of cultural resources from proposed and authorized activities. Additionally, the Ottawa seeks information about site records where information is not known to ensure resources are equally protected. Formal government-to-government consultations are part of this process.

Addressing effects to heritage resources is subject to regulations outlined in Section 106 of the National Historic Preservation Act (as amended) and promulgated by 36 CFR 800. As most sites' eligibility status for the National Register is not known, buffers to exclude activity around known sites are implemented through site-specific project design criteria to ensure no adverse effects from Forest Plan implementation occur.

Monitoring Program

Did the monitoring results provide all the information necessary to answer the monitoring question?

Yes, the data collection protocols and indicator adequately provides the necessary information to answer this monitoring question.

Monitoring Question 15 – Recommendations

There are no recommendations for changes to this question.

Table 83. Summary of monitoring recommendation options for Monitoring Question 15

Changes may be warranted for the:	Yes	Maybe, not enough information to determine at this time	No
Forest Plan			☐
Forest Assessment			☐

Changes may be warranted for the:	Yes	Maybe, not enough information to determine at this time	No
Management Actions			☐
Plan Monitoring Program			☐

Monitoring Question 16 — Is wilderness management contributing to improvement or preservation of wilderness character and values?

Due to personnel capacity issues, the Forest is unable to answer this question during this reporting period. However, results will be reported in the next biennial report.

Monitoring Question 17 — To what extent is Wild and Scenic River (WSR) management contribution to the protection and enhancement of the WSR values?

Context for this Evaluation

This monitoring question ensures the Ottawa remains consistent with its commitment to provide habitat for native and desirable non-native plants and animals as mandated by the NFMA. This includes species listed as Endangered or Threatened under the Endangered Species Act or Regional Forester Sensitive Species (RFSS). The wood turtle is a RFSS species. Lake sturgeon (STN) is another RFSS species, and the majority of known and potentially seasonally occupied habitat associated with existing spawning populations on the Ottawa occur in WSR segments on the Sturgeon River downstream of Prickett Dam and the lower reaches of the West, East and Middle Branch Ontonagon Rivers leading into the non-WSR designated mainstem Ontonagon River. STN were petitioned for listing under the Endangered Species Act in 2018; a decision by USFWS is anticipated for 2024. Relative to the Ottawa, the Ontonagon River population is actively being restored via stocking and the self-sustaining STN population in the Sturgeon River is a population stronghold and source of gametes and/or larvae raised for stocking in the Ontonagon River.

The National Wild and Scenic Rivers Act of 1968 established a nationwide system of outstanding free-flowing rivers, including 27 segments on the Forest. The Act requires administering agencies, such as the Forest Service, to protect and enhance values, known as Outstandingly Remarkable Values (ORVs), for which the rivers were designated. The CRMP was developed for the designated WSRs on the Forest and describes the desired conditions, ORVs, and management direction for the river segments. Amendment 1 to the Forest Plan incorporates the management direction contained in the CRMP.

The Scenic segment of the Sturgeon River extends approximately 8.5 miles downstream from the Prickett Dam outlet and provides spawning habitat for sturgeon, which are listed as a Fish ORV (CRMP, p. 2-27). The CRMP describes some of the desired conditions for the Scenic segment:

The lake sturgeon population is self-sustaining and increasing. Eggs from this population are being utilized to repopulate other historic, lake sturgeon rivers (CRMP, p. 3-14).

The CRMP also contains a monitoring and evaluation guide that lists indicators to measure to evaluate the implementation of the CRMP. A key indicator listed in the monitoring program is the status of lake sturgeon populations and their viability (CRMP, p. 5-3). It should be noted that formal population determinations and stocking are beyond the scope of Ottawa duties and purview, however, the Ottawa supports sampling and stocking efforts. The best available information about population status is described below in this evaluation.

The Sturgeon River spawning population is a self-sustaining population, and stronghold source of gametes for stocking efforts in the Western Lake Superior Basin. Sturgeon do not inhabit the river throughout the year but rather ascend the river from Lake Superior every spring to spawn and then return to the lake. Through stocking programs, restoration of the STN population in the Ontonagon River has been underway since approximately 1998, with substantive changes to how STN are reared in 2007 and again in 2023 (described below). Given the extended time to sexual maturity (approximately 20 to 30 years), the reestablishment of a spawning population is yet to be determined, and STN spawning in the Ontonagon River has not been confirmed. Although the presence of several adult STN in the Ontonagon River during spawning season has been observed by USFWS since the last evaluation (Schloesser, USFWS, personal communication 1/13/2023).

Table 84. Background information for Monitoring Question 17

Drivers	
This monitoring question links to the 2012 Planning Rule (36 CFR 219.12 (a)(5)(i)): The status of select watershed conditions. Of equal importance is the Forest Plan direction for Management Area 8.1 for the WSR corridors and the supporting Comprehensive River Management Plan, which is consistent with the Wild and Scenic Rivers Act.	
Primary Forest Plan Component Addressed	Monitoring Question Indicator
Management Prescription 8.1 (p. 3-71 to 3-81)	a: Number of adult female wood turtles observed in each WSR reach.
	b: Lake sturgeon population estimate in the Sturgeon River
	c: Number of juvenile lake sturgeon stocked in the Ontonagon River.
Who collected this data? Who is Responsible for analyzing this question?	
Becky Heaney, Natural Resources Specialist (Wildlife) and Ryan Beatty, Fish Biologist	

When was this monitoring question last updated?

- Date of current evaluation: April 2024
- Date of previous evaluation: FY 2017 Monitoring Evaluation Report

Table 85. Relationship of Monitoring Question 17 indicators to other Forest Plan direction

Question 17	Key Forest Plan Components		
	<i>Desired Conditions</i>	<i>Goals and Objectives</i>	<i>Standards and Guidelines</i>
Indicator a and b	Desired conditions for Management Area (MA) 8.1- Wild and Scenic River corridors (p. 3-74).	Goal 3: Lakes, streams, rivers, other water bodies, and wetlands are functioning appropriately and provide high quality habitat for plants and animals, as well as recreational opportunities. Water quality is high (p. 2-3). Goal 26: Promote landscape conditions and habitat diversity to support viable populations of	Guideline: Provide habitat for possible population growth and expansion for species of viability concern (p. 2-27). Guideline: Protect known occurrences of SVC and their zones of influence. Continue protection until population or habitat objectives are defined and met (p. 2-27). All standards and Guidelines for MA 8.1 (p. 3-74 to 3-81).

Question 17	Key Forest Plan Components		
	<i>Desired Conditions</i>	<i>Goals and Objectives</i>	<i>Standards and Guidelines</i>
		native and desired non-native animal and plant species (p. 2-8). Goal 30: Promote the conservation, restoration, and recovery of populations of species of viability concern (p. 2-9).	

**What monitoring activities have been conducted since the last monitoring evaluation?
What protocols were used to collect these data?**

The Ottawa initiated a wood turtle monitoring program in 2004 due to its listing as a RFSS. This monitoring program has been focused on assessing population trends by conducting mark-recapture studies on adult female wood turtles at selected nesting beaches in most of the WSRs across the Ottawa (Casper and Beuch, 2005; Casper, 2011).

In addition to mark-recapture studies, the Ottawa selected 23 traditional nesting sites in 2020 to perform vegetation management to enhance wood turtle habitat within WSRs. This consists of treating and removing invasive species and cutting woody brush, which helps improve the wood turtle habitat by increasing sun and sand exposure conditions. This vegetation management work has been done annually since 2020. The continued degradation of nesting beaches has been a main concern relating to the wood turtle population. Our site selected nesting habitat improvement work aims at enhancing nesting habitat, subsequently leading to increased nesting success.

The Ottawa does not independently conduct sampling or directly monitor the abundance of STN associated with the Sturgeon River spawning population. Forest fisheries staff do contribute collaboratively to support efforts led by our partners, UWFWS (Ashland Fish and Wildlife Conservation Office) and MI DNR (Marquette Fisheries Research Station). The Ottawa, along with natural resources partners from the Keweenaw Bay Indian Community (KBIC), contribute to annual efforts related to gamete collection, larval drift net sampling, PIT tagging for future monitoring, and STN gill net sampling at the mouth of the Ontonagon River as an index of Ontonagon River stocking success.

The Scenic segment of the Sturgeon River occurs below Prickett Dam and provides spawning habitat for sturgeon, which are listed as a Fish ORV (CRMP, p. 2-27). Sturgeon do not inhabit the river throughout the year but rather ascend the river from Lake Superior every spring to spawn and then return to the lake.

While Ottawa staff are typically present during spawning activity annually as part of the Ontonagon River Population Restoration Project gamete collection effort; spawner

enumeration has not been conducted. Spawner enumeration would be impractical and a poor estimator of STN population abundance in the Sturgeon River. Development of a Sturgeon River STN population estimate is beyond the management purview, land ownership extent and equipment capability of the Ottawa.

Similarly, for the Ontonagon River, the stocking of juvenile STN is outside the purview of the Ottawa NF, although the Forest has maintained a partnership with USFWS and Michigan DNR to support the stocking of the Ontonagon River through contributions of equipment and labor. The number of juvenile lake sturgeon stocked in the Ontonagon River are recorded by Michigan DNR and tracked annually by the Ottawa (Table 82 and Figure 9).

Ottawa fisheries staff also provide support and labor as needed during gill net surveys at the mouth of the Ontonagon River, conducted by the USFWS, using standardized protocols to maintain consistent effort and to assess STN population rehabilitation progress (Schloesser et al. 2024). This sampling targets STN near the mouth of the Ontonagon River to assess recruitment, specifically based on juvenile/sub-adult STN cohort aged 4 to 8 years. The sampling design is based on 5-year sampling intervals (although annual sampling may also occur) and is intended to evaluate progress towards Fish Community Objectives established by the Lake Superior Technical Committee and rehabilitation progress. This monitoring is conducted near the mouths of 19 total Lake Superior STN tributaries; for the purposes of this report the focus will be on sampling at the mouth of the Ontonagon River. Ontonagon River juvenile STN index sampling was conducted in 2011, 2016 and 2021 (Schloesser et al. 2024). The previous evaluation considered the 2011 data, and since that time the 2016 and 2021 data has been processed and is available for use. The results of this monitoring are described below, relative to targets and new best available scientific information.

What is the target, or range for the indicator being measured? Is there an alert level (such as a trigger or threshold), associated with the target that should be noted?

The target is high WSR values (ORVs), which would include a healthy population of wood turtles. This could be an indication of a healthy WSR. A trigger or threshold would be if the wood turtle population started significantly decreasing as a whole.

The target, or population objective, for STN in the Sturgeon River is based on the 2012 Michigan Lake Sturgeon Rehabilitation Strategy. The currently best available population estimate for the STN Sturgeon River population is contained within the 2012 Michigan Lake Sturgeon Rehabilitation Strategy (Hayes and Carrofino, 2012). The estimated abundance of spawning adult STN is 1,808 adults. This population falls in the 2012 strategy category of a “large, stable” population, defined as those populations with more than 750 adults. For stable populations, the strategy objective is to “encourage practices that will cause expansion”. For the purposes of this assessment, two alert thresholds may be considered: 1) The 2012 strategy objective for populations which experience declines of at least 30% over 15 years, management to offset declines should be implemented and 2) Overall STN population declines that trend towards a listing under the Endangered Species Act.

The target, or population objective, for STN in the Ontonagon River is based on the 2012 Michigan Lake Sturgeon Rehabilitation Strategy. For those populations estimated to be below the minimum viable population level of 80 adults, the objective is to “evaluate populations

that are below the minimum viable population size on a case-by-case basis to determine if management action is a prudent use of the limited resources available” (Hayes and Carrofino, 2012). As a result, the ongoing stocking effort led by Michigan DNR has been sustained since approximately 1998. Recruitment of juvenile STN with natal imprinting to the Ontonagon River is necessary to rehabilitate the population, generally considered extirpated due to the lack of known spawning or evidence of larval STN hatched from spawning in the Ontonagon River. The target, or desired condition, established for the number of STN stocked annually in the Ontonagon River is approximately 1,500 fall fingerlings. Due to the Covid-19 pandemic, climactic and instream flow variability, and other stocking programs reliant on the Sturgeon River source population and collection of gametes or larvae, this target has not been consistently attained (discussed below).

There is an established target, or quantitative indicator, used to assess progress towards the overall fish community objective of rehabilitation and maintenance of spawning populations that are self-sustaining fish community objective, established for juvenile recruitment to the Ontonagon River population. The target is a minimum of 0.5 geometric mean of catch per unit effort (CPUE) for cohort ages 4 to 8 years during the index surveys (Schloesser et al. 2024).

Has any new Best Available Scientific Information (BASI) informed this monitoring question, indicators, or methodology? Where is the data for this monitoring question stored?

17a: We seek to be aware and mindful of new BASI relating to the indicators and methodology in this report. However, no new BASI has led to changes in this monitoring question, our indicators, or monitoring methodology. Monitoring data is collected annually through our ongoing turtle monitoring contract.

17b: We seek to be aware and mindful of new BASI relating to the indicators and methodology in this report. However, the current best available population estimate for STN in the Sturgeon River remains unchanged, still based on the estimate provided in the 2012 Rehabilitation Strategy (Hayes and Carrofino, 2012). Beyond this estimate, Research Fisheries Biologist, Edward A. Baker, Ph.D. is confident the population is expanding (Personal Communication, Ed Baker, January 13, 2023).

17c: Since the last evaluation, several new sources of BASI have emerged. Annual stocking rates have been updated, available online via MI DNR online stocking database (MI DNR 2024). Juvenile STN index survey data used to assess rehabilitation progress, from 2016 and 2021, is now available and currently in press for final publication (Schloesser et al. 2024). Also, USFWS has observed STN using the Ontonagon River during spawning season, as described by J.T. Schloesser (USFWS) via personal communication on January 13, 2023, that states: *“sturgeon are in and using the Ontonagon during the spawning season. In 2018 and 2019 we caught one upriver in our gill nets and observed one in the West Branch on what looked like potential spawning habitat. We have also had about 5 to 6 acoustically tagged fish detected on upriver receivers during the spawning season. Those fish have all entered the West Branch, but some also nosed into the Middle and East branches. We don't have any direct evidence of successful spawning, but there are at least "some" fish in the Ontonagon during the spawning season”*.

Monitoring Question 17 - Results

Table 86. Status and trend of the indicator for Monitoring Question 17

Indicators		Recent Trend	
<i>Indicator 17a:</i> Number of adult female wood turtles observed in each WSR reach.		<i>Towards Target</i>	<i>Away from Target</i>
Current Status	<i>Within Target</i>	X	
	<i>Outside Target</i>		
<i>Indicator 17b:</i> Lake sturgeon population estimate in the Sturgeon River		<i>Towards Target</i>	<i>Away from Target</i>
Current Status	<i>Within Target</i>	X	
	<i>Outside Target</i>		
<i>Indicator 17c:</i> Number of juvenile lake sturgeon stocked into the Ontonagon River		<i>Towards Target</i>	<i>Away from Target</i>
Current Status	<i>Within Target</i>	X	
	<i>Outside Target</i>		

What level of confidence is there in the accuracy and precision?

There is a moderate to high level of confidence in the quality and quantity of data collected because the same collection protocols and reporting standards have been in place for many years. The Forest Plan states that the methods used for this monitoring question have a high degree of repeatability, reliability, accuracy, and precision (p. 4-4).

Relative to STN and Indicators 17b and 17c, there is a high level of confidence in the accuracy and precision of data collected because it is the best available information, is collected with standardized methods by professional fisheries biologists and research scientists, and juvenile STN index data was recently published in a peer reviewed journal.

Monitoring Question 17 - Evaluation Discussion

Wood turtles – Indicator 17a

Wood turtles are the most terrestrial of the three turtle species that inhabit the western Upper Peninsula: the other two species are snapping turtles and painted turtles. Much of their summers are spent foraging in upland areas, seeking open sunny areas to forage for succulent forbs, berries, insects, slugs and even bird eggs. The Ottawa, recognizing this, has been attempting to maintain open sunny meadows adjacent to river reaches known to be inhabited by wood turtles.

The CRMP states that wood turtles (as well as some other species) are contributing to the Wildlife ORVs for most of the segments of the WSRs on the Ottawa. The CRMP also contains a monitoring and evaluation guide that lists indicators to measure to evaluate the implementation of the CRMP. A key indicator listed in the monitoring program is the status of wood turtle populations and their viability (CRMP, p. 5-2 and 5-3). As stated above, the Ottawa initiated a wood turtle monitoring program in 2004, and this monitoring program has been focused on capturing and marking, then re-capturing, adult female wood turtles at

selected nesting beaches in most of the main river systems that comprise the WSR network across the Ottawa (Casper and Beuch 2005; Casper 2011).

Not every river reach has a monitored nesting beach, in part because not all reaches have nesting habitat, and in part due to financial and staff constraints. The goal of the monitoring program is to determine population viability of the wood turtles inhabiting the river systems, by documenting survival rates of the adult females, and by determining if recruitment is occurring in the populations. In preparing this report, the Ottawa contracted an analysis of 19 years of data, which is presented in this section (Casper and Halstead 2017). The results from 19 years of wood turtle monitoring reveal the wood turtle population in the western Upper Peninsula, and the Ottawa specifically, appears to be doing well at this time with 885 different wood turtles captured over the term of the project. Most sub-populations appear to have high adult survival, as evidenced by numerous recaptures of marked females over many years (Casper and Halstead 2017). Although our data shows a relatively stable population, it does fluctuate slightly. This is likely an artifact of varying effort levels along with seasonal fluctuation in weather favoring or unfavorable to wood turtle nesting. In addition, wood turtles are often susceptible to predation by raccoons, and this continues to be a major constraint on turtle survivorship and nesting success (Casper 2024).



Figure 28. Wood Turtle found by Ottawa Wildlife Biologist (P. Nankervis, 07/2022)

Table 87. Number of new wood turtle captured at nesting sites by river (FY 2004 to 2023)

River	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Black River	0	0	12	9	16	4	1	5	0	0	0	6	3	14	10	9	4	4	10	3
CBOR**	0	1	4	6	2	0	1	3	2	6	6	6	3	6	3	4	4	5	2	4
EBOR**	6	4	54	17	19	20	14	13	6	6	6	15	7	3	4	3	8	7	8	6
MBOR**	6	3	5	13	11	4	5	5	1	4	3	5	4	3	1	1	1	1	2	3
Paint River	0	1	5	1	3	0	0	*	*	*	3	4	1	0	*	1	0	*	*	*
SBOR	6	11	30	47	31	17	8	10	7	9	3	7	6	2	0	8	2	18	9	9
Sturgeon	7	15	22	20	10	5	4	2	5	3	2	4	10	1	1	9	8	5	3	2
Total:	27	35	133	113	92	50	33	38	19	32	21	47	30	29	19	37	27	40	34	29

**Empty box indicates that river was not surveyed during that specific FY.*

***CBOR=Cisco Branch Ontonagon River; EBOR=East Branch Ontonagon River; MBOR=Middle Branch Ontonagon River; SBOR=South Branch Ontonagon River*

The other main objective of wood turtle monitoring effort is determining juvenile recruitment to ensure there is successful reproduction in the nesting regions. Viability is further supported by finding a young turtles at most of the monitored beaches over the years (Casper and Halstead 2017). The methods employed during the mark-recapture of adult females are largely unproductive for detecting juveniles and males; nonetheless, the Ottawa has found some wood turtles as young as three years old. At four nesting regions, the Ottawa has failed to detect any juveniles, which may indicate low success rates of reproduction. Our data also shows that two sites, (the northern reach of the SBOR and the northern reach of the EBOR) have significant amounts of new turtles in comparison to other sites, indicating these areas have high reproductive success and subsequent offspring survival (see Table 87).

Lake sturgeon – Indicator 17b

The Sturgeon River STN population is considered a stronghold for the Western Basin of Lake Superior, is self-sustaining population, and utilizes portions of the Sturgeon River flowing through Ottawa lands for spawning and incubation before downstream drift as larvae off Ottawa lands. The STN Rehabilitation Plan defined a self-sustaining population as one with a minimum of 1,500 mature adults using a common tributary for spawning, a roughly equal sex ratio, 20 or more age-classes of adult fish, evidence of annual reproduction through collection of viable eggs, and measurable recruitment of age 0-5 fish (Hayes and Carrofino, 2012; Schloesser et al. 2024).

The current best available population estimate for the Sturgeon River spawning population has not been updated since the last evaluation and stands at 1,808 adults. The Ottawa is not aware of any data or studies that can be used to identify the population sex ratio. There is evidence of annual reproduction, based on annual spawning runs observed in the Sturgeon River which provides viable gametes for hatchery operation and larval drift downstream which has been used to source Ontonagon rearing trailer STN in 2023, and is planned for future years as well. Measurable recruitment for the Sturgeon River population has been confirmed for age-0 through larval drift sampling; in 2023 larval age-0 STN were used to maintain stocking efforts on the St. Louis River as well as the Ontonagon River, with 728 fall fingerlings stocked (Table 88, Figure 29). Recruitment is also supported by periodic Index netting surveys near the mouth of the Sturgeon River, which uses ages 4-8 to gauge recruitment and population rehabilitation success; in 2021 17 STN age 4-8 were captured near the mouth of the Sturgeon River (Schloesser et al. 2024).

The recent trend for this indicator was determined to be maintaining or moving towards the target. For the purposes of this evaluation, a sustained spawning population and likely expanding population supports this determination. However, the current best available population estimate for STN in the Sturgeon River remains unchanged, still based on the estimate provided in the 2012 Rehabilitation Strategy (Hayes and Carrofino, 2012). Beyond this estimate, Research Fisheries Biologist, Edward A. Baker, Ph.D. is confident the population is expanding (Personal Communication, Ed Baker, January 13, 2023).

Lake sturgeon (STN) – Indicator 17c

Efforts to rehabilitate the Ontonagon River STN spawning population and restore this charismatic and culturally significant component of the historic fish assemblage in the mainstem Ontonagon and potentially portions of Wild and Scenic River sections in the East and Middle Branches, has been ongoing since 1998 (Figure 28 and Figure 29, Table 88). The

way STN are raised for stocking has evolved since then, with major points of evolution in 2007, 2013 and 2023. In 2007, the Michigan DNR decided to cease STN rearing at a distant hatchery used since 1998, and to establish a streamside rearing facility near the mouth of the Ontonagon River. River water was circulated through the rearing tanks, with the objective of inducing juvenile STN imprinting to the Ontonagon River and increasing the likelihood that they would return to the river as adults to spawn.

In 2012, it was determined that the river water quality (suspended sediment) at the mouth was impacting STN fry survival in the facility. However, this is largely a natural condition due to watershed geology and mass wasting streambanks in incised valleys that yields extensive sediment and persistently turbid flows, despite the limited extent of watershed development and anthropogenic land use conversion (Creech et. al., 2010). To adapt operations, the USFWS Ashland Fish and Wildlife Conservation Office oversaw the construction of a streamside rearing trailer, which was placed many miles upstream of the mouth of the river, at the Bergland Dam on the West Branch Ontonagon River (Figure 29). In 2013 STN stocked in the Ontonagon River came from both streamside facilities, but the bulk of STN were small fingerlings which likely had poor survival compared to the 150 larger fall fingerlings which came from the West Branch Ontonagon rearing trailer in 2013. In 2014, climactic conditions and high stream flows prevented successful gamete collection in the Sturgeon River, so no stocking was conducted that year. From 2015 to 2019 the West Branch Ontonagon rearing trailer was used successfully, albeit with production not consistently nearing the desired outcome of 1,500 fall fingerlings annually (Figure 29). The 2020 coronavirus pandemic and workplace policies prevented field work, so gametes were collected, and no stocking occurred (Figure 29). In Fall 2022, the collaborative STN technical team decided to continue gamete collection to support STN stocking in the St. Louis River, Minnesota; larval drift sampling was to be used to collect larvae for use in the West Branch Ontonagon rearing trailer. However, climactic conditions led to high stream flows in Spring 2023, so no gametes were collected; larval drift collection was used to source both the Genoa National Fish Hatchery and the streamside trailer to support St Louis River and Ontonagon River stocking, respectively.

Although fall fingerling production has not consistently been attained to meet the stocking target of 1,500 individuals, and a global pandemic and variable stream flows, have impacted partners abilities to collect gametes annually, the program continues to be a priority and critical effort for overall STN conservation in the region. Because deviations from the target of 1,500 fall fingerlings have been modest and inconsistent, and the target was met in 2019 and 2021, the determination for this target was made to be “within target” and “trending towards” the target. Overall, this effort continues to support the STN fisheries ORV for the subject wild and scenic rivers.

To date, successful spawning by STN in the Ontonagon River has not been conclusively determined. However, there are data collection efforts ongoing that provide some indications of STN use of the Ontonagon River during spawning season and recruitment of juvenile and sub-adult STN to the Ontonagon River populations. As described above, based on acoustic detection arrays, several adults have been present in the Ontonagon River during spawning season in 2018 to 2019. The periodic juvenile recruitment index sampling also suggests

progress (Schloesser et al. 2024). This sampling targets STN near the mouth of the Ontonagon River to assess recruitment, specifically based on juvenile/sub-adult STN cohort aged 4-8 years. The previous evaluation considered the 2011 data, and since that time the 2016 and 2021 data has been processed. As a positive sign for the Ontonagon STN rehabilitation effort, the CPUE target was met for 7 of 19 Lake Superior tributaries in 2021, including the Ontonagon River. The number of age 4-8 STN captured at the mouth of the Ontonagon River was 34 individuals in 2011, 3 individuals in 2016, with a substantial increase to 55 individuals in 2021 (Table 89). The decreased catch in 2016 was attributed to significant flood event in the summer during normal netting times (Schloesser et al. 2024). This sampling effort has revealed that rehabilitation stocking in the Ontonagon River has resulted in stocked STN survival to at least ages 4-8 and that they are remaining near the tributary targeted for rehabilitation. This is further justification for the determination made above relative to targets and trend for Indicator 17c.

Table 88. Michigan DNR stocking database records of lake sturgeon in the Ontonagon River (1998 to 2023)

Site Name	Date	Number	Average Length (in)
Victoria Road Bridge	9/23/1998	6065	4.69
Victoria Road Bridge	10/26/1999	2820	5.24
Victoria Road Bridge	9/19/2000	7518	7.87
Victoria Road Bridge	9/27/2001	3456	8.35
Victoria Road Bridge	9/27/2001	12	15.55
Victoria Road Bridge	10/2/2002	7001	7.49
Victoria Road Bridge	11/9/2004	5133	8.15
River mouth	10/3/2007	738	5.98
Picnic site	8/31/2008	256	2.44
Victoria Road Bridge	10/2/2008	674	5.47
River mouth	8/13/2010	39	2.32
Victoria Road Bridge	6/11/2013	5500	0.79

Site Name	Date	Number	Average Length (in)
Victoria Road Bridge	6/26/2013	1500	1.5
Victoria Road Bridge	9/30/2013	150	7.48
Victoria Road Bridge	8/24/2015	820	7.48
Picnic site	8/1/2016	263	7.64
Victoria Road Bridge	10/4/2016	263	7.64
Picnic site	9/19/2017	631	6.65
Victoria Road Bridge	9/19/2017	630	6.65
Victoria Road Bridge	8/10/2018	174	7.2
Victoria Road Bridge	9/19/2018	585	6.14
Victoria Road Bridge	9/19/2019	39	7.48
Victoria Road Bridge	9/26/2019	463	7.09
Victoria Road Bridge	10/3/2019	1005	7.09
Victoria Road Bridge	9/15/2021	1042	6.5
Victoria Road Bridge	9/30/2021	625	6.85
Picnic site	9/27/2022	522	7.32
River mouth	10/4/2022	491	7.09
Victoria Road Bridge	9/5/2023	375	6.69
River mouth	9/28/2023	372	6.65

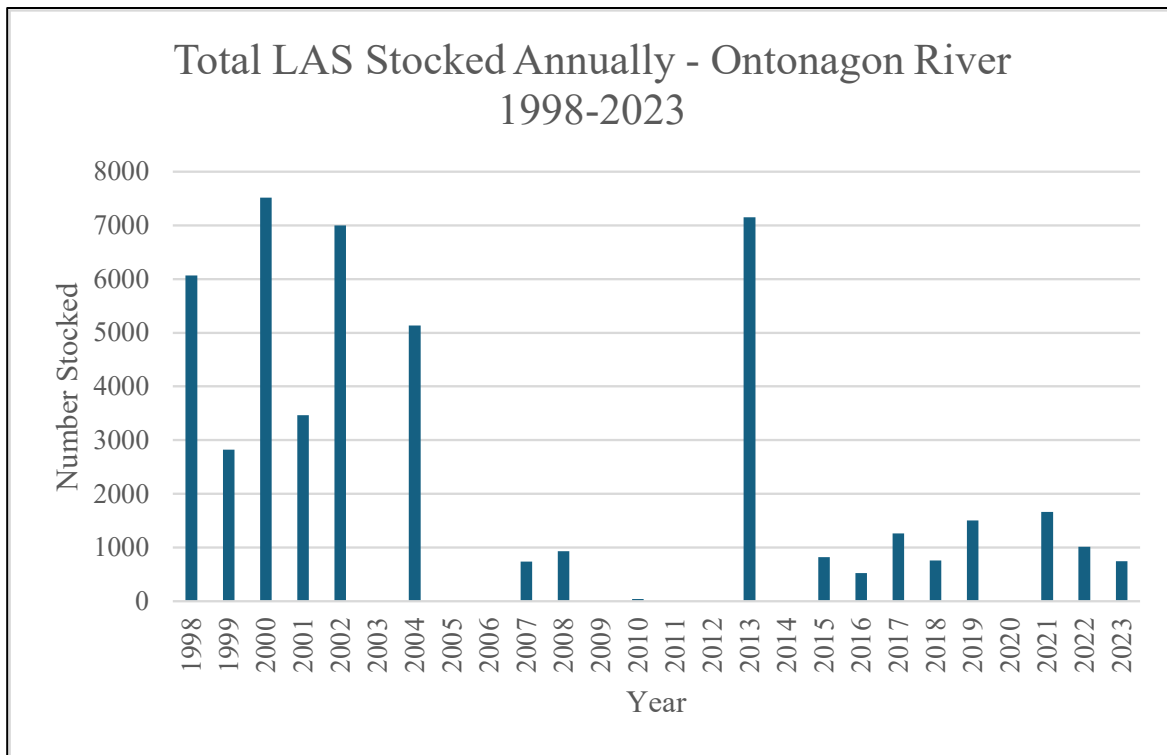


Figure 29. Annual total number of juvenile STN stocked in the Ontonagon River, spanning several different rearing strategies (1998 to 2023)

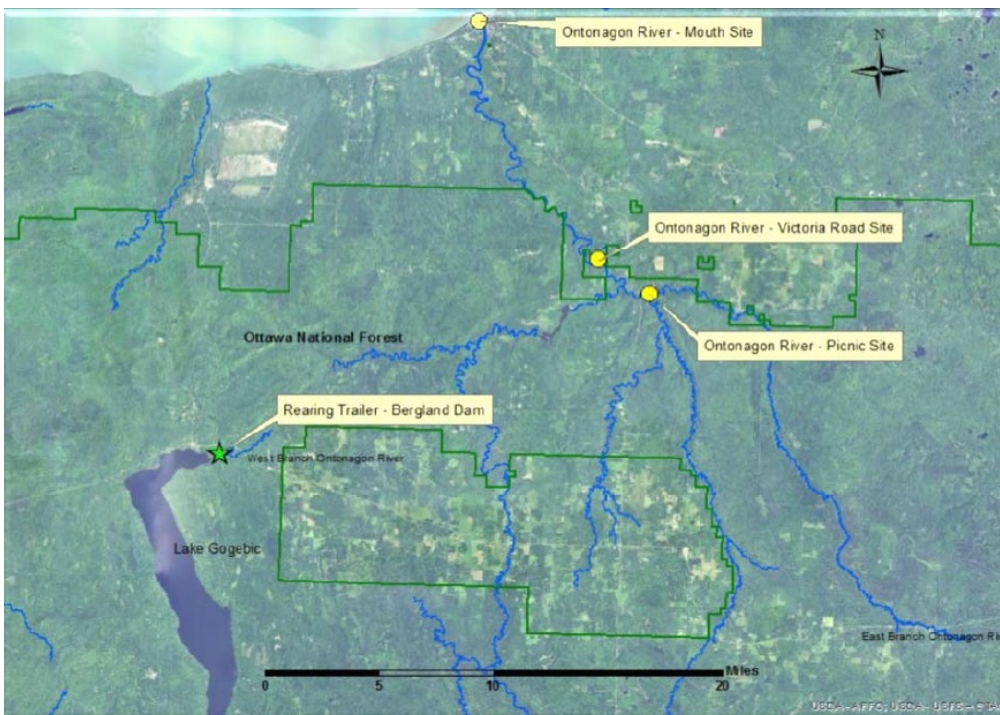


Figure 30. Location of STN rearing trailer and stocking sites on the Ontonagon River (2007 to 2023)

Table 89. Results of lake sturgeon tributary index sampling (2011 to 2021)

Year	Number of Nets	Total STN Catch	STN Age 4-8 Cohort Catch
2011	16	56	34
2016	16	15	3
2021	16	77	55

Adapted from Schloesser et al. 2024

Forest Plan

Are the current Forest Plan components (desired conditions, goals, objectives) achievable in the timeframes described and does the Forest Plan provide sufficient direction (standards, guidelines, suitability, designated lands) to achieve these components?

The Forest Plan does not have desired conditions, goals, or objectives specific to wood turtles. However, as outlined in the Forest Plan provides for meeting the habitat needs for threatened, endangered and sensitive species (TES) (Goal 26, Objective b, p. 2-8), and promotes the conservation, restoration and recovery for species of viability concern (Goal 30, p. 2-9). Therefore, the broad nature of the Forest Plan direction allows the necessary flexibility to manage for protection of wood turtles.

Relative to STN, the Forest Plan does not identify specific desired conditions, goals, or objectives. However, the Forest Plan provides for meeting the habitat needs for threatened, endangered and sensitive species (TES) (Goal 26, Objective b, p. 2-8), and promotes the conservation, restoration and recovery for species of viability concern (Goal 30, p. 2-9). Therefore, the broad nature of the Forest Plan direction allows the necessary flexibility to support ongoing STN rehabilitation efforts in the Ontonagon River, including select segments of the East and Middle Branches, which may potentially support adfluvial STN migration for spawning, rearing, and larval drift downstream towards Lake Superior. It also provides standards and guidelines that emphasize resource protection associated with known spawning habitats in the 8.5-mile scenic segment of the Sturgeon River downstream of Prickett Dam and potential future spawning habitats in the Ontonagon River downstream of and potentially including WSR segments of the East and Middle Branches.

A critical example of this, relative to MA 8.1, including known and potential STN spawning/rearing habitats, is the Soil, Water, Air Standard (Forest Plan, p. 3-79) “No flood control dams, levees, or other works are allowed in the channel or river corridor. The natural appearance and primitive character of the river area is maintained”. Avoiding further fragmentation of key migratory corridors to support upstream adult migration and passive downstream larval drift is essential to supporting the STN ORV for the subject WSR segments.

Relative to the conservation, restoration and recovery of STN within the timeframes described, this is not generally achievable due to the extended time to maturity for STN, and rehabilitation of the Ontonagon River population may take several decades. Contributing to habitat protection or improvement in the Sturgeon River scenic segment can be incrementally achieved in the timeframe but will require protection perpetuity to ensure forest management does not contribute to population decline and continues to support quality spawning and rearing habitat.

Forest Assessment

Is the status or trend of the monitoring indicators substantially different than described in the Forest Assessment, or was an assumption in the Forest Assessment proven to be invalid from the monitoring data?

The status and trend of Indicator 17a is not substantially different than anticipated in the analysis for the Forest Plan. The Forest Plan FEIS analysis parameters were based on the premise that the Ottawa would allow for variable width riparian areas to allow for flexible management (FEIS, p. 3-22). The Biological Evaluation finding for the Forest Plan FEIS was a May Impact Individuals (MII) determination regardless of proposed alternative under the revision process (FEIS Volume II, p. G-3) due to the effects of timber harvest on wood turtle habitat (FEIS, p. 3-16).

Relative to Indicator 17b, the Forest Plan FEIS did not establish specific targets for the indicator. Relative to supporting a self-sustaining STN population, the target is based on the 2012 Michigan Lake Sturgeon Rehabilitation Strategy, which defines large stable populations as having more than 750 adults. The estimated abundance of spawning adult STN is 1,808 (Hayes and Carrofino, 2012). It appears that the indicator for STN population size may have assumed revised population estimates would be periodically generated by Michigan DNR, however, the best available estimate has not been updated since 2012, and only professional judgement by subject matter experts is available to inform trend at this time. Similarly, an alert level was not established for this indicator in the Forest Assessment, but thresholds or alert levels were established in the STN rehabilitation plan. For example, for STN populations which experience declines of at least 30% over 15 years, management to offset declines should be implemented (Hayes and Carrofino, 2012).

Relative to Indicator 17c, the Forest Plan FEIS did not establish specific targets for the indicator. The target and alert threshold for STN in the Ontonagon River is based on the 2012 Michigan Lake Sturgeon Rehabilitation Strategy. The Ontonagon population is categorized as less than 25 adults, or functionally extirpated. For those populations estimated to be below the minimum viable population level of 80 adults, the objective is to “evaluate populations that are below the minimum viable population size on a case-by-case basis to determine if management action is a prudent use of the limited resources available” (Hayes and Carrofino, 2012). As a result, the ongoing stocking effort led by Michigan DNR has been sustained since approximately 1998, with significant refinements supported by Ottawa beginning in 2013 with development of the West Branch Ontonagon streamside rearing facility.

The target established for the number of STN stocked annually in the Ontonagon River is approximately 1,500 fall fingerlings. The indicator, while not specifically referring to 1,500

fall fingerlings, does assume annual stocking. The validity of the annual stocking assumption may be questioned, because of factors beyond our control. For example, due to the Covid-19 Pandemic, climactic and instream flow variability, and other stocking programs reliant on the Sturgeon River source population and collection of gametes or larvae, this target has not been consistently attained (Figure 29, Table 88).

Management Actions

Did any of the management activities potentially result in adverse or beneficial effects to the status and trend of the monitoring indicators?

Yes, the vegetation management treatments resulted in better nesting beaches for the wood turtles. As shown in Table 87, some of the nesting beaches had increased counts of new turtle captures after the treatments were performed. However, it may be too early to tell with certainty, but this would help increase the ORVs of WSRs.

Because STN are adfluvial species, residing predominantly off-forest in Lake Superior or near the mouths of tributaries, habitats on the Ottawa are used only for a short duration during movement, spawning, rearing and larval out-migration from approximately mid-April through mid-June. Relative to STN, select WSR segments and land management activities, there are no management actions that have resulted in adverse or beneficial effects to the STN population in the Sturgeon River or the annual consistency or number of STN stocked in the Ontonagon River. However, Ottawa staff do contribute valuable labor to the ongoing Ontonagon River STN rehabilitation program.

Monitoring Program

Did the monitoring results provide all the information necessary to answer the monitoring question?

Relative to Indicator 17a, the data collection protocols, and indicator adequately provide the necessary information to answer the monitoring question.

Relative to STN Indicator 17b, the monitoring necessary to update and inform trend in outside the scope of Ottawa administered lands and management purview. MI DNR is the agency responsible for fish population management and periodic refinement of estimates of the Sturgeon River population size. Since population abundance has not been estimated since 2012, only professional judgement of subject matter experts was available as new information to inform this indicator.

Relative to STN Indicator 17c, the available stocking records do inform the annual frequency of stocking and number of fall fingerlings stocked. Since these values are provided through our partnership with other agencies, this monitoring effort is relatively rapid and sustainable.

Monitoring Question 17 - Recommendations

There is no need for a change in this question currently. The indicators adequately provide the parameters needed to answer the monitoring question.

The existing STN indicators are only tangentially related to habitat management objectives and standards and guidelines provided in the Forest Plan. The existing indicators, however, can be evaluated with data requiring limited effort by the Ottawa which makes them sustainable, and they should be retained. Should other indicators or monitoring be considered, we may suggest focusing on enumeration of actions that result in adverse or beneficial effects to the subject segments of the WSR, including the scenic segment of the Sturgeon River below Prickett Dam, the lower wild segment of the Middle Branch Ontonagon River and the lower wild segment of the East Branch Ontonagon River. These are the only WSR segments known or with some potential to support future spawning and rearing. Monitoring the number and type of actions within these WSR corridors would aid our evaluation of conformance with the Forest Plan and continuing to monitor the existing indicators would inform long term effectiveness relative to the STN ORV.

Table 90. Summary of monitoring recommendations for Monitoring Question 17

Changes may be warranted for the:	Yes	Maybe, not enough information to determine at this time	No
Forest Plan			☐
Forest Assessment			☐
Management Actions			☐
Plan Monitoring Program			☐

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Monitoring Question 18 – To what extent are forest management activities restoring vegetation composition and spatial landscape patterns and moving toward desired conditions at the Forest, management area and other appropriate landscape scales?

Context for this Evaluation

This monitoring question ensures the Ottawa is working towards the desired forest type composition by MA.

Table 91. Background information for Monitoring Question 18

Drivers	
2012 Planning Rule (36 CFR 219.12(a)(5)(vii)): Progress toward meeting the desired conditions and objectives in the plan, including for providing multiple use opportunities. This question is responsive to one of the eight required monitoring elements prescribed by the 2012 Planning Rule. In addition, this monitoring question measures trends toward achieving several conditions outlined in the Forest Plan pertaining to vegetative composition under Goals 1, 13, 15, 16 and 17 (pp. 2-2, 2-5 and 2-6). Objectives 1a through 1d (p. 2-2), 15a through 15e (p. 2-6), are also applicable.	
Primary Forest Plan Component Addressed	Monitoring Question Indicator
Desired vegetation composition specifically the MAs where active management can change the vegetation composition percentages (MAs 1.1a, 2.1, 2.2, 3.1a, 4.1a, 4.2a, 6.1 and 6.2).	Comparison of current and desired percentages of forest types, by management area.
Who collected this data? Who is Responsible for analyzing this question?	
Michael Strieter, Forest Silviculturist	

When was this monitoring question last updated?

- Date of current evaluation: March 2024
- Date of previous evaluation: FY 2017 Monitoring Evaluation Report

Table 92. Relationship of Monitoring Question 18 to other Forest Plan direction

Question 18	Key Forest Plan Components		
	<i>Desired Conditions</i>	<i>Goals and Objectives</i>	<i>Standards and Guidelines</i>
Indicator 18	In each “Desired Condition of the Land” section of Management Areas where forest types are managed (pp. 3-4, 3-8, 3-13, 3-18, 3-23, 3-29, 3-57 and 3-63), the desired conditions include a foundation for Goal 13.	Goal 1: Provide a variety of ecological communities in order to maintain or enhance habitat conditions for plant and animal species, to provide for a natural buffer against invasive exotic organisms, and to provide for the long-term production of a mix of timber products (p. 2-2) Goal 13: Restore and maintain Great Lakes forested ecosystems using timber management and silvicultural practices as tools, and to enhance values associated with the Great Lakes Ecosystem (E.O. 13340) (p. 2-5). Goal 15: Manage northern hardwoods based on the capability of the ecosystem units where they are located, while providing for a mix of uneven-aged and even-aged conditions (p. 2-6). Goal 16: Provide for a mix of age classes within the aspen/paper birch vegetation type	Standards: 2400 Timber Management Guidelines: Regenerate existing aspen or convert another forest type to aspen by clearcutting. (p.2-16 – 2-22)

Question 18	Key Forest Plan Components		
	<i>Desired Conditions</i>	<i>Goals and Objectives</i>	<i>Standards and Guidelines</i>
		to support conservation, economic and social objectives associated with early successional habitats (p. 2-6). Goal 17: Increase the acreage of long-lived conifers at a modest rate. Maintain the acreage of short-lived conifers where appropriate (p. 2-6).	

What monitoring activities have been conducted since the last monitoring evaluation? What protocols were used to collect these data?

Forest type compositions are queried and analyzed prior to NEPA analysis for all vegetation management projects utilizing the FSVeg geodatabase.

What is the target, or range for the indicator being measured? Is there an alert level (such as a trigger or threshold), associated with the target that should be noted?

The Forest Plan outlines a range for each forest type based of management area. Thresholds are met when the actual composition either falls below or rises above the desired conditions in the Forest Plan (p. 3-4, 3-8, 3-13, 3-18, 3-23, 3-29, 3-57 and 3-63).

Has any new Best Available Scientific Information (BASI) informed this monitoring question, indicators, or methodology? Where is the data for this monitoring question stored?

There is no new BASI for this monitoring question. The data for this monitoring question is stored and managed in the FSVeg geodatabase.

Monitoring Question 18 - Results

Table 93. Status and trend of the indicator for Monitoring Question 18 (MA 1.1a)

Indicators		Recent Trend	
<i>Indicator 18 (MA 1.1):</i> Comparison of current and desired percentages of forest types, by management area.		<i>Towards Target</i>	<i>Away from Target</i>
Current Status	<i>Within Target</i>	X	
	<i>Outside Target</i>		

Goal 1 of the Ottawa Forest Plan is to provide for ecosystems that are healthy, diverse, and functioning in a sustainable manner (p. 2-2). In the Forest Plan, MA boundaries were refined using Ecological Classification System information to better align management direction with the capability of the land. To restore vegetative conditions, new MAs were created, along with new management prescriptions, and revised standards and guidelines.

Over the last 17 years of implementing the Forest Plan, there has been little change in the vegetative composition percentages across the Forest. Meeting the vegetative composition desired condition is a long-term goal which will take several decades and likely more than one planning period to accomplish.

The following tables show the desired condition vegetative composition percentage for each forest type group by MA, along with the current vegetative composition percentage and the percentage used during development of the Forest Plan FEIS.

Monitoring Question 18 - Evaluation Discussion

Table 94. MA 1.1a forest type composition (FY 2007, 2016, 2024)

Forest Type Group	Desired Condition (%)	Percent Change			
		FEIS	FY 2007	FY 2016	FY 2024
Aspen/Paper Birch	60 - 70	64	63	64	64
Long Lived Conifer	5 - 10	7	7	6	7
Short Lived Conifer	10 - 20	12	12	11	11
Northern Hardwoods	5- 20	17	18	19	18

MA 1.1a emphasizes early successional ecosystem community types, with a strong emphasis on maintaining aspen. Since the current Forest Plan was implemented, the vegetation composition percentage of aspen/paper birch in MA 1.1a has remained stable, and the northern hardwoods increased by 1%. The long-lived conifers have remained stable and short-lived conifers percentage decreased by 1%. All forest type groups are within the desired condition range.

The actual acres of aspen in MA 1.1a have increased by 268 acres since 2006. The increase is due to recent implementation of the 2016 Aspen Vegetation Management Project along with recent land acquisitions.

Much of the aspen on the Forest are on lands classified as unsuitable for timber production. Many of these stands are mature and naturally converting to more shade tolerant northern hardwoods and conifers through natural succession.

