Stockbridge-Munsee Community

Wetland Program Plan

2022–2026

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1.0 Introduction

The Stockbridge-Munsee Community (SMC; "Tribe") originally occupied a large area around the Hudson River. After multiple removals forced the Tribe westward, the current SMC Reservation was established in 1856 in what is now Shawano County, Wisconsin (Fig. 1). The historic reservation boundary is comprised of two townships, Bartelme and Red Springs, and includes a total of 46,080 ac. The current Tribal land base is approximately 25,300 ac, or slightly more than half of the original reservation size. About 17,400 ac are held in trust by the United States government. Land acquisition is ongoing and is a priority for the Tribe, particularly within the historic reservation boundaries.

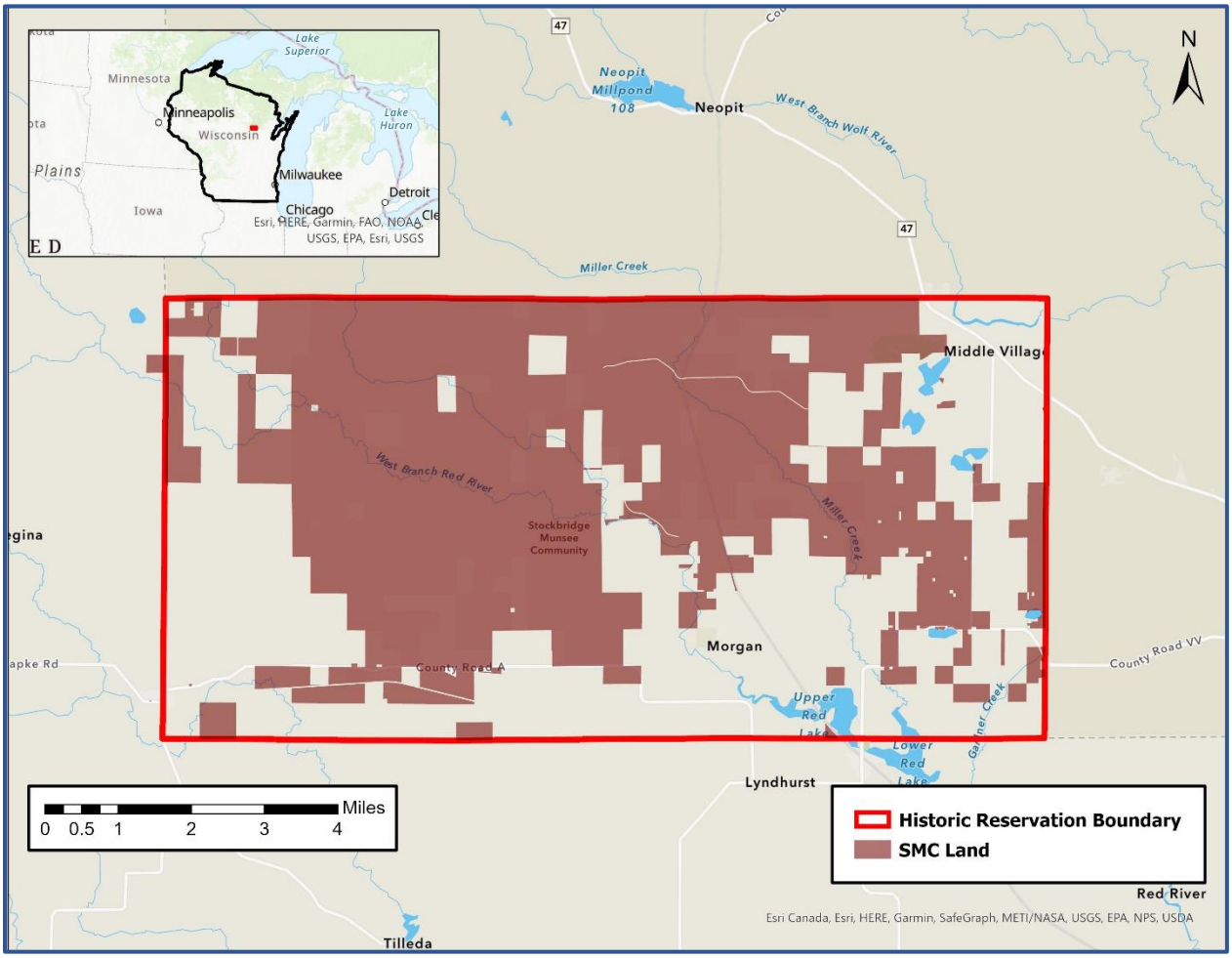

Figure 1. Land base and historic reservation boundaries of the Stockbridge-Munsee Community.

The Tribe has always had a deep connection to water, as evidenced by their original name, which translates to "people of the waters that are never still". In the ancestral homelands, early European settlers referred to them as the River Indians because they settled along rivers and depended on them for food, water, and transportation. Today, water still plays an important role in the lives of

Tribal members. In addition to providing clean drinking water, Tribal members use SMC waters for fishing, hunting, trapping, and recreation.

Wetlands are common throughout SMC lands and the surrounding watershed, and are highly valuable to the Tribe. They play a vital role in protecting water quality, reducing flooding, and providing recreational opportunities. They also support healthy fish, wildlife, and plant populations that Tribal members rely on. Native brook trout (*Salvelinus fontinalis*), a culturally-important species, are abundant in the watershed due, in part, to the large number of forested wetlands that keep water cool and clean as it feeds trout streams.

The SMC Ecology Department, which consists of the department manager, wetland specialist, hydrologist, and water resources technician, is responsible for the management and protection of the Tribe's wetland resources. The SMC Wetland Program is housed within the Ecology Department, and is managed by the wetland specialist. This plan outlines how the SMC Wetland Program will approach wetland protection, regulation, restoration, and outreach over the next 5 years. The plan includes current and ongoing efforts, as well as proposed program development activities. Many of the actions described follow the program building activities listed in the EPA's Core Elements Framework (CEF; EPA 2009).

2.0 Wetland Resources

2.1 Historic Reservation

According to the National Wetlands Inventory (NWI), there are 11,681 ac of mapped wetlands within the historic reservation boundary (Fig. 2), accounting for 25% of the land cover. Twenty-six percent (6,483 ac) of Tribal lands are wetlands. A large majority of the wetland acreage is forested (Table 1). The most common water regime is saturated (41%), followed by temporarily flooded (26%) and seasonally flooded (24%). Seventy percent of the total wetland acreage is classified as headwater wetland.

