Largon Lake
Lake Management Plan, 2023-2033

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Purpose of the Study

In November 2020, the Polk County Land and Water Resources Department applied for a Wisconsin Department of Natural Resources Lake Planning Grant in partnership with the Largon Lakes Protection and Rehabilitation District. The grant was awarded, and data collection occurred in 2021 and 2022.

Methods and activities completed through this grant award include:

- ✓ Lake resident survey
- ✓ Lake level and precipitation monitoring data
- ✓ In-lake physical and chemical data
- ✓ Spring and fall point intercept plant surveys
- ✓ Shoreline inventory
- ✓ Septic inventory
- ✓ Tributary physical and chemical data
- ✓ Culvert erosion vulnerability study
- ✓ Watershed delineation and boundaries
- ✓ Watershed modeling
- ✓ No-till and cover crop inventory
- ✓ Agricultural Conservation Planning Framework (ACPF)
- ✓ Pontoon classroom
- ✓ Largon Lake handbook

The following report details the methods and activities completed through this grant award.

Executive Summary

- Largon Lake is 135 acres in size with a maximum depth of 10 feet. Largon Creek enters Largon Lake from Little Largon Lake on the northeast side of the lake and exits the lake on the southwest side of the lake, eventually flowing to the Clam River. An unnamed tributary (termed North Inlet in this report) converges with Largon Creek before entering Largon Lake.

- A lake resident survey completed by 40 property owners (66% response rate) ranked top concerns for Largon Lake as: excessive algae blooms, decrease in overall lake health, and increased nutrients from failing septic systems.

- The lake resident survey asked respondents to indicate which actions should be completed by the Largon Lakes Protection and Rehabilitation District to manage the lake. The management options with the greatest support by respondents included: programs to prevent and monitor invasive species (85%), offering incentives for upgrades to non-conforming septic systems (83%), and practices to improve fishing and fish habitat (74%). Two-thirds of respondents supported offering incentives for property owners to install shoreline buffers/rain gardens (64%) and enforcement of slow-no-wake zones (63%). Half of respondents supported offering incentives for farmland conservation practices (53%).

- In both years of the study the upper two meters of the water column were well oxygenated and the bottom waters fell below the 5 mg/L standard for fish. In both years of the study, the bottom waters became depleted of oxygen (became anoxic). In 2021, the bottom waters of Largon Lake were below 1 mg/L dissolved oxygen from mid-June through the beginning of August. In 2022, the bottom waters were below 1 mg/L dissolved oxygen in July (second sampling date only).

- Largon Lake is classified as a eutrophic lake. Eutrophic lakes are generally high in nutrients and support many plants and animals. They are usually very productive and subject to frequent algae blooms. Eutrophic lakes often support large fish populations but are susceptible to oxygen depletion.

- The average summer index period (July 15th – September 15th) trophic status in 2021 and 2022 was eutrophic.

- Largon Lake was placed on the 303(d) Impaired Waters List in 2020 for total phosphorus and chlorophyll a for recreation use and fish and aquatic life use.
    - The impairment threshold for total phosphorus is greater than or equal to 40 µg/L for both recreational use and fish and aquatic life use.
    - The impairment threshold for chlorophyll a for recreational use is exceeded if greater than 30% of the days in the sampling season have moderate algal levels (greater than 20 µg/L chlorophyll a).
    - The impairment threshold for chlorophyll a is greater than or equal to 27 µg/L for aquatic life use.

- Fourteen aquatic plant species were found in Largon Lake. In June and August, plant growth covered 10% of the lake. The floristic quality index evaluates the closeness of the flora in an area to that of an undisturbed condition. The value for Largon Lake is lower than the value for the North Central Hardwood Forest region which Largon Lake is located in.

- Two invasive species (Chinese mystery snail and banded mystery snail) have been documented on Largon Lake.

- A shoreline inventory indicated that 89% of the properties on the shoreline of Largon Lake have canopy cover present greater than 80% and that 72% of the ground cover in the riparian buffer zone is shrubs/herbaceous plants. Twenty-five percent of the ground cover in the riparian buffer zone was lawn. Runoff concerns including point sources, channelized water flow/gully, lawn/soil sloping to lake, bare soil, and bank erosion exist on Largon Lake.

- The Ascent Permit Management Suite system for tracking sanitary permits was used to determine compliance for the fifty-four septic systems near Largon Lake. Forty-five systems (83%) were in compliance, with the remaining nine systems (17%) being out of compliance. Of the non-compliant systems, four have no records and the remaining systems were last serviced in 2019, 2018, 2016, 2002, and 1989.

- The state standard for total phosphorus for streams is set at 75 ug/L. The North Inlet and the Inlet from Little Largon Lake were below the standard in 2022.

- Erosion commonly occurs at culverts because of the concentration of water into a confined flow path. Two gullies have formed downstream of two culverts underneath

Largon Lake Court. The potential rate of soil loss attributed to the two gullies are 5.89 tons per year and 12.60 tons per year.

- The Largon Lake watershed is 2,497 acres in size. The most common land use in the Largon Lake Watershed is forest (70%), followed by wetland (7%), row crops (6%), grassland (5%), and mixed agriculture (5%).

- WiLMS determined the annual external phosphorus load to Largon Lake as 454 pounds of phosphorus per year. Overall, internal loading is predicted to be between 55 and 110 pounds of phosphorus per year, or 11-20% of the nutrient budget for Largon Lake. Septic loading was estimated at 2 pounds of phosphorus per year, or less than 1% of the nutrient budget.

- Modeling predicts that to achieve the phosphorus standard for Largon Lake (40 µg/L) the combined external and internal phosphorus load to the lake would need to be reduced by 194 pounds (37% reduction).

- The Largon Lake Watershed was divided into five subwatersheds: Direct Subwatershed, West Subwatershed, North Subwatershed, Little Largon Subwatershed, and South Subwatershed. The subwatersheds contributing the greatest phosphorus load per acre to Largon Lake are the South and Little Largon Subwatersheds.

- The agricultural land base in the Largon Lake Watershed consists primarily of row crops (corn and soybeans) (42%) and perennial vegetation (forage and pasture) (38%). Row crop fields were more likely to use conventional tillage (81%) compared to no-till (5%). Cover crops have not been adopted in the watershed. Beef (36 head) are the only livestock in the watershed. If all known suitable acres in 2021 had been planted using no-till and cover crops, phosphorus loading in the Largon Lake Watershed would have been reduced by 26%.

- The Agriculture Conservation Planning Framework was used to identify and prioritize conservation practices on agricultural lands in the Largon Lake Watershed. The program recommended and prioritized locations for grass waterway and determined field runoff risk and distance to stream.

- In 2023, stakeholders met to develop an implementation plan for Largon Lake which included the following goals:

  Goal 1. Improve the overall health of Largon Lake
  Goal 2. Increase natural beauty and habitat for wildlife and fish on Largon Lake
  Goal 3. Use multiple strategies to ensure the goals of the plan are met

- Many of the goals in the implementation plan are eligible for grant funding through the Wisconsin Department of Natural Resources Surface Water Grant Program.

Background Information on Lakes, Studies, and Management Plans

Lakes situated near one another can differ profoundly in the uses they support. Factors such as lake size, lake depth, water sources, geology, and human alterations all cause inherent differences in lake quality.

A landscape can be divided into watersheds and subwatersheds. These areas define the land that drains to a particular lake, flowage, stream, or river. Watersheds that preserve native vegetation and minimize impervious surfaces (cement, concrete, and other materials that water can't infiltrate) are less likely to result in negative impacts on lakes, rivers, and streams. This arises because rain and melting snow eventually end up in lakes and streams through surface runoff or groundwater infiltration. Rain and melting snow entering a waterbody are not inherently problematic. However, water can carry nutrients, bacteria, sediments, and chemicals into a waterbody. These inputs can impact aquatic organisms such as insects, fish, and wildlife. Additionally, nutrient inputs can fuel problematic algae blooms.

Lake studies examine the underlying factors that impact a lake's health, such as lake size, depth, water sources, and the land use in a lake's watershed. Many forms of data can be collected and analyzed to determine a lake's health including physical data (oxygen, temperature, etc.), chemical data (including nutrients such a phosphorus and nitrogen), biological data (algae, zooplankton, and aquatic plants), geological data (soils, glacial till, and sediment chemistry) and land use within a lake's watershed.

Lake studies identify challenges and threats to a lake's health along with opportunities for improvement. Studies identify practices already being implemented by watershed residents to improve water quality and areas providing benefits to a lake's ecosystem. They also quantify practices or areas in the watershed which have the potential to negatively impact the health of a lake and identify best management practices (BMPs) for improvement.

The product of a lake study is a **Lake Management Plan** which identifies goals, objectives, and action items to either maintain or improve the health of a lake. Goals should be realistic based on inherent lake and watershed characteristics (lake size, depth, land use etc.) and should align with the goals of watershed residents. Lake management plans are designed to be working documents that are used to guide the actions which take place to manage a specific lake.

Introduction to Largon Lake

Largon Lake is located entirely in the Town of McKinley, which is 37 square miles and had a 2020 population of 285 people. The lake has four areas that are designated as Areas of Special Natural Resources Interest (ASNRI) Sensitive Areas, most of which occur on the western side of the lake. These areas of aquatic vegetation offer critical or unique fish and wildlife habitat. According to Natural Heritage Inventory data, one special concern species (slender bulrush) occurs in the Town of McKinley.

Largon Lake is 135 acres in size with a maximum depth of 10 feet. Largon Creek enters Largon Lake from Little Largon Lake on the northeast side of the lake and exits the lake on the southwest side of the lake, eventually flowing to the Clam River and the St. Croix River. An unnamed tributary (termed North Inlet in this report) converges with Largon Creek before entering Largon Lake. Since 1977 an aerator has been operated on the lake to prevent winter fish kills.

Two invasive species (Chinese mystery snails and banded mystery snails) have been documented on Largon Lake.

The Town of McKinley owns a parcel of land on the southeast side of the lake that includes the public access (satisfies NR 1.91 access standards). Public use (fishing) is low-moderate in both summer and winter.

The Largon Lakes Protection and Rehabilitation District was formed in 1975.

Largon Lake is situated within the Clam River Watershed which is 207 square miles. The watershed has 218 miles of streams and rivers, 5,389 acres of lakes, 24,387 acres of wetlands, and is dominated by forest (59%), wetland (20%), and grassland (9%).[1]

On a smaller scale, the area of land that drains to Largon Lake is defined as the Largon Lake Watershed. This study used the computer program ArcMap and LiDAR data to delineate the Largon Lake Watershed, which is 2,497 acres. ArcMap and 2020 aerial imagery were used to delineate land use in the Largon Lake Watershed. The most common land use is forest (70%).

Lakes are hydrologically classified according to their primary source of water and how that water enters and leaves the system. Largon Lake is classified as a shallow mixed drainage lake. Drainage lakes receive most of their water from the surrounding

[1] https://dnr.wi.gov/water/waterDetail.aspx?key=16784

watershed in the form of stream drainage, have a prominent inlet and outlet that moves water through the system, and commonly have high nutrient levels due to inputs from the watershed.

The trophic state is a measure of a lakes health which relates to the amount of algae in the water. The average summer trophic state for 2021 and 2022 was eutrophic. Volunteers have been monitoring water clarity since 1998. Largon Lake was placed on the 303(d) Impaired Waters List in 2020 for total phosphorus and chlorophyll a for recreation use and fish and aquatic life use.

Largon Lake Characteristics [2]

Area: 135 acres
Maximum depth: 10 feet
Mean depth: 6 feet
Bottom: 40% sand, 0% gravel, 0% rock, and 60% muck
Hydrologic lake type: drainage
Invasive species: Chinese mystery snail and banded mystery snail
Fish: panfish, largemouth bass, and northern pike
Trophic Status: eutrophic

Lake Classification

Lake classification in Polk County is a relatively simple model that considers:

- ✓ Lake surface area
- ✓ Maximum depth
- ✓ Lake type
- ✓ Watershed area
- ✓ Shoreline irregularity
- ✓ Existing level of shoreline development

These parameters are used to classify lakes as class one, class two, or class three lakes.

Class one lakes are large and highly developed.
Class two lakes are less developed and more sensitive to development pressure.
Class three lakes are usually small, have little or no development, and are very sensitive to development pressure.

Largon Lake is classified as a class one lake.

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[2] https://dnr.wi.gov/lakes/lakepages/LakeDetail.aspx?wbic=2668100&page=facts

Impaired Waters

Wisconsin lakes, rivers, and streams are studied to determine if their conditions are meeting state and federal water quality standards. Water samples are collected through monitoring studies and results are compared to state standards. General assessments place waters in four different categories: poor, fair, good, and excellent. The results of assessments can be used to determine which actions will ensure that water quality standards are being met (anti-degradation, maintenance, or restoration).

If a waterbody does not meet water quality standards, it is placed on Wisconsin's Impaired Waters List under the Federal Clean Water Act, Section 303(d). Every two years the State of Wisconsin is required to submit impaired waters list updates to the United States Environmental Protection Agency for approval.

Waterbodies are listed as impaired based on pollutants including total phosphorus, total suspended solids, and metals. Waters are assigned four uses (fish and aquatic life, recreation, public health and welfare, and wildlife) that carry with them a set of goals.

Impairment thresholds vary for each use based on lake characteristics such as whether a waterbody is shallow or deep and whether a waterbody is a drainage or seepage lake. Largon Lake is classified as a shallow headwater drainage lake.[3]

Largon Lake was placed on the 303(d) Impaired Waters List in 2020 for total phosphorus and chlorophyll a for recreation use and fish and aquatic life use.

The impairment threshold for total phosphorus is greater than or equal to 40 µg/L for both recreational use and fish and aquatic life use. The impairment threshold for chlorophyll a for recreational use is exceeded if greater than 30% of the days in the sampling season have moderate algal levels (greater than 20 µg/L chlorophyll a). The impairment threshold for chlorophyll a is greater than or equal to 27 µg/L for aquatic life use.

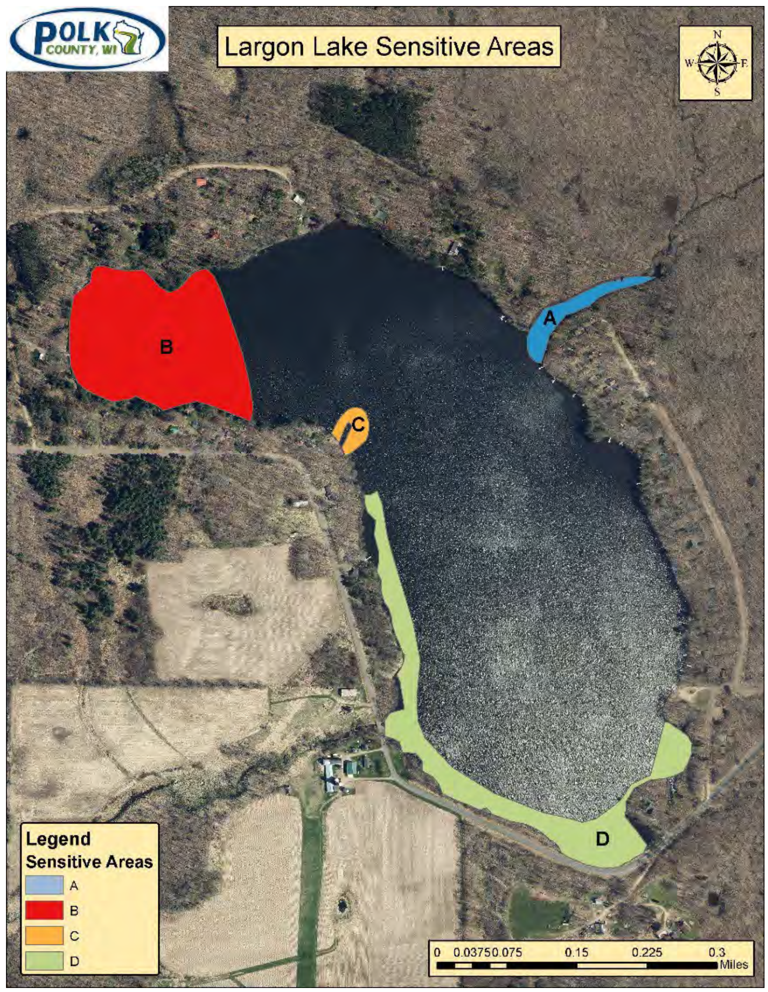
[3] Listing thresholds are found in Wisconsin Consolidated Assessment and Listing Methodology (WisCALM) for CWA Section 303(d) and 305(b) Integrated Reporting, Assessment Guidance for 2021-2022, Wisconsin Department of Natural Resources, January 2021.

Previous Lake Studies

Past studies and grant awards on Largon Lake include:

Largon Lake Sensitive Area Survey Report and Management Guidelines, 1999, Wisconsin Department of Natural Resources

This survey identified four areas along the shoreline of Largon Lake that merit special protection of aquatic habitat. These areas of aquatic vegetation offer critical or unique fish and wildlife habitat, provide necessary seasonal or life stage requirements for the fishery, offer water quality benefits, and provide erosion control benefits.



Sensitive area A includes the bay on the northeastern end of the lake where Largon Creek enters Largon Lake and includes around 400 feet of shoreline. Sensitive area B includes the bay on the northwestern side of Largon Lake and is largely dominated by a shallow open water wetland.

Sensitive area C is located off the small point on the western shore of Largon Lake and Sensitive area D is located along the southwestern and southern shoreline of Largon Lake and covers around 3,000 feet of shoreline and extends 100-300 feet into the lake. Most of sensitive area C and D are dominated by a deep marsh and shallow open water wetland. The western shoreline included in sensitive area D contains large amounts of logs and woody debris.

All four sensitive areas provide important habitat for spawning and nursery areas for bass, panfish, and northern pike along with important habitat for forage species. The sensitive areas also provide valuable habitat for loons, eagles, herons, waterfowl, songbirds, furbearers, turtles, and amphibians.

The report strongly discourages chemical and mechanical aquatic plant removal in all four sensitive areas except for the creation of an individual riparian access lane to access open water. [4] The report recommends that: whenever possible aquatic vegetation is not eliminated but is instead removed only as necessary to allow for navigation, that littoral zone (shallow water area) alternations are prohibited, that large logs/trees/stumps are left in the littoral zone, and that adequate shoreline buffers of un-mowed vegetation at the water's edge are left intact. Additionally, the report recommends that erosion is prevented at construction sites, that zoning ordinances are enforced, and that nutrient inputs to the lakes by lawn fertilizers and failing septic systems are eliminated.

Largon Lake Comprehensive Planning Report, 2002, Polk County Land and Water Resources Department

Data on Largon Lake was collected in 2000 and 2001. At this time, data showed that the lake was eutrophic with potential for persistent algae and nuisance plant growth. This study identified the gully on the north end of the lake as having the highest concentration of dissolved reactive phosphorus. The primary management strategy suggested in this study involved armoring the two primary gullies on the east side of the lake. At this time land use in the watershed was primarily forest (69%), followed by agriculture (14%), wetlands (12%), and residential (5%).

[4] Individual riparian access lanes are limited to a maximum width of 30 feet per property measured along the shoreline and includes the area where a dock, boat lift, swim raft, and other recreational equipment is located. Boundaries of the riparian access lane cannot be moved from year to year. Plant removal in the individual riparian access lane can only be done by hand with a tool such as a rake. There can be no assistance from machinery, boats, rollers, etc. unless a permit is obtained. When plants are cut/uprooted they must be taken out of the lake. Wild rice can never be removed even if it is present in a riparian access lane.

Lake Resident Survey

A Wisconsin Department of Natural Resources approved survey was mailed to sixty-three property owners on and around Largon Lake and Little Largon Lake in spring of 2022. Forty surveys were returned (66% response rate) and data was entered and analyzed.

Survey respondents have owned their property on Largon Lake for an average of 20 years. Over half of respondents use their property as a weekend, vacation, and/or holiday residence (58%). Fewer respondents use their property as a seasonal residence (10%) or do not occupy the property (13%). Less than one-fourth of respondents use their property as a year-round residence (20%). On average, properties on Largon Lake are used 103 days per year and occupied by 2.5 people.

Most of the respondents' own property on the shoreline of Largon or Little Largon Lake (90%). Respondents were asked to describe the first 35 feet of their shoreland (the area located directly adjacent to the lake). Three-fourths of respondents indicated their property contained un-mowed vegetation (73%). Around half of respondents indicated that their shoreline contained shrubs/trees (57%) and mowed vegetation (54%), and more than two-thirds of respondents indicated their shoreland has undisturbed woods (35%). Nearly two-thirds of respondents indicated that they had a dock or pier (62%) and one-fourth indicated they had stabilizing rock/rip rap (24%). Fewer respondents indicated their property has a shoreline buffer (11%) or rain garden (3%).

The survey asked respondents which activities they enjoy on Largon and Little Largon Lake. The most popular activities include enjoying peace and tranquility (88%), enjoying the scenic view (80%), observing birds and wildlife (70%), swimming (65%), non-motorized boating (63%), motorized boating (63%), and open water fishing (60%).

The survey asked how many days a month respondents use the Largon Lake boat landing during the open water and ice on season. More respondents use the boat landing in the open water season (45%, average 1.03 days/month) as compared to the ice on season (10%, 0.32 days/month).

A few survey respondents (15%) do not use watercraft on Largon Lake. The most common watercraft used on the lake are canoes (65%) and motorboats/pontoons that are 21-50 HP (38%). Fewer respondents use paddleboats/rowboats (30%), motorboats/pontoons that are 1-20 HP (20%), and motorboats/pontoons that are greater than 50 HP (18%).

To quantify risk of spreading aquatic invasive species, survey respondents were asked if the watercraft they use on Largon Lake are used on other waterbodies. Only a small portion of respondents' boats that are used on Largon Lake are used on different waterbodies (12%), with most respondents' boats (88%) only being used on Largon Lake. Survey participants were asked to describe their typical cleaning routine after using watercraft on water other than Largon Lake. All respondents removed aquatic hitchhikers (100%) and three-fourths of respondents air dry their boat for 5 or more days (75%). One-fourth of respondents rinsed their boat (25%) and drained their bilge (25%).

Respondents were asked to rank their degree of concern with eighteen issues as high, medium, low, issue exists but isn't a concern, and issue doesn't exist. To analyze the results, each issue ranked as high received 4 points, as medium received 3 points, as low received 2 points, as exists but not a concern 1 point, and as not an issue received 0 points. Total points were averaged to determine a final rank. Issues with a final ranking of high to medium concern included: excessive algae blooms, decrease in overall lake health, and increased nutrients from failing septic systems.

What is your degree of concern with each issue listed below?	Rank
Excessive algae blooms	3.3
Decrease in overall lake health	3.2
Increased nutrients from failing septic systems	3.0
Reduced fish abundance in the lake	2.9
Undesired species of fish in the lake	2.9
Runoff from lakeshore properties	2.9
Poor water quality	2.8
New invasive species entering the lake	2.8
Excessive aquatic plant growth (excluding algae)	2.8
Runoff from surrounding farmland	2.8
Lack of water clarity	2.7
Loss of natural scenery/beauty	2.2
Decreased wildlife populations	2.2
Disregard for slow-no-wake zones 100 ft from shore	2.2
Excessive noise level on the lake	2.1
Increased development	2.0
Unsafe use of motorized watercraft	1.9
Decreased property values	1.5

Lake levels can vary over the course of the year and from year to year. Residents were asked to describe the current water level of Largon Lake. Most respondents described the current water level as just right (83%), with more respondents describing the water level as too low (14%) as compared to too high (3%).

When asked to describe the current water quality on Largon Lake, nearly half of respondents described it as good (42%) and one-third (36%) described it as fair. Fewer respondents described water quality as poor (19%) and very poor (3%). Survey respondents were asked to identify how water quality has changed in the time they have lived on/near the lake. Nearly half of respondents felt that water quality has neither degraded nor improved (41%). More respondents felt that water quality has somewhat or greatly improved (26%) as compared to somewhat or severely degraded (18%). A smaller number of respondents haven't been on the lake long enough to notice a change (15%).

The survey also asked respondents what they think of when assessing water quality. When assessing water quality, over three-quarters of respondents think of algae blooms (87%) and water clarity (clearness of water) (79%) and two-thirds of respondents think of water color (68%), smell (66%), and fish kills (61%). Around half of respondents think of aquatic plant growth (47%) when assessing water quality.

The survey asked a variety of questions regarding algae and aquatic plants. Respondents were asked to describe the amount of algae and aquatic plants in Largon Lake, what months during the open water season algae and aquatic plants are a problem, and what uses are impaired because of algae and aquatic plants.

A large majority of respondents consider algae to be problematic in August (97%) and July (71%). Fewer respondents consider algae to be problematic in September (24%) and June (15%). Approximately three-fourths of respondents indicated that overall enjoyment of the lake (71%) is impaired by algae. Over half of respondents indicated that swimming (58%) is impaired by algae. Around one-third of respondents indicated that fishing (38%), dogs/animals using the water (35%), and boating (26%) are impaired by algae.

Two-thirds of survey respondents described the amount of aquatic plants on the lake as heathy (65%) and one-fourth described the amount of aquatic plants as too many (24%). Fewer respondents indicated there are too few aquatic plants in Largon Lake (12%).

Approximately half of respondents indicated that aquatic plant growth is never a problem in Largon Lake (47%). Around half of respondents indicated that aquatic plant growth is a problem in August (53%) and July (47%). Fewer respondents considered aquatic plant growth to be a problem in September (26%) and June (12%). Half of respondents indicated that swimming (55%) and overall enjoyment of the lake (50%) are limited by aquatic plants. One-third of respondents indicated that boating (37%) and fishing (32%) were limited by aquatic plants.

Early in the survey, 54% of respondents indicated that the area 35 feet back from their shoreline contained mowed lawn. Later, the survey asked respondents to describe the current amount of mowed lawn across the entire shoreline of Largon Lake. Two-thirds of respondents described the amount of lawn as just right (62%), one-third of respondents indicated that the amount of lawn was too much (38%), and zero respondents indicated the amount of lawn was not enough.

The survey listed five different landscaping practices designed to reduce nutrient runoff from properties. Respondents were asked to indicate if they are unfamiliar with the practice, familiar with the practice but have not installed it, have already installed the practice, or are planning to install the practice. Practices already implemented by respondents include not fertilizing/using zero phosphorus fertilizer (75%) and native shoreline plantings (47%). A small number of respondents are planning to implement native shoreline plantings (5%) and rain gardens (3%). Around half of respondents were unfamiliar with infiltration pits or trenches (58%), water diversions (44%), and rain gardens (43%).

Survey respondents were asked to provide feedback on what factors would motivate or convince them to install a practice to reduce waterfront runoff on their property. Two-thirds of respondents would be motivated to install a practice to improve the water quality of Largon Lake (69%). Around half of respondents would be motivated by how-to information about landscaping practices for water quality (58%) and no-cost technical assistance that would identify appropriate practices to install (42%). A third of respondents would be motivated by providing better habitat for birds and wildlife (39%), increasing the natural beauty of their property (36%), and financial assistance that pays a portion of the cost of installation (31%).

Survey respondents were asked how they prefer to receive information from the Largon Lakes Protection and Rehabilitation District. Respondents indicated that the preferred method of communication was email (80%), followed by a newsletter (50%), and an annual meeting (30%). Fewer respondents preferred a website (23%) or Facebook (8%).

The survey asked respondents to indicate which actions should be completed by the Largon Lakes Protection and Rehabilitation District to manage the lake. The management options with the greatest support by respondents included: programs to prevent and monitor invasive species (85%), offering incentives for upgrades to non-conforming septic systems (83%), and practices to improve fishing and fish habitat (74%). Two-thirds of respondents supported offering incentives for property owners to install shoreline buffers/rain gardens (64%) and enforcement of slow-no-wake zones (63%). Half of respondents supported offering incentives for farmland conservation practices (53%).

The survey asked respondents which activities they were interested in participating in to improve Largon Lake. Nearly half of respondents were interested in learning how to identify invasive species (44%) and approximately one-third were interested in learning how to monitor for invasive species (36%), learning how to monitor water quality (36%), and monitoring water quality (33%). Additionally, one-third of respondents were interested in installing a shoreline buffer (38%) and rain garden (33%) on their property.

Lake Level and Precipitation Monitoring

Lake water level fluctuations are important to lake managers, lakeshore property owners, developers, and recreational users because they can have significant impacts on lake water quality and recreation. Although lake levels naturally change from year to year, extreme high or low levels can present problems such as restricted water access, flooding, shoreline and structure damage, and changes in near shore vegetation. Records of lake water elevations can be useful in understanding changes that may occur in lakes.

A volunteer monitored lake level and precipitation on Largon Lake in 2021 and 2022. Polk County Land and Water Resources Department provided training and supplies (staff gage and rain gage) for data collection. A staff gage is a long ruler that is placed in a lake and is used to measure water surface elevation. The Polk County Surveyor calibrated the staff gage by referencing the numbered height on the gage to the surveyed elevation of the water when the gage was installed in the spring and prior to removal in the fall. Monitoring began in the spring and continued through fall.

Seasonal precipitation on Largon Lake totaled 14.64 inches in 2021 [5] and 13.94 inches in 2022. [6] Lake level responded to precipitation events, with levels increasing following rainfall events. Lake level in Largon Lake varied 0.98 feet over the two-year sampling period when comparing the highest (May 2022) and lowest elevation (September 2021). In both sampling years, lake level decreased as the season progressed. Volunteers categorized lake level as high, normal, or low throughout the ice off season. Both years began as normal and progressed to low, with the low period beginning earlier in 2022 (June) as compared to 2021 (July).

Wisconsin State Climatology Office data indicate that 2021 began as a period of near normal conditions and ended in severe drought conditions. In 2022, the year began in a severe drought condition and progressed into moderate drought conditions.

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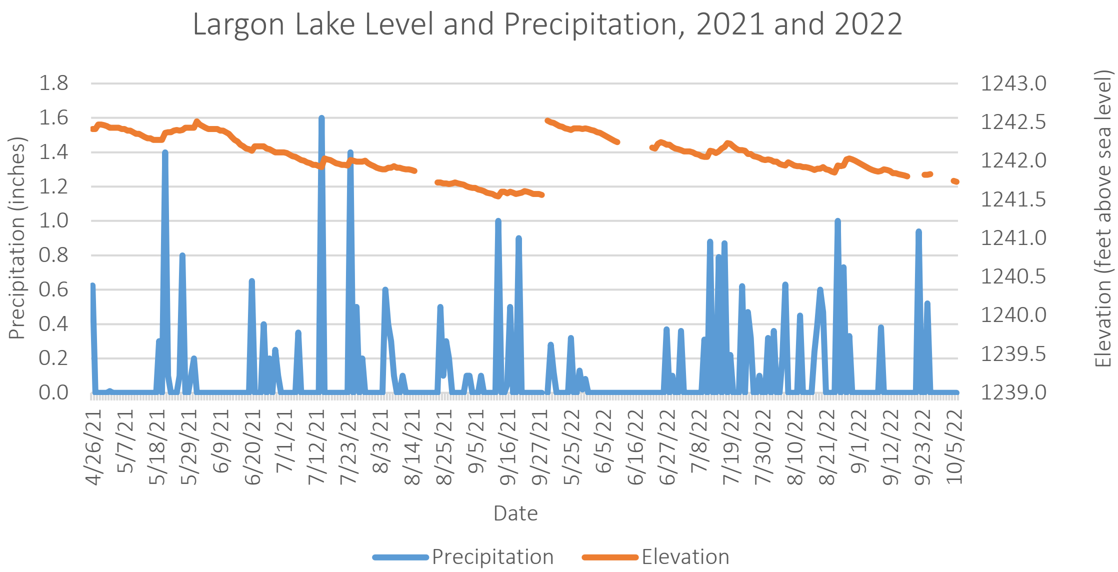
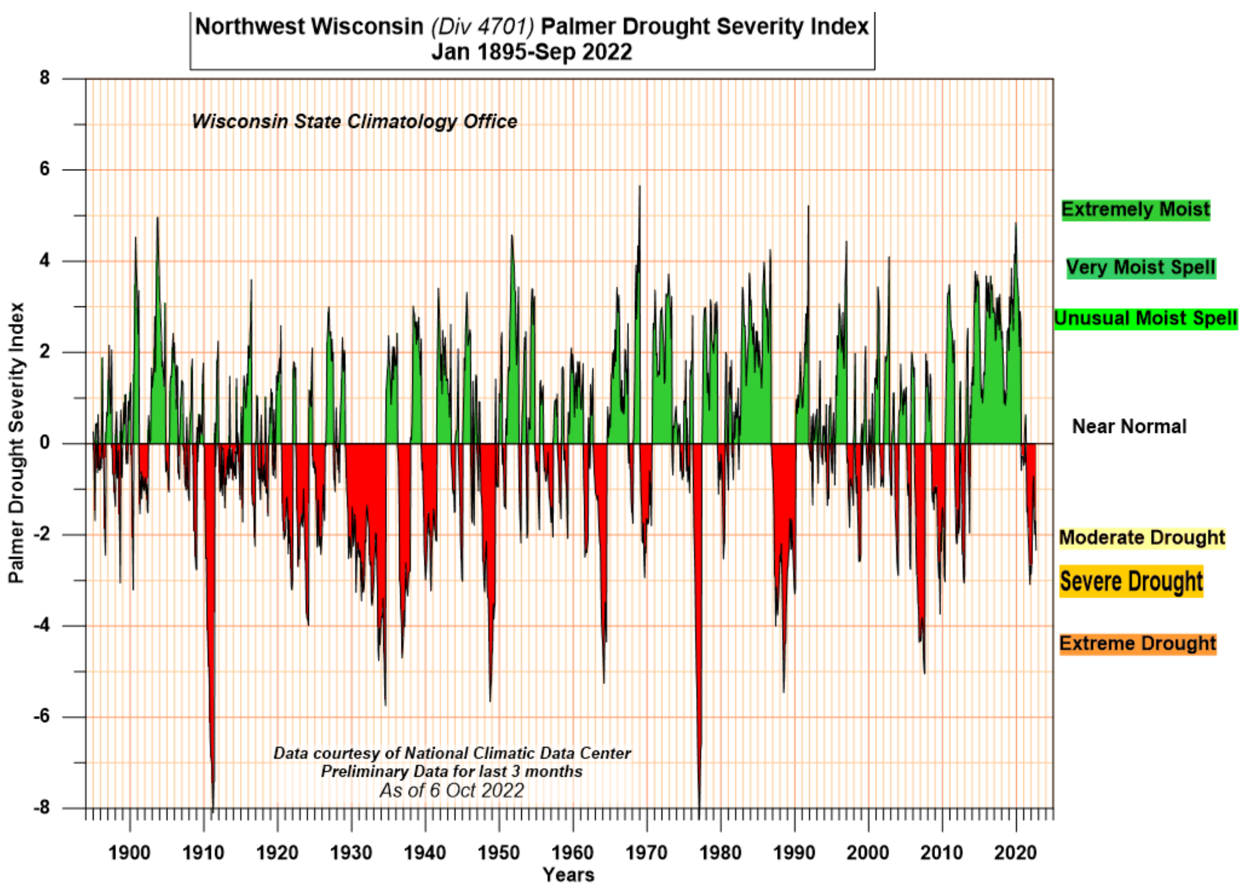
[5] 156 sampling days, April 26th through September 28th.
[6] 142 sampling days, May 17th through October 16th.



Gaps in the elevation line indicate dates where lake level was not collected.



Lake Mixing and Stratification

Water quality is affected by the degree to which water in a lake mixes. Within a lake, mixing is impacted by the temperature-density relationship of water. When comparing why certain lakes mix differently than others, lake area, depth, shape, and position in the landscape become important factors to consider.

Water reaches its greatest density at 3.9^{o}C (39^{o}F) and becomes less dense as temperatures increase or decrease. Compared to other liquids, the temperature-density relationship of water is unusual: liquid water is denser than water in its solid form (ice). As a result, ice floats on liquid water.

After ice melts in the early spring, the surface waters begin to warm until the entire lake reaches a temperature of 3.9 ^{o}C and the temperature and density of water become constant from the top to the bottom of a lake. This uniformity in density allows a lake to completely mix. As a result, oxygen is brought to the bottom of a lake and nutrients are re-suspended from the sediments. This event is termed spring turnover.

In the spring, the surface waters are warmed by the sun. Since warmer water is less dense, the warmer waters remain at the lake's surface until they are mixed deeper into the water column through wind and wave action. However, these forces can only mix water to a depth of approximately twenty to thirty feet. Generally, in a shallow lake, the water may remain mixed all summer. However, a deeper lake usually experiences layering based on temperature differences, called stratification.

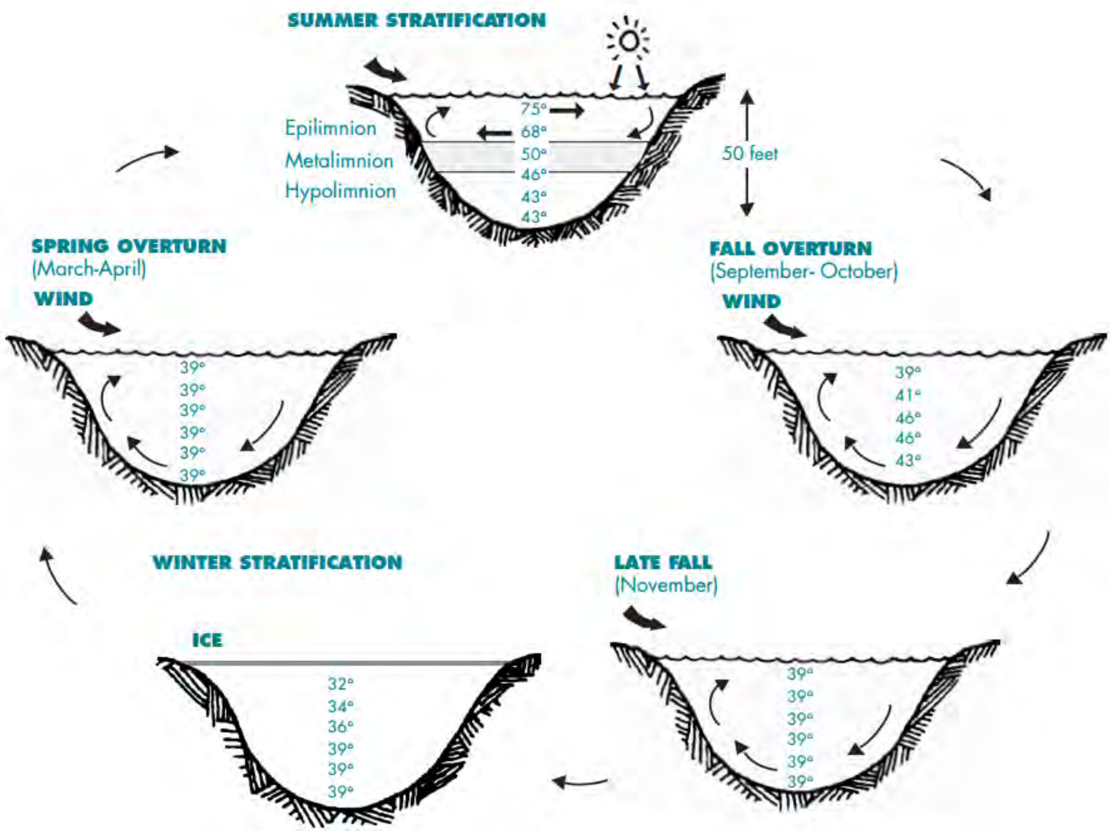
During the summer, lakes have the potential to divide into three distinct zones: the epilimnion, thermocline or metalimnion, and the hypolimnion. The epilimnion describes the warmer surface layer of a lake and the hypolimnion describes the cooler bottom area of a lake. The thermocline, or metalimnion, describes the transition area between the epilimnion and hypolimnion.

As surface waters cool in the fall, they become more dense and sink causing the warmer bottom waters to rise. This mixing continues until the water temperature evens out from top to bottom. This process is called fall turnover and allows for a second annual mixing event to occur. Occasionally, algae blooms can occur at fall turnover when nutrients from the hypolimnion are made available throughout the water column. In winter, surface waters will cool until ice forms. The colder surface waters are less dense and remain at the surface of the lake, resulting in winter stratification. While ice is present, stratification remains constant because ice cover prevents mixing by wind.

Variations in density arising from differences in water temperatures can prevent warmer water from mixing with cooler water. As a result, nutrients released from the sediments can become trapped in the hypolimnion of a lake that stratifies. Additionally, since mixing is one of the main ways oxygen is distributed throughout a lake, lakes that don’t mix have the potential to have low levels of oxygen in the hypolimnion.

If oxygen is available in the hypolimnion, iron binds with phosphorus, making phosphorus unavailable for use by plants and algae. However, when lakes lose oxygen in the winter or when the hypolimnion becomes anoxic in the summer, these particles dissolve and phosphorus is redistributed throughout the water column with strong wind action or turnover events. The redistribution of phosphorus can contribute to algae blooms. The release of phosphorus from lake bottom sediments is termed internal loading.

The absence of oxygen in the hypolimnion can have adverse effects on fisheries. Species of cold-water fish require the cooler waters that result from stratification. Cold water holds more oxygen as compared to warm water. As a result, the cooler waters of the hypolimnion can provide a refuge for cold water fisheries in the summer if oxygen is present. Respiration by plants, animals, and especially bacteria is the primary way oxygen is removed from the hypolimnion. A large algae bloom can cause oxygen depletion in the hypolimnion as algae die, sink, and are consumed by bacteria which utilize oxygen.



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[7] Figure from Understanding Lake Data (G3582), UW-Extension, Byron Shaw, Christine Mechenich, and Lowell Klessig, 2004.

Deep Hole Sampling Procedure

In-lake data was collected by the Polk County Land and Water Resources Department during the 2021 and 2022 growing season. Dissolved oxygen, temperature, conductivity, specific conductance, and pH were recorded at meter increments biweekly with a YSI ProDSS multiparameter digital water quality meter. Secchi depth was recorded by LWRD and a volunteer with the Citizen Lake Monitoring network volunteer in both years of the study. Surface samples were collected once a month with a 2-meter composite sampler and analyzed at the Wisconsin State Laboratory of Hygiene for total phosphorus and chlorophyll a.

Dissolved Oxygen

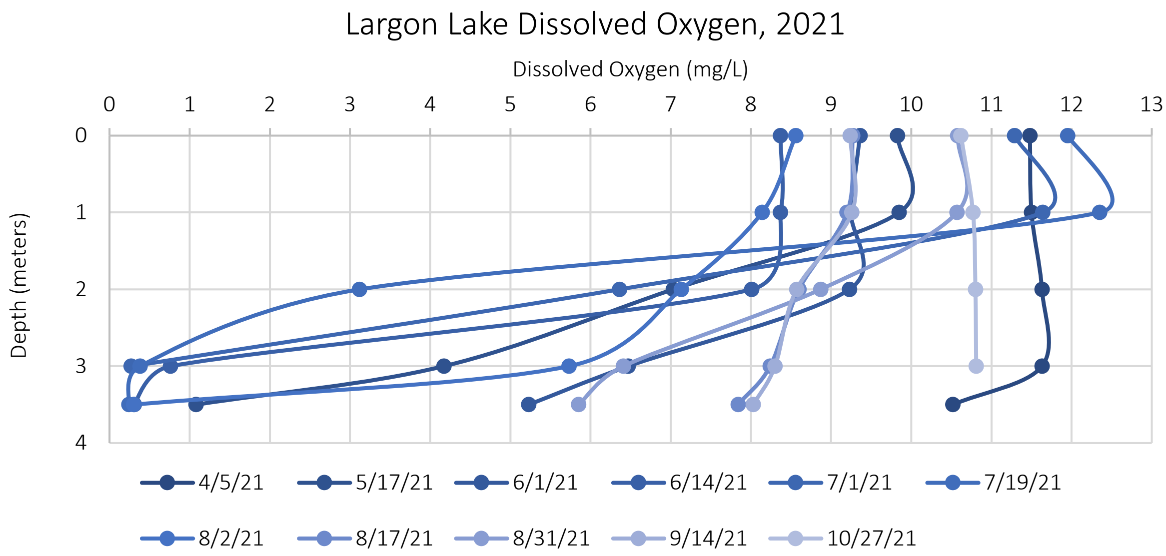
Oxygen is required by aquatic organisms for survival. The amount of oxygen dissolved in water depends on temperature, the amount of wind mixing that brings water into contact with the atmosphere, the biological activity that consumes or produces oxygen within a lake, and the composition of groundwater and surface water entering a lake.

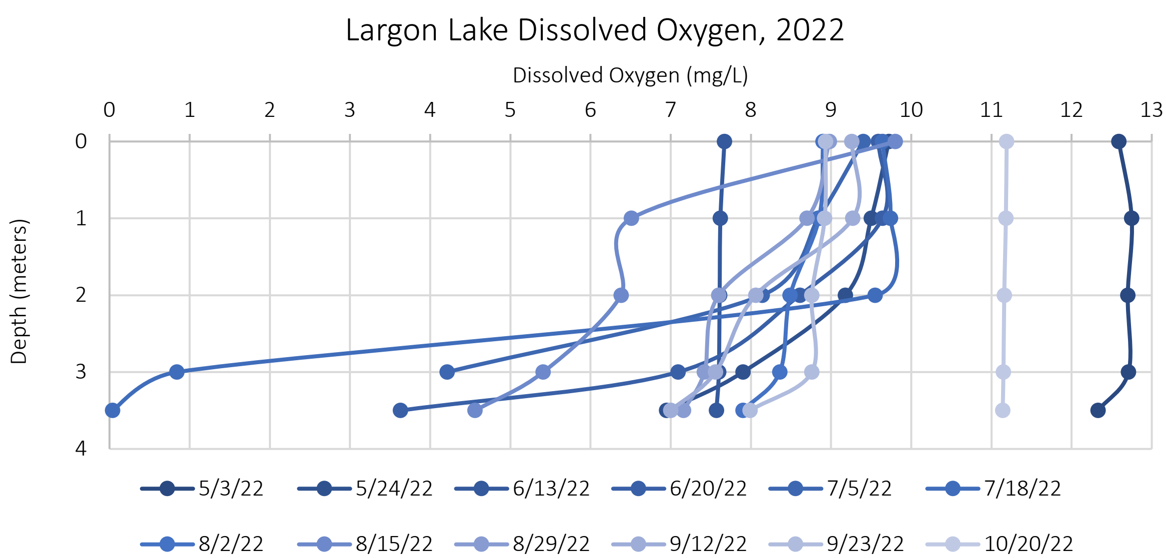
Plants produce oxygen in a process called photosynthesis. Since photosynthesis requires light, oxygen production occurs during the daylight hours at depths where sunlight can reach. During the sunlight hours, dissolved oxygen levels at a lake's surface may be quite high. Conversely, at night or early in the morning, dissolved oxygen values can be expected to be lower. Plants and animals use oxygen in a process called respiration.

It is not uncommon for oxygen depletion to occur in the hypolimnion because mixing is unable to introduce oxygen to greater water depths, oxygen producing photosynthesis is not occurring, and the only reaction occurring is oxygen consuming respiration.

A water quality standard for dissolved oxygen based on the minimum amount of oxygen required by fish for survival and growth in warm water lakes and streams is set at 5 mg/L. For cold water lakes supporting trout, the standard is set even higher at 7 mg/L.

In both years of the study the upper two meters of the water column were well oxygenated and the bottom waters fell below the 5 mg/L standard for fish. In both years of the study, the bottom waters became depleted of oxygen (became anoxic). In 2021, the bottom waters of Largon Lake were below 1 mg/L dissolved oxygen from mid-June through the beginning of August. In 2022, the bottom waters were below 1 mg/L dissolved oxygen in July (second sampling date only).

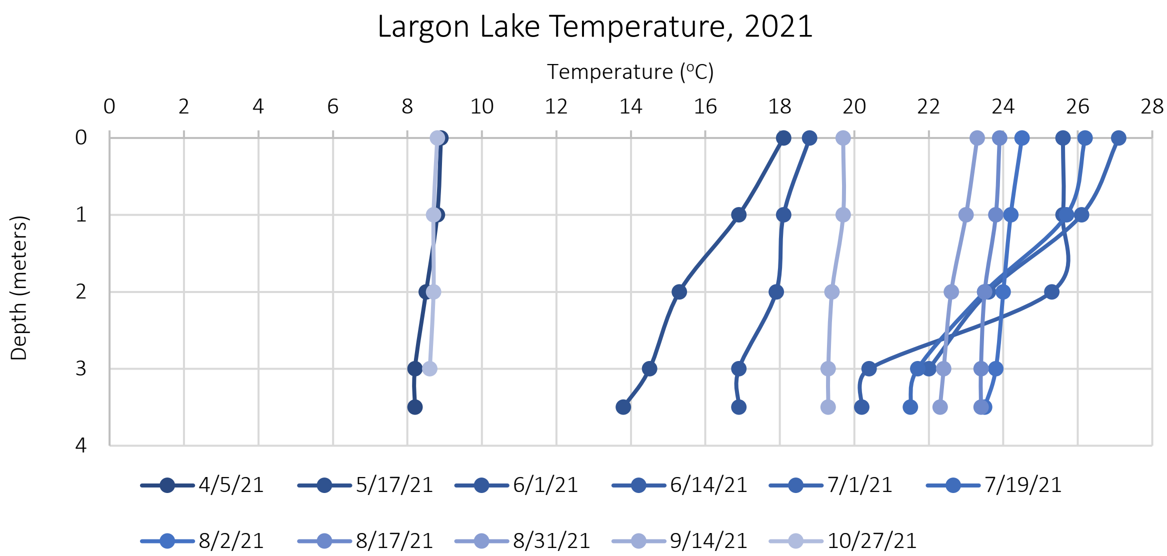

Largon Lake Dissolved Oxygen, 2021
Dissolved Oxygen (mg/L)
0
1
2
3
4
5
6
7
8
9
10
11
12
13
Depth (meters)
0
1
2
3
4
4/5/21
5/17/21
6/1/21
6/14/21
7/1/21
7/19/21
8/2/21
8/17/21
8/31/21
9/14/21
10/27/21

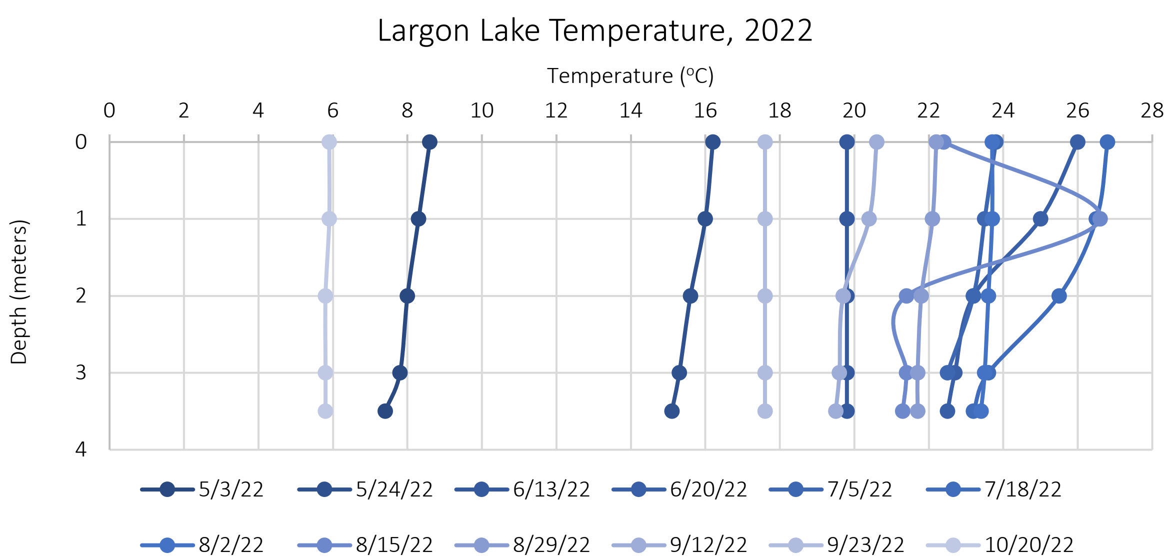

Largon Lake Dissolved Oxygen, 2022
Dissolved Oxygen (mg/L)
0
1
2
3
4
5
6
7
8
9
10
11
12
13
Depth (meters)
0
1
2
3
4
5/3/22
5/24/22
6/13/22
6/20/22
7/5/22
7/18/22
8/2/22
8/15/22
8/29/22
9/12/22
9/23/22
10/20/22

Temperature

Largon Lake remained well mixed during both years of the study and did not stratify (set up density dependent layers).

The surface temperature was greatest in July in both years of the study.



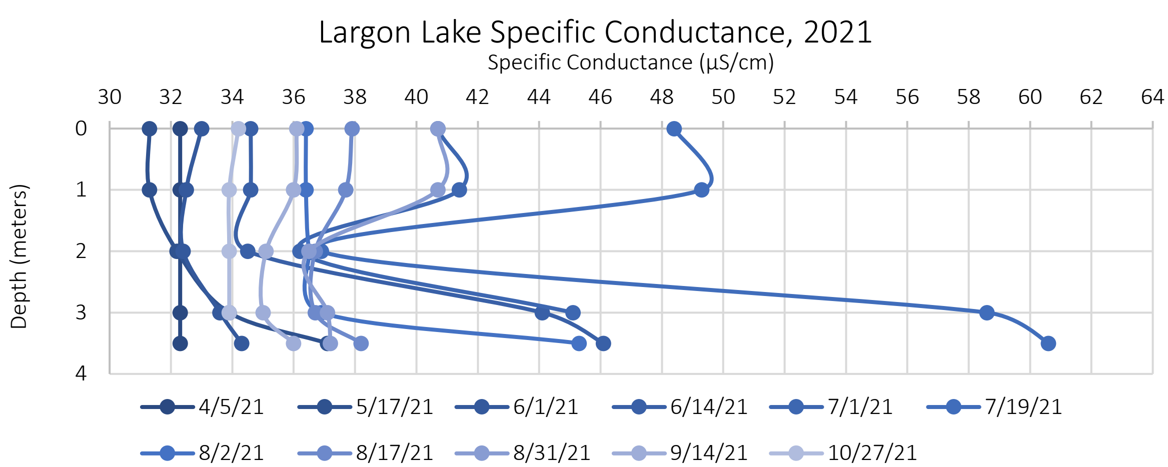


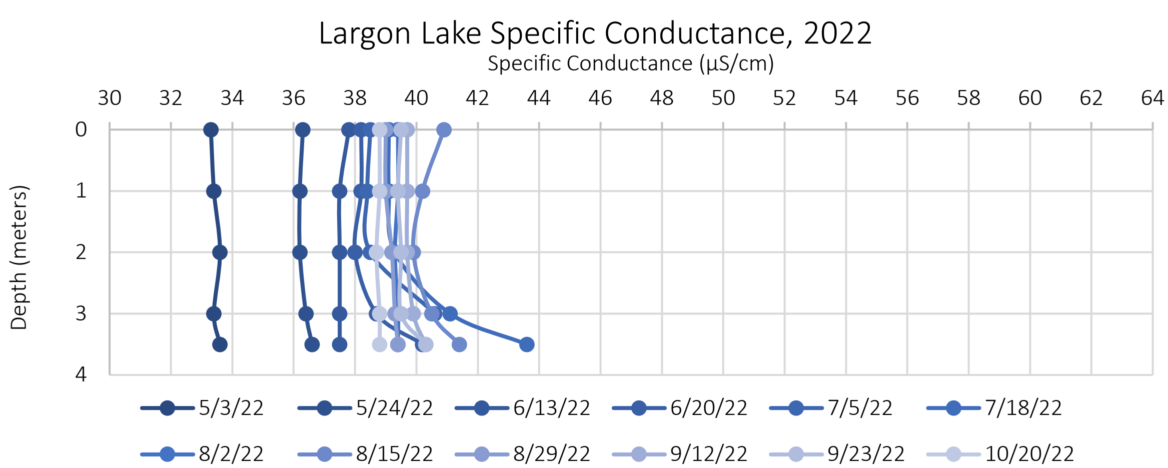
Specific Conductance (Conductivity)

Conductivity measures the ability of water to conduct an electrical current and is an indicator of the concentration of total dissolved inorganic chemicals in the water. Values increase as the concentration of dissolved minerals in a lake increase. Since conductivity is temperature related, values are normalized at 25°C and termed specific conductance.

When watersheds contain easily dissolved carbonate rocks, lakes are more likely to have higher conductivity. Watersheds that contain slow-to-dissolve rocks, such as granite, are more likely to have lower conductivity. Lakes with especially low conductivity are also more likely to be precipitation dominated (rather than groundwater or runoff dominated) because precipitation contains very little dissolved minerals.

Specific conductance values at the surface of Largon Lake were low, ranging between 31 and 41 µS/cm.



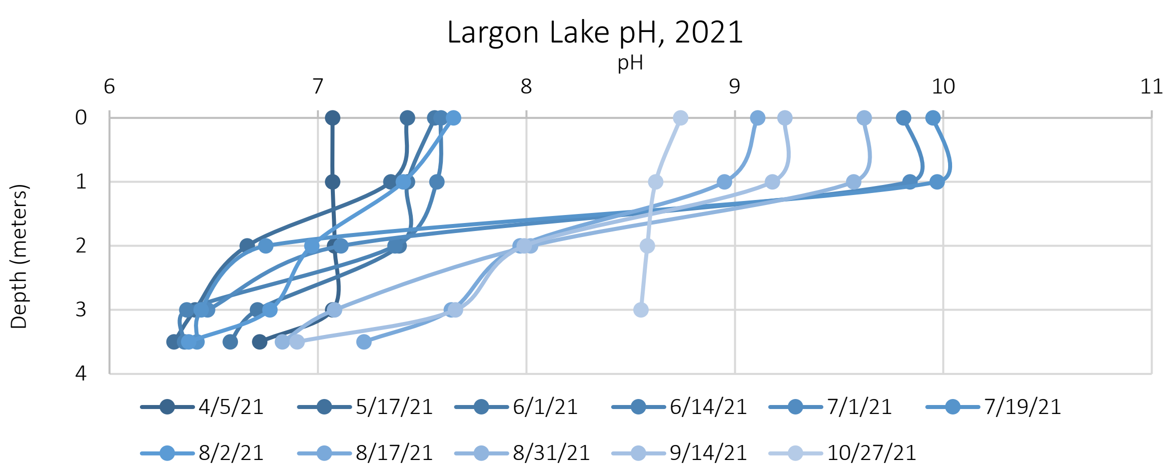


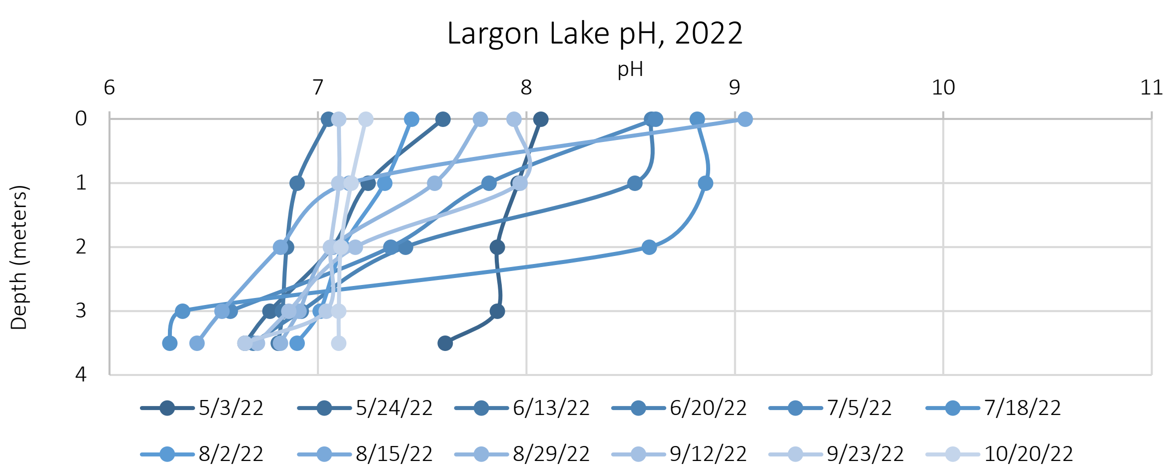
pH

The pH is an indicator of acidity, with a value of seven being neutral. Values less than seven indicate acidic conditions and values greater than seven indicate alkaline conditions. A single pH unit change represents a tenfold change in acidity. For example, a lake with a pH of eight is ten times less acidic than a lake with a pH of seven. Across Wisconsin lakes, pH can range from 4.5 (acid bog lakes) to 8.4 (hard water, marl lakes).