Table 95. Status and trend of the indicator for Monitoring Question 18 (MA 2.1)

Indicators		Recent Trend	
<i>Indicator 18 (MA 2.1):</i> Comparison of current and desired percentages of forest types, by management area.		<i>Towards Target</i>	<i>Away from Target</i>
Current Status	<i>Within Target</i>		
	<i>Outside Target</i>	X	

Table 96. MA 2.1 forest type composition (FY 2007, 2016, 2024)

Forest Type Group	Desired Condition (%)	Percent Change			
		FEIS	FY 2007	FY 2016	FY 2024
Aspen/Paper Birch	15 - 20	12	12	12	11
Long Lived Conifer	0 - 10	5	5	5	5
Short Lived Conifer	10 - 20	21	20	20	20
Northern Hardwoods	50 - 70	63	63	63	64

MA 2.1 emphasizes uneven-aged northern hardwoods ecosystems. Since the Forest Plan was implemented, the vegetation composition percentage of all forest type groups has remained relatively constant. Aspen remains below desired condition range. This is likely due to aspen stands converting to northern hardwoods as the table shows. Long-lived conifers and short-lived conifers forest type groups are within the desired condition range.

Table 97. Status and trend of the indicator for Monitoring Question 18 (MA 2.2)

Indicators		Recent Trend	
<i>Indicator 18 (MA 2.2):</i> Comparison of current and desired percentages of forest types, by management area.		<i>Towards Target</i>	<i>Away from Target</i>
Current Status	<i>Within Target</i>	X	
	<i>Outside Target</i>		

Table 98. MA 2.2 forest type composition (FY 2007, 2016, 2024)

Forest Type Group	Desired Condition (%)	Percent Change			
		FEIS	FY 2007	FY 2016	FY 2024
Aspen/Paper Birch	5 - 15	14	14	14	14
Long Lived Conifer	5 - 10	5	5	5	5
Short Lived Conifer	10 - 20	14	14	14	14
Northern Hardwoods	65 - 75	67	67	67	67

MA 2.2 emphasizes late successional northern hardwood forest types with an even greater emphasis on uneven-aged hardwood management than in MA 2.1. Since the Forest Plan was implemented, the vegetation composition percentage of all forest type groups has remained relatively constant. All forest type groups are within the desired condition range.

Table 99. Status and trend of the indicator for Monitoring Question 18 (MA 3.1a)

Indicators		Recent Trend	
<i>Indicator 18 (MA 3.1a):</i> Comparison of current and desired percentages of forest types, by management area.		<i>Towards Target</i>	<i>Away from Target</i>
Current Status	<i>Within Target</i>	X	
	<i>Outside Target</i>		

Table 100. MA 3.1a forest type composition (FY 2007, 2016, 2024)

Forest Type Group	Desired Condition (%)	Percent Change			
		FEIS	FY 2007	FY 2016	FY 2024
Aspen/Paper Birch	35 - 45	39	39	40	38
Long Lived Conifer	10 - 20	13	13	14	13
Short Lived Conifer	10 - 20	11	11	11	11
Northern Hardwoods	25 - 45	36	36	36	38

MA 3.1a emphasizes a mix of northern hardwoods, softwoods, and aspen vegetation types. Since 2016 we have seen a 2% decrease in aspen/paper birch and a 2% increase in northern hardwood forest types. This is likely due to aspen mortality and stands converting to northern hardwoods. Long-lived and short-lived conifer forest type groups have not changed since the implementation of the Forest Plan. All forest type groups are within the desired condition range.

Table 101. Status and trend of the indicator for Monitoring Question 18 (MA 4.1a)

Indicators		Recent Trend	
<i>Indicator 18 (MA 4.1a):</i> Comparison of current and desired percentages of forest types, by management area.		<i>Towards Target</i>	<i>Away from Target</i>
Current Status	<i>Within Target</i>		
	<i>Outside Target</i>	X	

Table 102. MA 4.1a forest type composition (FY 2007, 2016, 2024)

Forest Type Group	Desired Condition (%)	Percent Change			
		FEIS	FY 2007	FY 2016	FY 2024
Aspen/Paper Birch	15 - 25	26	26	26	26
Long Lived Conifer	30 - 60	27	28	28	28
Short Lived Conifer	20 - 25	24	24	24	24
Northern Hardwoods	15 - 25	22	22	22	22

MA 4.1a provides for a mix of aspen, northern hardwoods and conifer types with an emphasis on long-lived conifers. Since the Forest Plan was implemented, the vegetation composition percentage of all forest type groups has remained relatively constant. Though aspen currently exceeds the desired range, it is expected to gradually decrease over time, especially on unsuitable lands and portions of physically suited lands where needed for riparian protection and convert to other forest types (FEIS, 3-59). Long-lived conifer is currently below the desired condition range. The Ottawa should look for future opportunities to increase long-lived conifer.

Table 103. Status and trend of the indicator for Monitoring Question 18 (MA 4.2a)

Indicators		Recent Trend	
<i>Indicator 18 (MA 4.2a):</i> Comparison of current and desired percentages of forest types, by management area.		<i>Towards Target</i>	<i>Away from Target</i>
Current Status	<i>Within Target</i>		
	<i>Outside Target</i>	X	

Table 104. MA 4.2a forest type composition (FY 2007, 2016, 2024)

Forest Type Group	Desired Condition (%)	Percent Change			
		FEIS	FY 2007	FY 2016	FY 2024
Aspen/Paper Birch	10 - 25	12	12	12	12
Long Lived Conifer	10 - 25	19	19	20	19
Short Lived Conifer	50 - 60	50	51	51	50
Northern Hardwoods	0 - 15	18	18	18	18

MA 4.2a emphasizes short-lived conifers, with a strong emphasis on maintaining jack pine. Since the Forest Plan was implemented, the vegetation composition percentage of all forest type groups has remained relatively constant. For the exception of northern hardwoods, all forest type groups are within the desired condition range. When opportunities present themselves in the future, converting some northern hardwood acres to either short-lived conifer or aspen/paper birch should be considered.

Table 105. Status and trend of the indicator for Monitoring Question 18 (MA 6.1)

Indicators		Recent Trend	
<i>Indicator 18 (MA 6.1):</i> Comparison of current and desired percentages of forest types, by management area.		<i>Towards Target</i>	<i>Away from Target</i>
Current Status	<i>Within Target</i>	X	
	<i>Outside Target</i>		

Table 106. MA 6.1 forest type composition (FY 2007, 2016, 2024)

Forest Type Group	Desired Condition (%)	Percent Change			
		FEIS	FY 2007	FY 2016	FY 2024
Aspen/Paper Birch	10 - 55	10	10	10	11
Long Lived Conifer	1 - 45	5	5	5	5
Short Lived Conifer	1 - 30	7	7	7	7
Northern Hardwoods	15 - 90	78	78	78	77

MA 6.1 emphasizes a largely uneven-aged northern hardwoods ecosystem. Since the Forest Plan was implemented, the vegetation composition percentage of all forest type groups has remained relatively constant. All forest type groups are within the desired condition range.

Table 107. Status and trend of the indicator for Monitoring Question 18 (MA 6.2)

Indicators		Recent Trend	
<i>Indicator 18 (MA 6.2):</i> Comparison of current and desired percentages of forest types, by management area.		<i>Towards Target</i>	<i>Away from Target</i>
Current Status	<i>Within Target</i>	X	
	<i>Outside Target</i>		

Table 108. MA 6.2 forest type composition (FY 2007, 2016, 2024)

Forest Type Group	Desired Condition (%)	Percent Change			
		FEIS	FY 2007	FY 2016	FY 2024
Aspen/Paper Birch	10 - 55	27	27	27	26
Long Lived Conifer	1 - 45	4	4	5	5
Short Lived Conifer	1 - 30	8	7	8	8
Northern Hardwoods	15 - 90	61	61	61	61

MA 6.2 emphasizes a largely uneven-aged northern hardwood and aspen ecosystem. Since the Forest Plan was implemented, the vegetation composition percentage of all forest type groups has remained relatively constant. All forest type groups are within the desired condition range.

What level of confidence is there in the accuracy and precision?

There is a moderate level of confidence in the quality and quantity of data collected because the same collection protocols and reporting standards have been in place for several years. The Forest Plan states that the methods used for this monitoring question have a high degree of repeatability, reliability, accuracy and precision (p. 4-4).

Forest Plan

Are the current Forest Plan components (desired conditions, goals, objectives) achievable in the timeframes described and does the Forest Plan provide sufficient direction (standards, guidelines, suitability, designated lands) to achieve these components?

Meeting the vegetative composition desired condition is a long-term goal which will take several decades and likely more than one planning period to accomplish. In the future, the Ottawa will seek opportunities to adjust forest types to work towards desired condition for each MA.

Forest Assessment

Is the status or trend of the monitoring indicators substantially different than described in the Forest Assessment, or was an assumption in the Forest Assessment proven to be invalid from the monitoring data?

The status and trend of the indicator is not substantially different than anticipated in the analysis for the Forest Plan.

Management Actions

Did any of the management activities potentially result in adverse or beneficial effects to the status and trend of the monitoring indicators?

Yes, active management (timber harvesting) allows the opportunity to work towards and maintain desired conditions of forest type groups, even though these activities may take multiple entries to accomplish desired conditions in some MAs.

Monitoring Program

Did the monitoring results provide all the information necessary to answer the monitoring question?

Yes, the data collection protocols and indicator adequately provide the necessary information to answer the monitoring question.

Monitoring Question 18 - Recommendations

There are no recommendations for changes to this question.

Table 109. Summary of monitoring recommendations for Monitoring Question 18

Changes may be warranted for the:	Yes	Maybe, not enough information to determine at this time	No
Forest Plan			☐
Forest Assessment			☐
Management Actions			☐
Plan Monitoring Program			☐

Monitoring Question 19 — To what extent are old growth forest conditions being classified consistent with management area objectives?

Context for this Evaluation

This monitoring question ensures the Ottawa remains consistent with classification of old growth is consistent with management objectives.

Table 110. Background information for Monitoring Question 19

Drivers
The 2012 Planning Rule (36 CFR 219.12(a)(5)(ii)): The status of select ecological conditions including key characteristics of terrestrial and aquatic ecosystems. In addition, this monitoring question also measures trends toward achieving conditions outlined in Goal 1 (Objective e) of the Forest Plan that states “locate old growth forests across the landscape in conjunction with other adjacent ownerships to maintain healthy, diverse, and productive ecosystem components” (p. 2-2).

Primary Forest Plan Component Addressed	Monitoring Question Indicator
Provide a variety of ecological communities in order to maintain or enhance habitat conditions for plant and animal species, to provide for a natural buffer against invasive exotic organisms, and to provide for the long-term production of a mix of timber products (Forest Plan, Goal 1, p. 2-2).	a: Comparison of current and desired percentages of old growth, by management area.
	b: Acres of old growth by forest type group.
	c: Acres of contiguous blocks of classified old growth.
Who collected this data? Who is Responsible for analyzing this question?	
Michael Strieter, Forest Silviculturist	

When was this monitoring question last updated?

- Date of current evaluation: March 2024
- Date of previous evaluation: FY 2017 Monitoring Evaluation Report

Table 111. Relationship of Monitoring Question 19 to other Forest Plan direction

Question 19	Key Forest Plan Components		
	<i>Desired Conditions</i>	<i>Goals and Objectives</i>	<i>Standards and Guidelines</i>
Indicator 19 a Comparison of current and desired percentages of old growth, by management area.	Work towards maintaining old growth acreage within desired condition range for each MA.	Goal: 1 Provide a variety of ecological communities in order to maintain or enhance habitat conditions for plant and animal species, to provide for a natural buffer against invasive exotic organisms, and to provide for the long-term production of a mix of timber products (p. 2-2).	Standards: Old Growth Management (p. 2-23) Guidelines: All guidelines are applicable (p. 2-23 – 2-24).
b. Acres of old growth by forest type group.			
c. Acres of contiguous blocks of classified old growth.		Objective e. Locate old growth forests across the landscape in conjunction with other adjacent ownerships to maintain healthy,	

Question 19	Key Forest Plan Components		
	<i>Desired Conditions</i>	<i>Goals and Objectives</i>	<i>Standards and Guidelines</i>
		diverse, and productive ecosystems. Old growth areas contribute to species viability by providing ecosystem components, which are not present in younger forests. Old growth forests are available to provide recreational opportunities (p. 2-2).	

What monitoring activities have been conducted since the last monitoring evaluation? What protocols were used to collect these data?

Old growth classification calculations are conducted prior to the analysis of each vegetation management project. Spatial queries are ran using FS Veg stand data and old growth classification. Percentages are calculated based off total forested acres within the MA.

What is the target, or range for the indicator being measured? Is there an alert level (such as a trigger or threshold), associated with the target that should be noted?

There is a desired condition and range for each MA. The desired condition for each management area can be found in the Forest Plan (p. 3-4, 3-8, 3-13, 3-18, 3-24, 3-29, 3-58 and 3-64). It's important to note there is no target or range in the Forest Plan for acres of old growth by forest type or acres of contiguous blocks of old growth.

Has any new Best Available Scientific Information (BASI) informed this monitoring question, indicators, or methodology? Where is the data for this monitoring question stored?

Old growth classification is updated after each vegetation management decision is signed. The data for this monitoring question is stored spatially in the FS Veg geodatabase.

Monitoring Question 19 - Results

Table 112. Status and trend of the indicator for Monitoring Question 19

Indicators		Recent Trend	
<i>Indicator 19a:</i> Comparison of current and desired percentages of old growth, by management area		<i>Towards Target</i>	<i>Away from Target</i>
Current Status	<i>Within Target</i>		
	<i>Outside Target</i>	X	

<i>Indicator 19b: Acres of old growth by forest type group.</i>		<i>Towards Target</i>	<i>Away from Target</i>
Current Status	<i>Within Target</i>		
	<i>Outside Target</i>	X	
<i>Indicator 19c: Acres of contiguous blocks of classified old growth.</i>		<i>Towards Target</i>	<i>Away from Target</i>
Current Status	<i>Within Target</i>		
	<i>Outside Target</i>	X	

The Forest is moving towards the desired conditions for old growth. Acres of old growth have increased across all MAs since the previous reporting period. There is no specific Forest Plan target or desired condition for Indicators b and c.

What level of confidence is there in the accuracy and precision?

There is a moderate to high level of confidence in the quality and quantity of data collected because the same collection protocols and reporting standards have been in place for several years. The Forest Plan states that the methods used for this monitoring question have a high degree of repeatability, reliability, accuracy and precision (p. 4-4).

Monitoring Question 19 - Evaluation Discussion

The Ottawa is largely a second-growth forest due to being almost entirely logged at the turn-of-the 20th-century, in addition to subsequent wildfires and attempts to settle and farm the land. Remaining patches of true old growth on the Ottawa are contained within administratively protected areas, such as wilderness and WSR corridors. Old growth areas can contribute to species viability by providing ecosystem components which are not present in younger forests. Old growth forests also provide recreational opportunities.

To develop future old growth conditions in selected areas, the Forest Plan describes a desired condition for the arrangement of old growth habitat. The percentage of this habitat is accounted for at a MA landscape-scale to provide for the needs of species that require old growth conditions. The Forest Plan prescribes a desired percentage of old growth for only the MAs shown in Table 113.

Since the previous reporting period, 2017, all MAs have seen an increase in the amount of classified old growth acres. Management Areas 1.1a, 2.1, 2.2, 3.1a and 4.2a have a percentage of old growth classified that is within the amount prescribed in the Forest Plan. MA 4.1a is slightly above the desired condition. MAs 6.1 and 6.2 currently are showing the amount of old growth below the desired condition in described the Forest Plan (see Table 113).

Table 113. Old growth classification as percentage of total forested area (FY 2006 to FY 2023)

MA	2006 (acres)	2017 (acres)	2023 (acres)	Forest Plan Desired Condition
1.1a	1,995 (3.2%)	1,438 (2.3%)	1,440 (2.5%)	1% - 3%
2.1	20,317 (7.1%)	19,468 (6.8%)	20,274 (7.8%)	8% - 10%
2.2	8,799 (5.7%)	9,079 (5.6%)	13,684 (9.5%)	8% - 10%
3.1a	4,720 (5.4%)	5,101 (5.9%)	5,051 (6.4%)	4% - 7%
4.1a	9,647 (7.0%)	9,314 (6.8%)	9,331 (7.5%)	4% - 7%
4.2a	281 (2.2%)	305 (2.4%)	331 (2.7%)	1% - 3%
6.1	3,363 (5.9%)	3,339 (5.9%)	3,388 (6.3%)	10%+
6.2	4,011 (7.7%)	4,971 (9.4%)	4,707 (9.7%)	10%+
Total	53,132 (6.3%)	53,015 (6.2%)	58,206 (7.5%)	

Table 114 shows the distribution of old growth by forest type and management area. The Forest Plan does not have specific desired conditions for amount of old growth for each forest type by MA. Currently old growth is distributed across all forest types which follows Forest Plan direction to “maintain a representation of all forest types” (p. 2-24). All MAs except for MA 4.2a have a good representation of old growth across all forest types.

Table 114. Old growth acres by forest type and management area

MA	Forested Acres	Aspen/Paper birch	Long-Lived Conifer	Short-lived Conifer	Northern Hardwoods
1.1a	57,566	583	198	508	150
2.1	261,364	1,439	1,777	6,564	10,494
2.2	143,580	644	1,811	6,734	4,495
3.1a	79,195	886	493	1,501	2,171
4.1a	125,186	955	1,343	4,949	2,084
4.2a	12,100	0	24	283	24
6.1	53,479	227	759	440	1,963
6.2	48,677	134	704	259	3,610
Total	781,147	4,868	7,109	21,238	24,991

Table 115 shows the number of blocks of old growth. The Forest Plan does not have a desired condition for quantity or size of old growth blocks. The Forest Plan states, “Consider the following when classifying old growth stands: Providing effective blocks for old growth dependent plant and animal species” (p. 2-24). As expected, many of the complexes in the 0-to-50-acre range are made up of single stands. As the acreage range increases these complexes become more multi stand complexes. The above complexes don’t include the three wilderness areas on the Ottawa. McCormick Wilderness area encompasses approximately 16,850 acres; Sturgeon River Gorge Wilderness area encompasses approximately 14,500 acres and the Sylvania Wilderness area which encompasses approximately 18,400 acres. All three wilderness areas total to an additional 49,750 acres of large contiguous blocks where natural ecosystems are preserved (p. 3-32, 3-38 and 3-44).

Table 115. Number of contiguous old growth blocks by size

Acreage Range	Old Growth Blocks
0 to 50	891
51 to 100	145
101 to 250	109
251 to 500	27
501 to 1,000	15
1,001 to 2,500	2
2,501 +	1

Figure 31 shows how old growth complexes are located across the landscape. Note that the legend describes the forest type groupings used in the Forest Plan as outlined in Monitoring Question 18. The direction in the Forest Plan is to classify a variety of forest types on a variety of soil types, to capture the potential diversity of all ecosystems present on the Ottawa. Figure 30 shows current old growth is spatially arranged through each management area and across the landscape. This is in line with Forest Plan old growth management guidelines “Classify stands as old growth in patterns and arrangements that provide for the desired spatial arrangement within the management area and across the landscape” (p. 2-23). Once classified, areas are removed from the suited base for commercial timber production.

Forest Plan

Are the current Forest Plan components (desired conditions, goals, objectives) achievable in the timeframes described and does the Forest Plan provide sufficient direction (standards, guidelines, suitability, designated lands) to achieve these components?

Yes, the desired conditions, goals and objectives are achievable in the timeframes described in the Forest Plan. As management proceeds into the MAs that are below the desired condition (MAs 6.1 and 6.2) emphasis should be placed on moving towards the desired old growth conditions for each MA.

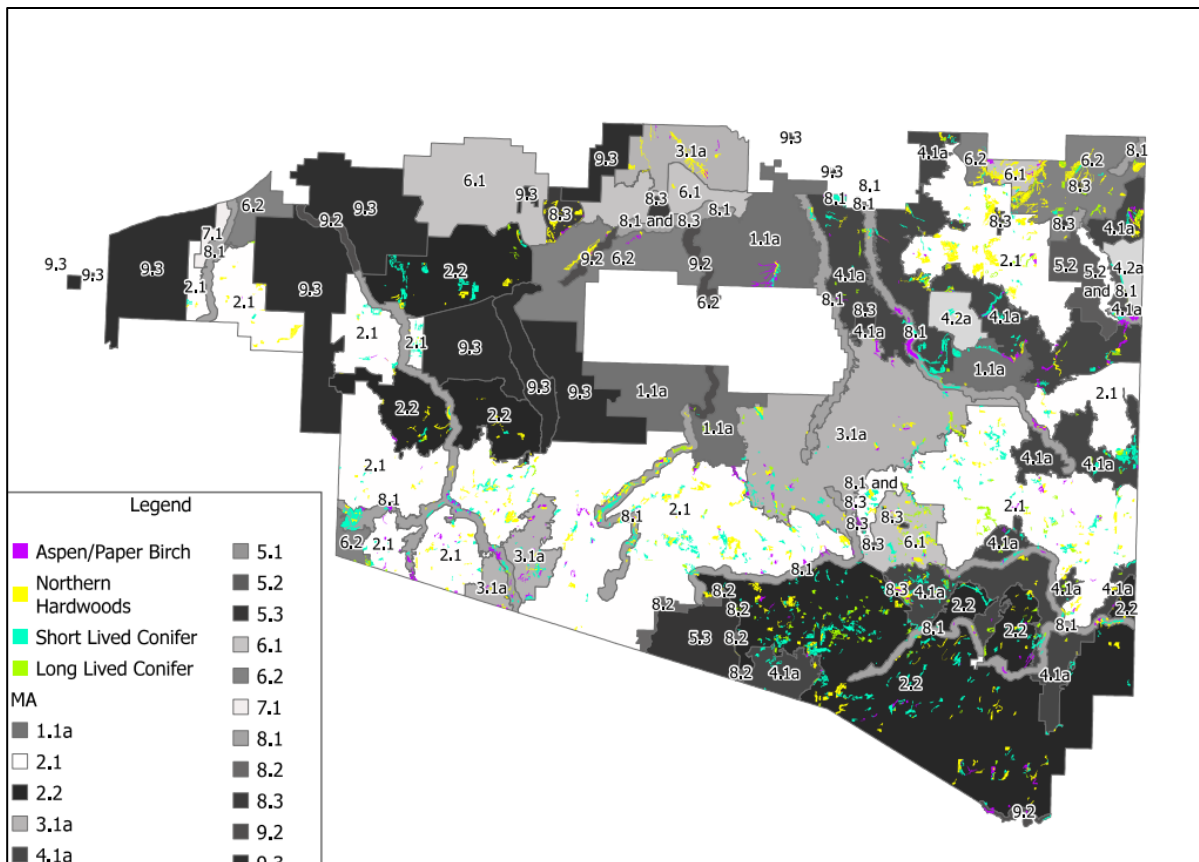


Figure 31. Classified old growth by forest type and MA (March 2024)

Forest Assessment

Is the status or trend of the monitoring indicators substantially different than described in the Forest Assessment, or was an assumption in the Forest Assessment proven to be invalid from the monitoring data?

The status and trend of the indicator is not substantially different than anticipated in the analysis for the Forest Plan. As the Forest reenters MAs 6.1 and 6.2, old growth classification should move towards the desired range in the Forest Plan.

Management Actions

Did any of the management activities potentially result in adverse or beneficial effects to the status and trend of the monitoring indicators?

Yes, active management allows the Forest to reclassify old growth during the environmental analysis process which will move old growth acres towards the desired conditions described in the Forest Plan.

Monitoring Program

Did the monitoring results provide all the information necessary to answer the monitoring question?

Yes, the data collection protocols and indicator adequately provide the necessary information to answer the monitoring question.

Monitoring Question 19 - Recommendations

Currently there are no recommendations for changes to this question. However, as old growth classification continues to develop, changes may need to be made in the future.

Table 116. Summary of monitoring recommendations for Monitoring Question 19

Changes may be warranted for the:	Yes	Maybe, not enough information to determine at this time	No
Forest Plan			☐
Forest Assessment			☐
Management Actions			☐
Plan Monitoring Program			☐

Monitoring Question 20 — To what extent are permanent upland openings being created and maintained to move towards desired conditions?

Context for this Evaluation

This monitoring question ensures the Ottawa remains consistent with Forest Plan direction regarding available open habitat to wildlife and plant species as described in Chapter 2 (Forest Management Direction) and Chapter 3 (Management Area Direction).

Table 117. Background information for Monitoring Question 20

Drivers	
The 2012 Planning Rule (36 CFR 219.12(a)(5)(ii)): The status of select ecological conditions including key characteristics of terrestrial and aquatic ecosystems. Goal 1, Objective (f) of the Forest Plan that states that the Forest shall “locate permanent upland openings on suitable sites to maintain and restore diversity of, and viability for, plant and animal communities, and to provide for recreational experiences” (p. 2-2).	
Primary Forest Plan Component Addressed	Monitoring Question Indicator
Locate permanent upland openings on suitable sites to maintain and restore diversity of, and viability for, plant and animal communities, and to provide for recreational experiences.	Comparison of current and desired percentages of permanent upland openings, by management area.
Who collected this data? Who is Responsible for analyzing this question?	
Pamela Nankervis (Wildlife Biologist), Brianne Boan (Wildlife Biologist), Samantha Holik (Wildlife Specialist)	

When was this monitoring question last updated?

- Date of current evaluation: November 2024

- Date of previous evaluation: FY 2017 Monitoring Evaluation Report

Table 118. Relationship of Monitoring Question 20 to other Forest Plan direction

Question 20	Key Forest Plan Components		
	<i>Desired Conditions</i>	<i>Goals and Objectives</i>	<i>Standards and Guidelines</i>
Indicator 20	Meet permanent opening goals outlined in each MA thereby providing a mosaic of habitat types across the Forest for wildlife and botany species.	Goal 1: Provide a variety of ecological communities in order to maintain or enhance habitat conditions for plant and animal species, to provide for a natural buffer against invasive exotic organisms, and to provide for the long-term production of a mix of timber products. Objectives: f. Locate permanent upland openings on suitable sites to maintain and restore diversity of, and variability for, plant and animal communities, and to provide for recreation experiences (p. 2-2). Goal 26: Promote landscape conditions and habitat diversity to support viable populations of native and desired non-native animal and plant species. Objectives: f. Maintain selected old fields, historic	Guideline: Infrequent small openings (both grassy openings and temporary openings regenerated to young forest) may be created and maintained (p. 2-26). Guideline: Within the upland portion of the riparian corridor, generally favor management for extended rotation of tree species suitable for the site. More frequent and larger openings (both grass openings and temporary openings regenerating to young forest) may be created and maintained in this area (p. 2-26). Guideline: Create or maintain small grassy openings (0.25 to 3.0 acres) adjacent to aspen regeneration and moist soil areas (p. 2-30). Guideline: When creating or maintaining openings for woodcock foraging habitat, the openings should be 0.25 acres or larger, located in areas with moist soils, and close to suitable

Question 20	Key Forest Plan Components		
	<i>Desired Conditions</i>	<i>Goals and Objectives</i>	<i>Standards and Guidelines</i>
		grassland ecosystems, old logging camps. Old homesteads, orchards, and other clearings greater than ½ acre in size such that the dominant vegetation is understory shrubs or herbs (p. 2-8).	woodcock nesting habitat (p. 2-30). Guideline: Emphasize creation and maintenance of large openings where they are ecologically appropriate, particularly in more xeric landscapes (Mas 4.1a, 4.2a). De-emphasize creation and maintenance of smaller openings (<5 acres) in hardwood \stands and other moist/mesic landscapes (p. 2-33). Guideline: Use hand tool treatment and mechanical treatment, or prescribed fire or maintain permanent upland openings (p. 2-33). Guideline: For Kirtland’s warbler management, strive to regenerate jack pine stands with the appropriate stem density and non-forested openings, as determined in collaboration with the USDI FWS (p. 3-25). Guideline: Seek opportunities to maintain and create large openings (>10

Question 20	Key Forest Plan Components		
	<i>Desired Conditions</i>	<i>Goals and Objectives</i>	<i>Standards and Guidelines</i>
			acres) on xeric ELTPs where fire was historically part of the disturbance regime (p. 3-26).

**What monitoring activities have been conducted since the last monitoring evaluation?
What protocols were used to collect these data?**

We conducted field surveys and evaluated conditions of openings during the planning phases of vegetation management decisions including Tepee Lake, Baraga II, North Victoria, Bergland Presque Isle, Drumloid, Pomeroy and Sun Lake. From data collected during the evaluation site visits, we identified the actual acres of existing open habitat compared to acres reported in Forest geodatabases. The type of work needed to retain or rehabilitate the opening towards prime quality that pollinators and wildlife prefer was collected during the evaluation. We also evaluated designated openings outside these authorized areas to identify maintenance needs.

What is the target, or range for the indicator being measured? Is there an alert level (such as a trigger or threshold), associated with the target that should be noted?

The goal is to establish and maintain the acres of openings originally identified in our spatial data of record. A need exists to increase to the middle range of the desired conditions for open habitat in each MA. During site evaluations, anywhere from 30-70% of the stands designated as open in the Forest spatial database were found to be no longer viable as open grassland habitat but reforested with mostly maple seedlings and saplings. This condition is an advanced seral stage of regeneration usually dominated by maple species and difficult to reset to open habitat. Also occurring is mesophication, a process where fire dependent open ecosystems convert to closed-canopy forests. In some cases, due to limited access or cost, we are constrained from trying to rehabilitate the area back to open habitat. The area is returned to the suitable land base for timber harvest, particularly when aspen has reclaimed the site. For each MA, anytime the percentage of open habitat decreases to the minimum desired condition, it should trigger action. Plants, pollinators and wildlife that depend on this habitat are at higher risk of decreased viability for maintaining self-sustaining populations.

Has any new Best Available Scientific Information (BASI) informed this monitoring question, indicators, or methodology? Where is the data for this monitoring question stored?

According to the *State of the Birds* (2022) report by the Committee on the North American Bird Conservation Initiative, grassland bird species in North America declined 42% between 1968 and 2018. The status report further emphasized the need to maintain quality open habitat on the landscape. Information regarding open habitat can be found in individual project implementation files and/or wildlife habitat files for contracted and in-house opening

maintenance. We are also working on updating the FSVeg geodatabase as openings are discovered, recovered or in some cases fully converted to a forested condition.

Monitoring Question 20 - Results

Table 119. Status and trend of the indicator for Monitoring Question 20

Indicators		Recent Trend	
<i>Indicator 20:</i> To what extent are permanent upland openings being created and maintained to move towards desired conditions.		<i>Towards Target</i>	<i>Away from Target</i>
Current Status	<i>Within Target</i>		X
	<i>Outside Target</i>		

What level of confidence is there in the accuracy and precision?

Field surveys reveal that the current FSVeg spatial data over-estimates the actual acres of upland open habitat. There is moderate- to low-level of confidence in the quality of data used for this report. We seek to restore the acres on the ground during implementation to match that identified in the spatial data whenever possible. The FSVeg database is updated annually with accomplishments; however, these updates result in small incremental changes Forest-wide.

Monitoring Question 20 - Evaluation Discussion

There are 1,000 permanent upland openings that are spread over many MAs throughout the Ottawa. The Forest Plan does not include a Forest-wide percentage for permanent upland openings. Instead, MAs 1.1a, 2.1, 2.2, 3.1a, 4.1a, 4.2a, 6.1 and 6.2 are identified for multiple-uses and have specified desired ranges for open habitat. Table 114 shows current FSVeg data reflecting current conditions.

All MAs, except MA 2.1, have shown a slight decrease in acres and percentage of upland openings. This was expected due to the discrepancies found in the database of record. There is a need for better data management to better represent conditions on the ground. Site surveys reveal that anywhere between 30-70% of actual open habitat has been reclaimed by trees when compared to the spatial data of record. When possible, we attempt to re-open the area during implementation to match what is shown in the spatial data. Overall, based on current spatial data, the Ottawa is falling short on maintaining a percentage of permanent upland openings within the desired range for MAs 2.1, 4.1a and 6.1. Those MAs that have openings within the desired ranges are currently at the lower end of these ranges (see Table 120). Research has shown that openings provide important feeding areas for forest wildlife because herbaceous vegetation grows much more abundantly in the open than beneath a forest canopy (Healy1989). Therefore, contributions of permanent upland openings in other MAs are important for resource needs. Openings account for another 0.8% of the landscape across the MAs outlined in Table 121.

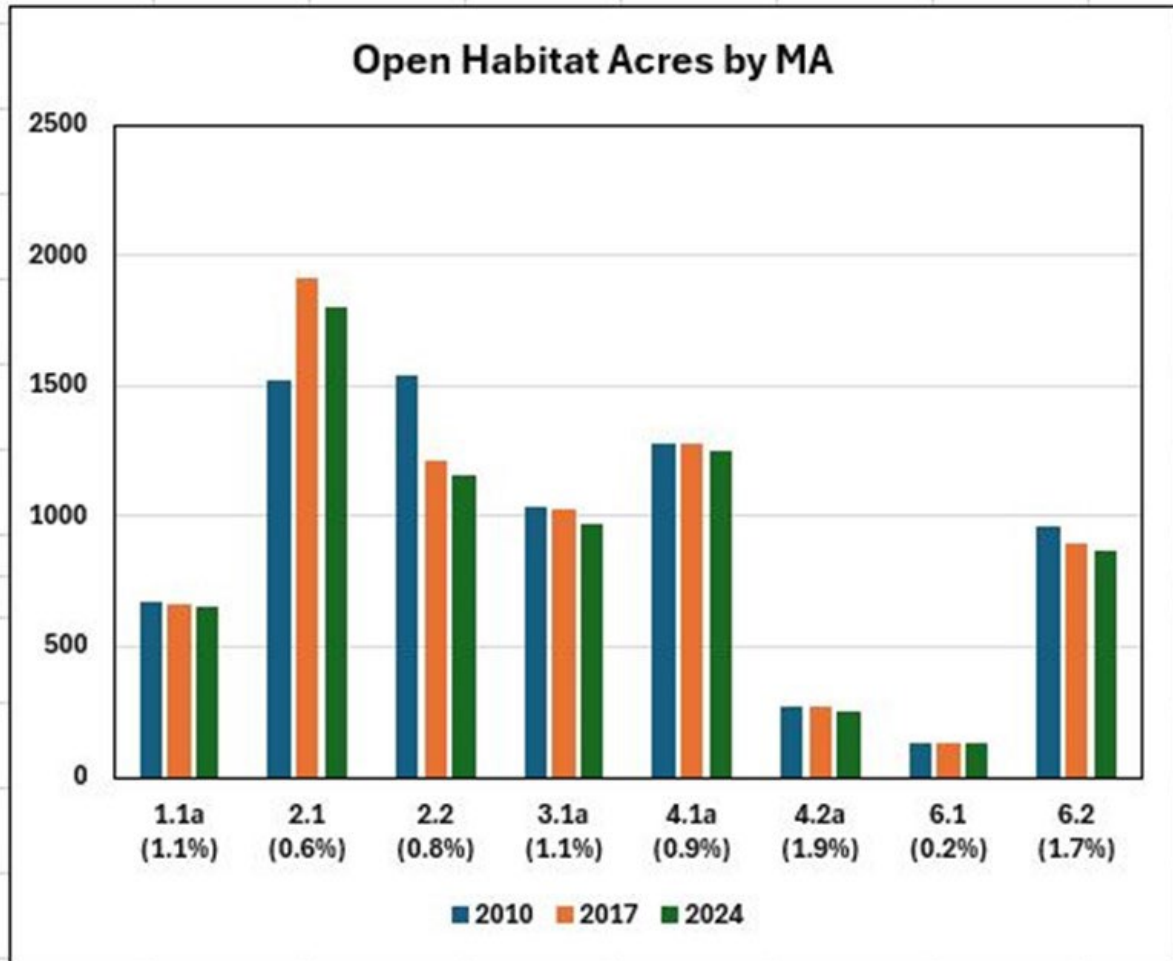


Figure 32. Graph showing the FS Veg acres of open habitat by Management Area on the Ottawa National Forest

Table 120. Open habitat by management area (2010 to 2024)

MA	MA Acres	Forest Plan Desired Condition	2010 Mapped Acres of Openings (%)	2017 Mapped Acres of Openings (%)	2024 Mapped Acres of Openings (%)	Total change in acres since 2010
1.1a	62,200	1-3%	670 (1.08)	667 (1.07)	652 (1.04)	-18 acres
2.1	285,900	1-5%	1,520 (0.53)	1,912 (0.66)	1,803 (0.63)	283 acres
2.2	153,700	0-2%	1,540 (1.0)	1,211 (0.79)	1,159 (0.75)	- 381 acres
3.1a	87,800	1-3%	1,040 (1.18)	1,028 (1.17)	969 (1.10)	-71 acres

MA	MA Acres	Forest Plan Desired Condition	2010 Mapped Acres of Openings (%)	2017 Mapped Acres of Openings (%)	2024 Mapped Acres of Openings (%)	Total change in acres since 2010
4.1a	138,200	1-10%	1,280 (0.93)	1,283 (0.93)	1,248 (0.90)	-32 acres
4.2a	12,900	1-5%	270 (2.09)	271 (2.10)	251 (1.94)	-19 acres
6.1	57,000	1-5%	130 (0.22)	130 (0.22)	129 (0.22)	-1 acres
6.2	52,400	1-5%	960 (1.83)	894 (1.71)	866 (1.65)	-94 acres
Totals	850,100		7,410 (0.87)	7,396 (0.87)	7,077 (0.83)	-333 acres

Table 121. Openings in other management areas (2010 to 2024)

MA	MA Acres	Forest Plan Desired Condition	2010 Mapped Acres of Openings	2017 Mapped Acres of Openings	2024 Mapped Acres of Openings	2024 Percent of Openings
5.1	16,850	N/A	6	6	6	0.04%
5.2	14,500	N/A	60	63	61	0.42%
5.3	18,400	N/A	3	3	3	0.02%
7.1	1,100	N/A	0	0	0	0
8.1	67,000	N/A	760	896	773	1.27%
8.2	2,600	N/A	3	3	3	0.13%
8.3	10,600	N/A	7	7	6	0.05%
9.2	8,900	N/A	110	108	96	1.21%
9.3	3,200	N/A	50	46	22	0.86%
Totals	143,150		999	1,132	1,069	0.75%

Forest Plan

Are the current Forest Plan components (desired conditions, goals, objectives) achievable in the timeframes described and does the Forest Plan provide sufficient

direction (standards, guidelines, suitability, designated lands) to achieve these components?

Goal 1 of the Forest Plan states that the Forest “is to provide a variety of ecological communities in order to maintain or enhance habitat conditions for plant and animal species” (p. 2-2). Forest Plan desired conditions and management direction focuses on providing a mosaic of habitat types across the Forest with total area in open habitat (0-10%) conditions in multiple-use MAs. All MAs are at the low end of their respective desired conditions (see Table 120). The Forest Plan provides sufficient direction to move towards the goal, although the timeline may be slow because there are large areas in need of intensive rehabilitation which comes with an associated high cost. Funding investment and effort to achieve the goals should be a high priority to increase and enhance open habitat for vulnerable grassland species of birds, wildlife, plants and pollinators.

Forest Assessment

Is the status or trend of the monitoring indicators substantially different than described in the Forest Assessment, or was an assumption in the Forest Assessment proven to be invalid from the monitoring data?

No, the monitoring indicators align with the FEIS.

Management Actions

Did any of the management activities potentially result in adverse or beneficial effects to the status and trend of the monitoring indicators?

We are currently working to coordinate timber harvest designated open habitat areas to increase the pace of restoration. Due to the advanced seral stages of many openings, additional work and expense will be needed to rehabilitate areas to productive grassland habitat to allow for regularly scheduled maintenance. Focus for intensive rehabilitation will be on sites with adequate access for on-going maintenance and enhancement activities.

Monitoring Program

Did the monitoring results provide all the information necessary to answer the monitoring question?

Yes, the data collection protocols and indicator adequately provide the necessary information to answer the monitoring question.

Monitoring Question 20 - Recommendations

The Forest had a peak of about 10,200 acres in upland openings in 1996 due to a concerted effort to create new openings and maintain existing openings (Ottawa National Forest Monitoring and Evaluation Report 1987-1996, p. 60-61). Since then, despite concerted efforts to increase the accuracy of our survey data and increase contracted work for maintaining this important habitat, there is a trend towards decreasing acres. We recommend that wildlife and silviculture work closely to regain open habitat and update the spatial database of record.

Table 122. Summary of monitoring recommendations for Monitoring Question 20

Changes may be warranted for the:	Yes	Maybe, not enough information to determine at this time	No
Forest Plan			☐
Forest Assessment			☐
Management Actions			☐
Plan Monitoring Program			☐

Literature Cited:

North American Bird Conservation Initiative. 2022. The State of the Birds, United States of America,

2022. StateoftheBirds.org

Monitoring Question 21 — To what extent are northern hardwood forest types being managed to work toward the desired mix of even-aged and uneven-aged stands?

Context for this Evaluation

This monitoring question ensures the Ottawa remains consistent with favoring uneven-aged treatments while using even-aged management to maintain or increase diversity of tree species and to promote mid-tolerant trees such as yellow birch, white ash, green ash, American basswood and Northern red oak.

Table 123. Background information for Monitoring Question 21

Drivers	
This monitoring question links to the 2012 Planning Rule (36 CFR 219.12(a)(5)(vii)): Progress toward meeting the desired conditions and objectives in the plan, including for providing multiple use opportunities. In addition, this monitoring question also measures trends toward achieving conditions outlined in Goal 15 of the Forest Plan that states, “manage northern hardwoods based on the capability of the ecosystem units where they are located, while providing a mix of uneven-aged and even-aged conditions” (p. 2-6). Objectives 15a through 15e are also applicable (p. 2-6).	
Primary Forest Plan Component Addressed	Monitoring Question Indicator
Favoring uneven-aged treatments while using even-aged management to maintain or increase diversity of tree species.	Acres of the northern hardwood forest type harvested, by silvicultural method.
Who collected this data? Who is Responsible for analyzing this question?	
Michael Strieter, Forest Silviculturist	

When was this monitoring question last updated?

- Date of current evaluation: March 2024
- Date of previous evaluation: FY 2017 Monitoring Evaluation Report

Table 124. Relationship of Monitoring Question 21 to other Forest Plan direction

Question 21	Key Forest Plan Components		
	<i>Desired Conditions</i>	<i>Goals and Objectives</i>	<i>Standards and Guidelines</i>
Indicator 21	Favor uneven-aged treatments while using even-aged management to maintain or increase diversity of tree species and to promote mid-tolerant trees such as yellow birch, white ash, green ash, basswood, and northern red oak.	Goal: 15 Manage northern hardwoods based on the capability of the ecosystem units where they are located, while providing for a mix of uneven-aged and even-aged conditions. Objectives: 15a through 15c and 15e (p. 2-6)	Standard: Lowland Hardwoods Guidelines: Regenerate using the two-cut shelterwood method. Standard: Northern Hardwoods Guidelines: Regenerate existing northern hardwood stands or convert another type to northern hardwood stands with either uneven-aged or even-aged management methods. Uneven-aged management may be favored: •In management areas that emphasize late-successional community types, •In visual resource areas of high sensitivity; or •Where limitations exist for even-aged management harvest methods. Even-aged management may be favored: •When the trees in the stand are at risk for disease and insect infestations or have limited genetic integrity; or •When the site has the potential to establish and maintain mid-tolerant species.

Question 21	Key Forest Plan Components		
	<i>Desired Conditions</i>	<i>Goals and Objectives</i>	<i>Standards and Guidelines</i>
			•In areas where uneven-aged management may not be successful due to heavy browsing. Hardwood stands managed even-aged should generally use the two-cut or three-cut shelterwood method. Standard: Northern Red Oak Guidelines: Regenerate northern red oak stands using the two-cut or three-cut shelterwood method.

What monitoring activities have been conducted since the last monitoring evaluation? What protocols were used to collect these data?

Monitoring activities for this question have been obtained through queries of accomplished and completed harvest activities in the FACTS geodatabase. This spatial query was then overlaid with FS Veg spatial data to determine cover types.

What is the target, or range for the indicator being measured? Is there an alert level (such as a trigger or threshold), associated with the target that should be noted?

The FEIS analysis estimated the mix of even and uneven-aged management in northern hardwoods stands to be 19-32% for even-aged treatments on suitable lands and 68-81% uneven-aged treatments on suitable lands (FEIS Volume I, p 3-56). If treatments fall or rise above the FEIS estimates would indicate a threshold being approached. Triggering factors are dependent on harvest activities being reported and getting entered into the FACTS database once they have been completed.

Has any new Best Available Scientific Information (BASI) informed this monitoring question, indicators, or methodology? Where is the data for this monitoring question stored?

Monitoring data is currently collected monthly and are based on actual harvested payment units, therefore, the information presented is the most current for FYs 2019 through FY 2023.

Monitoring Question 21 - Results

Table 125. Status and trend of the indicator for Monitoring Question 21

Indicators		Recent Trend	
<i>Indicator 21:</i> Acres of northern hardwood forest type harvested, by silvicultural method.		<i>Towards Target</i>	<i>Away from Target</i>
Current Status	<i>Within Target</i>	X	
	<i>Outside Target</i>		

What level of confidence is there in the accuracy and precision?

There is a moderate to high level of confidence in the quality and quantity of data collected because the same collection protocols and reporting standards have been in place for several years. The Forest Plan states that the methods used for this monitoring question have a high degree of repeatability, reliability, accuracy and precision (p. 4-4).

Monitoring Question 21 - Evaluation Discussion

All vegetation management decisions have specified goals pertaining to northern hardwood structure and composition through implementation of a variety of silvicultural activities. Silvicultural practices (i.e., timber harvest) and implementation of project design criteria will meet the goals and objectives of the Forest Plan by improving growing conditions within stands, enhance adaptive capabilities, bolster the health and resilience of the vegetation, regenerate mature stands to more vigorous younger stands and improve quality. Thus, desired stand structure and composition and site capability are considered by the project interdisciplinary teams during environmental analysis and incorporated into treatment proposals.

Table 126. Even and uneven aged treatments in northern hardwoods (2019 to 2023)

Treatment Type	2019	2020	2021	2022	2023	5 Year Average	FEIS Analysis Estimate
Even-Aged	33%	53%	32%	20%	32%	32%	19-32%
Uneven-Aged	67%	47%	68%	80%	68%	68%	68-81%

Table 126 shows that over the past five years the Forest is within the estimated range described in the FEIS (Volume I, p. 3-56). In 2020 there was a sharp increase in the amount of even-aged treatment occurring in northern hardwoods. This is mainly due to one of the last sales in the Rousseau East project area being completed. Compared to the previous reporting period, the number of even-aged treatments increased by 2% and the number of uneven-aged treatments decreased by 2%, primarily due to the reason stated above. Following Forest Plan direction, even-aged treatments have not been used for regeneration of northern hardwood stands in semi-primitive areas (MAs 6.1 or 6.2). Over the last five years most of the even-aged treatments have been completed in MA 2.2 and 2.1, with a smaller amount in MA 3.1a.