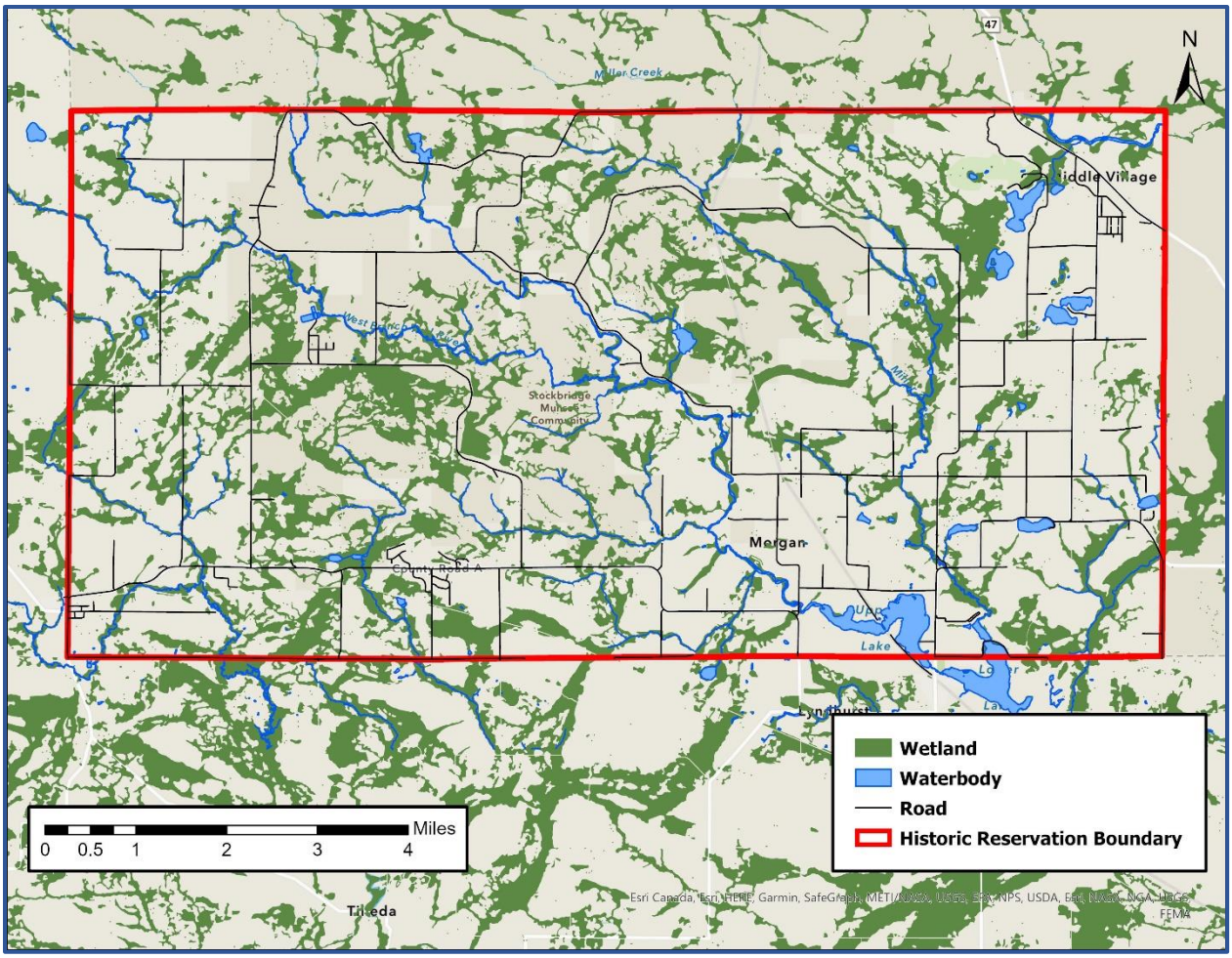

Figure 2. Wetland resources within the Stockbridge-Munsee Community historic reservation boundaries.

Wetland Class	Acres	% Wetland Acreage
Forested	9,984	85.3
Scrub/Shrub	722	6.2
Unconsolidated Bottom	634	5.5
Emergent	257	2.2
Aquatic Bed	84	0.8
Water Regime	**Acres**	**% Wetland Acreage**
Saturated	4,785	41.3
Temporarily Flooded	3,054	26.3
Seasonally Flooded	2,813	24.3
Permanently Flooded	659	5.7
Semi-Permanently Flooded	240	2.1
Exposed	49	0.4

Table 1. Wetland acreage by wetland class and water regime within the Stockbridge-Munsee Community historic reservation boundary.

2.2 SMC Study Area

The SMC study area includes the eight 12-digit hydrologic unit code (HUC 12) subwatersheds that overlap the SMC Reservation (Fig. 3, Table 2). These watersheds span portions of Shawano, Langlade, and Menominee Counties. Menominee County shares conterminous boundaries with Menominee Indian Reservation, and the majority of the land within the boundaries is owned by the Menominee Indian Tribe. The study area consists of 48,490 ac (23%) of mapped wetlands (Fig. 4). The distribution of acreage by wetland class and water regime are similar to that of the wetlands within the historic reservation boundary (Table 3). The percent wetland acreage classified as headwater wetland (72%) also is similar.

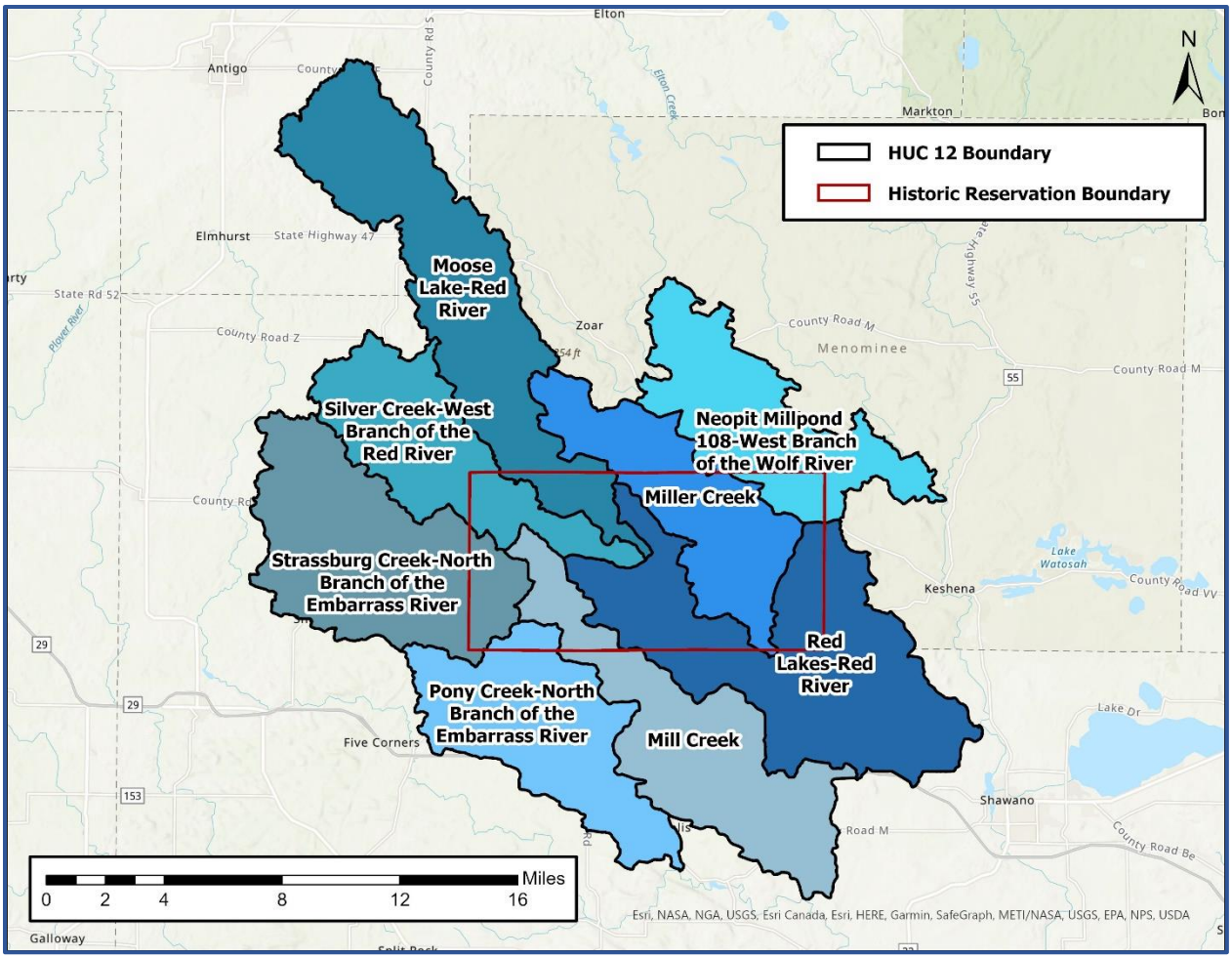

Figure 3. HUC 12 subwatersheds that make up the Stockbridge-Munsee Community study area.

Watershed Name	Hydrologic Unit Code	Area (acres)	% of Historic Reservation Area	Wetlands (acres)	% Wetlands
Neopit Millpond 108-West Branch of the Wolf River	40302020404	21,560	4.8	2,337	10.8
Silver Creek-West Branch of the Red River	40302020502	20,077	11.6	4,114	20.5
Moose Lake-Red River	40302020503	34,719	7.4	4,803	13.8
Miller Creek	40302020504	19,752	26.6	3,836	19.4
Red Lakes-Red River	40302020505	38,078	29.1	7,056	18.5
Strassburg Creek-North Branch of the Embarrass River	40302021201	29,879	8.3	6,996	23.4
Pony Creek-North Branch of the Embarrass River	40302021202	22,774	2.6	6,646	29.2
Mill Creek	40302021203	26,667	9.6	6,841	25.7

Table 2. Characteristics of the 8 HUC 12 subwatersheds that make up the Stockbridge-Munsee Community study area.