Photosynthesis removes carbon dioxide from the water column which increases pH. As a result, pH generally increases during the day and decreases at night. Dense algae blooms can also cause pH levels to increase.

In both years of the study surface pH on Largon Lake was between 7 and 10. Values for pH were the greatest in July and August. Values for pH were higher at the surface as compared to the bottom of the lake and in 2021 as compared to 2022.



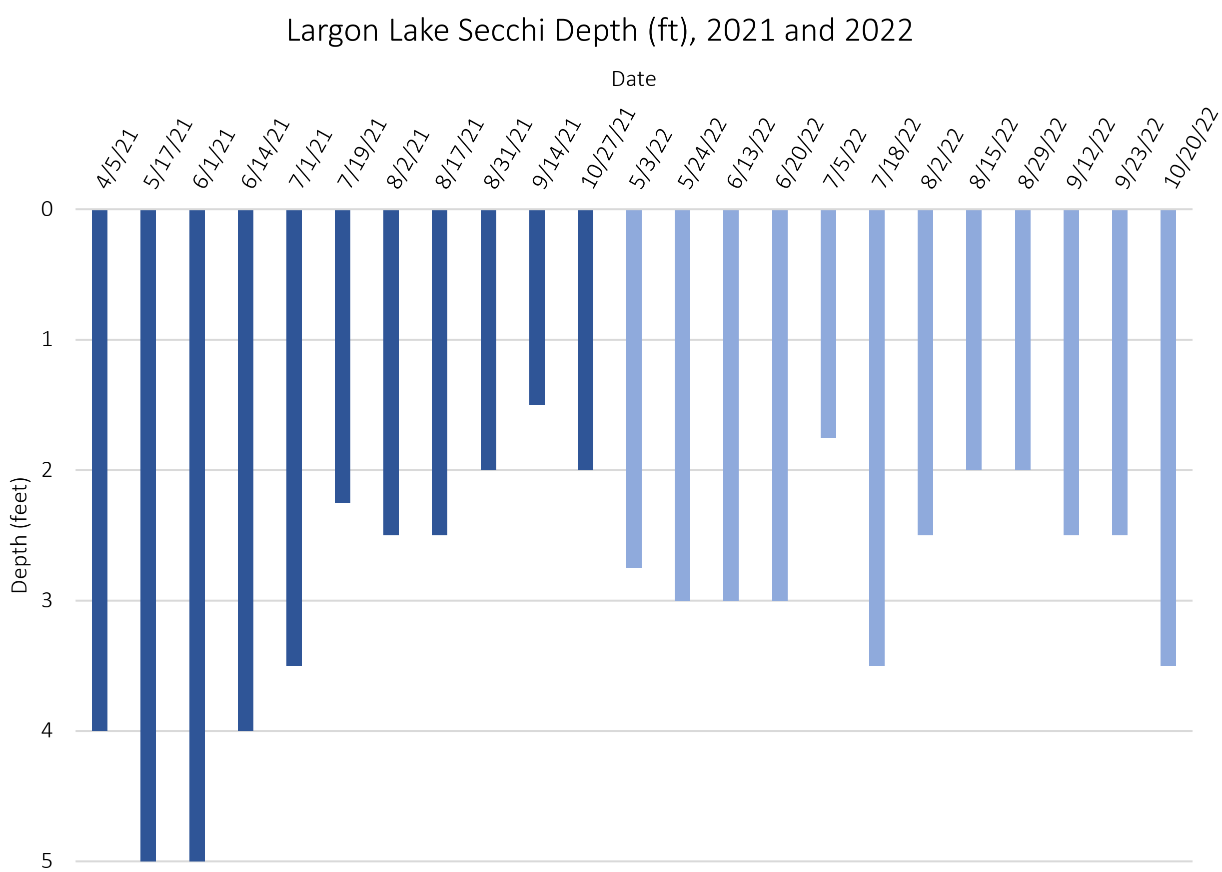


Secchi Depth

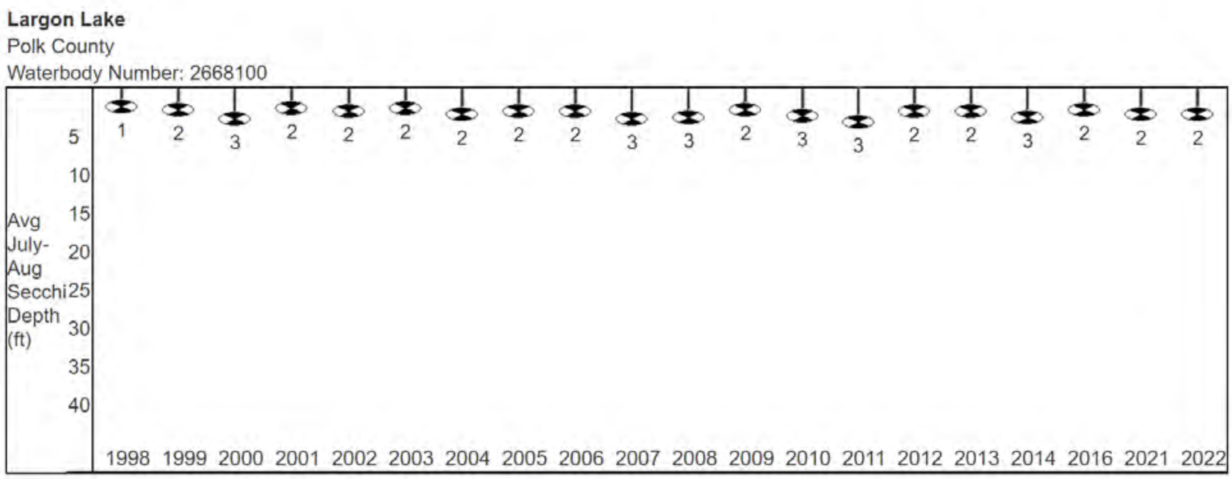
The depth light penetrates lakes is affected by suspended particles, dissolved pigments, and absorbance by water. Often the ability of light to penetrate the water column is determined by the abundance of algae or other photosynthetic organisms in a lake.

One method of measuring light penetration is with a secchi disk. A secchi disk is an eight-inch diameter round disk with alternating black and white quadrants that is used to provide an estimate of water clarity. The depth at which the secchi disk is just visible is defined as the secchi depth. A greater secchi depth indicates greater water clarity.

Secchi depth values on Largon Lake ranged from a low of 1.5 feet to a high of 5 feet over the course of this study. Growing season average (May-September) secchi depth was 3.1 feet in 2021 and 2.6 feet in 2022. Summer index period average (July 15-September 15) secchi depth was 2.2 feet in 2021 and 2.5 feet in 2022.



The Wisconsin Department of Natural Resources website provides historic secchi depth averages for the months of July and August. This data exists for Largon Lake for 1998-2014, 2016, and 2021-2022. During this time frame, secchi depth has ranged from 1 to 3 feet. When considering the 20 years where secchi depth data exists, the average July-August secchi depth was 3 feet in 30% of the years, 2 feet in 65% of the years, and 1 foot in 5% of the years.



Past secchi averages in feet (July and August only).

The average summer secchi depth (July and August) for the Northwest geo-region was 8.9 feet in 2021 and 9 feet in 2022. In each year of this study, secchi depth on Largon Lake was well below the geo-region average (2.4 feet in both 2021 and 2022).

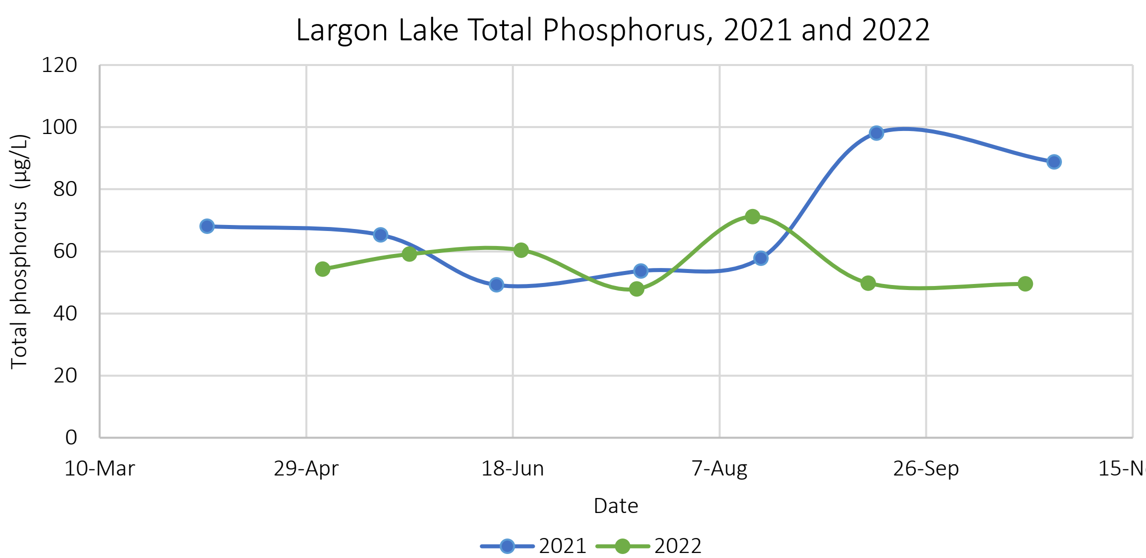
Phosphorus

Phosphorus is an element present in lakes which is necessary for plant and algae growth. It occurs naturally in soil and rocks and in the atmosphere in the form of dust. Phosphorus can make its way into lakes through groundwater and human induced disturbances such as soil erosion. Additional sources of phosphorus inputs into a lake can include external sources such as fertilizer runoff from urban and agricultural settings and internal sources such as release from sediment at the bottom of a lake. Excessive amounts of phosphorus can lead to an overabundance of algae growth which can decrease water clarity in lakes.

Total phosphorus is a measure of all the phosphorus in a sample of water. In many cases total phosphorus is the preferred indicator of a lake's nutrient status because it remains more stable than other forms over an annual cycle. In lakes, a healthy limit of total phosphorus is set at 20 µg/L. If a value is above the healthy limit, it is more likely that a lake could support nuisance algae blooms. On all sampling dates, phosphorus was above the healthy limit on Largon Lake.

Total phosphorus was analyzed at the surface (top 2 meters) of Largon Lake. Growing season average (May-September) surface total phosphorus was 65 µg/L in 2021 and 58 µg/L in 2022. Summer index period average (July 15-September 15) surface phosphorus was 70 µg/L in 2021 and 56 µg/L in 2022.

Largon Lake is on the Impaired Waters List because average total phosphorus is greater than or equal to 40 µg/L from June 1st to September 15th (65 µg/L in 2021 and 57 µg/L in 2022).



Chlorophyll a

Chlorophyll a is a pigment in plants and algae that is necessary for photosynthesis and is an indicator of water quality in a lake. Chlorophyll a gives a general indication of the amount of algae growth in a lake, with greater values for chlorophyll a indicating greater amounts of algae. However, since chlorophyll a is present in sources other than algae—such as decaying plants— it does not serve as a direct indicator of algae biomass.

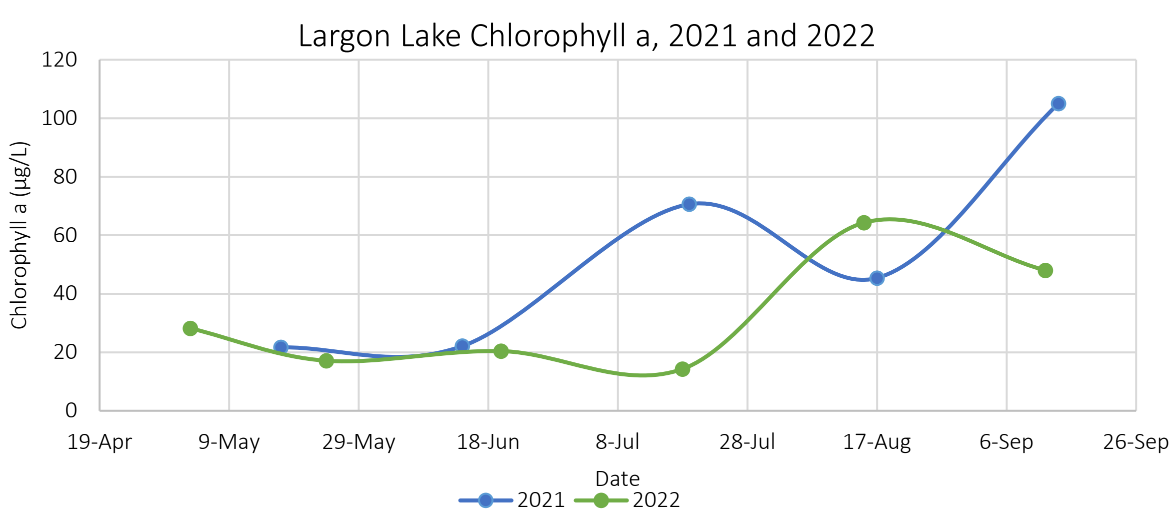
Chlorophyll a seems to have the greatest impact on water clarity when levels exceed 30 µg/L. Lakes which appear clear generally have chlorophyll a levels less than 15 µg/L.

Growing season average (May-September) chlorophyll a on Largon Lake was 53 µg/L in 2021 and 33 µg/L in 2022. Summer index period average (July 15th to September 15th) chlorophyll a on Largon Lake was 74 µg/L in 2021 and 42 µg/L in 2022.

Largon Lake is on the Impaired Waters List for recreational use for chlorophyll a because greater than 30% of the days in the sampling season (July 15th to September 15th) have moderate algae blooms, or chlorophyll a levels greater than 20 µg/L (100% of sampling days in 2021 and 67% of sampling days in 2022).

Largon Lake is on the Impaired Waters List for aquatic life use for chlorophyll a because average summer index period (July 15th to September 15th) chlorophyll a is greater than or equal to 27 µg/L (74 µg/L in 2021 and 42 µg/L in 2022).

Chlorophyll a values were greater in 2021 as compared to 2022. In 2021, values were below 30 µg/L in May and June. In 2022 values remained below 30 µg/L through July.



Trophic State Index

Lakes are divided into three categories based on their trophic states: oligotrophic, eutrophic, and mesotrophic. These categories reflect a lake's nutrient and clarity level and serve as an indicator of water quality. Each category is designed to serve as an overall interpretation of a lake's primary productivity.

Oligotrophic lakes are generally clear, deep, and free of weeds and large algae blooms. These types of lakes are often low in nutrients and are unable to support large populations of fish. However, oligotrophic lakes can develop a food chain capable of supporting a desirable population of large game fish.

Eutrophic lakes are generally high in nutrients and support many plants and animals. They are usually very productive and subject to frequent algae blooms. Eutrophic lakes often support large fish populations but are susceptible to oxygen depletion.

Mesotrophic lakes lie between oligotrophic and eutrophic lakes. They usually have good fisheries and occasional algae blooms.

All lakes experience a natural aging process which causes a change from an oligotrophic to a eutrophic state. Human influences that introduce nutrients into a lake (agriculture, lawn fertilizers, and septic systems) can accelerate the process by which lakes age and become eutrophic.

[8]

A common method of determining a lake's trophic state is to compare total phosphorus (important for algae growth), chlorophyll a (an indicator of the amount of algae present), and secchi disk readings (an indicator of water clarity). Although many factors influence

[8] Figure from Understanding Lake Data (G3582), UW-Extension, Byron Shaw, Christine Mechenich, and Lowell Klessig, 2004.

these relationships, the link between total phosphorus, chlorophyll a, and secchi disk readings is the basis of comparison for the trophic state index (TSI).

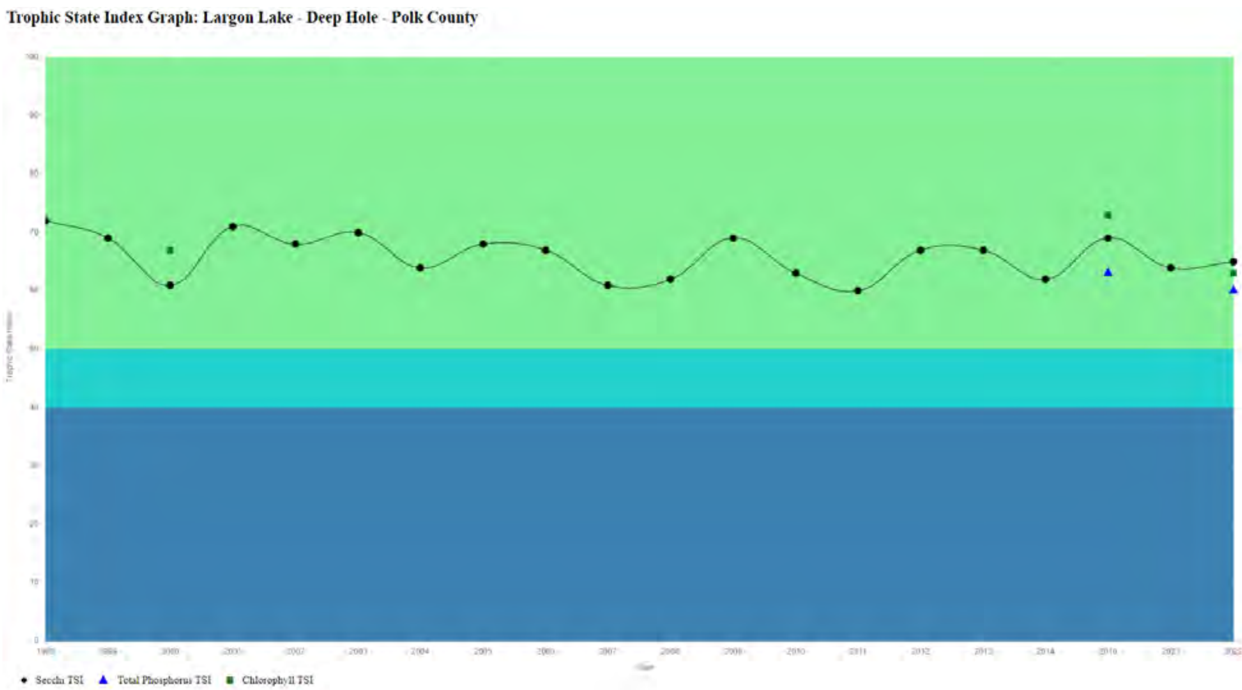
TSI values range from 0 to 110. Lakes with the lowest numbers are oligotrophic and lakes with the highest values are eutrophic. Three equations for summer index period TSI were examined for Largon Lake. [9]

Average Summer Index Period Trophic State Index, 2021 and 2022 respectively
Total phosphorus = 65 and 62
Chlorophyll a = 73 and 67
Secchi depth = 66 and 64
Trophic State Index = 68 and 65 = eutrophic and eutrophic

TSI	General Description
<30	**Oligotrophic** clear water, high dissolved oxygen throughout the year/lake
30-40	**Oligotrophic** clear water, possible periods of oxygen depletion in the lower depths of the lake
40-50	**Mesotrophic** moderately clear water, increasing chance of anoxia near the bottom of the lake in summer, fully acceptable for all recreation/aesthetic uses
50-60	**Mildly eutrophic** decreased water clarity, anoxic near the bottom, may have macrophyte problem, warm-water fisheries only
60-70	**Eutrophic** blue-green algae dominance, scums possible, prolific aquatic plant growth, full body recreation may be decreased
70-80	**Hypereutrophic** heavy algal blooms possible throughout the summer, dense algae and macrophytes
>80	Algal scums, summer fish kills, few aquatic plants due to algal shading, rough fish dominate

[9] TSI (P) = 14.42 * Ln [TP] + 4.15 (where total phosphorus is in µg/L)
TSI (C) = 30.6 + 9.81 Ln [Chlor-a] (where chlorophyll a is in µg/L)
TSI (S) = 60-14.41 * Ln [Secchi] (where secchi depth is in meters)

Monitoring the trophic state index of a lake gives stakeholders a method to gauge lake productivity over time. TSI data exists for Largon Lake for secchi depth for 1998-2014, 2016, and 2021-2022; for chlorophyll a for 2000, 2016, and 2021-2022; and for total phosphorus for 2016 and 2021-2022. The historic data indicates that Largon Lake is eutrophic.



Algae

Algae, also called phytoplankton, convert sunlight and nutrients into biomass and form the base of the food chain. Algae are consumed by zooplankton which are, in turn, eaten by fish. Algae can live on bottom sediments, in the water column, and on plants.

The types of algae present in a lake will change over the course of a year and are influenced by many environmental factors (climate, nutrients, silica, substrate, etc.). Typically, there is less algae in winter and spring because of ice cover and cold temperatures. As a lake warms up and sunlight increases, algae communities begin to increase. Additionally, as nutrient levels increase the number of algae present in a lake also increase. When high levels of nutrients are available, blue green algae often become predominant and create light limited conditions for other groups of algae and plants.

Blue green algae are a group of photosynthetic bacteria that are most often responsible for creating scum layers or surface mats that can cause negative aesthetics, including smell. Blue green algae are of specific concern because of their ability to produce toxins that when ingested or inhaled can cause short and long term health effects.

To quantify the presence of algae blooms in Largon Lake, a volunteer recorded perception of water color and water appearance using the CLMN protocols for perception ranging from 1 (beautiful, could not be nicer) to 5 (swimming and aesthetic enjoyment of lake substantially reduced because of algae levels). [10]

In 2021, Largon Lake received a perception rating of 5 on twenty days in July and six days in September. In 2022, a perception rating of 5 began in mid-August and persisted through the end of September.

[10] Beautiful, could not be nicer (1), very minor aesthetic problems, excellent for swimming and boating (2), swimming and aesthetic enjoyment of lake slightly impaired (3), desire to swim and level of enjoyment of lake substantially reduced because of algae i.e. would not swim, but boating is okay (4), and swimming and aesthetic enjoyment of lake substantially reduced because of algae levels (5).

Fisheries

In 2021 a comprehensive fisheries study was completed to estimate the Northern Pike population in Largon Lake. Previous surveys were completed in 1998 and 2003. In the winter of 2013-2014 there was a severe fish kill due to malfunctions with the aeration system.

Fyke netting was completed between March 30th and April 2nd, 2021. Fish caught in the net were weighed, sexed, and given a mark to indicate capture. Fish were aged by removing a portion of the pelvic fin ray and examining it under a microscope.

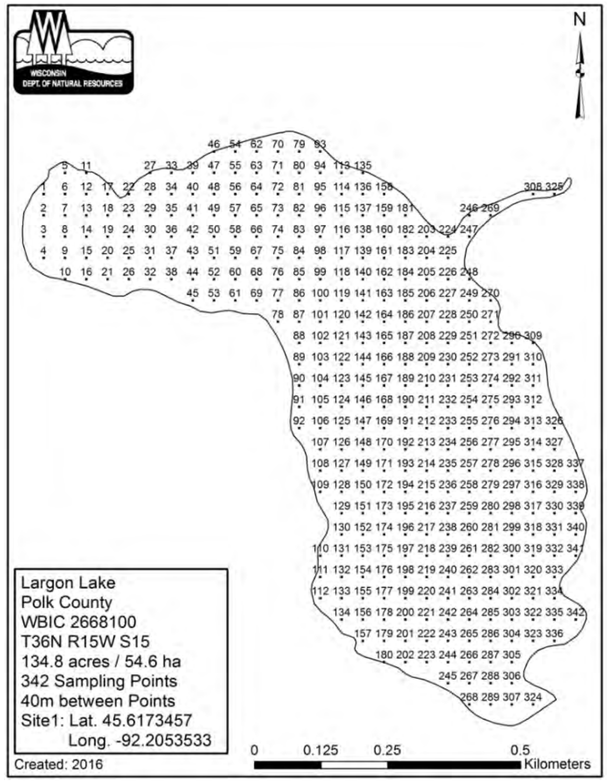
In 2021 the adult Northern Pike population was estimated as 10.9 fish/acre with a total of 721 fish collected. These results are similar to the population estimates completed prior to the winterkill (7.8 fish per acre in 2003 and 14.2 fish/acre in 1998). The catch per unit effort was 34.3 fish per net night which was above the 99th percentile (25.7 fish/net night) for similar lakes in Wisconsin. This is indicative of a high-density population.

The average Northern Pike length was 19.5 inches, which is near the 90th percentile (19.3) for similar lakes in Wisconsin. Males ranged from 15 to 28.5 inches and females ranged from 18 to 38.5 inches, with a male to female ratio of 3:1. The Northern Pike population relative length frequencies were not statistically different between 2003 and 2021, but the relative abundance of the largest individuals has decreased. The decrease in size structure is likely attributed to the 2013-2014 winterkill. However, the overall size structure remained good.

The age of Northern Pike in Largon Lake ranged from 2 to 9 years old, with females ranging from 3 to 9 years old and males ranging from 2 to 7 years old. The average length of Northern Pike at each age class is greater than the median for similar lakes in Wisconsin and is similar to the Polk/Barron County average.

The entire 2021 comprehensive fisheries study to estimate the Northern Pike population on Largon Lake can be found in Appendix G.

Aquatic Plant Surveys

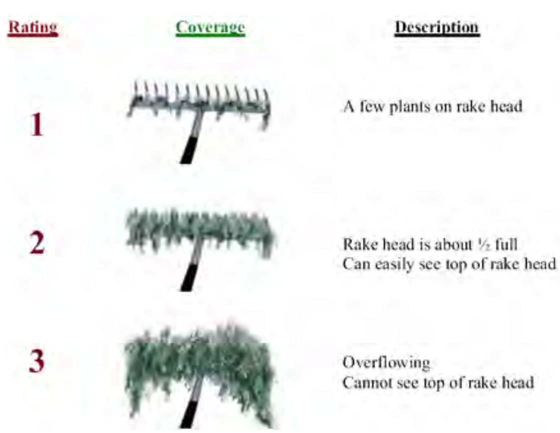


Full point intercept aquatic plant surveys were conducted on Largon Lake on June 22nd and August 17th, 2021 using the Jessen and Lound Rake Method. A previous survey was completed on July 13th, 2016.

Three hundred and forty-two sampling points were established in Largon Lake by the Wisconsin Department of Natural Resources using a standard formula that considers the shoreline shape and length, water clarity, depth, and total lake acres. Sampling points were generated in ArcMap and downloaded to a GPS unit.

The GPS unit was used to locate each sampling point in the field. At each sampling point a depth finder was used to determine depth and a pole or rope rake was used to sample the plant community of an approximately one-meter section of the lake bottom.

All plants on the rake, as well as any that were dislodged by the rake, were identified and assigned a rake fullness value of 1 to 3 to estimate abundance. Visual sightings of plants within six feet of the sample point were also recorded. The lake bottom substrate was assigned at each sampling point where the bottom was visible or reliably determined using the rake.



Data was collected at each sampling point, except for those that were too shallow (inaccessible by boat) or terrestrial. Although three hundred and forty-two sampling points were established in Largon Lake, it was only possible to sample three hundred and forty points during the spring survey and three hundred thirty-nine points during both the fall survey and 2016 survey.

Data collected was entered into a standard spreadsheet for analysis. The following analyses were generated from the spreadsheet:

- Maximum depth of plants
- Sample points with vegetation
- Species richness
- Number of species per site
- Number of sites where each species was found
- Average rake fullness
- Frequency of occurrence
- Relative frequency
- Simpson's Diversity Index
- Floristic Quality Index

The following are explanations of the various analyses for the spring and fall 2021 surveys, including comparisons with the 2016 survey.

<u>Maximum depth of plants</u>

All lakes have a maximum depth at which plants are present. Typically, clearer lakes have a greater depth at which plants can exist since sunlight can reach to greater depths. In Largon Lake, the maximum depth of plants was 7 feet in the spring survey and 6 feet in the fall survey. This is compared with a maximum depth of 7 feet in July 2016.

<u>Sample points with vegetation</u>

This value shows the number of sites where plants were collected and gives an approximation of the plant coverage of a lake.

Thirty-five sample sites had plants present in the 2021 surveys, indicating that plant growth covered approximately 10% of the lake. In 2016, fifty-three sites had plants present in July, indicating plant growth covered 15% of the lake.

Since plant growth is dependent on light penetration, plant coverage can also be approximated based on where in the lake plants can grow (maximum depth of plants). In June plant growth covered 27% of the area of the lake where plants can grow compared to 30% in August. These values are lower compared to 2016, when plant growth covered 47% of the area where plants can grow.

<u>Species richness</u>

Species richness is a measure of the number of different species found in a lake. Including visuals, fourteen species were located in Largon Lake in the spring and fall survey and sixteen were found in the 2016 survey. [11]

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[11] Fourteen species were on the rake head during the spring survey, nine were on the rake head during the fall survey, and thirteen were on the rake head during the 2016 survey.

Number of species per site

At the sites where plants were found, an average of 2.1 species were present in the spring survey and 1.7 species were present in the fall survey. These values are greater when compared to 2016, when on average 1.2 species were present at each site where plants were found.

The average number of species present where plants could potentially grow (maximum depth of plants) was 0.58 species in the spring survey, 0.49 in the fall survey, and 0.57 in 2016.

Number of sites where each species was found

The most common species in Largon Lake in 2021 were white water lily, watershield, and spiny hornwort. In 2016, the most common species were nitella, white water lily, and floating leaf pondweed.

Number of sites where each species was found (not including visuals)			
Species	July 2016	Spring 2021	Fall 2021
Brasenia schreberi, Watershield	6	17	15
Ceratophyllum demersum, Coontail	5	14	13
Eleocharis acicularis, Needle spikerush	2		
Elodea nuttallii, Slender waterweed		1	1
Lemna minor, Small duckweed		1	
Najas gracillima, Northern naiad			1
Nitella sp., Nitella	22	5	
Nuphar variegata, Spatterdock	3	1	2
Nymphaea odorata, White water lily	10	20	21
Pontederia cordata, Pickerelweed		1	
Potamogeton amplifolius, Large-leaf pondweed	1		
Potamogeton epihydrus, Ribbon-leaf pondweed	2		
Potamogeton natans, Floating-leaf pondweed	8	6	3
Potamogeton pusillus, Small pondweed		1	
Sagittaria sp., Arrowhead	2	3	
Schoenoplectus tabernaemontani, Softstem bulrush	1		
Sparganium sp., Bur-reed	1		
Spirodela polyrhiza, Large duckweed		1	
Utricularia vulgaris, Common bladderwort		2	1
Vallisneria americana, Wild celery	1	1	1

Average rake fullness

Average rake fullness was 1.5 in the spring survey and 1.4 in the fall survey. These values are lower than in 2016, when the average rake fullness was 1.9.

Frequency of occurrence

Two values are computed for frequency of occurrence: the frequency of occurrence within vegetated areas and the frequency of occurrence at sites shallower than the maximum depth of plants.[12] In both instances, the greater the value, the more frequently the plant was encountered in the lake.

In the spring 2021 survey, white water lily occurred at 57% of the sites with vegetation and 16% of the sites where plants could potentially grow. Other frequent species were watershield (49% and 13%), and spiny hornwort (40% and 11%).

In the fall 2021 survey, white water lily occurred at 60% of the sites with vegetation and 18% of the sites where plants could potentially grow. Other frequent species were watershield (43% and 13%) and spiny hornwort (37% and 11%).

In 2016, nitella occurred at 42% of the sites with vegetation and 19% of sites where plants could potentially grow. Other frequent species were white water lily (19% and 9%) and floating leaf pondweed (15% and 7%).

Relative frequency

Relative frequency is the frequency of a particular plant species relative to other plant species. Relative frequency can be used to show which plants are the dominant species in a lake. The higher the value a species has for relative frequency, the more common the species is compared to others. The relative frequency of all plants will always add up to 100%. If species A has a relative frequency of 30%, this species occurred 30% of the time compared to all the species sampled or makes up 30% of all species sampled.

The most dominant plants in Largon Lake in the spring and fall surveys as indicated by relative frequency were white water lily (27% and 36%), watershield (23% and 26%), and

[12] Frequency of occurrence within vegetated areas is defined as the number of times a species was sampled in a vegetated area divided by the total number of vegetated sites. This value shows how often the plant would be encountered everywhere vegetation was found in the lake. Frequency of occurrence at sites shallower than the maximum depth of plants is defined as the number of times a species was sampled divided by the total number of sites shallower than the maximum depth of plants. This value shows how often the plant would be encountered within the depths plants can potentially grow.

spiny hornwort (19% and 22%). In the fall 2016 survey, relative frequency was greatest for nitella (34%), white water lily (16%), and floating leaf pondweed (13%).

Relative frequency (%)			
Species	July 2016	Spring 2021	Fall 2021
Brasenia schreberi, Watershield	9.4%	23.0%	25.9%
Ceratophyllum demersum, Coontail	7.8%	18.9%	22.4%
Eleocharis acicularis, Needle spikerush	3.1%		
Elodea nuttallii, Slender waterweed		1.4%	1.7%
Lemna minor, Small duckweed		1.4%	
Najas gracillima, Northern naiad			1.7%
Nitella sp., Nitella	34.4%	6.8%	
Nuphar variegata, Spatterdock	4.7%	1.4%	3.4%
Nymphaea odorata, White water lily	15.6%	27.0%	36.2%
Pontederia cordata, Pickerelweed		1.4%	
Potamogeton amplifolius, Large-leaf pondweed	1.6%		
Potamogeton epihydrus, Ribbon-leaf pondweed	3.1%		
Potamogeton natans, Floating-leaf pondweed	12.5%	8.1%	5.2%
Potamogeton pusillus, Small pondweed		1.4%	
Sagittaria sp., Arrowhead	3.1%	4.1%	
Schoenoplectus tabernaemontani, Softstem bulrush	1.6%		
Sparganium sp., Bur-reed	1.6%		
Spirodela polyrhiza, Large duckweed		1.4%	
Utricularia vulgaris, Common bladderwort		2.7%	1.7%
Vallisneria americana, Wild celery	1.6%	1.4%	1.7%

Simpson's Diversity Index

Simpson's Diversity Index [13] is used to determine how diverse a plant community in a lake is by measuring the probability that two individuals randomly selected from a sample will belong to the same species. The Simpson's Diversity Index ranges from zero to one, with greater values representing more diverse plant communities. The Simpson's Diversity Index was 0.82 during the spring survey and 0.75 during the fall survey. In 2016, the Simpson's Diversity Index was 0.82.

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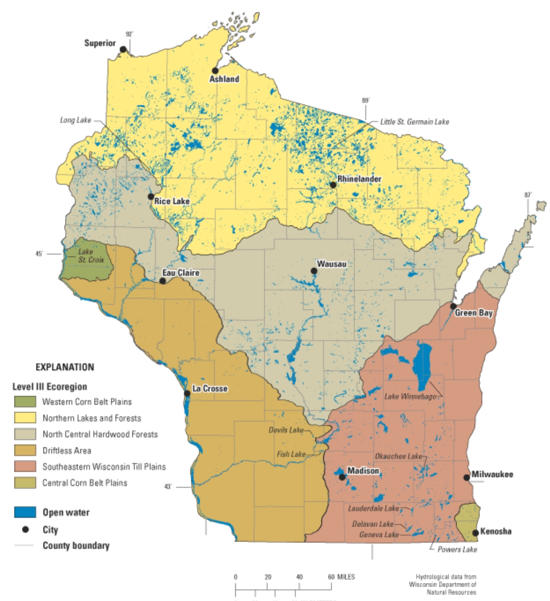
[13] Simpson's Diversity Index can be calculated by using the equation: $D = \frac{\sum n(n-1)}{N(N-1)}$
Where: D = Simpson's Diversity Index; n= the total number of organisms of a particular species; and N=the total number of organisms of all species.

Floristic Quality Index

The Floristic Quality Index (FQI)[14] is designed to evaluate the closeness of the flora in an area to that of an undisturbed condition. The FQI considers the species of aquatic plants found (species richness) and their tolerance for changing water quality and habitat modification (conservatism value). Each plant species has an assigned coefficient of conservatism ranging from 1 to 10. A high value indicates a plant is intolerant of change and a low value indicates a plant is tolerant of change. Plants with higher values are more likely to respond adversely to water quality and habitat changes. Invasive species have a conservatism value of 0. A higher FQI indicates a healthier plant community.

The FQI can be compared from year to year to determine if changes in the plant community are occurring. Since an extensive dataset does not exist for Largon Lake it is also useful to compare the values for Largon Lake with the values for the North Central Hardwood Forest (NCHF) region which Largon Lake is located in.



<u>NCHF FQI:</u>
Mean species richness = 14
Mean average conservatism = 5.6
Mean Floristic Quality = 20.9

<u>Largon Lake FQI (spring 2021, fall 2021, and fall 2016):</u>
Mean species richness = 11, 9, and 11
Mean average conservatism = 5.7, 6.7, and 5.7
Mean Floristic Quality = 19, 20, and 19

The mean species richness and Floristic Quality for Largon Lake is lower than the value for the NCHF and the mean average conservatism is greater for Largon Lake as compared to the value for the NCHF. Although Largon Lake has fewer species when compared to the NCHF, the species present in the lake have a higher mean value of conservatism (indicating an intolerance to change) when compared to the NCHF.

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[14] The Floristic Quality Index can be calculated using the equation: $I = \overline{C}\sqrt{N}$
Where: I is the Floristic Quality Index; $\overline{C}$ is the average coefficient of conservation (http://www.botany.wisc.edu/wisflora/FloristicR.asp); and $\sqrt{N}$ is the square root of the number of species.

Aquatic Invasive Species

Two invasive species are present in Largon Lake: Chinese and banded mystery snails.

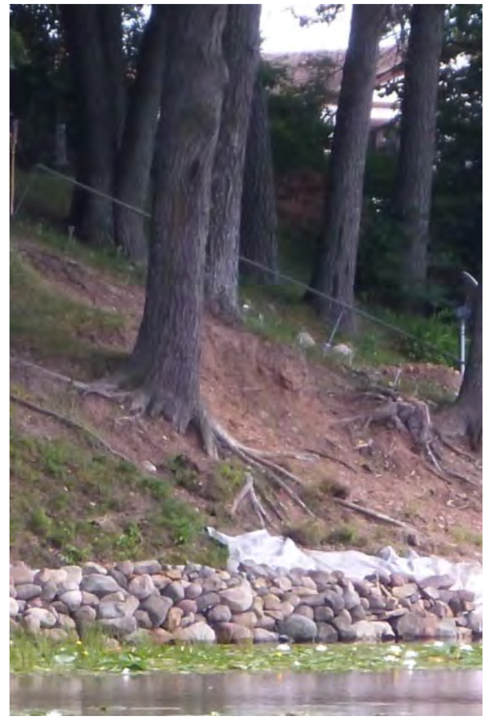
The Chinese mystery snail (right) is an aquatic invasive animal originally from Asia that can tolerate many different living conditions. The Chinese mystery snail has a brown colored spiral shell up to 2 inches in length. The snails feed on lake and river bottom material.

The Chinese mystery snail outcompetes native aquatic animals, affecting the food web. They impact recreation because they can die off in large numbers and wash up on shore.

The banded mystery snail (left) is also brown in color but is smaller than the Chinese mystery snail and is easily distinguished by the presence of reddish bands which are arranged parallel to the whorl of the shell. Banded mystery snails are native to the southeastern United States, being found primarily in the Mississippi River System up to Illinois. The banded mystery snail is popular in the aquarium trade which likely explains the presence of this species outside its native range.

Two Largon Lake residents were trained in the AIS CLMN protocol in 2022 and intend to monitor Largon Lake for aquatic invasive species in the future.

Shoreline Development and Water Quality



The health of water resources is impacted by decisions that landowners make on their properties. When waterfront lots are developed, a shift from native plants and trees to impervious surfaces and lawn often occurs. Impervious surfaces are hard, man-made surfaces such as rooftops, paved driveways, and concrete patios that make it impossible for rainwater to infiltrate into the ground.

By making it impossible for rainwater to infiltrate into the soil, impervious surfaces increase the volume of rainwater that washes over the soil surface and runs off directly into lakes and streams. Rainwater runoff can carry pollutants such as sediment, lawn fertilizers, and car oils directly into a lake. Native vegetation can slow the speed of rainwater runoff, giving it time to soak into the soil.

In extreme precipitation events, erosion and gullies can occur. The signs of erosion are unattractive and can cause decreases in property values. Sediment can also have negative impacts on aquatic life. Fish eggs will die when covered with sediment and sediment influxes to a lake can decrease water clarity making it difficult for predator fish species to locate food.

Increases in impervious surfaces and lawns cause a loss of habitat for birds and other wildlife. Over ninety percent of all lake life is born, raised, and fed in the area where land and water meet. Overdeveloped shorelines remove critical habitat which species such as loons, frogs, songbirds, ducks, otters, and mink depend on. Impervious surfaces and lawns can be thought of as biological deserts which lack food and shelter for birds and wildlife. Nuisance species such as Canada geese favor lawns over taller native grasses and flowers. Lawns provide geese with an abundant food source (grass) and a sense of security from predators (open views).

Additionally, fish species depend on the area where land and water meet for spawning. The removal of coarse woody habitat, or trees and branches that fall into a lake, cause decreases in habitat for fish and aquatic organisms.

Common lawn species, such as Kentucky bluegrass, are often dependent on chemical fertilizers and require mowing. Excess chemical fertilizers are washed directly into the adjacent water during precipitation events. The phosphorus and other nutrients in fertilizers which produce lush vegetative growth on land are the same nutrients which fuel algae blooms and decrease water clarity in a lake. Common lawn species have very shallow root systems as compared to native plants. Native species have extensive root systems that are effective at holding soil in place. When lawns are located on steep slopes the impacts of erosion can be intensified.

Avoiding the establishment of lawns can provide direct positive impacts on lake water quality. The creation of a buffer zone of native grasses, wildflowers, shrubs, and trees where the land meets the water can provide numerous benefits for water quality and restore valuable bird and wildlife habitat.

Removal of vegetation is regulated in the shoreland protection area, or the area within 35 feet of the Ordinary High Water Mark [15] landward on navigable lakes, rivers, and streams. Each property is allowed a viewing corridor (area cleared of vegetation) of no more than 35% of the lot width within the shoreland protection area. Creating or maintaining a viewing corridor requires a Land Use Permit from the Polk County Zoning Department. Viewing corridors cannot be expanded or moved once established. A lot with an existing viewing corridor that does not comply with current standards can be maintained if no additional trees and shrubs are removed within the shoreland protection area. However, if mowing ceases for one year, then the shoreland protection area must be allowed to reestablish and be maintained. Tree trimming is allowed in the shoreland protection area without a permit if the trimming does not result in the vegetation dying. Piers, wharfs, temporary boat shelters, and boatlifts must be located within or immediately adjacent to the viewing corridor.

The WDNR offers property owners up to $1,000 to install a 350 square foot shoreline buffer through the Healthy Lakes grant program. Larger plantings can be funded at 75% through the WDNR Management Plan Implementation grant program. These funding sources must be awarded to qualified entity (Lake District, Lake Association, County, etc.).

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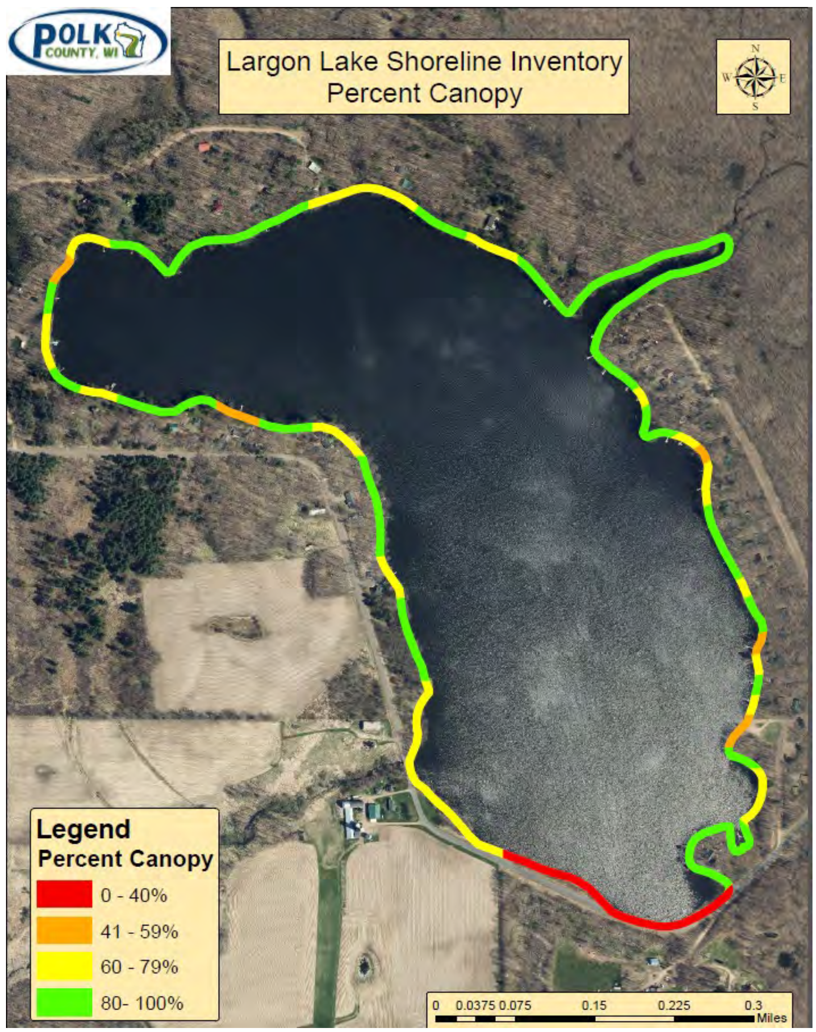
[15] The Ordinary High Water Mark is defined as the point on the bank or shore up to which the water leaves a distinct mark (erosion, change in vegetation, etc.).

Shoreline Inventory

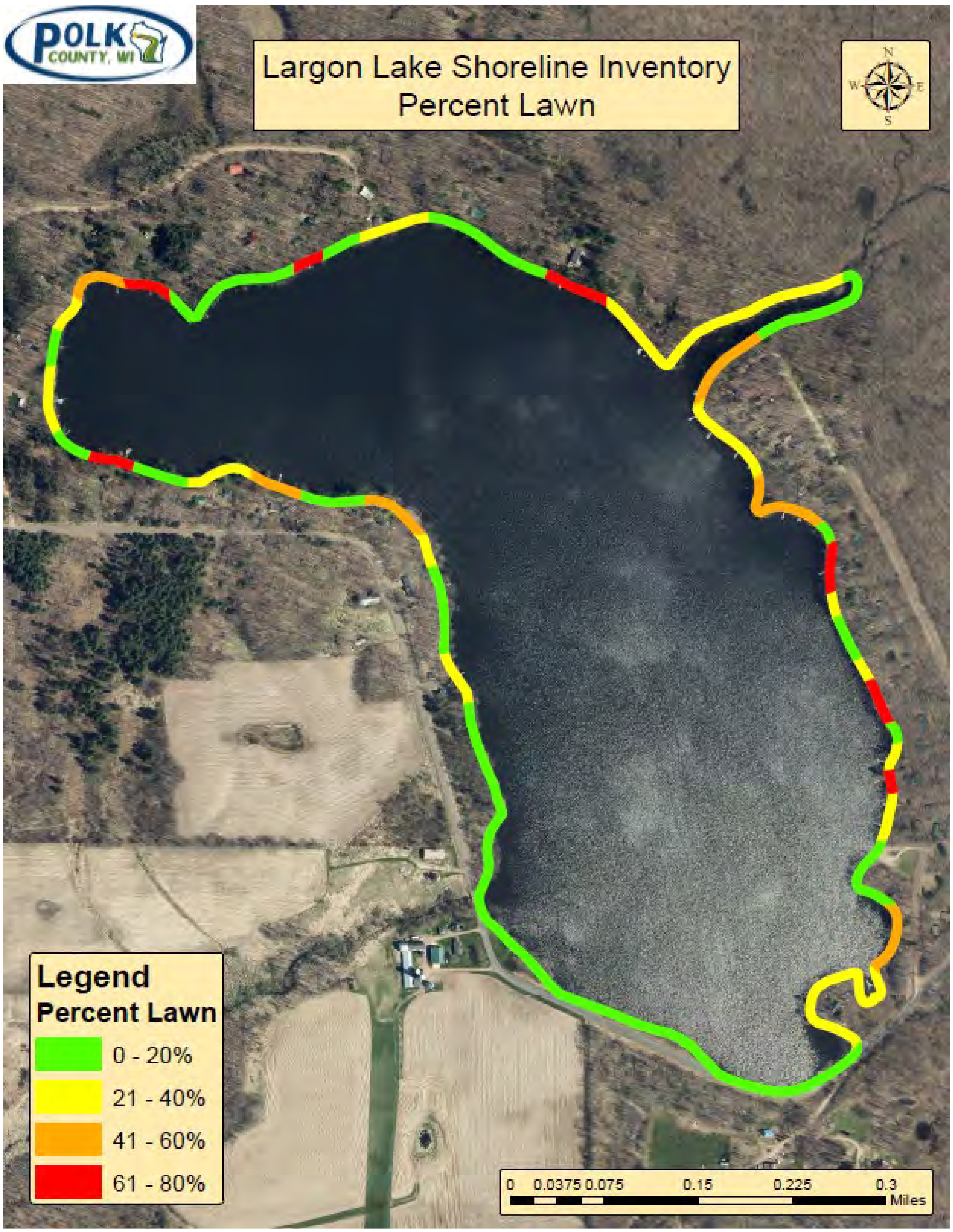
A shoreline inventory was completed using the Lake Shoreland and Shallows Habitat Monitoring Field Protocol developed by the Wisconsin Department of Natural Resources. The Land and Water Resources Department completed the survey on September 29th, 2021. For each of the fifty-six parcels surrounding Largon Lake, percent canopy, human structures, runoff concerns, and bank zone factors were documented in the first 35 feet of the shoreline landward from the water's edge (riparian buffer zone). Additionally, human structures and aquatic plants were documented in the littoral zone for each parcel. A coarse woody habitat inventory was also completed.

Percent canopy cover was determined for the first 35 feet of shoreline at each parcel on the lake. Any large trees at least sixteen feet in height were considered. Canopy cover was present on all parcels on Largon Lake and 89% of properties had a canopy cover over 80%. Canopy cover is important because trees intercept rainfall and reduce the potential for soil erosion.

Parcels in red (right) have less than 40% canopy cover.



Percent ground cover for shrub/herbaceous, impervious surface, and manicured lawn were determined for the riparian buffer zone of each parcel. Seventy-two percent of the ground cover in the riparian buffer zone on Largon Lake was shrubs and herbaceous plants. Only 25% of the ground cover in the riparian buffer zone was lawn. Parcels in red (below) have between 61% and 80% lawn within the riparian buffer zone.

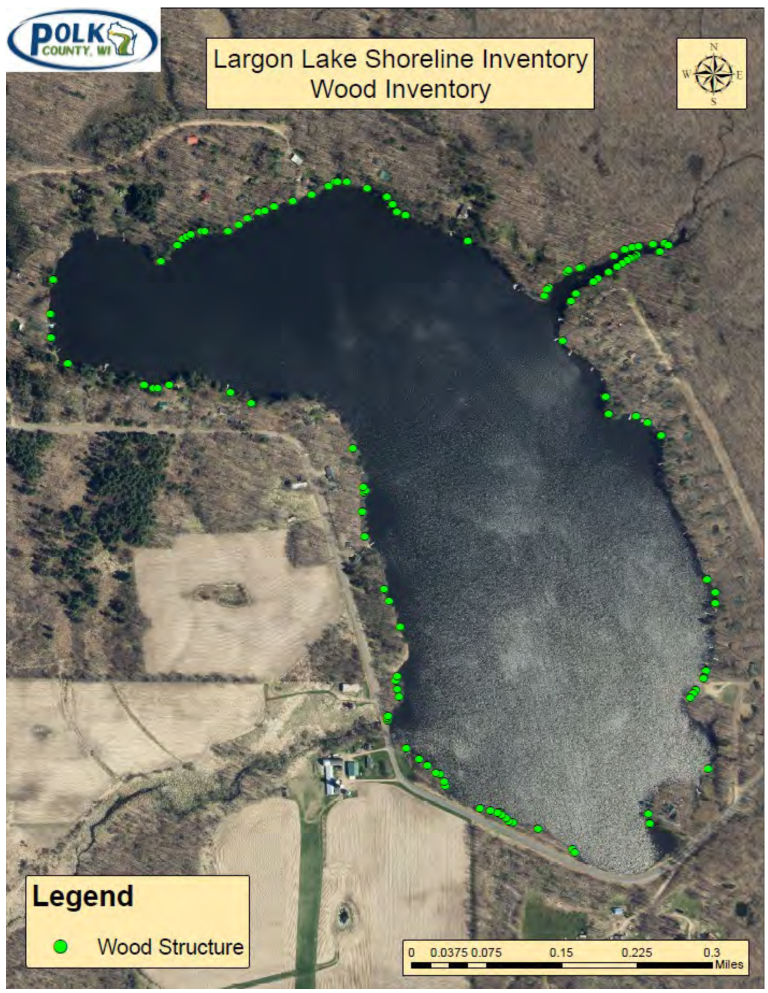


The shoreline inventory characterized human structures in the riparian buffer zone. In total there were 3 buildings and 13 firepits within the riparian buffer zone. The survey also determined human structures in the littoral zone. In total, forty-six parcels had piers and nine had boat lifts.

Runoff concerns were also identified in the riparian buffer zone. Within the riparian buffer zone, two parcels had a point source, three parcels had channelized water flow/gully, sixteen parcels had a stair or trail to the lake, forty-two had lawn/soil sloping to the lake, and eight had bare soil. Nine parcels had a total of four hundred twenty-five feet of rip rap, one parcel had an artificial beach, and two parcels had bank erosion.

When trees fall into a lake, fish and aquatic organisms use them as habitat. Over time, humans have greatly reduced the number of fallen trees along the shoreline of lakes. Undeveloped lakes have nearly 900 logs per mile of shoreline.

The shoreline inventory identified pieces of wood in the water. To be counted, wood needed to be greater than four inches in diameter and at least five feet long. There were one hundred thirteen pieces of wood and two beaver lodges along the shoreline of Largon Lake. Largon Lake had forty-two pieces of wood per mile of shoreline. Sixty-eight percent of the wood touched the shoreline and 95% of the wood had at least five feet of length underwater. Branchiness of each piece of wood was also determined. Forty-six percent of the pieces of wood had no branches, 29% had a few branches, and 25% had a full crown.



Septic Inventory

Private septic systems are regulated under Chapter 40 of the Polk County Code of Ordinances. To stay in compliance with the ordinance, all septic tanks must be visually inspected by a plumber, POWTS inspector, or person licensed under Wisconsin Statutes 281.48 and pumped within 3 years of the date of installation and at least once every 3 years thereafter.

The Ascent Permit Management Suite system for tracking sanity permits was used to determine compliance for the fifty-four septic systems near Largon Lake. Forty-five systems (83%) were in compliance, with the remaining nine systems (17%) being out of compliance. Of the non-complaint systems, four have no records and the remaining systems were last serviced in 2019, 2018, 2016, 2002, and 1989.

Proper septic upkeep is important to protect surface water and groundwater. Nutrients from septic systems move through the soil profile either leaching out directly to the lake or entering ground water.