Table 127. Annual acres of intermediate and even-aged regeneration harvest in northern hardwoods (FY 2019 to FY 2023)

Treatment Type	2019	2020	2021	2022	2023	5 Year Average Acreage
Intermediate Harvests	1,082	1,041	509	731	719	816
Even-Aged Regeneration Harvests	0	158	15	19	106	60

As shown in Table 127, the Ottawa has averaged about 816 acres annually of intermediate treatments (even-age treatments) in northern hardwoods annually over the last five years. Over the same time, the Forest has averaged about 2,799 acres annually of intermediate treatments in all forest types, which is about 72% of the amount estimated in the FEIS. This is the same percentage noted for total actual harvest outputs compared to projected harvest outputs in the Forest Plan (see Monitoring Question 1). Table 127 also shows that the Forest has regenerated a very modest acreage annually, 60 acres of even-aged northern hardwoods, over the last 5 years.

Forest Plan

Are the current Forest Plan components (desired conditions, goals, objectives) achievable in the timeframes described and does the Forest Plan provide sufficient direction (standards, guidelines, suitability, designated lands) to achieve these components?

Yes, as Table 126 shows the current Forest Plan over the last five years, the Forest has been within the FEIS analysis range for both even and uneven-aged treatments. There will continue to be a flux in activities being harvested as timber harvesting is highly dependent on markets and timing of the year.

Forest Assessment

Is the status or trend of the monitoring indicators substantially different than described in the Forest Assessment, or was an assumption in the Forest Assessment proven to be invalid from the monitoring data?

No, Table 126 shows the assumptions are valid.

Management Actions

Did any of the management activities potentially result in adverse or beneficial effects to the status and trend of the monitoring indicators?

These actions resulted in beneficial effects such as creating another age cohort in uneven-aged treatments and creating an environment suitable for mid-tolerant and intolerant species such as yellow birch, oak, paper birch and black cherry.

Monitoring Program

Did the monitoring results provide all the information necessary to answer the monitoring question?

As long as harvesting activity continues to be reported monthly, the data collection protocols and indicator adequately provide the necessary information to answer the monitoring question.

Monitoring Question 21 - Recommendations

There are no recommendations for changes to this question.

Table 128. Summary of monitoring recommendations for Monitoring Question 21

Changes may be warranted for the:	Yes	Maybe, not enough information to determine at this time	No
Forest Plan			☐
Forest Assessment			☐
Management Actions			☐
Plan Monitoring Program			☐

Monitoring Question 22 — To what extent are aspen forest type acres being maintained through regeneration activities to meet Forest-wide and management area objectives?

Context for this Evaluation

This monitoring question ensures the Ottawa remains consistent with regenerating aspen at the Forest-wide scale and maintaining acres in the 0-9-year age class.

Table 129. Background information for Monitoring Question 22

Drivers	
This monitoring question links to the 2012 Planning Rule (36 CFR 219.12(a)(5)(vii)): Progress toward meeting the desired conditions and objectives in the plan, including for providing multiple use opportunities. In addition, this monitoring question also measures trends toward achieving conditions outlined in Goal 16 of the Forest Plan that states “provide for a mix of age classes within the aspen/paper birch vegetation type to support conservation, economic and social objectives associated with early successional habitats” (p. 2-6).	
Primary Forest Plan Component Addressed	Monitoring Question Indicator
Goal 16: Provide for a mix of age classes within the aspen/paper birch vegetation type to support conservation, economic and social objectives associated with early successional habitats.	a. Comparison of projected and actual acres of aspen regenerated at the Forest-wide scale. b. Number of acres maintained in the 0 to 9-year age class at the Forest-wide scale.
Who collected this data? Who is Responsible for analyzing this question?	
Michael Strieter, Forest Silviculturist	

When was this monitoring question last updated?

- Date of current evaluation: March 2024
- Date of previous evaluation: 2017 Monitoring Evaluation Report

Table 130. Relationship of Monitoring Question 22 to other Forest Plan direction

Question 22	Key Forest Plan Components		
	<i>Desired Conditions</i>	<i>Goals and Objectives</i>	<i>Standards and Guidelines</i>
Indicator a & b	Naturally regenerate aspen. Maintain at least 12,000 acres of 0–9-year aspen/paper birch regeneration.	Goal 16: Provide for a mix of age classes within the aspen/paper birch vegetation type to support conservation, economic and social objectives associated with early successional habitats (p. 2-6) Objectives: a. Emphasize regeneration harvests of mature and over mature aspen within the next 10 to 20 years to ensure the aspen type is maintained within the desired vegetations composition range for the management area (p. 2-6). Goal 18: Emphasize natural regeneration over artificial reforestation (p. 2-7). Objectives: a. Favor natural regeneration to regenerate northern hardwoods, northern red oak, aspen, paper birch, jack pine, white spruce, balsam fir and hemlock (p. 2-7). Goal 27: Provide adequate habitat for	Aspen Guidelines: Regenerate existing aspen or convert another forest type to aspen by clearcutting. Favor natural regeneration of sucker-origin stands. Ruffed Grouse Guideline: When regenerating aspen, desired aspen sucker densities should be >10,000 stems per acre in order to result in a densely stocked aspen stand on most stands.

Question 22	Key Forest Plan Components		
	<i>Desired Conditions</i>	<i>Goals and Objectives</i>	<i>Standards and Guidelines</i>
		Management Indicator Species: American marten, ruffed grouse, cutleaf toothwort and mayfly-stonefly-caddisfly suite (p. 2-7). Objectives: a. Maintain at least 12,000 acres of 0–9-year aspen/paper birch regeneration, for ruffed grouse habitat, well-distributed on lands suited for timber production (p. 2-8).	

What monitoring activities have been conducted since the last monitoring evaluation? What protocols were used to collect these data?

Monitoring activities for this question have been obtained through queries of accomplished and completed activities in the Forest Activity Tracking System (FACTS) Database.

What is the target, or range for the indicator being measured? Is there an alert level (such as a trigger or threshold), associated with the target that should be noted?

Triggering factors or thresholds are dependent on activities getting entered into the FACTS database. Once a stand has been planted the activity is accomplished and completed in the FACTS database.

Has any new Best Available Scientific Information (BASI) informed this monitoring question, indicators, or methodology? Where is the data for this monitoring question stored?

Monitoring data is collected monthly through accomplishing harvest activities, and therefore, the information presented is the most current for FYs 2019 through FY 2023.

Monitoring Question 22 - Results

Table 131. Status and trend of the indicator for Monitoring Question 22

Indicators		Recent Trend	
<i>Indicator 22(a):</i> Comparison of projected and actual acres of aspen regenerated at the Forest-wide scale.		<i>Towards Target</i>	<i>Away from Target</i>
Current Status	<i>Within Target</i>		
	<i>Outside Target</i>	X	

<i>Indicator 22(b):</i> Number of acres maintained in the 0-9-year age class at the Forest-wide scale.		Recent Trend	
		<i>Towards Target</i>	<i>Away from Target</i>
Current Status	<i>Within Target</i>		
	<i>Outside Target</i>	X	

What level of confidence is there in the accuracy and precision?

There is a moderate to high level of confidence in the quality and quantity of data collected because the same collection protocols and reporting standards have been in place for several years. The Forest Plan states that the methods used for this monitoring question have a high degree of repeatability, reliability, accuracy and precision (p. 4-4).

Monitoring Question 22 - Evaluation Discussion

According to the Ottawa FS Veg geodatabase, there are approximately 199,747 acres of aspen/paper birch on the Ottawa, this is an increase of 747 acres from the previous reporting period primarily due ongoing common stand exams (CSE). About 41% of these acres are over 60 years of age and are considered mature or over mature. Approximately 38,750 acres are classified as unsuitable for timber production. These unsuitable lands are largely located in riparian areas, steep slopes and within WSR corridors. Management will be limited in these areas, and therefore, over time many of these acres are expected to convert to other forest types, except in those river segments where the ORVs may be enhanced by aspen regeneration.

Table 132. Aspen volume sold and harvested (FY 2019 to FY 2023)

Fiscal Year	Aspen Volume Sold		Aspen Volume Harvested	
	MMCF	MMBF	MMCF	MMBF
2019	2.9	18.4	1.5	9.5
2020	2.1	13.8	1.5	9.6
2021	3.1	19.7	2.3	14.3
2022	4.7	29.7	2.5	15.9
2023	2.9	18.8	2.6	16.3
Total	15.7	100.4	10.4	65.6
Average	3.1	20	2.1	13.1
Forest Plan Average Annual Estimate	4.7		4.7	
% of Forest Plan Estimate	66.8%		44.3%	

Table 133. Aspen acres harvested (FY 2019 to FY 2023)

Fiscal Year	Aspen Acres Harvested
2019	1,064
2020	995
2021	1,439

Fiscal Year	Aspen Acres Harvested
2022	1,406
2023	1,677
Total	6,581
Average	1,316
Forest Plan Average Annual Estimate of Aspen Acres Harvested	1,700
% of Forest Plan Estimate	77%

The FEIS projected that 109,000 acres of aspen/paper birch could be maintained over the long-term, with an estimated average annual regeneration harvest of about 1,700 acres per year. Aspen regeneration is an important early seral vegetative condition in the forest landscape. It provides the bulk of the temporary openings and early successional habitat on the Ottawa. Aspen is also an important commercial timber product important in supporting the socio-economic goals of the Forest Plan.

Aspen is an important vegetative component to be maintained on the Ottawa for several wildlife species. Regenerating aspen provides niches for over 20 species of mammals, from the white- tailed deer to the deer mouse. Aspen regeneration is also used by over 30 species of birds like the chestnut-sided and golden-winged warblers. There are a few species of reptiles and amphibians that can be found in regenerating aspen. Approximately 60 species represented by this ecosystem are a key component of the total number of species on the forest

compares the aspen volume sold and harvested from FY 2019 through FY 2023, with the average annual projections per decade in the Forest Plan. The aspen volumes were obtained from the Timber Information Manager (TIM) - Timber Cut and Sold Reports. In FY 2019, 2.9 MMCF (18.4 MMBF) were sold, which is 1.4 MMCF (9.0 MMBF) above the annual average aspen volume sold from the previous reporting period (2011 to 2016). In FY 2019, 1.5 MMCF (9.5 MMBF) were harvested, which is above the annual average from the previous reporting period (2012 to 2016).

The five-year average for aspen volume harvested was 3.1 MMCF (20 MMBF), which was 66.8 % of the projected annual average harvest in the Forest Plan. Between FYs 2019 to 2023, 1 MMCF (7 MMBF) more aspen volume was sold than was harvested. This has resulted in an increase of aspen volume under contract over the last several years. Implementation of the 2016 Aspen Management Project, COVID-19 pandemic mill closures, poor markets, poor winter logging conditions caused changing climatic patterns and a lack of snowfall resulted in shorter logging season. The Aspen Management Project authorized harvest of up to 30,000 acres of aspen in MAs 1.1a, 3.1a, 4.1a, and 4.2a. Since 2019, a total of 6,581 acres of aspen regeneration harvests were completed. In FY 2019, 1,064 acres were harvested, which is an increase over the previous reporting period (2011 to 2016). The five-year average annual harvest of 1,316 acres of aspen (about 77% of the Forest Plan estimate). Compared to the previous reporting period this is an increase of approximately 500 acres in the five-year average. This is mainly due to the implementation of the 2016 Aspen Management Project.

Table 132 compares the acres of aspen harvested in during the reporting period with the average annual estimate in the Forest Plan. Aspen harvest acres were obtained from using FACTS database and Forest Products Financial System (FPFS). As disclosed in Monitoring Question 1, the Ottawa is currently harvesting 61% of the estimate of the Forest Plan. This is reflected in Table 133 as well, as the aspen regeneration harvest is about 77% of the Forest Plan estimate. Even though these numbers are below the Forest Plan estimates they are an increase from the previous reporting period of 5%. Over the past five years the Ottawa has harvested a total of 6,581 acres, which is an increase of 1,669 acres or 34% increase from the previous reporting period. These acres will help maintain the 12,000 acres in the 0–9-year age class Forest-wide.

Forest Plan

Are the current Forest Plan components (desired conditions, goals, objectives) achievable in the timeframes described and does the Forest Plan provide sufficient direction (standards, guidelines, suitability, designated lands) to achieve these components?

The Forest will not average the 1,700 acres or achieve the 12,000 acres maintained in the 0-9 year age class unless the Forest Plan is fully implemented. A rebound in this percentage has occurred over the past five years, 2019 to 2023. The primary contributor to the increase in harvested and sold aspen acres is the 2016 Aspen Management Project.

Forest Assessment

Is the status or trend of the monitoring indicators substantially different than described in the Forest Assessment, or was an assumption in the Forest Assessment proven to be invalid from the monitoring data?

As stated above the Forest will not average the 1,700 acres or achieve 12,000 acres maintained in the 0–9-year age class unless the Forest Plan is fully implemented. Since the implementation of the Forest Plan in 2006 the Forest has not sold or harvested the estimated volume as stated in the Forest Plan.

Management Actions

Did any of the management activities potentially result in adverse or beneficial effects to the status and trend of the monitoring indicators?

These management activities did not result in any adverse effects. Through the implementation of these activities there were beneficial effect in maintaining at least 12,000 acres of aspen in the 0 – 9-year range of aspen/paper birch regeneration for ruffed grouse habitat (Forest Plan pp. 2-8). These activities allowed the Forest to regenerate mature and over mature aspen Forest-wide to avoid forest type conversion and perpetuate the species on the landscape.

Monitoring Program

Did the monitoring results provide all the information necessary to answer the monitoring question?

The indicators adequately provide the parameters needed to answer the monitoring question.

Monitoring Question 22 - Recommendations

To better assist with planning efforts, additional requests for Regional Office exemptions from the creation of temporary openings exceeding 40-acres in size should be considered. This is especially true where efforts to harvest 10 acres stands purposefully left unharvested are constrained. There is Forest Plan direction found in most MA guidelines that states, “Regeneration of the aspen forest type is the first priority where delay of harvesting would result in the forest type loss due to natural succession” (p. 3-10, 3-12, 3-20, 3-25, 3-60 and 3-65).

Table 134. Summary of monitoring recommendations for Monitoring Question 22

Changes may be warranted for the:	Yes	Maybe, not enough information to determine at this time	No
Forest Plan			☐
Forest Assessment			☐
Management Actions	☐		
Plan Monitoring Program			☐

Monitoring Question 23 — To what extent are long-lived conifer forest types being increased or maintained through regeneration activities to meet Forest-wide and management area objectives?

Context for this Evaluation

This monitoring question ensures the Ottawa remains consistent with increasing the acreage of long-lived conifers at a modest rate.

Table 135. Background information for Monitoring Question 23

Drivers	
This monitoring question links to the 2012 Planning Rule (36 CFR 219.12(a)(5)(vii)): Progress toward meeting the desired conditions and objectives in the plan, including for providing multiple use opportunities. This monitoring question also measures trends toward achieving conditions outlined in Goal 17 of the Forest Plan that states, “increase the acreage of long-lived conifers at a modest rate” (p. 2-6).	
Primary Forest Plan Component Addressed	Monitoring Question Indicator
Goal 17: Increase the acreage of long-lived conifers at a modest rate. Maintain the acreage of short-lived conifers where appropriate (p. 2-6).	Acres of long-lived conifers regenerated through natural and artificial reforestation.
Who collected this data? Who is Responsible for analyzing this question?	
Michael Strieter, Forest Silviculturist	

When was this monitoring question last updated?

- Date of current evaluation: March 2024
- Date of previous evaluation: FY 2017 Monitoring Evaluation Report

Table 136. Relationship of Monitoring Question 23 to other Forest Plan direction

Question 23	Key Forest Plan Components		
	<i>Desired Conditions</i>	<i>Goals and Objectives</i>	<i>Standards and Guidelines</i>
Indicator 23	In each “Desired Condition of the Land” section of Management Areas where forest types are managed (pp. 3-3, 3-7, 3-12, 3-17, 3-22 and 3-23, 3-28, 3-56, 3-62 and 3-63), the desired conditions include a foundation for Goal 13.	Goal 1: Provide a variety of ecological communities in order to maintain or enhance habitat conditions for plant and animal species, to provide for a natural buffer against invasive exotic organisms, and to provide for the long-term production of a mix of timber products (p. 2-2) Objectives: d. Maintain and expand the white pine and hemlock components to provide for a diversity of plant and animal communities (p. 2-2). Goal 2: Provide for ecosystems that are healthy, resilient, diverse, and functioning in a sustainable and productive manner (p. 2-2) Objectives a. Restore the eastern hemlock and white pine component to hardwood stands and	White Pine Guidelines: Underplant white pine under partial shade (to limit the damage from blister rust and white pine weevil) on sites ecologically suited to the establishment and growth of white pine. Favor planting on drier sites, which have less competition, and are a lower risk for blister rust.

Question 23	Key Forest Plan Components		
	<i>Desired Conditions</i>	<i>Goals and Objectives</i>	<i>Standards and Guidelines</i>
		on other suitable sites (p. 2-2). Goal 17: Increase the acreage of long-lived conifers at a modest rate. Maintain the acreage of short-lived conifers where appropriate (p. 2-6).	

What monitoring activities have been conducted since the last monitoring evaluation? What protocols were used to collect these data?

Monitoring activities for this question have been obtained through queries of accomplished and completed activities in the FACTS database.

What is the target, or range for the indicator being measured? Is there an alert level (such as a trigger or threshold), associated with the target that should be noted?

Thresholds are dependent on activities getting entered in the FACTS database. Once a stand has been planted, the activity is accomplished and reported in the FACTS database.

Has any new Best Available Scientific Information (BASI) informed this monitoring question, indicators, or methodology? Where is the data for this monitoring question stored?

Monitoring data is collected annually through accomplishing planting activities, and therefore, the information presented is the most current for FYs 2016 through 2023. The results of the planting (species planted, acres, number of seedlings planted) are entered into the FACTS database.

Monitoring Question 23 - Results

Table 137. Status and trend of the indicator for Monitoring Question 23

Indicators		Recent Trend	
Indicator 23: Acres of long-lived conifers regenerated, through natural and artificial regeneration, at the Forest-wide and management area scale.		<i>Towards Target</i>	<i>Away from Target</i>
Current Status	<i>Within Target</i>	X	
	<i>Outside Target</i>		

What level of confidence is there in the accuracy and precision?

There is a moderate to high level of confidence in the quality and quantity of data collected because the same collection protocols and reporting standards have been in place for several years. The Forest Plan states that the methods used for this monitoring question have a high degree of repeatability, reliability, accuracy and precision (p. 4-4).

Monitoring Question 23 - Evaluation Discussion

Several projects are being implemented that include maintaining long-lived conifer on the landscape through intermediate thinning harvests or retention of long-lived conifer during harvest. The Forest continues to seek opportunities to implement post-harvest activities such as releasing hemlock, red pine or white pine which will increase the prevalence of natural regenerated long-lived conifer on the Forest. The 2014 Red Pine Thinning Project is nearly complete, which authorized 14,000 acres of red pine treatment in MAs 3.1a, 4.1a and 4.2a. These projects do not add long-lived conifer to the landscape; however, they maintain and improve the health of existing long-lived conifer on the Forest.

The Forest Plan directs a modest rate of increase in acreage of long-lived conifers (white pine, red pine, white spruce and hemlock). The current acreage of long-lived conifer types on the Forest is 89,382 acres, a decrease of 365 acres, or 0.5%, from the last reporting period. This is partly due to updated stand data that occurs during CSEs prior to environmental analysis for current and past vegetation management projects or stand conversions to other forest types like aspen. The Forest continues to increase the long-lived conifer type with the planting of approximately 138 acres of blister rust (*Cronartium ribicola*) resistant white pine annually on suitable acres. This has resulted in a decrease in long-lived conifer planting from the prior reporting period of 82 acres (decrease of approximately 37%). This is largely due to planting not occurring in FY 20 due to implementing COVID-19 pandemic protocols.

The Forest continues to increase the long-lived conifer type with the planting of blister rust resistant white pine annually on suitable acres and across all MAs as outlined Table 138.

Table 138. White pine planting (FY 2016 to FY 2023)

Fiscal Year	2016	2017	2018	2019	2020	2021	2022	2023	Average
Planting Acres	163	69	91	110	0	332	186	158	138

Forest Plan

Are the current Forest Plan components (desired conditions, goals, objectives) achievable in the timeframes described and does the Forest Plan provide sufficient direction (standards, guidelines, suitability, designated lands) to achieve these components?

The current Forest Plan desired conditions, goals and objectives are achievable in the timeframes described in the Forest Plan. The Forest continues to plant long-lived conifer, primarily white pine, at a modest rate. As implementation of new vegetation management projects continue, more opportunities will become available to increase the amount of long-lived conifer planting across all MAs.

Forest Assessment

Is the status or trend of the monitoring indicators substantially different than described in the Forest Assessment, or was an assumption in the Forest Assessment proven to be invalid from the monitoring data?

The status and trend of the indicator is not substantially different than anticipated in the analysis for the Forest Plan. The decrease in planted acres in FY 20 was due to implementation of COVID-19 pandemic protocols.

Management Actions

Did any of the management activities potentially result in adverse or beneficial effects to the status and trend of the monitoring indicators?

No. 138 highlights, the Forest continues to plant long-lived conifers at a modest rate.

Monitoring Program

Did the monitoring results provide all the information necessary to answer the monitoring question?

Yes, the data collection protocols and indicators adequately provide the necessary information to answer the monitoring question.

Monitoring Question 23 - Recommendations

Table 139. Summary of monitoring recommendations for Monitoring Question 23

Changes may be warranted for the:	Yes	Maybe, not enough information to determine at this time	No
Forest Plan			☐
Forest Assessment			☐
Management Actions			☐
Plan Monitoring Program			☐

Monitoring Question 24 — To what extent are short-lived conifer forest types being maintained through regeneration activities to meet Forest-wide and management area objectives?

Context for this Evaluation

This monitoring question ensures the Ottawa remains consistent with regeneration of short-lived conifer to meet Forest-wide and MA objectives.

Table 140. Background information for Monitoring Question 24

Drivers
This monitoring question links to the 2012 Planning Rule (36 CFR 219.12(a)(5)(vii)): Progress toward meeting the desired conditions and objectives in the plan, including for providing multiple use opportunities.

Primary Forest Plan Component Addressed	Monitoring Question Indicator
Goals 17 and 28 of the Forest Plan (pp. 2-6 and 2-9) that states, “maintain the acreage of short-lived conifers where appropriate” and “manage Kirtland’s warbler jack pine habitat using ecosystem management principles”. Objectives 28a and 28b are also applicable (p. 2-9).	To what extent are short-lived conifer types being regenerated.
Who collected this data? Who is Responsible for analyzing this question?	
Michael Strieter, Forest Silviculturist	

When was this monitoring question last updated?

- Date of current evaluation: March 2024
- Date of previous evaluation: FY 2019 Monitoring Evaluation Report

Table 141. Relationship of Monitoring Question 24 to other Forest Plan direction

Question 24	Key Forest Plan Components		
	<i>Desired Conditions</i>	<i>Goals and Objectives</i>	<i>Standards and Guidelines</i>
Indicator 24	To maintain the desired condition for short lived conifer as described in the Forest Plan Which can be found in “Desired Condition of the Land” section of Management Areas where forest types are managed (pp. 3-4, 3-8, 3-13, 3-18, 3-23, 3-29, 3-57 and 3-63).	Goal 17: (p. 2-6) Increase the acreage of long-lived conifers at a modest rate. Maintain the acreage of short-lived conifers where appropriate. Goal 18: Manage Kirtland’s warbler jack pine habitat using ecosystem management principles that mimic/resemble historic conditions and disturbance regimes. Develop habitat by designing and configuring treatment blocks that mimic the regeneration effects of	Standards: 2400 Timber Management, Balsam Fir (2-17) and Jack Pine (2-18) Guidelines Balsam Fir: Regenerate existing balsam fir stands or convert other types to balsam fir by clearcut, shelterwood, or selection methods. Uneven-aged management may be used for special aesthetic, wildlife, or other values and will only make up a small proportion of managed balsam fir forests. Jack Pine: Regenerate existing jack pine stands or convert other types to jack pine by clearcutting.

Question 24	Key Forest Plan Components		
	<i>Desired Conditions</i>	<i>Goals and Objectives</i>	<i>Standards and Guidelines</i>
		stand replacing wildfires (p. 2-7). Goal 28: Manage Kirtland's warbler jack pine habitat using ecosystem management principles that mimic/resemble historic conditions and disturbance regimes. Develop habitat by designing and configuring treatment blocks that mimic the regeneration effects of stand replacing fires. Objectives: a: Manage approximately 4,000 to 5,000 acres of jack pine for Kirtland's warbler (and other jack pine-associated species) in Management Areas 4.1a and 4.2a. Manage for Kirtland's warbler breeding habitat primarily in the Baraga Plains area and seek opportunities to manage for Kirtland's warbler on the Kenton Ranger District. b: Regenerate 1 to 3 treatment blocks of jack pine in patches of 300 to 550 acres for Kirtland's warbler	Frequency of entry is usually once each rotation. Favor natural regeneration of jack pine where a sufficient quantity and quality seed source is present. Site preparation may be necessary to prepare an adequate seed bed. Direct seeding or planting of jack pine may be done. Generally, release of jack pine is not necessary to achieve reforestation. Release will be scheduled if evaluation of the stocking of planted species and the type and degree of competition indicates the need for release.

Question 24	Key Forest Plan Components		
	<i>Desired Conditions</i>	<i>Goals and Objectives</i>	<i>Standards and Guidelines</i>
		every 10 years (p. 2-9).	

What monitoring activities have been conducted since the last monitoring evaluation? What protocols were used to collect these data?

First- and third-year stocking surveys, plantation survival surveys and number of acres planted were used to evaluate this question. Protocols described in the Ottawa Supplement to FSH 2409.17 were used to evaluate first- and third-year surveys and planted acres of short-lived conifers. The FACTS geodatabase was utilized to query this data.

What is the target, or range for the indicator being measured? Is there an alert level (such as a trigger or threshold), associated with the target that should be noted?

The Forest Plan outlines a range for each forest type by MA. Thresholds are met when the actual composition either falls below or rises above the desired conditions described in the Forest Plan by MA (p. 3-4, 3-8, 3-13, 3-18, 3-23, 3-29, 3-57 and 3-63).

Has any new Best Available Scientific Information (BASI) informed this monitoring question, indicators, or methodology? Where is the data for this monitoring question stored?

There is no new BASI for this monitoring question. The data for this monitoring question is stored and managed in the FACTS geodatabase.

Monitoring Question 24 - Results

Table 142. Status and trend of the Indicator for Monitoring Question 24

Indicators		Recent Trend	
<i>Indicator 24:</i> Acres of short-lived conifers regenerated, through natural and artificial regeneration, at the Forest-wide and management area scale.		<i>Towards Target</i>	<i>Away from Target</i>
Current Status	<i>Within Target</i>	X	
	<i>Outside Target</i>		

What level of confidence is there in the accuracy and precision?

There is a moderate level of confidence in the quality and quantity of data collected because the same collection protocols and reporting standards have been in place for several years. The Forest Plan states that the methods used for this monitoring question have a high degree of repeatability, reliability, accuracy and precision (p. 4-4).

Monitoring Question 24 - Evaluation Discussion

The Forest Plan mandates that the acreage of short-lived conifers (jack pine, balsam fir and tamarack) should be maintained on suitable sites (p. 2-6).

The current acreage of short-lived conifer groups on the Forest is 160,302, which is a decrease of 130 acres from the previous reporting period. This decrease is likely due stand conversion due to the outbreak of spruce budworm the Ottawa. During the Forest Plan revision, total acres of short-lived conifer was estimated at 159,000 (FEIS Volume I, 3-46). The amount of short-lived conifer on the Forest has increased since the Forest Plan revision in 2006.

The Forest has implemented management of a large block of jack pine (512 acres) in the Baraga Plains with the harvest activity completed in 2013 and planting occurring in 2017 authorized by the Baraga Plains Vegetations Management Decision. The Baraga II Vegetation Management Project (2023) has authorized up to 1,366 acres of jack pine management to increase KW habitat in the coming years. These 1,366 acres will either be naturally regenerated to jack pine or other short-lived conifer or be artificially regenerated (planted) with jack pine.

Over the last eight years the Ottawa has planted an average of 102 acres of jack pine and naturally regenerated an average of 36 acres per year (see Table 143). The amount of jack pine regenerated, both naturally and artificially, is expected to increase in the coming years with projects currently being implemented. The amount of balsam fir is expected to increase through retention of non-merchantable balsam fir in clearcut treatments.

Table 143. Short-lived conifer regenerated (FY 2016 to FY 2023)

Fiscal Year	Artificial Regeneration (Acres)	Natural Regeneration (Acres)
2016	43	51
2017	511	113
2018	143	46
2019	119	67
2020	0	0
2021	0	14
2022	0	0
2023	0	0
Total	816	291
Year Average	102	36

Forest Plan

Are the current Forest Plan components (desired conditions, goals, objectives) achievable in the timeframes described and does the Forest Plan provide sufficient direction (standards, guidelines, suitability, designated lands) to achieve these components?

The current Forest Plan desired conditions, goals and objectives are achievable in the timeframes described in the Forest Plan. As implementation of new vegetation management projects continue, more opportunities will become available to increase the amount of short-lived conifer both naturally and through artificial regeneration across all MAs.

Forest Assessment

Is the status or trend of the monitoring indicators substantially different than described in the Forest Assessment, or was an assumption in the Forest Assessment proven to be invalid from the monitoring data?

The status and trend of the indicator is not substantially different than anticipated in the analysis for the Forest Plan.

Management Actions

Did any of the management activities potentially result in adverse or beneficial effects to the status and trend of the monitoring indicators?

No. As Table 143 highlights, the Forest continues to regenerate short-lived conifers both by natural and artificial means.

Monitoring Program

Did the monitoring results provide all the information necessary to answer the monitoring question?

Yes, the data collection protocols and indicator adequately provide the necessary information to answer the monitoring question.

Monitoring Question 24 - Recommendations

There is no need for a change to this question. The indicator adequately provides the parameters needed to answer the monitoring question.

Table 144. Summary of monitoring recommendations for Monitoring Question 24

Changes may be warranted for the:	Yes	Maybe, not enough information to determine at this time	No
Forest Plan			☐
Forest Assessment			☐
Management Actions			☐
Plan Monitoring Program			☐

Monitoring Question 25 — To what extent is natural regeneration favored over artificial reforestation to meet Forest-wide and management area objectives?

Context for this Evaluation

This monitoring question ensures the Ottawa remains consistent with Forest Plan direction of favoring natural regeneration over artificial reforestation.

Table 145. Background information for Monitoring Question 25

Drivers
This monitoring question links to the 2012 Planning Rule (36 CFR 219.12(a)(5)(vii)): Progress toward meeting the desired conditions and objectives in the plan, including for providing multiple use opportunities. This monitoring question also measures trends toward

achieving conditions outlined in Goal 18 of the Forest Plan that states, “emphasize natural regeneration over artificial reforestation” (p. 2-7).		
Primary Forest Plan Component Addressed	Monitoring Question Indicator	
Favor natural regeneration over artificial regeneration	a. Number of acres planted by forest type, at the Forest-wide scale.	b. Number of acres regenerated naturally by forest type, at the Forest-wide scale.
Who collected this data? Who is Responsible for analyzing this question?		
Michael Strieter, Forest Silviculturist		

When was this monitoring question last updated?

- Date of current evaluation: March 2024
- Date of previous evaluation: FY 2017 Monitoring Evaluation Report

Table 146. Relationship of Monitoring Question 25 to other Forest Plan direction

Question 25	Key Forest Plan Components		
	<i>Desired Conditions</i>	<i>Goals and Objectives</i>	<i>Standards and Guidelines</i>
Indicators 25a and 25b	Favor natural regeneration over artificial regeneration.	Goal 18: Emphasize natural regeneration over artificial reforestation. Objectives: a. Favor natural regeneration to regenerate northern hardwoods, northern red oak, aspen, paper birch, jack pine, white spruce, balsam fir, and hemlock. b. Favor planting when natural regeneration success is not expected, to introduce species on ecosystems where they once occurred and a seed source is lacking, and to introduce	Standards: 2400 timber Management (Forest Plan p. 2-16 – 2-23) Guidelines: All applicable guidelines for timber management (p. 2-16 – 2-23).

Question 25	Key Forest Plan Components		
	<i>Desired Conditions</i>	<i>Goals and Objectives</i>	<i>Standards and Guidelines</i>
		disease resistant trees (p. 2-7).	

What monitoring activities have been conducted since the last monitoring evaluation? What protocols were used to collect these data?

Data for this question have been obtained through queries of accomplishments and completed activities in the FACTS database.

What is the target, or range for the indicator being measured? Is there an alert level (such as a trigger or threshold), associated with the target that should be noted?

The Forest Plan directs the Ottawa to favor natural regeneration over artificial regeneration (p. 2-7). The threshold would be met if artificial regeneration acres as a whole exceeds natural regeneration acres.

Has any new Best Available Scientific Information (BASI) informed this monitoring question, indicators, or methodology? Where is the data for this monitoring question stored?

Monitoring data is collected annually through accomplishment reporting of planting activities, and therefore, the information presented is the most current for FYs 2019 to FY 2023. The results of the planting (species planted, acres, number of seedlings planted) are entered into the FACTS geodatabase.

Monitoring Question 25 - Results

Table 147. Status and trend of the indicator for Monitoring Question 25

Indicators		Recent Trend	
<i>Indicator 25(a):</i> Number of acres plant by forest type at the Forest-wide scale.		<i>Towards Target</i>	<i>Away from Target</i>
Current Status	<i>Within Target</i>	X	
	<i>Outside Target</i>		
<i>Indicator 25(b):</i> Number of acres regenerated naturally by forest type at the Forest-wide scale.		Recent Trend	
		<i>Towards Target</i>	<i>Away from Target</i>
Current Status	<i>Within Target</i>	X	
	<i>Outside Target</i>		

What level of confidence is there in the accuracy and precision?

There is a moderate to high level of confidence in the quality and quantity of data collected because the same collection protocols and reporting standards have been in place for several years. The Forest Plan states that the methods used for this monitoring question have a high degree of repeatability, reliability, accuracy and precision (p. 4-4).

Monitoring Question 25 - Evaluation Discussion

In support of Goal 18 (p. 2-7) in the Forest Plan, natural regeneration is heavily favored (95% of all reforestation efforts) over the past 5 years (see Table 148). Most of the artificial reforestation has been to restore blister rust resistant white pine back onto the landscape (see Monitoring Question 23).

The Forest treated an average of 4,691 acres with regeneration actions during the reporting period (see Monitoring Question 1). Table 148 shows the Forest averaged 4,566 acres annually of regeneration (all types) since 2019. The average acres of site preparation to promote natural regeneration decreased by 310 acres or 26% from the previous reporting period. This is primarily due to the final stages of the Aspen Management Project and moving into more northern hardwood dominated project areas. Artificial regeneration (planting) increased by 50 acres or 27% from the previous reporting period mainly due to an increased effort to increase species diversity. Regeneration, with no follow up treatments, increased by 963 acres or 38% increase from the previous reporting period, mainly due to implementing vegetation management project areas with a heavy northern hardwood composition.

Table 148. Natural regeneration and artificial Regeneration (FY 2019 to FY 2023)

Treatment	2019	2020	2021	2022	2023	Average	Forest Plan Average	Percent of Forest Plan
Artificial Regeneration	229	0	332	361	254	235	400	59%
Site Preparation for Natural Regeneration	701	389	1,748	962	529	866	1,500	58%
Regeneration with follow up treatments	2,749	4,296	2,817	4,689	2,773	3,465	8,700	40%
Total Acres Regenerated	3,679	4,685	4,897	6,012	3,556	4,566	10,600	43%
Percent Naturally Regenerated	94%	100%	93%	94%	93%	95%		

Table 148 shows acres naturally regenerated by forest type. 2023 saw a decrease in the number of northern hardwood acres regenerated due to poor hardwood markets. Aspen acreage remained consistent over the five-year period with a minor drop in 2020 due to the COVID-19 pandemic. From 2021 to 2023, there was an increase in the amount of long-lived conifer naturally regenerated due to the implementation of the Spruce Fir Decision Memo and harvesting some hemlock types authorized by Rousseau East and Pori Junction Vegetation Management Projects. The amount of short-lived conifer natural regeneration is expected to increase slightly with the implementation of the Baraga II Vegetation Management Project.

Table 149. Acres naturally regenerated by forest type (FY 2019 to FY 2023)

Forest Type	2019	2020	2021	2022	2023
Short-lived Conifer	43	44	63	89	49
Long-lived Conifer	42	19	175	95	235
Aspen/Paper Birch	1,064	995	1,439	1,406	1,677
Northern Hardwoods	2,301	3,627	2,888	4,061	1,341

Table 150 shows the acreage planted by forest type. In 2022, the Forest started planting species that are increasingly resilient to climate change like Northern red oak and bur oak. This trend is expected to continue with additional species like American basswood and black cherry. Long-lived conifer planting is expected to continue at a modest rate. Short-lived conifer is expected to increase with the implementation of Baraga II Vegetation Management Project.

Table 150. Acres planted by forest type (FY 2019 to FY 2023)

Forest Type	2019	2020	2021	2022	2023	5 Year Average
Short lived conifer	119	0	0	0	0	24
Long lived conifer	110	0	332	186	158	157
Northern Hardwood	0	0	0	175	96	33
Total	229	0	332	361	254	214

Forest Plan

Are the current Forest Plan components (desired conditions, goals, objectives) achievable in the timeframes described and does the Forest Plan provide sufficient direction (standards, guidelines, suitability, designated lands) to achieve these components?

Yes, the current Forest Plan desired conditions, goals and objectives give the Forest ample time and sufficient direction to achieve these components.

Forest Assessment

Is the status or trend of the monitoring indicators substantially different than described in the Forest Assessment, or was an assumption in the Forest Assessment proven to be invalid from the monitoring data?

The status and trend of the indicator is not substantially different than anticipated in the analysis for the Forest Plan. Most of the regeneration on the Forest, in the past and present, is due to natural regeneration. This trend is expected to continue.

Management Actions

Did any of the management activities potentially result in adverse or beneficial effects to the status and trend of the monitoring indicators?

No. As Table 148 highlights, the Forest continues to heavily emphasize natural regeneration over artificial.

Monitoring Program

Did the monitoring results provide all the information necessary to answer the monitoring question?

Yes, the data collection and indicators adequately provide the necessary information to answer the monitoring question.

Monitoring Question 25 - Recommendations

There is no need for a change to this question. The indicator adequately provides the parameters needed to answer the monitoring question.

Table 151. Summary of monitoring recommendations for Monitoring Question 25

Changes may be warranted for the:	Yes	Maybe, not enough information to determine at this time	No
Forest Plan			☐
Forest Assessment			☐
Management Actions			☐
Plan Monitoring Program			☐

Status of Watershed Conditions (Questions 26a, 26b and 26c)

Monitoring Question 26a — To what extent are we moving riparian areas towards desired conditions?

Context for this Evaluation

This monitoring question ensures the Ottawa remains consistent with the goal of providing for ecologically healthy watersheds by enhancing the diversity and structural composition of long-lived tree species (i.e. white pine, hemlock, white spruce, etc.) within riparian areas.

Table 152. Background information for Monitoring Question 26a

Drivers
2012 Planning Rule (36 CFR 219.12(a)(5)(i)): The status of watershed conditions. This question is responsive to one of the eight required monitoring elements prescribed by the 2012 Planning Rule. In addition, this monitoring question measures trends toward achieving several conditions outlined in the Forest Plan pertaining to riparian areas (Goals 2 (p. 2-2 to 2-3), 3 (p. 2-3), 20 (p. 2-7), 21 (p. 2-7), and 23 (p. 2-7) of the Forest Plan).

Primary Forest Plan Component Addressed	Monitoring Question Indicator
Provide for ecologically healthy watershed, soils, riparian areas, and streams to support viable populations of native and desired non-native species, and to restore and enhance values associated with the Great Lakes System (E.O. 13340) (Forest Plan, Goal 20, p 2-7).	Acres of riparian habitat improved
Who collected this data? Who is Responsible for analyzing this question?	
Amy Amman, Soil Scientist; Pam Nankervis, Wildlife Biologist; Ian Schackleford, Botanist	

When was this monitoring question last updated?

- Date of current evaluation: March 2024
- Date of previous evaluation: FY 2017 Monitoring Evaluation Report

Table 153. Relationship of Monitoring Question 26a to other Forest Plan direction

Question 26a	Key Forest Plan Components		
	<i>Desired Conditions</i>	<i>Goals and Objectives</i>	<i>Standards and Guidelines</i>
Indicator 26a	Ecological functions of watersheds and riparian areas will be enhanced or restored through improving road and trail crossings, decommissioning unneeded roads, and other appropriate activities. Silvicultural treatments or fire may be used to enhance shade, coarse woody debris recruitment, or bank stability in riparian areas (p. 1-10).	Goal 2: Provide for ecosystems that are healthy, resilient, diverse, and functioning in a sustainable and productive manner (p. 2-2). Goal 3: Lakes, streams, rivers, other water bodies, and wetlands are functioning appropriately and provide high quality habitat for plants and animals, as well as recreational opportunities. Water quality is high (p. 2-3).	Guideline: Protect super canopy trees when present in riparian areas (p. 2-26). Guideline: Within the riparian area, vegetative manipulation should generally maintain or enhance riparian function. Long-lived tree species should generally be favored; however, other species may be favored if desired to provide habitat for specific plant or animal species. Infrequent small openings (both grassy and temporary openings regenerated to young forest) may be created and maintained (p. 2-26).

Question 26a	Key Forest Plan Components		
	<i>Desired Conditions</i>	<i>Goals and Objectives</i>	<i>Standards and Guidelines</i>
		Goal 21: Floodplains are able to store and transmit floodwaters, fulfill their natural role in regulating water quality, and present minimum risk to human safety and property (p. 2-7). Goal 23: Water in lakes, rivers, streams, and wetlands meets or exceeds state water quality requirements (p. 2-7).	Guideline: Within the upland portion of the riparian corridor, generally favor management for extended rotation of tree species suitable for the site (p. 2-26). Guideline: Maintain hydrologic function and shade regime including wetland edges/ecotones (p. 2-34).

What monitoring activities have been conducted since the last monitoring evaluation? What protocols were used to collect these data?

Programmatic and contract activities have been conducted since this question was last reported on in 2017. Those include internal planting work, as well as planting and survival monitoring conducted by partners through agreements and contract specifications, descriptions, and work statements outlined protocols.

What is the target, or range for the indicator being measured? Is there an alert level (such as a trigger or threshold), associated with the target that should be noted?

Currently, to comply with the long-term objective to manage riparian areas, seasonal ponds and wetlands for desired function, species, composition and structure, the Ottawa aims to monitor short-term outcomes including the inventory, assessment, and treatment (i.e. planting, release and girdling) to move toward a desired condition as referenced above, as well as to monitor first- and third-year survival.

The target for this question's indicators is to achieve survivability in the treatment areas. There is not a numeric target of adding a long-lived conifer component to the riparian areas and the overall goal and may take many years to be fully realized.

Has any new Best Available Scientific Information (BASI) informed this monitoring question, indicators, or methodology? Where is the data for this monitoring question stored?

Monitoring data is collected through planting activity and seedling survival surveys. The information presented is current. The results of planting, monitoring and release are entered into the FACTS and/or Watershed Improvement Tracking (WIT) geodatabases.

Monitoring Question 26a - Results

Table 154. Status and trend of the indicator for Monitoring Question 26a

Indicators		Recent Trend	
<i>Indicator 26a:</i> Acres of riparian habitat improved.		<i>Towards Target</i>	<i>Away from Target</i>
Current Status	<i>Within Target</i>	X	
	<i>Outside Target</i>		

What level of confidence is there in the accuracy and precision?

There is a moderate level of confidence in the quality and quantity of data collected mainly due to variability in the planting process and seedling survival rates and estimates. The Forest Plan states that the methods used for this monitoring question are well accepted for modeling or quantitatively measuring the resource or condition, and have a high degree of repeatability, reliability, accuracy and precision (p. 4-4).

Monitoring Question 26a - Evaluation Discussion

Although the riparian planting effort on the Ottawa began in 2000, information about the details of those early year efforts is unfortunately no longer discernable. Thus, reportable riparian planting efforts began in 2005. Between 2005 and 2016, approximately 179,600 seedlings were planted over 421 acres. Planting continued between 2017 and 2023 where a total of 458,735 tree seedlings were planted across 1,669 acres. Since 2005, a cumulative grand total of 638,335 tree seedlings were planted on 2,090 acres helping to move the Forest closer to the desired condition outlined in the Forest Plan.

Table 155. Riparian planting between 2017 and 2023

Year	Adjacent Waterbody	Acres	Number of Seedlings	Trees/Acre
2017	Pendleton Creek, Lambert Creek	60	25,050	417
2018	Bluff Creek	106	24,800	234
2018	Tributaries to East Br. Ontonagon River	700	176,600	252
2019	Leveque Creek, Two Mile Creek, and Interior Creek	44	22,395	509
2019	Slate River	338	84,750	251
2019	Warbler Creek	8	864	108

Year	Adjacent Waterbody	Acres	Number of Seedlings	Trees/Acre
2020	Presque Isle River	9	770	85
2021	Smith Creek, Cooks Run, E. Branch Ontonagon River Tributaries	122	40,200	330
2021	Middle Branch Ontonagon River	1	200	200
2022	Trout Creek, Smith Creek, E. Branch Ontonagon River Tributaries	172	44,940	261
2023	North Branch Paint River, Golden Creek, Bush Creek, Thirty-three Creek	127	40,000	314
	2017 through 2023 TOTALS	1,687	460,569	
	2005 through 2023 GRAND TOTAL	2,108	640,169	

Riparian Planting Monitoring

The monitoring of riparian areas that had been planted (Table 155) did not begin until recently. The early strategy was to establish a desired species in the riparian areas simply by planting seedlings densely. However, monitoring efforts began in 2010 and have since been used to verify success as well as to provide opportunities for adaptive management, thereby



Figure 33. White pine seedling planted in a riparian habitat on the Ottawa

improving seedling survival as the planting program has progressed. Generally, monitoring is conducted at first- and third-year intervals (established 2014) and with silvicultural input, survival estimates can be provided. Subsample level of first- and/or third-year monitoring has occurred on planted sites between 2010 and 2023. On average the survival rate for first-year monitoring is 90-95% and third-year monitoring has been between 50-70%. Underplanting riparian ash sites has resulted in lower survival rates, between 1-10%, due to hydrologic stress drowning out seedlings.

