

Grand Portage Band of Lake Superior Chippewa Wetland Program Plan

2021-2025



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INTRODUCTION

The Grand Portage Reservation is located on the north shore of Lake Superior and lies in the extreme northeastern tip of Minnesota. The Grand Portage Band of Lake Superior Chippewa has 1,098 enrolled members. The Reservation consists of approximately 56,000 contiguous acres within its exterior boundaries. The Grand Portage Reservation is bounded on the north by the Canadian province of Ontario, and State and Federal forest land to the west. Lake Superior forms the rocky, wave-swept boundary on the south and east.

Some of the most rugged terrain in Minnesota is found within the Grand Portage Reservation. Glacial activity has scoured the landscape to produce long, steep ridges with vertical rock outcrops and wetland valleys. The 24 miles of irregular shoreline along Lake Superior provide several deep bays in contrast to the long, narrow projecting highlands. Elevations vary from 602 to 1,814 feet. Approximately 7,238 acres of the total area within the exterior boundaries of the Reservation can be classified as wetlands. The Minnesota update to the National Wetland Inventory shows that forested wetlands (coniferous bogs, hardwood wetlands) account for 70.5 percent of wetlands in Grand Portage, shrub wetlands (shrub wetlands, open bogs) 15.1 percent, emergent wetlands (seasonally saturated/flooded emergent wetlands, shallow and deep marshes) 11.6 percent, and submerged aquatic wetlands 2.9 percent.

Atlas of Grand Portage Reservation Water Resources

Surface Area of the Grand Portage Reservation	56,000 acres
Total Miles of Rivers and Streams within the Reservation	
-Perennial Stream Miles	42 miles
-Intermittent Stream Miles	55 miles
-Miles of Border or Shared Rivers or Streams	23 miles
Number of Lakes/Reservoirs/Ponds within the Reservation	17
Acres of Lakes/Reservoirs/Ponds within the Reservation	856 acres
Acres of Wetlands within the Reservation	7,238 acres
Miles of Lake Superior Shoreline	52 miles
Acres of the Grand Portage Zone of Lake Superior	176,065 acres