Septic systems should be inspected and pumped at least every 3 years to ensure functionality and extend the life of the system. Additional steps to maintain septic systems include:

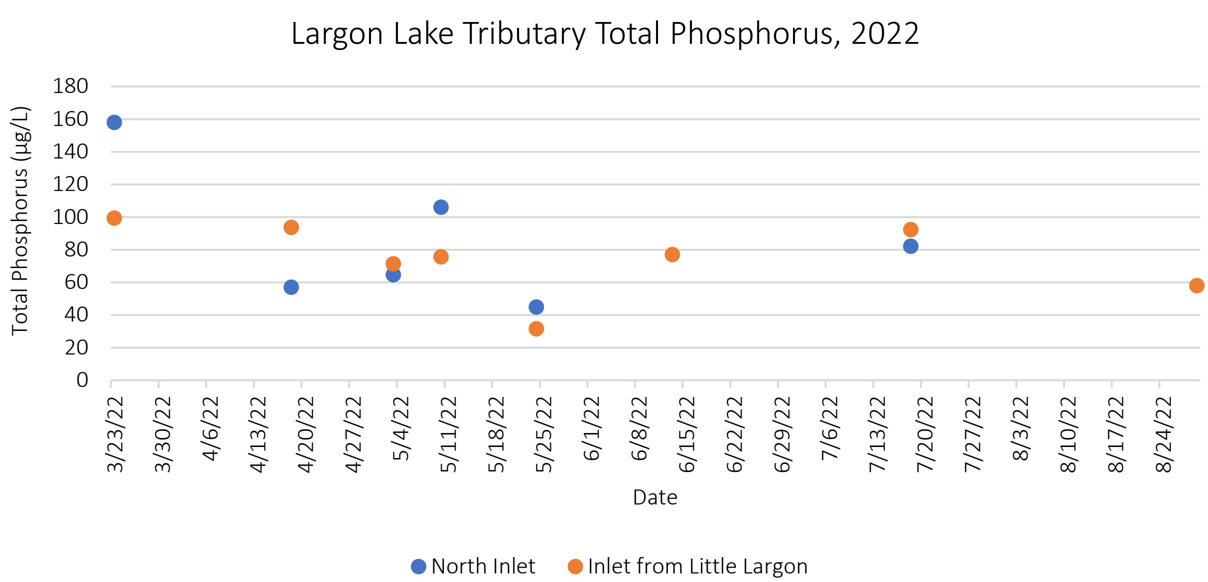
- Fix leaky faucets and adjust toilet floats to conserve water and avoid overloading septic systems
- Properly dispose products such as grease, paints, and solvents rather than pouring them down a drain
- Properly dispose of items such as diapers, coffee grounds, and feminine hygiene products rather than flushing them down the toilet.
- Avoid driving or parking on drainfields as soil compaction above a drainfield can shorten the life of a septic system
- Keep trees and deep-rooted vegetation from establishing on drainfields.
- Point drain spouts and roof gutters away from drainfields since extra runoff can overload a system

Tributary Monitoring

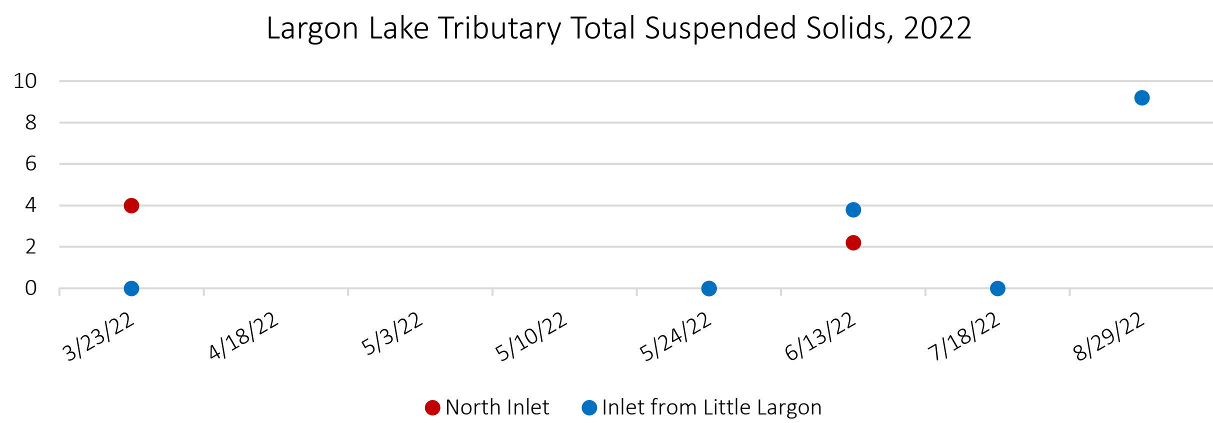
Data was collected on the two tributaries flowing to Largon Lake: the North Inlet and the Inlet from Little Largon Lake. Flow data was collected bi-weekly at each tributary with a Marsh McBirney Flo-Mate TM velocity flowmeter. At 6-inch intervals across each tributary, water depth (feet) and velocity (ft/s) were measured. Grab samples were collected once a month when there was flow on each tributary and analyzed at the State Lab of Hygiene for total phosphorus and total suspended solids.

Both tributaries to Largon Lake were dry for the majority of the summer months in both 2021 and 2022. The Palmer Drought Severity Index for Northwest Wisconsin indicated severe drought conditions for 2021 and moderate drought conditions for 2022. In years of moist conditions, it is likely the tributaries contribute flow to Largon Lake throughout the summer during rain events. In 2021, flow only occurred during the spring snowmelt event. Only one flow reading and total phosphorus/total suspended solids sample was captured during spring snowmelt in 2021. Models are not accurate in predicting an annual phosphorus load based on only one sampling event. As a result, the data presented in this study is limited to the 2022 sampling season.

In 2022, growing season average (May-September) total phosphorus was 74 µg/L in the North Inlet and 68 µg/L in the Inlet from Little Largon Lake. The state standard for total phosphorus for streams is set at 75 ug/L. Both tributaries were just below the standard in 2022.



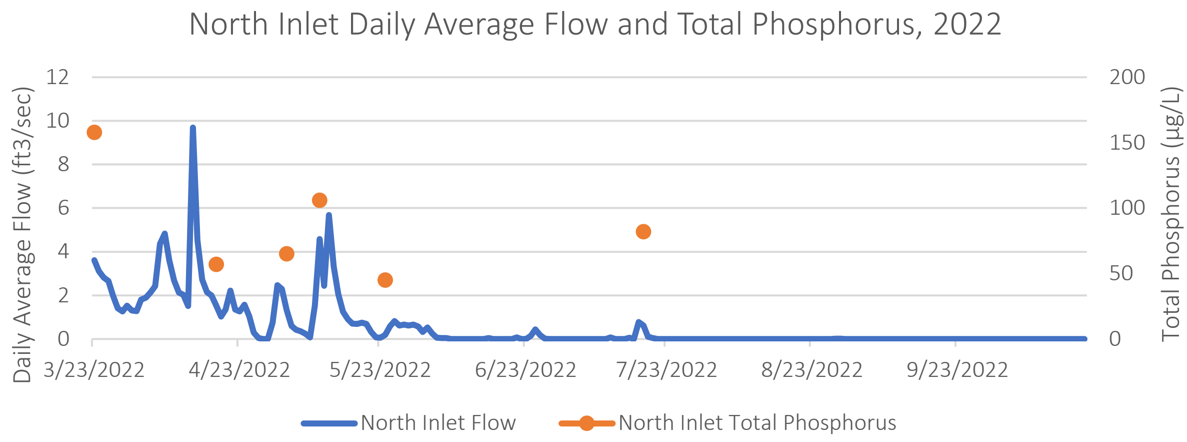
Total suspended solids ranged from no detection to 4 mg/L in the North Inlet and from no detection to 9 mg/L in the Inlet from Little Largon.

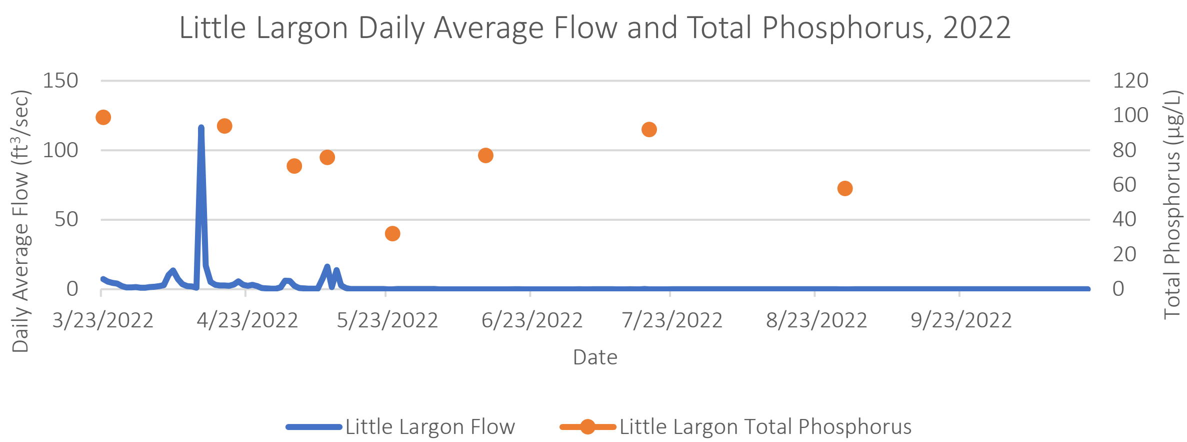


Tributary Annual Phosphorus Load

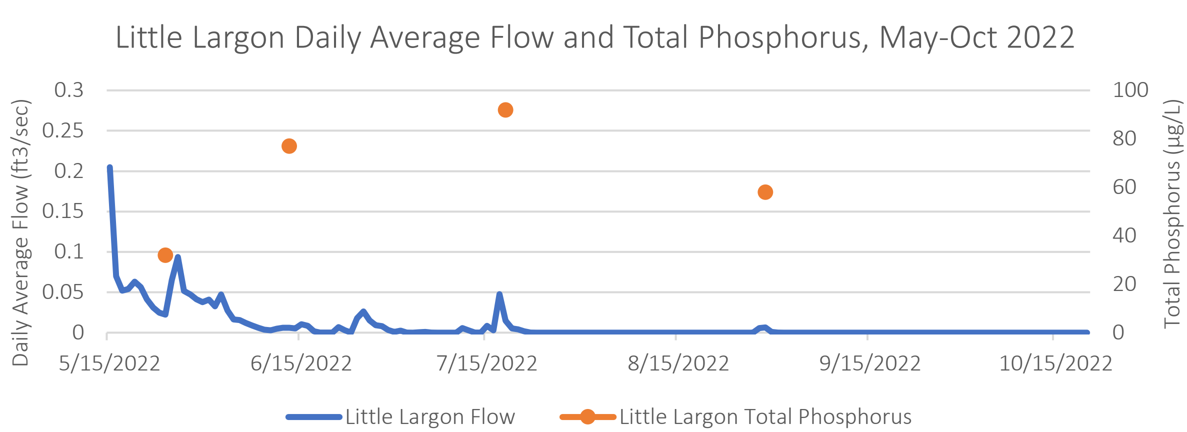
HOBO data loggers were installed at the North Inlet and the Inlet from Little Largon Lake. Each hour the loggers collected data for temperature, water pressure, and atmospheric pressure. The difference between water pressure and atmospheric pressure is paired with a depth of logger reading to determine a daily water depth. Next a relationship between water depth and field measured flow readings is calculated. This allows for a daily flow to be modeled for the dates where field measured flow readings were not collected. Data for total phosphorus and average daily flow were input into a model called FLUX to estimate an annual phosphorus load to Largon Lake from both inlets.

FLUX determines an annual total phosphorus load using seven methods. Some of the methods do not predict an accurate load when the flow is zero for much of the season. Since these conditions existed in the tributaries to Largon Lake, the estimated load from these methods was not considered. An average total phosphorus load for the methods that were applicable to the tributaries to Largon Lake was determined. FLUX determined a total phosphorus load of 56 pounds from the North Inlet and 111 pounds from the Inlet from Little Largon Lake for the time-period where ice was absent from the tributary (March through October). The winter months were excluded from the model because the HOBO data loggers are not accurate when ice conditions are present. However, since the streams were intermittent (flowing only during rainfall/runoff events) it is likely that they were not flowing to Largon Lake during the winter months.





On April 13th, 2022, both inlets experienced an extreme flow event which adjusted the scale of the graph for the Inlet from Little Largon such that the low flow events in May through August were undetectable. A secondary graph for the Inlet from Little Largon with an adjusted scale and timeframe is included below to better represent the summer months.



Erosion Vulnerability Study

Erosion commonly occurs at culverts because of the concentration of water into a confined flow path. The channelized flow increases velocity and energy of water flowing through the culvert and increases the likelihood for erosion. Culverts are often very necessary components of roads and driveways to convey water underneath travel lanes. However, if not properly protected, the channel downstream of the culvert can become eroded. Two culverts on the east side of Largon Lake underneath Largon Lake Court are examples of the large potential for soil erosion when channelized flow creates a gully.

Gully 1 and corrugated metal pipe culvert 1

The two culverts that were analyzed for soil erosion potential for this study were steel corrugated metal pipe. Culvert 1 has a 24-inch diameter and culvert 2 has a 36-inch diameter and each are 40 feet in length. Both culverts are situated in low areas to convey water from east to west underneath Largon Lake Court. Culverts are generally sized corresponding to the anticipated amount of water that will flow through them. For this situation, the peak flow that would flow from these culverts is primarily based on the upstream drainage area, land slope, and land use of the drainage area.

Vegetation, especially grasses, are very successful in preventing erosion as root structures hold soil particles together extremely well. In areas of low sunlight however, such as heavily forested areas, it isn't feasible to grow a thick layer of grass. During rain events or snowmelt in the spring, water flows through the culverts over the bare soil at a velocity that is strong enough to shear the bond between soil particles. Particles become dislodged and are transported downstream by the flowing water. Nutrients and pollutants held within the soil structure can also be transported in this process and can contribute to downstream nutrient loading and pollution.

Although it is difficult to model and predict erosion of gullies because of the complex variability of the different factors that attribute to the erosion, the Natural Resource Conservation Service has equations to quantify past erosion of identified gullies. This can help serve as a reasonable expectation for future erosion in that same gully if conditions stay similar.

Gully 2 and corrugated metal pipe culvert 2

Soil Loss

Using dimensional analysis of the gullies, as well as soil type, a rate of erosion can be calculated. Each soil type has a different specific weight based on soil particle size versus bulk density.

Using an average of both the New Gully Equation and the Gully Bank Sloughing Equation,[16] a rate of potential soil loss is calculated for each individual gully.

Gully 1 has an approximate top width of 5 feet, bottom width of 3 feet, and an average depth of 2.25 feet. The overall channel width is wider, but the area of active erosion is primarily within a 5-foot width. The length of visible erosion is approximately 340 feet between the culvert and Largon Lake. The soil type within the eroded area is sandy clay loam which has an approximate weight of 100 pounds per cubic foot. The potential rate of soil loss associated with Gully 1 is 5.89 tons per year.

Gully 2 has an approximate top width of 8 feet, bottom width of 4 feet, and an average depth of 3.5 feet. The length of visible erosion is approximately 380 feet between the culvert and Largon Lake. The soil type is sandy clay loam. Using an average of the same equations, the potential rate of soil loss for Gully 2 is 12.60 tons per year.

The values above are representative of soil displaced from its original position which doesn't necessarily mean the soil is entering Largon Lake. Some of the displaced soil will simply migrate a few feet down the gully or the channel every year. The rate of soil loss can also be misleading because of the weight of soil. At 100 pounds per cubic foot, the weight of soil adds up very quickly. Gully 1 has a soil loss of 5.89 tons per year, which equates to 4.3 cubic yards of soil. Gully 2, at 12.60 tons, displaces 9.3 cubic yards of soil per year. For perspective, a typical dump truck can hold 10-15 cubic yards of soil.

Erosion Reduction

There are best management practices that can provide a reduction in stormwater runoff, thus preventing soil erosion and improving water quality, all while providing a functioning water conveyance system. The current system at the two monitored culverts is compromised due to degradation of the steel culverts. A replacement of the culverts is

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[16] New Gully Equation can be calculated by using the equation: $x = \frac{(\mathrm{A+B})\mathrm{DLW}}{2(2000)Y}$ and Gully Bank Sloughing Equation can be calculated using the equation: $x = \frac{2\mathrm{DLRW}}{2000}$

Where: A = Top Width; W = Weight of Soil; B = Bottom Width; Y = Years to Form; D = Depth; L = Length; and R = Average Rate of Recession necessary to prevent failure of the roadbed and would provide an opportunity to install an improved system. Some possible improvements include:

- Rock Riprap Channel Protection: Riprap of adequate size and grade provides energy dissipation to concentrated flow and provides weight to hold soil in place. Rock riprap channel protection can be used in conjunction with a standard culvert.
- Drop Structure: Sometimes known as a "stand-pipe", a drop structure can provide a decrease in peak flow and runoff velocity by using an orifice to constrict flow and a vertical drop to decrease slope of the outlet. A drop structure would be used as a replacement for a standard horizontal culvert.
- Water and Sediment Control Basin: A water and sediment control basin creates a pooling area above the inlet of a drop structure or culvert. The water and sediment control basin reduces the velocity of runoff and allows time for sediment to settle from the water. Nutrients are also able to be utilized by vegetation while the water infiltrates into the soil before going through the structure.

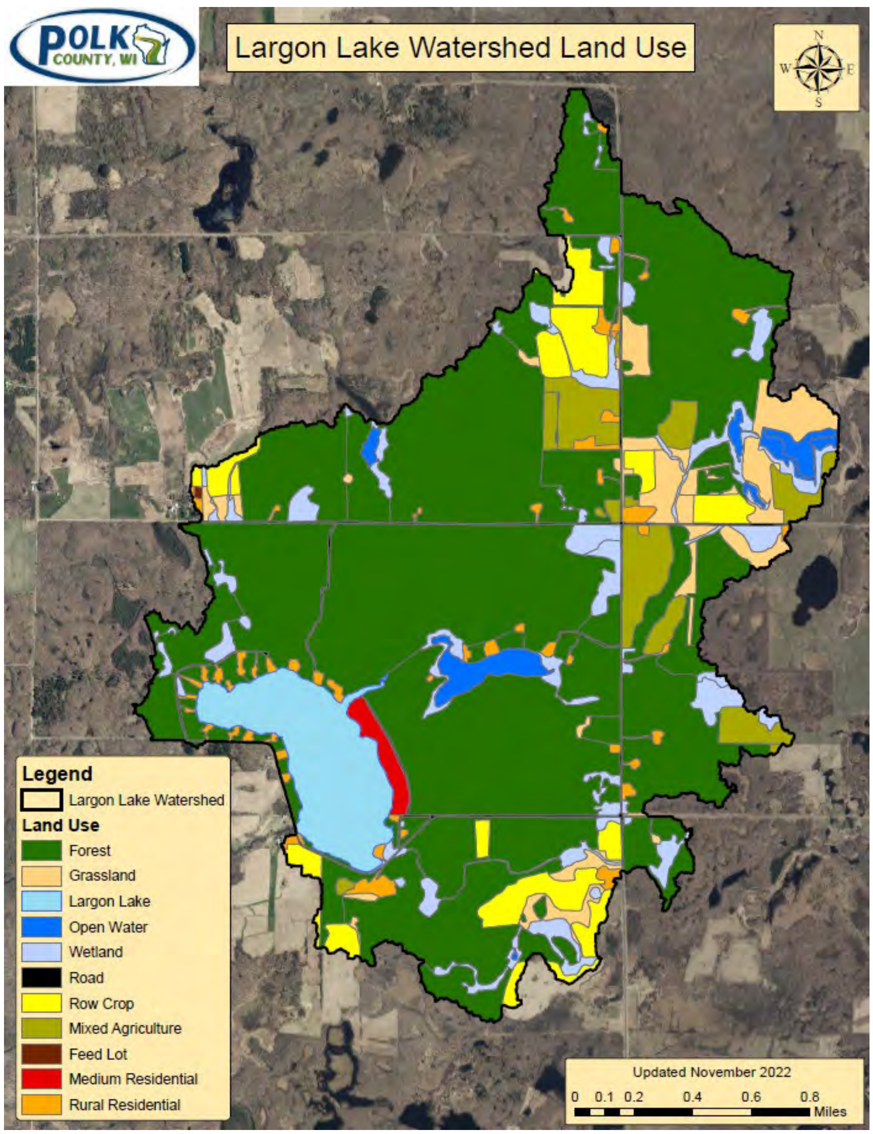
Failing culvert at Gully 2

Largon Lake Watershed Land Use

Land Use	Acres	Acres (%)
Forest	1,660	70%
Wetland	167	7%
Row crop	139	6%
Grassland	121	5%
Mixed agriculture	118	5%
Rural residential	56	2%
Open water	48	2%
Road	30	1%
Medium density residential	16	1%
Feed lot	1	< 1%

The area of land that drains to a lake is called a watershed. The ArcMap spatial Analyst Toolbox and LiDAR elevation data was used to delineate the watershed for Largon Lake. Identification of culverts underneath roads is important for watershed delineation. When delineating watersheds from elevation data, computer software perceives roads as dams which prevent the flow of water. Field verification was used to identify culvert locations within the watershed to allow for accurate watershed delineation. The Largon Lake Watershed is 2,497 acres in size.

Land use was delineated using spring 2020 aerial imagery. The most common land use in the watershed is forest (70%).



Watershed Modeling and Nutrient Reductions

The Wisconsin Lake Modeling Suite (WiLMS) was used to model current conditions for Largon Lake and estimate land use nutrient loading for the watershed. Phosphorus is the key parameter in the modeling scenarios used in WiLMS because it is the limiting nutrient for algae growth in most lakes. WiLMS can be used to estimate the amount of phosphorus being contributed from the watershed (external load) and from the lake sediments (internal load).

WiLMS uses average evaporation and precipitation data along with runoff coefficients for various land uses[17] to determine the annual nonpoint source load of phosphorus to a lake. WiLMS determined the annual external phosphorus load to Largon Lake as 454 pounds of phosphorus per year (35 pounds attributed to rain falling on the surface of Largon Lake). Overall, internal loading is predicted to be between 55 and 110 pounds of phosphorus per year, or 11-20% of the nutrient budget for Largon Lake. Septic loading was estimated at 2 pounds of phosphorus per year, or less than 1% of the nutrient budget.

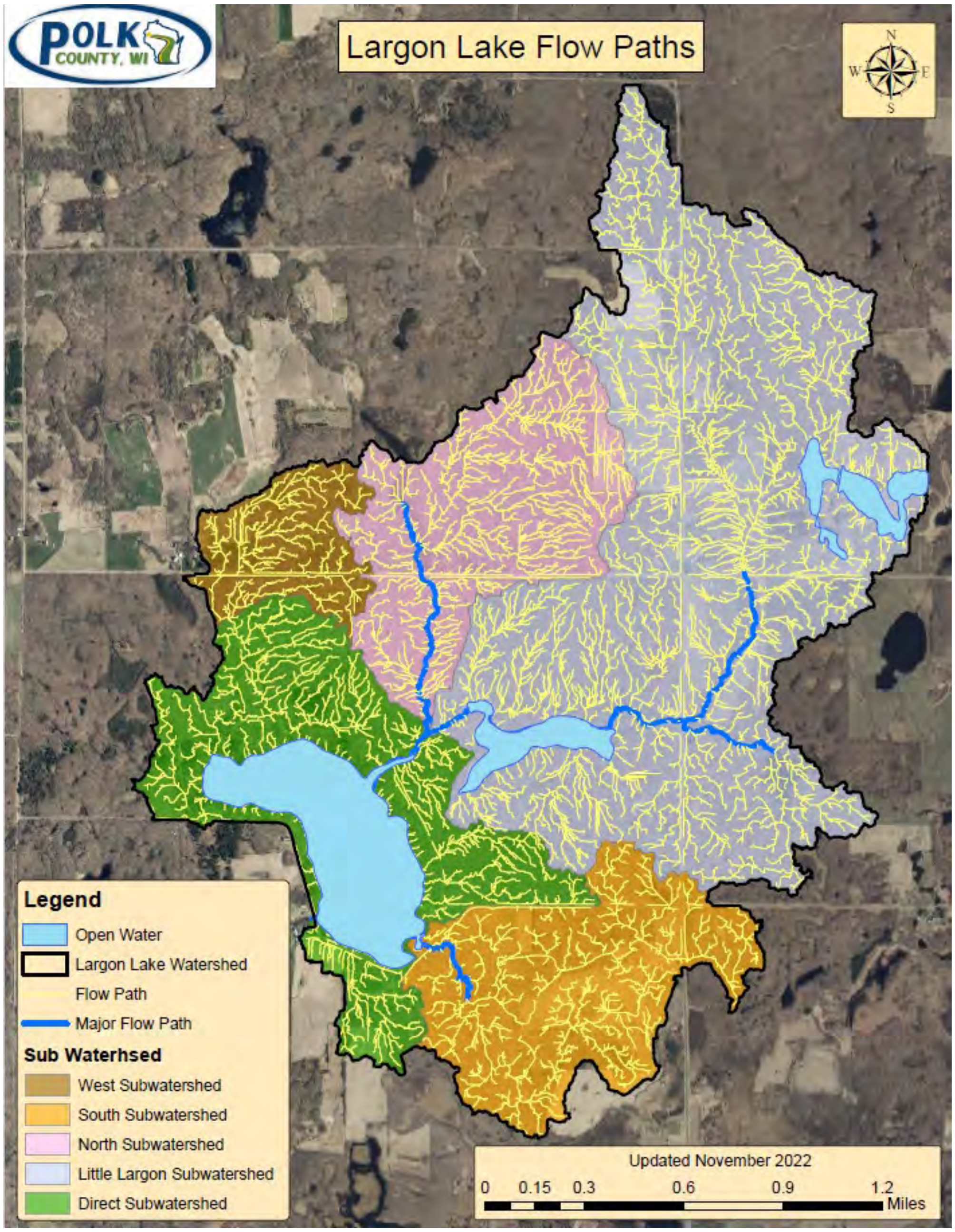
Land Use	Acres	Acres (%)	Phosphorus Load (lb/yr)	Phosphorus Load (%)
Forest	1,660	70	132	29
Wetland/open water	215	9	20	5
Row crop	140	6	126	27
Pasture/grassland	121	5	33	7
Mixed agriculture	118	5	84	18
Rural residential	56	2	4	1
Medium density residential	46	2	20	5

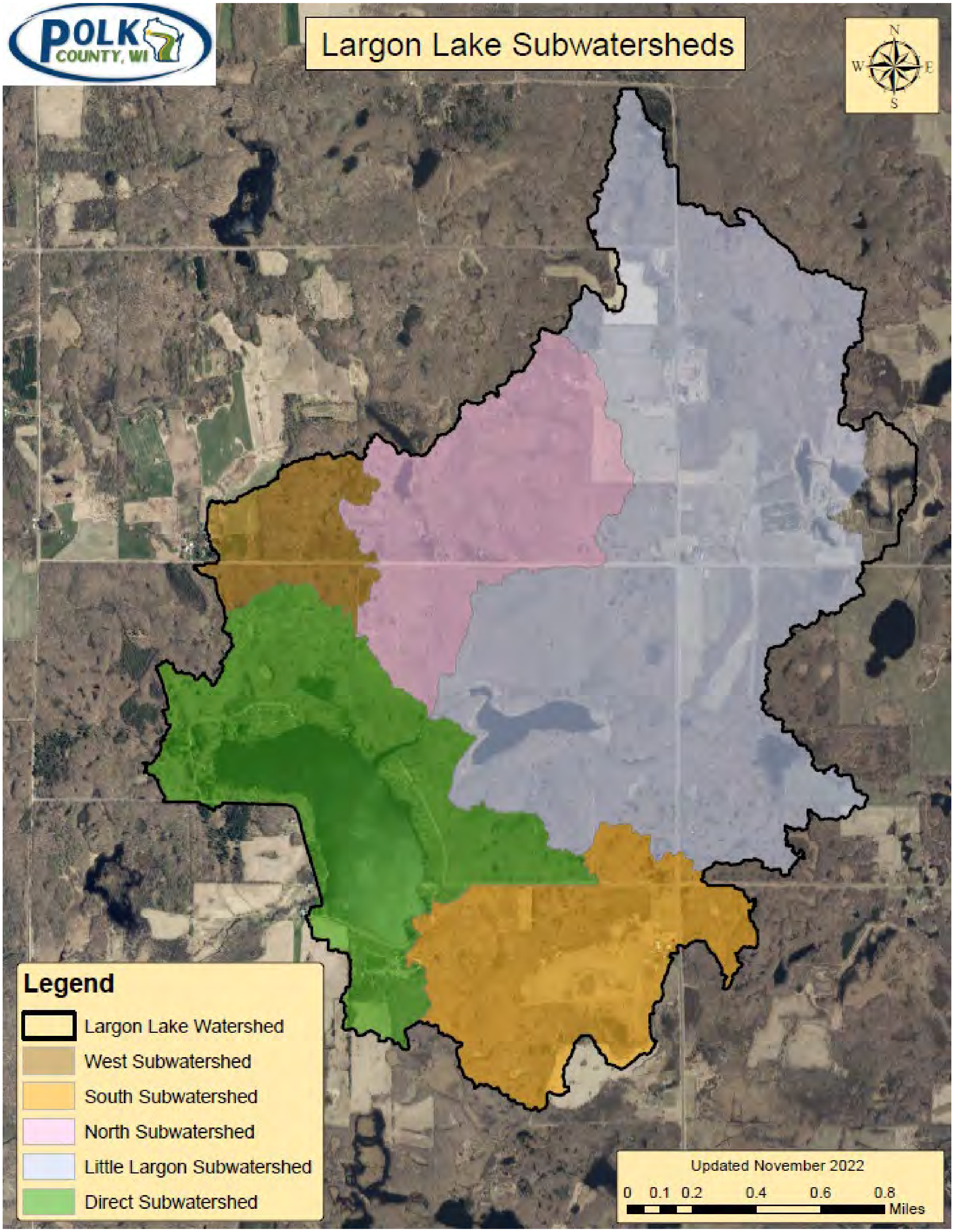
Modeling predicts that to achieve the phosphorus standard for Largon Lake (40 µg/L) the combined external and internal phosphorus load to the lake would need to be reduced by 194 pounds per year (37% reduction).

[17] Feedlot was combined with row crop, open water was combined with wetland, and road was combined with medium density residential

Subwatershed Modeling

To prioritize where the Largon Lakes Protection and Rehabilitation District should allocate efforts and/or money when available, the watershed was divided into five subwatersheds: Direct Subwatershed, West Subwatershed, North Subwatershed, Little Largon Subwatershed, and South Subwatershed. Subwatershed boundaries can be visualized by looking at flow paths or areas where water channelizes into a small stream. Small flow paths can remain nearly invisible to the naked eye or can combine as a larger flow path which is visible as a stream. Subwatershed boundaries are determined by examining where larger flow paths meet on the landscape.



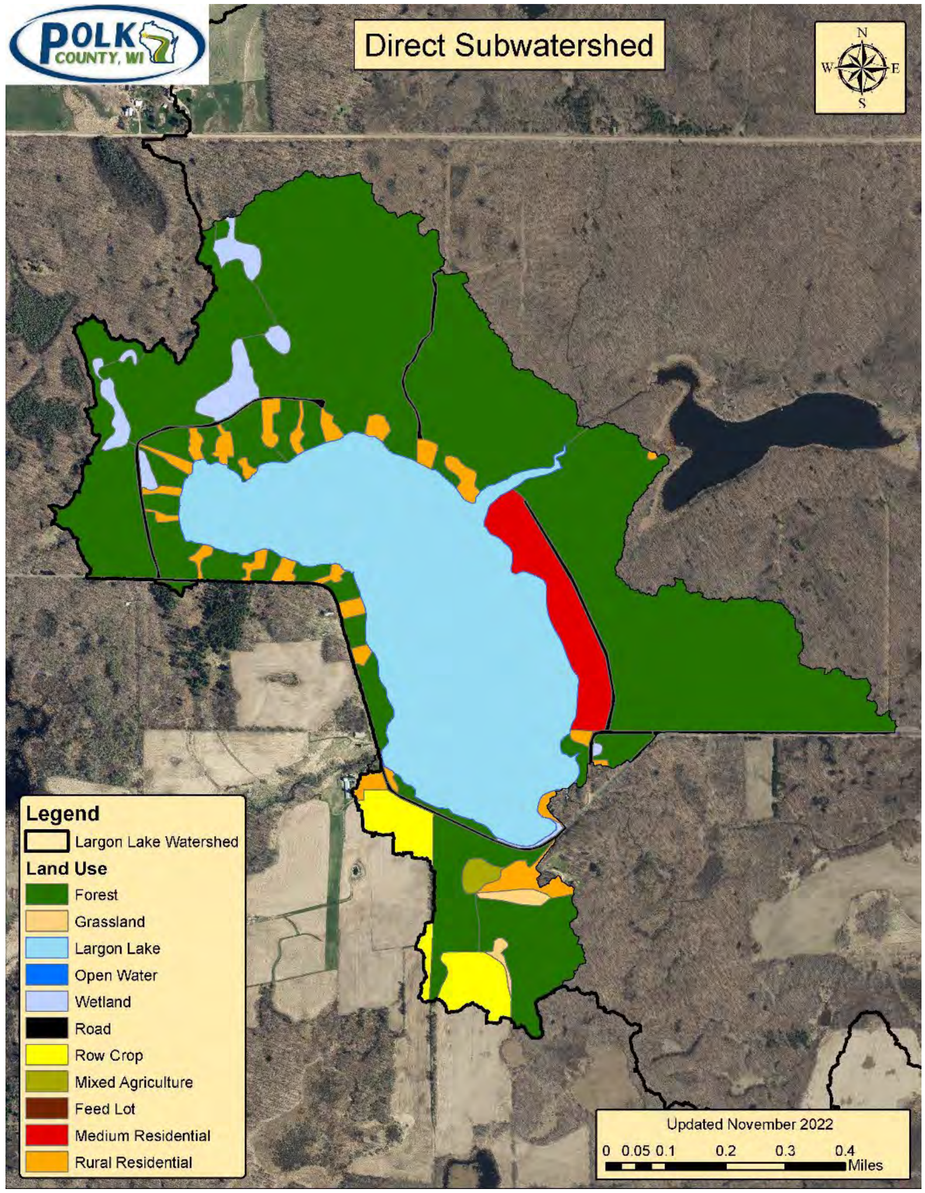


POLK COUNTY, WI
Largon Lake Subwatersheds
N
W
E
S
Legend
Largon Lake Watershed
West Subwatershed
South Subwatershed
North Subwatershed
Little Largon Subwatershed
Direct Subwatershed
Updated November 2022
0 0.1 0.2 0.4 0.6 0.8
Miles

The Direct Subwatershed encompasses Largon Lake and is 363 acres and primarily forest (80%).

The annual phosphorus load from this subwatershed is 51 pounds per year.

Forest is responsible for 46% of the phosphorus load in this subwatershed, row crop for 24%, and medium density residential for 21%.

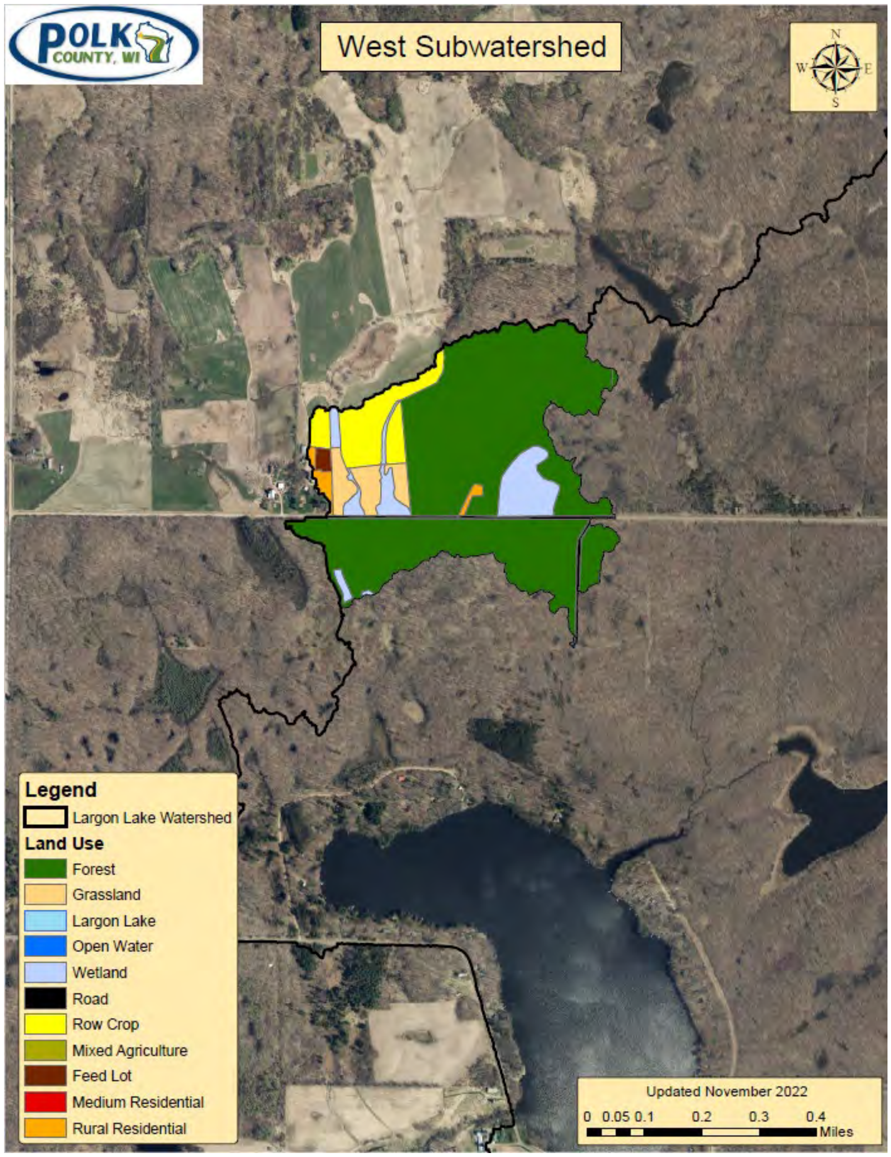


Largon Lake Direct Subwatershed				
Land Use	Acres	Acres (%)	Phosphorus Load (lb/yr)	Phosphorus Load (%)
Forest	291	80%	24	46%
Rural residential	19	5%	2	3%
Medium residential/road	24	7%	11	21%
Row crop	14	4%	13	24%
Wetland	11	3%	< 1	2%
Grassland	2	< 1%	< 1	1%
Mixed agriculture	2	< 1%	2	3%

The Largon Lake West Subwatershed is the smallest subwatershed at 119 acres and is primarily forest (74%), row crops/feedlot (10%), and wetland (8%).

The annual phosphorus load from this subwatershed is 21 pounds per year.

Row crops are responsible for 51% of the phosphorus load in this subwatershed and forest is responsible for 34% of the load.

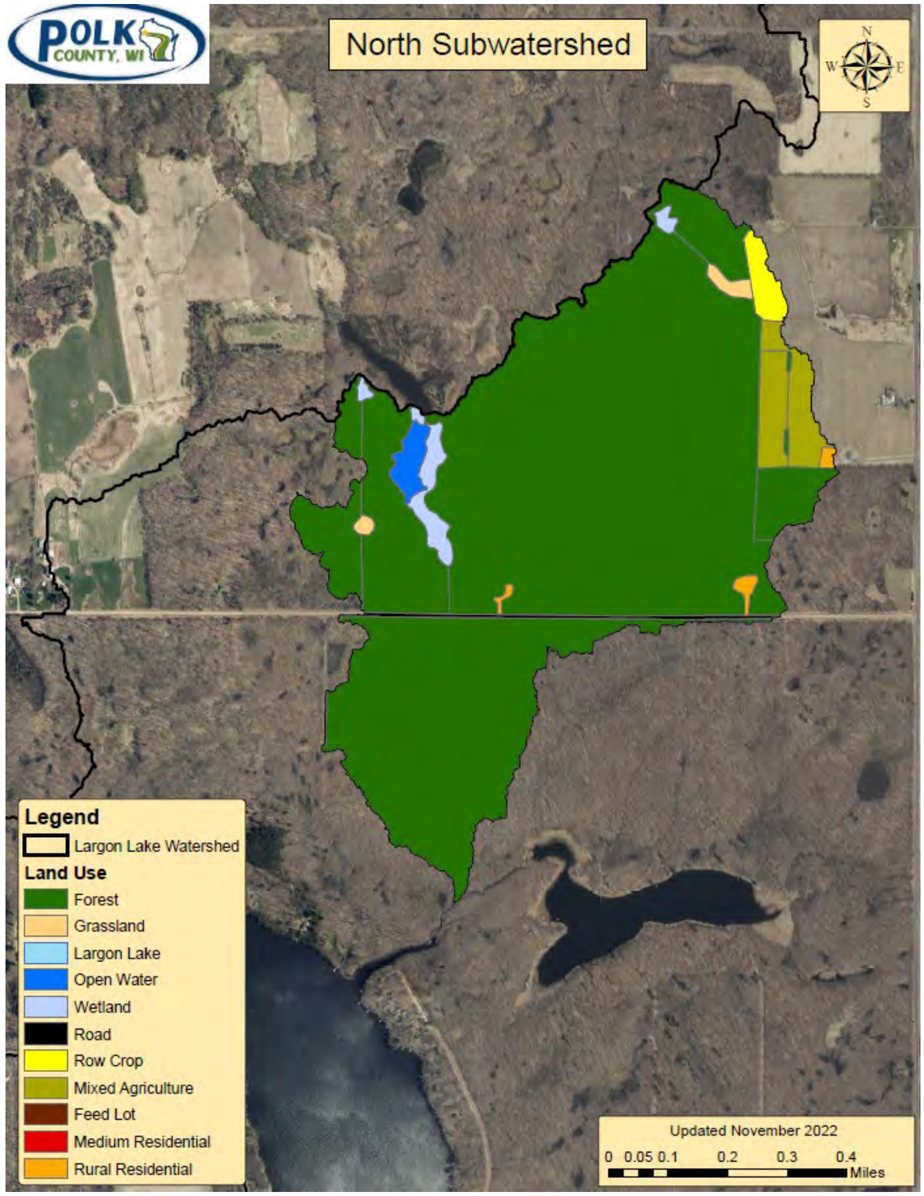


Largon Lake West Subwatershed				
Land Use	Acres	Acres (%)	Phosphorus Load (lb/yr)	Phosphorus Load (%)
Forest	88	74%	7	34%
Row crop/feedlot	12	10%	11	51%
Wetland	10	8%	< 1	4%
Grassland	5	4%	2	6%
Medium residential/road	2	2%	< 1	4%
Rural residential	2	2%	< 1	1%

The Largon Lake North Subwatershed is 344 acres and primarily forest (90%), followed by mixed agriculture (4%) and wetland/ open water (3%).

The annual phosphorus load from this subwatershed is 41 pounds per year.

Forest is responsible for 61% of the phosphorus load in this subwatershed and mixed agriculture is responsible for 23% of the load.

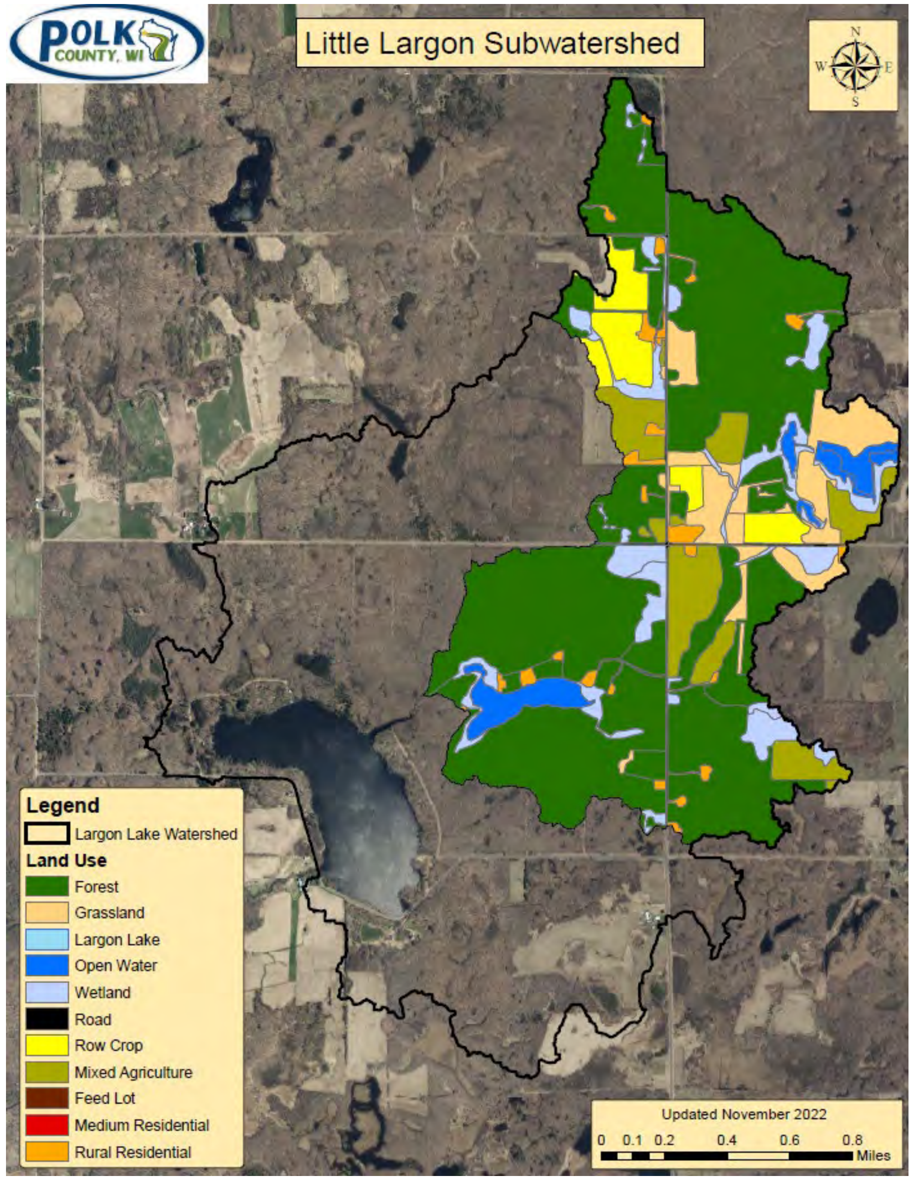


Largon Lake North Subwatershed				
Land Use	Acres	Acres (%)	Phosphorus Load (lb/yr)	Phosphorus Load (%)
Forest	311	90%	24	61%
Mixed agriculture	13	4%	9	23%
Wetland/open water	9	3%	< 1	2%
Row crop	4	1%	4	9%
Medium residential/road	3	1%	2	3%
Grassland	2	1%	< 1	<1%
Rural residential	2	0%	< 1	<1%

The Little Largon Subwatershed is the largest subwatershed at 1,196 acres in size and is primarily forest (63%), followed by wetland/open water (12%), mixed ag (9%), and grassland (8%).

The annual phosphorus load from this subwatershed is 234 pounds per year.

Mixed agriculture is responsible for 32% of the phosphorus load in this subwatershed, forest for 26%, and row crop for 23% of the load.

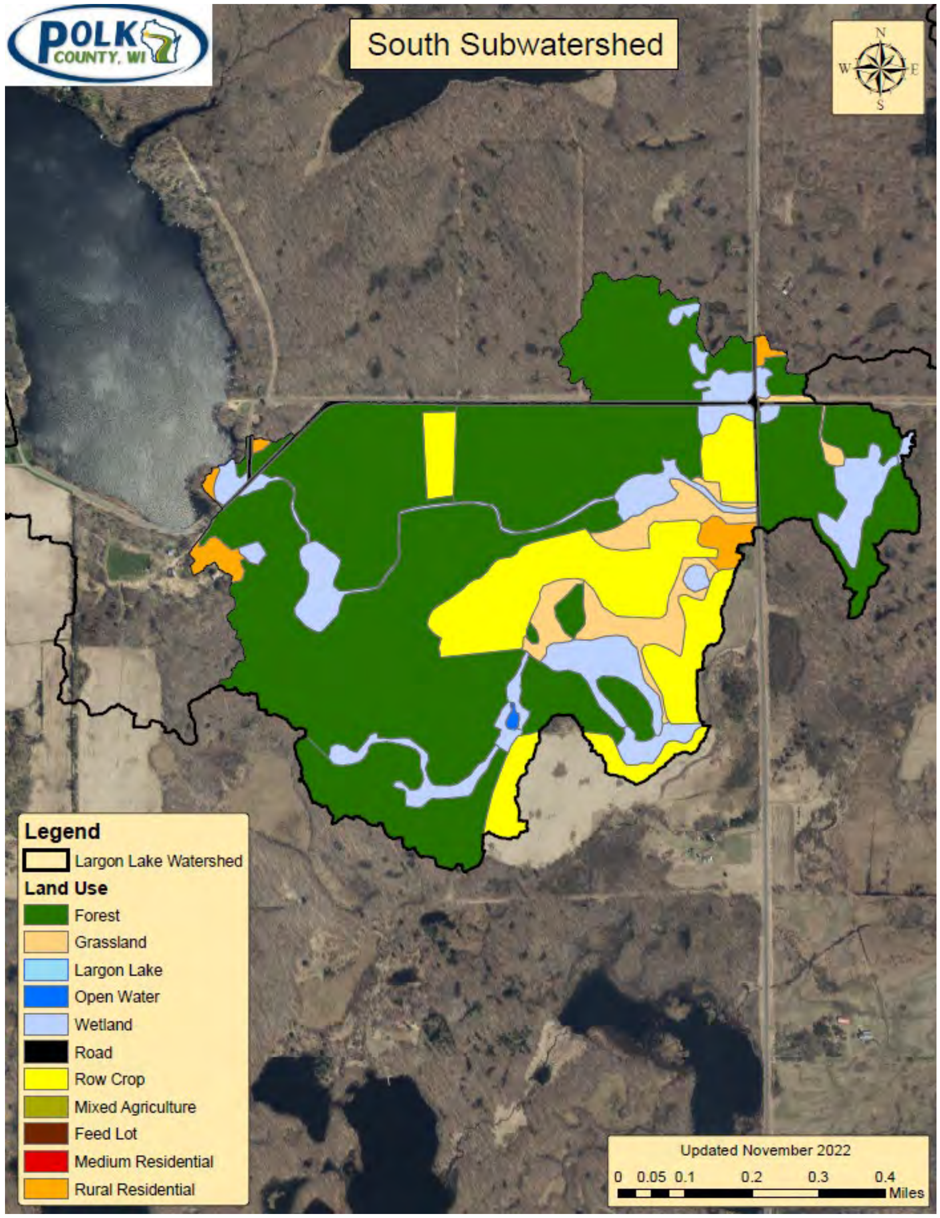


Little Largon Lake Subwatershed				
Land Use	Acres	Acres (%)	Phosphorus Load (lb/yr)	Phosphorus Load (%)
Forest	753	63%	60	26%
Wetland/open water	146	12%	13	5%
Mixed agriculture	104	9%	75	32%
Grassland	94	8%	24	11%
Row crop	59	5%	53	23%
Rural residential	27	2%	2	1%
Medium residential/road	13	1%	7	3%

The Largon Lake South Subwatershed is 334 acres and is primarily forest (65%), followed by row crop (15%), and wetland (12%).

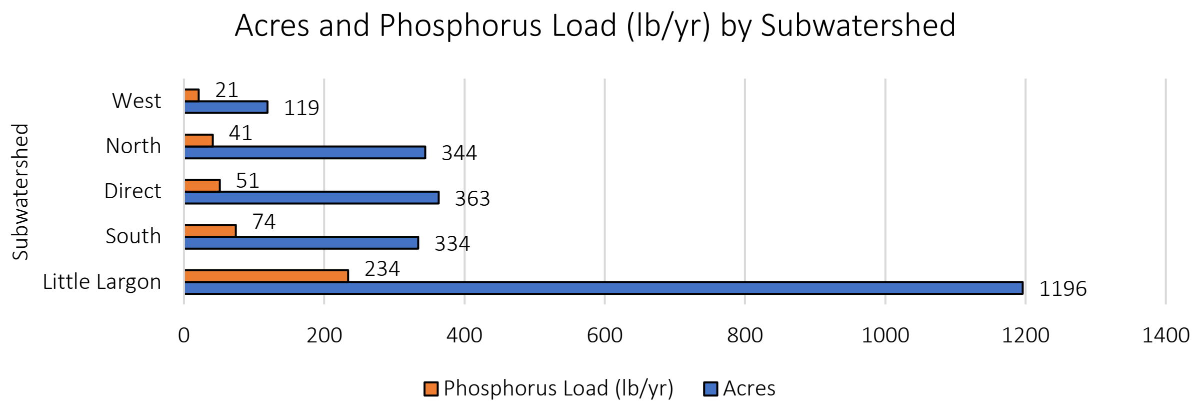
The annual phosphorus load from this subwatershed is 74 pounds per year.

Row crops are responsible for 62% of the phosphorus load in this subwatershed and forest is responsible for 24% of the load.

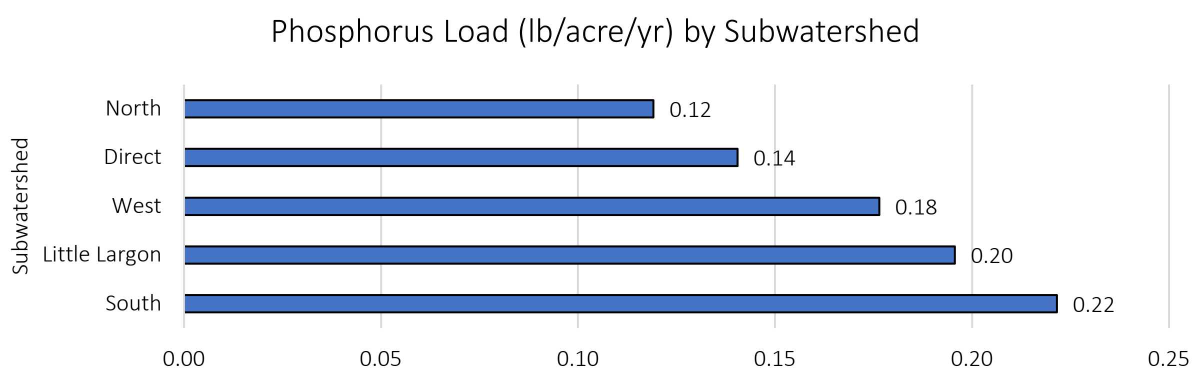


Largon Lake South Subwatershed				
Land Use	Acres	Acres (%)	Phosphorus Load (lb/yr)	Phosphorus Load (%)
Forest	217	65%	18	24%
Row crop	51	15%	46	62%
Wetland	39	12%	4	5%
Grassland	17	5%	4	6%
Rural residential	6	2%	< 1	1%
Medium residential/road	4	1%	2	2%

The phosphorus load from each subwatershed is related to the size of the subwatershed. As the size of the subwatershed increases, the annual phosphorus load increases.



When the data is shown as the annual pounds of phosphorus loading to Largon Lake as pounds per acre, the subwatersheds contributing the greatest amount of phosphorus to Largon Lake are the South and Little Largon Subwatersheds.

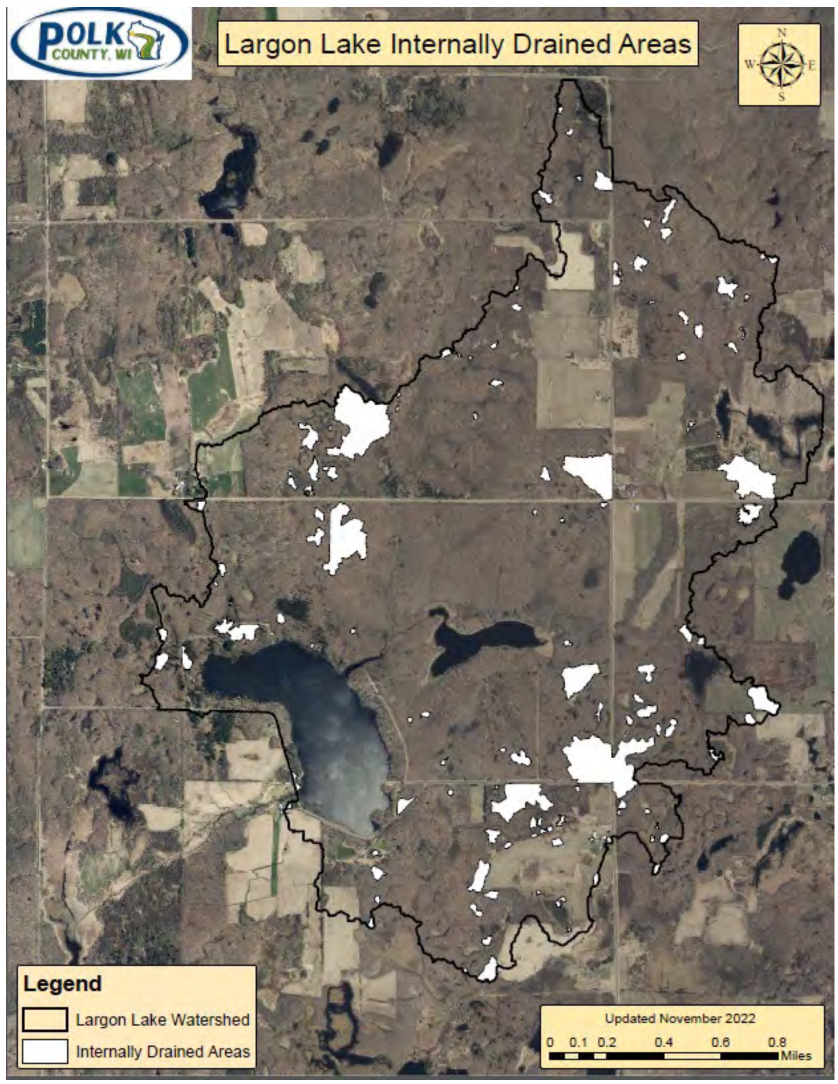


The North and Little Largon Subwatersheds include the two main tributaries the flow to Largon Lake. WiLMS estimated the annual phosphorus load for the North Subwatershed as 41 pounds per year and estimated the annual phosphorus load for the Little Largon Subwatershed as 234 pounds per year. WiLMS uses average evaporation and precipitation data along with runoff coefficients for various land uses to determine the annual nonpoint source load of phosphorus to a lake. FLUX estimated the load for the North Subwatershed as 56 pounds of phosphorus for the open water season and estimated the load for the Little Largon Subwatershed as 111 pounds of phosphorus for the open water season. FLUX uses grab samples for phosphorus concentrations and corresponding flow measurements and a complete flow record to estimate nutrient loading for tributaries over an annual timeframe. Outputs from both models are useful and should be considered when determining lake management options.

Internally Drained Areas

The Largon Lake Watershed is a unique landscape because a part of the landscape is internally drained. Internally drained areas are depressions on the landscape that accumulate water during rainfall events and spring snowmelt. The depressions are deep enough that water is not able to exit the depression. Therefore, water that accumulates in internally drained areas infiltrates into the ground rather than contributing to overland runoff/flow to a lake or river.