Riparian Planting Release

To further promote the survival of the seedlings planted in riparian areas, efforts to non-mechanically release the young trees were included in the plan of work. As with monitoring, release work was not incorporated into early planting efforts but has been incorporated where appropriate beginning in 2015. Not all sites are released as

dappled sunlight from super canopy trees can allow sufficient growth in many cases. If survival is low and shade is deemed excessive, some girdling or felling of trees may happen, but not on every site. Release of seedlings from a dense shrub layer blocking sunlight is most often the deciding factor. Release efforts took place at approximately 13 planting sites between 2015 and 2021.

The riparian planting program is helping move the Ottawa toward the desired condition in riparian areas across the Forest. Additional activities contributing to monitoring question 26a include riparian protections incorporated into project design criteria, Best Management Practice (BMP) implementation and monitoring and planting seedlings in black ash wetland systems in anticipation of the arrival of EAB. Into the future, it is expected that planting opportunities would continue as additional needs are identified. Riparian protections that limit vegetative removal based on slope and hydric soil conditions are incorporated into all project activities and would continue.

Forest Plan

Are the current Forest Plan components (desired conditions, goals, objectives) achievable in the timeframes described and does the Forest Plan provide sufficient direction (standards, guidelines, suitability, designated lands) to achieve these components?

Forest Plan direction provides for ecologically healthy watersheds, soils, riparian areas and streams, as well as the enhancement, restoration and protection of riparian habitat. There is not a specific appropriate timeframe for achievements because the benefits of these planting projects will not be fully realized until well into the future when the trees have matured in 80 years or longer.

Forest Assessment

Is the status or trend of the monitoring indicators substantially different than described in the Forest Assessment, or was an assumption in the Forest Assessment proven to be invalid from the monitoring data?

The status and trend of the indicator is not substantially different than anticipated in the analysis for the Forest Plan. The Forest Plan FEIS analysis included a projected, annual acreage of reforestation (FESI Volume I, p. 3-80); albeit the acreages in Table 155 are lower than estimated. It should be noted that this discrepancy is based on the number of acres treated per year, which is acknowledged to be lower than projected.

Management Actions

Did any of the management activities potentially result in adverse or beneficial effects to the status and trend of the monitoring indicators?

Riparian planting result in beneficial effects that provide for ecologically healthy watersheds, riparian areas and streams to support viable populations of native and desired non-native species. Replacing dead and dying trees maintains ecological function, stabilizes soil and provides healthy, resilient, and diverse vegetative communities helping to move the Forest closer to the desired condition outlined in the Forest Plan.

Monitoring Program

Did the monitoring results provide all the information necessary to answer the monitoring question

Yes, the results adequately provide the necessary information to answer the monitoring question.

Monitoring Question 26a - Recommendations

There are no recommendations for changes to this question.

Table 156. Summary of monitoring recommendations for Monitoring Question 26a

Changes may be warranted for the:	Yes	Maybe, not enough information to determine at this time	No
Forest Plan			☐
Forest Assessment			☐

Changes may be warranted for the:	Yes	Maybe, not enough information to determine at this time	No
Management Actions			☐
Plan Monitoring Program			☐

Monitoring Question 26b — To what extent are we restoring aquatic habitat connectivity?

Context for this Evaluation

Animals move through rivers and streams for a variety of reasons including to find food, avoid predators, find more suitable habitat due to seasonal changes in temperature, water depth, or velocity, to find a mate, breed and reproduce and to find more suitable habitat as they grow through their various life stages (Hoffman et al. 2012; USDA Forest Service, 2008). Some organisms are weak swimmers, while others are strong swimmers. Some organisms move great distances, while others move very small distances. Road-stream crossing structures can impede movement through debris accumulation, inlet or outlet drops, physical barriers (weirs or collapsed culverts), water velocities exceed swimming ability, absence of bank-edge areas, excessive turbulence, insufficient water depth or discontinuity of channel substrate (USDA Forest Service, 2008). This can lead to fragmentation and loss of habitat, as well as isolation of populations and, potentially, their eventual extinctions. Therefore, it is important to maintain the integrity of the physical-hydrological processes of a river system and the interconnectedness of its resource patches and habitats (Hoffman et al. 2012; USDA Forest Service, 2008).

Replacing road-stream crossing barriers with structures that simulate a natural stream channel or allow for aquatic organism passage creates stream connectivity resulting in a healthier aquatic ecosystem. Streams are constantly changing and evolving, so structures can pass aquatic organisms for many years and become barriers suddenly from stochastic events or structure failures. Barriers can also develop over time from natural channel processes that change the characteristics of the channel or the crossing structure itself.

There are hundreds of road-stream crossings within the stream networks associated with the Ottawa, both within and outside Federal jurisdiction. Removing all the barriers is a costly endeavor and will take decades to complete, and there may be setbacks along the way as structures age or weather events alter the stream and road systems. The objective is to show an increase in barriers removed, with more stream miles connected over time.

Table 157. Background information for Monitoring Question 26b

Drivers
2012 Planning Rule (36 CFR 219.12(a)(5)(i)): The status of watershed conditions. This question is responsive to one of the eight required monitoring elements prescribed by the 2012 Planning Rule.

Primary Forest Plan Component Addressed	Monitoring Question Indicator
Provide for ecologically healthy watersheds, soils, riparian areas, and streams to support viable populations of native and desired non-native species, and to restore and enhance values associated with the Great Lakes System (EO 13340) (Forest Plan, Goal 20, p. 2-7)	a: Number of barriers removed for aquatic organism passage.
	b: Number of stream miles reconnected.
Who collected this data? Who is Responsible for analyzing this question?	
Luke Rutten, Hydrologist	

When was this monitoring question last updated?

- Date of current evaluation: March 2024
- Date of previous evaluation: FY 2017 Monitoring Evaluation Report

Table 158. Relationship of Monitoring Question 26b to other Forest Plan direction

Question 26b	Key Forest Plan Components		
	<i>Desired Conditions</i>	<i>Goals and Objectives</i>	<i>Standards and Guidelines</i>
Indicators 26b(a) and 26b(b)	No specific desired conditions have been specified within the Forest Plan relating to restoring aquatic habitat connectivity however, habitat connectivity is directly related to achieving several desired conditions for aquatic habitats highlighted in the Forest Plan (pp. 2-2 and 2-7)	Goal 3: Lakes, streams, rivers, other water bodies, and wetlands are functioning appropriately and provide high quality habitat for plants and animals, as well as recreational opportunities (p. 2-3).	Guidelines: Management activities involving crossing (by road, trail, temporary road or skid trail) of any stream or drainway will be designed and conducted in a way that should consider: 1. The number of crossing locations kept to the minimum needed to conduct the activity; 2. Maintenance of channel stability (dimension, pattern and profile) or shoreline stability in the affected or connected waters;

Question 26b	Key Forest Plan Components		
	<i>Desired Conditions</i>	<i>Goals and Objectives</i>	<i>Standards and Guidelines</i>
			3. Seasonal closures; 4. Wetland water quality and the quantity and timing of flow (p. 2-31).

What monitoring activities have been conducted since the last monitoring evaluation? What protocols were used to collect these data?

The monitoring related to this question is indirectly measured at the time of this evaluation by gathering information that is stored in WIT database and Forest-level aquatics and watershed program files. The frequency of input of data for this monitoring is dependent on the completion of aquatic passage improvement projects which continually occur at a forest-wide level.

What is the target, or range for the indicator being measured? Is there an alert level (such as a trigger or threshold), associated with the target that should be noted?

No target or threshold is applicable to this question. The Forest Plan includes a goal of restoring aquatic organism passage at barriers to enhance stream connectivity, which results in improved watershed condition. Any project that improves aquatic organism passage helps the Forest move toward that goal.

Has any new Best Available Scientific Information (BASI) informed this monitoring question, indicators, or methodology? Where is the data for this monitoring question stored?

No new BASI is applicable. Data is stored in the WIT geodatabase and in watershed and fisheries program project files.

Monitoring Question 26b - Results

Table 159. Status and trend of the indicator for Monitoring Question 26b

Indicators		Recent Trend	
<i>Indicator 26b(a):</i> Number of barriers removed for aquatic organism passage.		<i>Towards Target</i>	<i>Away from Target</i>
Current Status	<i>Within Target</i>		
	<i>Outside Target</i>	X	
<i>Indicator 26b(b):</i> Total stream miles reconnected.		Recent Trend	
		<i>Towards Target</i>	<i>Away from Target</i>
Current Status	<i>Within Target</i>		
	<i>Outside Target</i>	X	

The Forest continues to make progress toward the goal of removing aquatic organism barriers to restore stream connectivity however no specific targets were identified within the Forest

Plan and therefore we are limited to tracking the indicator trends without a specific target in mind.

What level of confidence is there in the accuracy and precision?

It is likely that this evaluation is an underestimate of the quantity of passage improvement projects that have occurred on the Forest. Such projects may be implemented by several different programs or people and over time. Changes in staff involved in these projects can result in project accomplishments not being shared with the aquatic and watershed programs who store the information associated with the indicators in this evaluation.

A key example of this data gap are road access improvements completed during vegetation management projects. When a timber harvest project is developed, it often includes road work. This road work can include replacement of existing culverts with larger structures and/or decommissioning of existing routes which sometimes includes the removal of existing road-stream crossings. These actions typically occur on small seasonally flowing headwater streams and would be considered low priority compared to a site on a larger perennial channel.

Monitoring Question 26b - Evaluation Discussion

As shown in Table 160, the Ottawa has removed one or more barriers in most years since 2010. The number of stream miles reconnected has varied from 0.1 to 88.5. This large range in miles reconnected is due to the natural variation in the amount of available upstream miles from the barrier removal site and potentially inconsistent analysis of the amount of accessible habitat upstream of project sites. The data presented in this evaluation is limited to those sites that the aquatic and watershed programs have documented and tracked over the years. Barrier improvements not reported by other programs are not included.

Table 160. Number of barriers removed and stream miles reconnected (FY 2006 to FY 2023)

Fiscal year	Barriers removed for aquatic organism passage	Stream miles reconnected
2006	1	1.8
2007	NA	NA
2007	NA	NA
2008	NA	NA
2009	NA	NA
2010	1	3.7
2011	NA	NA

Fiscal year	Barriers removed for aquatic organism passage	Stream miles reconnected
2012	4	2.5
2013	1	2.0
2014	1	1.0
2015	3	1.4
2016	3	4.3
2017	2	0.2
2018	1	1.2
2019	1	0.1
2020	5	88.5
2021	1	Not Available
2022	NA	NA
2023	3	22.8

**NA indicates that no information was reported for that indicator during the specific fiscal year.*

Forest Plan

Are the current Forest Plan components (desired conditions, goals, objectives) achievable in the timeframes described and does the Forest Plan provide sufficient direction (standards, guidelines, suitability, designated lands) to achieve these components?

The overall direction in the Forest Plan is to improve watershed conditions and the work being completed with aquatic organism passage is working towards that goal. This work occurs gradually as funding and staffing allows. Across the Forest there are ample opportunities for projects, and it will likely take decades to complete this work.

Forest Assessment

Is the status or trend of the monitoring indicators substantially different than described in the Forest Assessment, or was an assumption in the Forest Assessment proven to be invalid from the monitoring data?

The Forest Plan provides adequate direction for the improvement of watershed conditions and the indicators assessed in this evaluation show one way we are working to improve those conditions. Aquatic organism passage was not assessed through the FEIS.

Management Actions

Did any of the management activities potentially result in adverse or beneficial effects to the status and trend of the monitoring indicators?

The beneficial effects of improving aquatic organism passage are also completed through our vegetation management projects and some of those passage related projects are likely not accounted for in this evaluation. Therefore, the beneficial effects analyzed in this evaluation are likely an underestimate of the work that is completed on an annual basis by Forest staff. Ongoing efforts by the Forest aquatics and watershed programs are continuously improving passages. Each completed project removes existing barriers and reestablishes access to habitat.

Monitoring Program

Did the monitoring results provide all the information necessary to answer the monitoring question?

Yes, the data collection protocols and indicators adequately provide the necessary information to answer this monitoring question.

Monitoring Question 26b - Recommendations

No changes in monitoring are suggested.

Table 161. Summary of monitoring recommendations for Monitoring Question 26b

Changes may be warranted for the:	Yes	Maybe, not enough information to determine at this time	No
Forest Plan			☐
Forest Assessment			☐
Management Actions			☐
Plan Monitoring Program			☐

Monitoring Question 26c — Does the relative abundance, density and species richness of aquatic macroinvertebrates within sampled reaches indicate plan objectives for stream water quality and habitat are being maintained?

Context for this Evaluation

This monitoring question ensures the Ottawa remains consistent with providing high quality stream habitat and maintaining functional streams and rivers. The orders of *Ephemeroptera* (mayflies), *Plecoptera* (stoneflies), and *Trichoptera* (caddisflies) or EPT, are sensitive to changes in water temperature, dissolved oxygen, and sedimentation (Colbert and Allan, 2001). Taxa from the orders of EPT are easily identifiable to order and family. Time required for sample identification is significantly increased for family level identification of EPT necessary to assess richness. If composition of aquatic insects sampled on the Ottawa experienced substantial declines in EPT taxa, it may indicate forest management practices are impacting water quality. Habitat changes due to extreme episodic flow events, channel inundation by beaver or rapid changes to substrate composition from beaver dam construction or failure may also influence EPT variability.

Table 162. Background information for Monitoring Question 26c

Drivers	
2012 Planning Rule (36 CFR 219.12(a)(5)(i)): The status of watershed conditions. This question is responsive to one of the either required monitoring elements prescribed by the 2012 Planning Rule.	
Primary Forest Plan Component Addressed	Monitoring Question Indicator
Lakes, streams, rivers, other water bodies, and wetlands are functioning appropriately and provide high quality habitat for plants and animals, as well as recreational opportunities. Water quality is high (Forest Plan, Goal 3, p. 2-3).	Extent of change in aquatic macroinvertebrate abundance, density, and family.
Who collected this data? Who is Responsible for analyzing this question?	
Caleb Silsby, Natural Resource Specialist (Fisheries); Ryan Beatty, Fisheries Biologist	

When was this monitoring question last updated?

- Date of current evaluation: April 2024
- Date of previous evaluation: FY 2017 Monitoring Evaluation Report

Table 163. Relationship of Monitoring Question 26c to other Forest Plan direction

Question 26c	Key Forest Plan Components		
	<i>Desired Conditions</i>	<i>Goals and Objectives</i>	<i>Standards and Guidelines</i>
Indicator 26c	No desired conditions specific for Mayfly-Stonefly-Caddisfly are specified in the	Goal 20: Provide for ecologically healthy watersheds, soils, riparian areas, and streams to support	Within riparian areas, avoid activities that may destabilize soils or add sediment to the water,

Question 26c	Key Forest Plan Components		
	<i>Desired Conditions</i>	<i>Goals and Objectives</i>	<i>Standards and Guidelines</i>
	Forest Plan. However, they serve as management indicator species and are used to monitor progress towards maintaining or achieving several desired conditions for aquatic habitats highlighted in the Forest Plan (pp. 2-2 and 2-7)	viable populations of native and desired non-native species, and to restore and enhance values associated with the Great Lakes System (EO 13340) (p.2-7). Goal 23: Water in lakes, rivers, streams, and wetlands meets or exceeds state water quality requirements. Goal 27: Provide adequate habitat for Management Indicator Species: American Marten, ruffed grouse, cutleaf toothwort, and mayfly-stonefly-caddisfly suite (p. 2-7).	where practical (p. 2-31 and 2-32).

**What monitoring activities have been conducted since the last monitoring evaluation?
What protocols were used to collect these data?**

The protocol used for aquatic insect collection is the *Ottawa National Forest Ephemeroptera-Plecoptera-Trichoptera (EPT) Management Indicator Species Survey Protocol* (Dunlap, 2006). Notably, 40 sites were initially chosen for EPT monitoring, however, one site was removed due to access issues. Streams were ranked from poor to excellent based on brook trout (*Salvelinus fontinalis*) and mottled sculpin (*Cottus bairdi*) abundance and density during 2001 to 2005.

Hydrologic Unit Codes (HUC) are what the United States Geological Survey (Jones, K.A. et al., 2022) uses to map drainage areas at varying scales across the country. HUCs are tiered by size and identified by how many digits they are coded with, the less digits, the bigger the drainage area (Jones, 2022). Streams were analyzed by which subbasin (HUC 8) they flow through. The HUC 8 level was chosen to organize analysis by subbasin with similar stream types and geology because it split watershed specific streams into four groups. Larger HUC areas would have resulted in only been two groups: the Southwestern Lake Superior subbasin, and the Northwestern Lake Michigan Subbasin. Any smaller HUC areas would have increased the number of groups dramatically.

On the Ottawa, there are four subbasins: the Ontonagon (19 sites), Sturgeon (3 sites), Black/Presque Isle (10 sites), and the Brule (8 sites). Since 2006, varying staffing levels and time allowance has led to inconsistent sampling of all EPT sites. Specifically, from 2006 to 2015, between 19 and 39 of the sites were sampled for aquatic insects on an annual basis. From 2016 to 2023, between 9 and 20 sites were sampled for aquatic insects. In 2020 and 2022, no sampling occurred due to the Covid-19 pandemic, staffing shortages and staffing turnover (Table 164).

Table 164. Number of EPT sites monitored annually

Sampling year	Number of sites sampled	Sampling year	Number of sites sampled
2006	24	2015	37
2007	30	2016	14
2008	30	2017	19
2009	29	2018	11
2010	29	2019	20
2011	32	2020	0
2012	21	2021	17
2013	19	2022	0
2014	39	2023	9

What is the target, or range for the indicator being measured? Is there an alert level (such as a trigger or threshold), associated with the target that should be noted?

No specific targets for this indicator were described in the Forest Plan or FEIS. This indicator aims at monitoring how management practices on the Ottawa may be affecting EPT populations, which in turn can be used to assess habitat suitability for management indicator species (MIS) and potentially represents impacts to cold-water stream habitat on the Ottawa. No specific alert levels (triggers or thresholds) were established. However, if a shift to smaller sediment sizes (<1.0" diameter), a shift away from insects from the EPT order at multiple sites or a noticeable reduction in taxa richness within a subbasin, may indicate impacts to cold-water stream habitat.

Has any new Best Available Scientific Information (BASI) informed this monitoring question, indicators, or methodology? Where is the data for this monitoring question stored?

We seek to be aware and mindful of new scientific publications affecting the effectiveness of the Ottawa monitoring program. Specifically for this question, no new BASI is known for the question, indicators or methodology. Data collection, storage and analysis is done by Ottawa fisheries staff.

Monitoring Question 26c - Results

Table 165. Status and trend of the indicator for Monitoring Question 26c

Indicators		Recent Trend	
<i>Indicator 26c:</i> Extent of change in aquatic macroinvertebrate abundance, density, and family.		<i>Towards Target</i>	<i>Away from Target</i>
Current Status	<i>Within Target</i>	X	
	<i>Outside Target</i>		

Percentage of EPT

One metric we consider is the percentage of samples that consists of EPT. To achieve this, we simply divide our total number of EPT collected at a site by the total number of aquatic insects captured. Knowing the percentage of EPT in streams is important to evaluating MIS on the Ottawa. Generally, the higher the proportion of EPT taxa that we capture, the more suitable the habitat is, which generally aligns with characteristics of high water quality (e.g. abundant rocky substrates, low composition of fine sediment, relatively cold water temperatures and adequate shade and carbon sources in the riparian area). Across most of the Ottawa, percentage of EPT stayed relatively consistent in the Ontonagon (56-83%), Brule (57-86%), and Black/Presque (52-79%) subbasin (See Figure 35).

Variation from year to year is likely explained by several factors including which sites were sampled in each subbasin, variation in individuals sampling, the time of year or what the weather conditions were like that year and the previous years. Of course, it is not expected to have 100% EPT in our streams.

The Sturgeon subbasin has been the most variable showing the widest range of EPT composition from 27 to 83%. This could be due to the low number of sites and high amount of small, “soft” sediment in most of the streams in this part of the Ottawa (Figure 34). Soft substrates, such as sand and silt, are generally considered low quality habitat for insects of the EPT orders. Soft substrates embed and cover larger sized substrates such as gravel and cobble. When gravel and cobble substrates exceed embeddedness of more than one-third by fine sediment, EPT abundance can decline by up to 50% (Bjorn et al. 1977).



Figure 34. *Pteronarcyid* stonefly, an indicator of high-water quality, from Cooks Run (Iron River, Michigan)

EPT Density, Estimated Population and Percent Hard Substrate

EPT density was estimated at each site using a Surber sampler protocol: sample one square foot of the thalweg, every 30 feet of the stream site, ten times. The average EPT density of each monitoring site was calculated based on a composite of all 10 Surber sampler samples collected for each 300-ft long stream reach. At each established monitoring site, we collected wetted and bank full width measurements at each Surber sample cross-section to estimate the average width of habitat, which were then multiplied by the stream length, to calculate an area for the stream reach. Percent hard substrate was gathered by using a modified Wolman method, with 20 particles measured across the stream at each transect, for a total of 200 particles at each monitoring site (Dunlap 2006).

Using the density, area estimate, and percent hard substrate, we estimate the population abundance for each monitoring site by multiplying density and area together and multiplying that value by the percent hard substrate.

The average population estimate for monitoring sites in the Ontonagon, Black/Presque Isle, and Sturgeon subbasins were similar over the survey period (Figure 36). The Brule subbasin was sporadic, this could be explained by the presence of some of our most productive streams with stable flow regimes and groundwater influenced cold water habitat, with high amounts of rocky substrate, making the habitat particularly suitable for EPT. This is especially true for the three sites on Cooks Run, South Branch Paint River, North Branch Paint River, and the Paint River, among others. Therefore, depending on which sites are sampled annually, it may greatly impact EPT results for this subbasin. For example, the high population estimate from 2018 (1,396,323 individuals) was solely from the main stem of the Paint River.

Aside from 2006 survey year, when only one site was surveyed, the Sturgeon subbasin appears to be consistent, but has lower population estimates than other subbasins. This can be explained by how we get our EPT population estimates, and the general habitat in those streams, which is not conducive for EPT habitat. The streams in this subbasin consist of mostly sand or “soft” substrates, which in this case gives us a lower population estimate.

The average percent hard substrate in the Ontonagon, Black/Presque Isle, and Brule subbasins are consistent throughout our sampling period. The Sturgeon subbasin is variable, several of these sites are in sand dominated systems, while other sites have a large hard substrate component.

Forest Plan

Are the current Forest Plan components (desired conditions, goals, objectives) achievable in the timeframes described and does the Forest Plan provide sufficient direction (standards, guidelines, suitability, designated lands) to achieve these components?

The Mayfly-Stonefly-Caddisfly suite does not have specific desired conditions or objectives. The desired goal of providing adequate habitat for the suite is achievable (Forest Plan, p. 2-8). The Forest Plan provides sufficient direction to achieve these components by having best management practices when working close to streams and wetlands (p. 2-31 to 2-32).

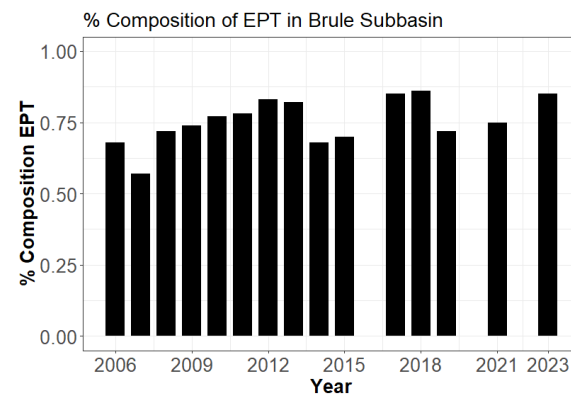
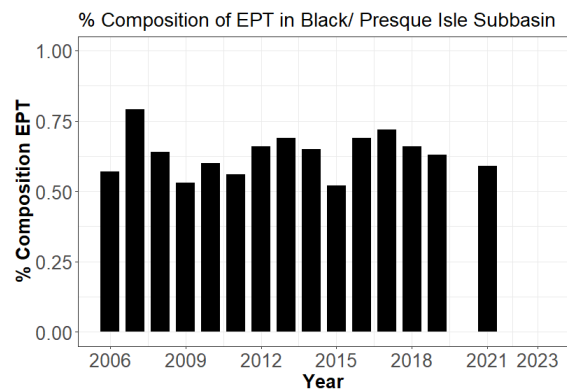
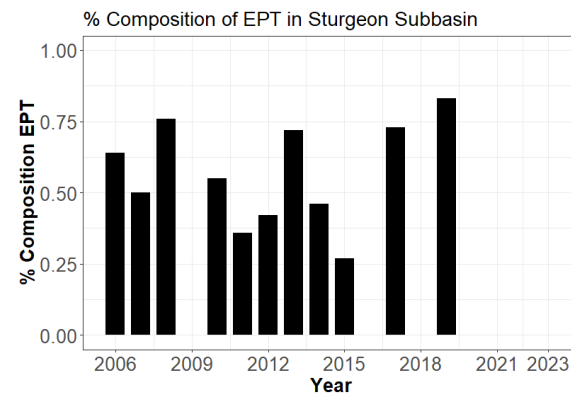
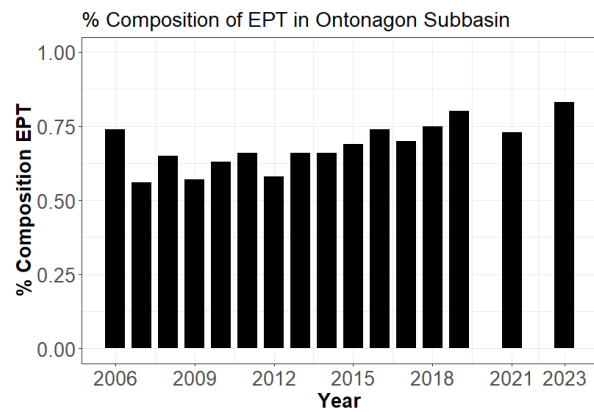


Figure 35. Percent composition of EPT in surveyed subbasins across the Ottawa (2006 to 2023)

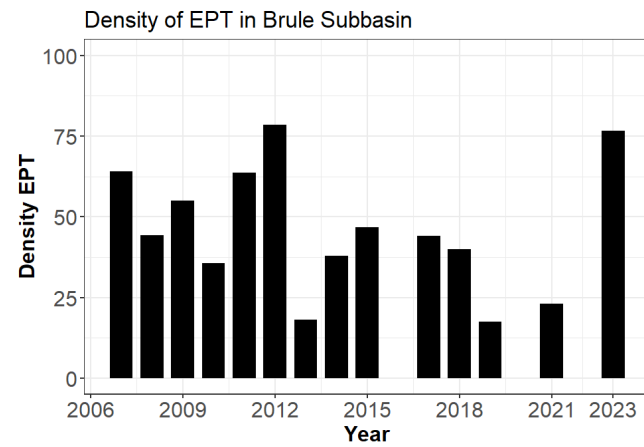
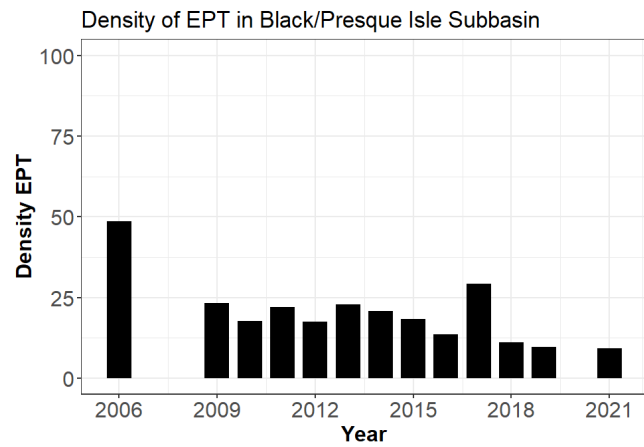
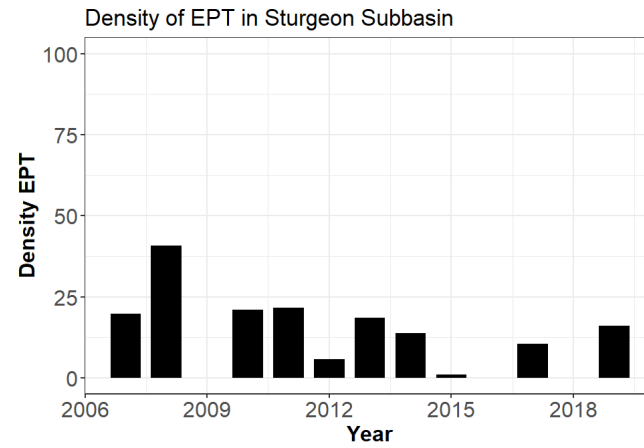
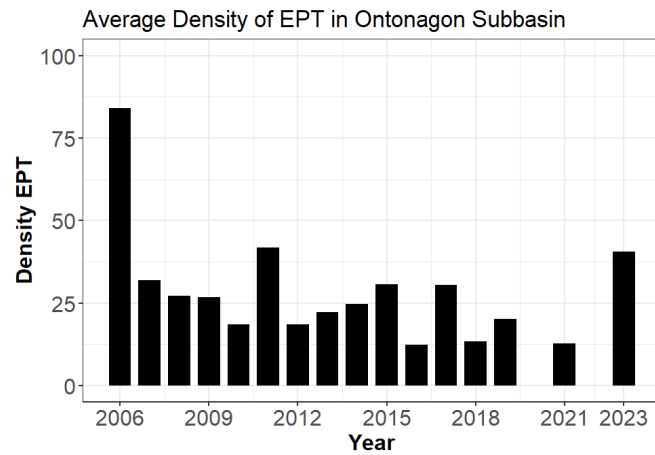


Figure 36. Density of EPT in surveyed subbasins across the Ottawa (2006 to 2023)

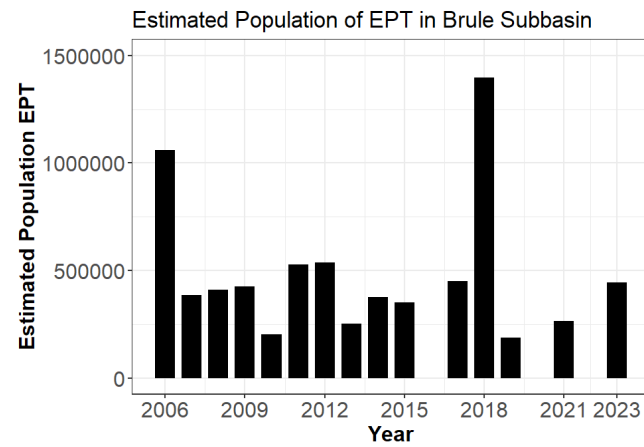
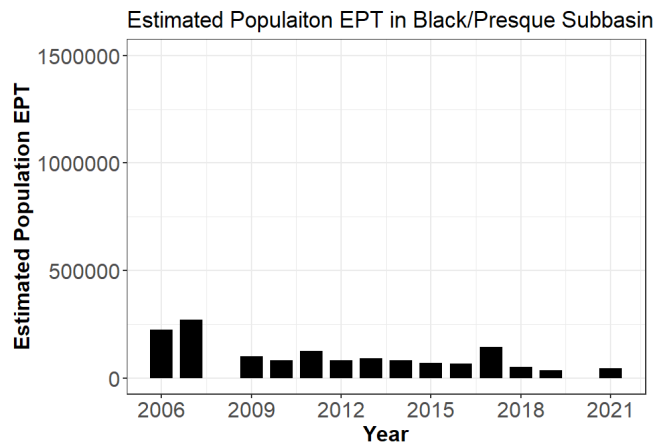
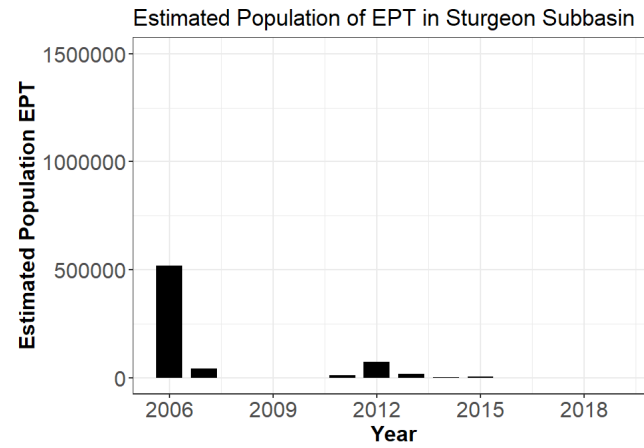
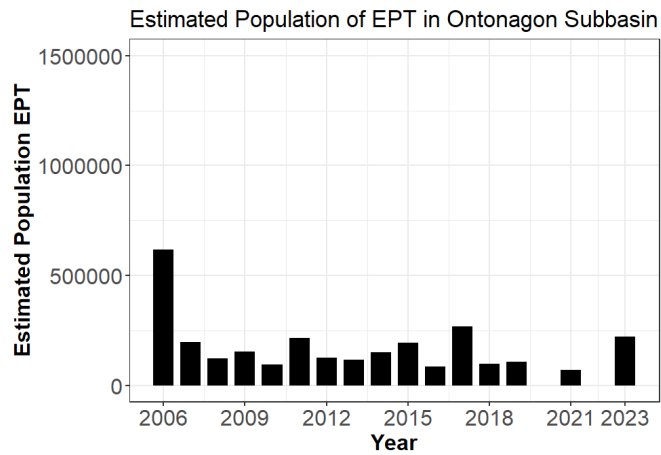


Figure 37. Average estimated population of EPT in subbasins across the Ottawa (2006 to 2023)

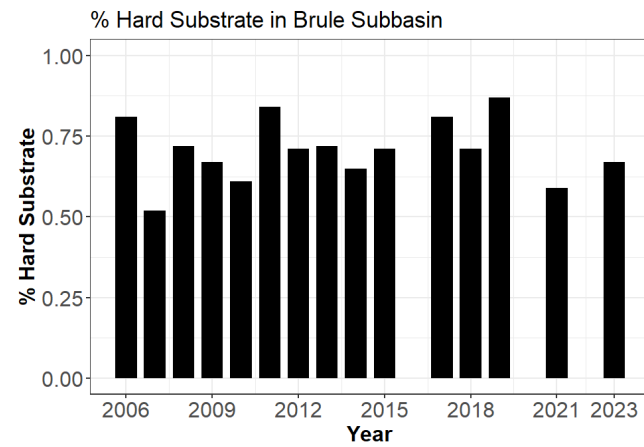
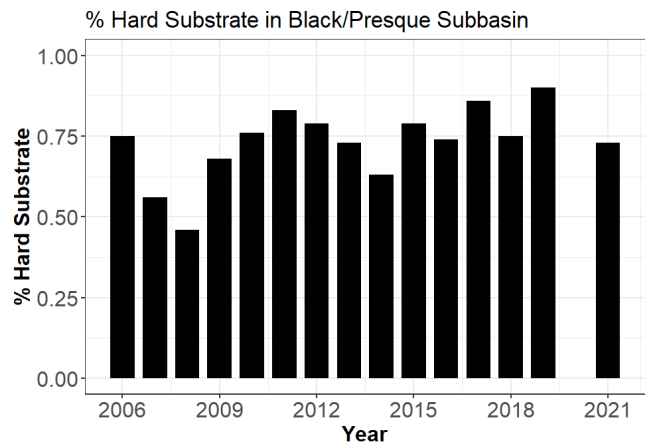
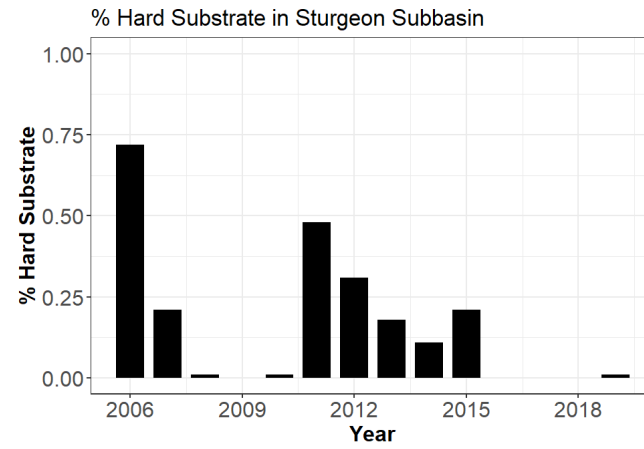
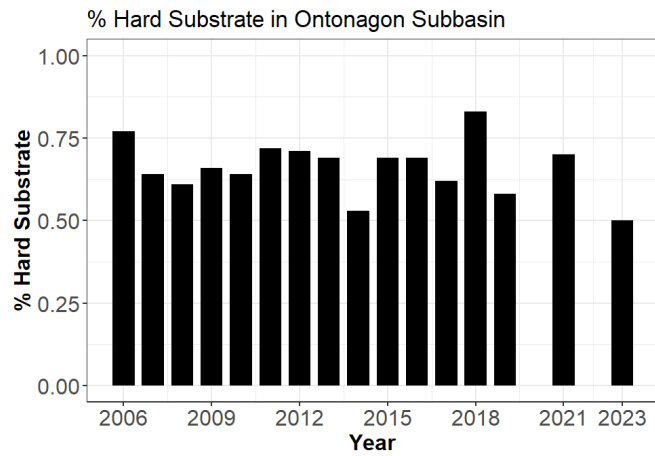


Figure 38. Percent hard substrate in surveyed subbasins across the Ottawa (2006 to 2023)

Forest Assessment

Is the status or trend of the monitoring indicators substantially different than described in the Forest Assessment, or was an assumption in the Forest Assessment proven to be invalid from the monitoring data?

No, the monitoring indicator is not substantially different than what is described in the FEIS. It was predicted that quality stream habitat would not decrease in the future due to cumulative effects of management actions on National Forest land (FEIS Volume I, p. 3-120).

Management Actions

Did any of the management activities potentially result in adverse or beneficial effects to the status and trend of the monitoring indicators?

This is hard to determine with the data that we have. Streams have not been consistently sampled year to year and have routinely been sampled by different seasonal employees, with potentially varying levels of efficacy. However, we have not seen a meaningful change in the data. This could be due to management activities not taking place near streams through implementation of BMPs which are designed to prevent negative impacts near streams. Our current information indicates that forest management activities have not had an apparent negative impact on habitat suitability for EPT populations.

Monitoring Program

Did the monitoring results provide all the information necessary to answer the monitoring question?

Yes, management activities such as riparian vegetation management, road construction, reconstruction, road maintenance and culvert/bridge construction have not had any adverse or beneficial effects to EPT at the sites we monitor.

Monitoring Question 26c – Recommendations

Our goal is to establish a repeatable and realistic sampling protocols and timelines for all sites. Moving forward we will be sampling sites on a three-year rotation broken down by Ranger District. In year one will focus on the Bergland and Bessemer Ranger Districts (15 sites), year two will focus on the Ontonagon and Kenton Ranger Districts (11 sites), and year three will focus on the Watersmeet and Iron River Ranger Districts (14 sites). This will allow for more realistic and long-term sustainability of consistent sampling, thus leading to better data.

There are several long-term sites that occur on private lands. When these sites were initially identified in 2006, there was likely a verbal agreement with current landowners about accessing these sites. However, there is no record of this permission. It is possible that the properties have changed hands or owners have revoked access. In the coming sampling seasons, the Forest will try to contact these landowners to obtain permission for access. If access is granted, we will continue to sample these sites on their designated rotation. If access is not granted, we will discontinue sampling at that site, make note in our site records and find a suitable site on the Forest. This includes sites on Narrows Creek (Bessemer Ranger District), Spargo Creek at Lake Thirteen Road, Stony Creek at Lake Thirteen Road and Trout Creek at 4 Mile Squared Road (all on the Kenton Ranger District).

Summary of monitoring recommendations for Monitoring Question 26c

Table 166. Summary of monitoring recommendations for Monitoring Question 26c

Changes may be warranted for the:	Yes	Maybe, not enough information to determine at this time	No
Forest Plan			☐
Forest Assessment			☐
Management Actions			☐
Plan Monitoring Program	☒		

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Measurable changes on the planning area related to the effects of climate change (27a and 27b)

Monitoring Question 27a — How is drought duration, severity, geographic extent or timing changing across the planning area on an annual basis?

Context for this Evaluation

This monitoring question discloses trends in drought conditions on the Ottawa.

Table 167. Background information for Monitoring Question 27a

Drivers	
2012 Planning Rule (36 CFR 219.12(a)(5)(vi)): Measurable changes on the plan area related to climate change and other stressors that may be affecting the plan area. This question is responsive to one of the eight required monitoring elements prescribed by the 2012 Planning Rule.	
Primary Forest Plan Component Addressed	Monitoring Question Indicator
Climate change is not a component of the current Forest Plan. This question addresses the 2012 Planning Rule.	Drought duration, severity, geographic extent, or timing changes across the planning area on an annual basis

Who collected this data? Who is Responsible for analyzing this question?
Ellen Lesch, Hydrologist

When was this monitoring question last updated?

- Date of current evaluation: November 2023
- Date of previous evaluation: FY 2017 Monitoring Evaluation Report

Table 168. Relationship of Monitoring Question 27a to other Forest Plan direction

Question 26c	Key Forest Plan Components		
	<i>Desired Conditions</i>	<i>Goals and Objectives</i>	<i>Standards and Guidelines</i>
Indicator 27a	There are no desired conditions focusing on managing drought conditions.	Goal 20: Provide for ecologically healthy watersheds, soils, riparian areas, and streams to support viable populations of native and desired non-native species, and to restore and enhance values associated with the Great Lakes System (EO 13340) (p.2-7). Goal 21: Floodplains are able to store and transmit floodwaters, fulfill their natural role in regulating water quality and present minimum risk to human safety and property (p. 2-7). Goal 22: Wetlands should be managed to prevent the impairment of water quality, fish, wildlife and plant habitat and aesthetic values (p. 2-7).	

Question 26c	Key Forest Plan Components		
	<i>Desired Conditions</i>	<i>Goals and Objectives</i>	<i>Standards and Guidelines</i>
		Goal 23: Water in lakes, rivers, streams, and wetlands meets or exceeds state water quality requirements.	

**What monitoring activities have been conducted since the last monitoring evaluation?
What protocols were used to collect these data?**

Drought is a normal and recurring feature of climate, has wide-ranging impacts on many sectors of society and ranks among the costliest of all natural disasters (Hayes et al., 2012; Svoboda et al., 2002). Drought affects terrestrial resources, aquatic resources and all associated species. Drought affects forest ecosystems in complex ways, ranging from reduced growth to mortality by starvation, desiccation, fire, insects or pathogens (Vose et al., 2016). Vose adds that drought has an ecological role that shapes the structure and function of many forests. Drought onset is slow and may not be recognized until a region finds itself during a natural disaster (Svoboda, 2000). Monitoring drought allows for better preparation, leads to better management practices and reduces the vulnerability of society to drought and its subsequent impacts (Svoboda et al., 2002). As drought regimes change, the ability to quantify and predict the impacts on forests and rangelands is critical to developing and implementing management actions to increase resiliency and adaptation (Vose et al., 2016).

Drought definitions, monitoring strategies and early warning systems for risk management have been developed and evolved over time (Hayes et al., 2012). No single definition of drought works for all circumstances, so people rely on drought indices to detect and measure droughts. Numerous drought indexes have been developed but no single index works under all circumstances (Hayes et al., 2012). A “composite” index approach that is a “hybrid” in nature that combines many parameters, indicators and/or indices into a single product with the ability to display drought information into a single map with a simple classification system has been explored.

The United States Drought Monitor (USDM) map is the most prominent composite index used within the United States and has been released on a weekly basis since 1999 (Hayes et al., 2012; Svoboda et al., 2002). The map is based on measurements of climatic, hydrologic and soil conditions as well as reported impacts and observations from more than 350 contributors around the country. This inclusion of input from experts gives the USDM additional strength (Svoboda et al., 2002). The product has been refined over time to better reflect the needs of decision-makers and others who use the information. The USDM classifies droughts on a scale from zero to four (D0–D4), with zero indicating an abnormally dry area and four reflecting a region experiencing an exceptional drought event (likened to a drought of record) (Svoboda, 2000; Svoboda et al., 2002; Hayes et al., 2012). Eleven climatologists from the partner organizations take turns serving as the lead author each week. The authors examine all the data and use their best judgment to reconcile any differences in what different sources are saying. The U.S. Drought Monitor is jointly produced by the

National Drought Mitigation Center at the University of Nebraska-Lincoln, the United States Department of Agriculture, the United States Department of Commerce and the National Oceanic and Atmospheric Administration.

For our purposes, we are relying on the USDM since it is a synthesis of multiple indices and impacts that represents a consensus of federal and academic scientists. We have found the mapping product to generally reflect what we experience on the Ottawa.

The USDM data used for this analysis were obtained through the National Drought Mitigation Center Drought Risk Atlas website (<http://droughtatlas.unl.edu/Data.aspx>). The Drought Atlas project allows decision makers to search for drought information from stations near them.

The Atlas provides tools to answer typical questions regarding drought so comparisons can be made giving the users a vast menu of options to study and investigate drought for their area. The Drought Monitor time series charts were chosen for our analysis because they portrayed drought in an easily observable and displayable format that is useful for our needs.

Stations were chosen from Gogebic, Iron, Ontonagon and Houghton Counties (Figure 38. Results of drought monitoring (Gogebic, Iron, Ontonagon and Houghton County stations))

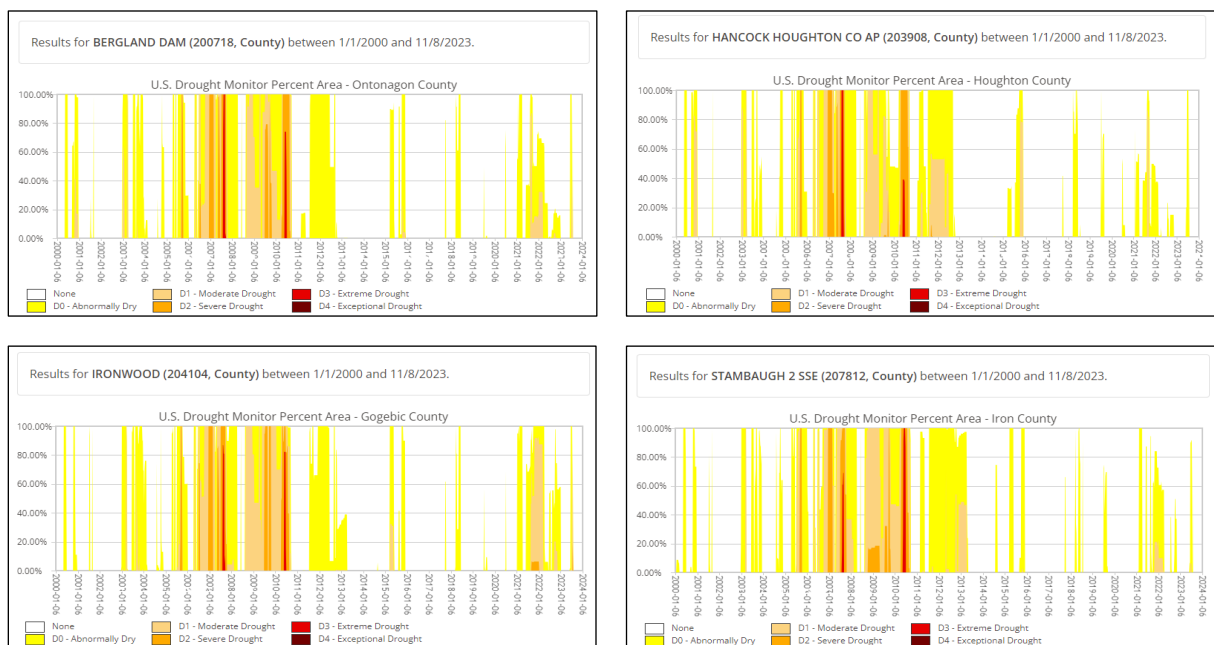


Figure 39. Results of drought monitoring (Gogebic, Iron, Ontonagon and Houghton County stations)

Baraga County does not have a climatic station available for drought monitor analysis and therefore Houghton County is considered a surrogate due to proximity and similar landscapes.