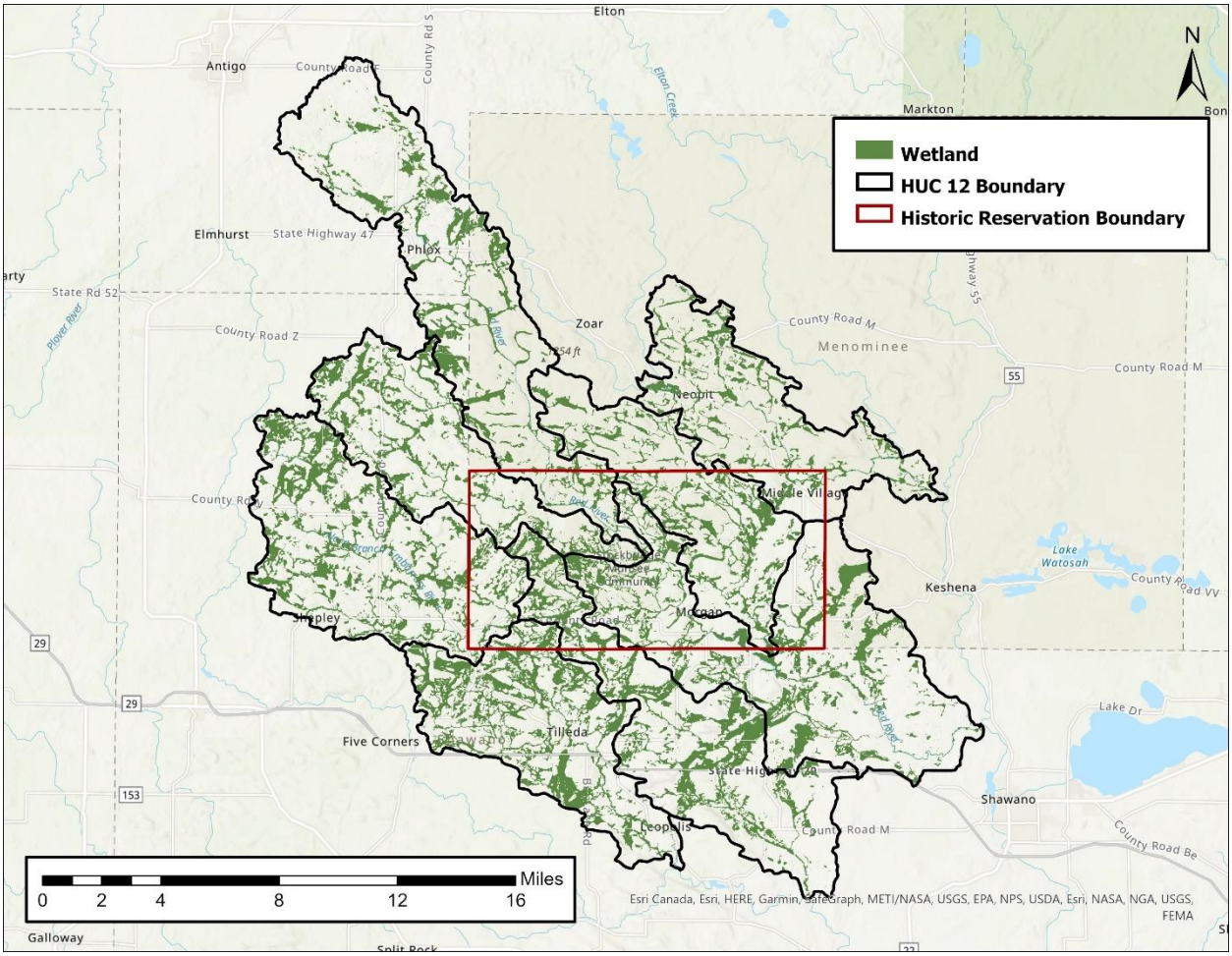

Figure 4. Wetlands within the Stockbridge-Munsee Community study area

Wetland Class	Acres	% Wetland Acreage
Forested	41,901	86.4
Scrub/Shrub	2,656	5.5
Unconsolidated Bottom	2,040	4.2
Emergent	1,752	3.6
Aquatic Bed	141	0.3
Water Regime	**Acres**	**% Wetland Acreage**
Saturated	22,393	46.2
Temporarily Flooded	12,012	24.8
Seasonally Flooded	10,999	22.7
Permanently Flooded	1,898	3.9
Semi-Permanently Flooded	818	1.7
Exposed	370	0.8

Table 3. Classifications of wetlands within the 8 HUC 12 subwatersheds that make up the Stockbridge-Munsee Community study area.

3.0 Core Element: Monitoring and Assessment

Goal: To improve wetland protection and management by utilizing practical and cost-effective methods to increase the knowledge of wetland extent, condition, and function.

Similar to most tribal wetland programs, monitoring and assessment activities are a major component of the SMC Wetland Program as they provide the foundational data necessary for the proper management of the Tribe's wetland resources. The SMC Wetland Monitoring Strategy (Appendix A.) details the Tribe's planned monitoring activities for 2022–2026. The strategy builds on past monitoring efforts and follows the EPA's Level 1, 2, and 3 monitoring approach to assess wetlands within the historic reservation boundary and SMC study area.

Ongoing monitoring and assessment activities include:

- Rapid assessments using the Wisconsin Department of Natural Resources (WDNR) Wetland Rapid Assessment Methodology (WRAM; WDNR 2014)
- Rapid floristic quality assessments (FQA; Minnesota Pollution Control Agency 2014)

- Long-term monitoring of black ash (*Fraxinus nigra*) wetlands to determine the impacts of emerald ash borer (*Agrilus planiplennis*; EAB) and assess mitigation effort
- Continuous monitoring of wetland water level and water temperature
- Post-harvest assessment of timber sales
- Restoration monitoring
- Invasive species monitoring

New planned efforts include:

- An update of the wetland inventory within the SMC historic reservation boundary
- Analysis of depressions to identify potential ephemeral ponds (PEPs), followed by field-verification
- Ephemeral pond monitoring, including hydrology, vegetation, and herpetofauna to characterize the wetlands and assess the impacts of timber harvest
- Characterizing and monitoring existing wild rice beds and potential areas for additional seeding
- Pre- and post-harvest monitoring of wetland crossings within timber sales
- Creation of a GIS-based plant database for cultural, medicinal, and rare species

Monitoring and assessment data will allow the Tribe to evaluate existing protection efforts and identify opportunities to improve wetland protection, restoration, and enhancement through targeted management. Monitoring also will be used to track long-term trends, quantify natural variability, and assess the impacts of threats such as invasive species and climate change.

MONITORING AND ASSESSMENT					
CEF Objective 2. Action (a) Ensure the scientific validity of monitoring and laboratory activities					
Activity	**2022**	**2023**	**2024**	**2025**	**2026**
Draft and peer review Quality Assurance Project Plan for the updated monitoring strategy	X	X			
CEF Objective 2. Action (b) Monitor wetland resources as specified in strategy					
Activity	**2022**	**2023**	**2024**	**2025**	**2026**
Update wetland inventory within the historic reservation boundary	X				
Continue routine monitoring and assessments, including WRAM, FQA, black ash and EAB long-term monitoring	X	X	X	X	X
Map potential ephemeral ponds and field-verify classification	X				

