



## Interconnected, Multi-Use System

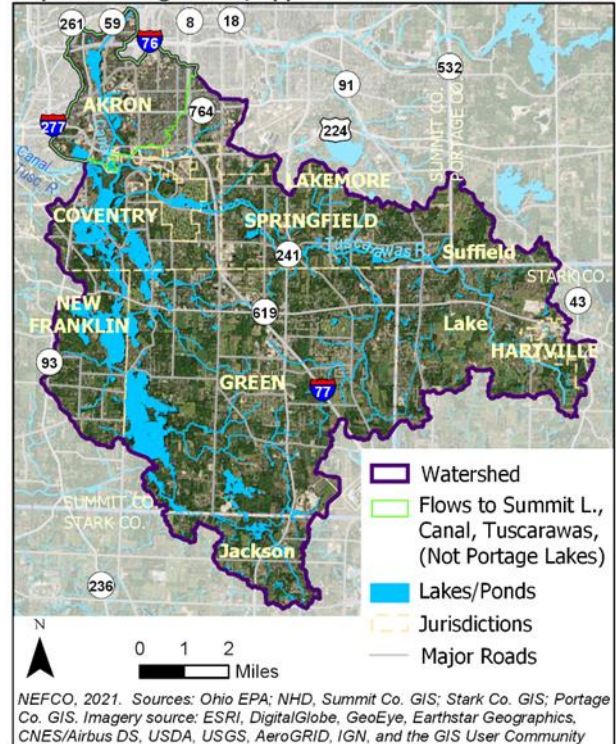
The Portage Lakes is a natural system and multi-use resource. It draws hundreds of thousands of visitors each year and is surrounded by thousands of homes and businesses. The lakes get their water from a 74-square mile watershed and are influenced by that landscape (Map 1.1).<sup>1</sup>

The use and enjoyment of the lakes is intertwined with the water quality and health of the lakes. The intense activities affect the lake system, and the natural lake processes affect activities.

The residents, boaters, swimmers, anglers, and others who use the lakes are connected by the lakes system, part of the lakes system:

- Water
- Sediment
- Plants and animals
- Substances in the water
- Activities on the lakes or surrounding watershed

Map 1.1 Portage Lakes/Upper Tuscarawas River Watershed



Changes to part of the system affect the rest of it, for good or bad. They can be sudden or gradual.

## Portage Lakes by the Numbers

- 2,200 acres of state-managed lakes
- 500 acres of state park land
- 900-foot swim beach, 2 boat swim areas
- 2 metro parks
- ~300,000 visitors to the State Park per year
- 8 boat launch ramps, 10 courtesy docks
- 19,320 boats on the lakes, twice as many arriving by trailer
- ~1,400 lakeside homes
- ~1,200 residential or commercial docks
- ~20,000 properties within a mile of the lakes

<sup>1</sup> Map source: Summit Co. GIS; Stark Co. GIS; Portage Co. GIS; National Hydrologic Database, 2016. Base map: ESRI; DigitalGlobe; GeoEye; EarthStar Geographics; CNES/AirBus DS; USDA; USGS; AeroGRID; IGN; GIS user community.

## Aquatic Plants – Essential Elements in Lake Systems

Plants are crucial to the functioning and health of lakes:

- Provide habitat, food, cover for fish, birds, and a host of other animals;
- Generate oxygen;
- Stabilize sediment, prevent erosion;
- *Improve* water quality, process nutrients help keep the lake system in balance, and thus
- Protect against Harmful Algal Blooms (HABs).



## Nutrients Drive Plant Growth – and HABs

Nutrients washing in from the landscape fuel growth of aquatic plants, just as fertilizer feeds growth of lush lawns and gardens.

- The nutrients recycle within the lake, build up, spurring more growth.
- In lakes that have become over-enriched (eutrophic), the high nutrient load causes excessive plant growth.
- The same nutrients that drive plant growth support cyanobacteria, which can release toxins and cause HABs when they grow rapidly. If a lake becomes too nutrient-rich, the HABs take over, shading out the plants. The lake becomes unusable and is very difficult and expensive to restore.



➤ ***Plants and algae protect the lake by using nutrients that would otherwise support cyanobacteria/HABs.***

## Too much of a Good Thing in the Portage Lakes – Impacts from Intense Use Shift the Balance

Concentrated human activity in a natural system is likely to cause impacts. In the Portage Lakes, years of intense use of the lakes and watershed have led to high levels of nutrients. The nutrients produce dense growth of aquatic vegetation, which causes conflicts with residents, businesses, boaters, and visitors.