What is the target, or range for the indicator being measured? Is there an alert level (such as a trigger or threshold), associated with the target that should be noted?

The drought monitor information is displayed in a time series for ease in viewing the data over time and to observe possible trends. It is displayed as the percent of the analysis area (the county the station represents) that is abnormally dry, in moderate drought, severe drought, extreme drought or exceptional drought. Areas of the chart that lack color indicate there were no drought indices occurring. The colored portions of the chart, indicating conditions ranging from abnormally dry to exceptional drought, are years in which resources could be adversely impacted, particularly when there are numerous years in a row.

Has any new Best Available Scientific Information (BASI) informed this monitoring question, indicators, or methodology? Where is the data for this monitoring question stored?

Monitoring data is collected from the Drought Mitigation Center drought risk atlas website (<http://droughtatlas.unl.edu/Data.aspx>) for the full record of information available whenever this monitoring question is to be reviewed. The data is not stored within Forest Service databases since it is readily available and weekly updated through the Drought Mitigation Center.

Monitoring Question 27a - Results

Table 169. Status and trend of indicator for Monitoring Question 27a

Indicators		Recent Trend	
<i>Indicator 27(a):</i> Drought duration, severity, geographic extent, or timing changes across the planning area on an annual basis.		<i>Towards Target</i>	<i>Away from Target</i>
Current Status	<i>Within Target</i>	X	
	<i>Outside Target</i>		

What level of confidence is there in the accuracy and precision?

We have found the USDM to generally reflect what we experience on the Ottawa. We feel that it is fairly accurate because it is a synthesis of multiple indices and impacts that represents a consensus of federal and academic scientists and it displays the percent of the county area thought to be impacted. In addition, we have observed impacts across the Forest, such as seasonal ponds that dry quicker than usual, seepage lakes that don't completely fill with water and stressed vegetation during drought years in areas displayed in the graphics, lending to our confidence in the USDM.

Monitoring Question 27a - Evaluation Discussion

The Ottawa has been experiencing periods of dry or drought conditions periodically throughout the observed period from 2000 through October 2023. For about six to seven years beginning in 2005/2006, the Ottawa experienced a fairly extensive dry and drought period. This was readily observed in area lakes where water levels dropped, boat docks were extended, boat ramps became dry and some streams dried up. Seepage lakes are particularly vulnerable to drought since these lakes do not have stream inflow or outflow.

Some rare plants grow and reproduce near shorelines only within lakes that periodically become dry within the near shore margins. These plants are able to take advantage of these drought years and prosper as seen through field observation. Drought effects likely contributed to tree mortality from insect and disease outbreaks in the forests putting stress on some vegetation (Timber Insect and Disease Monitoring Evaluation specialist reports 2007, 2008, 2009, 2010 and 2011). Some wildlife species are dependent on vernal ponds for



Figure 40. 2010 Google Earth imagery of Scout and Grass Lakes within the Ottawa, Gogebic County.

reproduction and were impacted during the drought period. Some vernal ponds dried up very early in the season affecting four-toed salamanders and green frogs, which are slow to metamorphose and therefore likely experienced reproduction failure during some years as observed across the Forest. Forest staff have noted that spotted salamanders and blue-spotted salamanders may have also experienced

reproductive failure on some years as some metamorphose a little earlier in the year but not as early as wood frogs and spring peepers. A downward trend in EPT populations, as well as the mean density of EPT, was noted from 2006 to 2009 (EPT Monitoring and Evaluation specialist report 2009). This trend most likely was influenced by stream conditions affected by numerous drought years in a row. Ottawa fire staff expected a correlation between drought and fire frequency. The US 2 Fire occurred during this drought period.

A dry period for some of the Ottawa, particularly in the west and south (Gogebic and Ontonagon Counties), started in 2021 and has somewhat persisted into the fall of 2023. Some areas moved into moderate and some severe drought condition (USDM Level D1 and D2) for a few months during this timeframe. This could become problematic, adversely impacting forest resources, if drought conditions persist or worsen in coming successional years. Few readily apparent impacts have been observed within the Forest at this time. Wildfires seem to occur more readily during the fall months within drought years. In 2023, a large 125-acre wildfire within and adjacent to the McCormick Wilderness Area occurred.

Although periods of abnormally dry conditions (USDM Level D0) appear to be cyclical and occur regularly. Insufficient time has evolved at the time of this reporting to observe long-term trends in drought conditions that may be due to climate change.

Forest Plan

Are the current Forest Plan components (desired conditions, goals, objectives) achievable in the timeframes described and does the Forest Plan provide sufficient

direction (standards, guidelines, suitability, designated lands) to achieve these components?

Climate change is not a component of the current Forest Plan. This monitoring question addresses the 2012 Planning Rule.

Forest Assessment

Is the status or trend of the monitoring indicators substantially different than described in the Forest Assessment, or was an assumption in the Forest Assessment proven to be invalid from the monitoring data?

Climate change is not a component of the Forest Assessment. This monitoring question addresses the 2012 Planning Rule.

Management Actions

Did any of the management activities potentially result in adverse or beneficial effects to the status and trend of the monitoring indicators?

The extended drought from 2005 through 2012 coincides with tree mortality that spurred the Forest to implement the Jack Pine Budworm Area Restoration Project (2007) and the Spruce and Fir Decline Fuels Management Project (2016) to address drought-related infestations and resulting mortality.

Riparian management on the Ottawa protects wetlands, streams, rivers and lakes to maintain a microclimate associated with these features to better withstand drought conditions.

To prepare for the potential for increased wildfires due to climate change impacts, the Ottawa has been increasing the fuels management program. Fire staff have been creating fuel breaks along roads that provide escape routes for communities across the Ottawa. The Ottawa has made prescribed fire a priority, restoring fire back to the landscape to reduce fuel loading that could otherwise lead to catastrophic wildfires during drought conditions.

Monitoring Program

Did the monitoring results provide all the information necessary to answer the monitoring question?

Yes, the data collection protocols adequately provide the necessary information to answer the monitoring question.

Monitoring Question 27a - Recommendations

Tracking the USDM should be continued as this may give managers a heads up of changes that may be occurring in the environment in response to drought conditions. If we see the climate becoming dryer or wetter, we can better make informed decisions about workforce and management adjustments.

The indicator for this question has been adjusted since the FY 2017 Monitoring Evaluation to better reflect the monitoring question.

Table 170. Summary of monitoring recommendations for Monitoring Question 27a

Changes may be warranted for the:	Yes	Maybe, not enough information to determine at this time	No
Forest Plan			☐
Forest Assessment			☐
Management Actions			☐
Plan Monitoring Program			☐

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Monitoring Question 27 — How are the timing and duration of winter weather conditions changing across the planning area on an annual basis?

Context for this Evaluation

This monitoring discloses trends in the duration of winter weather conditions on the Ottawa National Forest.

Table 171. Background information for Monitoring Question 27b

Drivers
2012 Planning Rule (36 CFR 219.12(a)(5)(vi)): Measurable changes on the plan area related to climate change and other stressors that may be affecting the plan area. This question is responsive to one of the eight required monitoring elements prescribed by the 2012 Planning Rule.

Primary Forest Plan Component Addressed	Monitoring Question Indicator
Climate change is not a component of the current Forest Plan. This question addresses the 2012 Planning Rule.	The Accumulated Winter Season Severity Index (AWSSI) calculated for planning area based on daily measurements of maximum temperature, minimum temperature, snowfall and snow depth.
Who collected this data? Who is Responsible for analyzing this question?	
Ellen Lesch, Aquatic Ecologist/Hydrologist	

When was this monitoring question last updated?

- Date of current evaluation: November 2023
- Date of previous evaluation: 2017 Monitoring Evaluation Report

Table 172. Relationship of Monitoring Question 27b to other Forest Plan direction

Question 27b	Key Forest Plan Components		
	<i>Desired Conditions</i>	<i>Goals and Objectives</i>	<i>Standards and Guidelines</i>
How are the timing and duration of winter weather conditions changing across the planning area on an annual basis	Climate change is not a component of the current Forest Plan. However, creating resilient landscapes to better withstand climate related impacts is an on-going effort across the Ottawa.	Goal 2: Provide for ecosystems that are healthy, resilient, diverse and functioning in a sustainable and productive manner (p. 2-2). Goal 3: Lakes, streams, rivers, other water bodies and wetlands are functioning appropriately and provide high quality habitat for plants and animals, as well as recreational opportunities. Water quality is high (p. 2-3). Goal 13: Restore and maintain Great Lakes forested ecosystems using timber management and	

Question 27b	Key Forest Plan Components		
	<i>Desired Conditions</i>	<i>Goals and Objectives</i>	<i>Standards and Guidelines</i>
		silvicultural practices as tools, and to enhance values associated with the Great Lakes Ecosystem (E.O. 13340) (p. 2-5). Goal 20: Provide for ecologically health watersheds, soils, riparian areas and streams to support viable populations of native and desired non-native species, and to restore and enhance values associated with the Great Lakes System (E.O. 13340) (p. 2-7).	

**What monitoring activities have been conducted since the last monitoring evaluation?
What protocols were used to collect these data?**

It can be difficult to determine what parameters constitute a severe winter given the variability in snow and temperature. The character of a winter can be defined by many of its features, including temperature averages, temperature extremes, snowfall totals, snow depth and the duration between onset and cessation of winter-weather conditions. The accumulated winter season severity index (AWSSI) incorporates these elements into one site-specific value that defines the severity of a particular winter, especially when examined in the context of climatological values for that site (Boustead et.al., 2015).

The AWSSI uses commonly available daily climatic data such as maximum and minimum temperature, snowfall, and snow depth (Marinero et al., 2015). Thresholds of this data are assigned points that accumulate through the defined winter season. A parallel index uses temperature and precipitation to provide a snow proxy where snow data are unavailable or unreliable (Boustead et al., 2015). The advantages of such an index are that it allows for the creation of a historical database for any location with daily temperature, snow and snow-depth data which allows for comparisons of season-to-season severity at one location in the context of the climatological mean of that location or between locations (Marinero et al., 2015). The results can then be analyzed to examine relationships and determine trends (Boustead et al., 2015). The AWSSI information can be used as a baseline with which innumerable impact-based data can be examined and can help the Ottawa monitor winter severity trends for managing forest resources, including winter recreation.

All the weather stations monitored have a 53-year baseline climate history from 1951 through 2014 for determining an average AWSSI score.

What is the target, or range for the indicator being measured? Is there an alert level (such as a trigger or threshold), associated with the target that should be noted?

The AWSSI scores are displayed as mild, moderate, average, severe and extreme with severity increasing from mild-to-extreme in that order. Scores are also shown for temperature and snow, which are factored into the accumulated score.

Has any new Best Available Scientific Information (BASI) informed this monitoring question, indicators, or methodology? Where is the data for this monitoring question stored?

Monitoring data consists of daily observed precipitation, snowfall inches, snow depth, maximum temperature and minimum temperature from September 1 through May 31 each year. This data is available from the Midwest Regional Climate Center (MRCC) cli-MATE website (<https://mrcc.purdue.edu/CLIMATE/>) for the following stations: Ironwood (MI Coop ID 204104) representing the western portion of the Forest; Greenland 6N (Coop ID 203421) representing the Forest's northern portion; Stambaugh, MI 2 SSE (Coop Id 207812) representing the eastern portion. The collected data is presented in spreadsheets which were developed for the Ottawa by experts at the MRCC.

Monitoring Question 27b - Results

Table 173. Status and trend of the indicator for Monitoring Question 27b

Indicators		Recent Trend	
<i>Indicator 27(b):</i> The Accumulated Winter Season Severity Index (AWSSI) calculated for planning area base on daily measurements of maximum temperature, minimum temperature, snowfall and snow depth.		<i>Towards Target</i>	<i>Away from Target</i>
Current Status	<i>Within Target</i>		X
	<i>Outside Target</i>		

The AWSSI scores are depicted below for Ironwood, Greenland, and Stambaugh weather stations. The higher the score, the more severe winter reported. Higher scores in temperature mean colder winters. Higher scores in snow mean greater snow depth.

Table 174. AWSSI scores for Ironwood, Michigan weather station

Year	AWSSI Score Accumulated Temperature	AWSSI Score Accumulated Snow	Total Accumulated AWSSI Score	AWSSI Severity Category
2016-2017	750	732	1482	Mild
2017-2018	1097	1440	2537	Extreme

Year	AWSSI Score Accumulated Temperature	AWSSI Score Accumulated Snow	Total Accumulated AWSSI Score	AWSSI Severity Category
2018-2019	1066	1268	2334	Severe
2019-2020	840	1421	2261	Average
2020-2021	839	793	1632	Mild
2021-2022	1058	1144	2202	Average
2022-2023	844	1681	2525	Extreme

Table 175. AWSSI scores for Greenland, Michigan weather station

Year	AWSSI Score Accumulated Temperature	AWSSI Score Accumulated Snow	Total Accumulated AWSSI Score	AWSSI Severity Category
2016-2017	533	1062	1595	Mild
2017-2018	792	1589	2381	Extreme
2018-2019	720	1638	2358	Extreme
2019-2020	565	1632	2197	Severe
2020-2021	574	1047	1621	Moderate
2021-2022	690	1387	2077	Severe
2022-2023	563	1559	2122	Severe

Table 176. AWSSI scores for Stambaugh, Michigan weather station

Year	AWSSI Score Accumulated Temperature	AWSSI Score Accumulated Snow	Total Accumulated AWSSI Score	AWSSI Severity Category
2016-2017	849	620	1469	Mild
2017-2018	1231	928	2159	Extreme

Year	AWSSI Score Accumulated Temperature	AWSSI Score Accumulated Snow	Total Accumulated AWSSI Score	AWSSI Severity Category
2018-2019	1205	1065	2270	Extreme
2019-2020	907	1048	1955	Severe
2020-2021	948	634	1582	Moderate
2021-2022	1124	766	1890	Severe
2022-2023	855	1025	1880	Severe

What level of confidence is there in the accuracy and precision?

There is a moderate to high level of confidence in the accuracy and precision of the data collected since it consists of temperature and snow depth measurements from standardized long-term weather stations that contribute to a national climate database. We are confident in the development and use of the AWSSI as it was developed by scientists with appropriate publication and peer review and our spreadsheets are periodically updated by the climate scientists at the MRCC.

Monitoring Question 27b - Evaluation Discussion

Winter severity has been variable from year to year. The data indicates severe winters in the north (Greenland) tend to be influenced mostly by snow accumulation, whereas the east (Stambaugh) tends to be colder with less snow. Severe winters in the western portion of the Forest (Ironwood) tend to have a combination of both cold temperatures with greater snow accumulation. These variations are likely due to proximity to Lake Superior and topographic changes. Trends are not apparent due to insufficient length of time for data collection.

Indicator b (opening and closure dates of snowmobile trails and c (number of total days snowmobile trails are open) are ways to evaluate the duration of winter on the Ottawa. The Forest is known as “Big Snow Country” and the Forest provides a variety of winter sports opportunities as described in the FEIS (Volume I, p. iii). Snowmobiling is one of the most popular and widely participated winter sports activity on the Ottawa, although the number of registrations has declined 37% since FY 2008 (MI DNR, 2023). The Ottawa is home to roughly 240 miles of snowmobile trail, in addition to 450 miles of trail within the proclamation boundary. Unlike other states, the snowmobile trail system in Michigan does not formally open and close trails based on snow conditions. The formal trail season begins on December 1 and ends March 31 each year. However, the utilization of trails is dependent on conditions and the ability for groomers to keep trails groomed, which generally requires 12-inches of snow.

Previously, tracking the effects of winter severity on snowmobile riding was done utilizing the number of snowmobile trail riders, however, this information was sporadic and did not

encompass a complete view of the usage on the Ottawa and was not included for this monitoring report. It can be assumed that the information collected from the AWSSI will provide a direct linkage to winter recreation on the Ottawa. Specifically, on years with high AWSSI scores for accumulated snow it can be assumed that snowmobiling was likely a prominent winter recreational activity occurring on the Ottawa.



Figure 41. Snowmobile Registrations by Fiscal Year

Forest Plan

Are the current Forest Plan components (desired conditions, goals, objectives) achievable in the timeframes described and does the Forest Plan provide sufficient direction (standards, guidelines, suitability, designated lands) to achieve these components?

Climate change is not a component of the current Forest Plan. This monitoring question addresses the 2012 Planning Rule.

Forest Assessment

Is the status or trend of the monitoring indicators substantially different than described in the Forest Assessment, or was an assumption in the Forest Assessment proven to be invalid from the monitoring data?

Climate change is not a component of the Forest Assessment. This monitoring question addresses the 2012 Planning Rule.

Management Actions

Did any of the management activities potentially result in adverse or beneficial effects to the status and trend of the monitoring indicators?

Winter severity can affect winter logging operations. Portions of the Ottawa have soil conditions that require winter or frozen ground harvesting. Winter conditions are an important component of forest management and changes in those conditions would affect management options across the Ottawa.

Winter temperatures and snow depths may impact equipment operability. Prudent winter harvest operations rely on either frozen ground or packed snow. If temperatures are not cold enough to freeze the soil prior to snow setting in for the winter, the soil will remain unfrozen under the insulating snow cover. If the soil is not frozen or the snow is inadequately packed and frozen down, equipment can break through the snow layer and make deep ruts in the soft soil. If timber cannot be harvested without damaging the soil, operations must be paused until conditions improve. Deep snow with very cold temperatures can result in snow with low moisture content that won't freeze and set up. This can be problematic for equipment operability where there are steep slopes. When these conditions were present in the past, logging equipment has been known to slide down the steep slopes, unable to grip while sinking in the deep snow. When snow is very deep, it can make it difficult to keep roads and log landings plowed and maintained for winter access.

Monitoring Program

Did the monitoring results provide all the information necessary to answer the monitoring question?

No, gaps in data collection did not provide the necessary information to answer all the monitoring indicators associated with this question.

Monitoring Question 27b - Recommendations

Tracking the AWSSI is useful in helping managers understand winter conditions. Over time, it may become apparent that some management strategies need to adjust if it becomes increasingly difficult to operate logging equipment in some areas. Winter recreation demand could also change if winters becoming longer or shorter. Winter severity may also affect vegetative species composition and wildlife habitats. However, more years of data collection and analysis are needed before trends and changes are apparent.

Monitoring indicators reliant upon snowmobile data should be removed from the monitoring program as these indicators cannot be sufficiently answered with current monitoring trends of snowmobile trails in the state of Michigan, which have a set period of opening and closing of trails that is not dependent upon winter severity.

Table 177. Summary of monitoring recommendations for Monitoring Question 27a

Changes may be warranted for the:	Yes	Maybe, not enough information to determine at this time	No
Forest Plan			☐

Changes may be warranted for the:	Yes	Maybe, not enough information to determine at this time	No
Forest Assessment			☐
Management Actions			☐
Plan Monitoring Program	☒		

References

Boustead, Barbara E Mayes; Hilberg, S.D.; Shulski, M. D.; Hubbard, K.G. 2015. The Accumulated Winter Season Severity Index (AWSSI). Journal of Applied Meteorology and Climatology 54.8: 1693-1712.

Marinero, Alan, Hilberg, S.; Changnon, D.; Angel, J.R. 2015. The North Pacific–Driven Severe Midwest Winter of 2013/14, Journal of Applied Meteorology and Climatology, Vol. 54, No. 10: 2141-2151.

Monitoring Question 28 — To what extent is Forest Plan implementation affecting streams, lakes, ponds and wetlands and their associated riparian ecosystems?

Context for this Evaluation

This monitoring question discloses results of the best management practices (BMPs) monitoring program, which determines if these practices are implemented correctly and are effective. These BMP protection measures are implemented to provide for ecologically healthy watersheds, riparian areas and aquatic systems and to provide for excellent water quality.

Table 178. Background information for Monitoring Question 28

Drivers	
The 2012 Planning Rule (36 CFR 219.12(a)(5)(i)(ii)): The status of select ecological conditions including key characteristics of terrestrial and aquatic ecosystems. Measurable changes on the plan area related to watersheds, riparian areas and aquatic systems and other stressors that may be affecting the plan area. This question is responsive to one of the eight required monitoring elements prescribed by the 2012 Planning Rule.	
Primary Forest Plan Component Addressed	Monitoring Question Indicator
Provide for ecologically healthy watersheds, soils, riparian areas, and streams to support viable populations of native and desired non-native species, and to restore and enhance values associated with the Great Lakes System (EO 13340) (Forest Plan, Goal 20, p. 2-7)	Results of best management practices implementation and effectiveness monitoring in activity areas.

Who collected this data? Who is Responsible for analyzing this question?
Ellen Lesch, Hydrologist

When was this monitoring question last updated?

- Date of current evaluation: November 2023
- Date of previous evaluation: FY 2017 Monitoring Evaluation Report

Table 179. Relationship of Monitoring Question 28 to other Forest Plan direction

Question 28	Key Forest Plan Components		
	<i>Desired Conditions</i>	<i>Goals and Objectives</i>	<i>Standards and Guidelines</i>
Indicator 28	Native trees, shrubs, herbaceous, and emergent vegetation provide for a wide array of functions which include shade for moderation of river water temperature, providing a source of fine litter and large woody debris to streams, stabilizing banks, filtering sediment and nutrients, modifying microclimate, and providing wildlife habitat and connectivity (p. 3-74).	Goal 21: Floodplains are able to store and transmit floodwaters, fulfill their natural role in regulating water quality, and present minimum risk to human safety and property (p. 2-7). Goal 22: Wetlands should be managed to prevent the impairment of water quality, fish, wildlife and plant habitat, and aesthetic values (p. 2-7).	2500 Guidelines associated with riparian area, riparian corridor, wetland (includes poorly and very poorly drained soils), seasonal ponds, and floodplain management (p. 2-26 to 2-27). 2600 Mayfly-Stonefly-Caddisfly Guidelines associated with crossings and areas within riparian areas (p. 2-31 to 2-32). 2600 Aquatic/Wetland Ecosystems Guidelines associated with shoreline buffers (p. 2-33). 2600 Bog/Fen/Wet Meadow/Open Wetland Guideline associated with hydraulic function and shade (p. 2-34).

**What monitoring activities have been conducted since the last monitoring evaluation?
What protocols were used to collect these data?**

The BMP monitoring on the Ottawa occurs annually in conjunction with USDA Forest Service monitoring efforts, which strives for a nationally consistent monitoring system.

This report summarizes results of monitoring conducted to assess implementation and effectiveness of BMPs employed to reduce risks to water quality within streams, lakes, ponds, wetlands and riparian areas. Previous Monitoring Evaluation reports focused solely on BMP effectiveness during timber management activities, however, the Forest has started monitoring additional management activities. BMP implementation and effectiveness monitoring has changed over the years since the national standard was developed and fully implemented in 2014 (USDA, 2015). The Ottawa began using National Core BMP standardized monitoring protocols and entering results into the national database in 2015. Previous monitoring efforts used draft protocols with inconsistent results. Therefore, monitoring results prior to 2015 have been dropped from further analysis.

The BMP evaluations are completed by interdisciplinary teams of resource specialists. Teams conduct include assessments of how BMP prescriptions were planned, implemented and effective at meeting water resource protection objectives. Implementation evaluations provide information on the extent to which water quality protection was considered in planning and project implementation. In addition to the implementation and effectiveness questions, field evaluators qualitatively estimate the spatial extent and level of risk to water quality by recording whether potential pollutants are found outside of Aquatic Management Zones (AMZ), found inside AMZs or delivered directly to waterbodies.

The Ottawa has monitored campgrounds, picnic areas, boat launches, road-stream crossing reconstruction sites, general road management and maintenance sites, prescribed fire areas and ground-based timber harvest operations. More monitoring sites with their associated protocols may be added in the future. The Table 180 identifies the protocols that have been used and a brief description of what is evaluated and examples of what is appropriate to monitor.

Table 180. BMP monitoring protocols and descriptions for sites monitored

Resource Category	Protocol	What does it evaluate?	Examples of appropriate project, activity or site
Recreation Management Activities	Rec A <i>Developed Recreation Sites</i>	Operation and maintenance of developed recreation sites	Operation and maintenance of: - Campgrounds - Day-use areas, including picnicking, swimming, rock climbing, or fishing areas
	Rec G <i>Watercraft launches</i>	- Operation and maintenance of existing watercraft launches - newly constructed/reconstructed watercraft launches	- Operation and maintenance of exiting watercraft launches that are official ONF recreation sites. - Construction of new launches - Reconstruction of existing launches that are official ONF boat launches.

Road Management Activities	Road B <i>Completed Road or Waterbody Crossing Construction or Reconstruction</i>	- Completed road or waterbody crossing construction or reconstruction - Includes work on Forest Service system roads, as well as work on roads with use agreements, special use permits, or mineral plans of operation.	- Completed constructed or reconstructed roads - Completed constructed or reconstructed waterbody crossings even if other road work was not performed
	Road C <i>Road Operation and Maintenance</i>	Long-term management and maintenance of Forest Service maintenance level 2 through 5 system roads	- Road use of both gated and open roads - Routine road maintenance (e.g., road grading or resurfacing, maintenance of drainage features.)
Mechanical Vegetation Management Activities	Veg A <i>Ground-Based Skidding and Harvesting</i>	Completed ground-based skidding and harvesting operations	- Typical timber harvesting operations involving log skidding and temporary storage of logs on landings - Ground-based timber/vegetation removal for facility development including recreation sites, ski areas, campgrounds, administrative sites, or road construction
Wildfire Management Activities	Fire A <i>Use of Prescribed Fire</i>	Completed implementation of prescribed fire, including fire lines	Prescribed fire used as a tool to achieve resource management objectives, such as fuels reduction or opening maintenance.

(USDA, 2015)

What is the target, or range for the indicator being measured? Is there an alert level (such as a trigger or threshold), associated with the target that should be noted?

The rating categories for implementation are “Fully Implemented”, “Mostly Implemented”, “Marginally Implemented”, “Not Implemented” and “No BMPs”. A rating of “No BMPs” is assigned to evaluations that found no evidence that BMPs were included in project planning or in documents that guide operations on site. The primary difference between “Fully Implemented” or “Mostly Implemented” and “Marginally Implemented” is that, in the former two, planned BMPs are implemented fully on the ground, whereas in “Marginally

Implemented,” some, but not all, planned BMPs are implemented fully on the ground (USDA, 2015).

The rating categories for effectiveness are “Effective”, “Mostly Effective”, “Marginally Effective” and “Not Effective”. “Effective” indicates no adverse impacts to water from project or activities were evident. “Mostly Effective” indicates impacts to water resources were minor and temporary. “Marginally Effective” indicates impacts to water resources were minor and prolonged, or major and temporary. Although some protocols incorporate use of existing water quality monitoring data, if available, the protocols do not include direct monitoring of beneficial or designated uses of waterbodies. BMP ratings of “Not Effective” indicate potential for major and prolonged adverse effects to water quality or waterbody condition, but they do not necessarily indicate impairment of beneficial or designated uses (USDA, 2015).

If a site is selected for BMP evaluation, it is to be assessed first for BMP implementation and then for BMP effectiveness. For those sites where BMP implementation and effectiveness evaluations have both been completed and ratings have been assigned, a composite rating for the evaluation is determined (USDA, 2015). Composite rating categories are “Excellent”, “Good”, “Fair”, “Poor” and “No Plan.” The effectiveness rating is given greater weight in the composite rating than the implementation rating unless the implementation rating was “No BMPs”. If the implementation rating is “No BMPs”, the composite rating is “No Plan” by default because an implementation rating of “No BMPs” represents a failure to consider BMPs in the planning process.

While there are no thresholds established for this monitoring protocol, the rating categories help managers determine if additional protection measures or other management actions are needed to better protect aquatic ecosystems.

Has any new Best Available Scientific Information (BASI) informed this monitoring question, indicators, or methodology? Where is the data for this monitoring question stored?

The BMP monitoring protocol was developed over many years with input from numerous Forest Service entities including the National Forest System, State and Private Forestry and Research and Development. The BMP monitoring program was developed to improve agency performance and accountability in managing water quality consistent with the Clean Water Act (CWA) and State water quality programs. Complete and detailed monitoring information, including protocol direction, is available for public viewing at <https://www.fs.usda.gov/naturalresources/watershed/bmp.shtml>.

Monitoring Question 28 – Results

Table 181. Status and trend of the indicator for Monitoring Question 28

Indicators		Recent Trend	
<i>Indicator:</i> Results of best management practices implementation and effectiveness monitoring in activity areas		<i>Towards Target</i>	<i>Away from Target</i>
Current Status	<i>Within Target</i>	X	
	<i>Outside Target</i>		

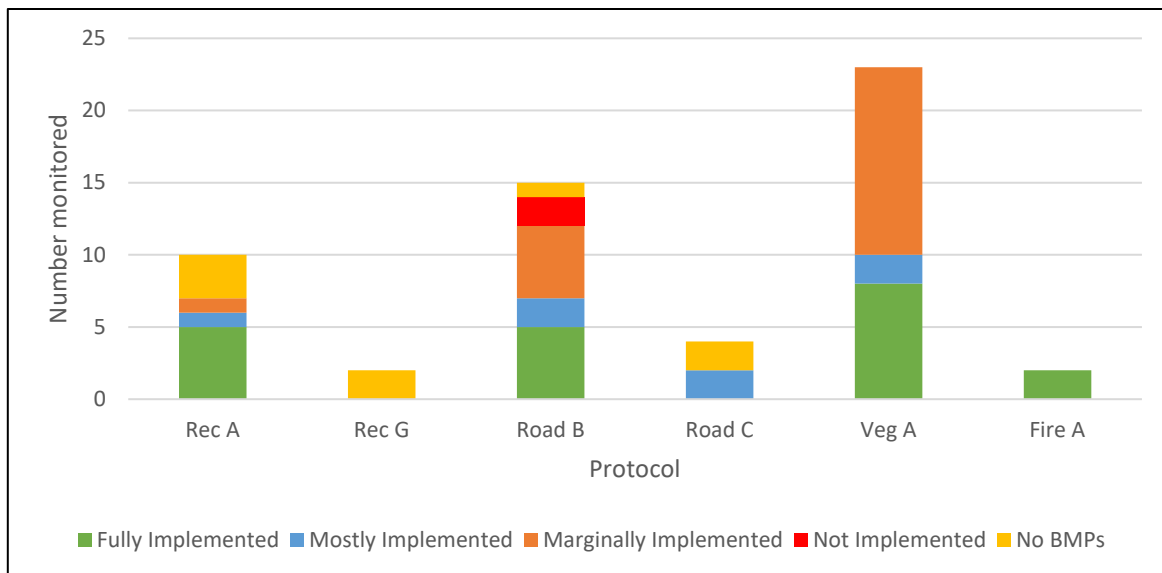


Figure 43. BMP implementation ratings (FY 2019 to FY 2023)

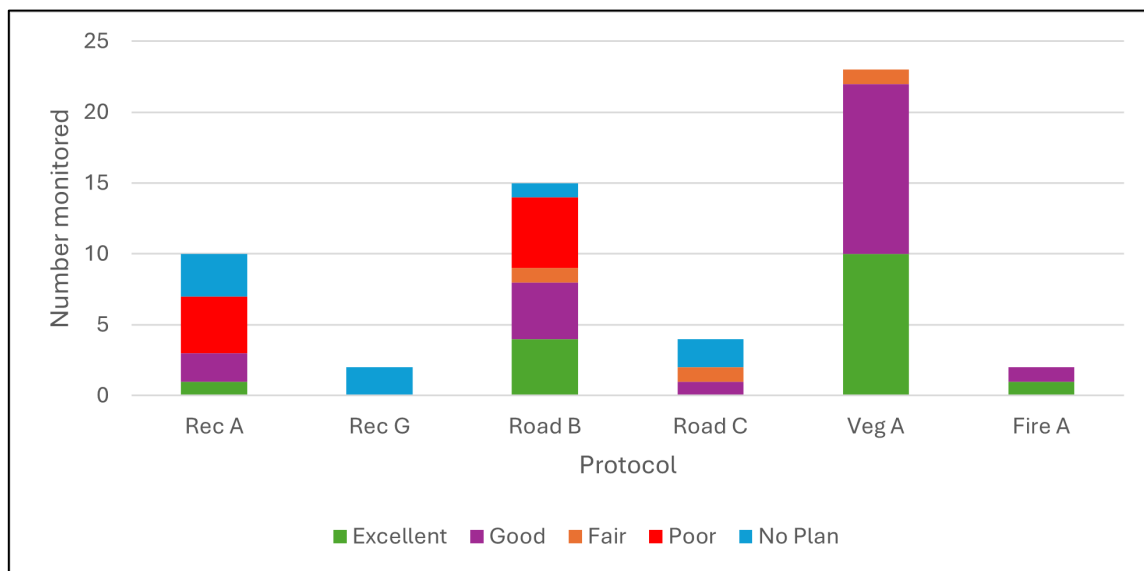


Figure 42. BMP composite scores (FY 2019 to FY 2023)

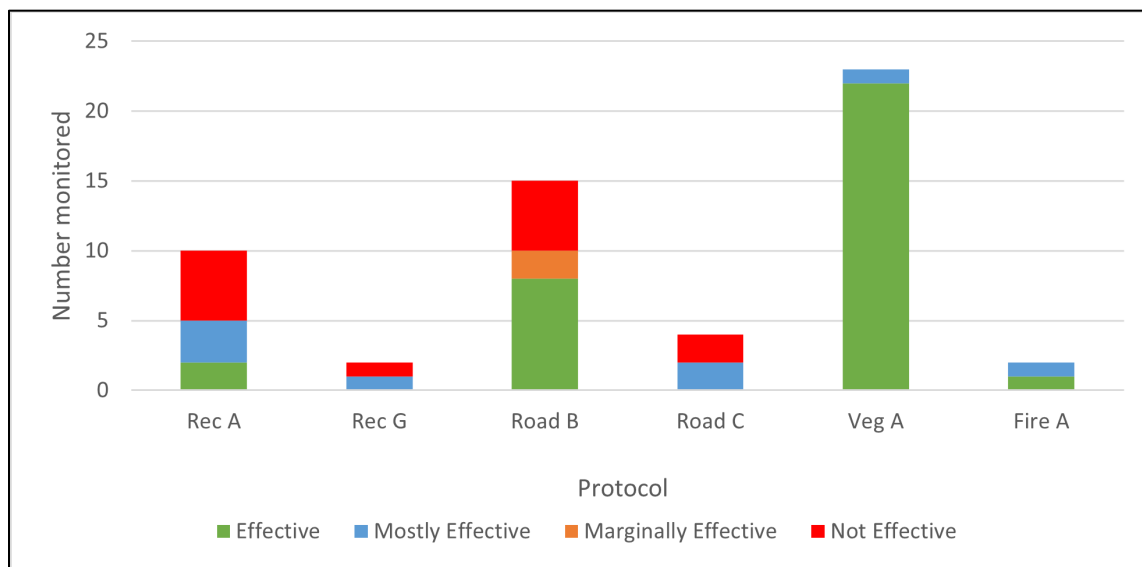


Figure 44. BMP effectiveness ratings (FY 2019 to FY 2023)

What level of confidence is there in the accuracy and precision?

There is high level of confidence in the quality of data collected since it consistently follows the national data collection and reporting protocols, which are repeatable and reliable.

Monitoring Question 28 - Evaluation Discussion

The BMP implementation monitoring shows areas where improvements can be made. The Forest needs to improve upon implementing water quality protection measures fully and correctly. We were mostly or fully successful at implementing BMPs to protect aquatic resources at most sites. Some developed recreation sites, water launches and roads did not have BMPs identified in planning documents. Operation plans or maintenance requirements of the sites.

The BMP effectiveness monitoring shows the BMPs were mostly effective or effective at preventing pollutants, including sediments, from entering riparian areas and waterbodies with ground-based timber harvest and prescribed fire. Half of the monitored sites for developed recreation and watercraft site implementation was found to be mostly effective or effective at protecting waterbodies. Most road construction and maintenance sites monitored were mostly effective or effective at protecting waterbodies.

Monitoring results show the best overall performances (composite BMP implementation and effectiveness scores rated as “Excellent” or “Good”) were in ground-based timber harvesting and prescribed fire. Road construction and reconstruction had ratings ranging from “Good” to “Excellent”. Five recreation sites, one road construction and two road maintenance sites had no BMPs for riparian and water quality protection written into their plans receiving a composite rating of “No Plan”.

Some improvements have recently been made to reduce riparian and water quality impacts. Two campgrounds and numerous watercraft launches have been analyzed and authorized under NEPA to receive erosion control work. Some recreation site improvements that did not require NEPA (categorically exempt) have been completed. Some watercraft launch sites across the Forest have had improvements made.

Riparian area BMPs for timber management (Riparian Table Matrices) have been rewritten by soil, hydrology and timber management staff to more clearly define protection measures during implementation. Soil mapping improvements are made as errors are found, providing better map guidance for field crews. Soil and hydrology staff have worked with marking crew members and sale administrators to help delineate riparian area boundaries, identify small streams, seasonal ponds and wetlands. Timber marking crews have new equipment to help implement riparian protection measures when laying out timber sales, which has helped with aquatic feature recognition and protection. Annual training to help timber management staff understand riparian protection measures and recognize features in the field is hosted by soil and hydrology staff.

Additional positions have been added to the Forest organization charts to improve program planning and implementation. This includes positions in engineering, timber, and hydrology. Hydrology, fisheries and engineering program managers and staff have spent additional time in the field looking at ongoing and recently completed construction sites to observe, discuss and improve how aquatic features are being protected.

The Ottawa has been purchasing erosion control products to use for quick installation when there is a need for additional protection measures. The Forest has been shifting away from silt fencing, which is difficult to correctly install and contributes micro-plastics to the aquatic system. Biodegradable and non-plastic erosion control materials, including waddles, are easier to install correctly than silt fencing. These materials are more effective at trapping sediment and are now being used on the Forest. There has been an increase in using erosion control fabric which is biodegradable, non-plastic and has an open weave that is less likely to trap wildlife. Areas where these have been installed have seen good results in protecting aquatic resources.

Forest Plan

Are the current Forest Plan components (desired conditions, goals, objectives) achievable in the timeframes described and does the Forest Plan provide sufficient direction (standards, guidelines, suitability, designated lands) to achieve these components?

The current Forest Plan desired conditions, goals and objectives for riparian areas and aquatic ecosystems are achievable, and the Forest Plan provides sufficient guidelines to achieve them. To assure these Forest Plan components are achieved, Forest-wide design criteria aimed at protecting aquatic resources were developed for project application as they are being developed and implemented. Additional design criteria are developed for projects as needed.

Forest Assessment

Is the status or trend of the monitoring indicators substantially different than described in the Forest Assessment, or was an assumption in the Forest Assessment proven to be invalid from the monitoring data?

The status of the monitoring indicator is not substantially different than described in the Assessment. The assessment for the Forest Plan included new riparian protection measures that are based on ecological site conditions and create a no harvest buffer that protects water quality and riparian ecological function. The assessment indicated implementation would provide adequate protection. The monitoring finds the water quality and riparian areas are adequately protected when the BMPs are correctly implemented.

Management Actions

Did any of the management activities potentially result in adverse or beneficial effects to the status and trend of the monitoring indicators?

The previously presented charts and tables disclose areas where riparian protections were not adequately implemented or were ineffective. Of the management activities monitored, recreation and road construction have the greatest potential for adverse impacts to riparian resources and water quality. The proximity of these activities to aquatic resources increases the risk. While timber and fire resources could have potential for adverse impacts, the risk is much lower due to the steps taken to reduce those risks, such as buffer zones, training, use of new tools and close interaction with soil and hydrology staff.

Monitoring Program

Did the monitoring results provide all the information necessary to answer the monitoring question?

Yes, the monitoring protocols and indicators adequately provide the necessary information to answer the monitoring question.

Monitoring Question 28 - Recommendations

There is an opportunity to improve BMP implementation, effectiveness and overall composite ratings. Developing BMPs and locating them in operations plans for all developed recreation sites, watercraft launches and road construction operations would improve scores for implementation. Soil and hydrology staff could work more closely with recreation staff to strengthen this working relationship. The increased time spent with engineering staff to reduce risks to water quality in these resource areas should be continued and increased where possible. Monitoring shows a need to continue working with timber marking crews and sale administrators to better implement the riparian protection measures defined included in land management decisions. Implementing crews have expressed concern over the availability of soil and water staff to assist them in the field. Vacancies in water, hydrology and engineering positions contribute to the availability concerns, quality implementation of road project concerns, as well as eliminate the ability for program coordination and development at the program manager level. The current training for timber management personnel, attended by fire staff as well, has been well received and should continue.

Table 182. Summary of monitoring recommendations for Monitoring Question 28

Changes may be warranted for the:	Yes	Maybe, not enough information to determine at this time	No
Forest Plan			☐
Forest Assessment			☐
Management Actions			☐

Changes may be warranted for the:	Yes	Maybe, not enough information to determine at this time	No
Plan Monitoring Program			☐

References

U.S. Department of Agriculture (USDA), Forest Service. 2015. National best management practices monitoring summary report: program phase-in period fiscal years 2013-2014. FS-1070. Washington, DC: U.S. Department of Agriculture, Forest Service. 42 p.

Monitoring Question 29 — To what extent are key habitat components in aquatic and terrestrial habitat being provided?

Due to personnel capacity issues, the Forest is unable to answer this question during this reporting period. However, results will be reported in the next biennial report.

Monitoring Question 30 — To what extent is Forest management contributing or responding to the conservation of Species of Viability Concern (such as Regional Forester's Sensitive Species) and moving toward desired habitat for these species?

Context for this Evaluation

This monitoring question ensures the Ottawa remains consistent with Forest Plan direction regarding management of habitat types suitable to RFSS and SVC. Managing for suitable habitat helps to maintain viable populations on the Forest. Federally listed species will not be addressed in Monitoring Question 30; they are found in Monitoring Question 31.

Table 183. Background information for Monitoring Question 30

Drivers	
The 2012 Planning Rule (36 CFR 219.12(a)(5)(iv)): The status of select set of the ecological conditions required under 36 CFR 219.9 to contribute to the recovery of Federally listed threatened and endangered species, conserve proposed and candidate species and maintain a viable population of each species of conservation concern.	
Primary Forest Plan Component Addressed	Monitoring Question Indicator
Promote the conservation, restoration, and recovery of populations of species of viability concern (Forest Plan, Goal 30, p. 2-9).	a: Number of actions implemented for plants from approved recovery plans, conservation strategies and/or Forest Plan direction.
	b: Number of actions implemented for wildlife from approved recovery plans, conservation strategies, and/or Forest Plan direction.
Who collected this data? Who is Responsible for analyzing this question?	
Brienne Boan (Wildlife Biologist), Ian Shackelford (Botanist), Ryan Beatty (Fish Biologist) and Jeremy Pickle (Wildlife Biologist)	

When was this monitoring question last updated?

- Date of current evaluation: May 2024
- Date of previous evaluation: FY 2017 Monitoring Evaluation Report

Table 184. Relationship of Monitoring Question 30 to other Forest Plan direction

Question 30	Key Forest Plan Components		
	<i>Desired Conditions</i>	<i>Goals and Objectives</i>	<i>Standards and Guidelines</i>
Indicators a and b	Maintain or improve habitat suitable to support viable populations of RFSS and other SVC. The 1982 Planning Rule states, “Forest planning shall provide for diversity of plant and animal communities...consistent with the overall multiple-use objectives of the planning area... Fish and wildlife habitat shall be managed to maintain viable populations of existing native and desired non-native vertebrate species in the planning area”.	Goal 20: Provide for ecologically healthy watersheds, soils, riparian areas, and streams to support viable populations of native and desired non-native species, and to restore and enhance values associated with the Great Lakes System (p. 2-7). Goal 22: Wetlands should be managed to prevent the impairment of water quality, fish, wildlife and plant habitat, and aesthetic values (p. 2-7). Goal 26: Promote landscape conditions and habitat diversity to support viable populations of native and desired non-native animal and plant species (p. 2-8). Goal 28: Manage Kirtland’s warbler habitat using management	General Guidelines (p. 2-27): Conduct inventories for SVC taxa at and above the project level where appropriate given existing habitat. Provide habitat for possible population growth and expansion for SVC where practical. Determine occurrence protection needs for delisted taxa on a case-by-case basis. When appropriate to Forest ecosystem and conditions, implement actions recommended in approved plans for species recovery. Design, construct, and maintain stream crossings and dams to minimize disrupting the migration or movement of fish and other aquatic life Species Specific Standards and Guidelines:

Question 30	Key Forest Plan Components		
	<i>Desired Conditions</i>	<i>Goals and Objectives</i>	<i>Standards and Guidelines</i>
		principles that mimic/resemble historic conditions and disturbance regimes. Develop habitat by using treatments that mimic the regeneration effects of stand replacing wildfires (p. 2-9) Objectives: a. Manage 4,000-5,000 acres of jack pine for Kirtland's warbler. Manage for breeding habitat primarily in the Baraga Plains. Objective B: Regenerate 1-3 treatment blocks of jack pine in patches of 300-550 acres every 10 years. (p. 2-9). Goal 31: Manage the Remote Habitat Area (RHA) to provide habitat for species that require some degree of remoteness from human activity, including gray wolf, American marten, goshawk, and red-shouldered hawk and others (p. 2-9).	Bald eagle nest protection guidelines (p. 2-28). Kirtland's warbler (including various other RFSS and SVC species), American woodcock, and raptor management guidelines (p. 2-30). Terrestrial Ecosystem Standards and Guidelines for upland conifer, pine barrens, lowland conifer, boreal forest, permanent forest openings, caves/mines/rock outcrops/talus slopes. Each of these terrestrial ecosystems involves at least one SVC (p. 2-32 and 2-33).

**What monitoring activities have been conducted since the last monitoring evaluation?
What protocols were used to collect these data?**

We continue monitoring known populations of SVC, finding new populations and learning more about our rare species. Redside dace are limited to the Presque Isle River Watershed, but an intensive eDNA sampling strategy was applied in 2021 to verify species persistence in streams known to support redbside dace and identify other potential populations. Thirty-three eDNA samples were collected from twenty streams in the potential species range on the Ottawa. Redside dace were detected at 19 sample locations and 14 different streams and rivers in the Presque Isle River watershed. Creek heelsplitter mussels, and other potentially rare mussel species, were surveyed for intensively in the Ontonagon River Watershed between 2017 and 2019, in collaboration with Lake Superior State University. The 44 wadable river surveys conducted throughout the Ontonagon River watershed determined that the Ontonagon River system is home to at least six species of freshwater mussels.