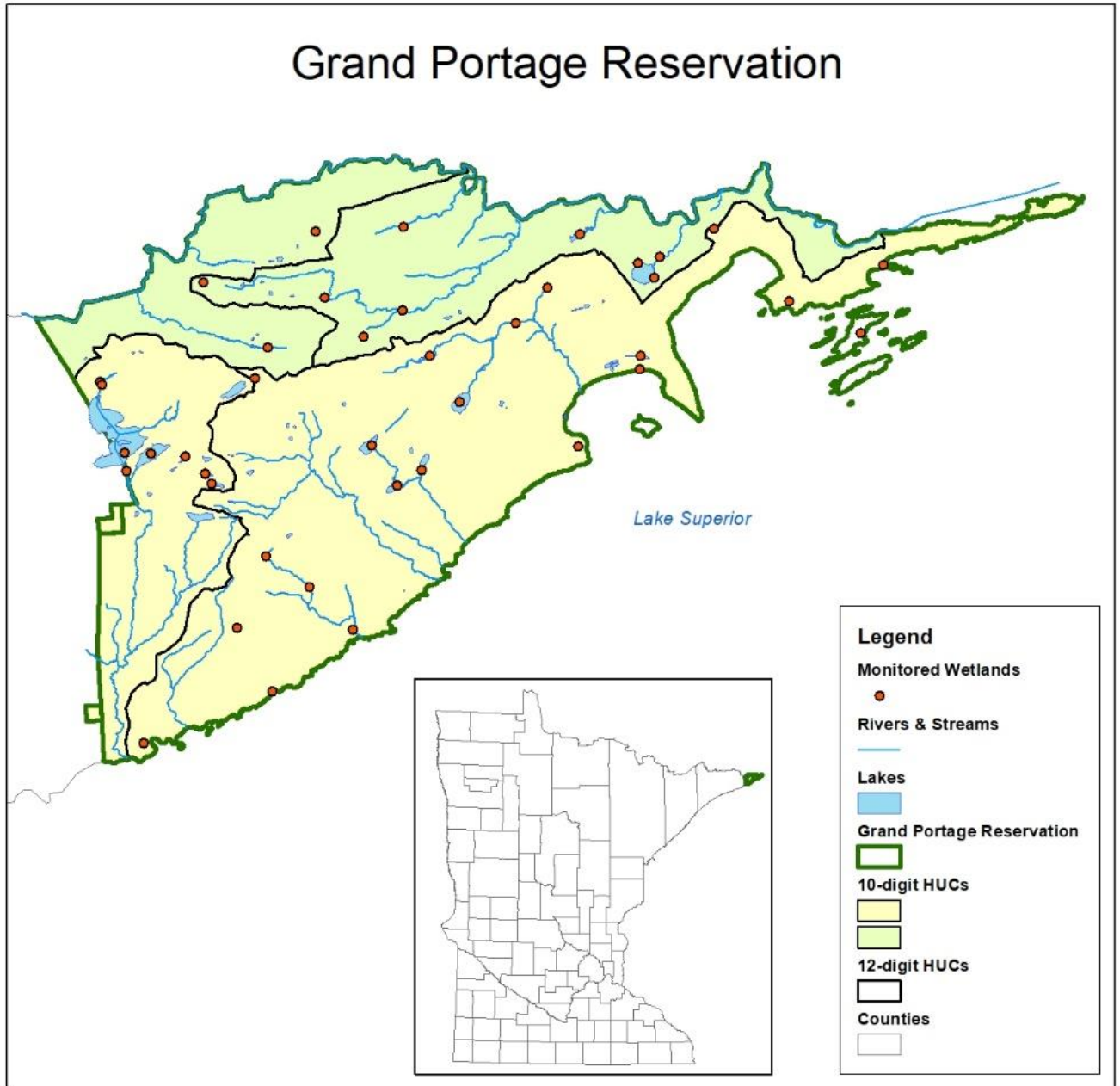


Figure 1. Grand Portage Reservation, including previously monitored wetlands, rivers and streams, lakes, and 10-digit and 12-digit HUCs, in Cook County, Minnesota.

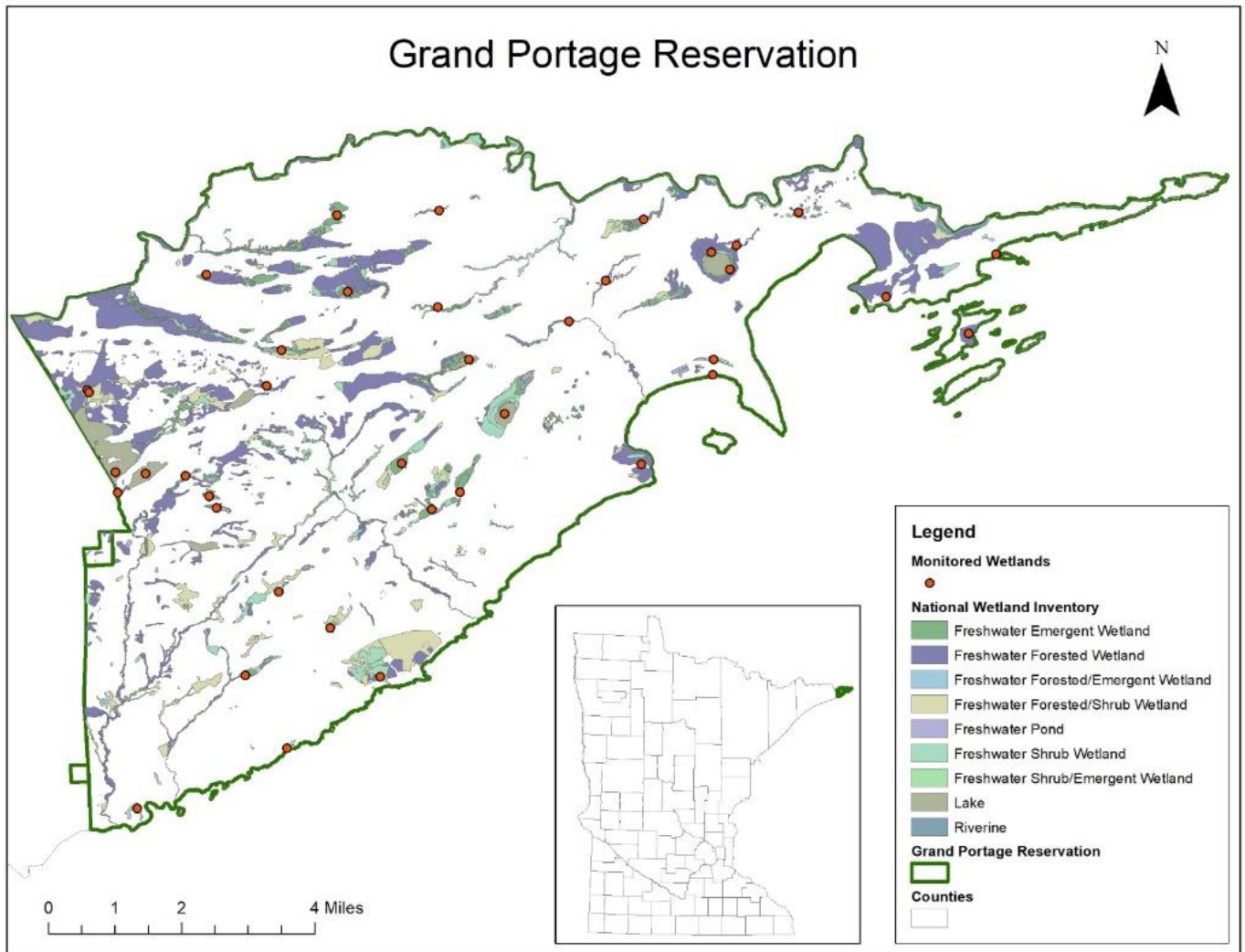


Figure 2. National Wetland Inventory wetland type and previously monitored wetlands on the Grand Portage Reservation.

It is estimated that, since the 1600's, just over 50 percent of the original wetlands in the lower 48 states have been destroyed through human impacts and natural threats. As urbanization and its impacts spread, Indian Reservations have become important reservoirs of biological diversity (L. Wenzel 1991). Wetlands are now recognized as some of the most productive natural areas in the world. They serve as habitat for waterfowl, fish and other wildlife.