**Problem: Dense Plant Growth Interferes with Uses**

**1. Cause: Over-enriched, Eutrophic Lakes and Invasive Plants.**

The balance in the lakes has shifted toward over-enrichment. Over years and decades, nutrients (phosphorus and nitrogen) have been washing in and building up from the altered, developed landscape - runoff, septic systems, lawn chemicals, cleared land, agricultural use, and animal waste.

➤ *The lakes have become over-enriched over time and continue to do so.*



**2. The eutrophic lakes feed excessive plant growth, possibly HABs, creating a nuisance.** Dense growth

has become a nuisance for residents and boaters and clogs flow control structures. Cyanobacteria blooms hint at a potential future with HABs.



Invasive plants, accidentally brought in on boats or fishing gear, create tangled mats that spread rapidly in the nutrient-rich waters.



**3. Conflicting priorities.** The plants grow in shallow water where people live, swim, boat, and fish, causing conflicts between the natural system and uses. But it would be much worse if these images showed lakes covered with HABs, instead of shallows full of plants. The plants provide essential benefits to the Portage Lakes system, *especially because the lakes are over enriched.*



Something will grow in all those nutrients – ***plants are better, and more manageable, than HABs.***

**“Just Clear the Stuff Out” Is Not an Option**

Property owners and organizations try their own individual approaches to control vegetation.

However, piecemeal plant control doesn’t work in a complex, interconnected lakes system. The plants, the conditions that cause them, and impacts from management approaches are lakes-wide.

The wrong method may not work at all and may cause more harm than good: spreading invasive plants, creating hazards with toxic chemicals, clogging flow gates, causing massive die-offs or decaying mats of plants, or – worse - tipping the system further toward eutrophication and HABs.

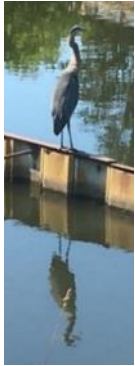


Source: J. Garretson, 2021.

Currently, there is no organization or individual with the scope, resources, time, staff, or background to systematically manage the aquatic plants or consider the context of the lakes.

➤ *The current method of dealing with the plants is not working. So what is to be done?*

## Achieving Balance with an Aquatic Plant Management Program



An aquatic plant management (APM) program is necessary to allow people to use and enjoy the lakes while protecting the health of the lakes at the same time. This approach devotes efforts and resources to systematic management of the plants and lakes system. It is used successfully in other areas to provide for activities in balance with sustaining the lakes:

- Provides for access, use, and aesthetics;
  - Protects the important benefits provide for habitat, water quality, and lake health.
- ***Aquatic plants must be managed systematically, in a balanced way that supports access, use, and aesthetics, and protect the habitats and health of the lakes.***

There are many tools that can be used to manage aquatic plants, each with different strengths and concerns. An aquatic plant management (APM) program will work with the lakers and partners to:

- Identify priority areas for use, conservation, and management;
- Identify types of plants, and problem areas;
- *Selectively* use methods that can address the need and improve conditions effectively in each area with minimal impacts;
- Provide assurance that problem areas will be addressed in a safe, systematic, consistent way that protects the lakes; and
- Be part of technically-based, coordinated management of the lakes system: health and habitats, impacts and changes, in-lake conditions and watershed inputs that promote plant/HABs growth.
- Systematic management of aquatic plants and the lakes requires adequate staff and resources.



### Pieces in a Puzzle



Taking care of a lake system is like putting together a puzzle.

The system has so many parts that lakers, visitors, agencies, organizations, volunteers can each focus on a piece or two that reduce impacts and improve lake conditions.

But individual pieces are only part of the entire picture. All pieces are essential, affect the others, and are affected by the others.

The individual elements must be connected and viewed as part of a whole in order to understand the context and for measures to be effective.