Develop and implement ephemeral pond monitoring protocols	X	X	X	X	X
Implement new monitoring protocols for existing and potential wild rice beds	X	X	X	X	X
Monitor wetland crossings before and after timber sales to assess impacts	X	X	X	X	X
Continue training in monitoring techniques for permanent and seasonal staff	X	X	X	X	X
Track sites that are monitored in a GIS database	X	X	X	X	X
Develop GIS database of cultural, medicinal, and rare plants	X				
CEF Objective 2. Action (c) Establish reference condition					
Activity	**2022**	**2023**	**2024**	**2025**	**2026**
Refine the disturbance gradient through continued monitoring, including WRAM and FQA	X	X			
Systematically select reference sites based on monitoring data that are representative of SMC wetlands, and monitor those sites in accordance with the monitoring strategy	X	X			
CEF Objective 2. Action (d) Track monitoring data in a system that is accessible, updated on a timely basis, and integrated with other tribal water quality data.					
Activity	**2022**	**2023**	**2024**	**2025**	**2026**
Further develop GIS-based applications for electronic field data collection	X	X			
Identify sites to revisit for long-term trend analysis		X	X		
CEF Objective 3. Action (a) Evaluate monitoring program to determine how well it is meeting the Tribe's monitoring program objectives					
Activity	**2022**	**2023**	**2024**	**2025**	**2026**
Ensure that monitoring and assessment methods are providing the necessary information	X	X	X	X	X
Make changes as necessary to the monitoring strategy	X	X	X	X	X
Modify other aspects of wetland program as needed based on review of monitoring data	X	X	X	X	X

CEF Objective 3. Action (d) Develop geographically-defined wetland protection, restoration, and management plans					
Activity	**2022**	**2023**	**2024**	**2025**	**2026**
Identify and prioritize specific wetlands or areas for additional protection, restoration, or enhancement	X	X	X	X	X

Table 4. Planned activities related to the Monitoring and Assessment Core Element.

4.0 Core Element: Regulatory Activities.

Goal: To ensure that no net loss of wetland extent, condition, or function occurs through the combination of federal, state, and Tribal regulations.

4.1 Permitting

The Tribe has not assumed any regulatory authority under the Clean Water Act (CWA) in part because wetland disturbance activities and activities resulting in discharges into jurisdictional waters are relatively uncommon on Tribal lands. SMC also has decided not to develop a separate Tribal wetland permitting program at this time. While Tribal permitting would allow for more direct control, it would be potentially costly, time-consuming, and create unnecessary redundancy. The wetland specialist will continue to work with WDNR, EPA, or U.S. Army Corps of Engineers (USACE) to obtain any applicable permits and stay up-to-date on any changes in regulations. The wetland specialist also will aid other Tribal departments by:

- Helping determine if and when permits are required
- Identifying actions to reduce or eliminate wetland disturbances, thus eliminating the need for permits
- Providing technical support for preparing permit applications

In addition, CWA §404, CWA §401, and WDNR water permit applications from within the SMC study area will be reviewed and tracked in a GIS database to allow for monitoring of wetland losses and impacts. The wetland specialist will provide comments on outside permit applications as needed.

4.2 Ordinances

While there is no stand-alone ordinance for wetlands, the SMC Law Library contains several ordinances that apply to wetlands. However, these contain instances of inconsistent and ambiguous language, contradictions among ordinances, and outdated information. Review and revision of existing ordinances would provide clarity to the Tribal Community regarding allowable and prohibited wetland-related activities, and would help improve wetland protection. These ordinances also provide the Tribe more local control over the protection of Tribal resources. Any changes will be accompanied by outreach to ensure that the Community understands the changes.

REGULATORY ACTIVITIES					
Action: Enhance wetland protection on SMC lands through the expansion and/or creation of water protection ordinances					
Activity	**2022**	**2023**	**2024**	**2025**	**2026**
Review current SMC ordinances (e.g., Water Pollution Control, Land) to document existing wetland and water protections and note any conflicting or outdated information	X				
Meet with appropriate SMC staff and Committees to determine if current ordinances provide adequate protection. If not, decide if a stand-alone wetland protection ordinance is required, or if revisions can be made to the existing ordinances	X				
Research existing wetland protection ordinances and available templates. Seek outside assistance if necessary (e.g., Wisconsin Wetlands Association)		X			
If deemed necessary, draft a wetland protection ordinance or any ordinance revisions. Gain approval from any appropriate SMC committees, SMC Legal Department, and Tribal Council		X	X		

Table 5. Planned wetland activities related to the Regulatory Core Element.

5.0 Core Element: Voluntary Restoration and Protection

Goal: To protect the extent, condition, or function of existing Tribal wetlands, and to restore or enhance lost or degraded wetlands.

5.1 Protection

Many of the Tribal wetlands are relatively high quality and subjected to low levels of human disturbance. Maintaining the quality of these wetlands is the top priority for the SMC Wetland Program, and much of the protection is from non-regulatory practices. The most common land disturbance activity on SMC lands is timber harvest. The SMC Forest Management Plan includes wetland protection measures by limiting forestry activities in wetlands and streams. The wetland specialist will work closely with the Tribal forester and Bureau of Indian Affairs (BIA) forester to ensure wetlands are protected during timber harvest by:

- Marking and mapping all wetland boundaries and stream buffers within the timber sale boundaries
- Identifying potential wetland crossing locations, when needed
- Recommending restrictions during harvest, such as only operating under frozen conditions

For a typical timber sale, the following procedures will apply when next to a wetland boundary:

- Trees shall not be felled within the periphery of the wetland
- Slash shall not be placed within the wetland
- Shade conditions over the wetland shall be maintained
- Avoid locating roads or landings in or near wetlands
- No equipment shall cross the wetland boundaries as marked

As part of the SMC Ecology Department, the Wetland Program will continue to play an active role in the implementation of water quality best management practices (BMP) through the Tribe's CWA §319 program. Through this program, staff may complete wetland-related projects designed to limit nonpoint source pollution in accordance with the SMC Nonpoint Source Pollution Management Plan. Examples of activities include wetland restoration, rain garden/bioretention basin construction, and wetland crossing improvements.

Other voluntary protection efforts will come through land impact reviews and involvement in the Core Planning group. Land impact reviews are interdepartmental reviews that are required for Tribal projects that include ground disturbance activities. These reviews allow the opportunity to document any concerns or provide recommendations regarding wetland protection prior to the project commencing. Core Planning meetings include staff from several Tribal departments, and involve discussion and review of proposed projects. While similar to land impact reviews, Core Planning meetings often occur earlier in the process and allow staff to provide input into the development of projects. Involving Ecology Department staff in these meetings ensures that wetland protection and potential impacts are considered in projects, when necessary.

5.2 Restoration

Like much of Wisconsin, wetlands on SMC lands and within the SMC study area have historically experienced substantial loss and degradation. Around the turn of the 20th century, nearly all trees with commercial value were harvested within the historic reservation boundaries. Many areas were then converted to agriculture by burning slash and filling or draining wetlands. Most of the lost wetland acreage in the study area is due to this conversion, and continued agricultural production is a major source of nutrient and sediment input into wetlands. Additional human disturbances, such as road construction and development, hydrologic modification, and invasive species introductions act as stressors that continue to degrade wetlands in the area.

A prior EPA Wetland Program Development Grant (WPDG) project identified potentially restorable wetlands (PRWs) within the study area and, along with the WDNR PRW data, provides the basis for identifying restoration opportunities. The Tribe has completed several wetland restorations and enhancements and performs regular management on those sites, particularly invasive species control. Additional sites have been identified for restoration on Tribal fee simple lands, but activities have been put on hold while the parcels go through the fee-to-trust process. This can be a considerable legal barrier to restoration activities as this process typically takes 7 or

more years to complete once a fee-to-trust application has been submitted. Because of this, early planning and good communication with the SMC Land Management Department is critical to completing restoration on fee simple lands. New or potential land acquisitions will be assessed as soon as possible to determine if wetland restoration or enhancement opportunities are present.

While off-Reservation wetland restoration remains a long-term goal of the Wetland Program, efforts in the short-term will focus on restoration and enhancement of Tribal wetlands. Working on Tribal lands means less legal and jurisdictional complexity, more opportunity to build Tribal capacity, and more freedom to experiment with different methods. Staff will support and encourage off-Reservation restoration through partnerships with local municipalities and conservation groups, such as the Shawano County Land Conservation Department and Fox-Wolf Watershed Alliance.