In Grand Portage, wetlands may enhance this biological diversity by serving as the habitat for threatened, endangered, rare and sensitive species. Animal species such as the peregrine falcon, gray wolf, and bald eagle, and sub-arctic plant species unique to the Grand Portage area may have a vital link to wetlands (USFWS 2018). Additionally, wetlands have and continue to play an important role in the lives of the Ojibwe people. The Grand Portage tribal community collects wild rice and medicinal plants, fishes and hunts in wetlands on the Reservation. The Grand Portage Reservation Tribal Council has a

responsibility to the land and the people to protect and enhance this biological diversity. Grand Portage Trust Lands Natural Resources Management (Trust Lands) is charged with maintaining sustainability of natural resources and looking after the environment through management and monitoring.

This wetland program plan will help to protect and enhance wetlands within the boundaries of the Grand Portage Reservation. Our plan will help ensure that wetlands continue to function in their natural condition providing food and habitat for fish and wildlife, water quality improvements, flood protection, shoreline erosion control, natural products for human use (wild rice), and opportunities for recreation and aesthetic appreciation. The overall goals of the Grand Portage Wetland Program Plan (GPWPP) are to:

- determine wetland quality and quantity and measure changes over time;
- develop wetland-specific water quality standards;
- ensure no net-loss of wetlands; and
- uphold the current regulations protecting wetlands and identify opportunities for future expansion.

The US EPA Core Elements Framework (CEF) was used in developing the GPWPP. The CEF defines four Core Elements of a comprehensive wetland program:

1. Monitoring and Assessment
2. Water Quality Standards for Wetlands
3. Voluntary Restoration and Protection
4. Regulatory Activities

Goals and tasks for each of the core elements as well as a timeline for completion are detailed in this document.

PROGRAM PLAN

Core Element 1: Monitoring and Assessment

In 2019 and 2020, the Grand Portage Wetlands Specialist examined past wetland monitoring projects, developed protocols to assess indicators of wetland quality, and completed a pilot project to establish a baseline of quality in six previously monitored wetlands in Grand Portage. The results and lessons learned from these activities were used to create a monitoring strategy for Grand Portage wetlands (see Appendix). This document details monitoring goals, objectives and activities to be completed over the next eight years. Monitoring and Assessment needs moving forward are connected to establishing and implementing a sustainable monitoring program.

The goals and objectives related to Monitoring and Assessment and the specific tasks Grand Portage plans to undertake to meet them and address program needs are outlined below.

Goal 1: To determine wetland quality and quantity in Grand Portage and measure changes over time.

Objective 1: To establish and implement a monitoring program consistent with the Grand Portage Wetland Monitoring Strategy.

Action a: Ensure the scientific validity of monitoring and laboratory activities.					
CEF M&A Objective 2 - Action a					
Activity	2021	2022	2023	2024	2025
Review and update the Grand Portage Wetlands Quality Assurance Program Plan.	<i>As needed</i>				
Develop a field operations manual.	X				
Ensure that selected indicators are scientifically defensible.	X				

Action b: Monitor wetlands as specified in the Grand Portage Monitoring Strategy.					
CEF M&A Objective 2 - Action b					
Activity	2021	2022	2023	2024	2025
Develop a schedule for monitoring wetland resources.	X	X			

Core Element 2: Wetland Water Quality Standards

The Grand Portage Band of Lake Superior Chippewa currently holds Clean Water Act Section 401 Water Quality Certification, however, water quality standards specific to wetlands have not been established. Wetlands are currently covered in the Grand Portage Reservation Water Quality Standards (adopted December, 2017) and included in the definition of “Waters of the Reservation”. This document also establishes designated uses for wetlands as aquatic life, wildlife, infrequent recreation, forestry water supply, industrial water supply, and navigation. Numeric criteria for assessing water quality in wetlands are limited and, in cases of pollutants that are not specifically listed, defer to the standards set by the EPA.

Updates to the Grand Portage Water Quality Standards are needed to incorporate specific criteria for wetlands and guard against degradation. Water quality standards will need to be specific to different types of wetlands as chemical, physical and biological properties vary significantly. Refined definition of water quality standards is particularly important for wetlands that provide important habitat for at-risk and culturally significant species such as moose and wild rice.

Comprehensive data on current wetland conditions in Grand Portage are needed to develop wetland-specific Water Quality Standards. The steps detailed in Core Element 1 as well as the Grand Portage Wetland Monitoring Strategy will be used to collect these data. The goals and objectives related to Wetland Water Quality Standards and the specific tasks Grand Portage plans to undertake to meet them and address program needs are outlined below.

Goal 1: To develop wetland-specific water quality standards for Grand Portage.

Objective 1: To take steps towards developing a basis for wetland-specific water quality standards.

Action: Collect and analyze monitoring data and other information that will become the basis of wetland water quality standards.

CEF WQS Objective 2 - Action a

Activity	2021	2022	2023	2024	2025
Define wetland types/classes.	X	X			
Identify and map wetlands that will be monitored for water quality standards.		X	X	X	X
Establish reference conditions for defined wetland types in terms of functional/condition performance and other physical and biological measurements.					X

Core Element 3: Restoration and Protection

The overall goal of restoration and protection activities is to ensure that there is no net loss of wetlands within the Grand Portage Reservation. Past studies have found that Grand Portage wetlands are generally of high quality. This is due to remote nature of the region and a lack development. Inventory and monitoring have not taken place across all wetlands, however, and invasive species have not been regularly monitored or mapped. There is also a need for identification of ecological, hydrological, and culturally important wetland resources within the Reservation as a basis for establishing a restoration and protection strategy.