Mussel abundance and richness were low relative to other parts of the state, but small “hotspots” of mussel richness and abundance were found in the upper reaches of the watershed in the Cisco and upper Middle branches. However, creek heelsplitter were detected at only three survey locations, and likely remain sparsely distributed and in low abundance across the Ottawa. Mussel surveys were also conducted above and below eight small dams in the Ontonagon River Watershed in 2023 to inform potential impacts associated with future possible dam removal projects. Specific surveys for RFSS dragonfly species have not been conducted since 2017, but we routinely seek out other data sources for other species detections on the Ottawa, such as citizen-science based efforts (iNaturalist and Odonata Central) and through subject matter experts (e.g. Julia Craves and Darrin Obrien who validate identifications for Odonata Central, curate specimen collections, and assist the Michigan Environment, Great Lakes and Energy Department with dragonfly identification.) Rare wildlife species are surveyed for using a variety of species-specific protocols.

Animal species are tracked in the Forest Service NRM Wildlife database. Rare plant survey and documentation follow the established the 2015 USDA Forest Service protocol and are recorded in the Forest Service Threatened, Endangered and Sensitive Plants – Invasive Species (TESP-IS database). Conservation actions applicable to Indicators (a) and (b) are tracked in several Forest Service databases and annual accomplishment reports.

What is the target, or range for the indicator being measured? Is there an alert level (such as a trigger or threshold), associated with the target that should be noted?

Ideally, Ottawa ecosystems would support viable populations of all wildlife and plants that occur here (Forest Plan, Goal 26, p. 2-8). However, as noted in the FEIS (page E-6), some listed species are at risk for reasons beyond the National Forest. There is no specific target or range for number of actions implemented for listed species. Alert levels to note are when new species are listed as Endangered, Threatened or RFSS.

Botany and Aquatic Insects

Table 185. Plant and aquatic insects listed since 2016

Species	Common Name	Status 2024
<i>Cypripedium parviflorum</i> var. <i>makasin</i>	Smaller Yellow Lady slipper	RFSS
<i>Gomphus</i> [<i>Hylogomphus</i>] <i>viridifrons</i>	Green-faced Clubtail Dragonfly	RFSS
<i>Ophioglossum pusillum</i>	Northern adder's-tongue	RFSS
<i>Potamogeton confervoides</i>	Alga pondweed	RFSS
<i>Primula mistassinica</i>	Bird's-eye Primrose	RFSS
<i>Somatochlora incurvata</i>	Incurvate Emerald Dragonfly	RFSS
<i>Stylurus amnicola</i>	Riverine Clubtail Dragonfly	RFSS
<i>Stylurus notatus</i>	Elusive Clubtail Dragonfly	RFSS

Most of the species in Table 185 have been rare in the western Upper Peninsula for many years. Their listing since 2016 reflects recent discoveries on the Ottawa or changes to their global, national or state conservation status that suggest increased risk of extirpation or imperilment.

Five species have been declared extirpated from the Ottawa since 2016: Carey's smartweed (*Polygonum careyi*), Satiny willow (*Salix pellita*), Schistostega moss (*Schistostega pennata*), Black foam lichen (*Anzia colpodes*) and Beauvois' spotted felt lichen (*Sticta beauvoisii*). All are difficult-to-identify species last observed 37 to 56 years ago. We hope they remain somewhere on the Forest and will be rediscovered and considered for RFSS protection.

The following species have been removed from our RFSS list since 2016: Large toothwort (*Careamine maxima*), Greater yellow lady's- slipper (*Cypripedium parviflorum* var. *pubescens*), White fawnlily (*Erythronium albidum*), Virginia bugleweed (*Lycopus virginicus*), Bog muhly (*Muhlenbergia uniflora*), Pink wintergreen (*Pyrola asarifolia*), New York fern (*helypteris noveboracensis*), Heart-leaved Foam-flower (*Tiarella cordifolia*), Ohio Orthotrichum moss (*Orthotrichum ohioense*), Pylaisiadelph moss (*Pylaisiadelph tenuirostris*), Snow lichen (*Stereocaulon pileatum*) and Beard lichen (*Usnea longissima*). In general, more sites of these species were documented leading to the determination that sufficient protection measures existed, and the species were not at risk on the Forest.

Wildlife

Since the FY 2019 report, the tri-colored bat, which was previously on the RFSS list, was elevated to "Proposed" for Federal listing. The tri-colored bat will be discussed further in Monitoring Question 31. The monarch butterfly is currently a candidate for listing but still considered a RFSS for management purposes. The KW was removed from the Federal endangered species list in 2019 and subsequently was added to the RFSS list. Since the last reporting period in 2017, one new species, the golden-winged warbler, was added to the RFSS list. In 2023, populations, habitat and hydrology protections already established in the Forest Plan were deemed sufficient to remove the four-toed salamander from the RFSS list.

There are quantified protections for specific species of concern listed in the Forest Plan (red-shouldered hawk (p. 2-30), northern goshawk (p. 2-30) and bald eagle (p. 2-28)), quantified habitat management goals for KW (p. 2-9) and general habitat management goals for the remaining SVC (p. 2-27 to 2-28). For RFSS and other SVC the Terrestrial Ecosystem Standards and Guides apply (p. 2-32 to 2-33). Each MA quantifies goals for managing the categorized terrestrial ecosystems (Forest Plan, Chapter 3).

Has any new Best Available Scientific Information (BASI) informed this monitoring question, indicators, or methodology? Where is the data for this monitoring question stored?

We seek to be aware and mindful of new scientific publications concerning the Ottawa SVC, and new BASI often affects how we manage our populations. However, no new BASI has led to changes in this monitoring question, our indicators or monitoring methodology. SVC wildlife are tracked in the NRM Wildlife database. SVC fish and aquatic invertebrate locations are tracked with internal databases and periodic RFSS species evaluations. SVC plants are tracked in the TESP-IS database. Recovery actions are stored in a variety of databases, including FACTS, TESP-IS, WIT and annual reporting tools.

Monitoring Question 30 – Results

Table 186. Status and trend of the indicator for Monitoring Question 30

Indicators		Recent Trend	
<i>Indicator 30a:</i> Number of actions implemented for plants from approved recovery plans, conservation strategies and/or Forest Plan direction.		<i>Towards Target</i>	<i>Away from Target</i>
Current Status	<i>Within Target</i>	X	
	<i>Outside Target</i>		
Indicators		Recent Trend	
<i>Indicator 30b:</i> Number of actions implemented for wildlife from approved recovery plans, conservation strategies and/or Forest Plan direction.		<i>Towards Target</i>	<i>Away from Target</i>
Current Status	<i>Within Target</i>	X	
	<i>Outside Target</i>		

What level of confidence is there in the accuracy and precision?

Calculating accuracy and precision is difficult when we work with generalities. Managing for hard numbers is difficult when there are many variables outside the control of the Forest Service (e.g. weather, disease, migration, etc.). Nonetheless, there is a high level of confidence that the quality and quantity of work are either conserving, improving, or expanding SVC habitat. Activities are tracked in the aforementioned databases.

Monitoring Question 30 - Evaluation Discussion

Botany – Indicator 30a

Table 187. Plant recovery actions (FY 2017 to FY 2023)

Taxon	Status	Year	Action
New England blue violet <i>Viola novae-angliae</i>	RFSS	2017 & 2022	NNIP removal at one occurrence to lessen competition.
Dwarf bilberry <i>Vaccinium cespitosum</i>	RFSS	2018, 2020, 2022	Plant 442, 100 and 405 seedlings at eleven experimental locations.
Black hawthorn <i>Crataegus douglasii</i>	RFSS	2019	Erected new small cages around experimental planting at one site.
Small blue-eyed mary <i>Collinsia parviflora</i>	SVC	2020 to 2023	NNIP removal at one site.
American ginseng <i>Panax quinquefolius</i>	RFSS	2022 & 2023	Provide Lac Vieux Desert Band of Lake Superior Chippewas with six ginseng plants grown from commercial seed. Erect 14 fences around ginseng at one location. Plant 37 seedlings and seed at three experimental locations.
Fairy bells <i>Prosartes hookeri</i>	RFSS	2022 & 2023	NNIP removal at one site.

Fish and Aquatic Invertebrates – Indicator 30b

Table 188. Management contributing to the conservation of aquatic SVC (FY 2017 to FY 2023)

Taxon	Status	Year	Action
Lake Sturgeon <i>Acipenser fulvescens</i>	RFSS	2017	Ottawa contribution to collaborative Ontonagon River, Lake Sturgeon Population Restoration in conformance with the MI DNR Sturgeon Rehabilitation Strategy (MDNR, 2012). Stocking of Ontonagon River with 1,261 juveniles.
Lake Sturgeon	RFSS	2018	Stocking of Ontonagon River with 759 juveniles.
Lake Sturgeon	RFSS	2019	Stocking of Ontonagon River with 1,507 juveniles.
Lake Sturgeon	RFSS	2021	Stocking of Ontonagon River with 1,667 juveniles.
Lake Sturgeon	RFSS	2022	Stocking of Ontonagon River with 1,013 juveniles.
Lake Sturgeon	RFSS	2023	Stocking of Ontonagon River with 747 juveniles.

Taxon	Status	Year	Action
Redside Dace <i>Clinostomus elongatus</i>	RFSS	2021	Little Presque Isle River: Large Woody Material (LWM) habitat enhancement with 15 trees over 1.25 miles.
Redside Dace	RFSS	2021	East Branch Presque Isle River: LWM habitat enhancement with 50 trees over 2.5 miles.
Redside Dace	RFSS	2022	East Branch Presque Isle River: LWM habitat enhancement with 20 trees and brush bundles over 1.75 miles.
Redside Dace	RFSS	2023	Iris Creek: LWM habitat enhancement with 25 trees and brush bundles over 1.75 miles.
Redside Dace	RFSS	2023	Pomeroy Creek: LWM habitat enhancement with 25 trees and brush bundles over 1.75 miles.
Redside Dace	RFSS	2021	Intensive eDNA population distribution study to assess local population persistence from historic detections and new local populations not previously detected with traditional sampling methods.
Redside Dace	RFSS	2017-2023	All vegetation management projects employ design criteria to avoid near stream disturbance to shade, bank stability and instream habitat. When concurrent with designated cold-water streams, a no-aspen regeneration buffer of 400 ft is also applied to avoid habitat alterations due to beaver impoundments.
Creek Heelsplitter <i>Lasmigona compressa</i>	RFSS	2017	Thirtythree Creek stream simulation culvert replacement to restore connectivity for host fish. The Paint River has the greatest distribution and mussel species richness, and this stream may be creek heelsplitter habitat.
Creek Heelsplitter <i>Lasmigona compressa</i>	RFSS	2019	Golden Creek stream simulation culvert replacement to restore connectivity for host fish. The Paint River Watershed has the greatest distribution and mussel species richness, and this stream may be creek heelsplitter habitat.

Taxon	Status	Year	Action
Creek Heelsplitter	RFSS	2017-2023	General Aquatic Organism Passage (AOP) restoration which may benefit host-fish distribution and subsequently creek heelsplitter persistence and distribution. There is a high degree of uncertainty regarding the true distribution of this species on the Ottawa, and all AOP projects have some potential to benefit this species. For a summary of AOP projects completed see Question 26b.
RFSS Dragonflies (Green-faced Clubtail, Rapids Clubtail, Pygmy Snaketail, Forcinate Emerald, Incurvate Emerald, Riverine Clubtail and Elusive Clubtail).	RFSS	2017-2023	Forest Management impacts are likely insignificant due to design criteria applied. All vegetation management projects employ design criteria to avoid streamside and shoreline disturbance to shade, bank stability and aquatic habitat. When concurrent with designated cold-water streams, a no-aspen regeneration buffer of 400-feet is also applied to avoid habitat alterations due to beaver impoundments.

Wildlife – Indicator 30b

There are 21 wildlife SVC that occur on the Ottawa. The majority (74%) of the actions implemented for wildlife are within target. Of the 21 species, five were considered outside target: West Virginia white butterfly, Connecticut warbler, black-backed woodpecker, spruce grouse and northern barrens tiger beetle. Efforts, described below, have either already begun or are in the planning phases to bring those species back within target.

- **West Virginia White Butterfly:** No surveys targeting the West Virginia white butterfly (WVW) were conducted between 2017 and 2023. One survey conducted in 2020 that focused on *Lepidoptera* in dry openings documented a WVW immediately adjacent to a site. The host plants, toothworts, are found frequently across the Forest. Mapping suitable habitat to survey host plants for eggs, larvae and adults is set to begin in 2024.
- **Connecticut Warbler:** In each VMP, Connecticut warbler habitat is assessed and opportunistically searched for both aurally and visually. During KW and golden-winged warbler (GWW) surveys, all species are recorded; however, surveys specific to Connecticut warbler were not conducted. Between 2017 and 2023, habitat management for Connecticut warbler became a priority in land management decisions. In 2023, a Connecticut warbler working group was formed and focused surveys are beginning in 2024.
- **Black-Backed Woodpecker and Spruce Grouse:** In each VMP, black-backed woodpecker (BBWO) and spruce grouse (SPGR) habitat is assessed and opportunistically searched for both aurally and visually. The area surveyed for KW contains suitable BBWO habitat and surrounded by suitable SPGR habitat. All birds

encountered during KW surveys are recorded and that has resulted in some BBWO and SPGR detections. The planned 2024 Connecticut warbler surveys overlaps both BBWO and SPGR habitat and therefore, all three species will benefit. Between 2017 and 2023, habitat management for BBWO became a priority in land management decisions. KW habitat projects also benefit BBWO and SPGR.

- Northern Barrens Tiger Beetle: Surveys specific to northern barrens tiger beetle did not occur between 2017 and 2023, however they are recorded when encountered in other pollinator surveys. The Forest will be including them on surveyors' lists to ensure they are recorded when encountered. Maintaining open habitat on dry, sandy soil is beneficial. The proposed fire break in the Baraga Plains and KW habitat improvement should benefit the northern barrens tiger beetle.

Table 189. Wildlife management contributing to the conservation of RFSS and SVC (FY 2017 to FY 2023)

Species	Status	Year	Action	Method
Bats (all species)	RFSS & SVC	2017-2023	Hibernacula Surveys	Visual and acoustic surveys were contracted and conducted in November of each year.
		2017-2023	Acoustic Surveys	NABat stationary and mobile acoustic surveys.
		2020	Mine closures	Contracted. Special fencing used to ensure bats could still access.
		2022-2023	Bat tree reservations	Identified timber sales with suitable bat habitat within a 5-mile radius of a hibernaculum. In those sales, trees exhibiting exceptional bat roosting habitat were reserved from cutting.
Red-Shouldered Hawk (<i>Buteo lineatus</i>) and Northern Goshawk (<i>Accipiter gentilis</i>)	RFSS & SVC	2017-2022	Suitable habitat surveys and opportunistic detection surveys	Inventoried potential habitat in proposed VMPs
		2017-2023	Nest Protections	Buffers and seasonal restrictions were applied to active nests.

Species	Status	Year	Action	Method
Connecticut Warbler (<i>Oporonis agilis</i>)	RFSS	2017-2021	Suitable habitat surveys and opportunistic detection surveys	Inventoried potential habitat in proposed VMPs
		2023	Connecticut Warbler Conservation Team established	Biologists gathered from Canada, Minnesota, Wisconsin, and Michigan to consolidate data to better understand the population decline and survey and management needs.
Black-Backed Woodpecker (<i>Picoides arcticus</i>) and Spruce Grouse (<i>Falcipennis canadensis</i>)	RFSS & SVC	2017-2023	Suitable habitat surveys and opportunistic detection surveys	Inventoried potential habitat in proposed VMPs
Kirtland's Warbler (<i>Septophaga kirtlandii</i>)	RFSS	2017-2019	Supplemental jack pine planting.	Hand-planted 719 acres
		2017-2023	Surveys	Point count. Full surveys are conducted during odd years; spot checks are conducted during even years.
		2022	Baraga II VMP EA signed	1,293 acres of Kirtland's warbler habitat improvement proposed
Golden-Winged Warbler (<i>Vermivora chrysoptera</i>)	RFSS	2021	Added to RFSS list	
		2023	Surveys	Point count
Wood Turtle (<i>Glyptemys insculpta</i>)	RFSS & SVC	2017-2023	Surveys	Contracted
		2017-2023	Turtle beach clearing	Hand work

Species	Status	Year	Action	Method
Four-Toed Salamander	RFSS	2024	Removed from RFSS list	Habitat and populations based on surveys on the Ottawa were deemed stable enough to warrant list removal.
Delicate Vertigo (<i>Vertigo bollesiana</i>) and Mystery Vertigo (<i>Vertigo paradoxa</i>)	RFSS	2017-2023	Habitat protections	Boulder protections per Forest Plan page 2-33.
Northern Barrens Tiger Beetle (<i>Cicindela patruela</i>)	RFSS	2023	Habitat improvement	Prescribed fire in habitat with sandy soil to maintain open habitat and prevent soil mesophication.
Monarch (<i>Danaus plexippus</i>)	RFSS & Candidate (ESA)	2020	Surveys	Contracted
		2017-2023	Open habitat improvement and maintenance	Tree/shrub removal in-house or contracted. Pollinator planting.
Yellow-Banded Bumble Bee (<i>Bombus terricola</i>), Chryxus Arctic (<i>Oenis chryxus</i>), and Tawny Crescent (<i>Phyciodes batesii</i>)	RFSS	2017-2020, 2023	Surveys	Contracted
		2017-2023	Open habitat improvement and maintenance	Tree/shrub removal in-house or contracted. Pollinator planting.
West Virginia White (<i>Pieris virginiensis</i>)	RFSS	2017-2023	No specific action taken	
Nabokov's (Northern) Blue (<i>Plebejus idas nabokovi</i>)	RFSS & SVC	2020	Surveys	Contracted
		2018, 2020, 2022	Bilberry planting	Hand planted at 11 sites

Species	Status	Year	Action	Method
Bald Eagle (<i>Haliaeetus leucocephalus</i>)	SVC	2017-2023	Nest protections	Buffers and seasonal restrictions are described on page 2-28. Protections are administered as active nests are discovered and if possible, forest actions may affect an active nest.
American Woodcock (<i>Scolopax minor</i>)	SVC	2017-2022	Alder shearing	In-house hand-work

Forest Plan

Are the current Forest Plan components (desired conditions, goals, objectives) achievable in the timeframes described and does the Forest Plan provide sufficient direction (standards, guidelines, suitability, designated lands) to achieve these components?

In the face of scientific uncertainties and many unknown variables, providing general guidance in the Forest Plan allows room for adaptive management that incorporates the latest scientific knowledge and consensus.

There are some management directions in the Forest Plan that are rather unrealistic given species requirements and available and accessible suitable land types.

1. In the next iteration of Forest Plan revision, it may be prudent to consider measures for bats. Since the 2017 and 2019 Monitoring Evaluation Reports, one species was listed as endangered, another is proposed endangered and another will be evaluated for listing candidacy.
2. The current goal for open habitat across Forest ranges from 5,046 to 42,979 acres. Eight MAs are assigned a range percentage (e.g., 1% to 3%) of open habitat to manage for across the landscape. Only one MA continues meet the described goal range (0% to 2%). Three of the MAs barely pass the lowest range percentage (1%) of open habitat, and the remaining four MAs do not meet their open habitat goal. Total actual open habitat across the Forest is estimated at 7,394 acres. Increased acres of open habitat and more connectivity between openings is desired to achieve meaningful ecological needs. Conversely, the maximum goal of 42,979 acres is, in our professional opinion, too high. Many openings do not remain open without significant and repetitive management. They are quickly reforested, difficult to access and require significant effort to create meaningful habitat (e.g. planting, timber removal, pile burning,

prescribed fire, etc.). Management areas should be reassessed to create more meaningful goals regarding open habitat since this habitat type is important to many SVC.

Forest Assessment

Is the status or trend of the monitoring indicators substantially different than described in the Forest Assessment, or was an assumption in the Forest Assessment proven to be invalid from the monitoring data?

The status of the monitoring indicators remains as described the FEIS. The Ottawa regularly takes action to assist with recovery and expansion of listed species. All assumptions in the FEIS remain valid.

Management Actions

Did any of the management activities potentially result in adverse or beneficial effects to the status and trend of the monitoring indicators?

Some actions may have resulted in short-term adverse effects to attain long-term benefits (e.g., mechanical treatment resulting in temporary loss of habitat). For instance, there have been many projects that have been beneficial to a variety of RFSS species. Wildlife opening enhancement projects have improved habitat for monarchs, yellow-banded bumble bee, chryxus arctic and tawny crescent. Alder sheering projects have helped enhance habitat for American woodcock and GWW. The full list of management activities that benefited the intended species as well as other SVC species is listed in Tables 187-189.

Monitoring Program

Did the monitoring results provide all the information necessary to answer the monitoring question?

Yes, data collection, upkeep of databases and indicators provided the necessary information to answer the monitoring question.

Monitoring Question 30 – Recommendations

Recommendations for SVC wildlife were described under the “Forest Plan” subsection. No changes are recommended for the Forest Plan, management actions or plan monitoring program for rare plants and lichens. We hope to initiate new actions to benefit SVC in the future.

Table 190. Summary of monitoring recommendations for Monitoring Question 30

Changes may be warranted for the:	Yes	Maybe, not enough information to determine at this time	No
Forest Plan	☐		
Forest Assessment			☐
Management Actions		☐	
Plan Monitoring Program			☐

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Moerke, A. 2020. Final Report - Ontonagon Watershed Freshwater Mussel Surveys 2019. Center for Freshwater Research and Education, Lake Superior State University. Unpublished Project Report contained in Ottawa National Forest Aquatic Surveys Records. Project Period 7/1/2019 - 3/31/2020

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Monitoring Question 31 — To what extent is forest management contributing to the conservation of threatened and endangered species and moving toward desired habitat conditions and population trends for these species?

Context for this Evaluation

This monitoring question discloses trends from the implementation of management practices that provide for, and protect, bat habitat in accordance with the North American Bat Protocol and USDI FWS Final 4(d) Rule.

This question added two additional indicators in the monitoring program in 2018 as part of the Forest-wide Administrative Change II Decision (November 2018) to implement monitoring for suitable KW habitat and bat presence on the Ottawa. The KW was removed from the Federal List of Endangered Species effective November 8, 2019 (USDI FWS, 2019). The Forest Service continues to protect and monitor recovered species as RFSS; therefore, KW monitoring is now addressed in Monitoring Question 30 along with other RFSS species.

Effective February 10, 2022, the gray wolf was returned to the Federal status of endangered wildlife in the continental United States and Mexico but remains listed as threatened in Minnesota (USDI FWS, 2023). The Federal legal status of the gray wolf has changed several times since it was first Federally listed in 2008 (Ward, 2020). Wolves occupy a range of habitat types and appear to prefer, although not require, remote wilderness areas or areas with low road densities (< 1 mile of road per square mile) (MI DNR, 2022). Wolves do need relatively undisturbed den and rendezvous sites. Habitat requirements necessary to maintain a viable wolf population are influenced by the habitat requirements for their prey, and the

degree to which wolves can avoid human-caused mortalities of which road density can influence encounters between people and wolves.

Two other threatened and endangered species, the Canada lynx and the red knot shorebird are not considered to be present on the Ottawa and will not be discussed in detail.

Table 191. Background information for Monitoring Question 31

Drivers	
This question is responsive to one of the eight required monitoring elements described in the 2012 Planning Rule (36 CFR 219.12(a)(5)(iv). It addresses the status of select set of the ecological conditions (required under 36 CFR 219.9) to contribute to the recovery of Federally listed threatened and endangered species, conserve proposed and candidate species and maintain a viable population of each species of conservation concern.	
Primary Forest Plan Component Addressed	Monitoring Question Indicator
Promote landscape conditions and habitat diversity to support viable populations of native and desired non-native animal and plant species (Forest Plan, Goal 26, p. 2-8)	a: Acres of suitable KW habitat currently available
	b: Acres of suitable KW habitat available in the next 5 to 10 years
	c: Results of forest bat monitoring efforts
Who collected this data? Who is Responsible for analyzing this question?	
Pam Nankervis, Wildlife Biologist; Bri Boan, Wildlife Biologist.	

When was this monitoring question last updated?

- Date of current evaluation: April 2024
- Date of previous evaluation: FY 2019 Monitoring Evaluation Report

Table 192. Relationship of Monitoring Question 31 to other Forest Plan direction

Question 31	Key Forest Plan Components		
	<i>Desired Conditions</i>	<i>Goals and Objectives</i>	<i>Standards and Guidelines</i>
Indicator a, b and c	Provide habitat for species listed by the USDI FWS as Threatened or Endangered under the Endangered Species Act and for Regional Forester's Sensitive Species that occur within the Ottawa's boundary (Forest Plan, Appendix F).	Objective 26b: Meet the habitat needs for threatened, endangered and sensitive species, while supporting recreational, commercial, and subsistence uses (p. 2-8). Goal 30: Promote the conservation, restoration, and recovery of	Guidelines: Protect known occurrences of SVC and their zones of influence (p. 2-27). Continue protection until population or habitat objectives are defined and met (p. 2-27; applicable for SVC category 1 – taxa listed by the USDI FWS as endangered, threatened, or proposed) (p. 2-27).

Question 31	Key Forest Plan Components		
	<i>Desired Conditions</i>	<i>Goals and Objectives</i>	<i>Standards and Guidelines</i>
		populations of species of viability concern (p. 2-9). Objective 31b: Maintain open road density in the RHA of less than or equal to 1 mile of road open to passenger vehicles (2- and 4-wheel drive) per square mile of NFS land ($\leq 1/\text{mi}/\text{mi}^2$) (p. 2-9).	Standards: Caves/mines/rock outcrops/talus slopes: Prohibit rock climbing and other recreational uses where sensitive rock-associated plant and animal population occur and the recreational uses are expected to have negative effects (p. 2-23) Restrict use of the area within 330 feet of wolf den or rendezvous site that have been used in the last two years (p. 2-23)

**What monitoring activities have been conducted since the last monitoring evaluation?
What protocols were used to collect these data?**

Monitoring activities for this question consist of acoustic bat survey detection and mine survey on an annual basis. The North American Bat Monitoring Protocol (NABat) has been selected by the Eastern Region of the Forest Service as the required monitoring method, with a minimum of two monitoring grids per Forest (Loeb et al., 2015).

Previous mobile transects were replaced in 2016 through the establishment of six stationary acoustic survey grids on the Ottawa that incorporates a mobile route within the grid. Three of the six NABat grids were monitored in an alternating strategy with three grids (Numbers 2, 3, and 5) monitored in 2019, 2021 and 2023 and the alternate grids (Numbers 1, 4 and 6) monitored in 2020 and 2022. We have since reduced the number of grids being monitored to the required two grids (Numbers 4 and 6) in 2023 and will be monitoring those two grids on an annual basis into the future.

Monitoring of wolf den or rendezvous sites is conducted if/when found until no use has been detected for two years. We rely on the State of Michigan DNR to share information regarding the wolf surveys they perform as we do not survey for wolves but rather record incidental observations.

What is the target, or range for the indicator being measured? Is there an alert level (such as a trigger or threshold), associated with the target that should be noted?

The target for this indicator is to protect known hibernacula locations by following required measures of USDI FWS 4(d) Rule through March 31, 2023, maintain the Forest closure order

for mines and gates on mine entrances and stay consistent with other facets of the NABat protocol. The Forest remains in an interim consultation period until November 30, 2024, continuing to implement conservation measures consistent with the 2024 Forest Service Bat Conservation Strategy. An updated Biological Opinion (BO) was received on March 31, 2023, which includes an Incidental Take Statement for projects previously consulted on under the 4(d) rule.

A triggering factor would be a continued decline in the Northern long-eared bat (NLEB) bat population, but as discussed in this section, the effects of white-nose syndrome (WNS) are independent of the Ottawa's protection efforts.

Table 193. Wildlife monitoring and management contributing to the conservation of threatened and endangered species (FY 2017 to FY 2023)

Species	Status	Year	Action	Method
NLEB Tri-colored bat	Endangered	2017-2023	Hibernacula Surveys	Visual and acoustic surveys were contracted and conducted in November of each year.
		2017-2023	Acoustic Surveys	NABat stationary and mobile acoustic surveys.
	Proposed for Listing	2020	Mine closures	Contracted. Special fencing used to ensure bats could still access.
		2022-2023	Bat tree reservations	Identified timber sales with suitable bat habitat within a 5-mile radius of a hibernaculum. In those sales, trees exhibiting exceptional bat roosting habitat were reserved from cutting.
Gray Wolf	Endangered	2017-2023	State Survey Data	We rely on data provided by the MI Department of Natural Resources and report our sightings to them as well.
Canada Lynx	Endangered	2000 - 2017	None – Not Present	Canada Lynx are not considered to be present in the Upper Peninsula. We did winter track

Species	Status	Year	Action	Method
				surveys between 2000 and 2017 in snowshoe hare habitat but did not detect any and stopped surveys.
Red Knot	Threatened	NA	None – Not Present	We do not have proper coastal habitat for this species of shore bird.

A triggering factor for wolves would be if populations decreased at a rate or to a level that causes the Michigan DNR to recommend further action or protections. The Ottawa does not monitor wolf population trends and rely on State data and recommendations.

Has any new Best Available Scientific Information (BASI) informed this monitoring question, indicators, or methodology? Where is the data for this monitoring question stored?

We seek to be aware and mindful of new scientific publications concerning the Ottawa's threatened and endangered species. New BASI often affects how we manage our habitat to support self-sustaining populations. However, no new BASI has led to changes in this monitoring question, our indicators or monitoring methodology. Threatened and endangered wildlife occurrences are tracked in the NRM Wildlife database, and we provide monitoring results to the Regional Biologist to supplement the regional monitoring efforts for bats.

Monitoring Question 31 - Results

Table 194. Status and trend of the indicator for Monitoring Question 31

Indicators		Recent Trend	
<i>Indicator 31c:</i> Results of forest bat monitoring efforts		Recent Trend	
		<i>Towards Target</i>	<i>Away from Target</i>
Current Status	<i>Within Target</i>		
	<i>Outside Target</i>	X	

What level of confidence is there in the accuracy and precision?

There is a moderate to high level of confidence in the quality and quantity of data collected because the same collection protocols and reporting standards have been in place for several years. The Forest Plan states that the methods used for this monitoring question have a high degree of repeatability, reliability, accuracy and precision (p. 4-4). However, some data findings are based on a variety of techniques, such as visual estimates by different surveyors.

Monitoring Question 31 - Evaluation Discussion

The WNS is caused by a fungal disease, which is lethal to hibernating bats and was first detected in New York State in the winter of 2006 to 2007. The fungus *Pseudogymnoascus destructans* (formerly called *Geomyces destructans*), infects the skin of the nose, ears, and wings of bats and causes them to rouse from hibernation, then starve and/or freeze searching for food before winter ends.



Figure 45. This rare find is one of the only two tri-colored bats ever found on the Ottawa. Photo taken by Dr. Allen Kurta (2021)

Since its discovery in New York State, WNS extirpated the once common tri-color bat species across much of their eastern range, including the Ottawa.

The NLEB is one of the species of bats most impacted by this disease (Frick et al., 2010). Mass mortality and rapid spread of WNS prompted the listing of the NLEB as threatened under the Endangered Species Act on April 2, 2015, and uplisted with a final ruling to Endangered status on November 30, 2022. The Federal 4(d) Rule, which published in the *Federal Register* on January 14, 2016, specifically defined the "take" prohibitions until uplisting of the NLEB to Endangered Consultation was re-initiated and a BO with an Incidental Take Statement for ongoing projects on the Ottawa was provided on March 30, 2023.

Tri-colored bats are extremely rare and are not known to occupy habitat in the Upper Peninsula of Michigan. Historical surveys have never found tri-colored bats foraging on the Ottawa during the summer. Two individuals were observed during winter surveys of mines on the Ottawa: one individual in 2013 (Kurta and Smith, 2013) and one individual in 2021 (Kurta and Rogers, 2021). They are considered incidental occurrences.

Due to the impending threat of WNS, the Ottawa began working cooperatively with the USDA Forest Service Northern Research Station in 2009 to acoustically monitor for the presence/absence of forest bat species. The Ottawa was one of the first National Forests to adopt the NABat protocol in 2015, as mandated by the Eastern Region of the Forest Service and began monitoring six sites. In years 2017 through 2023 the Ottawa monitored six grid cells on an alternating schedule with three per year, which goes beyond the Region 9 Forest Service NABat protocol which only requires two grid cells per Forest. Additionally, beginning in 2009, the Ottawa has maintained an annual contract with bat biologist, Dr. Alan Kurta and mine inspector, Steve Smith, to monitor bats in abandoned mine shafts located on the Ottawa. If Dr. Kurta and Inspector Smith are not available for monitoring, the Ottawa partners with the

Michigan DNR for further monitoring needs. No staff on the Ottawa have been trained and certified for underground confined-spaces entry.

Acoustic Survey Results

Six total stationary acoustic survey grids were surveyed between 2019 and 2023 following the NABat protocol.

There were two confirmed detections of the Endangered NLEB at two stationary detection sites in 2022. However, not all species of the genus *Myotis* can be differentiated via acoustic sampling, so some identifications labeled MY40 (for little brown bat or NLEB) could include NLEB presence.

Often larger migratory bat species such as the red, hoary and silver-haired were more often detected utilizing NABat acoustic monitoring than higher-acoustic frequency bat species that have been known to hibernate in abandoned mines on the Forest (NLEB, little brown, silver-haired and two incidental occurrences of tri-colored). This finding supports the mine survey evidence of declining populations of hibernating bat species due to WNS.

Five of seven species have been detected at all stationary acoustic survey sites in all years. A single NLEB was detected at two sites in 2022. No tri-colored bats were detected at any of the six stationary survey stations in any year. The large low audio frequency migratory species appear to be more abundant than the high audio frequency smaller *Myotis* species in both the stationary surveys and the mobile acoustic surveys. The order of most to least detections are hoary bat, silver haired bat, Eastern red bat, big brown bat, little brown bat and a rare occurrence of the NLEB only at two stationary sites so far (see Tables 195 and 196).

Table 195. Bat species acoustic echolocation records along mobile acoustic monitoring routes between (FY 2017 to FY 2023)*

Bat Species	Audio Frequency Range (kHz)	2017*	2018	2019	2020	2021*	2022	2023	Total Bats
Big Brown (<i>Eptesicus fuscus</i>)	24-34	0	5	5	0	6	9	7	32
Eastern Red (<i>Lasiurus borealis</i>)	29-49	3	35	8	4	7	36	8	101
Hoary (<i>Lasiurus cinereus</i>)	16-32	23	100	83	42	7	44	53	352
Silver Haired (<i>Lasionycteris noctivagans</i>)	23-31	43	95	85	21	16	37	20	317

Bat Species	Audio Frequency Range (kHz)	2017*	2018	2019	2020	2021*	2022	2023	Total Bats
Little Brown (<i>Myotis lucifugus</i>)	34-46	NA	41	35	5	3	6	2	92
Northern Long-eared (<i>Myotis septentrionalis</i>)	32-53	0	0	0	0	0	0	0	0
Unidentified High Frequency	40kHz	28	68	4	9	3	8	4	124
Unidentified Low Frequency	25kHz	82	175	61	124	15	58	96	611
Total Bat Detections		179	519	281	205	57	198	190	

*Surveys for 2017 did not identify *Myotis* to species; 2021 sampling was hindered by poor weather conditions and is an anomaly.

Table 196. Confirmed bat detections at stationary acoustic detection sites (FY 2017 to FY 2023)*

Survey Cell Number	Big Brown (EPFU)	Eastern Red (LABO)	Hoary (LACI)	Silver Haired (LANO)	Little Brown (MYLU)	Northern Long Eared (MYSE)
GRTS 25139	P**	P	P	P	P	P (2022)
GRTS 7475	P	P	P	P	P	ND**
GRTS 21043	P	P	P	P	P	P (2022)
GRTS 24483	P	P	P	P	P	ND

Survey Cell Number	Big Brown (EPFU)	Eastern Red (LABO)	Hoary (LACI)	Silver Haired (LANO)	Little Brown (MYLU)	Northern Long Eared (MYSE)
GRTS 20387	P	P	P	P	P	ND
GRTS 13619	P	P	P	P	P	ND

**NLEB were detected only in 2022. All others were present every year.*

*** (P) = Present (ND) = Not Detected*

Mine Survey Results

Mine surveys have been ongoing in late fall periodically between 1996 and 2001. Mine surveys have continued on an annual basis since 2013 by Dr. Al Kurta and Mine Inspector Steve Smith. Over time, survey results show the hibernating bat population on the Ottawa has declined in all monitored hibernacula by approximately 82% in most occupied hibernacula (Table 197).

One potential causation of this decline is that bats are using local mines to cluster into one prime location just prior to a mass mortality event of 90 percent or more according to Steve Smith. The vast majority of the bats detected in mines are little brown bats and big brown bats, with a few scattered NLEB. Depending on the adit being surveyed, distinguishing little brown bats from NLEB can be nearly impossible, so exact counts per species cannot always be made. A single tri-colored bat was detected in two hibernacula on two separate years (2013 and 2021) and are considered so rare as to be incidental. Even before WNS, tri-colored bats only represented less than 0.5% of the total bats detected in all mines in the Upper Peninsula (Kurta and Smith, 2020).

Ongoing studies suggest that colder temperature mines, like those found on the Ottawa, (see Table 197) may inhibit, to some degree, the growth of the deadly *P. destructans* fungus, thereby allowing bats on the Forest to have slightly better chance of survival than other warmer locations according to the Michigan DNR. In 2017, the Ottawa cooperated with university researchers to treat two of the Ottawa's mines with non-chemical, naturally occurring biopolymer chitosan for the prevention and treatment of the fungus that causes WNS. Results from that treatment study showed no noticeable difference of fungal loads on bats between treatment sites and control sites after two seasons of treatment. Results were inconclusive due to difficulties in keeping bats contained within the artificially closed system (Vonhof et al., 2020).

Table 197. Hibernating bat population counts on the Ottawa (1996 to 2023)

Year	Adit ¹ Locations on the Ottawa Supporting Bats				
	Adit A	Adit B	Adit C	Adit D	Adit E

	<i>Temp C°</i>	<i>Count</i>	<i>Temp C°</i>	<i>Count</i>	<i>Temp C°</i>	<i>Count</i>	<i>Temp C°</i>	<i>Count</i>	<i>Temp C°</i>	<i>Count</i>
1996	-	-	-	0	-	294	-	1,052	-	-
1999	-	230	-	-	-	-	-	-	-	2,568
2001	-	-	-	-	-	-	-	1,131	-	-
2009	-	-	-	0	-	253	-	1,401	-	-
2010	-	243	-	0	-	308	-	1,536	-	3,418
2013	5°	158	2.2°	6	7.8°	271	7.2°	1,302	7.2°	2,782
2014	5-6.5°	242	-	-	5-7°	305	8°	1,580	-	2,032
2015	8.5°	233	6°	2	8°	191	8°	1,342	3-6°	3,030
2016	8°	133	8°	2	9-10°	76	9°	247	3-6°	3,483
2017	-	69	6°	2	8.5°	51	-	251	-	1,779
2018	5.8°	52	-	-	-	-	-	219	-	-
2019	8.9°	38	2.2°	0	7.5°	39	7.8°	113	-	-
2020	6.1°	59	4.0°	0	7.9°	37	8.0°	134	-	-
2021	6.2°	43	4.0°	0	5-5.4°	36	6-6.6°	194	-	-
2022	5-6°	37	4.0°	0	5-5.4°	47	6-6.4°	240	-	-
2023	-	35	-	1	-	46	-	285	3.3°	2,321

¹*An adit is a horizontal passage leading into a mine for the purposes of access or drainage.*

²*Temperature in in degrees Celsius; it is the ambient temperature taken inside the adit.*

³*Count represents the total number of bats found.*

Forest management on the Ottawa is contributing to the conservation of threatened and endangered species and meets desired habitat conditions for bats. Currently there is no way to avoid mass bat mortality due to the effects of WNS. Mine entrance sites are excluded from management activity and gated to prevent access by people to avoid the spread of WNS in the hibernacula. The Ottawa continues to preserve and create habitat for roosting bats and maternity roosts through the implementation of project design criteria, which protects wildlife cavity trees and creates snags within management areas. There are also seasonal harvesting restrictions to further protect bats within conservation buffer zones when and where they are more likely to be in the area of influence, such as during spring staging and fall emergence around hibernacula.

It is also important to note that approximately 50% of the Ottawa is not managed for timber production that further promotes both larger-sized, and abundance of, snags in unmanaged stands (See 2017 Monitoring Evaluation Report, Figures 72-75). Much of the existing old

growth is more likely to have a greater abundance of snags and greater numbers of live cavity trees which increases the potential for maternity roost sites (Silvis et al., 2014). These areas include administratively-protected areas, such as wilderness and WSR corridors. The Ottawa continues to develop old growth characteristics as outlined in the Forest Plan. The Ottawa also continues to protect, restore and enhance riparian corridors and open habitat areas, which are prime for bat foraging (Silvis et al., 2016).

Gray Wolf

We do not do surveys for wolves on the Forest but rather rely on the Michigan DNR survey information to determine approximate numbers of wolf packs and numbers of wolves specific to the Ottawa. As of 2022, there are an estimated 156 wolves distributed throughout 40 pack territories within proclamation boundary based on reporting from Michigan DNR.

Regardless of ongoing and past human recreational activity and forest harvesting on both private and federal lands, the wolf population and wolf range has expanded and appears stable (approximately 12% annual population growth) throughout the Upper Peninsula. As of 2022, there are 631 wolves in the Upper Peninsula, which is close to three times the minimum population that biologists consider to be viable in this state (MI DNR, 2022). According to the USFWS, the western Great Lakes distinct population segment of gray wolf is recovered having maintained over 200 animals for over five consecutive years in each state (U.S. Fish and Wildlife Service, 2011).

Forest Plan

Are the current Forest Plan components (desired conditions, goals, objectives) achievable in the timeframes described and does the Forest Plan provide sufficient direction (standards, guidelines, suitability, designated lands) to achieve these components?

The Forest Plan does not have desired conditions, goals or objectives specific to bats. However, as outlined in Tables 195 and 196, the Forest Plan provides for meeting the habitat needs for threatened, endangered and sensitive species (Goal 26, Objective b, p. 2-8). The Forest Plan also promotes the conservation, restoration and recovery for SVC (Goal 30, p. 2-9). Therefore, the broad nature of the Forest Plan direction allows the necessary flexibility to manage for protection of NLEB and other bat species. The Forest Plan direction also specifies protections for gray wolf when specific habitat important for successful reproduction are discovered being utilized (p. 2-28 to 2-29).

Forest Assessment

Is the status or trend of the monitoring indicators substantially different than described in the Forest Assessment, or was an assumption in the Forest Assessment proven to be invalid from the monitoring data?

The status and trend of the indicators are not substantially different than anticipated in the analysis for the Forest Plan. The FEIS analysis parameters were based on the premise that management activities would not occur in caves or mineshafts, and bat gates would be maintained to protect this habitat. Trees in riparian habitat used by bats would not be harvested due to riparian Forest Plan direction and if trees are removed, would have seasonal restrictions based on the Bat Conservation Strategy. At the time of Forest Plan revision, the tri-colored bat was the only RFSS of bat. There were no Federally listed bat species. The

Biological Evaluation finding for the FEIS included a May Impact Individuals (MII) determination regardless of proposed alternative under the revision process (FEIS, Volume II, p. G-3) because of timber harvest on bat habitat (Forest Plan Administrative Record, Document 629a, p. 15-17).

White-nose syndrome in Michigan bats was not observed until 2014. Therefore, its effects on bat species were not taken into consideration in the original Biological Evaluation prepared for the FEIS. Updated BOs have been received since the status changes for NLEB and proposed federal listing of the tri-colored bat. Due to the effects of WNS found in the eastern United States beginning in 2006, the Ottawa began cooperatively working with Northern Research Station in 2009 to monitor bats. Additionally, as disclosed in Table 197, information about bat population counts in adits began in 1996. Continued monitoring will help identify whether an additional assessment and associated revision needs to be performed to support Forest Plan implementation.

Management Actions

Did any of the management activities potentially result in adverse or beneficial effects to the status and trend of the monitoring indicators?

Each project taking place after the designation of the NLEB as a threatened species has included design criteria that aligned with the Final 4(d) Rule and has since been updated upon the uplisting to federal endangered status, to implement conservation measures consistent with the Forest Service Bat Conservation Strategy. There are various conservation buffers that prohibit forest management activities within 500 feet, one-quarter mile, and two miles of known hibernacula. It is also prohibited to remove known, occupied maternal roost trees, or any other trees located within 150-feet of known maternal roost trees, with a secondary seasonal roost buffer at 0.7 miles around known maternity roost trees. The latter measure protects against the removal of maternal roosting trees and effects upon non-volant juveniles. These updated management actions result in beneficial effects to bats and their habitat.

The Ottawa also implements seasonal protections for gray wolf when dens or rendezvous sites (maternal loafing areas) are located per Forest Plan standards and guidelines. This helps to ensure reproductive success for wolves that may otherwise be impacted by management actions.

Monitoring Program

Did the monitoring results provide all the information necessary to answer the monitoring question?

Yes, the data collection protocols and indicators adequately provide the necessary information to answer the monitoring question.

Monitoring Question 31 - Recommendations

The continued management of forest resources, including providing snags and live cavity trees on the Ottawa, will provide bat habitat. Implementation of the bat conservation measures consistent with the Forest Service Bat Conservation Strategy will further protect bat and their habitat particularly during sensitive seasons of activity.

The acoustic and mine surveys conducted to answer this monitoring question should continue to detect bats. Analysis of acoustic data should occur on an annual basis, if possible. Continuing to implement NABat protocols on at least two survey grids per year and ongoing annual mine surveys will provide needed information to answer this monitoring question.

Partnership efforts could be sought to treat bats in the hibernacula with fungicide or utilize temperature modification if/when experimental studies warrant it safe and effective.

Additionally, it is being recommended to remove Indicators 31a and 31b from this monitoring question due to the change in status of KW. Work to enhance KW habitat on the Ottawa will continue and is discussed in Monitoring Question 30.

Table 198. Summary of monitoring recommendations for Monitoring Question 31

Changes may be warranted for the:	Yes	Maybe, not enough information to determine at this time	No
Forest Plan			☐
Forest Assessment			☐
Management Actions			☐
Plan Monitoring Program	☐		

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Monitoring Question 32 — To what extent is forest management affecting the density of open roads within the Remote Habitat Area and moving towards the Forest density objective of less than 1.0 miles/square mile?

Context for this Evaluation

This monitoring question ensures the Ottawa remains consistent with balancing the need for access with the need to manage and protect the Ottawa's resources.