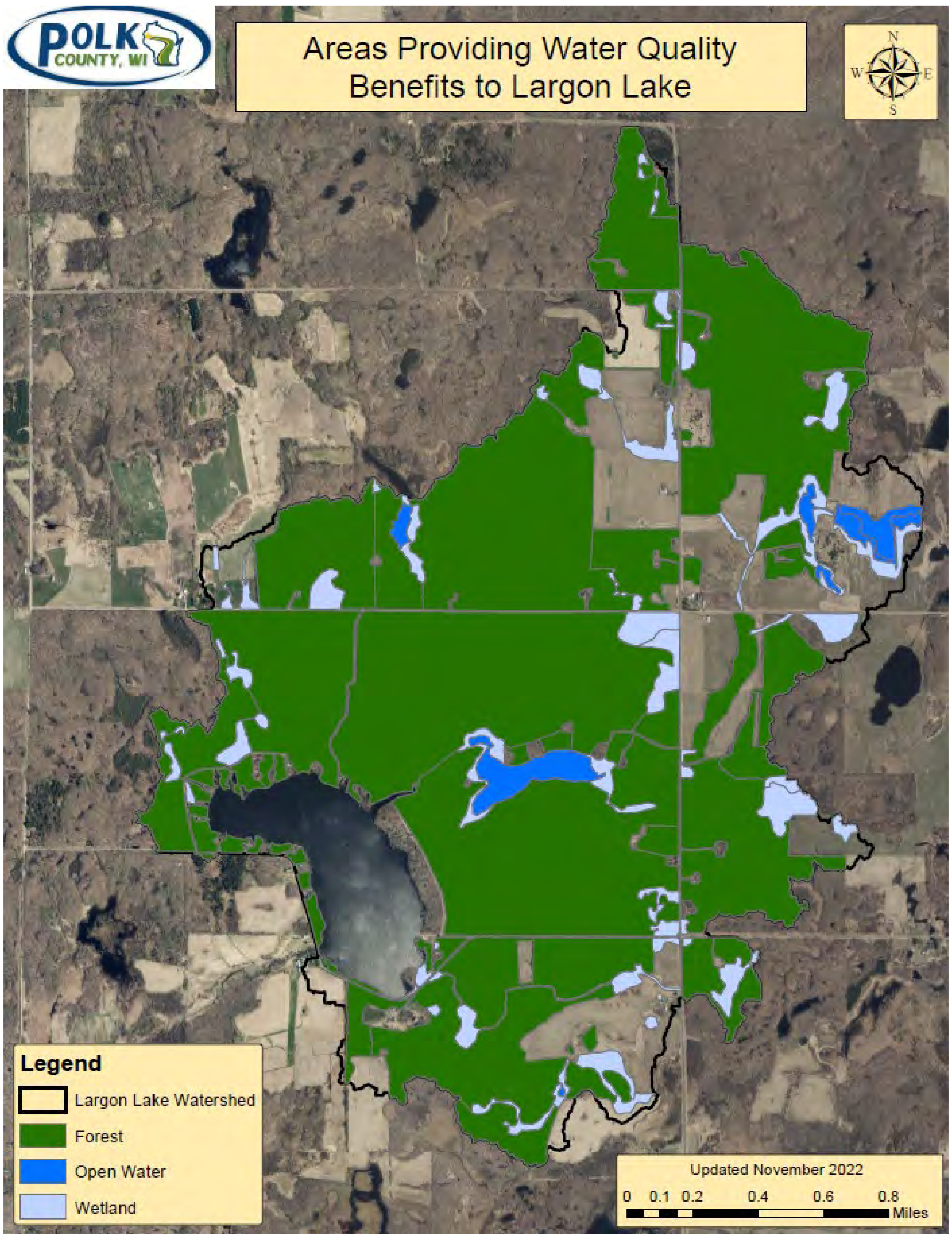
Internally drained areas are modeled based on storm intensity. For this project, a 10-year storm with a duration of 24 hours was used to model internally drained areas. This is equivalent to 4.2 inches of rain falling within a 24-hour period. This storm intensity is the commonly used standard for which conservation practices are designed to withstand. In total, 178.7 acres (7.5%) of the Largon Lake Watershed is internally drained. If 4.2 inches (or less) of rain falls on the watershed within a 24-hour timeframe these acres will not contribute runoff to Largon Lake.



One way to prioritize project installation would be to focus more effort on the land within the watershed that contributes runoff/flow to the lake during lower intensity/duration events. It is important not to entirely discount the internally drained areas because under high storm intensity events runoff from these areas would contribute to Largon Lake.

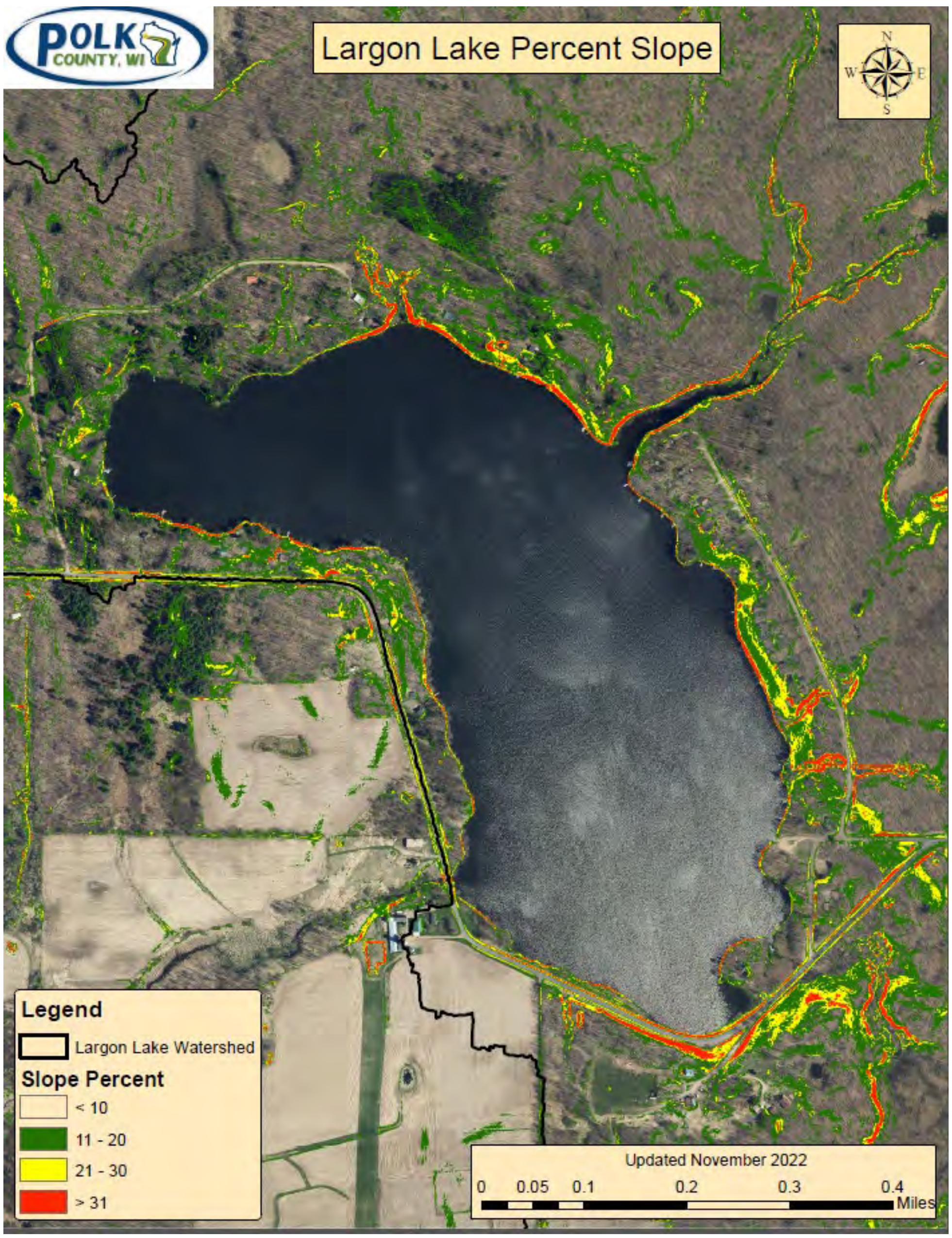
Areas Providing Water Quality Benefits to Largon Lake

Natural areas such as forests and wetlands allow for more infiltration of precipitation when compared with conventionally tilled row cropped fields and developed residential sites containing lawns, rooftops, sidewalks, and driveways. Dense vegetation lessens the impact of raindrops on the soil surface, thereby reducing erosion and allowing for greater infiltration of water. Additionally, wetlands provide extensive benefits through their ability to filter nutrients and allow sediments to settle out before reaching lakes and rivers. In the Largon Lake watershed 70% of the land use is forest and 7% is wetland.



Slope

Steep slopes occur in areas where the gradient of land is 10% or greater. Areas having steep slopes can be categorized into three levels: 11-20%, 21-30%, and greater than 30%. Steep slopes are vulnerable to soil erosion. A slope map can be used to prioritize areas that are prone to erosion and would benefit from establishment of perennial vegetation. Areas of likely gully erosion can also be identified from a slope map. Establishment of perennial vegetation will require landowner participation and in the case of gully erosion, it is likely an engineer would need to be hired to address problem areas.



Agricultural Land Use Inventory

An agricultural land use inventory was developed to establish a baseline understanding of the agricultural practices currently being used in the Largon Lake Watershed and to help identify conservation practices that could be adopted that would have a positive impact on water quality. An inventory conducted in the summer of 2021 documented the number and type of livestock present, type of crops being produced, and tillage practices used. A second inventory, conducted in the spring of 2022, documented the use of cover crops. The inventories identified 12% of the land use in the Largon Lake Watershed as agricultural (306 acres). A total of 45 fields were identified. Most fields (29) are entirely in the watershed. The remaining 16 fields are partially in the watershed.

Each inventory is a single year representation of the livestock, crops, and tillage practices currently present in the Largon Lake Watershed. The crops producers choose to grow, and the practices used to grow them, can change from year to year due to numerous factors such as commodity prices, livestock type, feed demand, equipment, and weather. Livestock numbers can fluctuate from year to year. However, producers are unlikely to switch between types of livestock they raise such as transitioning from dairy to beef animals.

Livestock Inventory

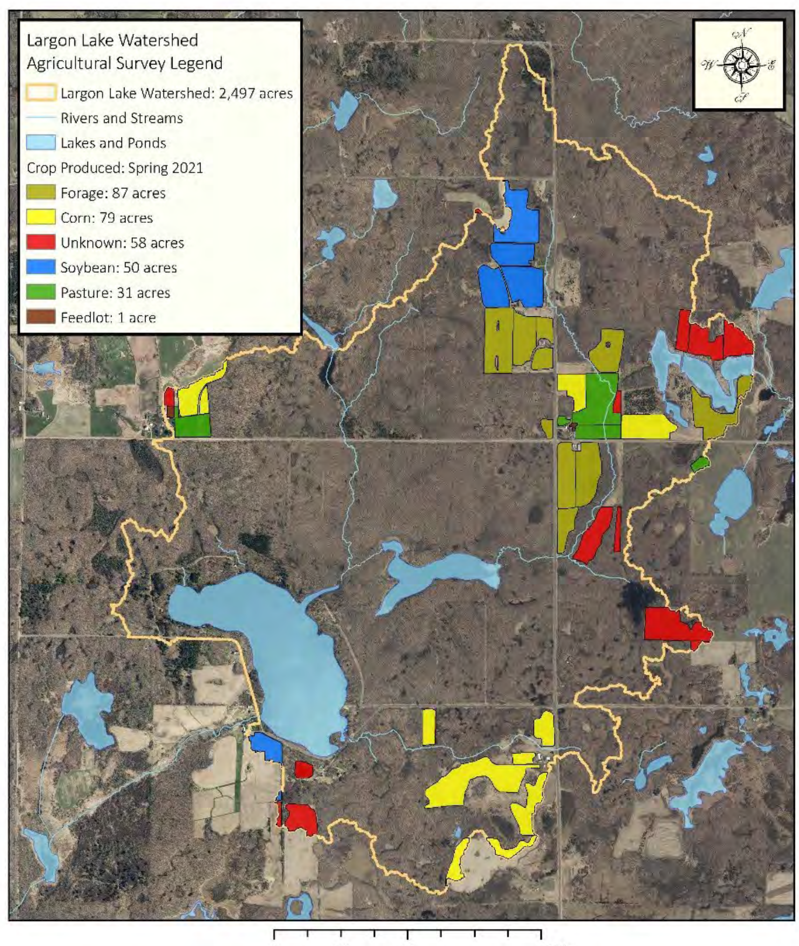
Raising livestock is common throughout the agricultural areas of Polk County. Livestock common in the area include cattle (dairy/beef), poultry (turkeys/chickens), pigs, sheep, and horses. The presence of livestock in a watershed can have an impact on water quality. The types of livestock present in a watershed often influence what crops are produced and how fields are managed. Cropland that receives manure is often tilled to help incorporate the manure into the soil, reduce nutrient runoff potential, and reduce odor. Different livestock species can be housed differently as well. Livestock may be housed inside a structure where their manure can be collected and spread on cropland where the nutrients can be used by the growing crop. Alternatively, livestock may be housed on open pasture or feedlots where manure is deposited on the landscape and more susceptible to surface runoff. Improper management of manure, pastures, and feedlot areas can present risks to water quality.

The Largon Lake Watershed has a few active livestock operations. The inventory identified 36 beef cattle (adult and young stock) in the watershed. All livestock were generally observed on open pasture. There are areas within the watershed (1 acre) that show signs of heavy animal use which prevents the establishment of vegetative cover. These heavy use feedlot areas may be contributing nutrient and sediment runoff to surface waters in the watershed. No manure storage facilities were observed in the watershed.

Livestock type in 2021	Quantity	Quantity (%)
Beef (adult)	31	86%
Beef (young stock)	5	14%
Total	**36**	**100%**

Crop Inventory

Largon Lake Watershed: 2021 Crop Inventory



A single agricultural field is typically managed using a crop rotation, where a series of different crops are grown over a period of years. Crop rotations common in Wisconsin include row crop rotations and livestock rotations. A typical row crop rotation might involve planting corn in odd numbered years and soybeans in even numbered years. A livestock rotation generally includes corn harvested for grain or silage, perennial vegetation such as alfalfa/grass that is harvested as a forage, and soybeans or small grain (wheat, rye). Over a seven-year period, a field in a livestock rotation might be planted in alfalfa for the first four years, followed by two years of corn, and one year of soybeans. On the eighth year the rotation would begin again, with four years of alfalfa. To determine the types of crop rotations being used in the Largon Lake Watershed, an inventory would need to span multiple years.

Different rotations have varying impacts on water quality based on the crops being grown and the tillage practices used. A rotation that incorporates perennial vegetation over several years of the rotation would have a lower potential to negatively impact water quality as compared to an excessively tilled field where only row crops are produced. The years of perennial vegetation production offer water quality benefits by eliminating several years of tillage and providing year-round vegetative cover that protects the soil from erosion.

Four crop categories were documented in the watershed: forage (87 acres), corn (79 acres), soybean (50 acres), and pasture (31 acres). The remaining agricultural land use consisted of unknown crop (58 acres), and feedlot (1 acre). Fields that could not be identified from the roadway were documented as unknown crop.

Crop grown in 2021	Acres	Acres (%)
Forage (grass/forbs primarily harvested mechanically)	87	28%
Corn	79	26%
Unknown (unable to determine due to obstructed view from roadway)	58	19%
Soybean	50	16%
Pasture (grass/forbs primarily harvested by livestock)	31	10%
Feedlot (bare soil due to animal activity)	1	<1%
Total	**306**	**100%**

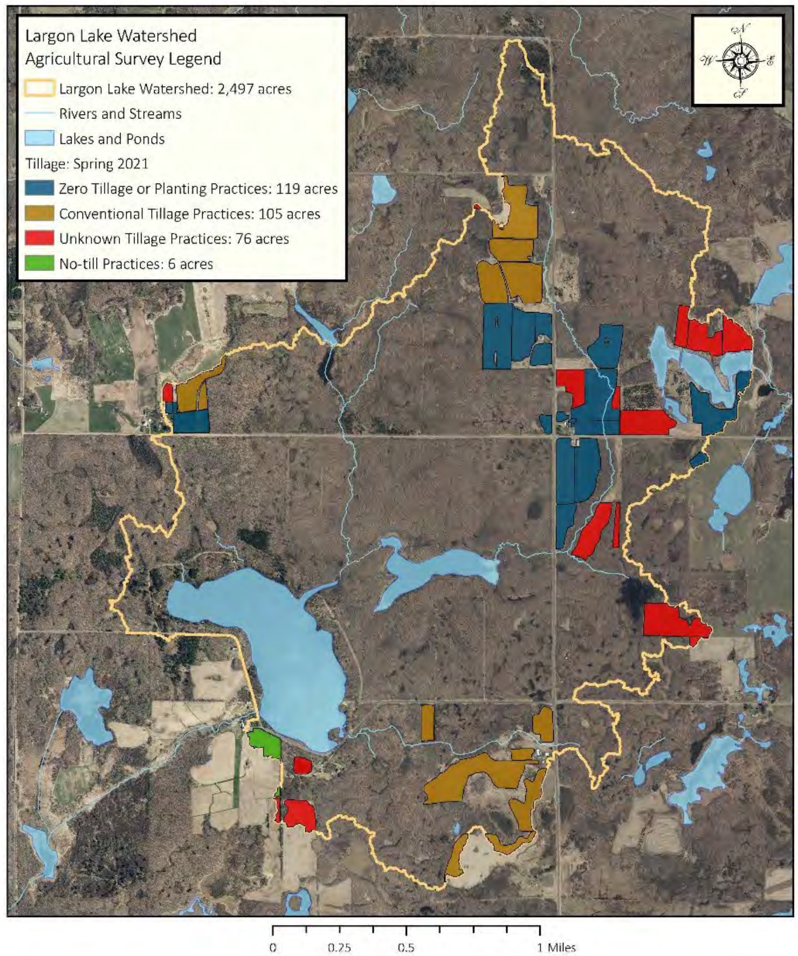
Tillage Practice Inventory

Soil tillage is a common agricultural practice used to mechanically loosen soil, incorporate crop residue and nutrients (fertilizer and manure), and prepare a suitable seed bed for planting a crop. Tillage breaks soil structure, inhibits the process of soil aggregation, and reduces surface crop residue. Soil is left exposed and more susceptible to the erosive forces of wind and water which increases the potential of soil erosion and nutrient runoff. Soil erosion from agricultural landscapes can be a major source of nutrients and sediment in lakes and rivers causing decreased water quality. No-till planting is a conservation practice where crops are grown without the use of tillage. The planter is outfitted with specialized equipment which allows the crop seed to be planted with no or minimal soil disturbance. No-till planting promotes soil health, increases soil biology, increases infiltration, and increases crop residue on the soil surface. Crop residue on the soil surface provides an armor like protection against the erosive forces of raindrops and flowing water.

The tillage inventory identified 119 acres where zero tillage or planting activities had occurred, 105 acres of conventional tillage, 76 acres where tillage practices were unknown and 6 acres of no-till. Fields that could not be identified from the roadway were documented as unknown tillage.

Row crop fields were more likely to use conventional tillage (81%) compared to no-till (5%).

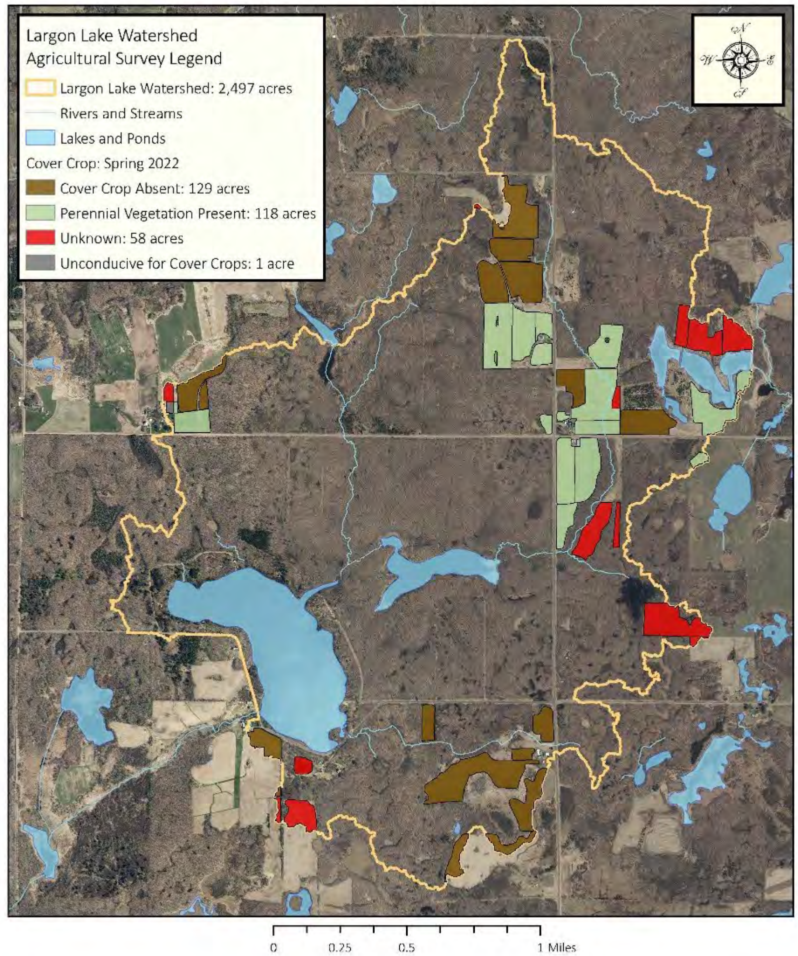
Largon Lake Watershed: 2021 Tillage Inventory



Tillage practice in 2021	Acres	Acres (%)
Zero tillage (field not tilled or planted, perennial forage or pasture vegetation established, and feedlot areas)	119	39%
Conventional tillage	105	34%
Unknown (unable to determine due to obstructed view from roadway)	76	25%
No-till	6	2%
Total	**306**	**100%**

Cover Crop Inventory

Largon Lake Watershed: 2022 Cover Crop Inventory



Planting cover crops is a conservation practice that can reduce agriculture's impact on water quality. Cover crops are plants that are grown outside of the main production crop specifically for their benefits to the soil or main crop. The primary benefit of cover crops is the reduction of erosion. Cover crops reduce erosion because the vegetation and roots protect the soil from early spring and late fall rains when the primary crop is not growing. Cover crops can increase infiltration, capture unused nutrients, build soil structure, promote soil bacteria and fungi growth, break compaction layers, suppress weeds, and provide many other benefits to the soil and environment. These benefits can lead to reductions in soil erosion, runoff, and nutrient loss from agricultural fields.

The cover crop inventory identified zero acres of cover crops in the spring of 2022. Fields that could not be identified from the roadway were documented as unknown.

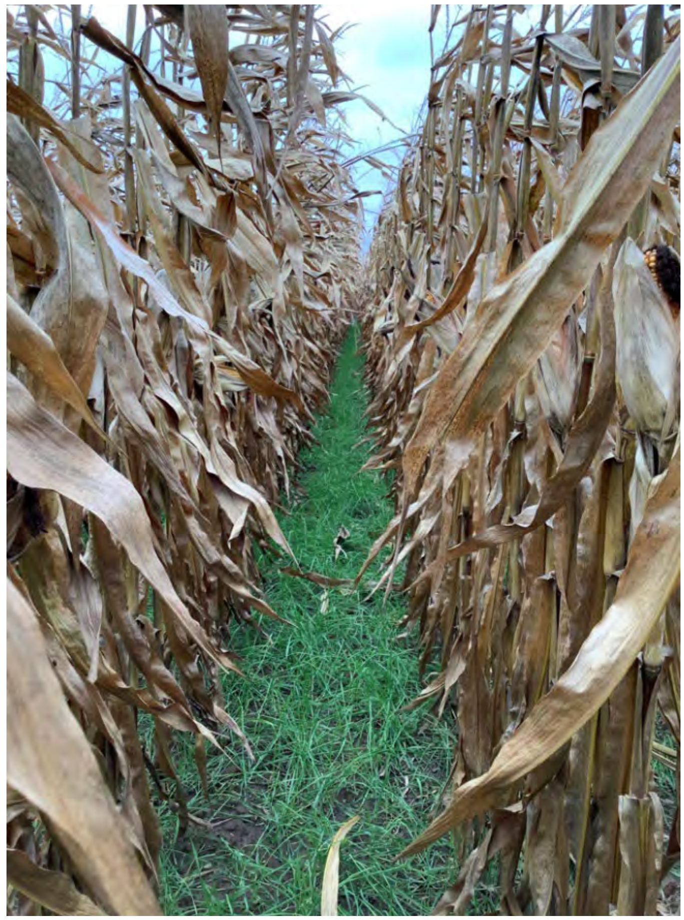
Cover crop in 2022	Acres	Acres (%)
Cover crop absent	129	42%
Perennial vegetation present (forage or pastureland)	118	39%
Unknown (unable to determine due to obstructed view from roadway)	58	19%
Unconducive for cover crops (feedlot)	1	<1%
Cover crop present	0	0%
Total	**306**	**100%**

Agricultural Land Use Summary

Row crops (corn and soybean) were the dominant agricultural commodity grown in the Largon Lake Watershed in 2021 (42% of the agricultural land). No-till was documented on 5% of row crop fields. No-till reduces the potential for nutrient loss and soil erosion, thus minimizing agriculture's impact on water quality. The photo to the left shows a typical tilled corn field with little surface residue and soil exposed to erosion. The photo to the right shows a no-till corn field with the soil protected from erosion by a layer of crop residue.

In 2021, a portion of the agricultural land in the watershed (39%) was in perennial (long term) vegetation (forage or pasture) where soil was not disturbed through tillage. The fields documented as pasture are likely never or vary rarely tilled and planted into row crops. Fields with perennial vegetation provide water quality benefits as compared to row crop fields. No cover crops were documented in the watershed. The absence of cover crops in the watershed is not entirely surprising. Cover crops are an emerging conservation practice that has many benefits but also many barriers to adoption. The adoption of cover crops would provide water quality benefits.

Agriculture's overall impact on water quality in the watershed can change on a yearly basis. These changes can be influenced by the type of crops grown, how those crops are managed, and environmental conditions (weather). This agricultural land use inventory represents a one-year snapshot of agricultural practices being used in the Largon Lake Watershed. The acres of no-till and cover crops may fluctuate annually based on multiple factors. Other barriers (equipment, agronomic, environmental, financial, social) may inhibit or prevent producers from implementing no-till, cover crops or other conservation practices. Future inventories could be used to gauge long term implementation and trends in practice adoption. Agricultural producers may also be using other practices to reduce erosion or nutrient loss that were not documented with this inventory.



Spreadsheet Tool for Estimating Pollutant Load (STEPL)

STEPL is a customizable spreadsheet-based model used to compute watershed surface runoff, nitrogen and phosphorus loads, and sediment delivery based on land use and management practices. The model calculates pollutant load reductions resulting from the implementation of different best management practices (BMPs). The land use and agricultural management data collected by the agricultural inventory was coupled with land use data and incorporated into STEPL to predict current nitrogen, phosphorus, and sediment loading from urban, cropland, pastureland, forest, feedlot, and user-defined land uses in the Largon Lake Watershed. User-defined land use includes agricultural fields planted to forage and non-agricultural grassland. Current pollutant loading based on land use and the current use of no-till is displayed in the table below. STEPL was then used to predict expected pollutant reductions that would result from the implementation of common agricultural BMPs some of which are outlined in the Agriculture Conservation Planning Framework section of the plan.

Current Loading with Reductions from No-till

Based on current land use and implementation of no-till, STEPL predicts annual loading in the Largon Lake Watershed to be 5,605 pounds of nitrogen, 2,410 pounds of phosphorus, and 630 tons of sediment. These loading numbers account for the 6 acres of no-till and zero acres of cover crops currently used in the watershed. The no-till acres produced reductions of 39 pounds of nitrogen, 30 pounds of phosphorus, and 10 tons of sediment. If these acres were converted back to conventional tillage, annual total loading would increase to 5,644 pounds of nitrogen, 2,440 pounds of phosphorus, and 640 tons of sediment.

Total Pollutant Load by Land Use (with current use of no-till as documented by agricultural inventory)

Sources	Land Use Area (acres)	N Load (lbs/year)	P Load (lbs/year)	Sediment Load (tons/year)
Urban	99	683	112	16
Cropland	187	2,211	1,201	389
Pastureland	31	244	54	15
Forest	1,657	588	354	57
Feedlots	1	1,346	269	0
User Defined	171	488	402	153
Septic	73 (systems)	45	18	0
Total Load		**5,605**	**2,410**	**630**

Agricultural BMP Per Acre Pollutant Reductions

STEPL was used to calculate pollutant reductions for nitrogen, phosphorus, and sediment on a per acre basis to help estimate potential reductions from the adoption of various agricultural BMPs. The reduction values in the following four tables can be used to calculate expected pollutant reductions for BMPs that are installed on cropland, pastureland, and feedlots in the Largon Lake Watershed.

To calculate pollutant reductions for an installed BMP, multiply the number of acres treated by the practice by the pounds per acre reduction value listed in the tables below. For example, if a 100-acre field is using conservation tillage, multiply the number of acres by 4.99 to get a total reduction of 499 pounds of phosphorus.

Example: Phosphorus reduction from 100 acres of conservation tillage.
100 acres x 4.99 lbs. of phosphorus/acre = 499 pounds of phosphorus reduced

	Pollutant Reductions		
Cropland BMPs	**Nitrogen (lbs/acre)**	**Phosphorus (lbs/acre)**	**Sediment (tons/acre)**
Buffer - grass (35ft wide)	5.4	3.42	1.14
Conservation tillage >=60% residue cover (no-till)	6.56	4.99	1.64
Contour farming	3.78	2.3	0.73
Cover crop 2 (traditional, normal planting time)	1.7	0.63	0.21
Cover crop 3 (traditional, early planting time)	2.43	1.27	0.43
Land retirement (taken out of crop production)	11.16	6.12	2.03
Nutrient management 1 (determined rate)	0.8	0.43	No Data
Nutrient management 2 (determined rate plus additional considerations)	1.29	0.53	No Data

When multiple BMPs are used in the same field there is a multiplier effect that increases the pollutant reduction efficiencies. Two practices are better than each practice individually. STEPL's BMP calculator was used to calculate combined BMP efficiencies which were used to determine per acre reductions when using multiple BMPs on cropland. Combined cropland BMP reductions can be found in the following table. If multiple BMPs are used on the same field, the combined BMP pollutant reductions numbers need to be used to calculate pollutant reductions.

	Pollutant Reductions		
Cropland Combined BMPs	**Nitrogen (lbs/acre)**	**Phosphorus (lbs/acre)**	**Sediment (tons/acre)**
Conservation tillage (no-till) + contour farming	8.18	5.5	1.81
Conservation tillage (no-till) + cover crop 2	7.48	5.15	1.69
Conservation tillage (no-till) + nutrient management 1	7.16	5.12	1.64
Conservation tillage (no-till) + buffer - grass (35ft wide)	8.72	5.81	1.9
Cover crop 2 + nutrient management 1	2.35	1.03	0.21
Cover crop 2 + buffer - grass (35ft wide)	6.40	3.72	1.24
Cover crop 2 + contour farming	4.97	2.71	.087
Nutrient management 1 + buffer - grass (35ft wide)	5.93	3.66	1.14
Conservation tillage (no-till) + cover crop 2 + nutrient management 1	7.97	5.27	1.69
Conservation tillage (no-till) + cover crop 2 + nutrient management 1 + buffer - grass (35ft wide)	9.61	5.95	1.93
Conservation tillage (no-till) + contour farming + cover crop 2 + nutrient management 1 + buffer - grass (35ft wide)	10.33	6.17	2.0

Pollutant reduction numbers were also calculated for BMPs installed on pastureland and feedlots. These per acre reduction numbers can be found in following two tables.

	Pollutant Reductions		
Pastureland BMPs	**Nitrogen (lbs/acre)**	**Phosphorus (lbs/acre)**	**Sediment (tons/acre)**
Critical area planting	1.75	0.63	0.2
Grass buffer (minimum 35 feet wide)	6.49	1.18	0.31
Grazing land management (rotational grazing with fenced areas)	2.73	0.13	No Data
Heavy use area protection	1.67	0.51	0.16
Livestock exclusion fencing	2.24	0.93	0.30
Pasture and hay-land planting (forage planting)	1.15	0.07	No Data
Prescribed grazing	3.1	0.53	0.16

	Pollutant Reductions		
Feedlot BMPs	Nitrogen (lbs/acre)	Phosphorus (lbs/acre)	Sediment (tons/acre)
Diversion	605.55	188.39	No Data
Filter strip	No Data	228.76	No Data
Waste storage facility	874.68	161.48	No Data

Some BMP pollutant reduction values could not be calculated with STEPL. Additional site-specific data would need to be collected to calculate reductions from practices like water and sediment control basins and grass waterways.

STEPL Loading and Reduction Percentage Considerations

In this study STEPL and WiLMS were both used to determine an external phosphorus load to Largon Lake. WiLMS and STEPL each provide unique information that is useful for watershed planning. WiLMS is able to estimate necessary phosphorus reductions to meet water quality standards while STEPL is able to estimate the predicted phosphorus reductions achieved through the implementation of conservation practices. The models predict different total phosphorus loads because WiLMS and STEPL use different watershed specific inputs. For this reason, percent reduction values are used to associate the outputs of WiLMS and STEPL to model improvements in water quality.

WiLMS modeling determined the external phosphorus load to Largon Lake as 454 pounds of phosphorus per year and determined that to meet water quality standards, the total load to Largon Lake would need to be reduced by 194 pounds (37% reduction). STEPL determined the external phosphorus load to Largon Lake as 2,410 pounds of phosphorus per year. Applying the 37% reduction to the predicted external phosphorus loads in STEPL (892 pounds) allows stakeholders to determine if the implementation of agricultural best management practices will achieve water quality standards.

Load Reduction Goals and Conservation Practice Adoption

STEPL was used to predict pollutant load reduction percentages assuming the use of no-till planting was adopted on all cropland that was conventionally tilled in 2021. Fields documented as unknown crop were not considered for the following calculations. Based on the agricultural inventory, an additional 123 acres of cropland were suitable for no-till planting and cover crop practices in the spring of 2021. If no-till was adopted on these additional acres, it would result in a 25% reduction in phosphorus loading in the watershed. If cover crops were adopted on these additional acres, it would result in a 3% reduction. If cover crops and no-till were both adopted a 26% phosphorus reduction would be achieved (phosphorus percent reduction from multiple practices are not cumulative). Converting all known row crop acres to no-till and cover crops would not achieve the 37% phosphorus reduction goal determined by WiLMS modeling. Additional BMPs would be needed to meet phosphorus reduction goals.

Agriculture Conservation Planning Framework

The Agriculture Conservation Planning Framework (ACPF) is a toolbox in ArcMap used to identify and prioritize conservation practices on the landscape at a watershed scale. ACPF uses high resolution LiDAR elevation data and a user supplied culvert inventory to determine flow paths on the landscape. Once the flow paths are created, the program prescribes conservation practices on the landscape based on slope, soils, field boundaries, and proximity to flow paths. This program is agriculture based so the practices suggested are designed for and located within agricultural fields.

ACPF was used to identify and prioritize agricultural conservation practices within the Largon Lake Watershed. The program prescribes water and sediment control basins, contour buffer strips, grass waterways, nutrient removal wetlands, and farm ponds. The Largon Lake Watershed is in a unique part of Polk County where agriculture is not the dominant land use. The Largon Lake Watershed only has 46 fields (306 acres), with 11 being split on the watershed boundary. With a limited amount of agriculture in a small watershed, ACPF identified grassed waterways as the only appropriate conservation practice for implementation in the Largon Lake Watershed. ACPF was also used to determine field runoff risk potential for the 46 fields in the Largon Lake Watershed.

The summary of the ACPF results will include an explanation of the ACPF output, in-field examples, and the number of potential practices identified within the Largon Lake Watershed. ACPF ranks practices based on priority, with adjustable criteria. Distance to stream and field runoff risk were used to rank the priority level of conservation practices in the Largon Lake Watershed. The practices displayed will be color coordinated based on priority, with green being lowest, yellow being moderate, and red being highest priority.

The outputs of ACPF allow for the prioritization of conservation practices that reduce runoff, erosion, and nutrient/sediment loading to surface waters. It is important to consider all the outputs of ACPF because the implementation of agricultural best management practices requires landowner participation and can directly impact the yield and economics for an agricultural system. Implementation of best management practices may not be possible on the highest priority areas, so it is important not to overlook lower ranked areas because they will still result in a positive impact.

Exact locations of potential practices will not be included in this report to ensure the anonymity of landowners. Information regarding site locations and landowner information will be kept for internal use with Polk County Land and Water Resources Department. Any practices suggested with this tool should be field verified.

Grass waterways

Grass waterways are installed within an agricultural field where there is a high probability of concentrated runoff. Grass waterways are planted with perennial grasses and are maintained in permanent vegetation. Installing grass waterways in areas where concentrated water flows through a field ensures that water is moving within a vegetated flow path (rather than over bare soil) which reduces the velocity of water and the risk of erosion and gully formation. The deep roots of the grasses keep the soil in place and reduce the amount of soil being transported by water in a runoff event. Grass waterways do not trap and store water or sediment; rather, they are reducing sediment loss where erosion and runoff has a high probability of occurring.

ACPF identified 25 locations within the Largon Lake Watershed where grass waterways could be implemented. This tool considers many different possibilities when prioritizing the locations of grass waterways.

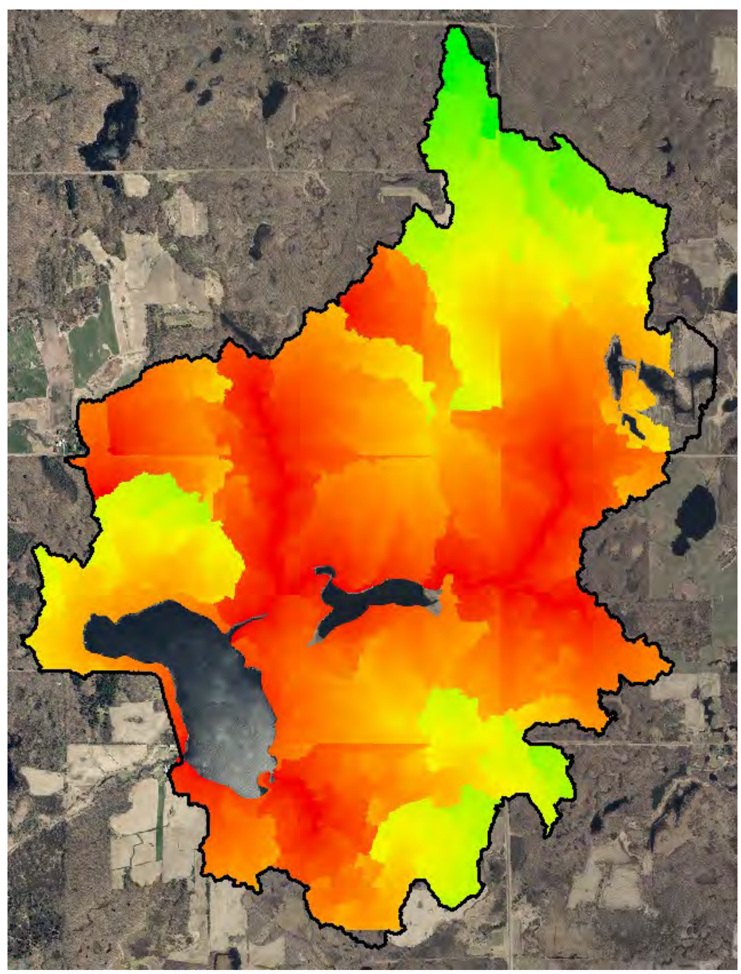
The image on the right shows an example of two moderate concern grass waterways located in the same field within the Largon Lake Watershed. By implementing the larger grass waterway, much of the runoff associated with the field will flow through the waterway, reducing soil erosion and gully formation. No high concern waterways were identified by ACPF, meaning that the moderate concern sites should receive the greatest priority. A site visit would be required to verify the site is suitable and would consider ACPF results, crop type, and crop rotation.

<u>Field runoff risk</u>

This tool is used to identify areas of concern by ranking agricultural fields based on their runoff risk. This tool takes into consideration slope, soil type, and land use classification (row crop or pasture). Based on field runoff risk, 1 field was considered very high risk (red), 5 were considered moderate risk (yellow), and the remaining fields are considered low risk (green). The results of this tool identify fields that would benefit the most from implementation of conservation practices or cover crops.

<u>Distance to stream</u>

The distance to stream output uses flow direction, stream reach, and slope to determine relative risk of sediment delivery to Largon Lake. The tool ranks the land in the watershed according to the distance from the main streams in meters. The distance to stream is displayed on a scale from red to green, with red areas being closest to the streams entering Largon Lake and green areas being furthest from the streams entering Largon Lake.



The distance to stream map is used to prioritize where to implement conservation practices, with areas in red being the most critical for implementation. Even though the green areas are the farthest from the stream and likely have the lowest impact, they should not be overlooked. Implementation in the green areas could still be important and beneficial.

Pontoon Classroom

A pontoon classroom to learn about the study completed on Largon Lake, was offered to members of the Largon Lakes Protection and Rehabilitation District. The pontoon classroom was held on August 19th, 2022, with five district members in attendance. The tour included plant identification, sampling procedures, equipment used, and general information about lakes.

Two individuals from the District were unable to attend the classroom on August 19th so the Land and Water Resources Department offered a second pontoon classroom on September 23rd, 2022 which doubled as an AIS CLMN Training.

Polk County Ordinances

One way the Polk County Board establishes policy is by adopting ordinances. Ordinances are local laws prescribing rules of conduct and are enforced by county officials. Ordinances become a permanent part of the governmental code and may be amended from time to time. Once policy has been approved by the county board of supervisors through plans, budgets, ordinances, and resolutions, it is the responsibility of county staff to implement the decisions of the board. Ordinances relevant to the Largon Lake Management Plan, 2023-2033 are administered by the Land and Water Resources Department and the Department of Land Information Zoning and are briefly summarized below.

Land and Water Resources Department

Manure and Water Quality Management Ordinance

The purpose of this ordinance is to enhance public health, prosperity, and welfare by protecting ground and surface water resources by promoting the proper storage and management of animal waste, including the prohibitions found in NR151.08.

Storm Water Management and Erosion Control Ordinance

The general purpose of this ordinance is to establish regulatory requirements for land development and land disturbing activities aimed to minimize the threats to public health, safety, welfare, and the natural resources in Polk County from construction site erosion and post-construction storm water runoff.

Nonmetallic Mining Reclamation Ordinance

The purpose and goal of this ordinance is to ensure the effective reclamation of nonmetallic mining sites after mining operations have ceased. This ordinance adopts and implements the uniform statewide standards for nonmetallic mining reclamation required by Section 295 of Wisconsin Statute and contained in Wisconsin Administrative Code NR 135. The ordinance in effect means that any proposed nonmetallic mining site (sand, gravel, or other nonmetallic minerals) is required to receive an approved reclamation permit to begin nonmetallic mining operations in Polk County. The permit also requires the development of an approved site-specific reclamation plan and for the operator to post financial assurance to guarantee the completion of reclamation.

Illegal Transport of Aquatic Plants and Invasive Animals Ordinance

The purpose of this ordinance is to prevent the spread of aquatic invasive species in Polk County and surrounding waterbodies to protect property values and the property tax base and ensure quality recreational opportunities. It requires all plants and invasive animals be removed from a boat and trailer prior to entering a public roadway. In 2021 this ordinance was amended to include decontamination. The ordinance now requires decontamination of watercraft if a decontamination station is present at the boat landing. The Largon Lake boat landing does not currently have a decontamination station.

Land Information-Zoning

<u>Comprehensive Land Use Ordinance</u>

The purpose of this ordinance is to promote and protect public health, safety, and other aspects of the general welfare. Further purposes of this ordinance are to: aid in the implementation of provisions of the county comprehensive plan; promote planned and orderly land use development; protect property values and the property tax base; fix reasonable dimensional requirements to which buildings, structures, and lots shall conform; prevent overcrowding of the land; advance uses of land in accordance with its character and suitability; provide property with access to adequate sunlight and clean air; aid in protection of groundwater and surface water; preserve water quality, shorelands, and wetlands; protect the beauty of landscapes; conserve flora and fauna habitats; preserve and enhance the county's rural characteristics; protect vegetative shore cover; promote safety and efficiency in the county's road transportation system; define the duties and powers of certain county officers and administrative bodies relative to the application, administration, and enforcement of the ordinance; and prescribe penalties in the form of civic forfeitures for violations of this ordinance and to facilitate enforcement of the provisions of this ordinance by injunctive relief.

<u>Shoreland Protection Ordinance</u>

The purpose of this ordinance is to ensure the proper management and development of the shoreland of all navigable lakes, ponds, flowages, rivers, and streams in the unincorporated areas of Polk County. The intent of these regulations is to further the maintenance of safe and healthful conditions; prevent and control water pollution; protect spawning ground for fish and aquatic life; control building sites, placement of structures, and land uses; and preserve shore cover and natural beauty.

<u>Private Sewage System Ordinance</u>

The underlying principles of this ordinance are basic goals in environment, health, and safety accomplished by proper siting, design, installation, inspection, maintenance, and management of private on-site waste treatment systems and non-plumbing sanitary systems.

Subdivision Ordinance

The purpose of this ordinance is to regulate and control subdivision development within Polk County to promote public health, safety, general welfare, water quality, and aesthetics. This purpose can be accomplished by requiring an orderly layout and use of land, providing safe access to highways, roads, and streets, facilitating adequate provision of water, sewer, transportation and surface drainage systems and parks, playgrounds, and other public facilities.

Lower St. Croix Riverway Ordinance

The purpose of this ordinance is to promote the public health, safety, and general welfare of the public by: reducing the adverse effects of overcrowding and poorly planned shoreline and bluff area development; preventing soil erosion, pollution, and contamination of surface water and groundwater; providing sufficient space on lots for sanitary facilities; minimizing flood damage; maintaining property values; and preserving and maintaining the exceptional scenic, cultural, and natural characteristics of the water and related land of the Lower St. Croix Riverway in a manner consistent with the National Wild and Scenic Rivers Act, the Federal Lower St. Croix River Act of 1972, and the Wisconsin Lower St. Croix River Act.

Floodplain Ordinance

This ordinance is intended to regulate floodplain development to minimize the potential for damage, the expenditure of public funds for flood control projects, and interruptions to businesses or other land uses.

Related Plans

The Largon Lake Management Plan is meant to direct the activities of the Largon Lake District through the development of goals, objectives, and activities for a ten-year period. However, the planning process is not unique to Largon Lake and many organizations have plans with goals, objectives, and activities which are related to or align with those of the Largon Lake Management Plan.

Lake St. Croix Total Maximum Daily Load (TMDL) Implementation Plan, 2013

The Lake St. Croix TMDL plan calls for a 38% reduction in the human-caused phosphorus carried to the rivers and streams of the basin, and eventually entering the St. Croix River and Lake St. Croix. The TMDL sets goals for each watershed in the basin, based on land cover and land uses practices. It also sets a cap on the amount of phosphorus that can be discharged each year by wastewater treatment plants serving communities and industries in the St. Croix Basin. Polk County's phosphorus load is 160,976 pounds of phosphorus per year, which is the largest of any county in the basin.

Subwatershed	Acres in Basin	Loading (lbs/year)	TMDL Load Reduction
Apple	303,298	84,087	28,493
Clam	74,533	14,393	3,733
Trade	60,563	11,607	3,098
Trout	46,172	14,599	5,099
Willow	26,821	9,055	3,350
Wolf	69,725	21,339	7,310
Wood	24,301	5,897	1,676

The Apple Lake (formerly Squaw Lake), Lake Mallalieu, and Cedar Lake TMDL also exist within the boundary of the St. Croix Lake TMDL. The Apple Lake and Cedar Lake TMDL boundary includes land in Polk and St. Croix County and the Lake Mallalieu TMDL includes land in St. Croix, Polk, and Barron County.

Agriculture and Farmland Preservation Plan, 2014

Under Chapter 91, a county must have a certified farmland preservation plan. The Polk County Agricultural and Farmland Preservation Plan identifies the county's goals and policies related to farmland preservation and agricultural development. The plan also identifies farmland preservation areas, agricultural enterprise areas, and areas for development within the next 15 years.

Polk County Aquatic Invasive Species Strategic Plan, 2021-2025

This plan provides an overview of aquatic invasive species in Polk County and includes an implementation plan to direct aquatic invasive species work. Plan goals include:

Goal 1. Prevent the introduction, establishment, and spread of AIS in Polk County waterbodies
Goal 2. Control populations of aquatic invasive species
Goal 3. Monitor Polk County waterbodies for AIS and document results
Goal 4. Provide AIS information and education in Polk County and surrounding areas
Goal 5. Sustain the implementation of the plan

Polk County Comprehensive Plan, 2009-2029

The Polk County Comprehensive Plan presents a vision for the future of Polk County, with long-range goals, objectives, and policies for housing, transportation, utilities and community facilities, economic development, intergovernmental cooperation, land use, energy and sustainability, and agricultural, natural, and cultural resources.

St. Croix-Red Cedar Cooperative Weed Management Area Strategic Management Plan, 2017

The St. Croix Red Cedar (SCRC) Cooperative Weed Management Area (CWMA) is a partnership of local, state, tribal, and federal agencies, businesses, nonprofits, community organizations, and individuals. Formed in 2013, the group combats invasive species in Washburn, Barron, Burnett, Polk, and St. Croix Counties. The SCRC CWMA fosters multi-generational awareness of invasive species and works to prevent and limit their intrusive impacts through partnerships.

Polk County Outdoor Recreation Plan, 2020-2024

This plan assesses the existing recreation system in Polk County, identifies recreation needs based upon public input and recreation standards, sets forth goals and objectives to be used as guidelines in formulating recreation plans, and establishes recommendations for improving the recreation system over the next four years.

Polk County Forest Comprehensive Land Use Plan, 2021-2035

The Polk County Forest Comprehensive Land Use Plan seeks to use sustainable forest management practices to protect forestry resources for present and future ecological and socioeconomic needs.

State of the St. Croix Basin, 2002

The Wisconsin Department of Natural Resources prepared the State of the St. Croix Basin in March 2002. The report describes the status of land and water resources in the Wisconsin portion of the basin. Goals for the St. Croix Basin include maintaining and improving water and air quality; maintaining diverse, rich shoreland habitat; preserving large contiguous blocks of forestland; working with the agricultural community to minimize non-point runoff; and working with cities, villages, towns, and counties to help stem urban sprawl.

St. Croix National Scenic Riverway Management Plans

A Cooperative Management Plan was completed for the Lower St. Croix National Scenic Riverway in 2002 and a General Management Plan for the Upper St. Croix and Namekagon Rivers was completed in 1998. The plans describe the direction the National Park Service intends to follow to manage the upper and lower riverways for the next 20 - 25 years.

Polk County Land and Water Resource Management Plan, 2020-2029

In 1997, a County Land and Water Resource Management Planning Program was created through amendments to Chapter 92.10 of the Wisconsin Statutes in Wisconsin Act 27. Act 27 directed the Wisconsin Department of Natural Resources (WDNR) to prescribe performance standards and prohibitions that farms in Wisconsin need to meet to reduce non-point source pollution and improve water quality. Act 27 also directed the Wisconsin Department of Agriculture, Trade and Consumer Protection (WDATCP) in conjunction with the WDNR to promulgate rules that prescribe technical standards and best management practices agriculture producers must follow to meet the performance standards. In October 2002, the rules were promulgated into law. WDNR administrative code NR 151 identifies the agricultural and urban performance standards for Wisconsin and WDATCP administrative code ATCP 50 sets the technical standards that agriculture producers will need to follow to implement the performance standards. County Land and Water Resource Management Plans are the local mechanism to implement NR 151. Plan goals include:

Goal 1. Protect and improve the water quality of lakes, rivers, and streams
Goal 2. Protect and improve groundwater quality and quantity
Goal 3. Sustain and enhance land resources
Goal 4. Support and develop community stewardship and partnerships to improve our natural resources

Lake Management Plans

Lake studies identify challenges and threats to a lake's health along with opportunities for improvement. These studies identify practices already being implemented by watershed residents to improve water quality and areas providing benefits to a lake's ecosystem. Additionally, these studies quantify practices or areas on the landscape, or within the lake, that have the potential to negatively impact the health of a lake and identify best management practices that can improve the health of a lake.

The product of most lake studies is a lake management plan which identifies goals, objectives, and action items to either maintain or improve the health of a lake. These goals should be realistic based on inherent lake and watershed characteristics (lake size, depth, land use, etc.) and should align with the goals of watershed stakeholders. Lake management plans are designed to be working documents that are used to guide the actions that take place to manage a specific lake. Additionally, having an approved lake management plan allows lake organizations to apply for WDNR funding to implement improvement projects. WDNR approved Comprehensive Lake Management Plans are usually written for a ten-year timeframe and exist for many Polk County lakes.

Aquatic Plant Management Plans

In many cases an Aquatic Plant Management Plan is required to apply for a permit to remove, add, or control aquatic plants. Generally, Aquatic Plant Management Plans describe the lake, present the aquatic plant management circumstances for a lake, and propose goals and actions for managing aquatic plants in the lake. WDNR approved Comprehensive Aquatic Plant Management Plans are usually written for a five-year timeframe and exist for many Polk County lakes.

Priority Watershed Plans

Priority watershed plans have been completed for the Balsam Branch Watershed, Horse Creek Watershed, and the Osceola Creek Watershed. Priority watershed planning provided a funding mechanism in the 1980s to begin implementing water quality and habitat improvement activities in these watersheds. Through the Priority Watershed Planning program, the WDNR ranked watersheds for nonpoint source problems to identify high priority areas under the state's Nonpoint Source Pollution Abatement Program. Today the WDNR uses these watershed and waterbody rankings to direct funding decisions in the Targeted Runoff Management Grant Program and identify specific work tasks needed in the watershed.

Implementation Plan Development

Lake management plans help protect natural resource systems by encouraging partnerships between concerned citizens, lakeshore residents, watershed residents, agency staff, and diverse organizations. They identify concerns of importance and set realistic goals, objectives, and action items to address each concern. Additionally, lake management plans identify roles and responsibilities for meeting each goal and provide a timeline for implementation.

Lake management plans are living documents which are under constant review and adjustment depending on the condition of a lake, available funding, level of volunteer commitments, and the needs of lake stakeholders.

The vision statement, guiding principles, and lake management plan goals presented below were created through collaborative efforts using current and past water quality data and a series of four meetings by the Largon Lake District Plan Committee held in 2023. Key study details were presented to the Largon Lake District over the course of the project and were included in a Largon Lake handbook which was distributed to Largon Lake Protection and Rehabilitation District members at the 2023 District Annual Meeting.

The draft plan was posted on the Polk County Land and Water Resources Department website and opened for a 30-day public comment period ending on April 19, 2023. A notice of public comment was published in the Inter-County Leader and the Cumberland Advocate on March 15, 2023. There were zero public comments received. The plan was approved by the Largon Lakes Protection and Rehabilitation District on July 21, 2023 and approved for grant eligibility by the Wisconsin Department of Natural Resources on XXX.

Implementation Plan

Vision An overall statement for what you want Largon Lake to look like

Largon Lake is a healthy lake that will be removed from the Impaired Waters list that provides habitat for fish and wildlife while providing peace, tranquility, and recreational opportunities to all that use and enjoy the lake.

Goal 1. Improve the overall health of Largon Lake
Goal 2. Increase natural beauty and habitat for wildlife and fish on Largon Lake
Goal 3. Use multiple strategies to ensure the goals of the plan are met

Acronyms used for partners in the following implementation table

LLPRD = Largon Lakes Protection and Rehabilitation District
TM = Town of McKinley
WDNR = Wisconsin Department of Natural Resources
LWRD = Polk County Land and Water Resources Department
ZON = Polk County Zoning Department
CON = Consultant

Acronyms used for funding sources in the following implementation table

EPG = WDNR Education and Planning Grant Program, funds 67% of eligible project costs
MPIG = WDNR Management Plan Implementation Grant Program, funds 75% of eligible project costs
SWMG-HL = WDNR Healthy Lakes Grant Program, funds 75% of eligible project costs
AISCG = WDNR Aquatic Invasive Species Control Grant Program, funds 75% of eligible project costs

Goal 1. Improve the overall health of Largon Lake

This goal will be met when Largon Lake is removed from the Impaired Waters List: average total phosphorus is less than 40 µg/l and chlorophyll a is less than 20 µg/l for 70% of the days during the sampling season

A. Partner with shoreline residential property owners to install shoreline best management practices (BMPs) including native plantings, rain gardens, diversions, and rock infiltration projects to reduce phosphorus entering Largon Lake
    1. Use special meetings, the annual meeting, and other communications to provide information on shoreline BMPs and to encourage property owners to install BMPs
    2. Identify property owners interested in installing BMPs
    3. Make site visits with a consultant available to property owners interested in installing BMPs
    4. Apply for a Healthy Lakes Grant or Management Plan Implementation Grant to fund BMP installation
    5. Install WDNR Healthy Lakes signs at Healthy Lakes project sites
    6. Offer tours of properties where Healthy Lakes practices have been installed to generate interest in BMP installation
    7. Recognize property owners who have installed BMPs

B. Partner with the Town of McKinley to install BMPs at the Largon Lake Boat Landing that will reduce phosphorus entering Largon Lake
    1. Work with the Town of McKinley and/or a consultant to design BMPs to reduce phosphorus entering Largon Lake at the boat landing
    2. Explore grant funding to assist with BMP installation at the boat landing
    3. Use signage and other means to highlight practices implemented at the boat landing to promote shoreline BMP installation

C. Implement practices to slow the flow of water and/or reduce soil loss and erosion associated with the culverts on Largon Lake Court
    1. Partner with the Town of McKinley to determine a plan to replace the culverts on Largon Lake Court and discuss opportunities for rock riprap channel protection, a drop structure, and/or a water and sediment control basin
    2. Partner with the Town of McKinley and/or a consultant to design and implement BMPs to address erosion at the culvert sites on Largon Lake Court
    3. Request property owners along the culvert outflows to divert water away from the outflows using rain gutters/barrels, diversions, or infiltration projects
    4. Apply for a Management Plan Implementation Grant to address soil loss and erosion associated with the culverts on Largon Lake Court

D. Upgrade non-compliant septic systems near Largon Lake
   A 2022 septic system inventory determined that 17% of the systems near the lake were out of compliance.
    1. Develop and deliver an educational message regarding the relationship between non-compliant septic systems and water quality
    2. Partner with shoreline property owners with non-compliant systems to bring their system back into compliance (pump or replace)
    3. Apply for a Management Plan Implementation Grant to replace non-compliant systems

E. After steps have been taken to reduce phosphorus entering Largon Lake from shoreline properties, build relationships with agricultural landowners to increase awareness of grant funding for BMPs that will reduce phosphorus reaching the Lake
    1. Partner with the Polk County Land and Water Resources Department (LWRD) to communicate with agricultural landowners in the Largon Lake Watershed through a mailing
    2. Provide agricultural landowners with information on the progress that has already been taken to reduce phosphorus entering Largon Lake and provide an action plan that allows producers to reach out to LWRD or the District if they are interested in funding for implementing BMPs
    3. Invite agricultural landowners in the watershed to Lake District meetings
    4. Recognize agricultural landowners who have taken steps to reduce phosphorus from reaching Largon Lake

F. Reduce sediment disturbance and shoreline erosion on Largon Lake
    1. Update the kiosk at the boat landing to include signage to ensure residents and visitors are aware of the slow-no-wake regulations within 100 feet of the shoreline for boats and within 200 feet of the shoreline for personal watercrafts
    2. Provide education on slow-no-wake regulations at the annual meeting

Goal 2. Increase natural beauty and habitat for wildlife and fish on Largon Lake

A. Expand habitat for wildlife and fish
   1. Maintain the winter aeration system on Largon Lake
   2. Increase native plants on the shoreline of Largon Lake, see goal 1A
   3. Work with DNR fisheries biologist to identify locations for habitat additions (fish sticks, fish cribs, etc.)
      Fish sticks are a grant eligible project through the Healthy Lakes Program
   4. Partner with DNR to explore Northern Pike management

B. Prevent the establishment of aquatic invasive species (AIS)
   1. If a new AIS is found on the lake, research and implement control options
   2. Partner with LWRD to ensure that the local AIS ordinance sign and state prevention AIS sign at the boat landing are maintained in good condition
   3. Update the kiosk at the boat landing to include an AIS educational message
   4. Consider installing a decontamination station at the boat landing to provide tools for cleaning boats and trailers
   5. Explore opportunities to participate in statewide AIS education initiatives such as the Drain Campaign and Landing Blitz
      Contact LWRD for support with these WDNR statewide programs

C. Monitor for new aquatic invasive species
   1. Maintain a volunteer to participate in the AIS Citizen Lake Monitoring Network Program
      LWRD provides training and materials from WDNR for this statewide program
   2. Ensure that lake residents and visitors know how to identify common AIS and where to report new findings
      New findings can be reported to LWRD or a lake contact can be designated

Goal 3. Use multiple strategies to ensure the goals of the plan are met

A. Form committees to implement the goals of the plan
   1. Identify current and future barriers to implementing goals
   2. Seek funding to implement goals
   3. Report actions completed, in progress, or not completed to the Lake District Board and Lake District members
   4. Adapt the plan as new issues arise

B. Evaluate the progress of lake management efforts through data collection efforts
   1. Ensure that a volunteer continues to be in place to collect secchi disk data each year on Largon Lake
   2. Add total phosphorus and chlorophyll a sampling for Largon Lake
   3. Collect data for secchi depth, total phosphorus, and chlorophyll a on Little Largon Lake
   4. Repeat the 2021-2022 water quality study in ten years to determine impacts of BMP installation and plan implementation

C. Communicate with lake stakeholders using the information and education strategy

Information and Education Strategy

The information and education strategy includes target audience, methods used to reach the target audience, and messages to convey. The District will determine a key issue of focus each year. Information and education efforts will begin at the annual meeting and continue throughout the year using additional methods.