The goals and objectives related to Restoration and Protection and the specific tasks Grand Portage plans to undertake to meet and address program needs are outlined below.

Goal 1: To ensure no net-loss of wetlands in Grand Portage.

Objective 1: To identify ecologically, hydrologically and culturally important wetlands within the Grand Portage Reservation.

Action: Collect and enhance wetland information as a foundation for a restoration and protection strategy.

CEF R&P Objective 1 - Action b

Activity	2021	2022	2023	2024	2025
Enhance wetland data for informing restoration decisions using functional assessment methods.	X	X			
Identify or collect tribal information related to rare, vulnerable, culturally important wetlands, and species that rely on wetlands.	X	X			
Identify or collect information on cultural practices that are dependent on wetlands.	X	X			
Pursue other specific information on how wetlands contribute to quality of life in Grand Portage.	X	X			

Core Element 4: Regulatory Activities

Historically, Grand Portage has not had a consistent wetlands specialist. For this reason, regulatory activities such as assessing mitigation projects, and assisting the Land Use Manager to review building requests and road maintenance plans have been inconsistent. Establishing reliable support and reinforcement of Clean Water Act protections on wetlands in Grand Portage will be a vital goal over the period of this Wetland Program Plan.

The Land Use Ordinance of the Grand Portage Band of Lake Superior Chippewa Indians (Land Use Ordinance) (1996) provides basic protections for wetlands. These provisions include setback requirements from any waterbody or watercourse and disclosure or evaluation to determine the presence of wetlands during the permit application process. The Wetlands Specialist will provide input on permit applications and wetland delineation services as requested to ensure that protections for wetlands defined in the Land Use Ordinance are followed. Current definitions and protections will also be reviewed to decide if additional protections are appropriate at this time.

The goals and objectives related to Regulatory Activities and the specific tasks Grand Portage plans to undertake to meet them and address program needs are outlined below.

Goal 1: To uphold the current regulations protecting wetlands in Grand Portage and identify opportunities for future expansion.

Objective 1: To clearly define the jurisdictional scope of the program.

Action: Provide clear and comprehensive jurisdictional coverage of aquatic resources. CEF RA Objective 1 - Action a					
Activity	2021	2022	2023	2024	2025
Review definition of waters of the Tribe.	X				
Make the definition of Tribal waters at least as inclusive as the CWA.				X	X
Delineate wetlands in a manner that is at least equivalent with the federal program.	X	X	X	X	X

PARTNERSHIPS AND FUNDING

Grand Portage staff will work closely with the US EPA to ensure that activities are carried out in accordance with Federal guidance. The wetlands specialist will collaborate with other tribal programs within the Grand Portage Environmental Department to integrate activities where appropriate and avoid duplication of effort. Other potential partners for future work include the Minnesota Department of Natural Resources, Minnesota Pollution Control Agency, other tribes in the state and region, and agencies such as the Minnesota Chippewa Tribe, 1854 Treaty Authority, and Great Lakes Indian Fish and Wildlife Commission. Grand Portage staff will maintain open communications with these potential partners by attending meetings and conferences and will seek to collaborate when appropriate.

Funding for the activities outlined in this document will come from the US EPA Wetland Program Development Grant when possible. Additional funding will be sought from the Bureau of Indian Affairs with potential grants from the Circle of Flight, Endangered Species, and Great Lakes Restoration Initiative programs among others.

REFERENCES

Wenzel, Lauren. 1991. *Environmental risk in Indian country* (Unpublished master's thesis). University of Michigan, Ann Arbor, Michigan.

APPENDIX - GRAND PORTAGE WETLAND MONITORING STRATEGY

WETLAND MONITORING STRATEGY FOR GRAND PORTAGE WETLANDS

Grand Portage Band of Lake Superior Chippewa

Wetland Monitoring Strategy

2021 - 2028

1. INTRODUCTION

This document was prepared as part of a Wetland Program Development Grant project funded by the US Environmental Protection Agency – Region V (U.S. EPA Reference Number BG 96585512). It outlines a strategy that Grand Portage Trust Lands Environmental Department will use to monitor wetlands in the Grand Portage Reservation over the next eight years.