5.2.1 Logging Roads and Crossings

Recently, the Ecology Department has began work on assessing and improving road-stream crossings throughout the Reservation. All known culverts, bridges, and fords have been mapped, measured, and assessed to determine condition and identify barriers to aquatic organism passage. In 2020 and 2021, work began to improve crossings on logging roads by either removing culverts or replacing them with larger diameter culverts to improve hydrologic connectivity. Crossings also were designed to correct any issues with alignment or improper elevations. While these efforts are focused on streams, improving the crossings also has helped restore more natural hydrology to the wetlands that surround many of these small streams. Since hydrologic alterations from roads are one of the major disturbances to Tribal wetlands, continuing this work and expanding efforts to improve wetland crossings is a priority for Wetland Program. This includes experimenting with alternatives to culverts that allow for more natural, diffuse flow. Whenever possible, the SMC Roads Department will be utilized for crossing construction. This helps reduce costs and builds Tribal capacity for these types of projects.

Logging roads are used heavily by Tribal members and staff for a variety of reasons. However, the Tribe's current logging road map is inaccurate and does not differentiate between well-maintained roads and roads and trails that were meant for temporary use, such as skidding trails. Many roads go through wetlands without any culverts or other water passage structure. The wetland specialist will work with the SMC Forestry and Land Management Departments to gradually remap the logging roads and classify each road based on the type of traffic it can support (e.g., passenger vehicles, ATV only, foot traffic only) or seasonal restrictions based on road conditions. Additionally, this gives an opportunity to assess road conditions and determine if any road closures should be implemented to prevent further wetland damage.

5.2.2 Invasive Species

Another major cause of degradation in Tribal wetlands is the presence of invasive species. As mentioned previously, the revised wetland monitoring strategy places an emphasis on detecting

and mapping wetland invasive species. Control efforts will follow the SMC Invasive Species Management Plan, and will prioritize small populations and high-quality wetlands first. Where practicable, native species will be established following control.

Since EAB prevention and control is infeasible long-term, underplantings in black ash wetlands will be used to mitigate the impacts of the invasive beetle. A pilot underplanting began in 2020 in 3 black ash wetlands using 4 potential replacement tree species. Subsequent survival monitoring will determine the best species as underplanting is expanded. Large tree stock will be used to improve flood tolerance and increase survival, and browse protection likely will be necessary on most sites. Additional potential underplanting sites will be evaluated based on risk of serious impacts from EAB, and priority will be placed on sites adjacent to trout streams. Planting in these wetlands is difficult and time-consuming, so hiring contractors will be considered to increase efficiency. Cost-share funding for underplanting is available through the Natural Resources Conservation Service (NRCS) Environmental Quality Incentives Program (EQIP), but other grant opportunities will be explored to help facilitate larger-scale plantings.

5.2.3 Illegal Dumping

Illegal dumping and littering also are concerns regarding wetland degradation. The SMC Environmental Department is in charge of solid waste management on the Reservation. The wetland specialist will work with that department to help locate and report illegal dumping sites in and around wetlands, as well as assist with cleanup and prevention efforts.

VOLUNTARY RESTORATION AND PROTECTION					
CEF Objective 2. Protect wetlands from degradation or destruction					
Activity	**2022**	**2023**	**2024**	**2025**	**2026**
Continue pre-harvest wetland delineations for timber sales and post-harvest site assessments	X	X	X	X	X
Maintain involvement in land use reviews and Core Planning meetings as they relate to potential wetland impacts	X	X	X	X	X
Identify potential black ash underplanting sites	X	X	X		
Expand black ash underplanting efforts in high risk wetlands to mitigate the impacts of EAB		X	X	X	X
Work with SMC Forestry and Land Management Departments to improve the logging road maps, classify roads based on condition and use, and identify potential road closures to minimize wetland impacts	X	X			

Implement water quality BMPs to address nonpoint source pollution	X	X	X	X	X
CEF Objective 3. Restore wetland acres, condition, and function					
Activity	**2022**	**2023**	**2024**	**2025**	**2026**
Continue control efforts for wetland invasive species and test control techniques on new invasive species	X	X	X	X	X
Improve wetland and stream crossings to restore connectivity and reduce runoff and sedimentation	X	X	X	X	X
Investigate and test alternatives to culverts for wetland crossings		X	X	X	X
Work with SMC Environmental Department to locate, cleanup, and prevent littering and illegal dumping in wetlands	X	X	X	X	X
Establish new partnerships and improve existing partnerships to address off-Reservation wetland restoration and protection	X	X	X	X	X

Table 6. Planned wetland activities related to the Voluntary Restoration and Protection Core Element.

6.0 Core Element: Water Quality Standards

Goal: To build a foundation for wetland-specific water quality standards (WQS) and be better prepared in the event the Tribe chooses to pursue WQS.

Thus far, the Tribe has chosen not to develop water quality standards for either surface waters or wetlands. The SMC hydrologist evaluates the need for WQS biennially based on surface water monitoring data and potential new threats, such as planned development in the watershed.

Although creating Tribal WQS is not a goal for this plan, there are steps that can be taken within the next 5 years to move toward that outcome and be better prepared if a major threat emerges that necessitates WQS. These activities will involve working closely with the SMC hydrologist, SMC Legal Department, and EPA.

WATER QUALITY STANDARDS					
CEF Objective 1. Action (a): Adopt and appropriate definition of wetlands					
Activity	**2022**	**2023**	**2024**	**2025**	**2026**
Work with the SMC Legal Department to create legal definition for "waters of the Tribe" that includes wetlands		X			

CEF Objective 2. Action (b): Establish and adopt appropriate wetland-specific designated uses to be achieved and protected					
Activity	**2022**	**2023**	**2024**	**2025**	**2026**
Assign designated uses for different SMC wetland types			X	X	

Table 7. Planned wetland activities related to the Water Quality Standards Core Element.

7.0 Partnerships

Establishing and expanding partnerships is essential to the success of the SMC Wetland Program. Partnerships allow for diverse viewpoints and pooling of resources, including funding, data, expertise, and labor. These partnerships may be short-term, such as the Wetland Program seeking input on a particular task, or long-term, like working together to enhance wetland protection throughout the Great Lakes basin.

Both internal (i.e., within the Tribe) and external partnerships are valuable to the Wetland Program (Table 8). Internal partnerships include interdepartmental cooperation and committee involvement. The goals and objectives of the Wetland Program and Ecology Department often overlap with those of other departments, such as Forestry and Environmental. Working closely with those departments facilitates creative thinking, improves efficiency, and builds Tribal capacity. There also are opportunities for partnership with departments where the overlap is less obvious, such as Cultural Affairs.

The SMC committee structure provides an opportunity to solicit input on wetland activities and address any concerns prior to beginning a project. Proposed activities are presented to applicable committees for feedback and approval, and their recommendations are submitted to Tribal Council. Program activities commonly involve the Forestry, Fish and Game, and/or Land Committees. Each committee consists of interested Tribal members, and meetings are open to all Tribal members.

External partnership opportunities exist with a number of diverse entities, including state and federal agencies, nonprofits, and universities. These types of partnerships offer access to a wealth of expertise and multiple grant and cost-share opportunities, and are important for expanding the scope of work beyond Tribal land. While the Tribe has ongoing relationships with many of these groups, particularly the agencies, there is certainly room to expand involvement with others.

POTENTIAL PARTNERSHIPS		
Partner	**Partnership Type**	**Potential Activities**
SMC Forestry Department	Internal	Black ash underplanting, timber harvest monitoring

SMC Environmental Department	Internal	Pollution prevention and cleanup
SMC Land Department	Internal	Land acquisition review, ordinance development
SMC Roads Department	Internal	Wetland restoration, road crossing construction and improvements
SMC Cultural Affairs Department	Internal	Education and outreach, cultural/medicinal plant database, wild rice establishment and harvest
SMC Legal Department	Internal	Ordinance development, WQS activities
SMC Conservation Department	Internal	Ordinance development and enforcement
Shawano County Land Conservation Department	External	Off-Reservation restoration and protection, shoreline restoration
Shawano County Highway Department	External	Road crossing improvements
Waterways Association of Shawano and Menominee Counties	External	Invasive species monitoring and control, shoreline protection and restoration
Fox-Wolf Watershed Alliance	External	Agricultural BMPs, education and outreach
Local lake associations	External	Invasive species monitoring and control, shoreline protection and restoration
Trout Unlimited	External	Restoration, invasive species monitoring and control
University of Wisconsin-Madison	External	Hyperspectral imaging for monitoring, EAB research
Wisconsin Tribal Conservation Advisory Council	External	Invasive species monitoring, restoration and enhancements
Environmental Protection Agency	External	Program development, technical expertise

Bureau of Indian Affairs	External	Logging road improvements, wetland crossings, road crossings
U.S. Forest Service	External	EAB research, black ash underplanting
Wisconsin Department of Natural Resources	External	Ephemeral pond monitoring, invasive species monitoring and control
Natural Resources Conservation Service	External	Restoration, agricultural BMPs, black ash underplanting

Table 8. Potential internal and external partnerships for SMC Wetland Program activities.