<u>Target audience</u>

- *Shoreline property owners*
- *Property owners in the Largon Lake Watershed*
- *Lake visitors*
- *Local government: Town and County*

<u>Methods to reach the target audience</u>

- *Presentations and trainings at Lake District Board and Annual Meetings*
- *Attendance at Town of McKinley and Polk County meetings*
- *Signs/information at the boat landing*
- *Brochures (existing and newly designed)*

- *Site visits, technical assistance, and offer of financial assistance to lakeshore and watershed property owners interested in implementing BMPs*
- *Recognition of landowners implementing practices to improve Largon Lake*
- *Tours and demonstration sites highlighting BMPs*

<u>Messages to convey</u>

Messages to engage stakeholders in improving water quality by increasing their understanding of the importance of installing BMPs to reduce phosphorus

- *Phosphorus is the nutrient responsible for excessive plant and algae growth in Largon Lake*
- *Major sources of phosphorus to a lake include lawn and agricultural fertilizers, soil erosion, human and animals waste, and runoff from the landscape*
- *In Wisconsin, the use of fertilizers containing phosphorus are prohibited for closely mowed managed grass with limited exceptions (establishment of new lawn or a soil test showing phosphorus deficiency)*
- *Natural shorelines and vegetated surfaces limit the amount of runoff, soil erosion, and amount of phosphorus that reaches Largon Lake*
- *Erosion control practices associated with new development reduce runoff, erosion, and phosphorus*
- *Non-compliant septic systems can negatively impact lake water quality*
- *Cover crops, ground cover, and reduced tillage limit runoff, erosion, and phosphorus from agricultural landscapes*
- *Wetlands filter sediment and nutrients (including phosphorus) from runoff*
- *BMPs exist to reduce the harmful effects of runoff and soil erosion: shoreline restoration, rain gardens, infiltration projects, diversions, sediment ponds, and grassed waterways/buffers*
- *Grant funding is available to install BMPs*
- *Large wakes can contribute to phosphorus release from the sediments into the water column where it is available for algae growth*

Messages to engage property owners in increasing natural beauty and habitat by increasing their understanding of the importance of native vegetation and coarse woody habitat and the negative impacts of aquatic invasive species (AIS)

- *Ninety percent of a lake ecosystem depends on what happens in the littoral zone, or the area of a lake close to shore*

- *Leaving fallen trees in the lake provides habitat for fish and aquatic animals*
- *Natural shorelines reduce nutrients entering the lake and provide critical habitat for fish and wildlife*
- *Largon Lake has two AIS: banded and Chinese mystery snails*
- *It is important that lake residents know how to identify AIS and who to contact if they locate a new AIS*
- *Reporting AIS are a first step in containing their spread*
- *Maintaining and restoring our waters and landscapes can reduce the impacts of invasive species*
- *Prevention of AIS establishment is easier and more likely to be successful than AIS management*
- *Wisconsin law requires the following prevention strategies: INSPECT your boat, trailer, and equipment, REMOVE any attached aquatic plants or animals, DRAIN all water from boats, motors and all equipment, NEVER MOVE live fish away from a waterbody, DISPOSE of unwanted bait in the trash, and BUY minnows from a Wisconsin bait dealer and use leftover minnows only on the same water or on other waters if no lake or river water or fish were added to their container*
- *Polk County's Illegal Transport of Aquatic Plants and Animals Ordinance requires persons to remove aquatic plants and animals from equipment before entering a roadway and before launching a boat/equipment and requires decontamination when a station is available*

Messages to engage stakeholders in meeting the goals of the Largon Lake Management Plan

- *Lake Management Plans identify goals, objectives, and activities to maintain and improve the health of a lake*
- *Lake Management Plans are designed to be working documents that adapt as new issues and conditions arise*
- *Lake Management Plan implementation success relies on participation by landowners in the Largon Lake Watershed*
- *Grant funding is available from WDNR to cost share up to 75% of the costs of eligible projects in the Largon Lake Management Plan*

Goal 1. Improve the overall health of Largon Lake	Priority	$ Estimate	Volunteer hours	Partners with LLPRD	Funding sources
A. Partner with shoreline residential property owners to install shoreline best management practices (BMPs) including native plantings, rain gardens, diversions, and rock infiltration projects to reduce phosphorus entering Largon Lake	High	$ - $$$		LWRD, CON	MPIG, SWMG-HL
1. Use special meetings, the annual meeting, and other communications to provide information on shoreline BMPs and to encourage property owners to install BMPs		No cost/$	5 hrs		
2. Identify property owners interested in installing BMPs		-	5-10 hrs	LWRD	
3. Make site visits with a consultant available to property owners interested in installing BMPs		No cost/$	10-15 hrs	LWRD, CON	
4. Apply for a Healthy Lakes Grant or Management Plan Implementation Grant to fund BMP installation		No cost/$	15-20 hrs	LWRD, CON	
5. Install WDNR Healthy Lakes signs at Healthy Lakes project sites		-	5 hrs	LWRD, WDNR	
6. Offer tours of properties where Healthy Lakes practices have been installed to generate interest in BMP installation		-	5-10 hrs	LWRD, CON	
7. Recognize property owners who have installed BMPs		No cost/$	5 hrs		
B. Partner with the Town of McKinley to install BMPs at the Largon Lake Boat Landing that will reduce phosphorus entering Largon Lake	High	$-$$$		TM, CON, LWRD	MPIG
1. Work with the Town of McKinley and/or a consultant to design BMPs to reduce phosphorus entering Largon Lake at the boat landing		$-$$	5-10 hrs	TM, CON, LWRD	
2. Explore grant funding to assist with BMP installation at the boat landing		-	5-10 hrs	TM, CON, LWRD	
3. Use signage and other means to highlight practices implemented at the boat landing to promote shoreline BMP installation		No cost/$	5-10 hrs	TM, CON, LWRD	

Goal 1. Improve the overall health of Largon Lake, continued	Priority	$ Estimate	Volunteer hours	Partners with LLPRD	Funding sources
C. Implement practices to slow the flow of water and/or reduce soil loss and erosion associated with the culverts on Largon Lake Court	High	$$-$$$		TM, LWRD, CON	MPIG
1. Partner with the Town of McKinley to determine a plan to replace the culverts on Largon Lake Court and discuss opportunities for rock riprap channel protection, a drop structure, and/or a water and sediment control basin		$$-$$$	5-10 hrs	TM, CON, LWRD	
2. Partner with the Town of McKinley and/or a consultant to design and implement BMPs to address erosion at the culvert sites on Largon Lake Court		$$-$$$	5-10 hrs	TM, CON, LWRD	
3. Request property owners along the culvert outflows to divert water away from the outflows using rain gutters/barrels, diversions, or infiltration projects		$-$$	10-15 hrs	LWRD, CON	
4. Apply for a Management Plan Implementation Grant to address soil loss and erosion associated with the culverts on Largon Lake Court		No cost/$	10-15 hrs	TM, CON, LWRD	
D. Upgrade non-compliant septic systems near Largon Lake	High	$$-$$$			MPIG
1. Develop and deliver an educational message regarding the relationship between non-compliant septic systems and water quality		No cost/$	5-10 hrs		
2. Partner with shoreline property owners with non-compliant systems to bring their system back into compliance (pump or replace)		$$-$$$	10-15 hrs	ZON, LWRD	
3. Apply for a Management Plan Implementation Grant to replace non-compliant systems		No cost/$	10-15 hrs	CON, LWRD	

Goal 1. Improve the overall health of Largon Lake, continued	Priority	$ Estimate	Volunteer hours	Partners with LLPRD	Funding sources
E. After steps have been taken to reduce phosphorus entering Largon Lake from shoreline properties, build relationships with agricultural landowners to increase awareness of grant funding for BMPs that will reduce phosphorus reaching the Lake	Medium	No Cost/$$$		LWRD, CON	MPIG
1. Partner with the Polk County Land and Water Resources Department (LWRD) to communicate with agricultural landowners in the Largon Lake Watershed through a mailing		No cost/$	5-10 hrs	LWRD	
2. Provide agricultural landowners with information on the progress that has already been taken to reduce phosphorus entering Largon Lake and provide an action plan that allows producers to reach out to LWRD or the District if they are interested in funding for implementing BMPs		No cost/$	10-15 hrs	LWRD, CON	
3. Partner with interested agricultural landowners to apply for a Lake Management Plan Implementation Grant and implement BMPs		$-$$$	15-20 hrs	LWRD, CON	
4. Invite agricultural landowners in the watershed to Lake District meetings		-	5 hrs		
5. Recognize agricultural landowners who have taken steps to reduce phosphorus from reaching Largon Lake		No cost/$	5 hrs		
F. Reduce sediment disturbance and shoreline erosion on Largon Lake	Medium	No cost/$			
1. Update the kiosk at the boat landing to include signage to ensure residents and visitors are aware of the slow-no-wake regulations within 100 feet of the shoreline for boats and within 200 feet of the shoreline for personal watercrafts		No cost/$	5 hrs		
2. Provide education on slow-no-wake regulations at the annual meeting		No cost/$	5 hrs		

Goal 2. Increase natural beauty and habitat for wildlife and fish on Largon Lake	Priority	$ Estimate	Volunteer hours	Partners with LLPRD	Funding sources
A. Expand habitat for wildlife and fish					
1. Maintain the winter aeration system on Largon Lake	High	$-$$$			
2. Increase native plants on the shoreline of Largon Lake, see goal 1A	High	$-$$$	20+ hrs	LWRD, CON	SWMG-HL
3. Work with DNR fisheries biologist to identify locations for habitat additions (fish sticks, fish cribs, etc.)	Medium	-	5-10 hrs	WDNR	SWMG-HL
4. Partner with DNR to explore Northern Pike management	Medium	-	5-10 hrs	WDNR	
B. Prevent the establishment of aquatic invasive species (AIS)					
1. If a new AIS is found on the lake, research and implement control options	As need arises	$-$$$	10-15 hrs	LWRD, CON	AISCG
2. Partner with LWRD to ensure that the local AIS ordinance sign and state prevention AIS sign at the boat landing are maintained in good condition	High	-	2 hrs	LWRD, WDNR	-
3. Update the kiosk at the boat landing to include an AIS educational message	High	No cost/$	10-15 hrs	LWRD	AISCG
4. Consider installing a decontamination station at the boat landing to provide tools for cleaning boats and trailers	Low		15-20 hrs	LWRD	AISCG
5. Explore opportunities to participate in statewide AIS education initiatives such as the Drain Campaign and Landing Blitz	Low	-	5 hrs	LWRD	AISCG
C. Monitor for new aquatic invasive species					
1. Maintain a volunteer to participate in the AIS Citizen Lake Monitoring Network Program	High	-	10-15 hrs	LWRD, WDNR	-
2. Ensure that lake residents and visitors know how to identify common AIS and where to report new findings	High	No cost/$	5-10 hrs	LWRD, WDNR	AISCG

Goal 3. Use multiple strategies to ensure the goals of the plan are met	Priority	$ Estimate	Volunteer hours	Partners with LLPRD	Funding sources
A. Form committees to implement the goals of the plan	High				
1. Identify current and future barriers to implementing goals		-	20+ hrs	-	-
2. Seek funding to implement goals		No cost/$	20+ hrs	-	-
3. Report actions completed, in progress, or not completed to the Lake District Board and Lake District members		-	5 hrs	-	-
4. Adapt the plan as new issues arise		-	20+ hrs	-	-
B. Evaluate the progress of lake management efforts through data collection efforts	Medium				
1. Ensure that a volunteer continues to be in place to collect secchi disk data each year on Largon Lake		-	10-15 hrs	LWRD, WDNR	-
2. Add total phosphorus and chlorophyll a sampling for Largon Lake		$300/yr	10-15 hrs	LWRD, CON	EPG
3. Collect data for secchi depth, total phosphorus, and chlorophyll a on Little Largon Lake		$300/yr	10-15 hrs	LWRD, CON	EPG
4. Repeat the 2021-2022 water quality study in ten years to determine impacts of BMP installation and plan implementation		$$$	50+ hrs	LWRD, CON	EPG
C. Communicate with lake stakeholders using the information and education strategy	High	No cost/$	50+ hrs		

Appendix A

Lake Resident Survey

Largon Lake Resident Survey, 2022

The following survey is a component of the Largon Lake Planning Grant. The Largon Lake District, Polk County Land and Water Resources Department, and Wisconsin Department of Natural Resources have partnered to gather data about Largon Lake in 2021-2022. The ultimate goal of the study is to identify ways to improve water quality on the lake. Your responses are very important and will help guide the future management of Largon Lake and its watershed. The survey should take approximately 5-10 minutes to complete. Responses will remain confidential. Feel free to contact the Polk County Land and Water Resources Department with any questions at 715-485-8699. Surveys should be returned in the enclosed self-addressed, stamped envelope by July 1st to:

LWRD
100 Polk County Plaza- Suite 120
Balsam Lake, WI 54810

Your Property on Largon Lake

These first few questions ask about your property on Largon Lake and how you use it.

1. How many years have you owned property on or near Largon Lake? If you own more than one property, please answer all questions for the property you have owned the longest.
   ______________Years

2. Which of the following best describes how you use your property?
   ___Year-round residence
   ___Seasonal residence (continuously occupied for months at a time)
   ___Weekend, vacation, and/or holiday residence
   ___Rental property
   ___Other, please specify_______________

3. How many days in a typical year is your property used by you or others? Provide your best estimate.
   _______________days per year

4. On the average day that your property is occupied, how many people occupy the property?
   ______________ people

5. Is the property you own on the shoreline of Largon Lake?
   ___Yes ___No **If no, skip to question 7**

6. Which of the following describe the first 35 feet of your shoreline (the area located directly adjacent to the lake)? If you don't own shoreline property, please skip this question. Please check all that apply.
   ___Mowed lawn
   ___Un-mowed vegetation
   ___Shrubs/trees
   ___Undisturbed woods
   ___Stabilizing rock/rip rap
   ___Pier/dock
   ___Buffer zone/shoreline restoration
   ___Rain garden
   ___Other, please describe__________

Your Activities on and around Largon Lake

The next questions ask about the activities you participate in on and around Largon Lake.

7. What activities do you enjoy on and around Largon Lake? Please check all that apply.
   ___Swimming
   ___Peace and tranquility
   ___Scenic view
   ___Jet skiing/wakeboarding/waterskiing
   ___Non-motorized boating (canoe/kayak)
   ___Motorized boating
   ___Sailing or wind surfing
   ___Hunting/trapping
   ___Observing birds/wildlife
   ___Open water fishing
   ___Ice fishing
   ___Snowmobiling
   ___Cross country skiing/snowshoeing
   ___Other, please list______________

8. How many days a month do you use the Largon Lake boat landing during the **open water season** and during the **ice on season**. Just provide your best estimate. If you never use the boat landing, write zero.
   I use the boat landing______________________days a month during the **open water season**
   I use the boat landing______________________days a month during the **ice on season**

9. Which of the following watercraft do you use on Largon Lake? Please check all that apply.
   ___Jet skis
   ___Motorboats/pontoons (1-20 HP)
   ___Motorboats/pontoons (21-50 HP)
   ___Motorboats/pontoons (more than 50 HP)
   ___Canoes/kayaks
   ___Paddleboats/rowboats
   ___Sailboats
   ___I do not use any watercraft, **skip to question 12**

10. Are the watercrafts that you use on Largon Lake used on other waterbodies?
    ___Yes ___No **If no, skip to question 12**

11. What is your typical cleaning routine after using your watercraft on water other than Largon Lake? Please check all that apply.
    ___Remove aquatic hitch-hikers (plant material, clams, and mussels)
    ___Drain bilge
    ___Rinse boat
    ___Power wash boat
    ___Apply bleach
    ___Air dry boat for 5 or more days
    ___Do not clean boat
    ___Other (please specify): _____________

Management Concerns on Largon Lake

The following questions ask about your experiences with and opinions regarding potential lake management concerns.

12. For each issue listed below, please tell us if you think it exists on Largon Lake and, if it does, what degree of concern you feel about it as a current management issue. Please only check one column per row.

	Issue doesn't exist	Exists, not a concern	Low concern	Medium concern	High concern
New invasive species entering the lake					
Excessive aquatic plant growth (excluding algae)					
Excessive algae blooms					
Lack of water clarity					
Poor water quality					
Loss of natural scenery/beauty					
Excessive noise level on the lake					
Decreased wildlife populations					
Reduced fish abundance in the lake					
Undesired species of fish in the lake					
Unsafe use of motorized watercraft					
Disregard for slow-no-wake zones 100 ft from shore					
Decreased property values					
Increased development					
Runoff from lakeshore properties					
Runoff from surrounding farmland					
Increased nutrients from failing septic systems					
Decrease in overall lake health					

13. How would you describe the current water level of Largon Lake?

___Too high ___Just right ___Too Low

14. How would you describe the current water quality of Largon Lake?

___Very Poor ___Fair ___Very good

___Poor ___Good

15. How has the water quality changed in Largon Lake in the time you've lived on/near the lake?

___ Severely degraded ___ Somewhat improved

___ Somewhat degraded ___ Greatly improved

___ Neither degraded nor improved ___ I haven't been on the lake long enough to notice a change

16. What do you think of when assessing water quality? Please check all that apply.

___ Water level
___ Water color
___ Smell
___ Fish kills
___ Algae blooms
___ Aquatic plant growth (not including algae blooms)
___ Water clarity (clearness of water)
___ Other, please describe_________________________

17. Which month(s) of the open water season do you consider algae growth (not including plants) to be a problem on Largon Lake. Please check all that apply.

___May
___June
___July
___August
____September
____October
____Algae growth is never a problem, **Please skip to question 19**

18. Please indicate which of the following uses you believe are impaired by algae (not including plants) on Largon Lake. If you don't participate in the activity, check the last column.

	Yes	No	Unsure	I do not participate in this activity
Swimming				
Fishing				
Boating				
Navigation				
Dogs/animals using the water				
Overall enjoyment of the lake				

19. Overall, how would you describe the amount of aquatic plants (not including algae) in Largon Lake?

___Too few plants ___Healthy amount of plants ___Too many plants

20. Which month(s) of the open water season do you consider aquatic plant growth (not including algae) to be a problem in Largon Lake? Please check all that apply.

___ May
___June
___July
___August
____September
___ October
___ Aquatic plants are never a problem, please **skip to question 22**

21. Please indicate which of the following uses you believe are limited by aquatic plants (not including algae) on Largon Lake. If you don't participate in the activity, check the last column.

	Yes	No	Unsure	I do not participate in this activity
Swimming				
Fishing				
Boating				
Navigation				
Overall enjoyment of the lake				

Management Practices

The following questions relate to common lake and land management practices that can affect lake water quality. The questions ask about your experience with and opinions regarding practices.

22. How would you describe the use of fertilizer on your property?
___I don't use any fertilizer on my property
___I use fertilizer that contains no phosphorus on my property
___I use fertilizer on my property but I'm unsure of its phosphorus content
___I use fertilizer on my property that contains phosphorus

23. When you're out on Largon Lake, how would you describe the current amount of mowed lawn along the shoreline from a whole lake perspective?
___Too much ___Just right ___Not enough

24. Below is a list of landscaping practices designed to reduce nutrient runoff from your property. For each practice please indicate if you are unfamiliar with the practice, are familiar with the practice but have not installed it, have already installed the practice, or are planning to install the practice. Please select one option for each row.

	Unfamiliar with the practice	Familiar but not installed	Already installed	Planning to install
Rain garden				
Native shoreline planting				
Infiltration pits or trenches				
Water diversions				
Not fertilizing/using zero phosphorus fertilizer				
Other, please list				

25. Which, if any, of the following would help motivate/convince you to install a practice to reduce waterfront runoff on your property? Check all that apply.

____ More how-to information about landscaping practices for water quality
____ Training to learn how to install a practice
____ Increasing the natural beauty of your property
____ Improving the water quality of Largon Lake
____ Providing better habitat for birds and wildlife
____ Setting an example for other lake residents
____ Less time spent mowing the lawn
____ Financial assistance that pays a portion of the cost of installation
____ No-cost technical assistance that would identify appropriate practices to install
____ Other, please describe ____
_____ None of the above would help motivate/convince me to install a practice

Largon Lake District

This final section asks for your opinions regarding the activities of the Largon Lake District.

26. How would you prefer to receive information from the Largon Lake District? Please check all that apply.

___Newsletter
___Email
___Website
___Facebook
___Annual Meeting
___Prefer not to receive information
___Other, please specify_____________

27. Please indicate which of the following actions should be completed by the Largon Lake District to help manage Largon Lake. Most activities are eligible for grant funding.

	Yes	No	Unsure
Offering incentives for property owners to install shoreline buffers and rain gardens			
Offering incentives for property owners to install farmland conservation practices			
Lake fairs and workshops to share information			
Enforcement of slow-no-wake zones (within 100 feet of shore)			
Practices to improve fishing and fish habitat			
Offering incentives for property owners to upgrade septic systems that are not up to code			
Programs to prevent and monitor invasive species			

28. From the list below, which activities might you be interested in participating in to improve Largon Lake? Responses will be considered as a measure of interest rather than a commitment.
    ___Learning to identify aquatic invasive species
    ___Monitoring for aquatic invasive species
    ___Learning how to monitor water quality
    ___Monitoring water quality
    ___Serving on a committee to develop an action plan for improving Largon Lake
    ___Installing a shoreline buffer on your property
    ___Installing a rain garden on your property
    ___Some other activity, please describe______________________________________
    ___None of the above

If you're interested in participating in any of the above activities and would like more information, please list your contact information below. This information will be kept separate from your responses to ensure confidentiality.

If you have any comments you would like to make, please use the back page.

Thank you for your time and your answers!

<u>Largon Lake Resident Survey, 2022</u>

Surveys mailed: 62
Surveys returned: 40
Response rate: 65%

Your Property on Largon Lake

These first few questions ask about your property on Largon Lake and how you use it.

1. How many years have you owned property on or near Largon Lake? If you own more than one property, please answer all questions for the property you have owned the longest.
   39 respondents, 98%
   Average years: 20 years

2. Which of the following best describes how you use your property? **40 respondents, 100%**
   Year-round residence **8 respondents, 20%**
   Seasonal residence (continuously occupied for months at a time) **4 respondents, 10%**
   Weekend, vacation, and/or holiday residence **23 respondents, 58%**
   Rental property **0 respondents, 0%**
   Other, please specify **5 respondents, 13%**
   Sentimental
   Investment
   Hunting (2 respondents)
   Hay field, woodland

3. How many days in a typical year is your property used by you or others? Provide your best estimate.
   38 respondents, 95%
   Average days: 103 days

4. On the average day that your property is occupied, how many people occupy the property?
   37 respondents, 93%
   Average people: 2.5 people

5. Is the property you own on the shoreline of Largon Lake? **40 respondents, 100%**
   Yes **36 respondents, 90%**
   No **4 respondents, 10%**

6. Which of the following describe the first 35 feet of your shoreline (the area located directly adjacent to the lake)? If you don't own shoreline property, please skip this question. Please check all that apply. **37 respondents, 93%**

   Mowed lawn **20 respondents, 54%**
   Un-mowed vegetation **27 respondents, 73%**
   Shrubs/trees **21 respondents, 57%**
   Undisturbed woods **13 respondents, 35%**
   Stabilizing rock/rip rap **9 respondents, 24%**
   Pier/dock **23 respondents, 62%**
   Buffer zone/shoreline restoration **4 respondents, 11%**
   Rain garden **1 respondent, 3%**
   Other, please describe **1 respondent, 3%**
   Garden

Your Activities on and around Largon Lake

The next questions ask about the activities you participate in on and around Largon Lake.

7. What activities do you enjoy on and around Largon Lake? Please check all that apply **40 respondents, 100%**

   Swimming **26 respondents, 65%**
   Peace and tranquility **35 respondents, 88%**
   Scenic view **32 respondents, 80%**
   Jet skiing/wakeboarding/waterskiing **5 respondents, 13%**
   Non-motorized boating (canoe/kayak) **25 respondents, 63%**
   Motorized boating **25 respondents, 63%**
   Sailing or wind surfing **1 respondent, 3%**
   Hunting/trapping **11 respondents, 28%**
   Observing birds/wildlife **28 respondents, 70%**
   Open water fishing **24 respondents, 60%**
   Ice fishing **11 respondents, 28%**
   Snowmobiling **3 respondents, 8%**
   Cross country skiing/snowshoeing **9 respondents, 23%**
   Other, please list **5 respondents, 13%**
   Hiking (2 respondents)
   Forest
   Mowing Lawn
   None

8. How many days a month do you use the Largon Lake boat landing during the **open water season** and during the **ice on season**. Just provide your best estimate. If you never use the boat landing, write zero. **39 respondents, 98%**

   I use the boat landing __ days a month during the **open water season**
   18 respondents, 45%
   Average days: 1.03 per month

   I use the boat landing __ days a month during the **ice on season**
   4 respondents, 10%
   Average days: 0.32 days per month

9. Which of the following watercraft do you use on Largon Lake? Please check all that apply.
   40 respondents, 100%
   Jet skis **6 respondents, 15%**
   Motorboats/pontoons (1-20 HP) **8 respondents, 20%**
   Motorboats/pontoons (21-50 HP) **15 respondents, 38%**
   Motorboats/pontoons (more than 50 HP) **7 respondents, 18%**
   Canoes/kayaks **26 respondents, 65%**
   Paddleboats/rowboats **12 respondents, 30%**
   Sailboats **1 respondent, 3%**
   I do not use any watercraft on Largon Lake **6 respondents, 15%**

10. Are the watercrafts that you use on Largon Lake used on other waterbodies? **34 respondents, 85%**
   Yes: **4 respondents, 12%**
   No: **30 respondents, 88%**

11. What is your typical cleaning routine after using your watercraft on water other than Largon Lake? Please check all that apply. **4 respondents, 10%**
   Remove aquatic hitch-hikers (plant material, clams, and mussels) **4 respondents, 100%**
   Drain bilge **1 respondent, 25%**
   Rinse boat **1 respondent, 25%**
   Power wash boat **0 respondents**
   Apply bleach **0 respondents**
   Air dry boat for 5 or more days **3 respondents, 75%**
   Do not clean boat **0 respondents**
   Other (please specify): **0 respondents**

Management Concerns on Largon Lake

The following questions ask about your experiences with and opinions regarding potential lake management concerns.

12. For each issue listed below, please tell us if you think it exists on Largon Lake and, if it does, what degree of concern you feel about it as a current management issue. Please only check one column per row.

	Issue doesn't exist	Exists, not a concern	Low concern	Medium concern	High concern
New invasive species entering the lake **32 respondents, 80%**	**2, 6%**	**2, 6%**	**6, 19%**	**11, 34%**	**11, 34%**
Excessive aquatic plant growth (excluding algae) **33 respondents, 83%**	**2, 6%**	**1, 3%**	**8, 24%**	**11, 33%**	**11, 33%**
Excessive algae blooms **34 respondents, 85%**	**1, 3%**	**0, 0%**	**5, 15%**	**11, 32%**	**17, 50%**
Lack of water clarity **35 respondents, 88%**	**1, 3%**	**4, 11%**	**7, 20%**	**14, 40%**	**9, 26%**
Poor water quality **33 respondents, 83%**	**3, 9%**	**1, 3%**	**9, 27%**	**7, 21%**	**13, 39%**
Loss of natural scenery/beauty **33 respondents, 83%**	**6, 18%**	**3, 9%**	**10, 30%**	**6, 18%**	**8, 24%**
Excessive noise level on the lake **34 respondents, 85%**	**7, 21%**	**5, 15%**	**9, 26%**	**4, 12%**	**9, 26%**
Decreased wildlife populations **33 respondents, 83%**	**10, 30%**	**1, 3%**	**5, 15%**	**7, 21%**	**10, 30%**
Reduced fish abundance in the lake **33 respondents, 83%**	**1, 3%**	**0, 0%**	**10, 30%**	**11, 33%**	**11, 33%**
Undesired species of fish in the lake **33 respondents, 83%**	**2, 6%**	**0, 0%**	**7, 21%**	**13, 39%**	**11, 33%**
Unsafe use of motorized watercraft **32 respondents, 80%**	**10, 31%**	**3, 9%**	**5, 16%**	**7, 22%**	**7, 22%**
Disregard for slow-no-wake zones 100 ft from shore **32 respondents, 80%**	**9, 28%**	**1, 3%**	**6, 19%**	**8, 25%**	**8, 25%**
Decreased property values **34 respondents, 85%**	**17, 50%**	**1, 3%**	**4, 12%**	**7, 21%**	**5, 15%**
Increased development **33 respondents, 83%**	**10, 30%**	**3, 9%**	**6, 18%**	**6, 18%**	**8, 24%**
Runoff from lakeshore properties **34 respondents, 85%**	**2, 6%**	**1, 3%**	**8, 24%**	**12, 35%**	**11, 32%**
Runoff from surrounding farmland **35 respondents, 88%**	**4, 11%**	**2, 6%**	**5, 14%**	**11, 31%**	**13, 37%**
Increased nutrients from failing septic systems **34 respondents, 85%**	**2, 6%**	**0, 0%**	**10, 29%**	**5, 15%**	**17, 50%**
Decrease in overall lake health **34 respondents, 85%**	**2, 6%**	**0, 0%**	**4, 12%**	**10, 29%**	**18, 53%**

13. How would you describe the current water level of Largon Lake? **36 respondents, 90%**
   Too high **1 respondent, 3%**
   Just right **30 respondents, 83%**
   Too Low **5 respondents, 14%**

14. How would you describe the current water quality of Largon Lake? **36 respondents, 90%**
   Very Poor **1 respondent, 3%**
   Poor **7 respondents, 19%**
   Fair **13 respondents, 36%**
   Good **15 respondents, 42%**
   Very good **0 respondents, 0%**

15. How has the water quality changed in Largon Lake in the time you've lived on/near the lake? **39 respondents, 98%**
   Severely degraded **1 respondent, 3%**
   Somewhat degraded **6 respondents, 15%**
   Neither degraded nor improved **16 respondents, 41%**
   Somewhat improved **9 respondents, 23%**
   Greatly improved **1 respondent, 3%**
   I haven't been on the lake long enough to notice a change **6 respondents, 15%**

16. What do you think of when assessing water quality? Please check all that apply. **38 respondents, 95%**
   Water level **14 respondents, 37%**
   Water color **26 respondents, 68%**
   Smell **25 respondents, 66%**
   Fish kills **23 respondent, 61%**
   Algae blooms **33 respondents, 87%**
   Aquatic plant growth (not including algae blooms) **18 respondents, 47%**
   Water clarity (clearness of water) **30 respondents, 79%**
   Other, please describe **1 respondent, 3%**
      Runoff

17. Which month(s) of the open water season do you consider algae growth (not including plants) to be a problem on Largon Lake. Please check all that apply. **34 respondents, 85%**
   May **0 respondents, 0%**
   June **5 respondents, 15%**
   July **24 respondents, 71%**
   August **33 respondents, 97%**
   September **8 respondents, 24%**
   October **2 respondents, 6%**
   Algae growth is never a problem **2 respondents, 6%**

18. Please indicate which of the following uses you believe are impaired by algae (not including plants) on Largon Lake. If you don't participate in the activity, check the last column.

	Yes	No	Unsure	I do not participate in this activity
Swimming **36 respondents, 90%**	**21, 58%**	**6, 17%**	**4, 11%**	**5, 14%**
Fishing **34 respondents, 85%**	**13, 38%**	**9, 26%**	**7, 21%**	**5, 15%**
Boating **35 respondents, 88%**	**9, 26%**	**18, 51%**	**4, 11%**	**4, 11%**
Navigation **33 respondents, 83%**	**2, 6%**	**16, 48%**	**8, 24%**	**7, 21%**
Dogs/animals using the water **34, 85%**	**12, 35%**	**6, 18%**	**2, 6%**	**14, 41%**
Overall enjoyment of the lake **35, 88%**	**25, 71%**	**6, 17%**	**3, 9%**	**1, 3%**

19. Overall, how would you describe the amount of aquatic plants (not including algae) in Largon Lake?

34 respondents, 85%

Too few plants **4 respondents, 12%**
Healthy amount of plants **22 respondents, 65%**
Too many plants **8 respondents, 24%**

20. Which month(s) of the open water season do you consider aquatic plant growth (not including algae) to be a problem in Largon Lake? Please check all that apply. **34 respondents, 85%**

May **0 respondents, 0%**
June **4 respondents, 12%**
July **16 respondents, 47%**
August **18 respondents, 53%**
September **9 respondents, 26%**
October **2 respondents, 6%**
Aquatic plants are never a problem **16 respondents, 47%**

21. Please indicate which of the following uses you believe are limited by aquatic plants (not including algae) on Largon Lake. If you don't participate in the activity, check the last column.

	Yes	No	Unsure	I do not participate in this activity
Swimming **20 respondents, 100%**	**11, 55%**	**4, 20%**	**4, 20%**	**1, 5%**
Fishing **19 respondents, 95%**	**6, 32%**	**7, 37%**	**2, 11%**	**4, 21%**
Boating **19 respondents, 95%**	**7, 37%**	**5, 26%**	**5, 26%**	**2, 11%**
Navigation **19 respondents, 95%**	**1, 5%**	**7, 37%**	**6, 32%**	**5, 26%**
Overall enjoyment of the lake **20, 100%**	**10, 50%**	**7, 35%**	**2, 10%**	**1, 5%**

Management Practices

The following questions relate to common lake and land management practices that can affect lake water quality. The questions ask about your experience with and opinions regarding practices.

22. How would you describe the use of fertilizer on your property? **40 respondents, 100%**
    - I don't use any fertilizer on my property **36 respondents, 90%**
    - I use fertilizer that contains no phosphorus on my property **4 respondents, 10%**
    - I use fertilizer on my property but I'm unsure of its phosphorus content **0 respondents, 0%**
    - I use fertilizer on my property that contains phosphorus **0 respondents, 0%**

23. When you're out on Largon Lake, how would you describe the current amount of mowed lawn along the shoreline from a whole lake perspective? **34 respondents, 85%**
    - Too much **13 respondents, 38%**
    - Just right **21 respondents, 62%**
    - Not enough **0 respondents, 0%**

24. Below is a list of landscaping practices designed to reduce nutrient runoff from your property. For each practice please indicate if you are unfamiliar with the practice, are familiar with the practice but have not installed it, have already installed the practice, or are planning to install the practice. Please select one option for each row.

	Unfamiliar with the practice	Familiar but not installed	Already installed	Planning to install
Rain garden **37 respondents, 93%**	**16, 43%**	**18, 49%**	**2, 5%**	**1, 3%**
Native shoreline planting **38 respondents, 95%**	**8, 21%**	**10, 26%**	**18, 47%**	**2, 5%**
Infiltration pits or trenches **36 respondents, 90%**	**21, 58%**	**12, 33%**	**3, 8%**	**0, 0%**
Water diversions **36 respondents, 90%**	**16, 44%**	**14, 39%**	**6, 17%**	**0, 0%**
Not fertilizing/using zero phosphorus fertilizer **40 respondents, 100%**	**4, 10%**	**6, 15%**	**30, 75%**	**0,0%**
Other, please list **3 respondents, 8%** *Planted 2,500 trees and created a 50 foot buffer zone in addition to natural buffer zone of 20-50 feet that already existed* *Minimal mowing near shoreline* *Barley straw bales*	**0, 0%**	**0, 0%**	**3, 100%**	**0, 0%**

25. Which, if any, of the following would help motivate/convince you to install a practice to reduce waterfront runoff on your property? Check all that apply. **36 respondents, 90%**

More how-to information about landscaping practices for water quality **21 respondents, 58%**

Training to learn how to install a practice **7 respondents, 19%**

Increasing the natural beauty of your property **13 respondents, 36%**

Improving the water quality of Largon Lake **25 respondents, 69%**

Providing better habitat for birds and wildlife **14 respondents, 39%**

Setting an example for other lake residents **10 respondents, 28%**

Less time spent mowing the lawn **8 respondents, 22%**

Financial assistance that pays a portion of the cost of installation **11 respondents, 31%**

No-cost technical assistance that would identify appropriate practices to install **15 respondents, 42%**

Other, please describe **6 respondents, 17%**

Having other owners doing it

Not on the lake

We're already motivated on clean lake practices

Already installed practices listed in Q24

I believe my property is well managed for runoff into the lake

I believe we use good practices

None of the above would help motivate/convince me to install a practice **5 respondents, 14%**

Largon Lake District

This final section asks for your opinions regarding the activities of the Largon Lake District.

26. How would you prefer to receive information from the Largon Lake District? Please check all that apply. **40 respondents, 100%**

Newsletter **20 respondents, 50%**

Email **32 respondents, 80%**

Website **9 respondents, 23%**

Facebook **3 respondents, 8%**

Annual Meeting **12 respondents, 30%**

Prefer not to receive information **0 respondents, 0%**

Other, please specify **0 respondents, 0%**

27. Please indicate which of the following actions should be completed by the Largon Lake District to help manage Largon Lake. Most activities are eligible for grant funding.

	Yes	No	Unsure
Offering incentives for property owners to install shoreline buffers and rain gardens **39 respondents, 98%**	**25, 64%**	**4, 10%**	**10, 26%**
Offering incentives for property owners to install farmland conservation practices **38 respondents,95%**	**20, 53%**	**3, 8%**	**15, 39%**
Lake fairs and workshops to share information **35 respondents, 88%**	**13, 37%**	**6, 17%**	**16, 46%**
Enforcement of slow-no-wake zones (within 100 feet of shore) **38 respondents, 95%**	**24, 63%**	**7,18%**	**7, 18%**
Practices to improve fishing and fish habitat **39 respondents, 98%**	**29, 74%**	**3, 8%**	**7, 18%**
Offering incentives for property owners to upgrade septic systems that are not up to code **40 respondents, 100%**	**33, 83%**	**3, 8%**	**4, 10%**
Programs to prevent and monitor invasive species **39 respondents, 98%**	**33, 85%**	**1, 3%**	**5, 13%**

28. From the list below, which activities might you be interested in participating in to improve Largon Lake? Responses will be considered as a measure of interest rather than a commitment. **39 respondents, 98%**

Learning to identify aquatic invasive species **17 respondents, 44%**
Monitoring for aquatic invasive species **14 respondents, 36%**
Learning how to monitor water quality **14 respondents, 36%**
Monitoring water quality **13 respondents, 33%**
Serving on a committee to develop an action plan for improving Largon Lake **5 respondents, 13%**
Installing a shoreline buffer on your property **15 respondents, 38%**
Installing a rain garden on your property **13 respondents, 33%**
Some other activity, please describe **1 respondent, 3%**

Address leaking boat motors please!

None of the above **10 respondents, 26%**

If you have any comments you would like to make, please use the back page.
Thank you for your time and your answers!

Since I'm only there one weekend a year, I don't know many answers. I can tell you too many have broken or no septic systems (leach beds). Way too many have cleared, mowed, and fertilized the lakeshore. I'd love to have rip-rap installed to protect the shoreline from erosion. I own 202 feet of undisturbed lakeshore.

Jet skis: Largon Lake is a shallow lake. Jet skis constantly doing figure 8's at high speeds tear up the bottom of the lake. High speed racing and sharp turns do the same. Largon is a small lake: jet skis should be banned on this lake. They get very close to people trying to fish, disrespectful. Not a very peaceful lake when jet skis are racing around the lake. Be great to have a no-wake lake! Jet skis among cabin owners are main top of conversations. Algae/algae blooms: Lake has improved over the years; some months (July/August) in hot summer years are a concern.

Thanks for the effort. My property has very limited lakeshore on Little Largon. I've left it natural. I put a boat in once or twice a summer for a paddle around. Sorry I'm not more help. Survey really doesn't apply to me. Thanks

I recently noticed trees were cut down and pushed into the ravine that has some sort of run-off. I realize it may be part of a project but wonder if that may cause a problem to the water quality of the lake.

Could the lake rent a weed harvesting machine to eliminate some of the weeds in front of residents docks?

Appendix B

Lake Level and Precipitation Data

Date	Daily Precipitation (Inches)	Elevation	Staff Gage Reading	Lake Level (High, Normal, Low)
4/26/21	0.63	1242.41	2.10	N
4/27/21	0.00	1242.41	2.10	N
4/28/21	0.00	1242.47	2.16	N
4/29/21	0.00	1242.47	2.16	N
4/30/21	0.00	1242.46	2.15	N
5/1/21	0.00	1242.45	2.14	N
5/2/21	0.01	1242.43	2.12	N
5/3/21	0.00	1242.43	2.12	N
5/4/21	0.00	1242.43	2.12	N
5/5/21	0.00	1242.43	2.12	N
5/6/21	0.00	1242.41	2.10	N
5/7/21	0.00	1242.41	2.10	N
5/8/21	0.00	1242.39	2.08	N
5/9/21	0.00	1242.39	2.08	N
5/10/21	0.00	1242.37	2.06	N
5/11/21	0.00	1242.35	2.04	N
5/12/21	0.00	1242.35	2.04	N
5/13/21	0.00	1242.33	2.02	N
5/14/21	0.00	1242.31	2.00	N
5/15/21	0.00	1242.29	1.98	N
5/16/21	0.00	1242.29	1.98	N
5/17/21	0.00	1242.27	1.96	N
5/18/21	0.00	1242.27	1.96	N
5/19/21	0.30	1242.27	1.96	N
5/20/21	0.00	1242.27	1.96	N
5/21/21	1.40	1242.36	2.05	N
5/22/21	0.10	1242.37	2.06	N
5/23/21	0.00	1242.37	2.06	N
5/24/21	0.00	1242.39	2.08	N
5/25/21	0.00	1242.40	2.09	N
5/26/21	0.10	1242.39	2.08	N
5/27/21	0.80	1242.40	2.09	N
5/28/21	0.00	1242.43	2.12	N
5/29/21	0.00	1242.43	2.12	N
5/30/21	0.10	1242.43	2.12	N
5/31/21	0.20	1242.43	2.12	N
6/1/21	0.00	1242.51	2.20	H/N
6/2/21	0.00	1242.47	2.16	N
6/3/21	0.00	1242.45	2.14	N
6/4/21	0.00	1242.43	2.12	N

Date	Daily Precipitation (Inches)	Elevation	Staff Gage Reading	Lake Level (High, Normal, Low)
6/5/21	0.00	1242.41	2.10	N
6/6/21	0.00	1242.41	2.10	N
6/7/21	0.00	1242.41	2.10	N
6/8/21	0.00	1242.41	2.10	N
6/9/21	0.00	1242.39	2.08	N
6/10/21	0.00	1242.39	2.08	N
6/11/21	0.00	1242.37	2.06	N
6/12/21	0.00	1242.35	2.04	N
6/13/21	0.00	1242.31	2.00	N
6/14/21	0.00	1242.27	1.96	N
6/15/21	0.00	1242.25	1.94	N
6/16/21	0.00	1242.21	1.90	N
6/17/21	0.00	1242.19	1.88	N
6/18/21	0.00	1242.16	1.85	N
6/19/21	0.00	1242.15	1.84	N
6/20/21	0.65	1242.13	1.82	N
6/21/21	0.00	1242.19	1.88	N
6/22/21	0.00	1242.19	1.88	N
6/23/21	0.00	1242.19	1.88	N
6/24/21	0.40	1242.19	1.88	N
6/25/21	0.00	1242.16	1.85	N
6/26/21	0.20	1242.15	1.84	N
6/27/21	0.00	1242.13	1.82	N
6/28/21	0.25	1242.11	1.80	N
6/29/21	0.10	1242.11	1.80	N
6/30/21	0.00	1242.11	1.80	N
7/1/21	0.00	1242.11	1.80	N
7/2/21	0.00	1242.10	1.79	L
7/3/21	0.00	1242.08	1.77	L
7/4/21	0.00	1242.06	1.75	L
7/5/21	0.00	1242.05	1.74	L
7/6/21	0.35	1242.03	1.72	L
7/7/21	0.00	1242.01	1.70	L
7/8/21	0.00	1242.00	1.69	L
7/9/21	0.00	1241.98	1.67	L
7/10/21	0.00	1241.97	1.66	L
7/11/21	0.00	1241.95	1.64	L
7/12/21	0.00	1241.95	1.64	L
7/13/21	0.00	1241.93	1.62	L
7/14/21	1.60	1241.92	1.61	L

Date	Daily Precipitation (Inches)	Elevation	Staff Gage Reading	Lake Level (High, Normal, Low)
7/15/21	0.00	1242.03	1.72	L
7/16/21	0.00	1242.02	1.71	L
7/17/21	0.00	1242.01	1.70	L
7/18/21	0.00	1241.99	1.68	L
7/19/21	0.00	1241.97	1.66	L
7/20/21	0.00	1241.96	1.65	L
7/21/21	0.00	1241.95	1.64	L
7/22/21	0.00	1241.95	1.64	L
7/23/21	0.00	1241.94	1.63	L
7/24/21	1.40	1242.01	1.70	L
7/25/21	0.00	1242.00	1.69	L
7/26/21	0.50	1241.99	1.68	L
7/27/21	0.00	1241.99	1.68	L
7/28/21	0.20	1241.99	1.68	L
7/29/21	0.00	1242.00	1.69	L
7/30/21	0.00	1241.97	1.66	L
7/31/21	0.00	1241.95	1.64	L
8/1/21	0.00	1241.93	1.62	L
8/2/21	0.00	1241.91	1.60	L
8/3/21	0.00	1241.90	1.59	L
8/4/21	0.00	1241.89	1.58	L
8/5/21	0.60	1241.89	1.58	L
8/6/21	0.40	1241.91	1.60	L
8/7/21	0.30	1241.91	1.60	L
8/8/21	0.10	1241.93	1.62	L
8/9/21	0.00	1241.91	1.60	L
8/10/21	0.00	1241.91	1.60	L
8/11/21	0.10	1241.90	1.59	L
8/12/21	0.00	1241.89	1.58	L
8/13/21	0.00	1241.89	1.58	L
8/14/21	0.00	1241.88	1.57	L
8/15/21	0.00	1241.87	1.56	L
8/16/21				
8/17/21	0.00	1241.79	1.48	L
8/18/21				
8/19/21				
8/20/21				
8/21/21				
8/22/21				
8/23/21	0.00	1241.72	1.41	L

Date	Daily Precipitation (Inches)	Elevation	Staff Gage Reading	Lake Level (High, Normal, Low)
8/24/21	0.50	1241.72	1.41	L
8/25/21	0.10	1241.71	1.40	L
8/26/21	0.30	1241.71	1.40	L
8/27/21	0.20	1241.70	1.39	L
8/28/21	0.00	1241.71	1.40	L
8/29/21	0.00	1241.72	1.41	L
8/30/21	0.00	1241.71	1.40	L
8/31/21	0.00	1241.70	1.39	L
9/1/21	0.00	1241.69	1.38	L
9/2/21	0.10	1241.67	1.36	L
9/3/21	0.10	1241.66	1.35	L
9/4/21	0.00	1241.65	1.34	L
9/5/21	0.00	1241.65	1.34	L
9/6/21	0.00	1241.63	1.32	L
9/7/21	0.10	1241.62	1.31	L
9/8/21	0.00	1241.61	1.30	L
9/9/21	0.00	1241.59	1.28	L
9/10/21	0.00	1241.58	1.27	L
9/11/21	0.00	1241.57	1.26	L
9/12/21	0.00	1241.55	1.24	L
9/13/21	1.00	1241.54	1.23	L
9/14/21	0.00	1241.60	1.29	L
9/15/21	0.00	1241.60	1.29	L
9/16/21	0.05	1241.58	1.27	L
9/17/21	0.50	1241.60	1.29	L
9/18/21	0.00	1241.59	1.28	L
9/19/21	0.00	1241.57	1.26	L
9/20/21	0.90	1241.58	1.27	L
9/21/21	0.00	1241.59	1.28	L
9/22/21	0.00	1241.61	1.30	L
9/23/21	0.00	1241.60	1.29	L
9/24/21	0.00	1241.59	1.28	L
9/25/21	0.00	1241.57	1.26	L
9/26/21	0.00	1241.57	1.26	L
9/27/21	0.00	1241.57	1.26	L
9/28/21	0.00	1241.56	1.25	L

Date	Daily Precipitation (Inches)	Elevation	Staff Gage Reading	Lake Level (High, Normal, Low)
5/17/22	0.00	1242.52	1.58	N
5/18/22	0.28	1242.50	1.56	N
5/19/22	0.12	1242.49	1.55	N
5/20/22	0.00	1242.47	1.53	N
5/21/22	0.00	1242.45	1.51	N
5/22/22	0.00	1242.44	1.50	N
5/23/22	0.00	1242.42	1.48	N
5/24/22	0.00	1242.41	1.47	N
5/25/22	0.32	1242.40	1.46	N
5/26/22	0.00	1242.42	1.48	N
5/27/22	0.00	1242.42	1.48	N
5/28/22	0.13	1242.42	1.48	N
5/29/22	0.02	1242.41	1.47	N
5/30/22	0.08	1242.42	1.48	N
5/31/22	0.00	1242.41	1.47	N
6/1/22	0.00	1242.40	1.46	N
6/2/22	0.00	1242.39	1.45	N
6/3/22	0.00	1242.37	1.43	N
6/4/22	0.00	1242.36	1.42	N
6/5/22	0.00	1242.34	1.40	N
6/6/22	0.00	1242.32	1.38	N
6/7/22	0.00	1242.30	1.36	N
6/8/22	0.00	1242.28	1.34	N
6/9/22	0.00	1242.26	1.32	N
6/10/22	0.00	1242.24	1.30	N-L
6/11/22				
6/12/22				
6/13/22	0.00	1242.25	1.31	L
6/14/22				
6/15/22				
6/16/22				
6/17/22				
6/18/22				
6/19/22				
6/20/22	0.00	1242.18	1.24	L
6/21/22				
6/22/22	0.00	1242.17	1.23	L
6/23/22	0.00	1242.16	1.22	L
6/24/22	0.00	1242.22	1.28	L
6/25/22	0.00	1242.24	1.30	L

Date	Daily Precipitation (Inches)	Elevation	Staff Gage Reading	Lake Level (High, Normal, Low)
6/26/22	0.00	1242.23	1.29	L
6/27/22	0.37	1242.21	1.27	L
6/28/22	0.00	1242.21	1.27	L
6/29/22	0.10	1242.18	1.24	L
6/30/22	0.00	1242.16	1.22	L
7/1/22	0.00	1242.15	1.21	L
7/2/22	0.36	1242.14	1.20	L
7/3/22	0.00	1242.12	1.18	L
7/4/22	0.00	1242.12	1.18	L
7/5/22	0.00	1242.12	1.18	L
7/6/22	0.00	1242.11	1.17	L
7/7/22	0.00	1242.09	1.15	L
7/8/22	0.00	1242.08	1.14	L
7/9/22	0.00	1242.06	1.12	L
7/10/22	0.31	1242.05	1.11	L
7/11/22	0.00	1242.05	1.11	L
7/12/22	0.88	1242.13	1.19	L
7/13/22	0.00	1242.12	1.18	L
7/14/22	0.00	1242.10	1.16	L
7/15/22	0.79	1242.12	1.18	L
7/16/22	0.00	1242.16	1.22	L
7/17/22	0.87	1242.18	1.24	L
7/18/22	0.00	1242.23	1.29	L
7/19/22	0.22	1242.22	1.28	L
7/20/22	0.00	1242.19	1.25	L
7/21/22	0.00	1242.16	1.22	L
7/22/22	0.00	1242.14	1.20	L
7/23/22	0.62	1242.14	1.20	L
7/24/22	0.00	1242.13	1.19	L
7/25/22	0.47	1242.09	1.15	L
7/26/22	0.32	1242.09	1.15	L
7/27/22	0.00	1242.06	1.12	L
7/28/22	0.00	1242.05	1.11	L
7/29/22	0.10	1242.04	1.10	L
7/30/22	0.00	1242.02	1.08	L
7/31/22	0.00	1242.01	1.07	L
8/1/22	0.32	1242.02	1.08	L
8/2/22	0.00	1242.01	1.07	L
8/3/22	0.36	1241.99	1.05	L
8/4/22	0.00	1241.99	1.05	L

Date	Daily Precipitation (Inches)	Elevation	Staff Gage Reading	Lake Level (High, Normal, Low)
8/5/22	0.00	1241.96	1.02	L
8/6/22	0.21	1241.95	1.01	L
8/7/22	0.63	1241.94	1.00	L
8/8/22	0.00	1241.98	1.04	L
8/9/22	0.00	1241.96	1.02	L
8/10/22	0.00	1241.94	1.00	L
8/11/22	0.00	1241.93	0.99	L
8/12/22	0.45	1241.93	0.99	L
8/13/22	0.00	1241.92	0.98	L
8/14/22	0.00	1241.92	0.98	L
8/15/22	0.00	1241.91	0.97	L
8/16/22	0.00	1241.90	0.96	L
8/17/22	0.24	1241.88	0.94	L
8/18/22	0.40	1241.90	0.96	L
8/19/22	0.60	1241.90	0.96	L
8/20/22	0.47	1241.92	0.98	L
8/21/22	0.00	1241.89	0.95	L
8/22/22	0.00	1241.88	0.94	L
8/23/22	0.00	1241.86	0.92	L
8/24/22	0.00	1241.85	0.91	L
8/25/22	1.00	1241.94	1.00	L
8/26/22	0.00	1241.93	0.99	L
8/27/22	0.73	1241.94	1.00	L
8/28/22	0.00	1242.02	1.08	L
8/29/22	0.33	1242.03	1.09	L
8/30/22	0.00	1242.02	1.08	L
8/31/22	0.00	1242.00	1.06	L
9/1/22	0.00	1241.98	1.04	L
9/2/22	0.00	1241.96	1.02	L
9/3/22	0.00	1241.94	1.00	L
9/4/22	0.00	1241.92	0.98	L
9/5/22	0.00	1241.90	0.96	L
9/6/22	0.00	1241.88	0.94	L
9/7/22	0.00	1241.87	0.93	L
9/8/22	0.00	1241.86	0.92	L
9/9/22	0.38	1241.87	0.93	L
9/10/22	0.00	1241.89	0.95	L
9/11/22	0.00	1241.88	0.94	L
9/12/22	0.00	1241.87	0.93	L
9/13/22	0.00	1241.84	0.90	L

Date	Daily Precipitation (Inches)	Elevation	Staff Gage Reading	Lake Level (High, Normal, Low)
9/14/22	0.00	1241.84	0.90	L
9/15/22	0.00	1241.83	0.89	L
9/16/22	0.00	1241.82	0.88	L
9/17/22	0.00	1241.81	0.87	L
9/18/22	0.00	1241.80	0.86	L
9/19/22				
9/20/22				
9/21/22				
9/22/22	0.94			
9/23/22				
9/24/22	0.00	1241.82	0.88	L
9/25/22	0.52	1241.82	0.88	L
9/26/22	0.00	1241.83	0.89	L
9/27/22				
9/28/22				
9/29/22				
9/30/22				
10/1/22				
10/2/22				
10/3/22				
10/5/22	0.00	1241.74	0.80	L
10/6/22	0.00	1241.73	0.79	L