Climate change is one of the largest threats to wetlands in the Grand Portage Reservation. Predicted changes in precipitation and wetland hydrology would have cascading impacts on drinking water, wildlife habitat, and species of cultural significance to the Grand Portage Band. Monitoring to detect changes in wetland quantity and quality will be crucial to protecting these resources and promoting climate change resiliency. The Grand Portage Climate Change Adaptation Plan (CCAP) outlines objectives and strategies “to protect wetlands to ensure the persistence of vital habitat for local flora and fauna and to maintain the imperative hydrological functions that wetlands provide for the quality of the waters under our stewardship” (GP Trust Lands, 2012). The long-term environmental goals for Grand Portage wetlands as described in the CCAP include:

- *To maintain native flora and fauna communities within and without our wetlands.*
- *To continue monitoring water quality, quantity and floristic quality to assess ecological function and potential.*
- *To provide habitat for the culturally significant resources that are important to subsistence (i.e., moose, wild rice, waterfowl, and medicinal plants).*
- *To solve issues related to fluctuations in annual precipitation and its effect on wetland hydrologic function.*

Over the last 20 years, a variety of monitoring activities have taken place in wetlands within the Grand Portage Reservation. A total of 45 wetlands have been monitored, 14 of these wetlands are also monitored every other year by Grand Portage Water Quality staff (Table 1). The Water Quality program collects data on water chemistry, macroinvertebrates and vegetation. Wetland-specific monitoring projects have also focused on these three parameters; however, these past projects have lacked consistent objectives and standardized sampling methods (Table 2). The monitoring strategy outlined in this document sets out goals and a design for wetland projects over the next eight years. As a part of this strategy, the Grand Portage Wetlands Specialist will work with Water Quality staff to ensure that all water resources are included in a monitoring program and to avoid duplication of effort.

The outputs from the Grand Portage wetlands monitoring program will help develop wetland-specific water quality standards, inform permitting activities, establish additional protection for culturally and ecologically important wetlands, and direct mitigation and restoration activities.

Table 1. Summary of previously surveyed wetlands including date sampled, wetland classification and 12-digit Hydrologic Unit Code (HUC).

Wetland	Years Sampled	Class*	HUC12
Bay Road Wetland	2010-2012	Shallow Marsh	40101010301
Black Spruce East	2013	Shallow Marsh	40101010208
Cannonball Bay Wetland	2010-2012	Hardwood Swamp	40101010301
Center Lake**	2001, 2005	Open Bog	40101010301
Chevans**	2002	Open Bog	40101010208
Clark's Bay Fen	2008, 2011-2012	Open Bog	40101010301
Cloudberry Bog	2007	Coniferous Bog	40101010208
Cowboy Bear Wetland	2014	Floodplain Forest	40101010208
Cowboy's Beaver Pond	2009	Fresh Wet Meadow	
Cowboy's Road West Fork	2013	Fresh Wet Meadow	40101010207
Cuffs Lake**	2001, 2006	Open Bog	40101010301
Dutchman Lake**	2001, 2002, 2005	Open Bog	40101010301
Helmer Nelson Pond**	2001, 2005, 2006	Shallow Marsh	40101010301
Hoach's Dock Wetland	2010	Shallow Marsh	40101010301
HWY 61 Rest Area	2010-2012	Fresh Wet Meadow	40101010301
Joe's Road GPT Wetland	2014	Fresh Wet Meadow	40101010301
Joe's Road Tier Ponds	2013	Fresh Wet Meadow	40101010301
Joe's Road Beaver Tiers	2013		40101010208
Leng's Road Wetland	2014		40101010301
Leng's Road Beaver Pond	2002	Fresh Wet Meadow	40101010301
Little Lake**	2001, 2002, 2005	Open Bog	40101010301
Loon Lake Wetland**	2006, 2014	Coniferous Swamp	40101010301
Mt. Maude Wetland**	2001, 2005, 2009	Shallow Marsh	40101010301
North Lake String	2001, 2006, 2007, 2013	Coniferous Swamp	40101010302
Old Highway 61 Wetland	2014		40101010301
Partridge Falls Wetland	2007, 2014	Coniferous Swamp	40101010207
Prominent Ridge Pond	2013	Fresh Wet Meadow	40101010208
Red Rock Creek	2008	Fresh Wet Meadow	40101010301
Rengo Road Wetland	2007	Hardwood Swamp	
Reservation River Wetland	2008	Hardwood Swamp	40101010302
Stick's Pond	2009		
Suzie Island Wetland	2010-2012	Coniferous Bog	40101010301
Swamp Lake**	2006		40101010302
Swamp Lake Creek	2008	Coniferous Bog	40101010302
Swamp Lake Spring	2008	Coniferous Swamp	40101010302
Swede Lake**	2002, 2005	Open Bog	40101010302
Tamarack Point Wetland	2010-2012	Coniferous Bog	40101010301
Taylor Pond	2001	Coniferous Swamp	40101010302

Teal Lake**	2002, 2006	Open Bog	40101010208
Teal Lake Beaver Pond	2008	Fresh Wet Meadow	40101010208
Teal Lake Bog**	2010	Coniferous Bog	40101010208
Trout Lake**	2006	Coniferous Swamp	40101010302
Trout Lake Road Wetland	2007	Hardwood Swamp	40101010302
Turtle Lake**	2002	Fresh Wet Meadow	40101010302
Wausaugoning Bay Pond	2005	Coniferous Swamp	40101010301

*As determined by past surveys (2001-2014). Based on Eggers and Reed (2011).

**Monitored by the Grand Portage Water Quality program.

Table 2. Summary of previous projects in Grand Portage wetlands including year conducted, data collected and number of wetlands surveyed.