8.0 Education and Outreach

Education and outreach (E&O) efforts span all of the Core Elements and are constantly changing as opportunities arise. To ensure the broadest reach to the Tribal Community and beyond, these efforts will be multi-pronged and utilize several different media. With the recent reorganization of the SMC Ecology Department, there is a renewed emphasis on interdisciplinary collaboration among department staff. As such, some of the existing E&O will be modified and expanded to include the department's work as a whole. Expected E&O actions include:

- Modify the SMC story map to highlight the work of the entire Ecology Department
- Write articles for the Mohican News (SMC's newspaper) to highlight projects and inform the Community
- Utilize social media, including the establishment of an Ecology Department Facebook page, to provide up-to-date information to Community members and a broader audience
- Create an annual Community report that summarizes the work accomplished by the Ecology, Forestry, and Environmental Departments
- Continue to use the WDNR Tribal Summer Youth grant program to mentor youth interested in natural resources careers
- Work with the Cultural Affairs Department and interested Tribal members to locate and teach about cultural/medicinal wetland plants
- Host virtual or in-person trainings on invasive species identification and prevention
- Install educational signage at project sites
- Participate in annual Shawano County Conservation Partners tour to showcase successful projects

9.0 Sustainable Funding

As is the case with many tribes, funding limitations are an ongoing concern for continuing and developing the SMC Wetland Program. Initially, SMC conducted wetland-related activities under the Tribe's CWA §106 Program, which is primarily focused on surface water monitoring and protection. As the need for wetland-specific activities grew, the Tribe began relying on WPDGs

to develop and advance a stand-alone wetland program. WPDGs continue to be the primary funding source for the SMC Wetland Program as the program evolves. However, a key limitation of WPDG funding is that, unlike the CWA §106 and §319 base funding, it is not intended for routine or ongoing tasks related to implementation. While WDPGs are anticipated to still be an important source of program funding for new developments and projects, other funding sources are necessary to continue ongoing work, such as monitoring and forestry delineations. Where the workplan and budget allow, CWA §106 and §319 funds may be used to support some of those routine tasks.

Personnel costs are expected to be particularly problematic as they make up the majority of the Wetland Program budget and can be difficult to cover through grants and cost-share programs. Many tribal wetland programs have been suspended or dissolved when grant funding was unavailable to support staffing. Moving forward, the Wetland Program likely will rely on annual Tribal contribution to cover a portion of personnel costs to maintain program stability. Reducing reliance on grant funding also will free up staff time and allow for greater flexibility to work on other tasks that may arise.

10.0 Acknowledgments

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STOCKBRIDGE-MUNSEE COMMUNITY

WETLAND MONITORING AND ASSESSMENT STRATEGY

2022-2026

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Appendix A: SMC Wetland Monitoring and Assessment Strategy

1.0 INTRODUCTION

Wetland monitoring and assessment are critical to the proper management of the resources. Wetlands on Stockbridge-Munsee Community (SMC, "Tribe") lands are generally high quality with minimal disturbance, while wetlands in the surrounding watersheds face more stressors and disturbance, primarily from agriculture, roads, and invasive species. Much of the focus of the SMC Wetland Program is on the protection of existing wetlands, while opportunities for restoration and enhancement are continuously evaluated.

The SMC Wetland Program relies heavily on EPA funding through Wetland Program Development Grants (WPDGs), so much of the past wetland monitoring has been short-term and project-based. This has created a knowledge gap regarding basic information about overall wetland condition and function. This updated strategy represents the Tribe's first comprehensive plan for short and long-term monitoring and assessment.

2.0 GOAL AND OBJECTIVES

The overall goal of the SMC monitoring and assessment strategy is to improve wetland protection and management by utilizing practical and cost-effective methods to increase the knowledge of wetland extent, condition, and function.

The main objectives of this strategy are to:

1. Define baseline wetland location, extent, condition, and function.
2. Identify existing and potential threats and stressors.
3. Allow for the detection of wetland change and characterization of temporal trends.
4. Evaluate the effectiveness of restoration and protection efforts.

3.0 LIMITATIONS AND CONSIDERATIONS

Funding and staff limitations were a large consideration in the development of this monitoring strategy. The SMC Wetland Program remains primarily grant-funded, so routine monitoring activities have, in many cases, been simplified to reduce costs and time requirements while still providing useful data. For example, the water chemistry and soil parameters included in the strategy are those that can be measured with the Tribe's existing equipment and eliminates outside lab costs. If additional funding becomes available, some of these monitoring activities may be adjusted to expand the scope or add parameters.

4.0 MONITORING DESIGN

The strategy follows the EPA's concept of monitoring levels. Level 1 assessment occurs at the landscape scale and provides relatively low cost, GIS-based identification and evaluation of wetlands. It allows for assessment of wetlands outside of Tribal lands, where field visits may be prohibited or infeasible. These assessments involve a census design, where all wetlands on SMC

lands or within the greater watershed area are assessed. The Tribe's wetland mapping and landscape-level stressor assessment are considered Level 1 assessments.

Level 2 assessments are conducted at the wetland site scale using rapid methods. This level involves relatively simple data collection, typically qualitative, to further assess wetlands without the need for expensive or labor-intensive methods. New data is collected and certain data from the Level 1 assessments may be verified or corrected, such as the presence or severity of stressors. These assessments will generally only be applied to wetlands on SMC lands due to issues with land access and management authority. SMC's Level 2 assessments use a combination of probabilistic and targeted sampling. Post-restoration monitoring and monitoring of sites with known wetland invasive species occurrences are examples of targeted sampling. The Wisconsin Department of Natural Resources (WDNR) Wetland Rapid Assessment Methodology (WRAM; WDNR 2014) uses a combination of probabilistic and targeted sampling by selecting sites in a stratified random manner based on stressor assessment score. Level 2 assessments are the most common type used by the Tribe as they provide the important benefits of on-the-ground wetland data collection while remaining relatively quick and inexpensive.

Level 3 assessments utilize intensive, field-based methods to describe the condition or functions of wetlands. They are more quantitative than Level 2 assessments, and may be used to verify data from Level 1 and 2 assessments. These assessments are more time-consuming and expensive, so they will be completed on a much smaller number of wetlands. Level 3 assessments also will only be conducted in wetlands within SMC lands for the reasons described previously. Like the Level 2 assessments, these utilize either a probabilistic or targeted sampling design. In most cases, site selection for floristic quality assessments (FQAs) will be the same as for WRAM, as described above. Targeted sampling will be used for reference wetlands, black ash (*Fraxinus nigra*) monitoring sites, wild rice (*Zizania* spp.) beds, and wetland crossings.

5.0 MONITORING ACTIONS

5.1 Level 1- Landscape Assessment

5.1.1 Update Wetland Inventory

An accurate wetland inventory is perhaps the most fundamental piece of information needed for properly protecting and managing wetland resources. SMC currently uses the WDNR wetland inventory, which is based on aerial photograph interpretation completed in 2003. The methods used then can be highly inaccurate, particularly when applied to forested wetland and wetland-upland complexes, which are common on SMC lands. Today, new data and GIS technologies exist to greatly improve wetland mapping. SMC recently received a WPDG to update the wetland inventory within the SMC's historic reservation boundaries. This will include mapping wetland extent and classifying each wetland polygon based on the National Wetlands Inventory (NWI) classification scheme.

5.1.2 Ephemeral Pond Mapping

Ephemeral ponds are ecologically-important and vulnerable wetlands that are relatively common on SMC lands. However, the exact number and locations of these ponds is unknown as they are often under-mapped due to their small size and ephemeral nature. As an addition to the standard wetland mapping, GIS-based depressional analysis will be used to map potential ephemeral ponds (PEPs) for field verification and potential monitoring. Having a complete inventory of these ponds will ensure they are included in existing protection efforts, including exclusion from timber harvest.