Appendix C

In-lake Physical Data

Largon Lake Deep Hole

Date	Depth (m)	Temp (oC)	Dissolved oxygen (mg/L)	Specific Conductance	Conductivity	Salinity	pH	ORP (millvolts)	Chl (ug/L)	Chl (RFU)	Phyco (ug/L)	Phyco (RFU)	Secchi (ft)	Comments
4/5/21	0	8.9	11.48	32.3	22.3	0.01	7.07	248.4	10.60	2.43	0.75	0.73	4.00	CS/DC
	1	8.8	11.50	32.3	22.3	0.01	7.07	248.4	13.11	3.31	0.90	0.86		50% clouds
	2	8.5	11.63	32.3	22.1	0.01	7.08	249.5	21.27	5.25	1.02	0.98		1:34pm
	3	8.2	11.63	32.3	21.9	0.01	7.07	251.2	23.04	5.71	1.06	1.04		Windy
	3.5	8.2	10.52	32.3	21.9	0.01	6.72	132.9	23.81	6.36	1.66	1.64		
5/17/21	0	18.1	9.83	31.3	27.3	0.01	7.43	142.7	4.93	1.28	0.35	0.34	5.00	KA/CS
	1	16.9	9.85	31.3	26.5	0.01	7.35	147.1	10.21	2.44	0.58	0.56		5% clouds
	2	15.3	7.03	32.2	26.2	0.01	6.66	176.7	10.85	2.41	0.87	0.84		12:54pm
	3	14.5	4.17	33.9	27.2	0.01	6.41	189.2	12.51	3.47	1.23	1.18		
	3.5	13.8	1.08	37.1	29.2	0.02	6.31	106.6	17.91	4.45	2.06	2.05		
6/1/21	0	18.8	9.36	33.0	29.1	0.01	7.56	132.8	3.61	0.91	0.33	0.31	5.00	KA/CS/TK
	1	18.1	9.25	32.5	28.2	0.01	7.43	142.3	8.25	2.01	0.56	0.59		15% clouds
	2	17.9	9.23	32.4	28.0	0.01	7.39	149.8	33.80	8.86	1.52	1.51		10:52am
	3	16.9	6.47	33.6	28.3	0.01	6.71	177.2	12.72	3.51	1.16	1.12		
	3.5	16.9	5.23	34.3	29.0	0.01	6.58	180.2	17.70	3.75	1.83	1.75		
6/14/21	0	25.6	8.37	34.6	35.0	0.01	7.59	95.1	4.88	1.28	0.50	0.49	4.00	KA/CS/DM
	1	25.6	8.37	34.6	35.0	0.01	7.57	98.1	6.00	1.50	0.56	0.53		0 % clouds
	2	25.3	8.01	34.5	34.7	0.01	7.37	106.4	23.62	5.86	1.03	0.98		9:55am
	3	20.4	0.76	44.1	40.2	0.02	6.37	69.4	20.42	5.02	1.76	1.73		Brown water
	3.5	20.2	0.31	46.1	41.9	0.02	6.36	20.4	22.37	5.32	2.16	2.12		Chemistry
7/1/21	0	27.1	11.29	40.7	42.5	0.02	9.81	37.1	3.57	0.89	1.24	1.19	3.50	KA/TK
	1	26.1	11.64	41.4	42.2	0.02	9.84	39.4	4.70	1.17	1.54	1.48		65% clouds
	2	23.6	6.36	36.2	35.3	0.02	7.11	119.5	36.40	7.54	1.63	1.62		2:33pm
	3	22.0	0.27	45.1	42.6	0.02	6.47	36.5	12.30	2.85	1.76	1.73		
7/19/21	0	26.2	11.95	48.4	49.4	0.02	9.95	26.2	3.61	1.01	3.40	3.22	2.25	KA/CS
	1	25.7	12.35	49.3	49.9	0.02	9.97	29.7	5.56	1.54	4.21	4.06		0% clouds
	2	23.5	3.12	36.9	35.8	0.02	6.75	125.4	8.10	2.17	2.61	2.41		Hazy
	3	21.7	0.38	58.6	54.9	0.03	6.44	-99.9	13.90	3.90	4.33	4.11		9:39am
	3.5	21.5	0.24	60.6	56.6	0.03	6.42	-117.3	20.53	5.31	6.27	5.93		Chemistry
8/2/21	0	24.5	8.56	36.4	36.0	0.02	7.65	135.9	12.17	3.21	3.01	2.85	2.50	KA/CS
	1	24.2	8.14	36.4	35.8	0.02	7.41	143.1	18.82	5.43	3.93	3.77		50% clouds
	2	24.0	7.13	36.5	35.8	0.02	6.97	158.7	20.92	4.73	3.84	3.59		11:02am
	3	23.8	5.73	36.9	36.1	0.02	6.77	164.9	25.04	5.07	4.10	3.97		
	3.5	23.5	0.30	45.3	43.8	0.02	6.38	33.3	23.64	6.14	4.92	4.68		
8/17/21	0	23.9	9.27	37.9	37.1	0.02	9.11	40.5	12.26	3.12	2.33	2.18	2.50	KA/CS/DM
	1	23.8	9.20	37.7	36.7	0.02	8.95	46.7	17.78	4.47	3.35	3.22		0% clouds
	2	23.5	8.60	36.7	35.6	0.02	7.97	80.5	21.48	5.71	3.30	3.12		12:50pm
	3	23.4	8.24	36.7	35.5	0.02	7.64	91.9	22.92	6.17	3.55	3.38		
	3.5	23.4	7.84	38.2	37.0	0.02	7.22	13.1	26.70	7.04	4.29	4.06		
8/31/21	0	23.3	10.58	40.7	39.3	0.02	9.62	18.2	8.99	2.46	4.86	4.66	2.00	KA/CS
	1	23.0	10.57	40.7	39.1	0.02	9.57	21.6	13.62	3.70	6.95	6.69		20% clouds
	2	22.6	8.87	36.5	34.8	0.02	8.02	72.1	19.43	5.27	6.75	6.55		11:16am
	3	22.4	6.41	37.1	35.3	0.02	7.08	97.9	20.61	5.59	5.94	5.66		
	3.5	22.3	5.85	37.2	35.3	0.02	6.83	107.7	25.98	6.16	6.19	5.99		

Date	Depth (m)	Temp (oC)	Dissolved oxygen (mg/L)	Specific Conductance	Conductivity	Salinity	pH	ORP (millvolts)	Chl (ug/L)	Chl (RFU)	Phyco (ug/L)	Phyco (RFU)	Secchi (ft)	Comments
9/14/21	0	19.7	9.24	36.1	32.5	0.02	9.24	49.5	18.45	5.01	9.23	8.20	1.50	KA/CS
	1	19.7	9.26	36.0	32.3	0.02	9.18	53.6	19.13	5.18	9.87	8.50		90% clouds
	2	19.4	8.57	35.1	31.3	0.02	7.99	89.6	19.29	5.23	9.24	8.86		12:05pm
	3	19.3	8.30	35.0	31.2	0.02	7.66	101.8	20.61	5.59	9.47	9.11		
	3.5	19.3	8.03	36.0	31.4	0.02	6.90	-60.9	19.71	5.32	8.73	8.34		
10/27/21	0	8.8	10.62	34.2	23.6	0.01	8.74	-112.4	12.14	3.34	5.99	5.73	2.00	KA/DC
	1	8.7	10.77	33.9	23.3	0.01	8.62	-106.0	13.97	2.82	6.36	6.10		100% clouds
	2	8.7	10.80	33.9	23.3	0.01	8.58	123.1	14.04	3.44	6.23	6.00		Raining
	3	8.6	10.81	33.9	23.3	0.01	8.55	124.8	13.99	3.16	6.40	6.15		
5/3/22	0	8.6	12.59	33.3	22.8	0.01	8.07	189.8	10.44	3.01	0.14	0.82	2.75	KA/CS
	1	8.3	12.75	33.4	22.7	0.01	7.96	193.5	36.88	11.77	1.11	1.62		45% clouds
	2	8.0	12.70	33.6	22.7	0.01	7.86	197.2	49.66	14.44	1.47	1.89		1:55pm
	3	7.8	12.71	33.4	22.5	0.01	7.86	198.3	55.52	16.22	1.57	1.93		Turnover sample
	3.5	7.4	12.33	33.6	22.3	0.01	7.61	206.9	60.77	17.60	1.62	2.04		
5/24/22	0	16.2	9.72	36.3	30.2	0.02	7.60	103.2	9.18	2.76	0.03	0.69	3.00	KA/CS 10:48 am
	1	16.0	9.50	36.2	29.8	0.02	7.24	112.8	14.00	4.19	0.38	0.96		10% cloud cover
	2	15.6	9.18	36.2	29.7	0.02	7.07	116.6	19.79	5.92	0.51	1.06		Chemistry
	3	15.3	7.90	36.4	29.6	0.02	6.77	125.3	20.57	6.81	0.79	1.33		Light southern
	3.5	15.1	6.95	36.6	29.6	0.02	6.65	117.6	22.48	6.92	1.55	1.98		breeze
6/13/22	0	19.8	7.67	37.8	34.0	0.02	7.05	165.5	11.77	3.53	0.76	1.24	3.00	KA/TK 10:43 am
	1	19.8	7.62	37.5	33.7	0.02	6.90	166.7	11.24	3.72	0.77	1.28		100% cloud
	2	19.8	7.61	37.5	33.7	0.02	6.85	167.4	15.93	4.78	0.75	1.28		cover
	3	19.8	7.60	37.5	33.8	0.02	6.83	167.6	13.81	4.23	0.84	1.33		Light am rain
	3.5	19.8	7.57	37.5	33.8	0.02	6.81	136.4	12.83	3.31	0.72	1.22		Calm
6/20/22	0	26.0	9.59	38.2	39.0	0.02	8.60	61.9	5.71	1.71	0.17	0.79	3.00	Breezy
	1	25.0	9.64	38.2	38.1	0.02	8.52	62.9	8.52	2.68	0.49	1.06		KA/CS/HH
	2	23.2	8.61	38.0	36.7	0.02	7.42	94.2	11.23	3.38	0.89	1.43		Hot, 100ºF
	3	22.7	7.09	38.7	37.0	0.02	6.92	111.9	14.18	4.23	1.12	1.58		
	3.5	22.5	3.63	40.2	38.2	0.02	6.69	55.2	30.17	14.13	4.56	5.58		
7/5/22	0	23.8	9.40	38.5	37.7	0.02	8.62	53.4	6.98	2.10	0.56	1.11	1.75	Calm
	1	23.5	8.84	38.4	37.2	0.02	7.82	72.4	9.41	2.81	0.94	1.44		Overcast
	2	23.2	8.14	38.5	37.3	0.02	7.35	88.1	12.16	3.41	1.40	1.80		
	3	22.5	4.21	40.6	38.7	0.02	6.58	107.3	15.22	4.33	3.12	3.33		
	3.25	22.5	3.74	40.8	38.9	0.02	6.44	40.2	25.99	7.52	4.99	4.82		
7/18/22	0	26.8	9.64	39.1	40.5	0.02	8.82	33.5	9.16	2.76	0.06	0.69	3.50	Light breeze, 80s
	1	26.5	9.74	39.1	40.2	0.02	8.86	33.1	10.11	2.98	0.06	0.62		Clear skies
	2	25.5	9.55	39.3	39.9	0.02	8.59	44.3	19.68	6.02	0.52	1.13		Chemistry
	3	23.6	0.84	41.1	39.9	0.02	6.35	115.8	16.50	4.88	2.33	2.67		
	3.5	23.2	0.04	43.6	42.2	0.02	6.29	47.3	22.72	6.99	3.40	3.55		
8/2/22	0	23.7	8.90	39.4	38.4	0.02	7.45	178.9	19.50	5.75	1.08	1.59	2.50	Partly cloudy
	1	23.7	8.85	39.4	38.4	0.02	7.32	182.0	24.91	7.86	1.44	1.88		Breezy
	2	23.6	8.49	39.3	38.3	0.02	7.12	187.3	24.33	7.24	1.33	1.80		
	3	23.5	8.36	39.4	38.2	0.02	7.01	188.9	25.10	7.42	1.22	1.69		
	3.5	23.4	7.90	39.4	38.2	0.02	6.90	186.6	24.33	6.84	1.36	1.83		

Date	Depth (m)	Temp (oC)	Dissolved oxygen (mg/L)	Specific Conductance	Conductivity	Salinity	pH	ORP (millvolts)	Chl (ug/L)	Chl (RFU)	Phyco (ug/L)	Phyco (RFU)	Secchi (ft)	Comments
8/15/22	0	22.4	9.80	40.9	38.8	0.02	9.05	55.6	21.59	5.26	4.67	4.77	2.00	Partly cloudy
	1	26.6	6.51	40.2	37.6	0.02	7.15	112.9	23.98	5.88	3.71	3.77		Light breeze
	2	21.4	6.38	39.9	37.2	0.02	6.82	119.3	20.50	5.01	3.36	3.47		Algae bloom
	3	21.4	5.41	40.5	37.7	0.02	6.54	123.6	23.83	5.87	3.30	3.40		
	3.5	21.3	4.56	41.4	38.5	0.02	6.42	77.9	32.38	7.95	4.21	4.29		
8/29/22	0	22.2	8.98	39.0	36.9	0.02	7.78	72.4	22.03	5.53	7.85	3.95	2.00	Cloudy
	1	22.1	8.70	39.0	36.9	0.02	7.56	79.9	21.03	5.32	4.12	4.26		Algae bloom
	2	21.8	7.60	39.2	36.7	0.02	7.07	97.3	21.62	5.51	3.96	4.04		Windy
	3	21.7	7.42	39.3	36.8	0.02	6.91	103.3	26.49	6.41	4.21	4.24		
	3.5	21.7	7.16	39.4	36.9	0.02	6.82	106.5	27.72	6.82	3.98	4.05		
9/12/22	0	20.6	9.26	39.7	36.3	0.02	7.94	73.6	11.93	2.95	2.46	2.55	2.50	Windy
	1	20.4	9.27	39.7	36.2	0.02	7.97	73.1	15.61	3.88	3.38	3.47		75% cloud cover
	2	19.7	8.06	39.7	35.7	0.02	7.18	99.4	16.73	4.31	3.50	3.56		
	3	19.6	7.56	39.9	35.8	0.02	6.86	109.8	21.48	5.33	3.39	3.43		
	3.5	19.5	7.00	40.3	36.2	0.02	6.71	78.1	25.56	6.09	6.78	6.83		
9/23/22	0	17.6	8.93	39.5	33.9	0.02	7.10	97.2	17.91	4.43	3.17	3.28	2.50	CS/KA/CD/RR
	1	17.6	8.92	39.4	33.9	0.02	7.10	98.8	20.01	4.62	3.21	3.30		Windy
	2	17.6	8.76	39.5	33.9	0.02	7.06	101.1	16.95	4.18	3.16	3.19		100% cloud
	3	17.6	8.76	39.5	33.9	0.02	7.04	102.4	20.26	4.99	3.05	3.13		cover
	3.5	17.6	7.99	40.3	34.7	0.02	6.65	-31.1	22.12	5.43	5.54	5.68		
10/20/22	0	5.9	11.19	38.8	24.6	0.02	7.23	117.6	16.37	4.08	1.48	1.56	3.50	KA/CS
	1	5.9	11.18	38.8	24.6	0.02	7.16	119.9	17.90	5.06	1.59	1.64		Slight algae
	2	5.8	11.16	38.7	24.6	0.02	7.11	121.5	20.98	5.18	1.65	1.71		bloom
	3	5.8	11.15	38.8	24.6	0.02	7.10	122.4	22.15	5.36	1.68	1.72		Cool
	3.5	5.8	11.14	38.8	24.6	0.02	7.10	122.8	20.93	5.15	1.64	1.72		Calm

Appendix D

In-lake Chemical Data

Wisconsin State Laboratory of Hygiene
2601 Agriculture Drive, PO Box 7996
Madison, WI 53707-7996
(800)442-4618 - FAX (608)224-6213
http://www.slh.wisc.edu

Laboratory Report

Environmental Health Division

WSLH Sample: 554587001

Report To:
COLTON SORENSEN

Invoice To:
KATELIN ANDERSON
POLK COUNTY LAND & WATER RESOURCES DEPARTMENT
100 POLK COUNTY PLAZA, STE 120
BALSAM LAKE, WI 54810
Customer ID: 336949

Field #: LARGON-APRIL1-21
Project No: LPL174921
Collection End: 4/5/2021 1:23:00 PM
Collection Start:
Collected By: COLTON SORENSEN
Date Received: 4/6/2021
Date Reported: 4/20/2021
Sample Reason:

ID#: 493142
Sample Location: LARGON LAKE - DEEP HOLE
Sample Description: INTEGRATED SAMPLER
Sample Type: SU-SURFACE WATER
Waterbody: 2668100
Point or Outfall: 269324838
Sample Depth:
Program Code:
Region Code:
County: 49

Inorganic Chemistry

Analyte	Analysis Method	Result	Units	LOD	LOQ
Prep Date: 04/07/21 15:40	Analysis Date: 04/15/21 17:35				
Phosphorus	EPA 365.1	0.0681	mg/L	0.0120	0.0400

Wisconsin State Laboratory of Hygiene
2601 Agriculture Drive, PO Box 7996
Madison, WI 53707-7996
(800)442-4618 - FAX (608)224-6213
http://www.slh.wisc.edu

Laboratory Report

Environmental Health Division

WSLH Sample: 554587001

WDNR LAB ID:113133790   NELAP LAB ID:2091   EPA LAB ID:WI00007, WI00008   WI DATCP ID:105-415

List of Abbreviations:

LOD = Level of detection
LOQ = Level of quantification (for PFAS the LOQ = MRL)
ND = None detected. Results are less than the LOD
F next to result = Result is between LOD and LOQ
Z next to result = Result is between 0 (zero) and LOD
if LOD=LOQ, Limits were not statistically derived

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The water microbiology unit analyzes samples as received and not all samples are tested for preservation before analysis is performed.

Responsible Party

Inorganic Chemistry: Graham Anderson, Supervisor 608-224-6281
Metals: Graham Anderson, Supervisor 608-224-6281
Organics: Erin Mani, Supervisor 608-224-6269
Environmental Toxicology: Dawn Perkins, Supervisor 608-224-6230
Water Microbiology: Martin Collins, Supervisor 608-224-6239
Radiochemistry: David Webb, Division Director 608-224-6227

Wisconsin State Laboratory of Hygiene
2601 Agriculture Drive, PO Box 7996
Madison, WI 53707-7996
(800)442-4618 - FAX (608)224-6213
http://www.slh.wisc.edu

Laboratory Report

Environmental Health Division

WSLH Sample: 562093001

Report To:

KATELIN ANDERSON
POLK COUNTY LAND & WATER RESOURCES DEPARTMENT
100 POLK COUNTY PLAZA, STE 120
BALSAM LAKE, WI 54810

Invoice To:

KATELIN ANDERSON
POLK COUNTY LAND & WATER RESOURCES DEPARTMENT
100 POLK COUNTY PLAZA, STE 120
BALSAM LAKE, WI 54810

Customer ID: 336949

Field #: LARGON-MAY-21_2
Project No: LPL174921
Collection End: 5/17/2021 1:05:00 PM
Collection Start: 05/17/2021 12:56:00
Collected By: KATELIN ANDERSON, COLTON
Date Received: 5/18/2021
Date Reported: 6/9/2021
Sample Reason:

ID#: 493142
Sample Location: LARGON LAKE - DEEP HOLE
Sample Description: INTEGRATED SAMPLER
Sample Type: SU-SURFACE WATER
Waterbody: 2668100
Point or Outfall: 273232511
Sample Depth: 0-2 M
Program Code:
Region Code:
County: 49

Inorganic Chemistry

Analyte	Analysis Method	Result	Units	LOD	LOQ
Prep Date: 05/19/21 15:31	Analysis Date: 06/08/21 14:24				
Chlorophyll A	EPA 445	21.7	ug/L	0.520	1.74
Prep Date: 05/19/21 14:43	Analysis Date: 05/28/21 14:38				
Phosphorus	EPA 365.1	0.0653	mg/L	0.0120	0.0400

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Laboratory Report

Environmental Health Division

WSLH Sample: 562093001

WDNR LAB ID:113133790 NELAP LAB ID:2091 EPA LAB ID:WI00007, WI00008 WI DATCP ID:105-415

List of Abbreviations:

LOD = Level of detection
LOQ = Level of quantification (for PFAS the LOQ = MRL)
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Z next to result = Result is between 0 (zero) and LOD
if LOD=LOQ, Limits were not statistically derived

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Responsible Party

Inorganic Chemistry: Graham Anderson, Supervisor 608-224-6281
Metals: Graham Anderson, Supervisor 608-224-6281
Organics: Erin Mani, Supervisor 608-224-6269
Environmental Toxicology: Dawn Perkins, Supervisor 608-224-6230
Water Microbiology: Martin Collins, Supervisor 608-224-6239
Radiochemistry: David Webb, Division Director 608-224-6227

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Laboratory Report

Environmental Health Division

WSLH Sample: 567095001

Report To:	Invoice To:
KATELIN ANDERSON POLK COUNTY LAND & WATER RESOURCES DEPARTMENT 100 POLK COUNTY PLAZA, STE 120 BALSAM LAKE, WI 54810	KATELIN ANDERSON POLK COUNTY LAND & WATER RESOURCES DEPARTMENT 100 POLK COUNTY PLAZA, STE 120 BALSAM LAKE, WI 54810 Customer ID: 336949

Field #: LARGON-JUNE14_0
Project No: LPL174921
Collection End: 6/14/2021 10:25:00 AM
Collection Start: 06/14/2021 10:15:00
Collected By: KATELIN ANDERSON, COLTON
Date Received: 6/15/2021
Date Reported: 6/30/2021
Sample Reason:

ID#: 493142
Sample Location: LARGON LAKE - DEEP HOLE
Sample Description: INTEGRATED SAMPLER
Sample Type: SU-SURFACE WATER
Waterbody: 2668100
Point or Outfall: 275742782
Sample Depth: 0-2 M
Program Code:
Region Code:
County: 49

Sample Comments

ICE MELTED/NOT ICED. RESULTS APPROXIMATE.

Inorganic Chemistry

Analyte	Analysis Method	Result	Units	LOD	LOQ
Prep Date: 06/16/21 16:18	Analysis Date: 06/30/21 15:33				
Chlorophyll A	EPA 445	22.1	ug/L	0.520	1.74
Prep Date: 06/18/21 13:20	Analysis Date: 06/21/21 09:06				
Phosphorus	EPA 365.1	0.0492	mg/L	0.00900	0.0300

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Laboratory Report

Environmental Health Division

WSLH Sample: 567095001

WDNR LAB ID:113133790 NELAP LAB ID:2091 EPA LAB ID:WI00007, WI00008 WI DATCP ID:105-415

List of Abbreviations:

LOD = Level of detection
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Wisconsin State Laboratory of Hygiene
University of Wisconsin–Madison

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Laboratory Report

Environmental Health Division

WSLH Sample: 573222001

Report To:
KATELIN ANDERSON
POLK COUNTY LAND & WATER RESOURCES DEPARTMENT
100 POLK COUNTY PLAZA, STE 120
BALSAM LAKE, WI 54810

Invoice To:
KATELIN ANDERSON
POLK COUNTY LAND & WATER RESOURCES DEPARTMENT
100 POLK COUNTY PLAZA, STE 120
BALSAM LAKE, WI 54810
Customer ID: 336949

Field #: LARGON-JULY-2021
Project No: LPL174921
Collection End: 7/19/2021 9:57:00 AM
Collection Start: 07/19/2021 09:52:00
Collected By: KATELIN ANDERSON, COLTON
Date Received: 7/20/2021
Date Reported: 8/9/2021
Sample Reason:

ID#: 493142
Sample Location: LARGON LAKE - DEEP HOLE
Sample Description: INTEGRATED SAMPLER
Sample Type: SU-SURFACE WATER
Waterbody: 2668100
Point or Outfall: 279095661
Sample Depth: 0-2 M
Program Code:
Region Code:
County: 49

Sample Comments

ICE MELTED/NOT ICED. RESULTS APPROXIMATE.

Inorganic Chemistry

Analyte	Analysis Method	Result	Units	LOD	LOQ
Prep Date: 07/22/21 06:25	Analysis Date: 08/04/21 15:10				
Chlorophyll A	EPA 445	70.6	ug/L	0.520	1.74
Prep Date: 07/28/21 13:26	Analysis Date: 07/30/21 09:33				
Phosphorus	EPA 365.1	0.0537	mg/L	0.00900	0.0300

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Laboratory Report

Environmental Health Division

WSLH Sample: 573222001

WDNR LAB ID:113133790 NELAP LAB ID:2091 EPA LAB ID:WI00007, WI00008 WI DATCP ID:105-415

List of Abbreviations:

LOD = Level of detection
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Water Microbiology: Martin Collins, Supervisor 608-224-6239
Radiochemistry: David Webb, Division Director 608-224-6227

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Laboratory Report

Environmental Health Division

WSLH Sample: 578978001

Report To:
COLTON SORENSEN

Invoice To:
KATELIN ANDERSON
POLK COUNTY LAND & WATER RESOURCES DEPARTMENT
100 POLK COUNTY PLAZA, STE 120
BALSAM LAKE, WI 54810
Customer ID: 336949

Field #: LARGON-AUG-2021
Project No: LPL174921
Collection End: 8/17/2021 12:57:00 PM
Collection Start: 08/17/2021 12:52:00
Collected By: KATELIN ANDERSON, COLTON
Date Received: 8/18/2021
Date Reported: 9/9/2021
Sample Reason:

ID#: 493142
Sample Location: LARGON LAKE - DEEP HOLE
Sample Description: INTEGRATED SAMPLER
Sample Type: SU-SURFACE WATER
Waterbody: 2668100
Point or Outfall: 279095678
Sample Depth: 0-2 M
Program Code:
Region Code:
County: 49

Sample Comments

ACID USED TO PRESERVE SAMPLES WAS EXPIRED

Inorganic Chemistry

Analyte	Analysis Method	Result	Units	LOD	LOQ
Prep Date: 08/18/21 17:20	Analysis Date: 08/31/21 15:08				
Chlorophyll A	EPA 445	45.4	ug/L	0.520	1.74
Prep Date: 08/27/21 13:19	Analysis Date: 08/30/21 10:52				
Phosphorus	EPA 365.1	0.0578	mg/L	0.00900	0.0300

Laboratory Report

Environmental Health Division

WSLH Sample: 578978001

WDNR LAB ID:113133790 NELAP LAB ID:2091 EPA LAB ID:WI00007, WI00008 WI DATCP ID:105-415

List of Abbreviations:

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Radiochemistry: David Webb, Division Director 608-224-6227

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Laboratory Report

Environmental Health Division

WSLH Sample: 583617001

Report To:

KATELIN ANDERSON
POLK COUNTY LAND & WATER RESOURCES DEPARTMENT
100 POLK COUNTY PLAZA, STE 120
BALSAM LAKE, WI 54810

Invoice To:

KATELIN ANDERSON
POLK COUNTY LAND & WATER RESOURCES DEPARTMENT
100 POLK COUNTY PLAZA, STE 120
BALSAM LAKE, WI 54810

Customer ID: 336949

Field #: LARGON-SEPT-2021
Project No: LPL174921
Collection End: 9/14/2021 12:15:00 PM
Collection Start: 09/14/2021 12:05:00
Collected By: KATELIN ANDERSON, COLTON
Date Received: 9/15/2021
Date Reported: 9/27/2021
Sample Reason:

ID#: 493142
Sample Location: LARGON LAKE - DEEP HOLE
Sample Description: INTEGRATED SAMPLER
Sample Type: SU-SURFACE WATER
Waterbody: 2668100
Point or Outfall: 279095682
Sample Depth: 0-2 M
Program Code:
Region Code:
County: 49

Sample Comments

ACID USED TO PRESERVE SAMPLES WAS EXPIRED

Inorganic Chemistry

Analyte	Analysis Method	Result	Units	LOD	LOQ
Prep Date: 09/15/21 13:48	Analysis Date: 09/24/21 14:42				
Chlorophyll A	EPA 445	105	ug/L	1.04	3.48
Prep Date: 09/22/21 14:00	Analysis Date: 09/23/21 11:59				
Phosphorus	EPA 365.1	0.0981	mg/L	0.00900	0.0300

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Laboratory Report

Environmental Health Division

WSLH Sample: 583617001

WDNR LAB ID:113133790 NELAP LAB ID:2091 EPA LAB ID:WI00007, WI00008 WI DATCP ID:105-415

List of Abbreviations:

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Responsible Party

Inorganic Chemistry: Graham Anderson, Supervisor 608-224-6281
Metals: Graham Anderson, Supervisor 608-224-6281
Organics: Erin Mani, Supervisor 608-224-6269
Environmental Toxicology: Dawn Perkins, Supervisor 608-224-6230
Water Microbiology: Martin Collins, Supervisor 608-224-6239
Radiochemistry: David Webb, Division Director 608-224-6227

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Laboratory Report

Environmental Health Division

WSLH Sample: 591990001

Report To:
COLTON SORENSEN

Invoice To:
KATELIN ANDERSON
POLK COUNTY LAND & WATER RESOURCES DEPARTMENT
100 POLK COUNTY PLAZA, STE 120
BALSAM LAKE, WI 54810
Customer ID: 336949

Field #: LARGON-FALLTO-2021
Project No: LPL174921
Collection End: 10/27/2021 10:17:00 AM
Collection Start: 10/27/2021 10:12:00
Collected By: KATELIN ANDERSON, DANE
Date Received: 10/28/2021
Date Reported: 11/17/2021
Sample Reason:

ID#: 493142
Sample Location: LARGON LAKE - DEEP HOLE
Sample Description: INTEGRATED SAMPLER
Sample Type: SU-SURFACE WATER
Waterbody: 2668100
Point or Outfall: 279095686
Sample Depth: 0-2 M
Program Code:
Region Code:
County: 49

Sample Comments

ACID USED TO PRESERVE SAMPLES WAS EXPIRED

Inorganic Chemistry

Analyte	Analysis Method	Result	Units	LOD	LOQ
Prep Date: 11/12/21 14:46	Analysis Date: 11/15/21 10:30				
Phosphorus	EPA 365.1	0.0888	mg/L	0.00900	0.0300

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Laboratory Report

Environmental Health Division

WSLH Sample: 591990001

WDNR LAB ID:113133790 NELAP LAB ID:2091 EPA LAB ID:WI00007, WI00008 WI DATCP ID:105-415

List of Abbreviations:

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LOQ = Level of quantification (for PFAS the LOQ = MRL)
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Laboratory Report

Environmental Health Division

WSLH Sample: 617820003

Report To:

KATELIN ANDERSON
POLK COUNTY LAND & WATER RESOURCES DEPARTMENT
100 POLK COUNTY PLAZA, STE 120
BALSAM LAKE, WI 54810

Invoice To:

KATELIN ANDERSON
POLK COUNTY LAND & WATER RESOURCES DEPARTMENT
100 POLK COUNTY PLAZA, STE 120
BALSAM LAKE, WI 54810

Customer ID: 336949

Field #: LARGON-MAY-22
Project No: LPL174921
Collection End: 5/3/2022 1:58:00 PM
Collection Start: 05/03/2022 13:56:00
Collected By: KATELIN ANDERSON, COLTON
Date Received: 5/5/2022
Date Reported: 5/20/2022
Sample Reason:

ID#: 493142
Sample Location: LARGON LAKE - DEEP HOLE
Sample Description: INTEGRATED SAMPLER
Sample Type: SU-SURFACE WATER
Waterbody: 2668100
Point or Outfall: 310707115
Sample Depth: 0-2M
Program Code:
Region Code:
County: 49

Sample Comments

SAMPLE RECEIVED ABOVE 6 DEGREES CELSIUS. RESULTS APPROX.

Inorganic Chemistry

Analyte	Analysis Method	Result	Units	LOD	LOQ
Prep Date: 05/06/22 15:52	Analysis Date: 05/18/22 13:38				
Chlorophyll A	EPA 445	28.2	ug/L	0.520	1.74
Prep Date: 05/06/22 15:40	Analysis Date: 05/10/22 12:15				
Phosphorus	EPA 365.1	0.0543	mg/L	0.00900	0.0300

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Laboratory Report

Environmental Health Division

WSLH Sample: 617820003

WDNR LAB ID:113133790 NELAP LAB ID:2091 EPA LAB ID:WI00007, WI00008 WI DATCP ID:105-415

List of Abbreviations:

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Laboratory Report

Environmental Health Division

WSLH Sample: 621595003

Report To:	Invoice To:
KATELIN ANDERSON POLK COUNTY LAND & WATER RESOURCES DEPARTMENT 100 POLK COUNTY PLAZA, STE 120 BALSAM LAKE, WI 54810	KATELIN ANDERSON POLK COUNTY LAND & WATER RESOURCES DEPARTMENT 100 POLK COUNTY PLAZA, STE 120 BALSAM LAKE, WI 54810 Customer ID: 336949

Field #: LARGON-DH-24-MAY-22
Project No: LPL174921
Collection End: 5/24/2022 10:07:00 AM
Collection Start:
Collected By: KATELIN ANDERSON, COLTON
Date Received: 5/25/2022
Date Reported: 6/8/2022
Sample Reason:

ID#: 493142
Sample Location: LARGON LAKE - DEEP HOLE
Sample Description: INTEGRATED SAMPLER
Sample Type: SU-SURFACE WATER
Waterbody: 2668100
Point or Outfall: 312315108
Sample Depth: 0-2M
Program Code:
Region Code:
County: 49

Inorganic Chemistry

Analyte	Analysis Method	Result	Units	LOD	LOQ
Prep Date: 05/25/22 14:50	Analysis Date: 06/07/22 14:12				
Chlorophyll A	EPA 445	17.1	ug/L	1.04	3.48
Prep Date: 05/26/22 15:19	Analysis Date: 06/01/22 12:55				
Phosphorus	EPA 365.1	0.0591	mg/L	0.00900	0.0300

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Laboratory Report

Environmental Health Division

WSLH Sample: 621595003

WDNR LAB ID:113133790 NELAP LAB ID:2091 EPA LAB ID:WI00007, WI00008 WI DATCP ID:105-415

List of Abbreviations:

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Metals: Graham Anderson, Supervisor 608-224-6281
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Environmental Toxicology: Dawn Perkins, Supervisor 608-224-6230
Water Microbiology: Martin Collins, Supervisor 608-224-6239
Radiochemistry: David Webb, Division Director 608-224-6227

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Madison, WI 53707-7996
(800)442-4618 - FAX (608)224-6213
http://www.slh.wisc.edu

Laboratory Report

Environmental Health Division

WSLH Sample: 626218001

Report To:	Invoice To:
KATELIN ANDERSON	KATELIN ANDERSON
POLK COUNTY LAND & WATER RESOURCES DEPARTMENT	POLK COUNTY LAND & WATER RESOURCES DEPARTMENT
100 POLK COUNTY PLAZA, STE 120	100 POLK COUNTY PLAZA, STE 120
BALSAM LAKE, WI 54810	BALSAM LAKE, WI 54810
	Customer ID: 336949

Field #: LARGON-JUNE-22
Project No: LPL174921
Collection End: 6/20/2022 2:05:00 AM
Collection Start:
Collected By: KATELIN ANDERSON, COLTON
Date Received: 6/21/2022
Date Reported: 6/30/2022
Sample Reason:

ID#: 493142
Sample Location: LARGON LAKE - DEEP HOLE
Sample Description: INTEGRATED SAMPLER
Sample Type: SU-SURFACE WATER
Waterbody: 2668100
Point or Outfall: 314749877
Sample Depth: 0-2M
Program Code:
Region Code:
County: 49

Inorganic Chemistry

Analyte	Analysis Method	Result	Units	LOD	LOQ
Prep Date: 06/22/22 11:30	Analysis Date: 06/24/22 15:22				
Chlorophyll A	EPA 445	20.4	ug/L	1.04	3.48
Prep Date: 06/27/22 14:52	Analysis Date: 06/28/22 12:28				
Phosphorus	EPA 365.1	0.0604	mg/L	0.00900	0.0300

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Madison, WI 53707-7996
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Laboratory Report

Environmental Health Division

WSLH Sample: 626218001

WDNR LAB ID:113133790 NELAP LAB ID:2091 EPA LAB ID:WI00007, WI00008 WI DATCP ID:105-415

List of Abbreviations:

LOD = Level of detection
LOQ = Level of quantification (for PFAS the LOQ = MRL)
ND = None detected. Results are less than the LOD
F next to result = Result is between LOD and LOQ
Z next to result = Result is between 0 (zero) and LOD
if LOD=LOQ, Limits were not statistically derived

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Responsible Party

Inorganic Chemistry: Graham Anderson, Supervisor 608-224-6281
Metals: Graham Anderson, Supervisor 608-224-6281
Organics: Erin Mani, Supervisor 608-224-6269
Environmental Toxicology: Dawn Perkins, Supervisor 608-224-6230
Water Microbiology: Martin Collins, Supervisor 608-224-6239
Radiochemistry: David Webb, Division Director 608-224-6227

Wisconsin State Laboratory of Hygiene
University of Wisconsin–Madison

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Laboratory Report

Environmental Health Division

WSLH Sample: 632010006

Report To:

KATELIN ANDERSON
POLK COUNTY LAND & WATER RESOURCES DEPARTMENT
100 POLK COUNTY PLAZA, STE 120
BALSAM LAKE, WI 54810

Invoice To:

KATELIN ANDERSON
POLK COUNTY LAND & WATER RESOURCES DEPARTMENT
100 POLK COUNTY PLAZA, STE 120
BALSAM LAKE, WI 54810

Customer ID: 336949

Field #: LARGON-JULY-22
Project No: LPL174921
Collection End: 7/18/2022 10:38:00 AM
Collection Start:
Collected By: KATELIN ANDERSON, COLTON
Date Received: 7/20/2022
Date Reported: 8/4/2022
Sample Reason:

ID#: 493142
Sample Location: LARGON LAKE - DEEP HOLE
Sample Description: INTEGRATED SAMPLER
Sample Type: SU-SURFACE WATER
Waterbody: 2668100
Point or Outfall: 317117468
Sample Depth: 0-2M
Program Code:
Region Code:
County: 49

Sample Comments

Received above required temperature.

Inorganic Chemistry

Analyte	Analysis Method	Result	Units	LOD	LOQ
Prep Date: 07/26/22 15:29	Analysis Date: 07/27/22 10:14				
Phosphorus	EPA 365.1	0.0479	mg/L	0.00900	0.0300

Inorganic Chem, Field Filtered

Analyte	Analysis Method	Result	Units	LOD	LOQ
Prep Date: 07/29/22 07:52	Analysis Date: 07/29/22 15:39				
Chlorophyll A	EPA 445	14.3	ug/L	0.260	0.870

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Laboratory Report

Environmental Health Division

WSLH Sample: 632010006

WDNR LAB ID:113133790   NELAP LAB ID:2091   EPA LAB ID:WI00007, WI00008   WI DATCP ID:105-415

List of Abbreviations:

LOD = Level of detection
LOQ = Level of quantification (for PFAS the LOQ = MRL)
ND = None detected. Results are less than the LOD
F next to result = Result is between LOD and LOQ
Z next to result = Result is between 0 (zero) and LOD
if LOD=LOQ, Limits were not statistically derived

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Responsible Party

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Environmental Toxicology: Dawn Perkins, Supervisor 608-224-6230
Water Microbiology: Martin Collins, Supervisor 608-224-6239
Radiochemistry: David Webb, Division Director 608-224-6227

Wisconsin State Laboratory of Hygiene
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Laboratory Report

Environmental Health Division

WSLH Sample: 636986004

Report To:

KATELIN ANDERSON
POLK COUNTY LAND & WATER RESOURCES DEPARTMENT
100 POLK COUNTY PLAZA, STE 120
BALSAM LAKE, WI 54810

Invoice To:

KATELIN ANDERSON
POLK COUNTY LAND & WATER RESOURCES DEPARTMENT
100 POLK COUNTY PLAZA, STE 120
BALSAM LAKE, WI 54810

Customer ID: 336949

Field #: LARGON-AUG-22
Project No: LPL179121
Collection End: 8/15/2022 10:16:00 AM
Collection Start: 08/15/2022 10:15:00
Collected By: KATELIN ANDERSON, COLTON
Date Received: 8/16/2022
Date Reported: 9/1/2022
Sample Reason:

ID#: 493142
Sample Location: LARGON LAKE - DEEP HOLE
Sample Description: INTEGRATED SAMPLER
Sample Type: SU-SURFACE WATER
Waterbody: 2668100
Point or Outfall: 319728027
Sample Depth: 0-2M
Program Code:
Region Code:
County: 49

Inorganic Chemistry

Analyte	Analysis Method	Result	Units	LOD	LOQ
Prep Date: 08/16/22 15:40	Analysis Date: 08/26/22 12:06				
Chlorophyll A	EPA 445	64.3	ug/L	1.04	3.48
Prep Date: 08/18/22 14:33	Analysis Date: 08/19/22 12:01				
Phosphorus	EPA 365.1	0.0712	mg/L	0.00900	0.0300

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Laboratory Report

Environmental Health Division

WSLH Sample: 636986004

WDNR LAB ID:113133790 NELAP LAB ID:2091 EPA LAB ID:WI00007, WI00008 WI DATCP ID:105-415

List of Abbreviations:

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LOQ = Level of quantification (for PFAS the LOQ = MRL)
ND = None detected. Results are less than the LOD
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Z next to result = Result is between 0 (zero) and LOD
if LOD=LOQ, Limits were not statistically derived

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Responsible Party

Inorganic Chemistry: Graham Anderson, Supervisor 608-224-6281
Metals: Graham Anderson, Supervisor 608-224-6281
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Environmental Toxicology: Dawn Perkins, Supervisor 608-224-6230
Water Microbiology: Martin Collins, Supervisor 608-224-6239
Radiochemistry: David Webb, Division Director 608-224-6227

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Laboratory Report

Environmental Health Division

WSLH Sample: 642342004

Report To:

KATELIN ANDERSON
POLK COUNTY LAND & WATER RESOURCES DEPARTMENT
100 POLK COUNTY PLAZA, STE 120
BALSAM LAKE, WI 54810

Invoice To:

KATELIN ANDERSON
POLK COUNTY LAND & WATER RESOURCES DEPARTMENT
100 POLK COUNTY PLAZA, STE 120
BALSAM LAKE, WI 54810

Customer ID: 336949

Field #: LARGON-SEPT-22
Project No: LPL174921
Collection End: 9/12/2022 12:50:00 PM
Collection Start: 09/12/2022 12:45:00
Collected By: KATELIN ANDERSON, COLTON
Date Received: 9/14/2022
Date Reported: 10/5/2022
Sample Reason:

ID#: 493142
Sample Location: LARGON LAKE - DEEP HOLE
Sample Description: INTEGRATED SAMPLER
Sample Type: SU-SURFACE WATER
Waterbody: 2668100
Point or Outfall: 322149813
Sample Depth: 0-2M
Program Code:
Region Code:
County: 49

Sample Comments

Received above required temperature.

Inorganic Chemistry

Analyte	Analysis Method	Result	Units	LOD	LOQ
Prep Date: 09/14/22 15:12	Analysis Date: 09/16/22 15:11				
Chlorophyll A	EPA 445	48.0	ug/L	0.520	1.74
Prep Date: 09/27/22 15:23	Analysis Date: 10/03/22 14:21				
Phosphorus	EPA 365.1	0.0498	mg/L	0.00900	0.0300

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Laboratory Report

Environmental Health Division

WSLH Sample: 642342004

WDNR LAB ID:113133790 NELAP LAB ID:2091 EPA LAB ID:WI00007, WI00008 WI DATCP ID:105-415

List of Abbreviations:

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LOQ = Level of quantification (for PFAS the LOQ = MRL)
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F next to result = Result is between LOD and LOQ
Z next to result = Result is between 0 (zero) and LOD
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Laboratory Report

Environmental Health Division

WSLH Sample: 650123001

Report To:

KATELIN ANDERSON
POLK COUNTY LAND & WATER RESOURCES DEPARTMENT
100 POLK COUNTY PLAZA, STE 120
BALSAM LAKE, WI 54810

Invoice To:

KATELIN ANDERSON
POLK COUNTY LAND & WATER RESOURCES DEPARTMENT
100 POLK COUNTY PLAZA, STE 120
BALSAM LAKE, WI 54810

Customer ID: 336949

Field #: LARGON-OCT-22_0
Project No: LPL174921
Collection End: 10/20/2022 9:20:00 AM
Collection Start:
Collected By: KATELIN ANDERSON, COLTON
Date Received: 10/25/2022
Date Reported: 11/10/2022
Sample Reason:

ID#: 493142
Sample Location: LARGON LAKE - DEEP HOLE
Sample Description: GRAB SAMPLE
Sample Type: SU-SURFACE WATER
Waterbody: 2668100
Point or Outfall: 325739639
Sample Depth: 0-2M
Program Code:
Region Code:
County: 49

Inorganic Chemistry

Analyte	Analysis Method	Result	Units	LOD	LOQ
Prep Date: 11/02/22 15:37	Analysis Date: 11/08/22 13:55				
Phosphorus	EPA 365.1	0.0495	mg/L	0.00900	0.0300

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Laboratory Report

Environmental Health Division

WSLH Sample: 650123001

WDNR LAB ID:113133790 NELAP LAB ID:2091 EPA LAB ID:WI00007, WI00008 WI DATCP ID:105-415

List of Abbreviations:

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Water Microbiology: Martin Collins, Supervisor 608-224-6239
Radiochemistry: David Webb, Division Director 608-224-6227

Appendix E

Citizen Lake Monitoring Network Data

Date	Appearance (Clear-Murky)	Water color (Blue-Green-Brown)	Perception (See footnote)
4/26/21	C	Bl	2
4/27/21	C	Bl	2
4/28/21	C	Bl	2
4/29/21	C	Bl	1
4/30/21	C	Bl	1
5/1/21	C	Bl	1
5/2/21	C	Bl	1
5/3/21	C	Bl	1
5/4/21	C	Bl	1
5/5/21	C	Bl	1
5/6/21	C	Bl	1
5/7/21	C	Bl	1
5/8/21	C	Bl	2
5/9/21	C	Bl	2
5/10/21	C	Bl	1
5/11/21	C	Bl	2
5/12/21	C	Bl	1
5/13/21	C	Bl	1
5/14/21	C	Bl	1
5/15/21	C	Bl	2
5/16/21	C/M	Bl	2
5/17/21	C/M	Bl	2
5/18/21	C/M	Bl	2
5/19/21	C/M	Bl	2
5/20/21	C/M	Bl	2
5/21/21	M	Br	3
5/22/21	M	Br	3
5/23/21	M	Br	3
5/24/21	M	Br	3
5/25/21	C/M	Br	2
5/26/21	C/M	Br	2
5/27/21	C/M	Br	2
5/28/21	C	Bl	1
5/29/21	C	Bl	1
5/30/21	C	Bl	1
5/31/21	C	Bl	2
6/1/21	C	Bl	3
6/2/21	C	Bl	3
6/3/21	C	Bl	3
6/4/21	C	Bl	3
6/5/21	C	Bl	3
6/6/21	C	Bl	3
6/7/21	C	Bl	3
6/8/21	C	Bl	2
6/9/21	C	Bl	2
6/10/21	C	Bl	2
6/11/21	C/M	Bl	2
6/12/21	C/M	Bl	3
6/13/21	C/M	Bl	3
6/14/21	C	Bl	2
6/15/21	C	Bl	2
6/16/21	C	Bl	2
6/17/21	C/M	Bl	2
6/18/21	C/M	Bl/Br	3
6/19/21	C/M	Bl/Br	4
6/20/21	C/M	Bl/Br	4
6/21/21	C	Bl	2
6/22/21	C	Bl	2
6/23/21	C	Bl	3.5
6/24/21	C	Bl	5
6/25/21	M	Gr	3
6/26/21	C/M	Bl/Gr	3
6/27/21	C/M	Bl/Gr	3
6/28/21	C/M	Bl/Gr	2.5
6/29/21	C/M	Bl/Gr	2.5
6/30/21	C/M	Bl/Gr	2.5
7/1/21	M	Gr	4
7/2/21	M	Gr	3.5
7/3/21	M	Gr	4.5
7/4/21	M	Gr	4
7/5/21	M	Gr	4
7/6/21	M	Gr	4
7/7/21	M	Gr	4
7/8/21	M	Gr	5
7/9/21	M	Gr	5
7/10/21	M	Gr	5
7/11/21	M	Gr	5
7/12/21	M	Gr	5
7/13/21	M	Gr	
7/14/21	M	Gr	3.5
7/15/21	M	Gr	4
7/16/21	M	Gr	4
7/17/21	M	Gr	5
7/18/21	M	Gr	5
7/19/21	M	Gr	5
7/20/21	M	Gr	5
7/21/21	M	Gr	5
7/22/21	M	Gr	5
7/23/21	M	Gr	5
7/24/21	M	Gr	4
7/25/21	M	Gr	5
7/26/21	M	Gr	5
7/27/21	M	Gr	5
7/28/21	M	Gr	5
7/29/21	M	Gr	5
7/30/21	M	Gr	5
7/31/21	M	Gr	5
8/1/21	M	Gr	4
8/2/21	M	Gr	4
8/3/21	M	Gr	4
8/4/21	M	Gr	4
8/5/21	M	Gr	4
8/6/21	M	Gr	4
8/7/21	M	Gr	4
8/8/21	M	Br	4
8/9/21	M	bf	4

Date	Appearance (Clear-Murky)	Water color (Blue-Green-Brown)	Perception (See footnote)
8/10/21	M	Br	4
8/11/21	M	Br	4
8/12/21	M	Br	4
8/13/21	M	Br	3
8/14/21	M	Br	
8/15/21	M	Br	
8/16/21			
8/17/21			
8/18/21			
8/19/21			
8/20/21			
8/21/21			
8/22/21			
8/23/21	M	Gr	3
8/24/21	M	Gr	3
8/25/21	M	Gr	3
8/26/21	M	Gr	3
8/27/21	M	Gr	3.5
8/28/21	M	Gr	3.5
8/29/21	M	Gr	3.5
8/30/21	M	Gr	4
8/31/21	M	Gr	4
9/1/21	M	Gr	4
9/2/21	M	Gr	4
9/3/21	M	Gr	4.5
9/4/21	M	Gr	5
9/5/21	M	Gr	5
9/6/21	M	Gr	5
9/7/21	M	Gr	4
9/8/21	M	Gr	4
9/9/21	M	Gr	4
9/10/21	M	Gr	4
9/11/21	M	Gr	4
9/12/21	M	Gr	4.5
9/13/21	M	Gr	5
9/14/21	M	Gr	4.5
9/15/21	M	Gr	4.5
9/16/21	M	Gr	4
9/17/21	M	Gr	4
9/18/21	M	Gr	4
9/19/21	M	Gr	4
9/20/21	M	Gr	4
9/21/21	M	Gr	4
9/22/21	M	Gr	4.5
9/23/21	M	Gr	5
9/24/21	M	Gr	5
9/25/21	M	Gr	4.5
9/26/21	M	Gr	4
9/27/21	M	Gr	4
9/28/21	M	Gr	4

Date	Appearance (Clear-Murky)	Water color (Blue-Green-Brown)	Perception (See footnote)
5/17/22	C	Br	2
5/18/22	C	Br	2
5/19/22	C	Br	2
5/20/22	C	Br	2
5/21/22	C	Br	2
5/22/22	C	Br	2
5/23/22	C	Br	2
5/24/22	C	Br	2
5/25/22	C	Br	2
5/26/22	C	Br	2
5/27/22	C	Br	2
5/28/22	M	Br	3
5/29/22	M	Br	3
5/30/22	M	Br	3
5/31/22	M	Br	3
6/1/22	M	Br	3
6/2/22	M	Br	2
6/3/22	M	Br	3
6/4/22	M	Br	3
6/5/22	M	Br	3
6/6/22	M	Br	3
6/7/22	M	Br	3
6/8/22	M	Br	3
6/9/22	M	Br	3
6/10/22	M	Br	4
6/11/22	M	Br	
6/12/22	M	Br	
6/13/22	M	Br	
6/14/22	M	Br	
6/15/22	M	Br	
6/16/22	M	Br	
6/17/22	M	Br	
6/18/22	M	Br	
6/19/22	M	Br	4
6/20/22	M	Br	4
6/21/22	M	Br	
6/22/22	M	Br	
6/23/22	M	Br	4
6/24/22	M	Br	4
6/25/22	M	Br	4
6/26/22	M	Br	4
6/27/22	M	Br	4
6/28/22	M	Br	
6/29/22	M	Br	
6/30/22	M	Br	
7/1/22	M	Br	4
7/2/22	M	Br	4
7/3/22	M	Br	4
7/4/22	M	Br	4
7/5/22	M	Br	4
7/6/22	M	Br	4
7/7/22	M	Br	3
7/8/22	M	Br	3

Date	Appearance (Clear-Murky)	Water color (Blue-Green-Brown)	Perception (See footnote)
7/9/22	M	Br	3
7/10/22	M	Br	3
7/11/22	M	Br	3
7/12/22	M	Br	3
7/13/22	M	Br	3
7/14/22	M	Br	3
7/15/22	M	Br	3
7/16/22	M	Br	3
7/17/22	M	Br	3
7/18/22	M	Br	3
7/19/22	M	Br	4
7/20/22	M	Br	4
7/21/22	M	Br	4
7/22/22	M	Br	3
7/23/22	M	Br	3
7/24/22	M	Br	3
7/25/22	M	Br	3
7/26/22	M	Br	3
7/27/22	M	Br	3
7/28/22	M	Br	3
7/29/22	M	Br	3
7/30/22	M	Br	3
7/31/22	M	Br	3
8/1/22	M	Br	3
8/2/22	M	Br	3
8/3/22	M	Gr	4
8/4/22	M	Gr	4
8/5/22	M	Gr	4
8/6/22	M	Gr	3
8/7/22	M	Gr	3
8/8/22	M	Gr	3
8/9/22	M	Gr	4
8/10/22	M	Gr	4
8/11/22	M	Gr	4
8/12/22	M	Gr	4
8/13/22	M	Gr	4
8/14/22	M	Gr	5
8/15/22	M	Gr	5
8/16/22	M	Gr	5
8/17/22	M	Gr	5
8/18/22	M	Gr	5
8/19/22	M	Gr	5
8/20/22	M	Gr	5
8/21/22	M	Gr	5
8/22/22	M	Gr	5

Date	Appearance (Clear-Murky)	Water color (Blue-Green-Brown)	Perception (See footnote)
8/23/22	M	Gr	5
8/24/22	M	Gr	5
8/25/22	M	Gr	5
8/26/22	M	Gr	5
8/27/22	M	Gr	5
8/28/22	M	Gr	5
8/29/22	M	Gr	5
8/30/22	M	Gr	5
8/31/22	M	Gr	5
9/1/22	M	Gr	5
9/2/22	M	Gr	5
9/3/22	M	Gr	5
9/4/22	M	Gr	5
9/5/22	M	Gr	5
9/6/22	M	Gr	5
9/7/22	M	Gr	5
9/8/22	M	Gr	5
9/9/22	M	Gr	5
9/10/22	M	Gr	5
9/11/22	M	Gr	5
9/12/22	M	Gr	5
9/13/22	M	Gr	5
9/14/22	M	Gr	5
9/15/22	M	Gr	4
9/16/22	M	Gr	4
9/17/22	M	Gr	4
9/18/22	M	Gr	
9/19/22	M	Gr	
9/20/22	M	Gr	
9/21/22	M	Gr	
9/22/22	M	Gr	
9/23/22	M	Gr	
9/24/22	M	Gr	5
9/25/22	M	Gr	5
9/26/22	M	Gr	5
9/27/22	M	Gr	5
9/28/22	M	Gr	5
9/29/22	M	Gr	5
9/30/22	M	Gr	5
10/1/22	M		
10/2/22	M		
10/3/22	M		
10/5/22	M	Gr	5
10/6/22	M		5

Perception: Beautiful, could not be nicer (1), very minor aesthetic problems, excellent for swimming and boating (2), swimming and aesthetic enjoyment of lake slightly impaired (3), desire to swim and level of enjoyment of lake substantially reduced because of algae i.e. would not swim, but boating is okay (4), and swimming and aesthetic enjoyment of lake substantially reduced because of algae levels (5)

Appendix F

Fisheries Report

WISCONSIN DEPARTMENT OF NATURAL RESOURCES

Fishery Survey Report for Largon Lake Polk County, Wisconsin 2021

WATERBODY IDENTIFICATION CODE: 266810

Brandon J. Wagester
Fisheries Technician - LTE
&
Kyle J. Broadway
Fisheries Biologist - Senior

2023

Introduction

Largon Lake is a 135-acre drainage lake located in northeastern Polk County. The lake has a maximum depth of 13 feet and a mean depth of 6 feet. Largon Lake is an algae-dominated shallow lake with gradual sloping shorelines, a large littoral zone and bottom substrates roughly composed of 40% sand and 60% muck. Shorelines are primarily developed with 15.5 dwellings per shoreline mile.

Largon Lake has a history of winterkills, and thus, a compressed air aeration system is operated during winters to prevent fish kills due to persistent low dissolved oxygen conditions. The aerator has been in operation since 1977 and has largely prevented significant winterkills. An aerator malfunction occurred during the winter between 2013-2014, which resulted in a significant winterkill that greatly affected most species in Largon Lake, including the quality northern pike fishery.

The Wisconsin Department of Natural Resources (DNR) surveyed Largon Lake to assess the status of the northern pike population following public concerns of low size structure and harvest potential under the current fishing regulation. An early spring fyke netting survey (SN1) was conducted using mark-recapture techniques to estimate adult densities, relative abundance, size structure and growth.

LAKE CHARACTERISTICS

Largon Lake is a fertile system classified as a simple-cool-dark lake (Rypel et al. 2019). Largon Lake experiences heavy algal blooms, and the July-August mean Trophic State Index (TSI) values for chlorophyll-a, Secchi depth and total phosphorus was 63, 65 and 66, respectively. Mean TSI has generally remained stable over the past decade. There is one public boat launch located on the southeast shoreline of the lake off 208th Ave (45.611, -92.192). More information on water quality and invasive species can be found on the DNR lake page for Largon Lake.

STOCKING HISTORY

Northern pike and largemouth bass were the only species stocked into Largon Lake in recent decades (Appendix Table 1). Northern pike stocking was discontinued after 2002, and the population was maintained through natural reproduction. Largemouth bass were last stocked by the DNR annually from 2014-2016 following the 2013-2014 winterkill.

FISHING REGULATIONS

Largon Lake has only one special fishing regulation, which is the 32-inch minimum length limit (MLL) and one fish daily bag limit for northern pike. This regulation has been in place since 1995. All other species follow statewide regulations.

Methods

Largon Lake was sampled during 2021 to estimate the adult northern pike population abundance. An early spring netting (SN1) survey occurred March 30 – April 2, 2021and up to six fyke nets were set for a total of 21 net nights. Northern pike were measured (total length), weighed, sexed and given a mark indicating capture. Recaptures were identified following the first day of netting. The adult northern pike (≥ 14 inches) population was estimated using the Schnabel method. Catch-per-unit effort (CPUE) was estimated as catch per net night.

Lake class standards CPUE were calculated by comparing Largon Lake northern pike CPUE to the CPUEs of the other simple-cool-dark lakes in Wisconsin (Rypel et al. 2019).

Aging structures were collected from a subsample of five fish per 0.5-inch group for each sex. Northern pike were aged with pelvic fin rays, which were cut with a Dremel tool and aged under a microscope by a single interpreter. The mean length at age was compared to the median length at age for simple-cool-dark lakes and to previous surveys when data were available. The von Bertalanffy growth model was fitted using mean length at age data to assess growth (von Bertalanffy 1938).

Size structure was assessed using the proportional size distribution (PSD) indices (Neumann et al. 2013) and comparing relative length frequencies between survey years using a Kolmogrov-Smirnov (KS) test. The PSD value for a species is the number of fish of a specified length and longer divided by the number of fish of stock length or longer, the result multiplied by 100. The fish condition was assessed by estimating the relative weight (W_r) of each fish, or the actual weight of a fish divided by its standard weight (Wege and Anderson 1978). The mean W_r was determined.

Results and Discussion

There were 721 northern pike collected during the SN1 survey. The adult northern pike population estimate was 10.9 fish/acre (CV = 0.13). Adult density remained similar to previous density estimates from 1998 (14.2 fish/acre) and 2003 (7.8 fish/acre) despite the 2013-2014 winterkill (Figure 1). The CPUE was 34.3 fish/net night, which was above the 99th percentile (25.7 fish/net night) for similar simple-cool-dark lakes in Wisconsin and indicative of a high-density population. Population density has remained high since the regulation change in 1995, but the population estimate of large individuals (≥ 32 inches) has decreased substantially (87%) since 2003 (Figure 1). The population estimate of fish ≥ 26 inches has also decreased by 35% since 2003. It is likely higher mortality occurred among the largest northern pike during the 2013-2014 winterkill.