Year(s)	Project Title	Data Collected	Number of Wetlands Surveyed
2013-2014	Nutrient Criteria Development in Wetlands Used by Moose	Vegetation, Periphyton, Water Chemistry (Total and Kjeldahl Nitrogen and Total and Ortho Phosphorus, Chlorophyll a), Sediment Chemistry (Total and Kjeldahl Nitrogen and Total Phosphorus)	12
2010-2012	Development of Coastal Wetland Nutrient and Biological Criteria	Vegetation, Periphyton, Water Chemistry (Total and Kjeldahl Nitrogen and Total Phosphorus, Chlorophyll a), Sediment Chemistry (Total and Kjeldahl Nitrogen and Total Phosphorus)	6
2009		Vegetation, Water Chemistry (Chlorophyll-a, Phosphorus, Total Kjeldahl Nitrogen, Total Nitrogen, Dissolved Organic Carbon)	4
2007-2008	Forested Wetlands Nutrient Criteria	Vegetation, Periphyton, Water Chemistry (Total and Kjeldahl Nitrogen and Total Phosphorus, Chlorophyll a), Sediment Chemistry (Total and Kjeldahl Nitrogen and Total Phosphorus)	14
2005-2006	Wetlands Nutrient Criteria	Vegetation, Periphyton, Water Chemistry (Total and Kjeldahl Nitrogen and Total Phosphorus, Chlorophyll a), Sediment Chemistry (Heavy metal conc.; Total N, Total P, TKN)	13
2001-2002	Wetlands Bioassessment & Biocriteria	Invertebrates, Vegetation, Water Chemistry (DO, Turbidity, pH, total Chlorides Total N, Total P, Temperature, Specific Conductance, Chlorophyll a), Sediment Chemistry (Heavy metal conc., N, P)	19

2. MONITORING GOALS AND OBJECTIVES

The following monitoring goals and objectives have been identified for the Grand Portage Wetland Monitoring Strategy:

Goal 1. To determine the total wetland acreage or wetland quantity in Grand Portage.

Objective 1.1. To review and verify available wetland mapping data.

Objective 1.2. To develop a mapping system for tracking and updating wetland data.

Goal 2. To determine wetland quality in Grand Portage.

Objective 2.1. To determine priority wetlands for monitoring based on wetland function and mapped critical habitat.

Objective 2.2. To establish baseline wetland conditions in priority wetlands based on selected core indicators.

Objective 2.3. To determine reference conditions for all wetland types.

Goal 3. To ensure that wetland monitoring methods and results fit into a broader strategy within the tribe, region and state when relevant.

Objective 3.1. To collaborate with the Grand Portage Water Quality program and other programs within the Environmental Department.

Objective 3.2. To coordinate with tribal, regional and state partners (1854 Treaty Authority, US Forest Service, and Minnesota Pollution Control Agency and Minnesota Department of Natural Resources, etc.).

3. MONITORING DESIGN

3.1. Current Efforts

Goal 1

The National Wetland Inventory (NWI) displays 7,238 acres of wetlands in the Grand Portage Reservation, about 13% of the total acreage. The classification system outlined in Eggers and Reed (2011) was chosen for use to group wetlands in Grand Portage. A simplified version of this classification is assigned to wetlands in the Minnesota NWI update. The Eggers and Reed classification is also the basis for the Rapid Floristic Quality Assessment created by the Minnesota Pollution Control Agency (2014) that will be used to evaluate wetlands in Grand Potage. Thus far, the extent and classification of 24 previously monitored wetlands (~500 acres) has been verified over 2019 and 2020 and compiled in a GIS database.

The NWI was updated in Minnesota in 2008 and is 90% accurate at identifying wetland extent (Kloiber et al., 2019). The NWI is less accurate (75%) at identifying wetland type and ground-truthing is necessary to verify this information. The NWI has a lower accuracy when identifying forested wetlands which includes vernal pools. Depending on the vegetative cover in a vernal pool, the categorization of these resources can vary based on the Eggers and Reed system. In Grand Portage, vernal pools are most likely to fall under the categories of hardwood swamp, shrub swamp, or seasonally flooded basin (L. Wilson, personal observation).

A mapping project to identify potential vernal pools took place in 2020 following the methods outlined by the US Forest Service (USDA 2017a, b & c). The analysis was completed in GIS and resulted in the identification of 964 potential vernal pools across the Grand Portage Reservation. In a study by the USFS Superior National Forest using the same GIS analysis method, 42% of the identified potential vernal pools were confirmed to be vernal pools through field verification (Creighton, 2019). Vernal pools are difficult for the NWI to capture due to their size, typically less than 1 acre (RSTC, 2007). Only 120 of the 964 potential vernal pools in Grand Portage appear to have been identified by the NWI.

Goal 2

In 2020, the Wetlands Specialist completed a project to test methods for monitoring baseline conditions and determine indicators of quality in Grand Portage wetlands. Six, previously monitored wetlands were chosen for sampling. These wetlands were chosen based on plant community classification, visually assessed level of disturbance, and location within the watershed (HUC12) (Table 3). Surveys targeted water chemistry, soil chemistry, invertebrates, and vegetation (Table 4). This project was completed according to the methods outlined in the *Grand Portage Band of Chippewa Wetland Assessment Project Quality Assurance Project Plan* (U.S. EPA Reference Number BG 96585512, approved 5/22/20). Based on the results of these surveys a set of core and supplemental indicators were selected for future monitoring (see section 4).