5.1.3 Wetland Stressor Assessment

In 2021, the Tribe completed a GIS-based assessment of wetland stressors throughout the SMC study area, which includes 8 HUC 12 subwatersheds, to provide a coarse estimate of wetland condition and disturbance level. The assessment focused on the following metrics:

- Proportion of anthropogenic land cover within 100m buffer
- Road density within wetland and 100m buffer
- Wetland invasive species (presence within 50m, >50% cattail)
- Recent land use change from natural to anthropogenic land cover within 100m
- Presence of culvert

Each wetland polygon received a score based on the cumulative presence and severity of each stressor, with a higher score indicating a higher level of disturbance and/or poorer expected condition. To better define the disturbance gradient, these scores were reclassified as high, medium, or low disturbance. The model is intended to be dynamic, and will be refined and rerun periodically as new information becomes available. This includes field-based verification of stressors, WRAM and FQA data, and new invasive species locations.

5.1.4 Permit Tracking

Clean Water Act §404 permitting is required for projects that entail significant wetland dredging or filling. WDNR has a separate permitting system for wetland dredging and filling, as well as other activities, such as livestock operations and water withdrawals, that may have wetland impacts. By tracking and georeferencing permit applications, SMC can have a better understanding of potential wetland loss, degradation, or mitigation affecting the area. There is expected to be a considerable lag between the time wetland changes occur and the time those changes are reflected in GIS datasets, so monitoring permit applications provides a better way to stay up-to-date. Additionally, georeferencing permitted sites allows for spatial analysis to better assess any cumulative impacts of those activities.

5.2 Level 2- Rapid Assessment

5.2.1 PEP Verification

PEPs identified in the depressional analysis require field visits to determine if they meet the definition of an ephemeral pond. Site visits will begin in Spring 2022. PEPs will be verified by the presence of ephemeral pond indicator species, such as wood frog (*Lithobates sylvaticus*) and fairy

shrimp (*Eubranchipus* spp.), or by best professional judgment. Repeat visits may be required late in the summer to verify ephemeral hydrology. Verified ephemeral ponds will be incorporated into the updated wetland inventory, and a subset will be selected for Level 3 monitoring (see Section 5.3.5) Verified ephemeral ponds will be analyzed to identify any pertinent spatial patterns, such as hot spots, where multiple ephemeral ponds exist at a high density, or isolated ponds that may have especially high local importance to amphibians. This information will help guide future conservation decisions.

5.2.2 WRAM

WRAM combines desktop and field-based observations to qualitatively evaluate wetland condition and functional values. For a rapid method (requires approximately 1 day of office and field work), WRAM provides a fairly comprehensive view of the target wetland. It is a very useful and cost-effective method that aligns well with SMC's monitoring and assessment goals. While Level 1 assessments are valuable for characterizing wetlands throughout the entire Reservation and study area, field-based methods like WRAM are critical to accurately assessing wetland quality and stressors. WRAM is especially valuable for the detection of invasive species. WRAM will be conducted on a minimum of 10 wetlands annually. Target wetlands will typically be selected using stratified random sampling to ensure representative sampling based on the human disturbance gradient.

5.2.3 Invasive Species Monitoring

Invasive species are one of the primary threats to the Tribe's wetlands, and early detection and monitoring are critical to mitigate any negative impacts. Any previously unreported occurrence of wetland invasive species will be reported and added to the existing GIS data layer in accordance with the Tribe's Invasive Species Management Plan. WRAM will play a large role in increasing the knowledge of invasive species locations and extent throughout Tribal lands. Known locations of wetland invasive species, excluding the widespread reed canary grass (*Phalaris arundinacea*), will be monitored using visual assessments at least once annually. The timing of monitoring will be species-dependent and based on maximizing detection probability (e.g., during flowering). This monitoring will be used to determine if the species is spreading and to evaluate the effectiveness of any control methods.

5.2.4 Post-Harvest Site Assessments

Wetland exclusion areas and wetland-related restrictions during timber harvest are a key component of the Tribe's wetland protection efforts. Once a timber sale is complete, a walk-through assessment will be conducted to verify that all conditions have been met. This includes confirmation that trees and equipment did not cross any marked wetland boundaries. If any wetland crossings were used, those will be visually inspected to ensure that best management practices (BMPs) were followed and any damage was mitigated as much as possible. Any major deviations from the BMPs, including failure to remove slash or major rutting, are reported to the Tribal and/or

Bureau of Indian Affairs (BIA) forester immediately. Additional Level 3 monitoring of wetland crossings is described in Section 5.3.8.

5.2.5 GIS Plant Database

As a secondary product of the other monitoring activities, locations of wetland plants that are rare, culturally significant, medicinal, or otherwise of interest to the Tribe will be recorded and compiled into a GIS database. This information can be used for a variety of reasons, including:

- Tracking change in extent of rare species
- Providing Tribal members with potential locations for gathering
- Identifying areas for transplanting species into wetland restoration and enhancement projects

5.3 Level 3- Intensive Site Assessment

5.3.1 Continuous Water Level and Temperature

Since 2014, the Tribe has been collecting continuous water level and water temperature data in wetlands and streams throughout the Reservation using shallow monitoring wells and stilling wells. Continuous data loggers record temperature and barometric pressure data every 15 to 60 minutes. Two additional loggers are deployed on land to collect barometric pressure measurements. Those data are used to convert barometric pressure readings from the monitoring wells to water level. Data are downloaded at least twice annually (spring and fall). These data allow for the development of hydrographs, quantification of inter- and intra-annual variation, and detection of change over time. This information is important in understanding the hydrology and natural variation in these systems, as well as monitoring for long-term changes due to climate change or human disturbances. This technique is incorporated into other monitoring activities as well, including black ash wetland monitoring and restoration monitoring.

5.3.2 FQA

FQAs are a bioassessment method that provide a measure of a wetland's ecological integrity based on the plant species found within the wetland community. The technique requires a high degree of botany expertise as it involves the identification of all observed plants to the species level. Currently, SMC staff requires additional plant identification training or will need to enlist the help of a botanist to properly conduct traditional FQAs. As an alternative, SMC will utilize a Rapid FQA methodology developed by the Minnesota Pollution Control Agency (MPCA 2014). This methodology uses a limited list of more common or easier to identify plant species, and is geared toward field staff with a more moderate level of plant identification skill. Rapid FQA will be incorporated into the floristic quality portion of WRAM data collection. Values will be used to refine the Tribe's human disturbance gradient and will be compared to the benchmarks developed by WDNR. FQAs also will be used to assess wetland restoration or enhancement success.

5.3.3 Reference Wetlands

Reference wetlands represent the best attainable condition and are subject to no or minimal current or anticipated anthropogenic disturbance. They also are located in areas of stable land use where new disturbances in the surrounding area are highly unlikely. Long-term monitoring of these sites will provide valuable data that will help describe natural conditions and variability within these systems. Because these wetlands are relatively stable, they also will allow the Tribe to evaluate the effects of large-scale environmental changes, such as climate change. Additionally, reference wetlands can be used to assess the success of restoration efforts by comparing the restored wetland to a reference wetland with similar characteristics. While candidate reference wetlands have previously been selected, continued WRAM and FQA assessments will help refine the human disturbance gradient before establishing long-term reference wetlands that are representative of the diversity of SMC lands. This includes representation of the 2 eco-regions that cover the Reservation, as well as different wetland types. Each reference wetland will be monitored using:

- Continuous water level and water temperature
- Rapid FQA (every 5 years)
- WRAM (every 5 years)
- Soil texture and color (initial visit only)

For wetlands with water depths >15 cm, the following core water chemistry parameters will be measured 3 times annually (spring, summer, fall):

- Temperature
- pH
- Dissolved oxygen
- Specific conductance
- Turbidity
- Oxidation-reduction potential (ORP)

Due to program funding constraints, additional monitoring that requires outside contracts for analysis, such as nutrient analysis and macroinvertebrate sampling, will not be included in routine monitoring at this time.