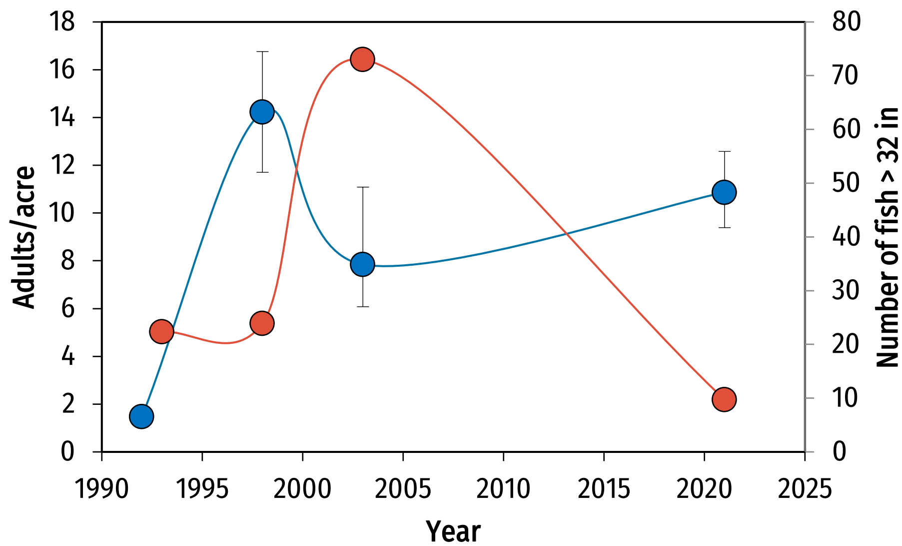

Figure 1. Population estimates of adult (≥ 14 inches) northern pike (blue circles; with 95% confidence intervals) and fish ≥ 32 inches (red circles) in Largon Lake, Polk County, WI, 1992-2021.

The mean length was 19.5 inches and near the 90th percentile (19.3 in) for similar simple-cool-dark Wisconsin lakes. Males ranged in length from 15.0 to 28.5 inches, while females ranged from 18.0 to 38.5 inches (Figure 2). The male-to-female ratio was 3:1.

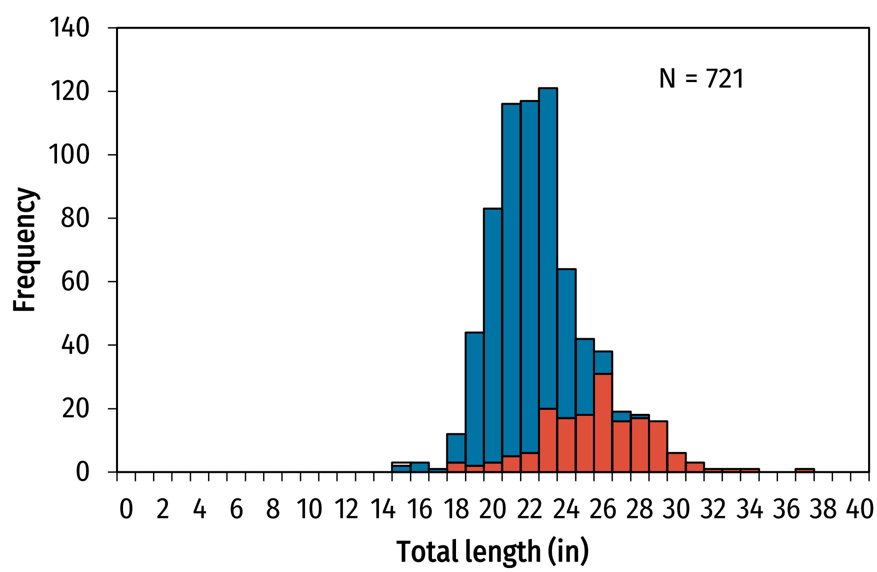

Figure 2. Length frequency of all the northern pike captured during 2021. Males are represented with blue bars, females with red bars and unknown sex with white bars.

Population relative length frequencies were not considered statistically different between 2003 and 2021 (KS test: D = 0.24, P = 0.17; Figure 3), but the relative abundance of the largest individuals decreased. Similarly, reductions in PSD indices were apparent. During 2021, PSD-32 was 1 and PSD-26 was 16. Both size structure indices declined by > 50% since 2003 (PSD-32 was 7 and PSD-26 was 34; Figure 4). This decrease in size structure was likely attributed to the 2013-2014 winterkill, but overall size structure remained good.

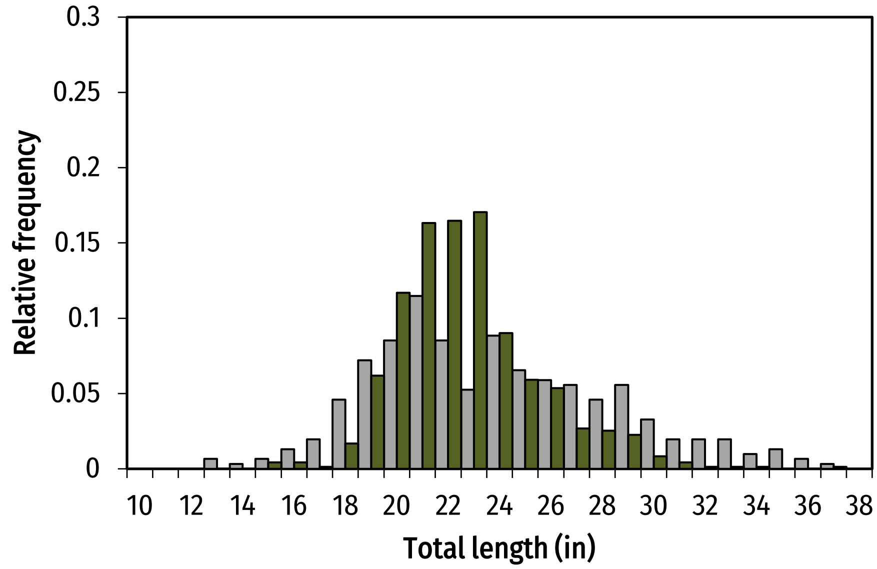

Figure 3. Relative length frequencies of northern pike sampled during 2003 (grey bars) and 2021 (green bars).

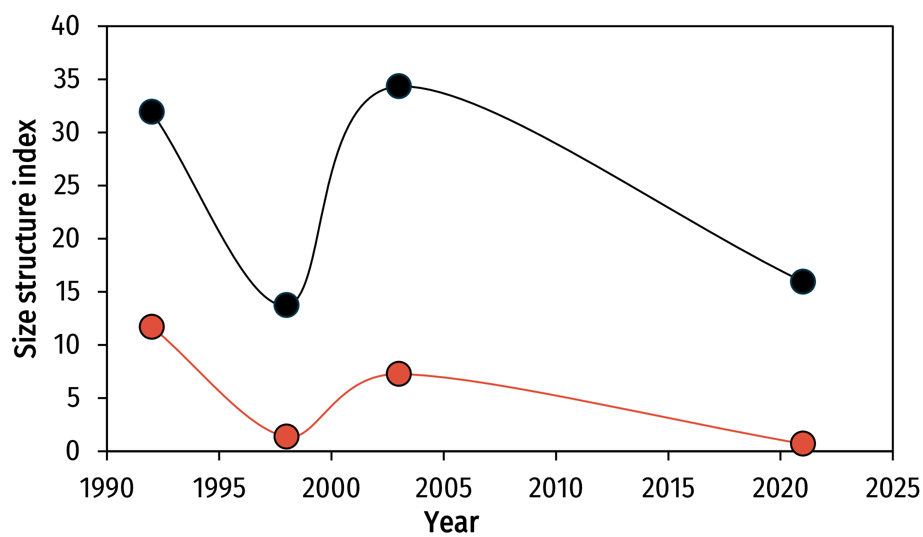

Figure 4. Size structure indices, PSD-26 represented by black circles and PSD-32 by red circles, for northern pike in Largon Lake, Polk County, WI, 1992-2021.

Northern pike ages ranged from 2 to 9, with females ranging from 3 to 9 and males 2 to 7. The mean length at age of northern pike was greater than the median from similar simple-cool-dark Wisconsin lakes (average difference in mean length at age: 4.3 inches; ages 2 - 9) and similar to the Barron/Polk counties average (average difference in mean lengths at age: 0.8 inches; ages 2 – 9; Figure 5). Mean lengths at age of northern pike during the 2021 survey were greater than those observed during the 2003 survey (average difference in mean length at age: 1.8 inches; ages 2 - 6). Northern pike growth rates remained good in Largon Lake compared to lake class standards, Barron/Polk counties average and the 2003 survey. Northern pike remained in above-average condition, which suggested intraspecific competition had not impacted the population. Mean W_r for all northern pike was 96 and remained similar to, but slightly lower than, those observed during the 2003 and 1998 surveys (Mean W_r > 100 in both surveys). Von Bertalanffy growth models could not be fit.

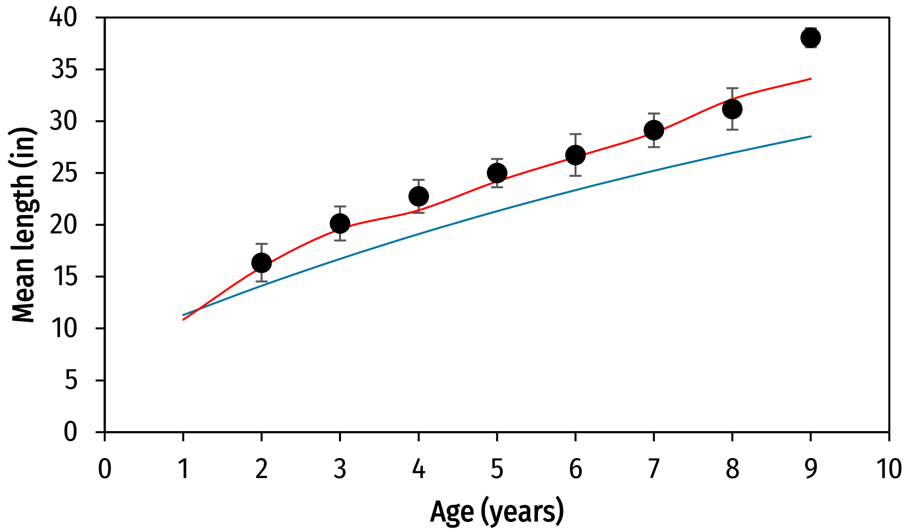

Figure 5. Mean length at age ± standard deviation of northern pike (black circles) in Largon Lake. The median length at age for similar simple-cool-dark Wisconsin lakes is represented by the blue line. Mean length at age estimates for Barron/Polk counties is represented by the red line.

During 2021, only 0.7% of the northern pike population was susceptible to harvest with the current 32-inch MLL special fishing regulation. The proportion of the population susceptible to harvest declined from 7.2% during 2003, likely driven by the 2013-2014 winterkill, which reduced abundances of the largest size classes. Additionally, 100% of harvested fish would be female given the current population structure, which could be detrimental to the reproductive success of the naturally reproducing population. Resource constituents of Largon Lake sought a change to the current northern pike harvest regulations to allow greater harvest potential while maintaining quality population size structure.

Management objectives are to reduce adult density by approximately 25% to eight adults/acre and increase population size structure to a target of PSD-26 > 30 and PSD-32 > 5. These management objectives would resemble the quality northern pike fishery observed during 2003. New harvest regulation options presented to the public included a no MLL (five fish daily bag limit), a 26-inch MLL (two fish daily bag limit) and a protected slot limit regulation (no fish between 25-35 inches could be harvested) with a five fish daily bag limit. The no MLL regulation was viewed as too liberal and least supported by the public despite possibly being the most appropriate to achieve management objectives and yield a quality harvest fishery with a good size structure. The 25-35 inches protected slot limit and five fish daily bag limit would greatly increase the proportion of the population susceptible to harvest (79%), greatly increase the total allowable harvest and shift the sex-biased selection of harvest toward males (90% males; 10% females). The protected slot regulation would likely achieve management objectives and promote a quality population size structure but was not supported by the local constituents, mainly due to the low size of pike (< 25 inches) available to harvest. Resource constituents favored a regulation change to a 26-inch MLL and two fish daily bag limit, which would also increase the proportion of the population susceptible to harvest, double the total allowable harvest and provide a quality harvest opportunity. Approximately 16% of the population, of which 90% would be females and 10% males, would be vulnerable to harvest under a new 26-inch MLL. In addition, this regulation could potentially decrease adult density and improve size structure through time.

The continued effective operation of the compressed air aeration system is imperative to the success of any fisheries management goals. If winterkills are prevented on Largon Lake in the coming years, the northern pike population should continue to improve as age and size structures increase. The northern pike population in Largon Lake should be reevaluated 10 years following the implementation of the new special fishing regulation, 26-inch MLL and two fish daily bag limit, to assess if management goals have been met or if additional actions are necessary. If management objectives have not been met at that time, then alternate harvest regulations may be considered.

Management Recommendations

1. Change the northern pike size and bag limit to a 26-inch MLL and two fish daily bag limit. The 32-inch size limit is overly protective and limits harvest potential given the current northern pike population status in Largon Lake. There has been considerable public support for a regulation that maintains or improves a desirable size structure yet offers a quality harvest opportunity.
2. The next DNR survey for Largon Lake is currently scheduled for 2032 but is subject to change depending on local and statewide sampling plans. Population density and size structure of northern pike should be evaluated and compared to management goals of eight adults/acre and a PSD-26 > 30 and PSD-32 > 5.
3. To prevent future winterkills, the compressed air aeration system should continue operations.
4. Efforts to increase habitat complexity in Largon Lake should also be encouraged where applicable. Inputs of coarse woody habitat,

protection/promotion of aquatic vegetation and maintenance/restoration of vegetative buffers would be beneficial. Inputs of coarse woody habitat, protection/promotion of aquatic vegetation and maintenance/restoration of vegetative buffers would be beneficial. The Healthy Lakes and Rivers website ([healthylakeswi.com)](healthylakeswi.com) is a great resource to learn about this recommendation.

5. Invasive species monitoring and control programs should continue.

Acknowledgments

Thanks to Craig Landes and Aaron Cole for assisting with field collection, aging and data entry.

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Appendix Table 1. Fish stocking records for Largon Lake, 1991-2016.

YEAR	SPECIES	AGE CLASS	NUMBER STOCKED
1991	Northern Pike	Small Fingerling	372
1992	Northern Pike	Small Fingerling	650
1994	Northern Pike	Small Fingerling	645
1996	Northern Pike	Small Fingerling	273
1998	Northern Pike	Small Fingerling	645
2000	Northern Pike	Small Fingerling	645
2002	Northern Pike	Small Fingerling	665
2014	Largemouth Bass	Large Fingerling	3,375
2015	Largemouth Bass	Large Fingerling	5,045
2016	Largemouth Bass	Large Fingerling	6,742

Appendix G

Point Intercept Survey Data

INDIVIDUAL SPECIES STATS: 6/22/21	Total vegetation	*Brasenia schreberi*, Watershield	*Ceratophyllum echinatum*, Spiny hornwort	*Elodea nuttallii*, Slender waterweed	*Lemna minor*, Small duckweed	*Nitella sp.*, Nitella	*Nuphar variegata*, Spatterdock	*Nymphaea odorata*, White water lily	*Pontederia cordata*, Pickerelweed	*Potamogeton natans*, Floating-leaf pondweed	*Potamogeton pusillus*, Small pondweed	*Sagittaria sp.*, Arrowhead	*Spirodela polyrhiza*, Large duckweed	*Utricularia vulgaris*, Common bladderwort	Wild celery	Aquatic moss
Frequency of occurrence within vegetated areas (%)		48.57	40.00	2.86	2.86	14.29	2.86	57.14	2.86	17.14	2.86	8.57	2.86	5.71	2.86	5.71
Frequency of occurrence at sites shallower than maximum depth of plants		13.28	10.94	0.78	0.78	3.91	0.78	15.63	0.78	4.69	0.78	2.34	0.78	1.56	0.78	1.56
Relative Frequency (%)		22.97	18.92	1.35	1.35	6.76	1.35	27.03	1.35	8.11	1.35	4.05	1.35	2.70	1.35	
Number of sites where species found		17	14	1	1	5	1	20	1	6	1	3	1	2	1	2
Average Rake Fullness	1.50	1.71	1.07	1.00	1.00	1.00	1.00	1.25	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
# visual sightings		26	1		5		6	27	1	6		2	9			

SUMMARY STATS: 6/22/21	
Total number of sites visited	340
Total number of sites with vegetation	35
Total number of sites shallower than maximum depth of plants	128
Frequency of occurrence at sites shallower than maximum depth of plants	27.34
Simpson Diversity Index	0.82
Maximum depth of plants (ft)**	7.00
Number of sites sampled using rake on Rope (R)	0
Number of sites sampled using rake on Pole (P)	124
Average number of all species per site (shallower than max depth)	0.58
Average number of all species per site (veg. sites only)	2.11
Average number of native species per site (shallower than max depth)	0.58
Average number of native species per site (veg. sites only)	2.11
Species Richness	14
Species Richness (including visuals)	14

6/22/21 Point Intercept Survey

Sampling point	Depth (ft)	Dominant sediment (M=muck, S=Sand, =Rock)	Sampled holding rake pole (P) or rope (R)?	Comments	Total Rake Fullness	*Brasenia schreberi*, Watershield	*Ceratophyllum echinatum*, Spiny hornwort	*Elodea nuttallii*, Slender waterweed	*Lemna minor*, Small duckweed	*Nitella* sp., Nitella	*Nuphar variegata*, Spatterdock	*Nymphaea odorata*, White water lily	*Pontederia cordata*, Pickerelweed	*Potamogeton natans*, Floating-leaf pondweed	*Potamogeton pusillus*, Small pondweed	*Sagittaria* sp., Arrowhead	*Spirodela polyrhiza*, Large duckweed	*Utricularia vulgaris*, Common bladderwort	*Vallisneria americana*, Wild celery	Aquatic moss
1	3	M	P		1	1	1	1	V		V	1					V			
2	3	M	P		2	2			V		V			1			V			
3	3	M	P		2	2						V		V			V			
4	3	M	P		2	2											1			
5	3	M	P		1	1	1		V			V	v			1	V			
6	3.5	M	P		3	3	1		1			1		1						
7	4.5	M	P																	
8	4	M	P									V								
9	3	M	P		1	V					1	1					V			
10				Terrestrial																
11	3	M	P		1		1					1	1			v	V			
12	4	M	P									V								
13	5	M	P																	
14	5	M	P									V								
15	5	M	P			V														
16	3	M	P		2	2						2								
17	3	M	P		3	3						V		1		1				
18	6	M	P									V								
19	6	M	P			V						V								
20	6	M	P																	
21	3	M	P		1	1	1					1		1						
22	3	M	P		2	1	v				V	2								
23	6	M	P																	
24	6	M	P																	
25	6	M	P																	
26	3	M	P		3	3	1					1		1						
27	3	R	P		2	2						1		V						
28	6	M	P			V														
29	7	M	P																	
30	7	M	P																	
31	6	M	P																	
32	4	S	P									V								
33	6	S	P			V														
34	7	M	P																	
35	8																			
36	8																			
37	7																			
38	7																			
39	6		P																	
40	8																			
41	8																			
42	8																			
43	8																			
44	8																			
45	3	R	P		1	1					v	V								
46	3	R	P			V						V								
47	9																			
48	9																			
49	9																			
50	8																			
51	8																			
52	7	M	P		1							1								
53	8																			
54	8																			

Sampling point	Depth (ft)	Dominant sediment (M=muck, S=Sand, =Rock)	Sampled holding rake pole (P) or rope (R)?	Comments	Total Rake Fullness	*Brasenia schreberi*, Watershield	*Ceratophyllum echinatum*, Spiny hornwort	*Elodea nuttallii*, Slender waterweed	*Lemna minor*, Small duckweed	*Nitella* sp., Nitella	*Nuphar variegata*, Spatterdock	*Nymphaea odorata*, White water lily	*Pontederia cordata*, Pickerelweed	*Potamogeton natans*, Floating-leaf pondweed	*Potamogeton pusillus*, Small pondweed	*Sagittaria* sp., Arrowhead	*Spirodela polyrhiza*, Large duckweed	*Utricularia vulgaris*, Common bladderwort	*Vallisneria americana*, Wild celery	Aquatic moss
55	10																			
56	9																			
57	8																			
58	9																			
59	8																			
60	8																			
61	8																			
62	9																			
63	10																			
64	10																			
65	9																			
66	9																			
67	9																			
68	9																			
69	9																			
70	9																			
71	10																			
72	10																			
73	9																			
74	9																			
75	9																			
76	9																			
77	5.5	R	P																	
78	2	M	P		1	V	1		V			1		v		V	V			
79	9																			
80	10																			
81	10																			
82	10																			
83	10																			
84	10																			
85	10																			
86	5																			
87	9																			
88	9																			
89	9																			
90	5	R	P																	
91	5	R	P																	
92	8																			
93	6	R	P									v								
94	10																			
95	10																			
96	10																			
97	9																			
98	10																			
99	10																			
100	10																			
101	9																			
102	9																			
103	9																			
104	9																			
105	9																			
106	9																			
107	8																			
108	5	R	P																	

Sampling point	Depth (ft)	Dominant sediment (M=muck, S=Sand, =Rock)	Sampled holding rake pole (P) or rope (R)?	Comments	Total Rake Fullness	*Brasenia schreberi*, Watershield	*Ceratophyllum echinatum*, Spiny hornwort	*Elodea nuttallii*, Slender waterweed	*Lemna minor*, Small duckweed	*Nitella* sp., Nitella	*Nuphar variegata*, Spatterdock	*Nymphaea odorata*, White water lily	*Pontederia cordata*, Pickerelweed	*Potamogeton natans*, Floating-leaf pondweed	*Potamogeton pusillus*, Small pondweed	*Sagittaria* sp., Arrowhead	*Spirodela polyrhiza*, Large duckweed	*Utricularia vulgaris*, Common bladderwort	*Vallisneria americana*, Wild celery	Aquatic moss
109	3	R	P		2	2														
110	4	M	P		1							1								
111	4	R	P			V														
112	4	R	P		1							v		1						
113	9																			
114	11																			
115	10																			
116	10																			
117	10																			
118	10																			
119	10																			
120	10																			
121	10																			
122	9																			
123	9																			
124	10																			
125	9																			
126	9																			
127	9																			
128	8																			
129	8																			
130	8																			
131	7	M	P																	
132	6	M	P																	
133	5	S	P																	
134	3	S	P		1	1														
135	3	R	P									V								
136	11																			
137	10																			
138	10																			
139	10																			
140	10																			
141	10																			
142	9																			
143	10																			
144	9																			
145	10																			
146	10																			
147	9																			
148	9																			
149	9																			
150	9																			
151	8																			
152	8																			
153	7	M	P																	
154	6	M	P																	
155	6	M	P																	
156	5	M	P																	
157	3	R	P		1	V	1													
158	10																			
159	11																			
160	10																			
161	10																			
162	10																			

Sampling point	Depth (ft)	Dominant sediment (M=muck, S=Sand, =Rock)	Sampled holding rake pole (P) or rope (R)?	Comments	Total Rake Fullness	*Brasenia schreberi*, Watershield	*Ceratophyllum echinatum*, Spiny hornwort	*Elodea nuttallii*, Slender waterweed	*Lemna minor*, Small duckweed	*Nitella* sp., Nitella	*Nuphar variegata*, Spatterdock	*Nymphaea odorata*, White water lily	*Pontederia cordata*, Pickerelweed	*Potamogeton natans*, Floating-leaf pondweed	*Potamogeton pusillus*, Small pondweed	*Sagittaria* sp., Arrowhead	*Spirodela polyrhiza*, Large duckweed	*Utricularia vulgaris*, Common bladderwort	*Vallisneria americana*, Wild celery	Aquatic moss
163	10																			
164	10																			
165	10																			
166	10																			
167	10																			
168	10																			
169	10																			
170	9																			
171	9																			
172	9																			
173	8																			
174	8																			
175	8																			
176	8																			
177	7	m	p																	
178	6	m	p																	
179	5	m	p																	
180	2	m	p		1							1				1				
181	10																			
182	10																			
183	10																			
184	10																			
185	10																			
186	10																			
187	10																			
188	10																			
189	10																			
190	10																			
191	10																			
192	10																			
193	9																			
194	8																			
195	8																			
196	8																			
197	8																			
198	8																			
199	7	m	p																	
200	6	m	p																	
201	6	m	p																	
202	2	m	p		2	V						2								
203	9																			
204	9																			
205	10																			
206	10																			
207	10																			
208	10																			
209	10																			
210	10																			
211	10																			
212	10																			
213	10																			
214	9																			
215	10																			
216	9																			

Sampling point	Depth (ft)	Dominant sediment (M=muck, S=Sand, =Rock)	Sampled holding rake pole (P) or rope (R)?	Comments	Total Rake Fullness	*Brasenia schreberi*, Watershield	*Ceratophyllum echinatum*, Spiny hornwort	*Elodea nuttallii*, Slender waterweed	*Lemna minor*, Small duckweed	*Nitella* sp., Nitella	*Nuphar variegata*, Spatterdock	*Nymphaea odorata*, White water lily	*Pontederia cordata*, Pickerelweed	*Potamogeton natans*, Floating-leaf pondweed	*Potamogeton pusillus*, Small pondweed	*Sagittaria* sp., Arrowhead	*Spirodela polyrhiza*, Large duckweed	*Utricularia vulgaris*, Common bladderwort	*Vallisneria americana*, Wild celery	Aquatic moss
217	9																			
218	9																			
219	9																			
220	8																			
221	6	M	P																	
222	6	M	P																	
223	5	M	P																	
224	2	R	P									V								
225	3	S	P																	
226	9																			
227	9																			
228	10																			
229	10																			
230	10																			
231	10																			
232	10																			
233	10																			
234	10																			
235	9																			
236	9																			
237	9																			
238	9																			
239	8																			
240	8																			
241	7	M	P																	
242	6	M	P																	
243	6	M	P																	
244	6	M	P																	
245	3	M	P			V						V								
246	2	M	P		1							V		V						1
247	2	M	P		1		1				V	V		V				1	1	1
248	3	S	P																	
249	8																			
250	8																			
251	9																			
252	9																			
253	9																			
254	10																			
255	10																			
256	10																			
257	9																			
258	9																			
259	8																			
260	8																			
261	8																			
262	7	M	p																	
263	8																			
264	7	M	p																	
265	6	M	p																	
266	6	M	p																	
267	5	M	p																	
268	2	M	p		2	1	1			1		2								
269	2	M	p		1	V	1		V		V	V		V	1		V			
270	6	S	p			V														

Sampling point	Depth (ft)	Dominant sediment (M=muck, S=Sand, =Rock)	Sampled holding rake pole (P) or rope (R)?	Comments	Total Rake Fullness	*Brasenia schreberi*, Watershield	*Ceratophyllum echinatum*, Spiny hornwort	*Elodea nuttallii*, Slender waterweed	*Lemna minor*, Small duckweed	*Nitella* sp., Nitella	*Nuphar variegata*, Spatterdock	*Nymphaea odorata*, White water lily	*Pontederia cordata*, Pickerelweed	*Potamogeton natans*, Floating-leaf pondweed	*Potamogeton pusillus*, Small pondweed	*Sagittaria* sp., Arrowhead	*Spirodela polyrhiza*, Large duckweed	*Utricularia vulgaris*, Common bladderwort	*Vallisneria americana*, Wild celery	Aquatic moss
271	8																			
272	6	S	p																	
273	5	S	p			V														
274	7	S	p																	
275	9																			
276	9																			
277	9																			
278	9																			
279	9																			
280	8																			
281	8																			
282	8																			
283	6	R	P																	
284	6	R	P			v														
285	7	S	P																	
286	6	M	P			v														
287	6	M	P																	
288	5	M	P																	
289	4	M	P		1					1		V								
290	5	S	P																	
291	8																			
292	8																			
293	9																			
294	9																			
295	9																			
296	9																			
297	8																			
298	8																			
299	8																			
300	8																			
301	7	M	P																	
302	6	M	P									V								
303	5	S	P																	
304	5	M	P		1	V	1													
305	5	M	P									V								
306	4	M	P		1	V				1		V								
307	2	M	P			V						V								
308	2	M	P		3		2			1		1					V	1		
309	2	R	P																	
310	7	S	P									V								
311	8																			
312	8																			
313	8																			
314	8																			
315	8																			
316	8																			
317	8																			
318	8																			
319	7	M	P																	
320	6	M	P																	
321	7	M	P									V								
322	6	M	P									V								
323	5	M	P			V														
324	3	M	P		2							2								

Sampling point	Depth (ft)	Dominant sediment (M=muck, S=Sand, =Rock)	Sampled holding rake pole (P) or rope (R)?	Comments	Total Rake Fullness	*Brasenia schreberi*, Watershield	*Ceratophyllum echinatum*, Spiny hornwort	*Elodea nuttallii*, Slender waterweed	*Lemna minor*, Small duckweed	*Nitella* sp., Nitella	*Nuphar variegata*, Spatterdock	*Nymphaea odorata*, White water lily	*Pontederia cordata*, Pickerelweed	*Potamogeton natans*, Floating-leaf pondweed	*Potamogeton pusillus*, Small pondweed	*Sagittaria* sp., Arrowhead	*Spirodela polyrhiza*, Large duckweed	*Utricularia vulgaris*, Common bladderwort	*Vallisneria americana*, Wild celery	Aquatic moss
325				Terrestrial																
326	7	M	P																	
327	8																			
328	8																			
329	8																			
330	8																			
331	8																			
332	7	m																		
333	4	r	P																	
334	5	m	P																	
335	5	m	P			V														
336	3	m	P		1	1	1			1										
337	4	r	P		1							1								
338	5	M	P			V														
339	4	S	P			V														
340	5	M	P			V														
341	3	S	P			V														
342	2	M	P		1	V						1								

Largon Lake 6/22/21

Species	Common Name	C	species present=1	
Acorus americanus	Sweet-flag	7	0	0
Alisma triviale	Northern water-plantain	4	0	0
Bidens beckii	Water marigold	8	0	0
Bolboschoenus fluviatilis	River bulrush	6	0	0
Brasenia schreberi	Watershield	6	1	6
Calla palustris	Wild calla	9	0	0
Callitriche hermaphroditica	Autumnal water-starwort	9	0	0
Callitriche heterophylla	Large water-starwort	9	0	0
Callitriche palustris	Common water-starwort	8	0	0
Carex comosa	Bottle brush sedge	5	0	0
Catabrosa aquatica	Brook grass	10	0	0
Ceratophyllum demersum	Coontail	3	0	0
Ceratophyllum echinatum	Spiny hornwort	10	1	10
Chara	Muskgrasses	7	0	0
Dulichium arundinaceum	Three-way sedge	9	0	0
Elatine minima	Waterwort	9	0	0
Elatine triandra	Greater waterwort	9	0	0
Eleocharis acicularis	Needle spikerush	5	0	0
Eleocharis erythropoda	Bald spikerush	3	0	0
Eleocharis palustris	Creeping spikerush	6	0	0
Elodea canadensis	Common waterweed	3	0	0
Elodea nuttallii	Slender waterweed	7	1	7
Equisetum fluviatile	Water horsetail	7	0	0
Eriocaulon aquaticum	Pipewort	9	0	0
Glyceria borealis	Northern manna grass	8	0	0
Gratiola aurea	Golden hedge-hyssop	10	0	0
Heteranthera dubia	Water star-grass	6	0	0
Isoetes echinospora	Spiny-spored quillwort	8	0	0
Isoetes lacustris	Lake quillwort	8	0	0
Isoetes sp.	Quillwort	8	0	0
Juncus pelocarpus f. submersus	Brown-fruited rush	8	0	0
Juncus torreyi	Torrey's rush	4	0	0
Lemna minor	Small duckweed	4	1	4
Lemna perpusilla	Least duckweed	10	0	0
Lemna trisulca	Forked duckweed	6	0	0
Littorella uniflora	Littorella	10	0	0
Lobelia dortmanna	Water lobelia	10	0	0
Ludwigia palustris	Marsh purslane	4	0	0
Myriophyllum alterniflorum	Alternate-flowered water-milfoil	10	0	0
Myriophyllum farwellii	Farwell's water-milfoil	8	0	0
Myriophyllum heterophyllum	Various-leaved water-milfoil	7	0	0
Myriophyllum sibiricum	Northern water-milfoil	6	0	0
Myriophyllum tenellum	Dwarf water-milfoil	10	0	0
Myriophyllum verticillatum	Whorled water-milfoil	8	0	0
Najas flexilis	Slender naiad	6	0	0
Najas gracillima	Northern naiad	7	0	0
Najas guadalupensis	Southern naiad	8	0	0
Nelumbo lutea	American lotus	7	0	0
Nitella	Nitella	7	1	7
Nuphar advena	Yellow pond lily	8	0	0
Nuphar microphylla	Small pond lily	9	0	0
Nuphar X rubrodisca	Intermediate pond lily	9	0	0
Nuphar variegata	Spatterdock	6	1	6

Species	Common Name	C	species present=1	
Nymphaea odorata	White water lily	6	1	6
Phragmites australis	Common reed	1	0	0
Polygonum amphibium	Water smartweed	5	0	0
Polygonum punctatum	Dotted smartweed	5	0	0
Pontederia cordata	Pickerelweed	8	1	8
Potamogeton alpinus	Alpine pondweed	9	0	0
Potamogeton amplifolius	Large-leaf pondweed	7	0	0
Potamogeton bicupulatus	Snail-seed pondwwed	9	0	0
Potamogeton confervoides	Algal-leaved pondweed	10	0	0
Potamogeton diversifolius	Water-thread pondweed	8	0	0
Potamogeton epihydrus	Ribbon-leaf pondweed	8	0	0
Potamogeton foliosus	Leafy pondweed	6	0	0
Potamogeton friesii	Fries' pondweed	8	0	0
Potamogeton gramineus	Variable pondweed	7	0	0
Potamogeton hillii	Hill's pondweed	9	0	0
Potamogeton illinoensis	Illinois pondweed	6	0	0
Potamogeton natans	Floating-leaf pondweed	5	1	5
Potamogeton nodosus	Long-leaf pondweed	7	0	0
Potamogeton oakesianus	Oakes' pondweed	10	0	0
Potamogeton obtusifolius	Blunt-leaf pondweed	9	0	0
Potamogeton praelongus	White-stem pondweed	8	0	0
Potamogeton pulcher	Spotted pondweed	10	0	0
Potamogeton pusillus	Small pondweed	7	1	7
Potamogeton richardsonii	Clasping-leaf pondweed	5	0	0
Potamogeton robbinsii	Fern pondweed	8	0	0
Potamogeton spirillus	Spiral-fruited pondweed	8	0	0
Potamogeton strictifolius	Stiff pondweed	8	0	0
Potamogeton vaseyi	Vasey's pondweed	10	0	0
Potamogeton zosteriformis	Flat-stem pondweed	6	0	0
Ranunculus aquatilis	White water crowfoot	8	0	0
Ranunculus flabellaris	Yellow water crowfoot	8	0	0
Ranunculus flammula	Creeping spearwort	9	0	0
Riccia fluitans	Slender riccia	7	0	0
Ruppia cirrhosa	Ditch grass	8	0	0
Sagittaria brevirostra	Midwestern arrowhead	9	0	0
Sagittaria cuneata	Arum-leaved arrowhead	7	0	0
Sagittaria graminea	Grass-leaved arrowhead	9	0	0
Sagittaria latifolia	Common arrowhead	3	0	0
Sagittaria rigida	Sessile-fruited arrowhead	8	0	0
Schoenoplectus acutus	Hardstem bulrush	6	0	0
Schoenoplectus heterochaetus	Slender bulrush	10	0	0
Schoenoplectus pungens	Three-square bulrush	5	0	0
Schoenoplectus subterminalis	Water bulrush	9	0	0
Schoenoplectus tabernaemontani	Softstem bulrush	4	0	0
Sparganium americanum	American bur-reed	8	0	0
Sparganium androcladum	Branched bur-reed	8	0	0
Sparganium angustifolium	Narrow-leaved bur-reed	9	0	0
Sparganium emersum	Short-stemmed bur-reed	8	0	0
Sparganium eurycarpum	Common bur-reed	5	0	0
Sparganium fluctuans	Floating-leaf bur-reed	10	0	0
Sparganium natans	Small bur-reed	9	0	0
Spirodela polyrhiza	Large duckweed	5	1	5
Stuckenia filiformis	Fine-leaved pondweed	8	0	0
Stuckenia pectinata	Sago pondweed	3	0	0
Stuckenia vaginata	Sheathed pondweed	9	0	0

Species	Common Name	C	species present=1	
Typha angustifolium	Narrow-leaved cattail	1	0	0
Typha latifolia	Broad-leaved cattail	1	0	0
Typha sp.	Cattail	1	0	0
Utricularia cornuta	Horned bladderwort	10	0	0
Utricularia geminiscapa	Twin-stemmed bladderwort	9	0	0
Utricularia gibba	Creeping bladderwort	9	0	0
Utricularia intermedia	Flat-leaf bladderwort	9	0	0
Utricularia minor	Small bladderwort	10	0	0
Utricularia purpurea	Large purple bladderwort	9	0	0
Utricularia resupinata	Small purple bladderwort	9	0	0
Utricularia vulgaris	Common bladderwort	7	1	7
Vallisneria americana	Wild celery	6	1	6
Wolffia borealis	Northern watermeal	6	0	0
Wolffia columbiana	Common watermeal	5	0	0
Zannichellia palustris	Horned pondweed	7	0	0
Zizania aquatica	Southern wild rice	8	0	0
Zizania palustris	Northern wild rice	8	0	0
Zizania sp.	Wild rice	8	0	0
N			13	
mean C				6.46153846
FQI				23.2974082

CITATION: Nichols, SA. 1999. Floristic Quality Assessment of Wisconsin Lake Plant Communities with Example Applications. Journal of Lake and Reservoir Management, 15(2):133-141.

CITATION: University of Wisconsin-Madison, 2001. Wisconsin Floristic Quality Assessment (WFQA). Retrived October 27, 2009 from: http://www.botany.wisc.edu/WFQA.asp

INDIVIDUAL SPECIES STATS: 8/17/21	Total vegetation	*Brasenia schreberi*, Watershield	*Ceratophyllum echinatum*, Spiny hornwort	*Elodea nuttallii*, Slender waterweed	*Najas gracillima*, Northern naiad	*Nuphar variegata*, Spatterdock	*Nymphaea odorata*, White water lily	*Pontederia cordata*, Pickerelweed	*Potamogeton epihydrus*, Ribbon-leaf pondweed	*Potamogeton natans*, Floating-leaf pondweed	*Sagittaria sp.*, Arrowhead	*Sparganium eurycarpum*, Common bur-reed	*Spirodela polyrhiza*, Large duckweed	*Utricularia vulgaris*, Common bladderwort	*Vallisneria americana*, Wild celery	Aquatic moss
Frequency of occurrence within vegetated areas (%)		42.86	37.14	2.86	2.86	5.71	60.00			8.57				2.86	2.86	8.57
Frequency of occurrence at sites shallower than maximum depth of plants		12.71	11.02	0.85	0.85	1.69	17.80			2.54				0.85	0.85	2.54
Relative Frequency (%)		25.86	22.41	1.72	1.72	3.45	36.21			5.17				1.72	1.72	
Number of sites where species found		15	13	1	1	2	21			3				1	1	3
Average Rake Fullness	1.4	1.33	1.15	1.00	1.00	1.00	1.33			1.67				1.00	1.00	1.00
# visual sightings		18				3	28	5	2	12	4	3	2	2		

SUMMARY STATS: 8/17/21	
Total number of sites visited	339
Total number of sites with vegetation	35
Total number of sites shallower than maximum depth of plants	118
Frequency of occurrence at sites shallower than maximum depth of plants	29.66
Simpson Diversity Index	0.75
Maximum depth of plants (ft)**	6.00
Number of sites sampled using rake on Rope (R)	0
Number of sites sampled using rake on Pole (P)	112
Average number of all species per site (shallower than max depth)	0.49
Average number of all species per site (veg. sites only)	1.66
Average number of native species per site (shallower than max depth)	0.49
Average number of native species per site (veg. sites only)	1.66
Species Richness	9
Species Richness (including visuals)	14

8/17/21 Point Intercept Survey

Sampling point	Depth (ft)	Dominant sediment type (M=muck, S=Sand, R=Rock)	Sampled holding rake pole (P) or rake rope (R)?	Comments	Total Rake Fullness	*Brasenia schreberi*, Watershield	*Ceratophyllum echinatum*, Spiny hornwort	*Elodea nuttallii*, Slender waterweed	*Najas gracillima*, Northern naiad	*Nuphar variegata*, Spatterdock	*Nymphaea odorata*, White water lily	*Pontederia cordata*, Pickerelweed	*Potamogeton epihydrus*, Ribbon-leaf pondweed	*Potamogeton natans*, Floating-leaf pondweed	*Sagittaria* sp., Arrowhead	*Sparganium eurycarpum*, Common bur-reed	*Spirodela polyrhiza*, Large duckweed	*Utricularia vulgaris*, Common bladderwort	*Vallisneria americana*, Wild celery	Aquatic moss
1	2	M	P		2	V	1	1			2									
2	3	M	P		2	1				V	1			1						
3	3	M	P		1	V					1			V						
4	3	M	P		1	V	1				1			V						
5	2	M	P		2	V	1				2									
6	4	M	P		1	1					1			V						
7	5	M	P								V									
8	4	m	p								V									
9	3	M	P		1					1	V			V						
10				Terrestrial																
11	1	M	P		1		1				1	v								
12	4	M	P			V					V			V						
13	5	M	P								V									
14	5	M	P								V									
15	5	M	P								V									
16	2	M	P		1	1			1											
17	2	M	P		1	1					V			V						
18	5	M	P																	
19	5	M	P								V									
20	5	M	P																	
21	2	M	P		2	V					2			2						
22	2	s	P		1	1						v				v				
23	6	M	P																	
24	6	M	P																	
25	6	M	P																	
26	3	M	P		2	2	1				V			V						
27	3	M	P		1	1					1									
28	6																			
29	7																			
30	7																			
31	6																			
32	5	M	P																	
33	5	S	P		1															1
34	7																			
35	8																			
36	7																			
37	7																			
38	7																			
39	7																			
40	8																			
41	8																			
42	8																			
43	8																			
44	8																			
45	4	S	P		1	1					V									
46	2	R	P			V					V									

Sampling point	Depth (ft)	Dominant sediment type (M=muck, S=Sand, R=Rock)	Sampled holding rake pole (P) or rake rope (R)?	Comments	Total Rake Fullness	*Brasenia schreberi*, Watershield	*Ceratophyllum echinatum*, Spiny hornwort	*Elodea nuttallii*, Slender waterweed	*Najas gracillima*, Northern naiad	*Nuphar variegata*, Spatterdock	*Nymphaea odorata*, White water lily	*Pontederia cordata*, Pickerelweed	*Potamogeton epihydrus*, Ribbon-leaf pondweed	*Potamogeton natans*, Floating-leaf pondweed	*Sagittaria* sp., Arrowhead	*Sparganium eurycarpum*, Common bur-reed	*Spirodela polyrhiza*, Large duckweed	*Utricularia vulgaris*, Common bladderwort	*Vallisneria americana*, Wild celery	Aquatic moss
47	9																			
48	9																			
49	8																			
50	8																			
51	8																			
52	6	M	P		1						1									
53	8																			
54	6	R	P																	
55	9																			
56	9																			
57	8																			
58	9																			
59	8																			
60	8																			
61	9																			
62	8																			
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67	8																			
68	8																			
69	8																			
70	9																			
71	9																			
72	8																			
73	8																			
74	8																			
75	8																			
76	8																			
77	5	R	P																	
78	1	R	P		1	1					1	v				V				
79	9																			
80	9																			
81	8																			
82	9																			
83	9																			
84	9																			
85	10																			
86	5	R	P																	
87	9																			
88	8																			
89	8																			
90	5	M	P		1															1
91	5	R	P																	
92	2	M	P		3	V					2			2						
93	3	R	P		1						1									
94	10																			

Sampling point	Depth (ft)	Dominant sediment type (M=muck, S=Sand, R=Rock)	Sampled holding rake pole (P) or rake rope (R)?	Comments	Total Rake Fullness	*Brasenia schreberi*, Watershield	*Ceratophyllum echinatum*, Spiny hornwort	*Elodea nuttallii*, Slender waterweed	*Najas gracillima*, Northern naiad	*Nuphar variegata*, Spatterdock	*Nymphaea odorata*, White water lily	*Pontederia cordata*, Pickerelweed	*Potamogeton epihydrus*, Ribbon-leaf pondweed	*Potamogeton natans*, Floating-leaf pondweed	*Sagittaria* sp., Arrowhead	*Sparganium eurycarpum*, Common bur-reed	*Spirodela polyrhiza*, Large duckweed	*Utricularia vulgaris*, Common bladderwort	*Vallisneria americana*, Wild celery	Aquatic moss
95	9																			
96	9																			
97	9																			
98	9																			
99	10																			
100	10																			
101	9																			
102	9																			
103	9																			
104	9																			
105	8																			
106	8																			
107	8																			
108	5	R	P																	
109	3	M	P		2	2					V									
110	3				2						2									
111	4	R	P			V								V						
112	4	M	P		1						1			V						
113	8																			
114	9																			
115	9																			
116	9																			
117	9																			
118	9																			
119	10																			
120	10																			
121	9																			
122	8																			
123	8																			
124	9																			
125	8																			
126	8																			
127	9																			
128	8																			
129	7																			
130	7																			
131	7																			
132	5	M	p																	
133	5	M	p																	
134	3	R	p		1	V					1									
135	3	R	p																	
136	10																			
137	9																			
138	9																			
139	9																			
140	9																			
141	9																			
142	9																			

Sampling point	Depth (ft)	Dominant sediment type (M=muck, S=Sand, R=Rock)	Sampled holding rake pole (P) or rake rope (R)?	Comments	Total Rake Fullness	*Brasenia schreberi*, Watershield	*Ceratophyllum echinatum*, Spiny hornwort	*Elodea nuttallii*, Slender waterweed	*Najas gracillima*, Northern naiad	*Nuphar variegata*, Spatterdock	*Nymphaea odorata*, White water lily	*Pontederia cordata*, Pickerelweed	*Potamogeton epihydrus*, Ribbon-leaf pondweed	*Potamogeton natans*, Floating-leaf pondweed	*Sagittaria* sp., Arrowhead	*Sparganium eurycarpum*, Common bur-reed	*Spirodela polyrhiza*, Large duckweed	*Utricularia vulgaris*, Common bladderwort	*Vallisneria americana*, Wild celery	Aquatic moss
143	9																			
144	8																			
145	9																			
146	8																			
147	8																			
148	8																			
149	8																			
150	8																			
151	7																			
152	7																			
153	7																			
154	6																			
155	6																			
156	6	M	P																	
157	2	M	P		2	2					V									
158	10																			
159	9																			
160	9																			
161	9																			
162	9																			
163	9																			
164	9																			
165	9																			
166	9																			
167	9																			
168	9																			
169	8																			
170	8																			
171	8																			
172	8																			
173	7																			
174	7																			
175	7																			
176	7																			
177	6	M	P																	
178	5	M	P																	
179	5	M	P																	
180	2	M	P		1	V					1	v			V	V				
181	9																			
182	9																			
183	9																			
184	9																			
185	9																			
186	10																			
187	9																			
188	9																			
189	9																			
190	9																			

Sampling point	Depth (ft)	Dominant sediment type (M=muck, S=Sand, R=Rock)	Sampled holding rake pole (P) or rake rope (R)?	Comments	Total Rake Fullness	*Brasenia schreberi*, Watershield	*Ceratophyllum echinatum*, Spiny hornwort	*Elodea nuttallii*, Slender waterweed	*Najas gracillima*, Northern naiad	*Nuphar variegata*, Spatterdock	*Nymphaea odorata*, White water lily	*Pontederia cordata*, Pickerelweed	*Potamogeton epihydrus*, Ribbon-leaf pondweed	*Potamogeton natans*, Floating-leaf pondweed	*Sagittaria* sp., Arrowhead	*Sparganium eurycarpum*, Common bur-reed	*Spirodela polyrhiza*, Large duckweed	*Utricularia vulgaris*, Common bladderwort	*Vallisneria americana*, Wild celery	Aquatic moss
191	8																			
192	8																			
193	8																			
194	7																			
195	7																			
196	7																			
197	7																			
198	6																			
199	6	M	P																	
200	6	M	P																	
201	5	M	P																	
202	3	M	P		2	2					1									
203	8																			
204	8																			
205	9																			
206	9																			
207	9																			
208	9																			
209	9																			
210	9																			
211	9																			
212	9																			
213	8																			
214	8																			
215	7																			
216	7																			
217	7																			
218	7																			
219	7																			
220	6	M	P																	
221	6	M	P																	
222	5	M	P																	
223	5	M	P																	
224	3	M	P		1	V	1				1									
225	3	R	P																	
226	8																			
227	8																			
228	8																			
229	9																			
230	9																			
231	9																			
232	9																			
233	9																			
234	8																			
235	8																			
236	8																			
237	7																			
238	7																			

Sampling point	Depth (ft)	Dominant sediment type (M=muck, S=Sand, R=Rock)	Sampled holding rake pole (P) or rake rope (R)?	Comments	Total Rake Fullness	*Brasenia schreberi*, Watershield	*Ceratophyllum echinatum*, Spiny hornwort	*Elodea nuttallii*, Slender waterweed	*Najas gracillima*, Northern naiad	*Nuphar variegata*, Spatterdock	*Nymphaea odorata*, White water lily	*Pontederia cordata*, Pickerelweed	*Potamogeton epihydrus*, Ribbon-leaf pondweed	*Potamogeton natans*, Floating-leaf pondweed	*Sagittaria* sp., Arrowhead	*Sparganium eurycarpum*, Common bur-reed	*Spirodela polyrhiza*, Large duckweed	*Utricularia vulgaris*, Common bladderwort	*Vallisneria americana*, Wild celery	Aquatic moss
239	7																			
240	7																			
241	6	M	P																	
242	5	M	P																	
243	5	M	P																	
244	5	M	P																	
245	3	M	P		1	1	1				V									
246	2	M	P		1		1			V	V		V	V					1	1
247	2	M	P			V				V	V				V					
248	2	R	P								V									
249	8																			
250	8																			
251	9																			
252	9																			
253	9																			
254	9																			
255	9																			
256	9																			
257	8																			
258	8																			
259	8																			
260	7																			
261	7																			
262	7																			
263	6	M	P																	
264	6	M	P																	
265	5	M	P																	
266	5	M	P																	
267	4	M	P																	
268	2	M	P		2		2				2	v						1		
269	2	M	P		2	V	2			1	V			v	V		V	V		
270	5	M	P																	
271	7	R	P																	
272	7																			
273	5	R	P																	
274	7	M	P																	
275	9																			
276	8																			
277	8																			
278	8																			
279	8																			
280	8																			
281	7																			
282	7																			
283	7																			
284	5	M	P																	
285	6	M	P																	
286	5	M	P																	

Sampling point	Depth (ft)	Dominant sediment type (M=muck, S=Sand, R=Rock)	Sampled holding rake pole (P) or rake rope (R)?	Comments	Total Rake Fullness	*Brasenia schreberi*, Watershield	*Ceratophyllum echinatum*, Spiny hornwort	*Elodea nuttallii*, Slender waterweed	*Najas gracillima*, Northern naiad	*Nuphar variegata*, Spatterdock	*Nymphaea odorata*, White water lily	*Pontederia cordata*, Pickerelweed	*Potamogeton epihydrus*, Ribbon-leaf pondweed	*Potamogeton natans*, Floating-leaf pondweed	*Sagittaria* sp., Arrowhead	*Sparganium eurycarpum*, Common bur-reed	*Spirodela polyrhiza*, Large duckweed	*Utricularia vulgaris*, Common bladderwort	*Vallisneria americana*, Wild celery	Aquatic moss
287	5	M	P																	
288	4	M	P			V					V									
289	3	M	P			V					V									
290	5	R	P								V									
291	10																			
292	10																			
293	11																			
294	11																			
295	10																			
296	10																			
297	10																			
298	9																			
299	9																			
300	9																			
301	8																			
302	7																			
303	6	M	P																	
304	6	M	P								V									
305	6	M	P																	
306	5	M	P																	
307	3	M	P			V														
308	1	M	P		1	V	1						V		v		V	V		
309	2	S	P								V									
310	9																			
311	9																			
312	11																			
313	11																			
314	10																			
315	8																			
316	7																			
317	7																			
318	6																			
319	6																			
320	5	M	P																	
321	5	M	P																	
322	4	M	P																	
323																				
324	2	M	P		2		1				2									
325				Terrestrial																
326	6	S	P																	
327	7																			
328	7																			
329	7																			
330	7																			
331	7																			
332	6	M	P																	
333	4	S	P																	
334	4	M	P								V									

Sampling point	Depth (ft)	Dominant sediment type (M=muck, S=Sand, R=Rock)	Sampled holding rake pole (P) or rake rope (R)?	Comments	Total Rake Fullness	*Brasenia schreberi*, Watershield	*Ceratophyllum echinatum*, Spiny hornwort	*Elodea nuttallii*, Slender waterweed	*Najas gracillima*, Northern naiad	*Nuphar variegata*, Spatterdock	*Nymphaea odorata*, White water lily	*Pontederia cordata*, Pickerelweed	*Potamogeton epihydrus*, Ribbon-leaf pondweed	*Potamogeton natans*, Floating-leaf pondweed	*Sagittaria* sp., Arrowhead	*Sparganium eurycarpum*, Common bur-reed	*Spirodela polyrhiza*, Large duckweed	*Utricularia vulgaris*, Common bladderwort	*Vallisneria americana*, Wild celery	Aquatic moss
335	5	M	P																	
336	3	M	P		2	2	1							V						
337	5	M	P																	
338	5	M	P																	
339	5	M	P																	
340	5	M	P								V									
341	3	M	P								V									
342	3	M	P		1	1					V									

Largon Lake 8/17/21

Species	Common Name	C	species present=1	
Acorus americanus	Sweet-flag	7	0	0
Alisma triviale	Northern water-plantain	4	0	0
Bidens beckii	Water marigold	8	0	0
Bolboschoenus fluviatilis	River bulrush	6	0	0
Brasenia schreberi	Watershield	6	1	6
Calla palustris	Wild calla	9	0	0
Callitriche hermaphroditica	Autumnal water-starwort	9	0	0
Callitriche heterophylla	Large water-starwort	9	0	0
Callitriche palustris	Common water-starwort	8	0	0
Carex comosa	Bottle brush sedge	5	0	0
Catabrosa aquatica	Brook grass	10	0	0
Ceratophyllum demersum	Coontail	3	0	0
Ceratophyllum echinatum	Spiny hornwort	10	1	10
Chara	Muskgrasses	7	0	0
Dulichium arundinaceum	Three-way sedge	9	0	0
Elatine minima	Waterwort	9	0	0
Elatine triandra	Greater waterwort	9	0	0
Eleocharis acicularis	Needle spikerush	5	0	0
Eleocharis erythropoda	Bald spikerush	3	0	0
Eleocharis palustris	Creeping spikerush	6	0	0
Elodea canadensis	Common waterweed	3	0	0
Elodea nuttallii	Slender waterweed	7	1	7
Equisetum fluviatile	Water horsetail	7	0	0
Eriocaulon aquaticum	Pipewort	9	0	0
Glyceria borealis	Northern manna grass	8	0	0
Gratiola aurea	Golden hedge-hyssop	10	0	0
Heteranthera dubia	Water star-grass	6	0	0
Isoetes echinospora	Spiny-spored quillwort	8	0	0
Isoetes lacustris	Lake quillwort	8	0	0
Isoetes sp.	Quillwort	8	0	0
Juncus pelocarpus f. submersus	Brown-fruited rush	8	0	0
Juncus torreyi	Torrey's rush	4	0	0
Lemna minor	Small duckweed	4	0	0
Lemna perpusilla	Least duckweed	10	0	0
Lemna trisulca	Forked duckweed	6	0	0
Littorella uniflora	Littorella	10	0	0
Lobelia dortmanna	Water lobelia	10	0	0
Ludwigia palustris	Marsh purslane	4	0	0
Myriophyllum alterniflorum	Alternate-flowered water-milfoil	10	0	0
Myriophyllum farwellii	Farwell's water-milfoil	8	0	0
Myriophyllum heterophyllum	Various-leaved water-milfoil	7	0	0
Myriophyllum sibiricum	Northern water-milfoil	6	0	0
Myriophyllum tenellum	Dwarf water-milfoil	10	0	0
Myriophyllum verticillatum	Whorled water-milfoil	8	0	0
Najas flexilis	Slender naiad	6	0	0
Najas gracillima	Northern naiad	7	1	7

Najas guadalupensis	Southern naiad	8	0	0
Nelumbo lutea	American lotus	7	0	0
Nitella	Nitella	7	0	0
Nuphar advena	Yellow pond lily	8	0	0
Nuphar microphylla	Small pond lily	9	0	0
Nuphar X rubrodisca	Intermediate pond lily	9	0	0
Nuphar variegata	Spatterdock	6	1	6
Nymphaea odorata	White water lily	6	1	6
Phragmites australis	Common reed	1	0	0
Polygonum amphibium	Water smartweed	5	0	0
Polygonum punctatum	Dotted smartweed	5	0	0
Pontederia cordata	Pickerelweed	8	0	0
Potamogeton alpinus	Alpine pondweed	9	0	0
Potamogeton amplifolius	Large-leaf pondweed	7	0	0
Potamogeton bicupulatus	Snail-seed pondwwed	9	0	0
Potamogeton confervoides	Algal-leaved pondweed	10	0	0
Potamogeton diversifolius	Water-thread pondweed	8	0	0
Potamogeton epihydrus	Ribbon-leaf pondweed	8	0	0
Potamogeton foliosus	Leafy pondweed	6	0	0
Potamogeton friesii	Fries' pondweed	8	0	0
Potamogeton gramineus	Variable pondweed	7	0	0
Potamogeton hillii	Hill's pondweed	9	0	0
Potamogeton illinoensis	Illinois pondweed	6	0	0
Potamogeton natans	Floating-leaf pondweed	5	1	5
Potamogeton nodosus	Long-leaf pondweed	7	0	0
Potamogeton oakesianus	Oakes' pondweed	10	0	0
Potamogeton obtusifolius	Blunt-leaf pondweed	9	0	0
Potamogeton praelongus	White-stem pondweed	8	0	0
Potamogeton pulcher	Spotted pondweed	10	0	0
Potamogeton pusillus	Small pondweed	7	0	0
Potamogeton richardsonii	Clasping-leaf pondweed	5	0	0
Potamogeton robbinsii	Fern pondweed	8	0	0
Potamogeton spirillus	Spiral-fruited pondweed	8	0	0
Potamogeton strictifolius	Stiff pondweed	8	0	0
Potamogeton vaseyi	Vasey's pondweed	10	0	0
Potamogeton zosteriformis	Flat-stem pondweed	6	0	0
Ranunculus aquatilis	White water crowfoot	8	0	0
Ranunculus flabellaris	Yellow water crowfoot	8	0	0
Ranunculus flammula	Creeping spearwort	9	0	0
Riccia fluitans	Slender riccia	7	0	0
Ruppia cirrhosa	Ditch grass	8	0	0
Sagittaria brevirostra	Midwestern arrowhead	9	0	0
Sagittaria cuneata	Arum-leaved arrowhead	7	0	0
Sagittaria graminea	Grass-leaved arrowhead	9	0	0
Sagittaria latifolia	Common arrowhead	3	0	0
Sagittaria rigida	Sessile-fruited arrowhead	8	0	0
Schoenoplectus acutus	Hardstem bulrush	6	0	0
Schoenoplectus heterochaetus	Slender bulrush	10	0	0

Schoenoplectus pungens	Three-square bulrush	5	0	0
Schoenoplectus subterminalis	Water bulrush	9	0	0
Schoenoplectus tabernaemontani	Softstem bulrush	4	0	0
Sparganium americanum	American bur-reed	8	0	0
Sparganium androcladum	Branched bur-reed	8	0	0
Sparganium angustifolium	Narrow-leaved bur-reed	9	0	0
Sparganium emersum	Short-stemmed bur-reed	8	0	0
Sparganium eurycarpum	Common bur-reed	5	0	0
Sparganium fluctuans	Floating-leaf bur-reed	10	0	0
Sparganium natans	Small bur-reed	9	0	0
Spirodela polyrhiza	Large duckweed	5	0	0
Stuckenia filiformis	Fine-leaved pondweed	8	0	0
Stuckenia pectinata	Sago pondweed	3	0	0
Stuckenia vaginata	Sheathed pondweed	9	0	0
Typha angustifolium	Narrow-leaved cattail	1	0	0
Typha latifolia	Broad-leaved cattail	1	0	0
Typha sp.	Cattail	1	0	0
Utricularia cornuta	Horned bladderwort	10	0	0
Utricularia geminiscapa	Twin-stemmed bladderwort	9	0	0
Utricularia gibba	Creeping bladderwort	9	0	0
Utricularia intermedia	Flat-leaf bladderwort	9	0	0
Utricularia minor	Small bladderwort	10	0	0
Utricularia purpurea	Large purple bladderwort	9	0	0
Utricularia resupinata	Small purple bladderwort	9	0	0
Utricularia vulgaris	Common bladderwort	7	1	7
Vallisneria americana	Wild celery	6	1	6
Wolffia borealis	Northern watermeal	6	0	0
Wolffia columbiana	Common watermeal	5	0	0
Zannichellia palustris	Horned pondweed	7	0	0
Zizania aquatica	Southern wild rice	8	0	0
Zizania palustris	Northern wild rice	8	0	0
Zizania sp.	Wild rice	8	0	0

N			9	
mean C				6.66666667
FQI				20

CITATION: Nichols, SA. 1999. Floristic Quality Assessment of Wisconsin Lake Plant Communities with Example Applications. Journal of Lake and Reservoir Management, 15(2):133-141.