Table 3. Summary of wetlands surveyed in 2020 including wetland name, targeted plant community, wetland area (determined by GIS delineation of targeted plant community), disturbance level (based on observations in 2019), and 12-digit Hydrologic Unit Code (HUC).

Wetland	Targeted Wetland Classification*	Area (acres)	Disturbance Level	HUC12
Red Rock Creek	Coniferous Bog	23.1	High ¹	40101010301
Swamp Lake Spring	Coniferous Bog	177.0	Low	40101010302
Tamarack Point Wetland	Coniferous Bog	106.6	Moderate ²	40101010301
Leng's Road Beaver Pond	Fresh Wet Meadow	3.3	High ³	40101010301
Loon Wetland	Fresh Wet Meadow	10.5	Low - Moderate ⁴	40101010301/302
North Lake String	Fresh Wet Meadow	5.0	Low ⁴	40101010302

*Determined by 2019 site visit. Based on Eggers and Reed (2011).

¹ The wetland is crossed by an ATV trail and utility line. Additional disturbance may have occurred due to accidental fill and restoration of adjacent Red Rock Creek.

² Nearby development and recent tree blow-down has caused disturbance in the wetland.

³ A high level of beaver activity has caused disturbance across the wetland. Invasion by reed canary grass has taken place since the last survey in 2002.

⁴ Past beaver activity has resulted in standing dead trees within the wetland. There is no current beaver activity.

Table 4. Summary of data collected in 2020.

Characteristic	# Samples	Period
<u>Vegetation</u>	1 MPCA Rapid Floristic Quality Assessment	July-August
<u>Invertebrates</u>	2 dipnet samples (in wetlands with open water)	June
	2 light trap samples and 4 pitfall trap samples per site	August
<u>Water Chemistry</u>		
Temperature	Mean of four field collections	June-September
Dissolved O ₂	Mean of four field collections	June-September
pH	Mean of four field collections	June-September

Specific Conductivity	Mean of four field collections	June-September
Chloride, Total	1-2 grab samples per month per site	June-September
Chlorophyll-a		
Nitrogen, Nitrate + Nitrite and Kjeldahl		
Organic Carbon, Total		
Phosphorus, Total		
Suspended Solids, Total		
<u>Sediment Chemistry</u>		
Nitrogen, Nitrate + Nitrite and Kjeldahl	1-2 core samples from surficial sediment per month per site	June-September
Organic Carbon, Total		
Phosphorus, Total		
Solids, Total		

Goal 3

The Grand Portage Wetlands Specialist attended the EPA Region 5 State and Tribal Wetlands meeting in the fall of 2019 and the State of Minnesota Wetland Monitoring symposium in the fall of 2020. These meetings allowed for networking and a way of keeping up-to-date on wetland efforts taking place throughout the state and region.

When determining the parameters for the 2020 monitoring project, wetland monitoring methods used by other regional organizations were used as a reference. These organizations included the Fond du Lac Band of Lake Superior Chippewa, the Minnesota Department of Natural Resources, and the Minnesota Pollution Control Agency as well as the Grand Portage Water Quality program.

The Grand Portage Wetlands program has been collaborating with the 1854 Treaty Authority to complete a herptile and waterfowl monitoring project in the 1854 Ceded Territory. Surveys for waterfowl and herptile species were completed in 2020 at 12 wetlands across the 1854 Ceded Territory and the Grand Portage Reservation. Four types of herptile surveys, auditory, basking, visual encounter and dipnet, were chosen for use in this project. Auditory recording devices were deployed in April at three deep marsh wetlands and three vernal pools and collected in September. Basking, encounter and dipnet surveys were completed at all sites in May. Waterfowl surveys were conducted in conjunction with basking surveys in the spring. In September, during wild rice harvest, round count surveys for waterfowl were conducted at the deep marsh wetlands.

3.2. Future Efforts

A timeline for completion of the objectives for this monitoring strategy are given the Table 5.

Table 5. Timeline for completion of objectives.

GOAL	OBJECTIVE	TIMELINE
To determine the total wetland acreage or wetland quantity in Grand Portage.	To review and verify available wetland mapping data.	2021-2022
	To develop a mapping system for tracking and updating wetland data.	2022-2023
To determine wetland quality in Grand Portage.	To determine priority wetlands for monitoring based on wetland function and mapped critical habitat.	2021
	To establish baseline wetland conditions in priority wetlands based on selected core indicators.	2022-2025
	To determine reference conditions for all wetland types.	2025-2028
To ensure that wetland monitoring methods and results fit into a broader strategy within the tribe, region and state when relevant.	To collaborate with the Grand Portage Water Quality program and other programs within the Environmental Department.	ON-GOING
	To coordinate with tribal, regional and state partners.	ON-GOING

Goal 1

A mapping system will be developed in GIS to store wetland information. Trust Lands staff will use the National Wetland Inventory (NWI) along with aerial surveys, and past ground surveys to create a comprehensive inventory of wetlands within the Grand Portage Reservation boundaries. The goal of the system will be to track changes in wetland type and extent to detect changes in wetland quantity across the Grand Portage Reservation.

Wetlands identified by the NWI and other inventory efforts will be ground-truthed as time and resources allow. This process will ensure that the boundaries of the wetlands and wetland classification are accurately reflected in the Grand Portage wetlands mapping system.