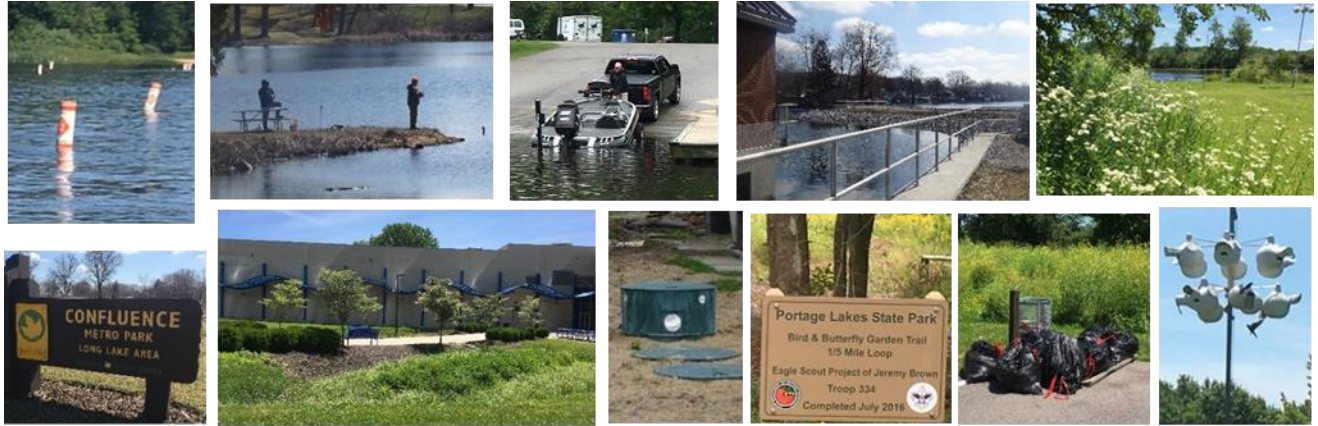
- Without context, the pieces may not be the appropriate ones.
- Without all the pieces, there are gaps.

*People and organizations are part of the lakes system and can help take care of the lakes with individual actions in the context of the interconnected lakes system.*



## Managing the Lakes System

Plants are driven by and affect the lakes system. It is essential to understand and address conditions in the lakes and watershed. There are many dedicated organizations, communities, and individuals working in and around the Portage Lakes, each focusing on individual aspects of the lakes and watershed.



Some are land-based, some work in the lakes or along the shore. Each contributes something important to the well-being of the lakes, but their work and resources are narrowly focused.

- They cannot manage the lakes and aquatic plants on their own.



## A New Approach: Lakes Management

Sustaining the health and activities of eutrophic multi-use lakes is challenging. With many uses on the lakes and in the watershed, many interconnections, there is great potential for conflicting interests and priorities, for impacts that tip the balance toward more problems. Lakes management, which includes the plants, is necessary to sustain the system and the activities it supports. This involves:

- **Commitment** by lakers and partners to manage activities on the lakes, reduce impacts improve conditions, make choices to balance use and protection of the lakes and coexist with the natural system;
- **Collaborative, coordinated management** among partners and lakers, sharing information, perspectives, and resources;
- **Building a shared understanding** about lake conditions, changes, processes, concerns, priorities, management practices, impacts;
- **Increasing awareness, stewardship, involvement, and support for lake management**, among lakers, agencies, other organizations, and communities; and
- **Increased organization focus, coordination, monitoring, and resources for lake management**, including adequate staff, funding, equipment, resources, lakes management expertise, technical background, and systematic monitoring of lake conditions and plants.



While such a coordinated, focused approach is new for the Portage Lakes, lake management programs are used successfully in many other areas, demonstrating that lakes can be managed in a way that supports uses and lake health together. A lake management program, with well-understood guidelines, processes, roles, and responsibilities allows lake residents, visitors, and participating organizations to understand what is expected of them, what will be managed, when, and how.

## The Portage Lakes Management Plan

In order to develop an approach to protect the lakes' ecosystem while supporting their uses, Ohio Environmental Protection Agency (Ohio EPA) provided funding for five years of studies and planning to NEFCO. NEFCO staff have worked closely with representatives from the Portage Lakes Advisory Council (PLAC), community members, and a Technical Advisory Committee (TAC), which included agency staff, community representatives, lake scientists, and volunteers. (See Appendix A for a list of TAC members and meetings.)



Over the past five years the TAC members have worked together and built a partnership to better understand the lakes conditions and processes, concerns, current lake management, and potential approaches to improve conditions. The TAC and other community members have shared information, ideas, and perspectives about the lake system, identified needs and steps forward, shaping this plan.

Continuing this collaborative approach is essential. It is already changing the partners' understanding of lake conditions and possible approaches. The partners are starting to define roles and tasks to help carry out the recommendations. The partnership will evolve as the recommendations are carried out, and will seek more community involvement in setting priorities, decision-making stewardship, and advocacy.