Table 199. Background information for Monitoring Question 32

Drivers	
This monitoring question links to the 2012 Planning Rule (36 CFR 219.12(a)(5)(vii)): progress toward meeting the desired conditions and objectives in the plan, including for providing multiple use opportunities.	
Primary Forest Plan Component Addressed	Monitoring Question Indicator
Manage the RHA to provide habitat for species that require some degree of remoteness from human activity, including gray wolf, American marten, goshawk, red-shouldered hawk and others (Forest Plan, Goal 31, p. 2-9).	Miles of system road open to passenger vehicles per square mile of land within the remote habitat area.

Who collected this data? Who is Responsible for analyzing this question?

Jeremy Pickle, Wildlife Biologist

When was this monitoring question last updated?

- Date of current evaluation: March 2024
- Date of previous evaluation: FY 2017 Monitoring Evaluation Report

Table 200. Relationship of Monitoring Question 32 to other Forest Plan direction

Question 32	Key Forest Plan Components		
	<i>Desired Conditions</i>	<i>Goals and Objectives</i>	<i>Standards and Guidelines</i>
Indicator 32	In each “Desired Condition of the Land” section of MAs where forest types are managed (3-18, 3-23, 3-33, 3-45, and 3-63) and include the desired conditions that provide the foundation for Goal 13 (p. 2-5).	Goal 26: Promote landscape conditions and habitat diversity to support viable populations of native and desired non-native animal and plant species (p. 2-8). Goal 30: Promote the conservation, restoration, and recovery of populations of species of viability concern (p. 2-9). Goal 31: Manage the Remote Habitat Area (RHA) to provide habitat for species that require some degree of remoteness from human activity, including gray wolf, American marten, goshawk, red-shouldered hawk and others (p. 2-9). Objectives:	Guidelines: Where feasible, wildlife habitat is managed to benefit species requiring remoteness and mature forest conditions with an abundance of standing snags and coarse woody debris (p. 3-59).

Question 32	Key Forest Plan Components		
	<i>Desired Conditions</i>	<i>Goals and Objectives</i>	<i>Standards and Guidelines</i>
		a. Maintain the RHA, which is comprised of parts of several management areas in the southern part of the Ottawa, totaling about 256,000 acres (p. 2-9). b. Maintain an average, open road density in the RHA of less than or equal to 1 mile of road open to passenger vehicles (2- and 4-wheel drive) per square mile of National Forest System land ($<1 \text{ mi/mi}^2$) (p. 2-9).	

What monitoring activities have been conducted since the last monitoring evaluation? What protocols were used to collect these data?

The Motor Vehicle Use Map (MVUM) spatially based data was last updated in 2022. The new data allowed for more accurate information on how many miles of road have been added or removed in the RHA. The Forest is continually monitoring the miles of road within the RHA during project proposals to make sure that the number of road miles does not exceed 1 mi/mi^2 .

What is the target, or range for the indicator being measured? Is there an alert level (such as a trigger or threshold), associated with the target that should be noted?

A threshold would be met if the RHA falls below the 256,000-acre target described in the Forest Plan or if road density exceeds one mile of road open to passenger vehicles (2- and 4-wheel drive) per square mile of National Forest System land ($<1 \text{ mi/mi}^2$) (p. 2-9).

Has any new Best Available Scientific Information (BASI) informed this monitoring question, indicators, or methodology? Where is the data for this monitoring question stored?

The number of miles per square mile open road density is derived from a spatial analysis of the MVUM system. The roads layer is updated annually to reflect open or closed road status after implementation of land management decisions affecting public access across the Forest.

Monitoring Question 32 - Results

Table 201. Status and trend of the indicator for Monitoring Question 32

Indicators		Recent Trend	
<i>Indicator:</i> Road Density in Remote Habitat Area.		<i>Towards Target</i>	<i>Away from Target</i>
Current Status	<i>Within Target</i>	X	
	<i>Outside Target</i>		

What level of confidence is there in the accuracy and precision?

There is a high level of confidence that this information is accurate due the MVUM being recently updated.

Monitoring Question 32- Evaluation Discussion

The RHA is comprised of approximately 256,000 acres covering several MAs in the southern part of the Forest (Management Areas 2.1, 2.2, 3.1a, 4.1a and 6.2). The goal is to manage RHA to provide habitat for species that require some degree of remoteness from human activity, including gray wolf, American marten, black bear, goshawk, red-shouldered hawk and others (Forest Plan, p. 2-9). Another key component of RHA management is to provide habitat to benefit prey species, specifically deer, snowshoe hare and beaver. The rationale being that predators would fare best in a remote area with abundant prey. All three of these key prey species thrive in young forest areas that provide abundant forage and dense cover.

The Forest is meeting the objectives for maintaining and managing the RHA. Road density has been below 1 mile/mi² since the Forest Plan was adopted. The road density has remained relatively stable from a density of 0.68 (mi/mi²) in 2006 to 0.69 in 2023 (see Table 202). Road density has fluctuated within the 10-year period by 0.01 or 0.02 mi/mi². The differences primarily come from roads in vegetation management projects being modified to better suit administrative needs. Not all roads are open year-round as some are permitted to be used seasonally to reduce resource concerns like erosion or due to lack of funding to conduct continual road maintenance. The Forest is not exceeding the 1 mi/mi² threshold. The Forest is balancing the need for access with the need to manage and protect the Ottawa's resources.

Table 202. Road density in Remote Habitat Area (FY 2006 to FY 2024)

Year	Open System Roads (mi)	Road Density mi/mi ²
2006	272	.68*
2007	253	.63*
2008	251	.63*
2011	262	.66*
2016	267	.67*
2024	277	.69

**Road density was updated from the previous monitoring reports due to a miscalculation in the amount of RHA on the Ottawa*

Forest Plan

Are the current Forest Plan components (desired conditions, goals, objectives) achievable in the timeframes described and does the Forest Plan provide sufficient direction (standards, guidelines, suitability, designated lands) to achieve these components?

The Ottawa is currently meeting Forest Plan standards by maintaining road density below 1 mi/mi² across all MAs that encompass the entirety of the RHA.

Forest Assessment

Is the status or trend of the monitoring indicators substantially different than described in the Forest Assessment, or was an assumption in the Forest Assessment proven to be invalid from the monitoring data?

The status and trend of indicators are not substantially different than anticipated in the Forest Assessment. The FEIS analysis parameters were based on the premise that given the continued need for access, changes in road use, potential increases in road density and continued management of the Ottawa road system. Cumulative impacts are anticipated to be minor.

Management Actions

Did any of the management activities potentially result in adverse or beneficial effects to the status and trend of the monitoring indicators?

No. Overall, the need for administrative and public access is balanced with the need to manage and protect the Ottawa's resources. The RHA will continue to be protected from unnecessary public access by limiting road densities.

See Monitoring Question 30 and Monitoring Question 31 to see the status of RFSS and SVC, many of which depend upon the RHA.

Monitoring Program

Did the monitoring results provide all the information necessary to answer the monitoring question?

Yes, the data collection protocols and indicators adequately provide the necessary information to answer the monitoring question.

Monitoring Question 32 - Recommendations

There are no recommendations for changes to this question.

Table 203. Summary of monitoring recommendations for Monitoring Question 32

Changes may be warranted for the:	Yes	Maybe, not enough information to determine at this time	No
Forest Plan			☐
Forest Assessment			☐
Management Actions			☐
Plan Monitoring Program			☐

Monitoring Question 33 – To what extent is forest management contributing to the development and maintenance of foraging and denning habitat, and connectivity of habitats for Canada lynx.

Context for this Evaluation

This monitoring question ensures the Ottawa remains consistent with its commitment to provide habitat for native and desirable non-native plants and animals as mandated by the NFMA. This includes species listed as Endangered or Threatened under the Endangered Species Act or RFSS. The Canada lynx is a Federally Threatened species.

Table 204. Background information for Monitoring Question 33

Drivers	
This monitoring question links to the 2012 Planning Rule (36 CFR 219.12(a)(5)(iv)): The status of select set of the ecological conditions required under 219.9 to contribute to the recovery of Federally-listed threatened and endangered species, conserve proposed and candidate species and maintain a viable population of each species of conservation concern.	
Primary Forest Plan Component Addressed	Monitoring Question Indicator
Maintain sufficient habitat connectivity to allow Canada Lynx to disperse between management areas on National Forest System land (Forest Plan, Goal 29, p. 2-9).	a: Acres of aspen hunting habitat (total and 5-to-20-year age class) on the suited landbase.
	b: Acres of jack pine hunting habitat (total and 10-to-20-year age-class) on the suited and unsuited landbase.
	c: Acres of spruce/fir-aspen hunting habitat (total and 10-to-40-year age-class) on the suited and unsuited landbase
	d: Total acres of lowland conifer hunting habitat on the unsuited landbase.
	e: Total acres of short-lived conifer hunting habitat on the unsuited landbase.
Who collected this data? Who is Responsible for analyzing this question?	
Ottawa Wildlife Staff and Ross Mielke, Wildlife Biologist	

When was this monitoring question last updated?

- Date of current evaluation: April 2024
- Date of previous evaluation: FY 2017 Monitoring Evaluation Report

Table 205. Relationship of Monitoring Question 33 to other Forest Plan direction

Question 33	Key Forest Plan Components		
	<i>Desired Conditions</i>	<i>Goals and Objectives</i>	<i>Standards and Guidelines</i>
Indicator 33	“Desired Condition of the Land” sections of MA 1.1a, 3.1a, 4.1a and 4.2a (p. 3-3, 3-17, 3-23 and 3-29) include the desired conditions that provide the foundation for Goal 29 (p. 2-9).	Goal 1: Provide a variety of ecological communities in order to maintain or enhance habitat conditions for plant and animal species, to provide for a natural buffer against invasive exotic organisms, and to provide for the long-term production of a mix of timber products (p. 2-2). Goal 2: Provide for ecosystems that are healthy, resilient, diverse, and functioning in a sustainable and productive manner (p. 2-2). Goal 16: Provide a mix of age classes within the aspen/paper birch vegetation type to support conservation, economic and social objectives associated with early successional habitat (p. 2-6).	2400 Timber Management Guidelines: • Aspen (p. 2-16 to 2-17) • Balsam fir (p. 2-17) • Jack pine (p. 2-18) • Lowland conifer (p. 2-18 to 2-19) • White spruce (p. 2-22 to 2-23) Guidelines: Temporary Openings Created by the Application of Even-aged Silviculture (p. 2-23). Guidelines: Old Growth Management (p. 2-23 to 2-25). 2500 Soil, Water, and Air Guideline: Discourage the removal of coarse woody debris, existing snags and live cavity trees from riparian corridors and streams and lakes unless they present a hazard to people or structures. Restrict removal to the minimum amount necessary to assure safety (p. 2-26).

Question 33	Key Forest Plan Components		
	<i>Desired Conditions</i>	<i>Goals and Objectives</i>	<i>Standards and Guidelines</i>
		Goal 26: Promote landscape conditions and habitat diversity to support viable populations of native and desired non-native animal and plant species (p. 2-8). Goal 27: Provide adequate habitat for Management Indicator Species: American marten, ruffed grouse, cutleaf toothwort, and mayfly-stonefly-caddisfly suite (p. 2-8). Goal 28: Manage KW jack pine habitat using ecosystem management principles that mimic/resemble historic conditions and disturbance regimes. Develop habitat by designing and configuring treatment blocks that mimic the regeneration effects of stand replacing wildfires (p. 2-9). Goal 31: Manage the Remote Habitat Area (RHA) to provide for species that require some degree of remoteness from human activity, including gray wolf, American marten,	2600 Wildlife, Fish and Sensitive Plants Guidelines: • Kirtland's Warbler (p. 2-30) • American Woodcock (p. 2 - 30) • American Marten (p. 2-31) • Ruffed Grouse (p. 2-31) • Terrestrial Ecosystems (p. 2-32 to 2-33). Aquatic/Wetland Ecosystem Guideline: Maintain beaver works (dams, lodges, food caches, etc.) to the extent practical, while recognizing there will be instances where removal is warranted due to other resource concerns (p. 2-34).

Question 33	Key Forest Plan Components		
	<i>Desired Conditions</i>	<i>Goals and Objectives</i>	<i>Standards and Guidelines</i>
		goshawk, red-shouldered hawk and others (p. 2-9).	

What monitoring activities have been conducted since the last monitoring evaluation? What protocols were used to collect these data?

Winter mammal tracking last occurred in 2017, as part of the Ottawa’s ongoing monitoring program. No lynx has been detected during these surveys or in the last 18 years since these efforts were initiated. Winter mammal tracking surveys ceased after 2017 due to lack of personnel. To deal with staff shortages, camera traps were set out in a historical lynx/hare habitat area in 2019 and detected no lynx. The Michigan DNR collects extensive information through public contacts and the State’s predator trapping season reports. There were no verified reports of lynx present in the Upper Peninsula received between 2017 and 2023. This data has extensive geographic coverage and has been collected over many years.

Because of lack of species documentation and low probability of Canada lynx populating the Ottawa, habitat characteristics (described in Table 207) will be evaluated to see if the Forest is meeting habitat targets identified in the Forest Plan. These habitats are consistent with this species’ primary prey (snowshoe hare) habitat.

What is the target, or range for the indicator being measured? Is there an alert level (such as a trigger or threshold), associated with the target that should be noted?

Triggering factors or thresholds are dependent upon the forest type identified in Table 207. The target for this question’s indicators should fall within the management objective thresholds to align with the targets described in the Forest Plan.

Has any new Best Available Scientific Information (BASI) informed this monitoring question, indicators, or methodology? Where is the data for this monitoring question stored?

Timber sale activity and common stand exams are collected annually, and therefore, the information presented is the most current for FYS 2017 to 2023. The results of these treatments and common stand exam information are entered into the FACTS database.

Monitoring Question 33 - Results

Table 206. Status and trend of the indicator for Monitoring Question 33

Indicators		Recent Trend	
<i>Indicator 33a: Acres of aspen hunting habitat (total and 5-to-20-year age class) on the suited land base.</i>		<i>Towards Target</i>	<i>Away from Target</i>
Current Status	<i>Within Target</i>	X (in total acres)	
	<i>Outside Target</i>		X (in the 5–20-year age class)

Indicators		Recent Trend	
<i>Indicator 33b:</i> Acres of jack pine hunting habitat (total and 10-to-30-year age-class) on the suited and unsuited land-base.		<i>Towards Target</i>	<i>Away from Target</i>
Current Status	<i>Within Target</i>	X (both)	
	<i>Outside Target</i>		
<i>Indicator 33c:</i> Acres of spruce/fir-aspen hunting habitat (total and 10-to-40 year age-class) on the suited and unsuited landbase.		<i>Towards Target</i>	<i>Away from Target</i>
Current Status	<i>Within Target</i>	X (in total acres)	
	<i>Outside Target</i>	X (in the 5–20-year age class)	
<i>Indicator 33d:</i> Total acres of lowland conifer hunting habitat on the unsuited land base.		<i>Towards Target</i>	<i>Away from Target</i>
Current Status	<i>Within Target</i>	X (both)	
	<i>Outside Target</i>		
<i>Indicator 33e:</i> Total acres of short-lived conifer hunting habitat on the unsuited land base.		<i>Towards Target</i>	<i>Away from Target</i>
Current Status	<i>Within Target</i>	X (both)	
	<i>Outside Target</i>		

What level of confidence is there in the accuracy and precision?

There is moderate to high level of confidence in the quality and quantity of data collected because the same collection protocols and reporting standards have been in place for several years. The Forest Plan states that the methods used for this monitoring question have a high degree of repeatability, reliability, accuracy and precision (p. 4-4).

Monitoring Question 33 - Evaluation Discussion

As the Ottawa provides transient habitat for lynx, and no lynx presence has been detected through survey, a primary objective is to provide suitable habitat for the main prey for lynx (snowshoe hare) through proactive management activities. There are five main habitat types listed in the Forest Plan for management that can support lynx or, more importantly, their prey. These habitat types are shown in Table 207. These habitats provide foraging habitat for lynx, which is very important if connectivity habitat is to be maintained for dispersing lynx. Clearcutting is the predominate method to regenerate aspen and mixed aspen forested stands. Conifer stands are most often clearcut and allowed to regenerate naturally or re-planted with trees. The RHA (see Monitoring Question 32) could also serve as a conduit to move lynx from source populations (also located in northern Minnesota) eastward into the Upper Peninsula of Michigan. This area is managed for lower open road densities for species requiring a degree of remoteness.

Table 207. Canada lynx habitat guidelines, objectives and actual habitat acreage (FY 2017 to FY 2023)

Lynx Habitat Class	Management Guidelines (Forest Plan, p. 2-29)	Actual Acreage Maintained FY 2017	Actual Acreage Maintained FY23
Aspen	90,000 Acres total with 25% of those in the 5-to-20-year class	192,000 Acres total with 14,200 in the 5-to-20-year class and 156,000 Acres with 14,000 Acres (9%) in the 5-to-20-year class for suitable land-base	142,197 Acres total of pure (quaking or big tooth) aspen stands with 7,925 (5.5%) acres in the 5-to-20-year class and 105,444 acres with 7,588 acres (7%) for suitable land-base
Jack Pine	10,000 Acres total with 30% of those in the 10-to-30-year class	16,600 Acres total with 5,900 in the 10-to-30-year class and 14,500 Acres with 5,800 (40%) in the 10-30-year class for suitable land-base	15,963 acres total with 4780 acres (30%) in the 10-to-30-year class and 13,468 acres with 4,702 (35%) in the 10-to-30-year class for suitable land-base
Lowland Conifer	91,000 Acres Total	142,100 Acres Total with 95,000 in unsuitable land-base	94,813 acres total with 94,377 acres in unsuitable land-base
Short Lived Conifer (Jackpine, balsam fir, lowland conifer)	Minimum of 34,000 acres	*Not surveyed	>106,000 acres*
Spruce/Fir/Aspen	10,000 Acres total with 30% of those in the 5-to-20-year class	48,600 Acres total with 3,200 in the 5-to-20-year class and 34,600 acres with 3,200 Acres (9.2%) in the 5-to-20-year class for suitable land-base	40,440 Acres total with 3,418 (8.4%) in the 5 to 20 class and 31,321 acres with 7989 acres (20%) in the 10-to-40-year class for suitable land-base

**Balsam fir data is not included within calculation as those numbers are unattainable with current monitoring methods.*

The Ottawa is providing a fair amount of foraging habitat in both jack pine and lowland conifer habitat types. The other two habitat types need to be improved. Both aspen (25% threshold) and spruce/fir/aspen (30% threshold) are well below the thresholds required the 5-to-20-year class that is described in the Forest Plan. Both are currently well above the Forest Plan for total acres in suitable land-base, which give a higher total of acres in the 5-to-20-year age class. If these habitat types were within current objectives, it would enhance the foraging habitat for lynx but would not solely create optimal foraging habitat. Other disadvantages for lynx include predator competition for prey species, high road densities and optimal snow conditions.

Forest Plan

Are the current Forest Plan components (desired conditions, goals, objectives) achievable in the timeframes described and does the Forest Plan provide sufficient direction (standards, guidelines, suitability, designated lands) to achieve these components?

Current Forest Plan desired conditions and management direction focus on developing habitat characteristics suitable for snowshoe hare and important alternate prey in amounts and distributions available to dispersing lynx. There are portions of the landscape that currently align with this direction, but as a whole the Forest is falling short on key prey, foraging habitat conditions. This is not without effort as key habitats are regularly scheduled for treatment, but only so much can be attained in any given year due to economic and social constraints in today's fluctuating timber market.

Forest Assessment

Is the status or trend of the monitoring indicators substantially different than described in the Forest Assessment, or was an assumption in the Forest Assessment proven to be invalid from the monitoring data?

No, the monitoring indicators align with the FEIS.

Management Actions

Did any of the management activities potentially result in adverse or beneficial effects to the status and trend of the monitoring indicators?

Yes, vegetation management treatments resulted in more suitable habitat for snowshoe hare, the lynx's primary prey species.

Monitoring Program

Did the monitoring results provide all the information necessary to answer the monitoring question?

The data collection protocols and indicators adequately provide the necessary information to answer the monitoring question. However, monitoring indicator (e) should be removed from the monitoring indicator list. Currently, with the obtainable data we have available this indicator, it will be impossible to answer with 100% confidence. The Forest currently has approximately 94,000 acres classified as lowland conifer, which includes short-lived conifer species, so therefore it is safe to assume 30,000 acres of short-lived conifer are present on the Forest as directed by the Forest Plan.

Monitoring Question 33 - Recommendations

The analysis shows that the Ottawa needs to recruit more acres into the 5-to-20-year age-class for both aspen and spruce/fir/aspen to support foraging habitat for lynx.

The Forest should continue to harvest aspen and spruce/fir/aspen as often as possible. Aspen is an early successional species and if not harvested, this species will be lost. Currently, there are 21,638 acres (21%) of aspen and 14,509 (46%) of spruce/fir/aspen (all suitable acres) at or over 65-year age-class. Focusing management on these stands would achieve Forest Plan

direction of maintaining at least 25% of 5-to-20-year age-class aspen and bring spruce/fire/aspen (approximately 18%) closer to the 5-to-20-year age-class goal in supporting foraging habitat for lynx.

Table 208. Summary of monitoring recommendations for Monitoring Question 33

Changes may be warranted for the:	Yes	Maybe, not enough information to determine at this time	No
Forest Plan			☐
Forest Assessment			☐
Management Actions	☐		
Plan Monitoring Program	☐		

Monitoring Question 34 – Is the Forest providing minerals and mineral material to help support economic growth?

Context for this Evaluation

This monitoring question addresses authorizations and permits for Federal mineral exploration, permits issued for gravel use and the Notice to Proceed when dealing with private mineral exploration.

Table 209. Background information for Monitoring Question 34

Drivers	
This monitoring question links to the 2012 Planning Rule (36 CFR 219.12(a)(5)(vii)): Progress toward meeting the desired conditions and objectives in the plan, including for providing multiple use opportunities. This monitoring question also measures trends toward achieving conditions outlines in Goal 36 of the Forest Plan states: “Provide mineral resources to support economic growth through environmentally sound development on National Forest System lands” (p. 2-10).	
Primary Forest Plan Component Addressed	Monitoring Question Indicator
Provide mineral resources to support economic growth through environmentally sound development on National Forest System lands.	Number of permits and authorizations processed.
Who collected this data? Who is Responsible for analyzing this question?	
Shawn Brown, Realty Specialist and Pamela Vande Venter, Realty Specialist	

When was this monitoring question last updated?

- Date of current evaluation: October 2024
- Date of previous evaluation: FY 2019 Monitoring Evaluation Report

Table 210. Relationship of Monitoring Question 34 to other Forest Plan direction

Question 34	Key Forest Plan Components		
	<i>Desired Conditions</i>	<i>Goals and Objectives</i>	<i>Standards and Guidelines</i>
Indicator 34	The Ottawa will use environmentally sustainable management practices to provide commodity and non-commodity resources that contribute to the social and economic vitality of local communities (p. 1-10).	Goal 7: Identify opportunities for the Ottawa to contribute to the social and economic vitality of local communities (p. 2-10). Goal 41: Design and maintain a safe, efficient, and effective transportation system that support both public and administrative uses of National Forest System lands (p. 2-12).	Guideline: Federal Minerals – Generally, permit surface-disturbing exploration (including core drilling) in most areas, except within or adjacent to developed recreation sites during the recreation use season. Permit exploration especially where there is a potential to discover mineral of compelling domestic significance (as defined by U.S. Department of the Interior) (p. 2-35). Guideline: Provide maintenance, resource protection, and drivability commensurate with road use (p. 2-37).

**What monitoring activities have been conducted since the last monitoring evaluation?
What protocols were used to collect these data?**

Monitoring activities for this question have been obtained through querying NRM as well as reviewing internal files for mineral permits issued (see Monitoring Guide). No other authorizations or permits for mineral resources were received.

What is the target, or range for the indicator being measured? Is there an alert level (such as a trigger or threshold), associated with the target that should be noted?

The target for this question's indicator is to process 100% of applications received. Authorizations of permits would be based upon proposals aligning with Forest Plan direction as well as FSH and Forest Service Manual (FSM) direction. A trigger for additional action would occur if permits for mineral exploration changed to applications to mine. Otherwise, the goal is to process 100% of applications received.

Has any new Best Available Scientific Information (BASI) informed this monitoring question, indicators, or methodology? Where is the data for this monitoring question stored?

Monitoring data is collected by querying NRM as well as reviewing internal files for mineral permits issued. No other monitoring took place in FY 2016 through FY 2023 for mineral resources.

Permitted gravel pits are inspected to ensure that permits are being implemented appropriately.

Monitoring Question 34 - Results

Table 211. Status and trend of the indicator for Monitoring Question 34

Indicators		Recent Trend	
<i>Indicator 34:</i> Number of permits and authorizations processed.		<i>Towards Target</i>	<i>Away from Target</i>
Current Status	<i>Within Target</i>	X	
	<i>Outside Target</i>		

What level of confidence is there in the accuracy and precision?

There is a high level of confidence in the quality and quantity of data collected because the same collection protocols and reporting standards have been in place for several years. The Forest Plan states that the methods used for this monitoring question have a high degree of repeatability, reliability, accuracy, and precision (p. 4-4).

Monitoring Question 34 - Evaluation Discussion

Interest in mineral resources has become moderate over the last several years. The Forest Plan permits exploration activities in most areas especially where there is potential to discover minerals of compelling domestic significance (as defined by U.S. Department of the Interior) (p. 2-10). Most of the mineral resources beneath the Ottawa are not owned by the Federal government but are in private or State of Michigan ownership. The laws and regulations regarding exploration and exploitation of those minerals are highly variable and depend on the ownership.

No monitoring occurred for Federal, private or State-owned minerals from FY 2016 through FY 2023 as no exploration occurred for Federal minerals, no Notices to Proceed were received for exploring private and/or State-owned minerals and no support for economic growth, in terms of this question, occurred during this timeframe.

Federal Minerals

The Bureau of Land Management (BLM) has the responsibility and authority over Federally owned hard rock minerals, including those lying under National Forest System lands. Hard rock minerals include base metals, precious metals, industrial minerals and precious or semi-precious gemstones. Prospecting permits issued by the BLM allow for exploration for leasable minerals on BLM-administered hard rock minerals.

Administrative responsibility for surface resources remains with the Forest Service, as well as responsibility for making recommendations to the BLM regarding protection of surface resources.

From FY 2016 through FY 2023, there were no applications (or exploration) to exploit Federally owned minerals on the Ottawa (see Table 212).

Table 212. Federal mineral permit applications and decisions (FY 2016 to FY 2023)

Fiscal Year	Number of Applications Received	Number of Issued Decisions	Number of Applications Return to the BLM	Number of BLM Issued Permits
2016	0	0	0	0
2017	0	0	0	0
2018	0	0	0	0
2019	0	0	0	0
2020	0	0	0	0
2021	0	0	0	0
2022	0	0	0	0
2023	0	0	0	0

Private Minerals

In FY 2017, the State of Michigan notified the Forest Service that they intended to lease State-owned minerals existing under approximately 6,167 acres of the Ottawa. As shown in Table 212, no mineral exploration has been proposed or taken place.

In FY 2018, the State of Michigan notified the Forest Service that they intended to lease State-owned minerals existing under an additional 40 acres of the Ottawa. However, like the FY 2017 notification, no private mineral exploration has been proposed or implemented (see Table 213).

In FY 2019, the State of Michigan notified the Forest Service that they intended to lease State-owned minerals existing under an additional 2,520 acres of the Ottawa. However, just like the FY 2017 and FY 2018 notifications, no private mineral exploration has been proposed or implemented (Table 213).

Table 213. Private mineral permits issued (FY 2016 to FY 2023)

Fiscal Year	Received Official Notice of Intent for Leasing Minerals	Number of Issuances to Proceed with Exploration	Number of Issued Permits
2016	1	1	1
2017	0	0	0
2018	0	0	0
2019	1	0	0
2020	0	0	0

Fiscal Year	Received Official Notice of Intent for Leasing Minerals	Number of Issuances to Proceed with Exploration	Number of Issued Permits
2021	0	0	0
2022	0	0	0
2023	0	0	0

Gravel Pits

The Ottawa has several gravel pits that provide for internal and external uses, such as free use by county road commissions and sales to private individuals. Gravel used by the Forest is used for administrative purposes such as road maintenance. As highlighted in Table 208, a total of 30 individual permits were issued during the reporting period.

Operations within existing pits resulted in a total of 63,078.83 cubic yards of material extracted in the reporting period (see Table 214). Of this total, at least 15,418.5 cubic yards was used by the Forest. This “in-service use” material is used for general road maintenance, road work needed for timber sale operations and other miscellaneous projects on the Forest.

Table 214. Mineral material permits issued for gravel pits (FY 2016 to FY 2023)

Fiscal Year	Permits and In-Service Use	Amount of Material (cubic yards)	Amount of In-Service Use (cubic yards)
2016	4	25,803.5	4,679.5
2017	4	9,489	8,226
2018	5	2,618	2,513
2019	5	10,730	0
2020	8	9,420	0
2021	0	0	0
2022	2	5,008.33	19,000
2023	2	10	52,653.06
TOTAL	30	63,078.83	87,071.56

The use of this local material reduces costs associated with timber sales which supports economic growth. Additionally, using sites on the Ottawa is a cost-efficient option to maintain Forest roads and trails that are important to tourism.

During FY 2016, test holes were completed to locate new gravel sources and to also expand current gravel sources. As a result, four pit expansions and one pit development were identified as part of the North Zone Gravel Pits Project. The environmental analysis for this project occurred in FY 2017 and a decision to implement was completed on July 13, 2018. Also, during FY 2017 and 2018, work has continued to update gravel pit plans, which will help to ensure consistency among plans to support future operations.

Forest Plan

Are the current Forest Plan components (desired conditions, goals, objectives) achievable in the timeframes described and does the Forest Plan provide sufficient direction (standards, guidelines, suitability, designated lands) to achieve these components?

Forest Plan direction provides adequate direction for the use of mineral materials on the Ottawa. In most cases, the Ottawa does not own subsurface mineral rights and therefore, the direction is specific to Federally owned minerals and gravel pits. The Forest Plan's direction is broad enough to accommodate the changes in the number of permits and authorizations that need to be managed, which can vary from year-to-year based on administrative and public needs.

Forest Assessment

Is the status or trend of the monitoring indicators substantially different than described in the Forest Assessment, or was an assumption in the Forest Assessment proven to be invalid from the monitoring data?

The status and trend of the indicator is not different than anticipated in the analysis for the Forest Plan. The FEIS analysis was specific to the creation of special interest Areas (SIAs) in seven areas of the Ottawa, which exclude mineral exploration (p. 3-30). These areas do not include private or State-owned minerals, and therefore any future exploration needs would be consistent with the FEIS. Designation of the SIAs removed 84 acres, or 10%, of the Federally owned minerals from mineral exploration and pit development.

Management Actions

Did any of the management activities potentially result in adverse or beneficial effects to the status and trend of the monitoring indicators?

No exploration requests or operations have taken place for Federal, private or State-owned mineral resources in the monitoring period. However, all 74 permits for gravel pits were processed, resulting in a positive effect for the status and trend of the monitoring indicator.

Monitoring Program

Did the monitoring results provide all the information necessary to answer the monitoring question?

The data collection protocols and indicator adequately provide the necessary information to answer the monitoring question.

Monitoring Question 34 - Recommendations

There are no recommendations for changes to this question.

Table 215. Summary of monitoring recommendations for Monitoring Question 34

Changes may be warranted for the:	Yes	Maybe, not enough information to determine at this time	No
Forest Plan			☐
Forest Assessment			☐

Changes may be warranted for the:	Yes	Maybe, not enough information to determine at this time	No
Management Actions			☐
Plan Monitoring Program			☐

Monitoring Question 35 – Has land ownership adjustment facilitated Forest Plan implementation?

Has land ownership adjustment facilitated Forest Plan implementation?

Context for this Evaluation

This monitoring question ensures the Ottawa remains consistent with the Forest Plan for land adjustments.

Table 216. Background information for Monitoring Question 35

Drivers	
This monitoring question links to the 2012 Planning Rule (36 CFR 219.12(a)(5)(vii)): progress toward meeting the desired conditions and objectives in the plan, including for providing multiple use opportunities. This monitoring question also measures trends toward achieving conditions outlined in Goal 40 of the Forest Plan that states, “Adjust land ownership to facilitate land ownership to facilitate restoration, protection, and management of resources; and to provide for recreation opportunities” (p. 2-12).	
Primary Forest Plan Component Addressed	Monitoring Question Indicator
Adjust land ownership to facilitate restoration, protection, and management of resources; and to provide for recreation opportunities (Forest Plan, Goal 40, p. 2-12).	a: Number of acres acquired into Federal ownership
	b: Number of acres exchanged out of Federal ownership
Who collected this data? Who is Responsible for analyzing this question?	
Pamela Vande Venter, Realty Specialist	

When was this monitoring question last updated?

- Date of current evaluation: May 2024
- Date of previous evaluation: FY 2017 Monitoring Evaluation Report

Table 217. Relationship of Question 35 to other Forest Plan direction

Question 35	Key Forest Plan Components		
	<i>Desired Conditions</i>	<i>Goals and Objectives</i>	<i>Standards and Guidelines</i>
Indicator 35	No specific desired conditions have been outlined for	Goal 6, Objective (d): Provide a variety of recreational wildlife-	Guideline: Give priority to land adjustment that:

Question 35	Key Forest Plan Components		
	<i>Desired Conditions</i>	<i>Goals and Objectives</i>	<i>Standards and Guidelines</i>
	this Monitoring Question	based and nature watching opportunities (p. 2-8). Goal 10, Objective (a): Provide outstanding opportunities for people to experience solitude or primitive and unconfined recreation (p. 2-5). Goal 20: Provide for ecologically healthy watersheds, soils, riparian areas, and streams to support viable populations of native and desired non-native species, and to restore and enhance values associated with the Great Lakes System (E.O. 13340) (p. 2-7).	• Are within a designated wilderness or wild and scenic river corridor • Will protect wildlife, fish and wetland values • Result in more efficient landownership patterns • Result in lower resource management costs • Are suited to and needed for community development and other public purposes (p. 2-36).

What monitoring activities have been conducted since the last monitoring evaluation? What protocols were used to collect these data?

No specific monitoring is required for this monitoring question. The tracking of the monitoring indicators is accomplished through administering the Ottawa Lands Program.

What is the target, or range for the indicator being measured? Is there an alert level (such as a trigger or threshold), associated with the target that should be noted?

No targets or ranges are associated with this monitoring question; however, the ultimate goal is to adhere to the Forest Plan.

Has any new Best Available Scientific Information (BASI) informed this monitoring question, indicators, or methodology? Where is the data for this monitoring question stored?

No new BASI was used to inform this question. The data is stored within the Lands Program and managed by Ottawa staff.

Monitoring Question 35 - Results

Table 218. Status and trend of the indicator for Monitoring Question 35

Indicators		Recent Trend	
<i>Indicator a:</i> Number of acres acquired into Federal ownership.		<i>Towards Target</i>	<i>Away from Target</i>
Current Status	<i>Within Target</i>	X	
	<i>Outside Target</i>		
<i>Indicator b:</i> Number of acres exchanged out of Federal ownership.		<i>Towards Target</i>	<i>Away from Target</i>
Current Status	<i>Within Target</i>	X	
	<i>Outside Target</i>		

What level of confidence is there in the accuracy and precision?

There is high level of confidence that the information in this report is accurate and precise.

Monitoring Question 35 - Evaluation Discussion

Land Acquisitions

Project: Presque Isle

District: Bessemer

County: Gogebic

The Presque Isle River is a congressionally designated Wild and Scenic River. Totalling 1,811.01 acres, six of the seven parcels acquired from Keweenaw Land Association are located within the WSR corridor of the Presque Isle River.

This acquisition prevents development and assures protections to desired water quality and riverbanks.



Figure 46. Presque Isle purchase

The river serves as a corridor for species migration connecting large areas of low human habitation with similarly uninhabited areas to the north, including the Porcupine Mountains Wilderness State Park on Lake Superior. This area has also been identified as a corridor for key species dispersal. These protected waterways serve important functions to the ability of the Forest and the Lake Superior Watershed to adapt to predicted changes because of climate change.

Project: Clisch Family No. 2, LLC

District: Ontonagon

County: Houghton

The purchase of 144.52 acres from Clisch Family No. 2, LLC, resulted in all of Section 19 coming under Federal ownership. Doing this reduces boundary management burden and securing legal access. This parcel also provides access to the Posse Podzol (designated Special Interest Area) on the Forest and increases public access for hunting and recreation.

Approximately 1,200 feet of the Silver River flows through the parcel's northwest side as well as two, unnamed, intermittently flowing tributaries to Posse Creek. This acquisition prevents any development that might otherwise occur if it remained in private ownership. Development increases the potential for the introduction of invasive species, as well as a threat of erosion and sediment delivery into Lake Superior.

Project: Silver Mountain

District: Ontonagon

County: Houghton

Acquired with the partnership of The Nature Conservancy, the Silver Mountain project is adjacent to one of the most unique recreation sites on the Forest, the entire Silver Mountain Special Interest Area. This acquisition brought the entire Silver Mountain area into public ownership. It decreases the amount of private/public boundary thereby decreasing boundary management burden and eliminates the need for special use permits.

This acquisition will conserve natural resources (including protecting a known hibernaculum for the NLEB), enhances protection for two RFSS snails and provides potential habitat for three rare plants. The addition of this parcel to Forest Service ownership would add approximately 0.3 miles of stream between two segments currently under Forest Service ownership that creates a 2.3-mile section of habitat connectivity under adjoining Federal management.



Figure 47. Silver Mountain purchase

Project: West Branch of the Ontonagon River

District: Ontonagon

County: Ontonagon

This project totaled 1,246.57 acres where 293 of those acres fall within the designated WSR corridor of the West Branch of the Ontonagon River. Acquired with the assistance from the Trust for Public Land, this river segment is designated “recreation” for its “outstandingly remarkable values” in scenery, geology, fish and wildlife. The rapids are perfect for paddling. There are abundant smallmouth bass and walleye for anglers. The steep river slopes are a refuge for numerous rare plants.

The North Country National Scenic Trail runs through the northern portion of the acquired area, and the unique cliffs of the Northwich Outcrop Special Interest Area are visible from the overlooks in the project area.

Nearly ten miles of the West Branch of the Ontonagon River is now protected. The integrity of this river helps maintain quantity, quality and timing of the water flows that impact Lake Superior and its wildlife habitat, commercial fisheries and public recreation.



Figure 48. West Branch of the Ontonagon River purchase

Land Exchanges

Project: Hill

District: Bessemer

County: Gogebic

This project involved the exchange of 1.85 acres of Federal land for 1.85 acre of non-Federal land to resolve a Conveyance of Small Tracts (85 FR 60913) case.

Project: Hovel Tripartite Exchange

District: Ontonagon

County: Ontonagon

The Hovel Tripartite Exchange (219.38 acres) was the first time the Ottawa used “tripartite exchange” to purchase non-federal lands. Land acquired under a transaction like this involves three parties: a non-Federal landowner, National Forest timber value equal to the non-Federal property and the Purchaser who harvest National Forest timber.

Under a tripartite exchange, the timber purchaser agrees that timber values, for which cash payment is required under Federal timber regulations, may be used by the Forest Service in consideration for lands to be purchased by the United States. Collected timber receipts are placed in a timber sale deposit account and transferred periodically to a land exchange suspense account for eventual disbursement to the landowner for purchase of lands.

A segment (approximately 29 acres) of the West Branch of the Ontonagon runs through the Hovel parcel. Acquisition provides continuous public ownership along the West Branch of the Ontonagon River as it enters Victoria Reservoir, which increases opportunities for outdoor recreation enthusiasts. Federal acquisition helps to ensure that this area is not developed and that future management activities will protect sensitive soils, steep slopes and water quality of the reservoir and river. The parcel also contains the Ontonagon River confluence with the reservoir which is a fertile aquatic environment that is a prime feeding area for eagles, ospreys, loons and other wildlife species.

Conveyance of Small Tracts Act

Project: D'Antonio Small Tracts Act

District: Watersmeet

County: Gogebic

This project involved the disposal of 0.38 acres of federal land to resolve a Conveyance of Small Tracts (85 FR 60913) case.

Table 219. Land adjustment cases (FY 2019 to FY 2023)

Fiscal Year	Adjustment	Case Name	Acreage	Deed Recorded
2019	Purchase	Presque Isle	+ 1811.01	10/1/2018
2019	Exchange	Hill	+ 1.85 - 1.85	4/8/2019
2020	Purchase	Clisch Family No. 2, LLC	+ 144.52	7/10/2020
2021	Tripartite Exchange	Hovel Tripartite Exchange	+ 219.38	3/22/2021
2022	Purchase	Silver Mountain	+ 160.00	7/18/2022
2022	Purchase	West Branch of the Ontonago	+ 1246.57	8/17/2022
2023	Small Tracts Act	D'Antonio	- 0.38	

Table 220. Land adjustment funding summary (FY 2019 to FY 2023)

Fiscal Year	Funding	Acreage	Case
2019	Land and Water Conservation Fund (LWCF) Purchase	+ 1811.01	Presque Isle
2019	Exchange	+ 1.85 - 1.85	Hill
2020	Great Lakes Restoration Initiative	+ 144.52	Clisch Family No. 2, LLC
2021	Tripartite Exchange	+ 219.38	Hovel Tripartite Exchange
2022	Land and Water Conservation Fund (LWCF) Critical Inholding Purchase	+ 160.00	Silver Mountain
2022	Land and Water Conservation Fund (LWCF) Purchase	+ 1246.57	West Branch of the Ontonagon
2023	N/A	- .38	D'Antonio

Table 221. Land adjustment totals (FY 2019 to FY 2023)

Total Acres Acquired	+ 3583.33
Total Acres Conveyed	- 2.23
Net Gain	+ 3581.10

Forest Plan

Are the current Forest Plan components (desired conditions, goals, objectives) achievable in the timeframes described and does the Forest Plan provide sufficient direction (standards, guidelines, suitability, designated lands) to achieve these components?

Yes, the projects described above are contributing to working towards meeting the objectives and goals of the Forest Plan.

Forest Assessment

Is the status or trend of the monitoring indicators substantially different than described in the Forest Assessment, or was an assumption in the Forest Assessment proven to be invalid from the monitoring data?

The FEIS did not quantify specific goals for land acquisition however we continue to acquire more land in accordance with the Forest Plan.

Management Actions

Did any of the management activities potentially result in adverse or beneficial effects to the status and trend of the monitoring indicators?

Multiple land acquisitions have been completed since this monitoring question was last evaluated in 2017. All land acquisitions are considered to be beneficial and work towards achieving the goals of the Forest Plan.

Monitoring Program

Did the monitoring results provide all the information necessary to answer the monitoring question?

Yes, the indicators are sufficient for providing the necessary information related to the monitoring question.

Monitoring Question 35 - Recommendations

No recommendations for changes to this question.

Table 222. Summary of monitoring recommendations for Monitoring Question 35

Changes may be warranted for the:	Yes	Maybe, not enough information to determine at this time	No
Forest Plan			☐
Forest Assessment			☐
Management Actions			☐
Plan Monitoring Program			☐

Monitoring Question 36 – To what extent is forest management meeting hazardous fuels objectives?

Context for this Evaluation

This monitoring question ensures the Ottawa remains consistent with Forest Plan direction to utilize naturally occurring wildland fire, prescribed and mechanical fuel treatments to enhance ecosystem resiliency and function, lower hazardous fuel levels, protect public and private resources and values and provide for public and firefighter safety.

Table 223. Background information for Monitoring Question 36

Drivers	
This monitoring question links to the 2012 Planning Rule (36 CFR 219.12(a)(5)(vii)): This monitoring question stems from the 1995 Federal Wildland Fire Management Policy updated in 2001, The National Cohesive Strategy 2009, The National Cohesive Strategy Wildland Fire Management Strategy Northeast Regional Action Plan 2015, and more recently the 2022 10-year fire strategy Confronting the Wildfire Crisis: A Strategy for Protecting Communities and Improving Resilience in America's Forests and its Implementation Plan.	
Primary Forest Plan Component Addressed	Monitoring Question Indicator
Manage fuels consistent with fire regime group while maintaining condition classes I and II (p. 2-11).	Number of hazardous fuels acres treated.
Who collected this data? Who is Responsible for analyzing this question?	
Eric Rebitzke, Unit Fire Management Officer (Ottawa and Hiawatha National Forests)	

When was this monitoring question last updated?

- Date of current evaluation: May 2024
- Date of previous evaluation: FY 2017 Monitoring Evaluation Report

Table 224. Relationship of Monitoring Question 36 to other Forest Plan direction

Question 36	Key Forest Plan Components		
	<i>Desired Conditions</i>	<i>Goals and Objectives</i>	<i>Standards and Guidelines</i>
Indicator 36 a 36 b	Prescribed fire will be used alone or with silvicultural treatments to mimic the effects of natural fire (p. 1-9).	Goal 13: Restore and maintain Great Lakes forested ecosystems using timber management and silvicultural practices as tools, and to enhance values associated with the Great Lakes Ecosystem (Executive Order 13340) (p. 2-7). Objective 39a: Manage fuels consistent with fire regime group while maintaining condition	Guideline: Allow fires originating from natural ignitions (lighting) to burn as part of natural ecological disturbance regimes where appropriate (p. 2-35).

Question 36	Key Forest Plan Components		
	<i>Desired Conditions</i>	<i>Goals and Objectives</i>	<i>Standards and Guidelines</i>
		classes I and II (p. 2-11). Objective 39b: Reduce hazardous fuels in the wildland-urban interface and intermix areas (p. 2-11). Objective 39d: Integrate hazardous fuels projects with other programs to achieve multiple resource objectives (p. 2-11). Objective 39e: Allow fires from natural ignitions (e.g., lightning) to burn as part of a natural disturbance regime where appropriate (p. 2-11).	

**What monitoring activities have been conducted since the last monitoring evaluation?
What protocols were used to collect these data?**

Monitoring activities for this question have been obtained through querying results from the FACTS database of record for FY 2019 to FY 2023 (see Monitoring Guide). No other monitoring activities have taken place.

What is the target, or range for the indicator being measured? Is there an alert level (such as a trigger or threshold), associated with the target that should be noted?

Human-induced fire exclusion due to landscape fragmentation, grazing and fire suppression has weakened, and in some cases, eliminated the relationship of fire with vegetation, climate and people. The target, or range, for this question's indicator is dependent on elapsed time from last treatment or disturbance defined by species and fire frequency. Projects are designed to achieve site-specific objectives. These objectives are primarily fuel reduction and ecosystem resilience. These are accomplished through an integrated management approach using the best available and newly emerging science while adapting to changed conditions

and pre- and post-treatment monitoring to help evaluate if objectives being met.

A threshold for this indicator is a situation(s) that indicate a need to address hazardous fuel conditions, such as areas of blowdown due to storms or damaging effects from insects/disease or changes within the wildland-urban interface (WUI).