Field surveys will be conducted to confirm the presence of vernal pools identified in a previously described GIS analysis. Surveys will be conducted in May to early July when water is typically present. A wetland will be considered a vernal pool if it 1) Lacks visible hydrological connection to nearby wetlands, 2) Lacks evidence of fish, and 3) Contains indicator species (wood frogs or fairy shrimp) (Creighton, 2019). Due to the importance and sensitivity of vernal pools, these wetlands will be given a separate designation in the Grand Portage mapping system to ensure that changes in their extent are tracked.

Goal 2

Due to the large number of wetlands in the Grand Portage Reservation it is not feasible to monitor every wetland on an annually or even biennial basis at this time. In order to determine priorities for on-going monitoring, a landscape level wetland functional assessment and mapping of critical habitat will take place. The landscape level functional assessment will be carried out using protocols developed by Tiner (2003). In addition, wetlands that provide critical habitat for sensitive or culturally significant species will be mapped. Targeted species include, but are not limited to: wild rice, moose, waterfowl, fish, and federal and state listed threatened and endangered species. Wetlands that have a high hydrological, ecological, and/or cultural importance will be prioritized for monitoring.

Once a list of priority wetlands is created, a rotation for monitoring will be established. Native plant community type, hydrogeomorphic classification, and watershed location will also be factors in determining which wetlands are targeted for frequent monitoring. In Grand Portage, development is mostly limited to the Highway 61 corridor near the shore of Lake Superior. If new development threatens the health of a wetland, it will be considered for addition to the list of monitored wetlands.

Baseline monitoring will take place in wetlands selected from the priority list. The information gathered will be used to determine reference condition for various types of wetlands. A process for measuring reference conditions and reference standard and for selecting reference sites will be developed.

Goal 3

The Wetlands Specialist will work closely with other Grand Portage Environmental Departmental staff to avoid duplication of efforts and collaborate on projects when appropriate. Water Quality staff will be consulted when making plans for data collection to make sure that methods from the two programs align. The Wetlands Specialist will work with the Environmental Specialist to map and track invasive species in Grand Portage wetlands.

To ensure that wetland monitoring methods and results fit into broader strategies within the region and state, the Wetland Specialist will work with regional natural resource management groups including, but not limited to the 1854 Treaty Authority, US Forest Service, and Minnesota Pollution Control Agency and Minnesota Department of Natural Resources. In 2021 and 2022, the collaborative project with the 1854 Treaty Authority will expand to include invertebrate and vegetation monitoring at regional wetlands. The methods used will be consistent with the core indicators selected for Grand Portage wetlands.

4. CORE AND SUPPLEMENTAL WATER QUALITY INDICATORS

Based on the data collected and analyzed in 2020, a suite of core and supplemental indicators were chosen for use in future monitoring efforts (Table 6). Core indicators include floristic quality, invertebrate diversity, and a suite of basic water chemistry parameters. Supplemental indicators include water and soil chemistry and nutrient parameters.

The Rapid Floristic Quality Assessment (FQA) created by the Minnesota Pollution Control Agency (2014) will be used to determine quality of the plant community. This method produces a variety of metrics that can be indicative quality including weighted Coefficient of Conservatism (wC), mean Coefficient of Conservatism (mean C), Floristic Quality Index (FQI), and species richness. wC is the primary assessment metric for the FQA and it was also the best indicator of disturbance level based on the results of the 2020 Grand Portage wetlands project. This metric is calculated by multiplying each species Coefficient of Conservatism (C) by its abundance in the plant community to find the pC value. All of the pC values are added together to find the wC for the plant community.

Core indicators will be measured annually in selected wetlands (see Section 4 for details). Due to uncertainty in future funding for laboratory analysis these methods were selected as supplemental indicators. Supplemental indicators will be measured when funding is available and/or in-depth monitoring is needed to determine the cause of changes in core indicators.

Table 6. Core and Supplemental Wetland Quality Indicators.

Frequency	Parameters	Assessment	Analysis
<i>Core Indicators</i>			
Annually at selected sites	Floristic quality	MPCA Rapid Floristic Quality Assessment	Weighted C (wC), mean C, FQI, species richness
Annually at selected sites	Invertebrate diversity	Genus/species level identification of light trap and pitfall trap samples	Species diversity
Annually at selected sites	Temperature Dissolved O ₂ pH Specific Conductivity	Field measurement	Basic water chemistry
<i>Supplemental Indicators</i>			
As funding allows	Chloride, Total Chlorophyll-a Nitrogen, Nitrate + Nitrite and Kjeldahl Organic Carbon, Total Phosphorus, Total Suspended Solids, Total	Laboratory analysis	Water chemistry and nutrient levels
As funding allows	Nitrogen, Nitrate + Nitrite and Kjeldahl Organic Carbon, Total Phosphorus, Total Solids, Total	Laboratory analysis	Soil chemistry and nutrient levels

5. DATA MANAGEMENT

Data collected in Grand Portage wetlands will be stored in an Excel format on the Grand Portage network server. The physical field and laboratory data forms are stored in the Wetlands Specialist’s office in the Grand Portage Trust Lands building, 27 Store Rd, Grand Portage, MN 55605. Data will be submitted into the EPA WQX system when appropriate.

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