### Development of the Portage Lakes Watershed Plan

- Year 1 – Watershed characteristics, updating the 2000 Upper Tuscarawas Watershed Plan.
- Year 2 – Study of aquatic plants in the lakes, generally identifying types and extent from boat trips and shoreline visits, noting conflicts with the lake users, and exploring management strategies.
- Year 3 – Public and community engagement to help identify priorities and concerns, including focus groups, a lake monitoring workshop, boat tours of the lakes with community representatives, and various meetings and discussion groups. Appendix A lists public engagement activities, Appendix B summarizes the focus groups.
- Years 4 and 5– Compiling information from the first three years, additional information about lake processes and conditions, and results of numerous, in-depth discussions with the TAC and others, into a cohesive framework for managing aquatic plants and the lakes.

## Plan Overview

The plan compiles existing information about the Portage Lakes conditions to provide the background for understanding and managing the lakes system, including:

- Lake characteristics and processes;
- How the water is managed;
- Uses, community, and watershed;
- Aquatic plants, habitats, fish and other wildlife;
- Preliminary plant management priorities and approaches;
- Organizations currently working on and around the lakes;
- Recommendations; and
- Opportunities for organizations and individuals to help improve conditions and sustain the lakes.

Some of the background (specifically plants, lake chemistry/processes, and aquatic plant management strategies) is general, based on limited data. Important tasks include systematic inventory and monitoring of aquatic plants and lake conditions, developing roles and resources, and identifying priority management zones and approaches with involvement of the lakes community.

The plan and recommendations encompass the lakes, surrounding land, and the contributing watershed. There are many practices on land, along the shoreline, and in the water that will improve lake conditions. There is a great need and many opportunities for organizations and individuals to increase awareness of the lakes system and practice good stewardship.



The new approach involves more effort, coordination, and systematic management of the lake system and activities within it. It provides a lakes-wide context for managing this important resource in a balanced way, setting priorities, addressing concerns, and improving conditions for the users, community, and health of the lakes.



The plan is organized as follows:

1. Introduction
2. Portage Lakes Setting
3. The Portage Lakes and their People: Community; Uses and Users; Balancing Priorities; Caretakers
4. Limnological Characteristics, Productivity and Eutrophication of Portage Lakes
5. Habitat, Wildlife, and Aquatic Plants
6. Water Quality and Portage Lakes Watershed
7. Recommendations and Management

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### *Overall Goal:*

*Manage the Portage Lakes in a way that protects the natural lakes system in balance with the priorities of lake users, communities, and management organizations.*

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### *Important Note on Recent Occurrences – Highlighting the Need for Coordinated, Supported, Systematic Lakes Management*

Several recent events in 2020-2021 affect – and emphasize - the findings and recommendations of the plan. Some have been addressed in the plan, but some occurred too recently to be included.

- Dense growth throughout North Reservoir
- *Floating vegetation clogging the Long Lake Feeder outlet* to the Ohio and Erie Canal and other water control facilities
- *Occurrence of the cyanobacteria, anabaena, in Nimisila Reservoir* early in the season. Cyanobacteria blooms occasionally occur, but this bloom early in the season, along with changing climate and increasing nutrients, highlights the potential for future HABs and the need to understand existing and changing conditions, so appropriate measures can be developed.
- *Recent research on Harmful Algal Blooms* changes our understanding of the nutrients and lake temperature conditions that affect the severity and toxicity of HABs.
- *Recent discovery in Mosquito Lake of hydrilla*, a highly invasive, easily spread plant. It is easily spread by fragments on boats or fishing gear traveling between Mosquito Lake and the Portage Lakes, including the shared harvester, and it is very difficult to eradicate.



These occurrences emphasize these urgent needs identified in the plan:

- The critical importance of inventory and monitoring programs to characterize lake conditions and plant communities, changes, and impacts. Without understanding the aquatic plant community and lake characteristics, management measures cannot be targeted, and their impacts could make conditions worse. Early identification and eradication of hydrilla may prevent an infestation in the Portage Lakes and Lake Erie drainage, which receives water from Long Lake.
- Need to move forward developing management measures that improve conditions for residents, boaters, and the lakes.
- The need for technical expertise and coordination to bring new developments into the decision-making process, to build understanding of causes, effects, and management implications.

Conditions and understanding of the lakes will continue to evolve, often rapidly, in this heavily used eutrophic system. The collaborative partnership and lake managers will need to and will be able to address these, with technical support, in developing management measures and monitoring lake conditions.