5.3.4 EAB and Black Ash Wetlands

Black ash is a common wetland tree species on Tribal lands and is under threat from the invasive emerald ash borer (*Agrilus planipennis*; EAB). While not yet detected within the Reservation, EAB is expected to kill nearly all black ash trees, and resulting changes to the wetland ecosystems are a concern. It is possible that lost transpiration from the ash trees will cause water level rise that swamps out regenerating trees and leads to a shift in vegetation community. Also, as with any disturbance, EAB kill will leave these wetlands more susceptible to colonization of invasive plant species. As part of a previous WPDG, the Tribe established a monitoring protocol to determine baseline vegetation and hydrologic conditions in 12 black ash wetlands. Each site contains three $1/10^{th}$-acre fixed sampling plots. The 12 sites undergo the following long-term monitoring:

- Water level and water temperature
    - Continuous (30-minute logging intervals)
    - 1 well per site
- Tree layer
    - Every 5 years pre-invasion and every 2 years post-invasion
    - Three 1/10th-acre sampling plots per site
    - Species tally, canopy health, canopy height, canopy closure
- Herbaceous vegetation
    - Biennial
    - Quadrat-based; 4 quadrats per sampling plot
    - Species, vegetation and ground cover percentage
- Shrub/sapling layer
    - Biennial
    - Transect-based; 4 transects per sampling plot
    - Species tally, DBH class, growth form, canopy health

Six of the sites also are being monitored to determine how evapotranspiration from black ash and other associated tree species affects the hydrology of the wetlands. This research was initially funded by an FY18 WPDG and is being continued as part of a University of Wisconsin-Madison (UW) graduate research project. To estimate tree-level evapotranspiration, sap flow sensors are installed in 3 black ash trees and either 3 red maple (*Acer rubrum*) or 3 yellow birch (*Betula alleghaniensis*) trees. The sensors measure how quickly heat dissipates from a heated probe, which is then converted into a sap flow rate. Sap flow is influenced by the amount of moisture in the wetland, so ancillary data from water level loggers, weather stations, soil moisture sensors, and eddy covariance towers are used to adjust for site conditions. The data will be used to help select potential replacement tree species for future underplanting projects, as well as model the anticipated post-EAB hydrologic impacts across the Reservation.

EAB trap surveys are conducted annually throughout the Reservation to detect EAB presence. Purple prism traps are placed at 25 locations, including each black ash monitoring site. This also includes 7 “double-decker” traps (McCullough and Poland 2009), which are designed to detect very small EAB populations. Once EAB is detected on the Reservation, general trapping will cease. Trapping at the black ash sites will continue until the first EAB detection. This will help determine more specific timing of site-level invasion and add context to any changes in site hydrology and vegetation.

Finally, the Tribe has recently completed underplantings in black ash wetlands and will continue those efforts moving forward. These underplantings aim to mitigate the impacts of EAB by planting replacement tree species in the understory of existing black ash stands. Underplanting sites are monitored annually for the following:

- Species-specific survival

- Presence and severity of wildlife damage
- Presence and severity of disease
- Cause of mortality
- Tree protector condition

Data from this monitoring are used to select suitable replacement species for future planting.

5.3.5 Ephemeral Ponds

As part of the Tribe's FY21 WPDG, 16 field-verified ephemeral ponds will be selected for long-term monitoring. Twelve of those ponds will be located in areas where timber harvests are being planned. The number of years until anticipated harvest will vary. Four ponds within Tribal wilderness reserves, where timber harvest, development, and most other management activities are prohibited, will be selected to serve as control sites. Short-term goals of the monitoring include characterizing and collecting pre-harvest baseline data on:

- Physical pond characteristics
- Hydrology
- Vegetation within and surrounding the pond
- Water temperature
- Amphibian populations

Monitoring protocols will be developed as part of the WPDG objectives. Amphibian monitoring will serve as an expansion of prior survey work and will help assess the status and trends of local populations. Long-term monitoring will assess the impact of timber harvest on amphibian populations, as well as pond characteristics. Ephemeral ponds will be excluded from harvest, but thinning will occur in the forest surrounding the ponds, as is current practice. If amphibian populations are negatively impacted, monitoring also will determine if and when populations return to baseline levels. This information will help decide if current SMC forestry practices provide adequate protection for ephemeral pond communities, or if the addition of buffers is necessary.

5.3.6 Wetland Restorations

Restoration monitoring objectives and methods are very site-specific, and most projects will have stand-alone management plans that describe monitoring methods. In general, SMC will document pre-restoration conditions through vegetation and soil sampling and water level monitoring. When possible, water level will be monitored for at least 1 full year prior to restoration, and data will be used to inform the restoration design. Post-restoration monitoring is critical to the success of any restoration, and includes routine site visits (Level 2) and advanced monitoring (Level 3). Routine site visits are conducted frequently and include visual inspections of some or all of the following:

- Presence of invasive species or disease
- Condition and efficacy of erosion control methods

- Success of seeding and/or planting efforts
- Wildlife damage
- Condition and efficacy of any structures (e.g., berms, spillways)
- Human disturbance (e.g., rutting, littering)

Advanced monitoring becomes more important after the first growing season as the restoration becomes more established. Examples of this monitoring include:

- Continuous water level
- Vegetation (e.g., coverage, invasive species, FQA)
- Soils (e.g., wetland indicators, organic matter accumulation, compaction)
- Water chemistry (e.g., pH, specific conductance)
- Wildlife surveys (e.g., amphibians, waterfowl)

5.3.7 Wild Rice

The Tribe has been attempting to establish wild rice on the Reservation for many years, but have only recently had success. In 2021, the first successful wild rice harvest was completed on 2 small wild rice beds. To guide management and improve future harvest opportunities, the Tribe will begin monitoring those existing beds as well as any potential seeding sites. Monitoring will be based on a simplified version of the methods outlined in the University of Minnesota Sea Grant Program's *Wild Rice Monitoring Handbook* (Kjerland 2015). The 2 established rice beds will be characterized to determine what growing conditions led to successful seeding efforts. Parameters include:

- Water level
- Specific conductance
- pH
- Water temperature
- Turbidity
- Muck depth

Wild rice is sensitive to large changes in water depth during the floating leaf stage, so water level will be monitored continuously to determine hydroperiod throughout the growing season. All other parameters will be measured once annually. These data can then be used to target sites with similar growing conditions for future seeding efforts. To assess the relationship between environmental variables and rice production, productivity will be measured each season based on:

- Stem density (quadrat-based sampling)
- Bed area (visual estimate)
- Biomass (based on plant height and number of pedicels)
- Brown spot fungal disease presence and severity

5.3.8 Timber Harvest Wetland Crossings

While wetlands are excluded from timber harvest on SMC lands, wetland crossings often are required to allow access to upland forest for management. Ecology Department staff work with the Tribal and/or BIA forester to determine what areas require crossings, then conduct site visits to identify crossing locations that minimize wetland impacts. Crossings can only be used under frozen conditions, and the use of slash or traction mats are often required. Soil compaction is the concern at these crossings, as compaction can limit native vegetation growth and impact natural water infiltration. The impacts of severe compaction are apparent in several locations on the Reservation where historic skidding trails remain unnaturally ponded throughout much of the growing season and have caused shifts is plant communities. Wetland crossings are visually assessed post-harvest, but those assessments are mostly to ensure that major damage did not occur.

To better assess the efficacy of the BMP, more extensive monitoring will be implemented to compare pre- and post-harvest conditions. Soil compaction will be evaluated using a soil cone penetrometer and soil bulk density measurements from 0-30 cm (the typical rooting zone of plants). The soil cone penetrometer is a quick and efficient method that provides a semi-quantitative, field-based measure of soil compaction. Soil bulk density is based on the oven-dried weight of a known volume of soil, collected using a core sampler. The method follows the U.S. Department of Agriculture's *Soil Quality Test Kit Guide* (USDA 1999). The bulk density is then compared to established thresholds where density is known to affect or restrict root growth. Both the penetrometer and bulk density methods require classification of soil texture to correctly interpret the results. In addition to the soil measurements, pre- and post-harvest vegetation inventory and species coverage estimates will be completed at each crossing.

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