Has any new Best Available Scientific Information (BASI) informed this monitoring question, indicators, or methodology? Where is the data for this monitoring question stored?

Recent scientific papers have been published on fire frequency and geographic extent focusing on the Upper Peninsula and Great Lakes region (Sutheimer, et al., 2021 and Sutheimer, et al. 2023).

Monitoring protocols are used to evaluate first order fire effects, char longevity and long-term postfire ecosystem response have been developed. Monitoring sites are being established in preparation for future projects. These tools will better inform responsible officials about decisions based on the ecological benefits of fire use on the landscape. Monitoring data is collected annually through querying the FACTS database of record.

Monitoring Question 36 - Results

Table 225. Status and trend of the indicator for Monitoring Question 36

Indicators		Recent Trend	
<i>Indicator 36:</i> Acres of treatment (mechanical and prescribed fire) to reduce hazardous fuel conditions.		<i>Towards Target</i>	<i>Away from Target</i>
Current Status	<i>Within Target</i>	X	
	<i>Outside Target</i>		

What level of confidence is there in the accuracy and precision?

There is a moderate to high level of confidence in the quality and quantity of data collected because the same collection protocols and reporting standards have been in place. The Forest Plan states that the methods used for this monitoring question have a high degree of repeatability, reliability, accuracy and precision (p. 4-4). However, there are complementary monitoring efforts that can vary by staff, such as visual estimates and surveys, lending to a moderate level of accuracy and precision.

Monitoring Question 36 - Evaluation Discussion

Projects to reduce hazardous fuels on the Ottawa are prioritized by location and documented in annual fire management plans. Hazardous fuel reduction is defined as the removal of excessive live or dead wildland fuel accumulations for the strict objective of reducing the potential for the occurrence of uncharacteristically intense wildland fire. Projects are prioritized based on a site's location within or near WUI areas, areas where the fire frequency return interval is reduced (0 to 35 years), proximity to municipal watersheds, key habitat areas near infrastructure and/or areas experiencing (or imminently threatened) by insect and

disease. Input from Tribal partners to promote fire-dependent species such as paper birch (*Betula papyrifera*) and blueberry (*Cyanococcus spp.*) are also given consideration when planning and developing projects across management boundaries. These and other key stakeholders are involved in the planning process to provide the most ecological and social benefit.

Table 226. Hazardous fuel reduction actions (FY 2019 to FY 2023)

Fiscal Year	Acres of Hazardous Fuels Reduction Actions
2019	5,798.3
2022	5,082.8
2021	5,939.5
2022	4,231.3
2023	3,994.0
TOTAL	25,036.9

Forest Plan

Are the current Forest Plan components (desired conditions, goals, objectives) achievable in the timeframes described and does the Forest Plan provide sufficient direction (standards, guidelines, suitability, designated lands) to achieve these components?

Forest Plan direction provides adequate direction for the use of integrated management activities to reduce hazardous fuels (p. 2-11). In terms of meeting fuel reduction objectives, the Ottawa's Fire Management program views several actions as removing excessive fuels accumulations to achieve results for reducing the risk of intense wildland fire. This includes, but is not limited to, tree removal as part of timber harvest, addressing post-harvest slash (such as through chipping or pile burning), broadcast burning of forest understory and other actions to prepare sites for regeneration of desired tree species, wildlife habitat creation and tree removal as part of transportation system maintenance. These types of actions are supported by the Forest Plan direction for timber, fire management, wildlife habitat and transportation resources (Forest Plan, Goals, p. 2-2, 2-5, 2-6, 2-8, 2-11 and 2-12).

Forest Assessment

Is the status or trend of the monitoring indicators substantially different than described in the Forest Assessment, or was an assumption in the Forest Assessment proven to be invalid from the monitoring data?

The status and trend of the indicator is not different than anticipated in the analysis for the Forest Plan. The FEIS analysis was specific to changing Forest Plan direction to address opportunities to reduce hazardous fuel loads, along with fire use (natural ignition or

prescribed), with an emphasis on fire-prone landscapes and the WUI (p.1-15 and 3-171 to 3-172). The FEIS states that prior to Forest Plan revision, fuel reduction activities were implemented on an average of 50 acres per year.

The WUI area was not specifically identified, but the analysis was based on an equivalent definition (FEIS, p. G-21). With the change in Forest Plan direction, an increase was expected in the trend of hazardous fuel reduction and therefore the status of the monitoring indicator is not substantially different than the FEIS. The acres treated address not only hazard and risk of accumulating fuels, but also focus on ecosystem health as well as local, cultural and economic values.

Management Actions

Did any of the management activities potentially result in adverse or beneficial effects to the status and trend of the monitoring indicators?

As disclosed in Table 226, the approved activities authorized under various vegetation management projects. These have added to the positive trend for this monitoring indicator in the past five years.

Monitoring Program

Did the monitoring results provide all the information necessary to answer the monitoring question?

Yes, the data collection protocols and indicator adequately provide the necessary information to answer the monitoring question. New monitoring protocols currently being initiated will greatly enhance the quality, quantity and diversity of available data which will aid in future project decisions.

Monitoring Question 36 - Recommendations

There are no recommendations for changes to this question.

Table 227. Summary of monitoring recommendations for Monitoring Question 36

Changes may be warranted for the:	Yes	Maybe, not enough information to determine at this time	No
Forest Plan			☐
Forest Assessment			☐
Management Actions			☐
Plan Monitoring Program			☐

Monitoring Question 37 – To what extent is wildland fire (natural and prescribed) used to maintain or mimic natural processes, and/or restore natural processes and functions to ecosystems?

Context for this Evaluation

This monitoring question measures implementation towards the use of fire as part of the Ottawa's efforts to re-introduce the benefits of fire on the landscape. Fire use as part of fuel reduction is a primary, or active management, target for the Forest Service.

Table 228. Background information for Monitoring Question 37

Drivers	
This monitoring question links to the 2012 Planning Rule (36 CFR 219.12(a)(5)(vii)): This monitoring question stems from the 1995 Federal Wildland Fire Management Policy updated in 2001, The National Cohesive Strategy 2009, The National Cohesive Strategy Wildland Fire Management Strategy Northeast Regional Action Plan 2015 and the 2022 10-year Fire Strategy Confronting the Wildfire Crisis: A Strategy for Protecting Communities and Improving Resilience in America's Forests and associated Implementation Plan.	
Primary Forest Plan Component Addressed	Monitoring Question Indicator
Wildland fire suppression, wildland fire use (naturally occurring and prescribed) and mechanical fuel treatments will be used to enhance ecosystem resiliency and function, lower hazardous fuel levels, protect public and private resources and values, and provide for public and firefighter safety (Forest Plan, Goal 39, p. 2-11).	Number of hazardous fuels acres treated using prescribed fire (FP-FUELS-ALL)
Who collected this data? Who is Responsible for analyzing this question?	
Eric Rebitzke, Unit Fire Management Officer (Ottawa and Hiawatha National Forests)	

When was this monitoring question last updated?

- Date of current evaluation: May 2024
- Date of previous evaluation: FY 2019 Monitoring Evaluation Report

Table 229. Relationship of Monitoring Question 37 to other Forest Plan direction

Question 37	Key Forest Plan Components		
	<i>Desired Conditions</i>	<i>Goals and Objectives</i>	<i>Standards and Guidelines</i>
Indicator 37 a 37 b	Prescribed fire will be used alone or with silvicultural treatments to mimic the effects of natural fire (p. 1-9).	Goal 13: Restore and maintain Great Lakes forested ecosystems using timber management and silvicultural practices as tools, and to	Guideline: Allow fires originating from natural ignitions (lighting) to burn as part of natural ecological disturbance regimes where appropriate (p. 2-35).

Question 37	Key Forest Plan Components		
	<i>Desired Conditions</i>	<i>Goals and Objectives</i>	<i>Standards and Guidelines</i>
		enhance values associated with the Great Lakes Ecosystem (Executive Order 13340) (p. 2-5). Goal 39 Objectives: a: Manage fuels consistent with fire regime group while maintaining condition classes I and II. b: Reduce hazardous fuels in the wildland-urban interface and intermix areas. d: Integrate hazardous fuels projects with other programs to achieve multiple resource objectives. e: Allow fires from natural ignitions (e.g., lightning) to burn as part of a natural disturbance regime where appropriate (p. 2-11).	

What monitoring activities have been conducted since the last monitoring evaluation? What protocols were used to collect these data?

Monitoring activities for this question have been obtained through querying results from the FACTS database for FY 2019 to FY 2023 (see Monitoring Guide). No other monitoring activities have taken place.

What is the target, or range for the indicator being measured? Is there an alert level (such as a trigger or threshold), associated with the target that should be noted?

The target for this question's indicators is to achieve site-specific objectives for integrating the use of fire as a tool to accomplish integrated management approaches. As noted for

Monitoring Question 36, the Ottawa’s flexibility to use fire (natural and prescribed) is important because there are variety of actions that can be used to achieve management objectives. A threshold for these indicators would be to exclude fire from the landscape in those situations where fire (either naturally occurring or prescribed) could lend beneficial effects. For example, there are instances where fire use could be the best ecological choice to address habitat management needs (such as maintaining opening habitat for pollinator species), or where the use of fire can effectively address conditions in a more efficient and/or less expensive manner than mechanical treatments. It is important to note that safety is an important consideration that could change how an area is treated. Therefore, exclusion of fire would need to be reviewed in context of a project’s objectives in the determination about thresholds for restoring fire use on the landscape.

Has any new Best Available Scientific Information (BASI) informed this monitoring question, indicators, or methodology? Where is the data for this monitoring question stored?

Recently published scientific papers have been published on the fire frequency and extent with a focus on the Upper Peninsula and Great Lakes region (Forest Ecology and Management: Sutheimer and others 2021, International Journal of Wildland Fire: Sutheimer and others 2023).

Monitoring protocol to evaluate First Order Fire Effects, char longevity and long-term postfire ecosystem response have been developed. Monitoring sites are being established in preparation for future projects. These tools will better inform responsible officials about decisions based on the ecological benefits of fire use on the landscape. Monitoring data is collected annually through querying the FACTS database of record.

Monitoring Question 37 - Results

Table 230. Status and trend of the indicator for Monitoring Question 37

Indicators		Recent Trend	
<i>Indicator 37(a): Acres of treatment using wildfire as a tool to maintain or restore conditions, by forest type.</i>		<i>Towards Target</i>	<i>Away from Target</i>
Current Status	<i>Within Target</i>	X	
	<i>Outside Target</i>		
<i>Indicator 37(b): Acres of treatment using Prescribed fire to maintain or restore conditions, by forest type.</i>		<i>Towards Target</i>	<i>Away from Target</i>
Current Status	<i>Within Target</i>	X	
	<i>Outside Target</i>		

What level of confidence is there in the accuracy and precision?

There is a moderate to high level of confidence in the quality and quantity of data collected because the same collection protocols and reporting standards have been in place. The Forest Plan states that the methods used for this monitoring question have a high degree of

repeatability, reliability, accuracy and precision (p. 4-4). However, there are complementary monitoring efforts that can vary by staff, such as visual estimates and surveys, lending to a moderate level of accuracy and precision.

Monitoring Question 37 - Evaluation Discussion

Projects to reduce hazardous fuels and restore fire on the Ottawa are prioritized by location through annual fire management plans. Hazardous fuel reduction is the removal of excessive live or dead wildland fuel accumulations for the strict objective of reducing the potential for the occurrence of uncharacteristically intense wildland fire. Projects are prioritized based on a site's location in the WUI, including areas where the fire frequency return interval is reduced (0- to 35-years), within municipal watersheds, key habitat areas near infrastructure and/or areas experiencing (or imminently threatened) by insect and disease that can increase fire risk conditions. Input from Tribal partners to promote fire-dependent species such as paper birch (*Betula papyrifera*) and blueberry (*Cyanococcus*) are also given consideration when planning and developing projects that utilize prescribed fire. These and other key stakeholders are involved in the planning process to provide best value and identify areas on the landscape where cross-boundary projects can occur.

There were no opportunities to allow natural occurring wildfire, such as fire originating from lightning, to be managed for resource benefit. There were two natural ignition fires that occurred and were managed with a modified suppression strategy using light minimum impact suppression tactics, that did provide a benefit within the footprint of the fire perimeter. Those fires were the White Deer Fire (FY 23) that was contained at one acre and the Yellow Dog Fire (FY 23) that was contained at 144 acres (125 acres on Ottawa National Forest lands and 19 acres on private lands).

A total of 545 acres were treated with prescribed fire (see Table 231). Broadcast and low intensity under burning was used to accomplish ecosystem health objectives on 466 total acres during the period. Prescribed fire was used to treat eight acres of upland opening to regenerate grass species and address woody encroachment to enhance wildlife habitat. Within the openings, pile burning of material was also used on 71 acres during the period. Prescribed fire in these openings, such as those in the sand plains, encourages the growth of native grasses and blueberries.

Table 231. Acres treated with prescribed fire

Fiscal Year	Total Acres
2019	284
2020	20
2021	14
2022	50
2023	177
TOTAL	545

Forest Plan

Are the current Forest Plan components (desired conditions, goals, objectives) achievable in the timeframes described and does the Forest Plan provide sufficient direction (standards, guidelines, suitability, designated lands) to achieve these components?

Forest Plan direction provides adequate direction for the use of fire as a tool to accomplish multi-faceted objectives (p. 2-11). Although no opportunities have occurred during the reporting period to allow wildfire to accomplish project objectives as identified in Goal 39 and its Objective e, it is important to highlight that not all wildfire conditions can support this objective. There is an important balance with Forest Plan Goal 39 and its guideline that calls for wildland fire suppression, especially to a level commensurate with the threat posed to the public, firefighter safety and/or risks to property or other threatened resources (p. 2-35).

Forest Assessment

Is the status or trend of the monitoring indicators substantially different than described in the Forest Assessment, or was an assumption in the Forest Assessment proven to be invalid from the monitoring data?

The status and trend of the indicators is not different than anticipated in the analysis for the Forest Plan. Although the Ottawa has no results to date for Indicators 37a and 37b, the FEIS (p. 3-171) discloses that prescribed fire treatment depends on a variety of factors, some of which are difficult to predict. Examples include meteorological conditions, the amount of seasonal snowpack, rainfall and available funding. Additionally, allowing use of prescribed fire (either human or natural ignitions) does depend on a site's management direction, vegetation cover conditions, and vegetation type (FEIS, p. 3-171). The FEIS states that upland conifer species present the greatest challenge for wildfire suppression due to risk of fire spread in these areas, which are typically drier sites with heavy fuel loading. Considerations for these conditions would be an important determining factor for operations, especially within the WUI.

Management Actions

Did any of the management activities potentially result in adverse or beneficial effects to the status and trend of the monitoring indicators?

As disclosed in Table 231, the prescribed fires implemented as part of the various restoration projects have continued to have beneficial effects for Monitoring Indicator 37b. Restoration actions have been occurring across the Forest for several years.

Monitoring Program

Did the monitoring results provide all the information necessary to answer the monitoring question?

Yes, the data collection protocols and indicators adequately provide the necessary information to answer the monitoring question.

Monitoring Question 37 - Recommendations

There are no recommendations for changes to this question.

Table 232. Summary of monitoring recommendations for Monitoring Question 37

Changes may be warranted for the:	Yes	Maybe, not enough information to determine at this time	No
Forest Plan			☐
Forest Assessment			☐
Management Actions			☐
Plan Monitoring Program			☐

Monitoring Question 38 – To what extent are unneeded roads being decommissioned?

Context for this Evaluation

This monitoring question ensures the Ottawa remains consistent with the Forest Plan and Travel Management Rule (36 CFR 212) direction for transportation management. This monitoring question measures the number of road miles that the Ottawa decommissions per fiscal year. Decisions to decommission roads need to be weighed carefully based on current and future needs for both administrative uses and the public transportation system.

Table 233. Background information for Monitoring Question 38

Drivers	
This monitoring question links to the Travel Management Rule (36 CFR 212.5), that requires responsible officials to identify unneeded roads. These are roads that are no longer needed to meet forest resource management objectives and therefore should be decommissioned or considered for other uses (USDA, 2005).	
Primary Forest Plan Component Addressed	Monitoring Question Indicator
Design and maintain a safe, efficient, and effective transportation system that supports both public and administrative uses of National Forest System lands (Forest Plan, Goal 41, p. 2-12)	Miles of road decommissioned based on the Travel Analysis Process or other planning efforts.
Who collected this data? Who is Responsible for analyzing this question?	
Ellen Lesch, Aquatic Ecologist/Hydrologist	

When was this monitoring question last updated?

- Date of current evaluation: December 2023
- Date of previous evaluation: FY 2019 Monitoring Evaluation Report

Table 234. Relationship of Monitoring Question 38 to other Forest Plan direction

Question 38	Key Forest Plan Components		
	<i>Desired Conditions</i>	<i>Goals and Objectives</i>	<i>Standards and Guidelines</i>
Indicator 38	Desired road densities per MA (p. 3-4, 3-8, 3-13, 3-18, 3-23, 3-29, 3-58 and 3-63)	Goal 9: Promote diverse and quality recreation experiences within the capability of sustainable ecosystems, and consistent with the niche of the Ottawa, while minimizing impacts to natural resources (p. 2-4).	Guideline: Decommission, or consider for alternate uses, roads that are no longer needed to meet Ottawa resource management objectives (p. 2-37).

**What monitoring activities have been conducted since the last monitoring evaluation?
What protocols were used to collect these data?**

Monitoring activities for this question have been obtained through querying results from WIT, the database of record (see Monitoring Guide). The WIT database tracks decommissioning of system and unauthorized road miles for watershed and engineering annual targets. The database has evolved over the years, and some errors have occurred in how data was entered and queried. Therefore, the mileage results are not consistent with past monitoring reports.

In 2019 through 2021, routes were reviewed by seasonal staff in completed timber sale areas to determine if decommissioning had been successfully completed. This work was continued by Ottawa staff in 2022. This effort has included the use of technology for data collection in the field that can be directly incorporated into GIS, including geo-referenced photos and notes, thereby improving efficiency and accuracy. The routes that have been successfully decommissioned are then added to the WIT database during the fall and winter months. This has greatly improved the ability to report and track decommissioned routes. Routes that have not been successfully decommissioned can be added to future contracts so decommissioning can be accomplished. Once it is accomplished, the information is added to WIT.

What is the target, or range for the indicator being measured? Is there an alert level (such as a trigger or threshold), associated with the target that should be noted?

The target for this question's indicator is to remove roads from the administrative and/or public transportation networks that are not needed for current or future management or have been deemed unsuitable to support motorized traffic. There are no thresholds in terms of miles that need to be decommissioned in the Forest Plan. A trigger for the need to decommission is determined on a site-specific management objective, which is typically recommended through a transportation analysis process often in conjunction with vegetation management planning during the NEPA process.

Has any new Best Available Scientific Information (BASI) informed this monitoring question, indicators, or methodology? Where is the data for this monitoring question stored?

Tracking of decommissioned routes has changed over the years as better national databases have been developed. Past decommission reporting focused more on actions authorized for specific projects. However, it has been determined through field inventory and monitoring that some routes authorized for decommissioning were not successfully implemented even though the road status was changed in WIT. These routes were either re-opened via unauthorized use, or in some cases, they were overlooked for physical decommissioning. In 2011, a more strategic program of review was developed and by 2013, contracts were being awarded to physically decommission problematic routes.

Monitoring Question 38 - Results

Table 235. Status and trend of the indicator for Monitoring Question 38

Indicators		Recent Trend	
<i>Indicator:</i> Miles of road decommissioning based on the Travel Analysis Process or other planning efforts.		<i>Towards Target</i>	<i>Away from Target</i>
Current Status	<i>Within Target</i>	X	
	<i>Outside Target</i>		

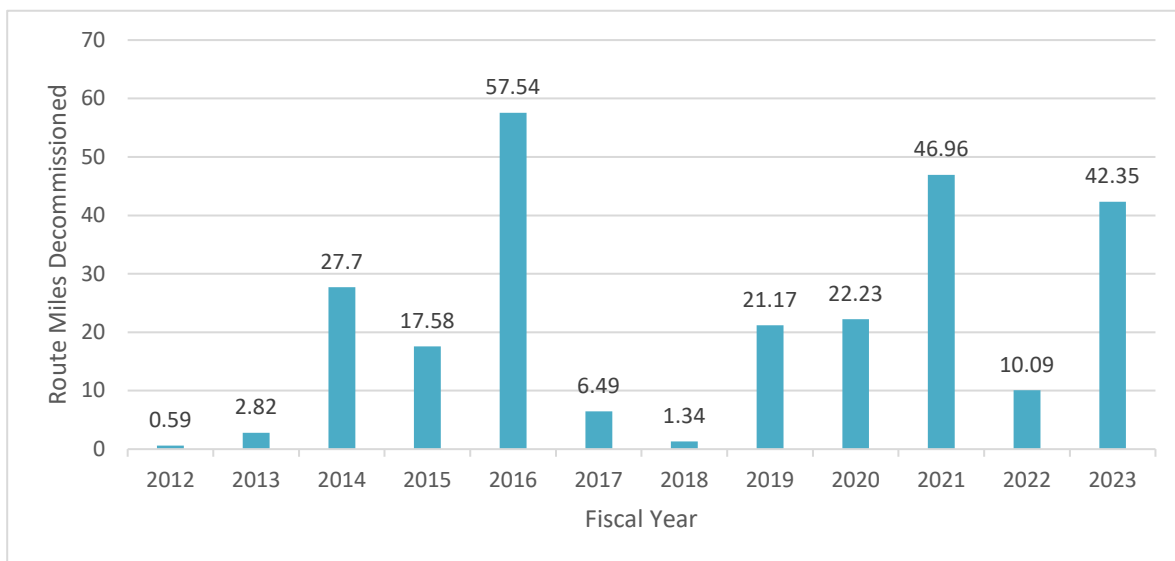


Figure 49. Route miles decommissioned by fiscal year

What level of confidence is there in the accuracy and precision?

There is a moderate to high level of confidence in the quality and quantity of data collected particularly in recent years. The Forest Plan states that the methods used for this monitoring

question have a high degree of repeatability, reliability, accuracy and precision (p. 4-4). Although the data collection protocols remain constant, monitoring efforts can vary by staff from year to year, which results in a moderate level of confidence in accuracy and precision. However, having a permanent employee conducting the field work has improved accuracy and precision.

Monitoring Question 38 - Evaluation Discussion

The Ottawa decommissions routes that have been selected for removal from the designated system or are unauthorized and deemed unsuitable. Decisions to decommission are made through project decisions, often in conjunction with large vegetation management projects where access management is a priority.

Many decommissioned routes have received little to no use and have naturally revegetated. Some roads require physical barriers like berms or obstructing the road surface for approximately the first 150-feet by using a variety of techniques including pulling in stumps, boulders, slash and woody debris or transplanting trees. Some routes require culverts to be removed. A few routes require more extensive decommissioning techniques that not only block the route entrances, but also remove additional culverts, install water bars, apply riprap to eroding sites, scarify road surfaces, apply seed and mulch and plant trees along much of the roadway length.

Cost varies from route-to-route depending on the complexity of decommissioning actions and budgets vary from year-to-year. Therefore, the number of miles accomplished can vary. In years when routes are inventoried in advance, and sufficient funds are available to award contracts, more decommissioning occurs.

Some timber sales are also able to decommission routes. With the advent of the stewardship program, which has been used as a mechanism for decommissioning since 2013, more routes have been added to stewardship contracts.

Figure 48 shows that there was a decline in decommissioned route miles completed in fiscal years 2017 and 2018. This is due, in part, to a shift in the Ottawa's priorities for work accomplishment and funding. Additionally, it can take many years before decommissioning occurs through timber sales and stewardship contracting.

Depending on contract specifications at the time of implementation, not all routes are included for decommissioning. Therefore, it is a complex and cumbersome process to track accomplishments over time. The WIT database requires not only route miles, but spatial information, contract date, completion date, cost and funding source for accomplishment reporting. This type of information can be difficult to obtain if routes are entered into the stewardship contracting process.

Additional decommissioning needs must be determined once stewardship and timber sale contracts are completed. Some decommissioning actions are unsuccessful, especially when decommissioned routes are re-opened and are trafficked by unauthorized OHV use.

Eliminating all vehicle use from decommissioned routes allows vegetation to naturally re-establish, prevents soil damage and water quality impacts.

Forest Plan

Are the current Forest Plan components (desired conditions, goals, objectives) achievable in the timeframes described and does the Forest Plan provide sufficient direction (standards, guidelines, suitability, designated lands) to achieve these components?

The Forest Plan provides adequate direction for the need for decommissioning. Forest Plan direction for recreation and transportation offers a foundation for specialists to make recommendations at a site-specific level to meet administrative and public needs. Any roads deemed not needed, such as those routes that are unsafe, present risk to cultural or natural resources (in accordance with applicable laws, regulations and policies), do not provide a quality recreational experience or are redundant (leading to the same area) can be proposed for decommissioning.

Forest Assessment

Is the status or trend of the monitoring indicators substantially different than described in the Forest Assessment, or was an assumption in the Forest Assessment proven to be invalid from the monitoring data?

The status and trend of the indicator is not different than anticipated in the analysis for the Forest Plan. Off-highway vehicle use was a principal issue identified in the FEIS, and the availability of cross-country use was a factor analyzed as part of this issue. The prohibition of cross-country use was established in the FEIS Record of Decision (p. 12), which aligns with the 2005 Travel Management Rule. The anticipated trend of the monitoring indicator is not substantially different than that outlined in the FEIS as the analysis allowed for flexibility in decommissioning roads based on site-specific project needs.

Management Actions

Did any of the management activities potentially result in adverse or beneficial effects to the status and trend of the monitoring indicators?

Figure 48 shows the number of miles reported varies by fiscal year with most years accomplishing ten or more miles of decommissioning. With many routes authorized for decommissioning through various NEPA projects, implementation and monitoring of the decommissioning actions cannot occur until timber sales are completed, which can take many years. It is important to note that not all authorized decommissioning has been implemented as planned.

Monitoring Program

Did the monitoring results provide all the information necessary to answer the monitoring question?

Yes, the data collection protocols and indicators adequately provide the necessary information to answer the monitoring question.

Monitoring Question 38 - Recommendations

There are no recommendations for changes to this question.

Table 236. Summary of monitoring recommendations for Monitoring Question 38

Changes may be warranted for the:	Yes	Maybe, not enough information to determine at this time	No
Forest Plan			☐
Forest Assessment			☐
Management Actions			☐
Plan Monitoring Program			☐

Summary of All Monitoring Question Evaluations

Table 237. Summarized list of Monitoring Question evaluations and recommendations addressed in this report

Monitoring Question	Date of Most Current Evaluation	Are any changes being recommended resulting from this evaluation?	Date of Previous Evaluation	Previously, were changes recommended?
1	2019	No	2019	No
2	2024	Yes. Track the cost of salary and expense for the timber program based on encumbered positions for the fiscal year using the cost per day for each employee that was charged to NFSE. Inflation should be considered when comparing the cost of operations from 2006 to the average cost of the analysis period.	2017	No
3	2024	No	2017	No
4	2024	Yes. Exclude Indicator 4b that addresses EAB tree trap monitoring due to the elimination of this program in 2018. Additional management actions may be needed in the future upon establishment of the EAB.	2019	No
5			2017	No
6			2019	No
7	2019	No	2019	No
8	8a: 2024 8b: 2021	8a: No 8b: No	2017	No
9	2024	No	2017	To better assist with planning

Monitoring Question	Date of Most Current Evaluation	Are any changes being recommended resulting from this evaluation?	Date of Previous Evaluation	Previously, were changes recommended?
				efforts, additional requests for Regional Office exemptions from the creation of temporary openings exceeding 40 acres in size should be considered.
10	2024	No	FY 2017	The Ottawa should continue to utilize the FSDM Protocol to monitor land management activities to ensure that the soils on the Ottawa remain productive. It was recommended that adjustments to design criteria should be considered for winter harvest operations considering observed and predicted changes in seasonal trends (summers have been wet; frozen conditions have been hard to achieve; and climate change predictions, etc.).

Monitoring Question	Date of Most Current Evaluation	Are any changes being recommended resulting from this evaluation?	Date of Previous Evaluation	Previously, were changes recommended?
11			2017	Monitoring Indicator b: Comparison of the seedling/sapling-sized, mid-tolerant tree species component in the understory and overstory of managed <i>and unmanaged stands</i> .
12	2024	12a: No 12b: No 12c: Yes. Both Indicators (a) and (c) monitor the spread of invasive species. Indicator (a) is sufficient in doing this alone. Recommend removal of Indicator (c). 12d: No	2017	12a Monitoring Indicator a: Number of acres with known <i>high and medium priority</i> non-native invasive plant infestations. Monitoring Indicator b: Number of infested <i>sites</i> treated, by species. Monitoring Indicator d: <i>The average effectiveness score of invasive plant treatment.</i>
13			2019	No
14			2017	No
15	2025	No	2019	No
16			2019	No
17	2024	No	2017	Monitoring Indicator 17b:

Monitoring Question	Date of Most Current Evaluation	Are any changes being recommended resulting from this evaluation?	Date of Previous Evaluation	Previously, were changes recommended?
				Number of adult bald eagle territories <i>occurring in WSR corridors.</i> Monitoring Indicator 17c: Number of juvenile eagles fledged <i>within the WSR corridors.</i>
18	2024	No	2017	
19	2024	No	2017	Monitoring Indicator 19b: <i>Acres of old growth by forest type group.</i> Monitoring Indicator 19c: <i>Acres of contiguous blocks of classified old growth.</i>
20	2024		2017	
21	2024	No	2017	No
22	2024	Yes. Recommending requesting additional Regional Office exemption for openings greater than 40-acres in size.	2017	No
23	2024	No	2017	No
24	2024	No	2019	No
25	2024	No	2017	No
26	2024	26a. No 26b. No	2017	No

Monitoring Question	Date of Most Current Evaluation	Are any changes being recommended resulting from this evaluation?	Date of Previous Evaluation	Previously, were changes recommended?
		26c. Yes. Establish new repeatable and realistic sampling protocols and timelines for all monitoring sites.		
27	2023	27a. No 27b. Yes. Remove monitoring indicators reliant upon snowmobile data.	2017	No
28	2023	No	2017	No
29			2017	No
30	2024	Possibly. Initiate additional actions to benefit SVC.	2017	Question 30: To what extent is Forest Plan implementation <i>contributing or responding to desired habitat conditions for Regional Forester Sensitive Species, Species of Viability Concern or Species of Conservation Concern?</i> Monitoring Indicator 30a: Number of actions implemented <i>for plants</i> from approved recovery plans, conservation strategies and/or Forest Plan direction.

Monitoring Question	Date of Most Current Evaluation	Are any changes being recommended resulting from this evaluation?	Date of Previous Evaluation	Previously, were changes recommended?
				Monitoring Indicator 30b: Number of actions implemented <i>for wildlife</i> from approved recovery plans, conservation strategies and/or Forest Plan direction.
31	2024	Yes. Implement the Forest Service Bat Conservation Strategy. Remove Indicators (a) and (b) due to change in status of KW.	31a. 2017 31b. 2017 31c. 2019	Monitoring Indicator 31a: Acres of suitable Kirtland's warbler habitat <i>currently available</i> . <i>Monitoring Indicator 31b: Acres of suitable Kirtland's warbler habitat available within the next 5 to 10 years.</i>
32	2024	No	2017	No
33	2024	Yes. Recruit addition aspen and spruce/fir/aspen acres in the 5-to-20-year age-class. Increase harvest levels in those cover types.	2019	No
34	2024	No	2017	No
35	2024	No	2017	No
36	2024	No	2019	No
37	2024	No	2019	No
38	2023	No	2019	No

Listing of Supporting Plan Monitoring Program Documents

Forest Assessment

USDA Forest Service. 2006. Ottawa National Forest Final Environmental Impact Statement, Volumes I and II. Eastern Region. Ironwood, MI.

USDA Forest Service. 2006. Ottawa National Forest, Record of Decision. Eastern Region. Ironwood, MI.

Land and Resource Management Plan

USDA Forest Service. 2006. Ottawa National Forest Land and Resource Management Plan. Eastern Region. Ironwood, MI.

Previous Biennial Monitoring Evaluation Report

USDA Forest Service. 2017. Ottawa National Forest Fiscal Years 2012-2016 Monitoring Evaluation Report. Ironwood, MI.

Planning Documents:

Ridge Vegetation and Roads Project. 2008. Ottawa National Forest. Ontonagon Ranger District, Ontonagon, MI.

Rousseau East Vegetation Management Project. 2008. Ottawa National Forest. Kenton Ranger District, Kenton, MI.

Baraga Plains Restoration Project. 2011. Kenton and Ontonagon Ranger Districts, Kenton, MI.

Beaton Vegetation Management Project. 2011. Ottawa National Forest. Bessemer and Watersmeet Ranger Districts, Bessemer, MI.

Interior Vegetation Management Project. 2014. Ottawa National Forest. Watersmeet Ranger District, Watersmeet, MI.

Redboat Resource Management Project. 2014. Ottawa National Forest. Bessemer Ranger District, Bessemer, MI.

Red Pine Thinning Project. 2014. Ottawa National Forest. Ironwood, MI.

Riparian Restoration Project. 2014. Ottawa National Forest. Ironwood, MI.

Pori Junction Vegetation Management Project. 2014. Ottawa National Forest. Kenton Ranger District, Kenton, MI.

Spruce/Fir Decline Hazardous Fuels Reduction Project. 2016. Ottawa National Forest. Iron River and Watersmeet Ranger Districts, Watersmeet, MI.

Administrative Change 1 Project. 2017. Ottawa National Forest. Ironwood, MI.

East Iron-Phelps OHV Connector Project. 2017. Ottawa National Forest. Iron River and Watersmeet Ranger Districts, Watersmeet, MI.

Forestwide Designated Motorized Use Project. 2017. Ottawa National Forest. Ironwood, MI.

Prickett Vegetation Management Project. 2017. Ottawa National Forest. Bergland and Ontonagon Ranger Districts, Ontonagon, MI.

Administrative Change 2 Project. 2018. Ottawa National Forest. Ironwood, MI.

Forestwide Planting for Forest Health and Diversity Project. 2018. Ottawa National Forest. Ironwood, MI.

North Zone Gravel Pits Project. 2018. Ottawa National Forest. Kenton and Ontonagon Ranger Districts, Kenton, MI.

Pomeroy Vegetation Management Project. 2019. Ottawa National Forest. Bessemer Ranger District, Bessemer, MI.

Other Supporting Documents

USDA Forest Service. 2012. Ottawa National Forest Travel Management Strategy and Implementation Process. Ironwood, MI.

Appendix 1: Schedule for Forest Plan Monitoring Evaluation

Monitoring Question(s)	Monitoring Indicator(s)	Measurement Frequency / Evaluation Reporting Frequency
1. How do actual outputs and services compare to those outputs and services projected in the Forest Plan?	a. Comparison of the projected and actual timber volume sold, by product.	Annual / Biennial
	b. Comparison of the projected and actual acres harvested, by treatment method.	
	c. Comparison of the projected and actual acres of forest treated annually.	
2. How close are actual costs to projected costs?	a. Comparison of the projected and actual timber management costs.	5 Years / 6 Years
	b. Comparison of the projected and actual reforestation and timber sale improvement costs.	
3. To what extent do output levels and the mix of sawtimber and pulpwood compare to those levels projected?	a. Timber volume sold by product.	3 to 5 Years / 4 to 6 Years
	b. Payments to counties.	
4. Are exotic insect and disease impacting achievement of objectives for restoring or maintaining healthy forest conditions?	a. Extent and severity of exotic insect and disease population levels based on results of detection flights.	Annual / Biennial
	b. Results of emerald ash borer trap tree monitoring.	

Monitoring Question(s)	Monitoring Indicator(s)	Measurement Frequency / Evaluation Reporting Frequency
5. What is the status of visitor use and visitor satisfaction?	a. Number of visitors participating in recreation activities.	5 Years / 6 Years
	b. Percentage of overall visitor satisfaction.	
6. Percentage of road closure barriers breached leading to unauthorized use.	Percentage of road closure barriers breached leading to unauthorized use.	Annual / 2-6 Years
7. Are harvested lands adequately restocked after 5 years?	Number of acres certified as adequately restocked.	Annual / Biennial
8a. To what extent are timber management activities occurring on lands suited for timber production?	Number of acres managed by timber suitability class.	10 Years / 10 Years
8b. To what extent have conditions, or information, changed the classification of lands "not suited" for timber production to "suitable" for timber production?	Number of acres determined to be suited for timber production.	10 Years / 10 Years
9. To what extent, and under what circumstances, are clearcuts and other openings created by even-aged management exceeding 40 acres?	Acres of temporary opening, managed to exceed 40 acres in size, by forest type.	5 Years / 6 Years
10. Is Forest Plan implementation resulting in impacts that may substantially and permanently impair the productivity of the land?	Extent of soil disturbance affecting soil function and soil productivity on managed lands.	Annual / 2-6 Years

Monitoring Question(s)	Monitoring Indicator(s)	Measurement Frequency / Evaluation Reporting Frequency
11. Are northern hardwood forest management activities promoting the regeneration of mid-tolerant tree species, specifically green and white ash, American basswood, Eastern white pine, Northern red oak, and yellow birch?	a. Difference in the number of seedling/sapling-sized, mid-tolerant tree species in managed and unmanaged northern hardwood forest stands.	5 Years / 6-10 Years
	b. Comparison of the seedling/sapling-sized, mid-tolerant tree species component in the understory and overstory of managed and unmanaged stands.	
12a. To what extent is Forest Plan implementation contributing or responding to non-native invasive plant species?	a. Number of acres with known high and medium priority non-native invasive plant infestations.	1-5 Years / 2-6 Years
	b. Number of infested acres treated, by species.	
	c. Acres of new non-native invasive plants found, by species.	
	d. The average effectiveness score of invasive plant treatment.	
12b. To what extent is Forest Plan implementation contributing or responding to non-native invasive animal species?	a. Number of sites with known non-native invasive animal infestations.	1-5 Years / 2-6 Years
	b. Number of infested sites treated, by species.	
	c. New non-native invasive animals found, by species.	
13. What amount of road routes and recreation trails are designated open for OHV riding and provide connections to other public trails?	a. Total number of miles open to OHV use.	1-5 Years / 2-6 Years
	b. Number of system roads open to OHV use.	
	c. Number of trails (non- system roads) open to OHV use.	

Monitoring Question(s)	Monitoring Indicator(s)	Measurement Frequency / Evaluation Reporting Frequency
	d. Number of miles of designated OHV route that connects to other public trails.	
14. Is Forest Plan implementation consistent with the Recreational Opportunity Spectrum Objectives and Desired Conditions?	Number of miles of road per square mile of land, by management area.	2-5 Years / 3-6 Years
15. To what extent is the Forest meeting its Federal Indian trust responsibility, including but not limited to, meeting the requirements of the memorandum of understanding, consulting with Tribes for Forest management, and actively seeking collaborative opportunities?	a. Number of notifications and consultations, e.g. documentation of NEPA notifications and consultations, National Historic Preservation Act (NHPA) and Native American Graves Protection and Repatriation Act (NAGPRA) consultations.	Annual / Biennial
	b. Number of consultation meetings.	Annual / Biennial
	c. Number of collaborative meetings and discussions.	
16. Is wilderness management contributing to improvement or preservation of wilderness character and values?	Score from the wilderness stewardship performance plan, by wilderness area.	1-5 Years / 2-6 Years
17. To what extent is Wild and Scenic River (WSR) management contributing to the protection and enhancement of the WSR values?	a. Number of adult female wood turtles observed in each WSR reach.	Biennial / 2-4 Years
	b. Lake sturgeon population estimate in the Sturgeon River.	4-6 Years / 4-6 Years

Monitoring Question(s)	Monitoring Indicator(s)	Measurement Frequency / Evaluation Reporting Frequency
	c. Number of juvenile lake sturgeon stocked into the Ontonagon River.	Annual / 4-6 Years
18. To what extent are forest management activities restoring vegetation composition and spatial landscape patterns and moving toward desired conditions at the Forest, management area and other appropriate landscape scales?	Comparison of current and desired percentages of forest types, by management area.	5 Years / 6 Years
19. To what extent are old growth forest conditions being classified consistent with management area objectives?	a. Comparison of current and desired percentages of old growth, by management area	5 Years / 6 Years
	b. Acres of old growth by forest type group.	
	c. Acres of contiguous blocks of classified old growth.	
20. To what extent are permanent upland openings being created and maintained to move towards desired conditions.	Comparison of current and desired percentages of permanent upland openings, by management area.	5 Years / 6 Years

Monitoring Question(s)	Monitoring Indicator(s)	Measurement Frequency / Evaluation Reporting Frequency
21. To what extent are northern hardwood forest types being managed to work toward the desired mix of even-aged and uneven-aged stands?	Acres of the northern hardwood forest type harvested, by silvicultural method.	5 Years /6 Years
22. To what extent is the aspen forest type being maintained through regeneration activities to meet Forestwide and management area objectives?	a. Comparison of projected and actual acres of aspen regenerated at the Forestwide scale.	5 Years /6 Years
	b. Number of acres maintained in the 0 to 9 year age class at the Forestwide scale.	
23. To what extent are long-lived conifer forest types being increased or maintained through regeneration activities to meet Forestwide and management area objectives?	Acres of long-lived conifers regenerated, through natural and artificial reforestation, at the Forestwide and management area scale.	5 Years /6 Years
24. To what extent are short-lived conifer forest types being maintained through regeneration activities to meet Forestwide and management area objectives?	Acres of short-lived conifers regenerated, through natural and artificial reforestation, at the Forestwide and management area scale.	5 Years /6 Years

Monitoring Question(s)	Monitoring Indicator(s)	Measurement Frequency / Evaluation Reporting Frequency
25. To what extent is natural regeneration favored over artificial reforestation to meet Forestwide and management area objectives?	a. Number of acres planted by forest type, at the Forestwide scale.	5 Years / 6 Years
	b. Number of acres regenerated naturally by forest type, at the Forestwide scale.	
26a. To what extent are we moving riparian areas towards desired conditions?	Acres of riparian habitat improved.	Annual / 2-6 Years
26b. To what extent are we restoring aquatic habitat connectivity?	a. Number of barriers removed for aquatic organism passage.	1-5 Years / 2-6 Years
	b. Number of stream miles reconnected.	1-5 Years / 2-4 Years
26c. Does the relative abundance, density, and species richness of aquatic macroinvertebrates within sampled reaches indicate plan objectives for stream water quality and habitat are being obtained?	Extent of change in aquatic macroinvertebrate abundance, density, and species.	Annual / 2-4 Years
27a. How is drought duration, severity, geographic extent or timing changing across the planning area on an annual basis?	The U.S. Drought Monitor rating for the planning area.	Annual / 6 Years
27b. How are the timing and duration of winter weather conditions changing across the planning area on an annual basis?	a. The Accumulated Winter Season Severity Index (AWSSI) calculated for planning area based on daily measurements of maximum	Annual / 2-6 Years

Monitoring Question(s)	Monitoring Indicator(s)	Measurement Frequency / Evaluation Reporting Frequency
	temperature, minimum temperature, snowfall and snow depth.	
27b. How are the timing and duration of winter weather conditions changing across the planning area on an annual basis?	b. Opening and closure dates of snowmobile trails.	Annual / 2-6 Years
	c. Number of total days snowmobile trails are open.	
28. To what extent is Forest Plan implementation affecting streams, lakes, ponds and wetlands and their associated riparian ecosystems?	Results of best management practices implementation and effectiveness monitoring in activity areas.	1-5 Years / 2-6 Years
29. To what extent are the key habitat components in aquatic and terrestrial habitat being provided?	a. The extent of large woody material in streams	1-5 Years / 2-6 Years
	b. The extent of terrestrial large woody material provided (snags and down wood).	
	c. The extent of low dense conifer regeneration in aspen regeneration harvest areas.	

Monitoring Question(s)	Monitoring Indicator(s)	Measurement Frequency / Evaluation Reporting Frequency
30. To what extent is Forest Plan implementation contributing or responding to desired habitat conditions for Regional Forester's Sensitive Species, Species of Viability Concern or Species of Conservation Concern?	a. Number of actions implemented for plants from approved recovery plans, conservation strategies and/or Forest Plan direction.	Annual / 2-6 Years
	b. Number of actions implemented for wildlife from approved recovery plans, conservation strategies and/or Forest Plan direction.	
31. To what extent is forest management contributing to the conservation of threatened and endangered species and moving toward desired habitat conditions and population trends for these species?	a. Acres of suitable Kirtland's warbler habitat currently available.	1-5 Years / 2-6 Years
	b. Acres of suitable Kirtland's warbler habitat available within the next 5 to 10 years.	
	c. Results of forest bat monitoring efforts.	Annual / Biennial

Monitoring Question(s)	Monitoring Indicator(s)	Measurement Frequency / Evaluation Reporting Frequency
32. To what extent is forest management affecting the density of open roads within the Remote Habitat Area, and moving toward the Forest density objective of < 1.0 miles/square mile?	Miles of system road open to passenger vehicles per square mile of land within the remote habitat area.	1-5 Years / 2-6 Years
33. To what extent is forest management contributing to the development and maintenance of foraging and denning habitat, and connectivity of habitats for Canada lynx?	a. Acres surveyed in primary lynx habitat.	1-5 Years / 2-6 Years
	b. Acres of jack pine foraging habitat (total and 10 to 20 year age-class) on the suited and unsuited landbase.	
	c. Acres of spruce/fir-aspen foraging habitat (total and 10 to 40 year age-class) on the suited and unsuited landbase.	
	d. Total acres of lowland conifer foraging habitat on the unsuited landbase.	
	e. Total acres of short-lived conifer foraging habitat on the unsuited landbase.	

Monitoring Question(s)	Monitoring Indicator(s)	Measurement Frequency / Evaluation Reporting Frequency
34. Is the Forest providing minerals and mineral materials to help support economic growth?	Number of permits and authorizations processed.	1-5 Years / 2-6 Years
35. Has land ownership adjustment facilitated Forest Plan implementation?	a. Number of acres acquired into Federal ownership.	2 Years / 2-6 Years
	b. Number of acres exchanged out of Federal ownership.	
36. To what extent is forest management meeting hazardous fuels objectives?	Acres of treatment (mechanical and prescribed fire) to reduce hazardous fuel conditions.	1-5 Years / 2-6 Years
37. To what extent is wildland fire (natural and prescribed) used to maintain or mimic natural processes, and/or restore natural processes and functions to ecosystems?	a. Acres of treatment using wildfire as a tool to maintain or restore conditions, by forest type.	1-5 Years / 2-6 Years
	b. Acres of treatment using prescribed fire to maintain or restore conditions, by forest type.	

Monitoring Question(s)	Monitoring Indicator(s)	Measurement Frequency / Evaluation Reporting Frequency
38. To what extent are unneeded roads being decommissioned?	Miles of road decommissioned based on the Travel Analysis Process or other planning efforts.	Annual / Biennial