CITATION: University of Wisconsin-Madison, 2001. Wisconsin Floristic Quality Assessment (WFQA). Retrived October 27, 2009 from: http://www.botany.wisc.edu/WFQA.asp

Appendix H

Tributary Physical Data

North Inlet

Date	Foot	Depth	Flow
4/12/21	0.0	0.4	0.62
	1.0	0.4	1.23
	2.0	0.4	0.93
	3.0	0.5	1.51
	4.0	0.4	1.16
	5.0	0.4	0.84
	6.0	0.4	1.23
	7.0	0.4	0.78
	8.0	0.4	0.25
4/27/21	0.0	0.3	0.20
	1.0	0.5	0.32
	2.0	0.6	0.34
	3.0	0.4	0.16
	4.0	0.5	0.26
	5.0	0.5	0.34
	6.0	0.3	0.32
	7.0	0.1	0.00
3/21/22	0.5	0.3	0.02
	1.0	0.3	0.08
	1.5	0.3	0.13
	2.0	0.3	0.09
	2.5	0.3	0.24
	3.0	0.3	0.44
	3.5	0.3	0.27
	4.0	0.3	0.33
	4.5	0.3	0.18
	5.0	0.3	0.11
	5.5	0.2	0.02
	6.0	0.2	0.00
	6.5	0.1	0.00
3/23/22	0.5	0.5	0.27
	1.0	0.4	1.34
	1.5	0.4	2.51
	2.0	0.4	1.97
	2.5	0.5	1.67
	3.0	0.4	1.96
	3.5	0.4	1.53
	4.0	0.4	0.77
	4.5	0.4	0.88
	5.0	0.4	0.00
4/18/22	0.5	0.3	1.12
	1.0	0.3	1.38
	1.5	0.3	1.13
	2.0	0.1	0.91
	2.5	0.1	0.54
	3.0	0.3	0.47
	3.5	0.4	0.57
	4.0	0.4	0.99
	4.5	0.4	0.46
	5.0	0.3	0.94
	5.5	0.2	0.89
	6.0	0.2	0.93
	6.5	0.2	0.48
	7.0	0.3	0.38
	7.5	0.2	0.11

Date	Foot	Depth	Flow
5/3/22	0.5	0.3	0.99
	1.0	0.3	1.10
	1.5	0.3	0.95
	2.0	0.3	0.95
	2.5	0.3	0.30
	3.0	0.3	0.63
	3.5	0.3	0.48
	4.0	0.3	0.51
	4.5	0.3	0.40
	5.0	0.2	0.52
	5.5	0.2	0.44
	6.0	0.3	0.73
	6.5	0.3	0.61
	7.0	0.4	0.18
	7.5	0.3	0.08
5/10/22	0.5	0.4	1.68
	1.0	0.5	1.51
	1.5	0.4	1.76
	2.0	0.4	1.28
	2.5	0.5	1.32
	3.0	0.5	1.27
	3.5	0.5	1.63
	4.0	0.5	1.44
	4.5	0.5	0.82
	5.0	0.4	0.73
	5.5	0.4	0.88
	6.0	0.5	1.15
	6.6	0.5	1.48
	7.0	0.5	0.79
	7.5	0.5	0.14
	8.0	0.4	0.08
5/24/22	0.5	0.2	0.25
	1.0	0.3	0.28
	1.5	0.0	0.00
	2.0	0.0	0.00
	2.5	0.2	0.08
	3.0	0.2	0.20
	3.5	0.2	0.06
	4.0	0.2	0.04
	4.5	0.2	0.02
	5.0	0.1	0.00
	5.5	0.0	0.00
	6.0	0.0	0.00
	6.5	0.1	0.00
	7.0	0.2	0.01
	7.5	0.2	0.00
	8.0	0.2	0.00

Tributary from Little Largon

Date	Foot	Depth	Flow
4/12/21	0.0	0.7	0.04
	1.0	0.9	0.52
	2.0	1.0	0.91
	3.0	1.0	0.88
	4.0	0.9	0.96
	5.0	0.7	0.85
	6.0	0.7	0.93
	7.0	0.6	0.92
	8.0	0.5	0.65
	9.0	0.4	0.56
	10.0	0.4	0.62
	11.0	0.3	0.08
	12.0	0.1	0.00
4/27/21	0.0	0.3	0.02
	1.0	0.5	0.10
	2.0	0.5	0.24
	3.0	0.6	0.21
	4.0	0.5	0.14
	5.0	0.4	0.15
	6.0	0.3	0.09
	7.0	0.2	0.03
	8.0	0.1	0.00
3/21/22	0.5	0.8	0.08
	1.0	0.8	0.08
	1.5	0.8	0.26
	2.0	0.7	0.40
	2.5	0.8	0.30
	3.0	0.8	0.28
	3.5	0.8	0.29
	4.0	0.7	0.31
	4.5	0.3	0.24
	5.0	0.5	0.17
	5.5	0.5	0.23
	6.0	0.4	0.19
	6.5	0.4	0.16
	7.0	0.4	0.08
	7.5	0.4	0.00
	8.0	0.4	0.00
	8.5	0.4	0.00
	9.0	0.5	0.00
	9.5	0.5	0.00
	10.0	0.5	0.00
	10.5	0.5	0.00
	11.0	0.5	0.00
	11.5	0.4	0.00
3/23/22	0.5	1.0	0.36
	1.0	1.0	0.89
	1.5	1.1	0.65
	2.0	0.8	0.85
	2.5	0.8	0.89
	3.0	0.7	0.95
	3.5	0.7	0.91
	4.0	0.7	0.89
	4.5	0.6	0.94
	5.0	0.6	0.85

Date	Foot	Depth	Flow
3/23/22 Continued			
	5.5	0.6	0.93
	6.0	0.6	0.88
	6.5	0.6	0.69
	7.0	0.5	0.62
	7.5	0.5	0.55
	8.0	0.4	0.51
	8.5	0.5	0.38
	9.0	0.5	0.39
	9.5	0.5	0.51
	10.0	0.5	0.37
	10.5	0.4	0.09
	11.0	0.3	0.00
4/18/22	0.0	0.7	0.41
	0.5	0.7	0.59
	1.0	0.5	0.43
	1.5	0.6	0.56
	2.0	0.6	0.68
	2.5	0.7	0.45
	3.0	0.7	0.69
	3.5	0.6	0.55
	4.0	0.6	0.51
	4.5	0.6	0.32
	5.0	0.6	0.51
	5.5	0.5	0.62
	6.0	0.5	0.51
	6.5	0.4	0.46
	7.0	0.3	0.28
	7.5	0.3	0.33
	8.0	0.3	0.21
	8.5	0.2	0.14
	9.0	0.2	0.13
	9.5	0.1	0.18
	10.0	0.1	0.00
5/3/22	0.5	0.7	0.62
	1.0	0.8	0.57
	1.5	0.8	0.52
	2.0	0.8	0.62
	2.5	0.7	0.48
	3.0	0.7	0.53
	3.5	0.7	0.57
	4.0	0.6	0.48
	4.5	0.6	0.51
	5.0	0.5	0.39
	5.5	0.5	0.39
	6.0	0.4	0.46
	6.5	0.4	0.33
	7.0	0.4	0.35
	7.5	0.3	0.20
	8.0	0.3	0.33
	8.5	0.3	0.21
	9.0	0.3	0.19
	9.5	0.2	0.06

Tributary from Little Largon

Date	Foot	Depth	Flow
5/10/22	0.0	1.1	0.96
	0.5	1.1	1.59
	1.0	1.2	1.40
	1.5	1.2	1.39
	2.0	1.3	1.39
	2.5	1.3	1.24
	3.0	1.3	1.32
	3.5	1.1	1.38
	4.0	1.1	1.35
	4.5	1.1	1.46
	5.0	0.9	1.36
	5.5	0.9	1.27
	6.0	0.9	1.08
	6.5	0.8	1.22
	7.0	0.7	1.04
	7.5	0.7	1.04
	8.0	0.7	1.03
	8.5	0.6	0.92
	9.0	0.6	0.98
	9.5	0.6	0.88
	10.0	0.4	0.99
	10.5	0.3	0.42
	11.0	0.2	0.04
5/24/22	0.5	0.3	0.01
	1.0	0.4	0.02
	1.5	0.4	0.04
	2.0	0.5	0.01
	2.5	0.5	0.03
	3.0	0.5	0.02
	3.5	0.2	0.00
	4.0	0.2	0.00
	4.5	0.2	0.00
	5.0	0.2	0.00
	5.5	0.2	0.00
	6.0	0.2	0.00
6/13/22	0.0	0.2	0.00
	0.5	0.2	0.01
	1.0	0.3	0.02
	1.5	0.3	0.03
	2.0	0.4	0.03
	2.5	0.3	0.03
	3.0	0.3	0.02
	3.5	0.2	0.00
	4.0	0.2	0.00
	4.5	0.2	0.00
	5.0	0.1	0.00
	5.5	0.1	0.00
	6.0	0.1	0.00
	6.5	0.1	0.00
8/29/22	1.0	0.1	0.03

Appendix I

Tributary Chemical Data

Wisconsin State Laboratory of Hygiene
UNIVERSITY OF WISCONSIN–MADISON

Wisconsin State Laboratory of Hygiene
2601 Agriculture Drive, PO Box 7996
Madison, WI 53707-7996
(800)442-4618 - FAX (608)224-6213
http://www.slh.wisc.edu

Laboratory Report

Environmental Health Division

WSLH Sample: 562101001

Report To:

KATELIN ANDERSON
POLK COUNTY LAND & WATER RESOURCES DEPARTMENT
100 POLK COUNTY PLAZA, STE 120
BALSAM LAKE, WI 54810

Invoice To:

KATELIN ANDERSON
POLK COUNTY LAND & WATER RESOURCES DEPARTMENT
100 POLK COUNTY PLAZA, STE 120
BALSAM LAKE, WI 54810

Customer ID: 336949

Field #: LARGON-NINLET-MAY-21
Project No: LPL174921
Collection End: 5/17/2021 1:45:00 PM
Collection Start: 05/17/2021 13:40:00
Collected By: KATELIN ANDERSON, COLTON
Date Received: 5/18/2021
Date Reported: 6/8/2021
Sample Reason:

ID#: 10054840
Sample Location: LARGON INLET NORTH
Sample Description:
Sample Type: SU-SURFACE WATER
Waterbody: 5004837
Point or Outfall: 273232516
Sample Depth: 0.5 F
Program Code:
Region Code:
County: 49

Inorganic Chemistry

Analyte	Analysis Method	Result	Units	LOD	LOQ
Prep Date: 05/21/21 22:40	Analysis Date: 05/21/21 22:40				
TOTAL SUSPENDED SOLIDS	SM2540D	ND	mg/L	2.0	2.0
Prep Date: 05/19/21 14:43	Analysis Date: 05/28/21 14:50				
Phosphorus	EPA 365.1	0.150	mg/L	0.0120	0.0400

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Madison, WI 53707-7996
(800)442-4618 - FAX (608)224-6213
http://www.slh.wisc.edu

Laboratory Report

Environmental Health Division

WSLH Sample: 562101001

WDNR LAB ID:113133790 NELAP LAB ID:2091 EPA LAB ID:WI00007, WI00008 WI DATCP ID:105-415

List of Abbreviations:

LOD = Level of detection
LOQ = Level of quantification (for PFAS the LOQ = MRL)
ND = None detected. Results are less than the LOD
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Z next to result = Result is between 0 (zero) and LOD
if LOD=LOQ, Limits were not statistically derived

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Responsible Party

Inorganic Chemistry: Graham Anderson, Supervisor 608-224-6281
Metals: Graham Anderson, Supervisor 608-224-6281
Organics: Erin Mani, Supervisor 608-224-6269
Environmental Toxicology: Dawn Perkins, Supervisor 608-224-6230
Water Microbiology: Martin Collins, Supervisor 608-224-6239
Radiochemistry: David Webb, Division Director 608-224-6227

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Madison, WI 53707-7996
(800)442-4618 - FAX (608)224-6213
http://www.slh.wisc.edu

Laboratory Report

Environmental Health Division

WSLH Sample: 611035001

Report To:
COLTON SORENSEN

Invoice To:
KATELIN ANDERSON
POLK COUNTY LAND & WATER RESOURCES DEPARTMENT
100 POLK COUNTY PLAZA, STE 120
BALSAM LAKE, WI 54810
Customer ID: 336949

Field #: LARGON INLET N-MAR22
Project No: LPL174921
Collection End: 3/23/2022 10:26:00 AM
Collection Start: 10:26:00
Collected By: KATELIN ANDERSON, COLTON
Date Received: 3/24/2022
Date Reported: 4/12/2022
Sample Reason:

ID#: 10054840
Sample Location: LARGON INLET NORTH
Sample Description: GRAB SAMPLE
Sample Type: SU-SURFACE WATER
Waterbody: 5004837
Point or Outfall: 306080039
Sample Depth: 2IN
Program Code:
Region Code:
County: 49

Inorganic Chemistry

Analyte	Analysis Method	Result	Units	LOD	LOQ
Prep Date: 03/28/22 16:20	Analysis Date: 03/28/22 16:20				
TOTAL SUSPENDED SOLIDS	SM2540D	4.00	mg/L	2.0	2.0
Prep Date: 03/30/22 14:20	Analysis Date: 03/31/22 13:23				
Phosphorus	EPA 365.1	0.158	mg/L	0.00900	0.0300

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Laboratory Report

Environmental Health Division

WSLH Sample: 611035001

WDNR LAB ID:113133790 NELAP LAB ID:2091 EPA LAB ID:WI00007, WI00008 WI DATCP ID:105-415

List of Abbreviations:

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Water Microbiology: Martin Collins, Supervisor 608-224-6239
Radiochemistry: David Webb, Division Director 608-224-6227

Wisconsin State Laboratory of Hygiene
University of Wisconsin-Madison

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Madison, WI 53707-7996
(800)442-4618 - FAX (608)224-6213
http://www.slh.wisc.edu

Laboratory Report

Environmental Health Division

WSLH Sample: 614691002

Report To:

KATELIN ANDERSON
POLK COUNTY LAND & WATER RESOURCES DEPARTMENT
100 POLK COUNTY PLAZA, STE 120
BALSAM LAKE, WI 54810

Invoice To:

KATELIN ANDERSON
POLK COUNTY LAND & WATER RESOURCES DEPARTMENT
100 POLK COUNTY PLAZA, STE 120
BALSAM LAKE, WI 54810

Customer ID: 336949

Field #: LARGON INLET N-APR22
Project No: LPL174921
Collection End: 4/18/2022 11:11:00 AM
Collection Start:
Collected By: KATELIN ANDERSON, COLTON
Date Received: 4/19/2022
Date Reported: 5/4/2022
Sample Reason:

ID#: 10054840
Sample Location: LARGON INLET NORTH
Sample Description: GRAB SAMPLE
Sample Type: SU-SURFACE WATER
Waterbody: 5004837
Point or Outfall: 309418472
Sample Depth: 2IN
Program Code:
Region Code:
County: 49

Inorganic Chemistry

Analyte	Analysis Method	Result	Units	LOD	LOQ
Prep Date: 04/20/22 14:17	Analysis Date: 04/21/22 15:22				
Chlorophyll A	EPA 445	2.80	ug/L	0.520	1.74
Prep Date: 04/28/22 14:42	Analysis Date: 04/29/22 11:30				
Phosphorus	EPA 365.1	0.0570	mg/L	0.00900	0.0300

Laboratory Report

Environmental Health Division

WSLH Sample: 614691002

WDNR LAB ID:113133790 NELAP LAB ID:2091 EPA LAB ID:WI00007, WI00008 WI DATCP ID:105-415

List of Abbreviations:

LOD = Level of detection
LOQ = Level of quantification (for PFAS the LOQ = MRL)
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Z next to result = Result is between 0 (zero) and LOD
if LOD=LOQ, Limits were not statistically derived

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Environmental Toxicology: Dawn Perkins, Supervisor 608-224-6230
Water Microbiology: Martin Collins, Supervisor 608-224-6239
Radiochemistry: David Webb, Division Director 608-224-6227

Wisconsin State Laboratory of Hygiene
University of Wisconsin–Madison

Wisconsin State Laboratory of Hygiene
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Madison, WI 53707-7996
(800)442-4618 - FAX (608)224-6213
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Laboratory Report

Environmental Health Division

WSLH Sample: 617820002

Report To:

KATELIN ANDERSON
POLK COUNTY LAND & WATER RESOURCES DEPARTMENT
100 POLK COUNTY PLAZA, STE 120
BALSAM LAKE, WI 54810

Invoice To:

KATELIN ANDERSON
POLK COUNTY LAND & WATER RESOURCES DEPARTMENT
100 POLK COUNTY PLAZA, STE 120
BALSAM LAKE, WI 54810

Customer ID: 336949

Field #: LARGON-N-INLET-MAY22
Project No: LPL174921
Collection End: 5/3/2022 2:31:00 PM
Collection Start: 05/03/2022 14:30:00
Collected By: KATELIN ANDERSON, COLTON
Date Received: 5/5/2022
Date Reported: 5/20/2022
Sample Reason:

ID#: 10054840
Sample Location: LARGON INLET NORTH
Sample Description: INTEGRATED SAMPLER
Sample Type: SU-SURFACE WATER
Waterbody: 5004837
Point or Outfall: 310707119
Sample Depth: 3I
Program Code:
Region Code:
County: 49

Sample Comments

SAMPLE RECEIVED ABOVE 6 DEGREES CELSIUS. RESULTS APPROX.

Inorganic Chemistry

Analyte	Analysis Method	Result	Units	LOD	LOQ
Prep Date: 05/06/22 15:52	Analysis Date: 05/18/22 13:38				
Chlorophyll A	EPA 445	0.624F	ug/L	0.520	1.74
Prep Date: 05/06/22 15:40	Analysis Date: 05/10/22 12:14				
Phosphorus	EPA 365.1	0.0646	mg/L	0.00900	0.0300

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Laboratory Report

Environmental Health Division

WSLH Sample: 617820002

WDNR LAB ID:113133790 NELAP LAB ID:2091 EPA LAB ID:WI00007, WI00008 WI DATCP ID:105-415

List of Abbreviations:

LOD = Level of detection
LOQ = Level of quantification (for PFAS the LOQ = MRL)
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Responsible Party

Inorganic Chemistry: Graham Anderson, Supervisor 608-224-6281
Metals: Graham Anderson, Supervisor 608-224-6281
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(800)442-4618 - FAX (608)224-6213
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Laboratory Report

Environmental Health Division

WSLH Sample: 619042001

Report To:
COLTON SORENSEN

Invoice To:
KATELIN ANDERSON
POLK COUNTY LAND & WATER RESOURCES DEPARTMENT
100 POLK COUNTY PLAZA, STE 120
BALSAM LAKE, WI 54810
Customer ID: 336949

Field #: LARGON-MAY10-22
Project No: LPL174921
Collection End: 5/10/2022 11:58:00 AM
Collection Start:
Collected By: KATELIN ANDERSON, COLTON
Date Received: 5/11/2022
Date Reported: 5/23/2022
Sample Reason:

ID#: 10054840
Sample Location: LARGON INLET NORTH
Sample Description: INTEGRATED SAMPLER
Sample Type: SU-SURFACE WATER
Waterbody: 5004837
Point or Outfall: 311243766
Sample Depth: 6I
Program Code:
Region Code:
County: 49

Inorganic Chemistry

Analyte	Analysis Method	Result	Units	LOD	LOQ
Prep Date: 05/11/22 16:18	Analysis Date: 05/18/22 13:38				
Chlorophyll A	EPA 445	1.19F	ug/L	0.520	1.74
Prep Date: 05/13/22 14:15	Analysis Date: 05/16/22 11:51				
Phosphorus	EPA 365.1	0.106	mg/L	0.00900	0.0300

Wisconsin State Laboratory of Hygiene
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Madison, WI 53707-7996
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http://www.slh.wisc.edu

Laboratory Report

Environmental Health Division

WSLH Sample: 619042001

WDNR LAB ID:113133790 NELAP LAB ID:2091 EPA LAB ID:WI00007, WI00008 WI DATCP ID:105-415

List of Abbreviations:

LOD = Level of detection
LOQ = Level of quantification (for PFAS the LOQ = MRL)
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Results relate only to the items tested.
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Responsible Party

Inorganic Chemistry: Graham Anderson, Supervisor 608-224-6281
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Organics: Erin Mani, Supervisor 608-224-6269
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Water Microbiology: Martin Collins, Supervisor 608-224-6239
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Wisconsin State Laboratory of Hygiene
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Madison, WI 53707-7996
(800)442-4618 - FAX (608)224-6213
http://www.slh.wisc.edu

Laboratory Report

Environmental Health Division

WSLH Sample: 621595002

Report To:

KATELIN ANDERSON
POLK COUNTY LAND & WATER RESOURCES DEPARTMENT
100 POLK COUNTY PLAZA, STE 120
BALSAM LAKE, WI 54810

Invoice To:

KATELIN ANDERSON
POLK COUNTY LAND & WATER RESOURCES DEPARTMENT
100 POLK COUNTY PLAZA, STE 120
BALSAM LAKE, WI 54810

Customer ID: 336949

Field #: LARGON-24-MAY22
Project No: LPL174921
Collection End: 5/24/2022 10:07:00 AM
Collection Start:
Collected By: KATELIN ANDERSON, COLTON
Date Received: 5/25/2022
Date Reported: 6/8/2022
Sample Reason:

ID#: 10054840
Sample Location: LARGON INLET NORTH
Sample Description: GRAB SAMPLE
Sample Type: SU-SURFACE WATER
Waterbody: 5004837
Point or Outfall: 312315118
Sample Depth: 6I
Program Code:
Region Code:
County: 49

Inorganic Chemistry

Analyte	Analysis Method	Result	Units	LOD	LOQ
Prep Date: 05/27/22 16:45	Analysis Date: 05/27/22 16:45				
TOTAL SUSPENDED SOLIDS	SM2540D	ND	mg/L	2.0	2.0
Prep Date: 05/26/22 15:19	Analysis Date: 06/01/22 12:54				
Phosphorus	EPA 365.1	0.0449	mg/L	0.00900	0.0300

Wisconsin State Laboratory of Hygiene
2601 Agriculture Drive, PO Box 7996
Madison, WI 53707-7996
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http://www.slh.wisc.edu

Laboratory Report

Environmental Health Division

WSLH Sample: 621595002

WDNR LAB ID:113133790 NELAP LAB ID:2091 EPA LAB ID:WI00007, WI00008 WI DATCP ID:105-415

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Radiochemistry: David Webb, Division Director 608-224-6227

Wisconsin State Laboratory of Hygiene
UNIVERSITY OF WISCONSIN-MADISON

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(800)442-4618 - FAX (608)224-6213
http://www.slh.wisc.edu

Laboratory Report

Environmental Health Division

WSLH Sample: 632010001

Report To:	Invoice To:
KATELIN ANDERSON	KATELIN ANDERSON
POLK COUNTY LAND & WATER RESOURCES DEPARTMENT	POLK COUNTY LAND & WATER RESOURCES DEPARTMENT
100 POLK COUNTY PLAZA, STE 120	100 POLK COUNTY PLAZA, STE 120
BALSAM LAKE, WI 54810	BALSAM LAKE, WI 54810
	Customer ID: 336949

Field #: NORTH INLET-JULY-22
Project No: LPL174921
Collection End: 7/18/2022 11:22:00 AM
Collection Start:
Collected By: KATELIN ANDERSON, COLTON
Date Received: 7/20/2022
Date Reported: 8/4/2022
Sample Reason:

ID#: 10054840
Sample Location: LARGON INLET NORTH
Sample Description: GRAB SAMPLE
Sample Type: SU-SURFACE WATER
Waterbody: 5004837
Point or Outfall: 317168213
Sample Depth: 2I
Program Code:
Region Code:
County: 49

Sample Comments

Received above required temperature.

Inorganic Chemistry

Analyte	Analysis Method	Result	Units	LOD	LOQ
Prep Date: 07/21/22 16:45	Analysis Date: 07/21/22 16:45				
TOTAL SUSPENDED SOLIDS	SM2540D	2.20	mg/L	2.0	2.0
Prep Date: 07/26/22 15:29	Analysis Date: 07/27/22 10:08				
Phosphorus	EPA 365.1	0.0821	mg/L	0.00900	0.0300

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Laboratory Report

Environmental Health Division

WSLH Sample: 632010001

WDNR LAB ID:113133790   NELAP LAB ID:2091   EPA LAB ID:WI00007, WI00008   WI DATCP ID:105-415

List of Abbreviations:

LOD = Level of detection
LOQ = Level of quantification (for PFAS the LOQ = MRL)
ND = None detected. Results are less than the LOD
F next to result = Result is between LOD and LOQ
Z next to result = Result is between 0 (zero) and LOD
if LOD=LOQ, Limits were not statistically derived

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see http://www.slh.wisc.edu/about/compliance/nelac-laboratory-accreditation
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Results relate only to the items tested.
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The water microbiology unit analyzes samples as received and not all samples are tested for preservation before analysis is performed.

Responsible Party

Inorganic Chemistry: Graham Anderson, Supervisor 608-224-6281
Metals: Graham Anderson, Supervisor 608-224-6281
Organics: Erin Mani, Supervisor 608-224-6269
Environmental Toxicology: Dawn Perkins, Supervisor 608-224-6230
Water Microbiology: Martin Collins, Supervisor 608-224-6239
Radiochemistry: David Webb, Division Director 608-224-6227

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Laboratory Report

Environmental Health Division

WSLH Sample: 562101002

Report To:	Invoice To:
KATELIN ANDERSON POLK COUNTY LAND & WATER RESOURCES DEPARTMENT 100 POLK COUNTY PLAZA, STE 120 BALSAM LAKE, WI 54810	KATELIN ANDERSON POLK COUNTY LAND & WATER RESOURCES DEPARTMENT 100 POLK COUNTY PLAZA, STE 120 BALSAM LAKE, WI 54810 Customer ID: 336949

Field #: LARGON-LLOUT-MAY-21
Project No: LPL174921
Collection End: 5/17/2021 1:35:00 PM
Collection Start: 05/17/2021 13:30:00
Collected By: KATELIN ANDERSON, COLTON
Date Received: 5/18/2021
Date Reported: 6/8/2021
Sample Reason:

ID#: 10054839
Sample Location: LITTLE LARGON OUTLET
Sample Description:
Sample Type: SU-SURFACE WATER
Waterbody: 2667800
Point or Outfall: 273232520
Sample Depth: 0.5 F
Program Code:
Region Code:
County: 49

Inorganic Chemistry

Analyte	Analysis Method	Result	Units	LOD	LOQ
Prep Date: 05/21/21 22:40	Analysis Date: 05/21/21 22:40				
TOTAL SUSPENDED SOLIDS	SM2540D	2.80	mg/L	2.0	2.0
Prep Date: 05/19/21 14:43	Analysis Date: 05/28/21 14:51				
Phosphorus	EPA 365.1	0.0414	mg/L	0.0120	0.0400

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Laboratory Report

Environmental Health Division

WSLH Sample: 562101002

WDNR LAB ID:113133790 NELAP LAB ID:2091 EPA LAB ID:WI00007, WI00008 WI DATCP ID:105-415

List of Abbreviations:

LOD = Level of detection
LOQ = Level of quantification (for PFAS the LOQ = MRL)
ND = None detected. Results are less than the LOD
F next to result = Result is between LOD and LOQ
Z next to result = Result is between 0 (zero) and LOD
if LOD=LOQ, Limits were not statistically derived

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Responsible Party

Inorganic Chemistry: Graham Anderson, Supervisor 608-224-6281
Metals: Graham Anderson, Supervisor 608-224-6281
Organics: Erin Mani, Supervisor 608-224-6269
Environmental Toxicology: Dawn Perkins, Supervisor 608-224-6230
Water Microbiology: Martin Collins, Supervisor 608-224-6239
Radiochemistry: David Webb, Division Director 608-224-6227

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Laboratory Report

Environmental Health Division

WSLH Sample: 611035002

Report To:
COLTON SORENSEN

Invoice To:
KATELIN ANDERSON
POLK COUNTY LAND & WATER RESOURCES DEPARTMENT
100 POLK COUNTY PLAZA, STE 120
BALSAM LAKE, WI 54810
Customer ID: 336949

Field #: LT LARG OUTLET-MAR22
Project No: LPL174921
Collection End: 3/23/2022 10:29:00 AM
Collection Start: 10:29:00
Collected By: KATELIN ANDERSON, COLTON
Date Received: 3/24/2022
Date Reported: 4/12/2022
Sample Reason:

ID#: 10054839
Sample Location: LITTLE LARGON OUTLET
Sample Description: GRAB SAMPLE
Sample Type: SU-SURFACE WATER
Waterbody: 2667800
Point or Outfall: 306080063
Sample Depth: 2IN
Program Code:
Region Code:
County: 49

Inorganic Chemistry

Analyte	Analysis Method	Result	Units	LOD	LOQ
Prep Date: 03/28/22 16:20	Analysis Date: 03/28/22 16:20				
TOTAL SUSPENDED SOLIDS	SM2540D	ND	mg/L	2.0	2.0
Prep Date: 03/30/22 14:20	Analysis Date: 03/31/22 13:30				
Phosphorus	EPA 365.1	0.0994	mg/L	0.00900	0.0300

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Laboratory Report

Environmental Health Division

WSLH Sample: 611035002

WDNR LAB ID:113133790 NELAP LAB ID:2091 EPA LAB ID:WI00007, WI00008 WI DATCP ID:105-415

List of Abbreviations:

LOD = Level of detection
LOQ = Level of quantification (for PFAS the LOQ = MRL)
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Responsible Party

Inorganic Chemistry: Graham Anderson, Supervisor 608-224-6281
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Water Microbiology: Martin Collins, Supervisor 608-224-6239
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Laboratory Report

Environmental Health Division

WSLH Sample: 614691001

Report To:	Invoice To:
KATELIN ANDERSON POLK COUNTY LAND & WATER RESOURCES DEPARTMENT 100 POLK COUNTY PLAZA, STE 120 BALSAM LAKE, WI 54810	KATELIN ANDERSON POLK COUNTY LAND & WATER RESOURCES DEPARTMENT 100 POLK COUNTY PLAZA, STE 120 BALSAM LAKE, WI 54810 Customer ID: 336949

Field #: LT LARG OUTLET-APR22
Project No: LPL174921
Collection End: 4/18/2022 11:09:00 AM
Collection Start:
Collected By: KATELIN ANDERSON, COLTON
Date Received: 4/19/2022
Date Reported: 5/4/2022
Sample Reason:

ID#: 10054839
Sample Location: LITTLE LARGON OUTLET
Sample Description: GRAB SAMPLE
Sample Type: SU-SURFACE WATER
Waterbody: 2667800
Point or Outfall: 309418653
Sample Depth: 4IN
Program Code:
Region Code:
County: 49

Inorganic Chemistry

Analyte	Analysis Method	Result	Units	LOD	LOQ
Prep Date: 04/20/22 14:17	Analysis Date: 04/21/22 15:22				
Chlorophyll A	EPA 445	7.62	ug/L	0.520	1.74
Prep Date: 04/28/22 14:42	Analysis Date: 04/29/22 11:29				
Phosphorus	EPA 365.1	0.0937	mg/L	0.00900	0.0300

WDNR LAB ID:113133790 NELAP LAB ID:2091 EPA LAB ID:WI00007, WI00008 WI DATCP ID:105-415

List of Abbreviations:

LOD = Level of detection
LOQ = Level of quantification (for PFAS the LOQ = MRL)
ND = None detected. Results are less than the LOD
F next to result = Result is between LOD and LOQ
Z next to result = Result is between 0 (zero) and LOD
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Responsible Party

Inorganic Chemistry: Graham Anderson, Supervisor 608-224-6281
Metals: Graham Anderson, Supervisor 608-224-6281
Organics: Erin Mani, Supervisor 608-224-6269
Environmental Toxicology: Dawn Perkins, Supervisor 608-224-6230
Water Microbiology: Martin Collins, Supervisor 608-224-6239
Radiochemistry: David Webb, Division Director 608-224-6227

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Laboratory Report

Environmental Health Division

WSLH Sample: 617820001

Report To:

KATELIN ANDERSON
POLK COUNTY LAND & WATER RESOURCES DEPARTMENT
100 POLK COUNTY PLAZA, STE 120
BALSAM LAKE, WI 54810

Invoice To:

KATELIN ANDERSON
POLK COUNTY LAND & WATER RESOURCES DEPARTMENT
100 POLK COUNTY PLAZA, STE 120
BALSAM LAKE, WI 54810

Customer ID: 336949

Field #: LIT-LAR-INLET-MAY22
Project No: LPL174921
Collection End: 5/3/2022 2:30:00 PM
Collection Start: 05/03/2022 14:29:00
Collected By: KATELIN ANDERSON, COLTON
Date Received: 5/5/2022
Date Reported: 5/20/2022
Sample Reason:

ID#: 10054839
Sample Location: LITTLE LARGON OUTLET
Sample Description: INTEGRATED SAMPLER
Sample Type: SU-SURFACE WATER
Waterbody: 2667800
Point or Outfall: 310707123
Sample Depth: 3l
Program Code:
Region Code:
County: 49

Sample Comments

SAMPLE RECEIVED ABOVE 6 DEGREES CELSIUS. RESULTS APPROX.

Inorganic Chemistry

Analyte	Analysis Method	Result	Units	LOD	LOQ
Prep Date: 05/06/22 15:52	Analysis Date: 05/18/22 13:38				
Chlorophyll A	EPA 445	9.43	ug/L	0.520	1.74
Prep Date: 05/06/22 15:40	Analysis Date: 05/10/22 12:13				
Phosphorus	EPA 365.1	0.0714	mg/L	0.00900	0.0300

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Laboratory Report

Environmental Health Division

WSLH Sample: 617820001

WDNR LAB ID:113133790 NELAP LAB ID:2091 EPA LAB ID:WI00007, WI00008 WI DATCP ID:105-415

List of Abbreviations:

LOD = Level of detection
LOQ = Level of quantification (for PFAS the LOQ = MRL)
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F next to result = Result is between LOD and LOQ
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Responsible Party

Inorganic Chemistry: Graham Anderson, Supervisor 608-224-6281
Metals: Graham Anderson, Supervisor 608-224-6281
Organics: Erin Mani, Supervisor 608-224-6269
Environmental Toxicology: Dawn Perkins, Supervisor 608-224-6230
Water Microbiology: Martin Collins, Supervisor 608-224-6239
Radiochemistry: David Webb, Division Director 608-224-6227

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Laboratory Report

Environmental Health Division

WSLH Sample: 619042002

Report To:
COLTON SORENSEN

Invoice To:
KATELIN ANDERSON
POLK COUNTY LAND & WATER RESOURCES DEPARTMENT
100 POLK COUNTY PLAZA, STE 120
BALSAM LAKE, WI 54810
Customer ID: 336949

Field #: LARGON-LL-MAY10-21
Project No: LPL174921
Collection End: 5/10/2022 11:58:00 AM
Collection Start:
Collected By: KATELIN ANDERSON, COLTON
Date Received: 5/11/2022
Date Reported: 5/23/2022
Sample Reason:

ID#: 10054839
Sample Location: LITTLE LARGON OUTLET
Sample Description: INTEGRATED SAMPLER
Sample Type: SU-SURFACE WATER
Waterbody: 2667800
Point or Outfall: 311243781
Sample Depth: 6l
Program Code:
Region Code:
County: 49

Inorganic Chemistry

Analyte	Analysis Method	Result	Units	LOD	LOQ
Prep Date: 05/11/22 16:18	Analysis Date: 05/18/22 13:38				
Chlorophyll A	EPA 445	20.1	ug/L	0.520	1.74
Prep Date: 05/13/22 14:15	Analysis Date: 05/16/22 11:52				
Phosphorus	EPA 365.1	0.0756	mg/L	0.00900	0.0300

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Laboratory Report

Environmental Health Division

WSLH Sample: 619042002

WDNR LAB ID:113133790 NELAP LAB ID:2091 EPA LAB ID:WI00007, WI00008 WI DATCP ID:105-415

List of Abbreviations:

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LOQ = Level of quantification (for PFAS the LOQ = MRL)
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F next to result = Result is between LOD and LOQ
Z next to result = Result is between 0 (zero) and LOD
if LOD=LOQ, Limits were not statistically derived

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Responsible Party

Inorganic Chemistry: Graham Anderson, Supervisor 608-224-6281
Metals: Graham Anderson, Supervisor 608-224-6281
Organics: Erin Mani, Supervisor 608-224-6269
Environmental Toxicology: Dawn Perkins, Supervisor 608-224-6230
Water Microbiology: Martin Collins, Supervisor 608-224-6239
Radiochemistry: David Webb, Division Director 608-224-6227

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Laboratory Report

Environmental Health Division

WSLH Sample: 621595001

Report To:

KATELIN ANDERSON
POLK COUNTY LAND & WATER RESOURCES DEPARTMENT
100 POLK COUNTY PLAZA, STE 120
BALSAM LAKE, WI 54810

Invoice To:

KATELIN ANDERSON
POLK COUNTY LAND & WATER RESOURCES DEPARTMENT
100 POLK COUNTY PLAZA, STE 120
BALSAM LAKE, WI 54810

Customer ID: 336949

Field #: LARGON-LL-24-MAY-22
Project No: LPL174921
Collection End: 5/24/2022 10:07:00 AM
Collection Start:
Collected By: KATELIN ANDERSON, COLTON
Date Received: 5/25/2022
Date Reported: 6/8/2022
Sample Reason:

ID#: 10054839
Sample Location: LITTLE LARGON OUTLET
Sample Description: GRAB SAMPLE
Sample Type: SU-SURFACE WATER
Waterbody: 2667800
Point or Outfall: 312315122
Sample Depth: 3I
Program Code:
Region Code:
County: 49

Inorganic Chemistry

Analyte	Analysis Method	Result	Units	LOD	LOQ
Prep Date: 05/27/22 16:45	Analysis Date: 05/27/22 16:45				
TOTAL SUSPENDED SOLIDS	SM2540D	ND	mg/L	2.0	2.0
Prep Date: 05/26/22 15:19	Analysis Date: 06/01/22 12:53				
Phosphorus	EPA 365.1	0.0316	mg/L	0.00900	0.0300

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Laboratory Report

Environmental Health Division

WSLH Sample: 621595001

WDNR LAB ID:113133790 NELAP LAB ID:2091 EPA LAB ID:WI00007, WI00008 WI DATCP ID:105-415

List of Abbreviations:

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LOQ = Level of quantification (for PFAS the LOQ = MRL)
ND = None detected. Results are less than the LOD
F next to result = Result is between LOD and LOQ
Z next to result = Result is between 0 (zero) and LOD
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Responsible Party

Inorganic Chemistry: Graham Anderson, Supervisor 608-224-6281
Metals: Graham Anderson, Supervisor 608-224-6281
Organics: Erin Mani, Supervisor 608-224-6269
Environmental Toxicology: Dawn Perkins, Supervisor 608-224-6230
Water Microbiology: Martin Collins, Supervisor 608-224-6239
Radiochemistry: David Webb, Division Director 608-224-6227

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Laboratory Report

Environmental Health Division

WSLH Sample: 625035001

Report To:	Invoice To:
KATELIN ANDERSON POLK COUNTY LAND & WATER RESOURCES DEPARTMENT 100 POLK COUNTY PLAZA, STE 120 BALSAM LAKE, WI 54810	KATELIN ANDERSON POLK COUNTY LAND & WATER RESOURCES DEPARTMENT 100 POLK COUNTY PLAZA, STE 120 BALSAM LAKE, WI 54810 Customer ID: 336949

Field #: LT LARG OUTLET-JUN22
Project No: LPL174921
Collection End: 6/13/2022 10:10:00 AM
Collection Start:
Collected By: KATELIN ANDERSON, TRENT
Date Received: 6/14/2022
Date Reported: 6/28/2022
Sample Reason:

ID#: 10054839
Sample Location: LITTLE LARGON OUTLET
Sample Description: GRAB SAMPLE
Sample Type: SU-SURFACE WATER
Waterbody: 2667800
Point or Outfall: 314112283
Sample Depth: 2I
Program Code:
Region Code:
County: 49

Inorganic Chemistry

Analyte	Analysis Method	Result	Units	LOD	LOQ
Prep Date: 06/20/22 16:50	Analysis Date: 06/20/22 16:50				
TOTAL SUSPENDED SOLIDS	SM2540D	3.80	mg/L	2.0	2.0
Prep Date: 06/16/22 14:47	Analysis Date: 06/22/22 15:07				
Phosphorus	EPA 365.1	0.0770	mg/L	0.00900	0.0300

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Laboratory Report

Environmental Health Division

WSLH Sample: 625035001

WDNR LAB ID:113133790 NELAP LAB ID:2091 EPA LAB ID:WI00007, WI00008 WI DATCP ID:105-415

List of Abbreviations:

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LOQ = Level of quantification (for PFAS the LOQ = MRL)
ND = None detected. Results are less than the LOD
F next to result = Result is between LOD and LOQ
Z next to result = Result is between 0 (zero) and LOD
if LOD=LOQ, Limits were not statistically derived

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Responsible Party

Inorganic Chemistry: Graham Anderson, Supervisor 608-224-6281
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http://www.slh.wisc.edu

Laboratory Report

Environmental Health Division

WSLH Sample: 632010002

Report To:

KATELIN ANDERSON
POLK COUNTY LAND & WATER RESOURCES DEPARTMENT
100 POLK COUNTY PLAZA, STE 120
BALSAM LAKE, WI 54810

Invoice To:

KATELIN ANDERSON
POLK COUNTY LAND & WATER RESOURCES DEPARTMENT
100 POLK COUNTY PLAZA, STE 120
BALSAM LAKE, WI 54810

Customer ID: 336949

Field #: LITTLELARGON-JULY-22
Project No: LPL174921
Collection End: 7/18/2022 11:22:00 AM
Collection Start:
Collected By: KATELIN ANDERSON, COLTON
Date Received: 7/20/2022
Date Reported: 8/4/2022
Sample Reason:

ID#: 10054839
Sample Location: LITTLE LARGON OUTLET
Sample Description: GRAB SAMPLE
Sample Type: SU-SURFACE WATER
Waterbody: 2667800
Point or Outfall: 317168217
Sample Depth: 2I
Program Code:
Region Code:
County: 49

Sample Comments

Received above required temperature.

Inorganic Chemistry

Analyte	Analysis Method	Result	Units	LOD	LOQ
Prep Date: 07/21/22 16:45	Analysis Date: 07/21/22 16:45				
TOTAL SUSPENDED SOLIDS	SM2540D	ND	mg/L	2.0	2.0
Prep Date: 07/26/22 15:29	Analysis Date: 07/27/22 10:09				
Phosphorus	EPA 365.1	0.0923	mg/L	0.00900	0.0300

Report ID: 9965482

0000.25.2.WSLH.0

Wisconsin State Laboratory of Hygiene
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Madison, WI 53707-7996
(800)442-4618 - FAX (608)224-6213
http://www.slh.wisc.edu

Laboratory Report

Environmental Health Division

WSLH Sample: 632010002

WDNR LAB ID:113133790 NELAP LAB ID:2091 EPA LAB ID:WI00007, WI00008 WI DATCP ID:105-415

List of Abbreviations:

LOD = Level of detection
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Z next to result = Result is between 0 (zero) and LOD
if LOD=LOQ, Limits were not statistically derived

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see http://www.slh.wisc.edu/about/compliance/nelac-laboratory-accreditation
Results, LOD and LOQ values have been adjusted for analytical dilutions and percent moisture where applicable.
Results relate only to the items tested.
This Laboratory Report shall not be reproduced except in full, without written approval of the laboratory.
The water microbiology unit analyzes samples as received and not all samples are tested for preservation before analysis is performed.

Responsible Party

Inorganic Chemistry: Graham Anderson, Supervisor 608-224-6281
Metals: Graham Anderson, Supervisor 608-224-6281
Organics: Erin Mani, Supervisor 608-224-6269
Environmental Toxicology: Dawn Perkins, Supervisor 608-224-6230
Water Microbiology: Martin Collins, Supervisor 608-224-6239
Radiochemistry: David Webb, Division Director 608-224-6227

Wisconsin State Laboratory of Hygiene
UNIVERSITY OF WISCONSIN-MADISON

Wisconsin State Laboratory of Hygiene
2601 Agriculture Drive, PO Box 7996
Madison, WI 53707-7996
(800)442-4618 - FAX (608)224-6213
http://www.slh.wisc.edu

Laboratory Report

Environmental Health Division

WSLH Sample: 639659001

Report To:

KATELIN ANDERSON
POLK COUNTY LAND & WATER RESOURCES DEPARTMENT
100 POLK COUNTY PLAZA, STE 120
BALSAM LAKE, WI 54810

Invoice To:

KATELIN ANDERSON
POLK COUNTY LAND & WATER RESOURCES DEPARTMENT
100 POLK COUNTY PLAZA, STE 120
BALSAM LAKE, WI 54810

Customer ID: 336949

Field #: LT LARG OUTLET-AUG22
Project No: LPL174921
Collection End: 8/29/2022 1:05:00 PM
Collection Start:
Collected By: KATELIN ANDERSON, COLTON
Date Received: 8/30/2022
Date Reported: 9/13/2022
Sample Reason:

ID#: 10054839
Sample Location: LITTLE LARGON OUTLET
Sample Description: GRAB SAMPLE
Sample Type: SU-SURFACE WATER
Waterbody: 2667800
Point or Outfall: 320950050
Sample Depth: 1I
Program Code:
Region Code:
County: 49

Inorganic Chemistry

Analyte	Analysis Method	Result	Units	LOD	LOQ
Prep Date: 09/02/22 16:40	Analysis Date: 09/02/22 16:40				
TOTAL SUSPENDED SOLIDS	SM2540D	9.20	mg/L	2.0	2.0
Prep Date: 09/09/22 14:05	Analysis Date: 09/12/22 13:27				
Phosphorus	EPA 365.1	0.0580	mg/L	0.00900	0.0300

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Laboratory Report

Environmental Health Division

WSLH Sample: 639659001

WDNR LAB ID:113133790 NELAP LAB ID:2091 EPA LAB ID:WI00007, WI00008 WI DATCP ID:105-415

List of Abbreviations:

LOD = Level of detection
LOQ = Level of quantification (for PFAS the LOQ = MRL)
ND = None detected. Results are less than the LOD
F next to result = Result is between LOD and LOQ
Z next to result = Result is between 0 (zero) and LOD
if LOD=LOQ, Limits were not statistically derived

Test results for NELAP accredited tests are certified to meet the requirements of the NELAC standards. For a list of accredited analytes
see http://www.slh.wisc.edu/about/compliance/nelac-laboratory-accreditation
Results, LOD and LOQ values have been adjusted for analytical dilutions and percent moisture where applicable.
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Responsible Party

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Appendix J

Modeling

Date: 11/23/2022   Scenario: 7

Lake Id: Largon
Watershed Id: 0

Hydrologic and Morphometric Data

Tributary Drainage Area: 2356.0 acre
Total Unit Runoff: 8.00 in.
Annual Runoff Volume: 1570.7 acre-ft
Lake Surface Area <As>: 129.2 acre
Lake Volume <V>: 826.5 acre-ft
Lake Mean Depth <z>: 6.4 ft
Precipitation - Evaporation: 3.3 in.
Hydraulic Loading: 1606.2 acre-ft/year
Areal Water Load <qs>: 12.4 ft/year
Lake Flushing Rate <p>: 1.94 1/year
Water Residence Time: 0.51 year
Observed spring overturn total phosphorus (SPO): 61.2 mg/m^3
Observed growing season mean phosphorus (GSM): 61.0 mg/m^3
% NPS Change: 0%
% PS Change: 0%

NON-POINT SOURCE DATA

Land Use	Acre (ac)	Low	Most Likely	High	Loading %	Low	Most Likely	High
		Loading (kg/ha-year)				Loading (kg/year)		
Row Crop AG	140.0	0.50	1.00	3.00	27.3	28	57	170
Mixed AG	118.0	0.30	0.80	1.40	18.4	14	38	67
Pasture/Grass	121.0	0.10	0.30	0.50	7.1	5	15	24
HD Urban (1/8 Ac)	0.0	1.00	1.50	2.00	0.0	0	0	0
MD Urban (1/4 Ac)	46	0.30	0.50	0.80	4.5	6	9	15
Rural Res (>1 Ac)	56	0.05	0.10	0.25	1.1	1	2	6
Wetlands	215.0	0.10	0.10	0.10	4.2	9	9	9
Forest	1660.0	0.05	0.09	0.18	29.1	34	60	121
Lake Surface	129.2	0.10	0.30	1.00	7.5	5	16	52

POINT SOURCE DATA

Point Sources	Water Load (m^3/year)	Low (kg/year)	Most Likely (kg/year)	High (kg/year)	Loading %

SEPTIC TANK DATA

Description		Low	Most Likely	High	Loading %
Septic Tank Output (kg/capita-year)		0.30	0.50	0.80	
# capita-years	38.1				
% Phosphorus Retained by Soil		98.0	90.0	80.0	
Septic Tank Loading (kg/year)		0.23	1.91	6.10	0.9

TOTALS DATA

Description	Low	Most Likely	High	Loading %
Total Loading (lb)	224.9	458.3	1035.9	100.0
Total Loading (kg)	102.0	207.9	469.9	100.0
Areal Loading (lb/ac-year)	1.74	3.55	8.02	
Areal Loading (mg/m^2-year)	195.12	397.59	898.69	
Total PS Loading (lb)	0.0	0.0	0.0	0.0
Total PS Loading (kg)	0.0	0.0	0.0	0.0
Total NPS Loading (lb)	212.9	419.5	907.2	99.1
Total NPS Loading (kg)	96.6	190.3	411.5	99.1

Phosphorus Prediction and Uncertainty Analysis Module

Date: 11/23/2022 Scenario: 4
Observed spring overturn total phosphorus (SPO): 61.2 mg/m^3
Observed growing season mean phosphorus (GSM): 61.0 mg/m^3
Back calculation for SPO total phosphorus: 61.2 mg/m^3
Back calculation GSM phosphorus: 61 mg/m^3
% Confidence Range: 70%
Nurenberg Model Input - Est. Gross Int. Loading: 0 kg

Lake Phosphorus Model	**Low** Total P (mg/m^3)	**Most Likely** Total P (mg/m^3)	**High** Total P (mg/m^3)	**Predicted** -Observed (mg/m^3)	**% Dif.**
Walker, 1987 Reservoir	26	52	118	-9	-15
Canfield-Bachmann, 1981 Natural Lake	31	54	100	-7	-11
Canfield-Bachmann, 1981 Artificial Lake	27	45	75	-16	-26
Rechow, 1979 General	12	25	56	-36	-59
Rechow, 1977 Anoxic	42	86	195	25	41
Rechow, 1977 water load<50m/year	27	56	127	-5	-8
Rechow, 1977 water load>50m/year	N/A	N/A	N/A	N/A	N/A
Walker, 1977 General	32	65	147	4	7
Vollenweider, 1982 Combined OECD	25	45	88	-16	-26
Dillon-Rigler-Kirchner	14	29	65	-32	-52
Vollenweider, 1982 Shallow Lake/Res.	20	38	78	-23	-38
Larsen-Mercier, 1976	30	61	138	0	0
Nurnberg, 1984 Oxic	16	33	74	-28	-46

Lake Phosphorus Model	**Confidence** Lower Bound	**Confidence** Upper Bound	**Parameter** Fit?	**Back** Calculation (kg/year)	**Model** Type
Walker, 1987 Reservoir	31	96	FIT	243	GSM
Canfield-Bachmann, 1981 Natural Lake	17	156	FIT	241	GSM
Canfield-Bachmann, 1981 Artificial Lake	14	130	FIT	329	GSM
Rechow, 1979 General	14	47	FIT	515	GSM
Rechow, 1977 Anoxic	51	158	FIT	147	GSM
Rechow, 1977 water load<50m/year	32	105	FIT	226	GSM
Rechow, 1977 water load>50m/year	N/A	N/A	N/A	N/A	N/A
Walker, 1977 General	32	128	FIT	195	SPO
Vollenweider, 1982 Combined OECD	22	85	FIT	301	ANN
Dillon-Rigler-Kirchner	17	53	P	441	SPO
Vollenweider, 1982 Shallow Lake/Res.	19	73	FIT	361	ANN
Larsen-Mercier, 1976	37	111	P Pin	208	SPO
Nurnberg, 1984 Oxic	17	63	FIT	388	ANN

Phosphorus Prediction and Uncertainty Analysis Module

Date: 11/23/2022   Scenario: 5
Observed spring overturn total phosphorus (SPO): 61.2 mg/m^3
Observed growing season mean phosphorus (GSM): 61.0 mg/m^3
Back calculation for SPO total phosphorus: 40 mg/m^3
Back calculation GSM phosphorus: 40 mg/m^3
% Confidence Range: 70%
Nurenberg Model Input - Est. Gross Int. Loading: 0 kg

Lake Phosphorus Model	**Low** Total P (mg/m^3)	**Most Likely** Total P (mg/m^3)	**High** Total P (mg/m^3)	**Predicted** -Observed (mg/m^3)	**% Dif.**
Walker, 1987 Reservoir	26	52	118	-9	-15
Canfield-Bachmann, 1981 Natural Lake	31	54	100	-7	-11
Canfield-Bachmann, 1981 Artificial Lake	27	45	75	-16	-26
Rechow, 1979 General	12	25	56	-36	-59
Rechow, 1977 Anoxic	42	86	195	25	41
Rechow, 1977 water load<50m/year	27	56	127	-5	-8
Rechow, 1977 water load>50m/year	N/A	N/A	N/A	N/A	N/A
Walker, 1977 General	32	65	147	4	7
Vollenweider, 1982 Combined OECD	25	45	88	-16	-26
Dillon-Rigler-Kirchner	14	29	65	-32	-52
Vollenweider, 1982 Shallow Lake/Res.	20	38	78	-23	-38
Larsen-Mercier, 1976	30	61	138	0	0
Nurnberg, 1984 Oxic	16	33	74	-28	-46

Lake Phosphorus Model	**Confidence** Lower Bound	**Confidence** Upper Bound	**Parameter** Fit?	**Back** Calculation (kg/year)	**Model** Type
Walker, 1987 Reservoir	31	96	FIT	159	GSM
Canfield-Bachmann, 1981 Natural Lake	17	156	FIT	140	GSM
Canfield-Bachmann, 1981 Artificial Lake	14	130	FIT	171	GSM
Rechow, 1979 General	14	47	FIT	338	GSM
Rechow, 1977 Anoxic	51	158	FIT	96	GSM
Rechow, 1977 water load<50m/year	32	105	FIT	149	GSM
Rechow, 1977 water load>50m/year	N/A	N/A	N/A	N/A	N/A
Walker, 1977 General	32	128	FIT	128	SPO
Vollenweider, 1982 Combined OECD	22	85	FIT	180	ANN
Dillon-Rigler-Kirchner	17	53	P	288	SPO
Vollenweider, 1982 Shallow Lake/Res.	19	73	FIT	223	ANN
Larsen-Mercier, 1976	37	111	P Pin	136	SPO
Nurnberg, 1984 Oxic	17	63	FIT	254	ANN

Phosphorus Prediction and Uncertainty Analysis Module

Date: 11/23/2022   Scenario: 6
Observed spring overturn total phosphorus (SPO): 61.2 mg/m^3
Observed growing season mean phosphorus (GSM): 61.0 mg/m^3
Back calculation for SPO total phosphorus: 61.2 mg/m^3
Back calculation GSM phosphorus: 61 mg/m^3
% Confidence Range: 70%
Nurenberg Model Input - Est. Gross Int. Loading: 35.2 kg

Lake Phosphorus Model	Low Total P (mg/m^3)	Most Likely Total P (mg/m^3)	High Total P (mg/m^3)	Predicted -Observed (mg/m^3)	% Dif.
Walker, 1987 Reservoir	26	52	118	-9	-15
Canfield-Bachmann, 1981 Natural Lake	31	54	100	-7	-11
Canfield-Bachmann, 1981 Artificial Lake	27	45	75	-16	-26
Rechow, 1979 General	12	25	56	-36	-59
Rechow, 1977 Anoxic	42	86	195	25	41
Rechow, 1977 water load<50m/year	27	56	127	-5	-8
Rechow, 1977 water load>50m/year	N/A	N/A	N/A	N/A	N/A
Walker, 1977 General	32	65	147	4	7
Vollenweider, 1982 Combined OECD	25	45	88	-16	-26
Dillon-Rigler-Kirchner	14	29	65	-32	-52
Vollenweider, 1982 Shallow Lake/Res.	20	38	78	-23	-38
Larsen-Mercier, 1976	30	61	138	0	0
Nurnberg, 1984 Oxic	34	50	92	-11	-18

Lake Phosphorus Model	Confidence Lower Bound	Confidence Upper Bound	Parameter Fit?	Back Calculation (kg/year)	Model Type
Walker, 1987 Reservoir	31	96	FIT	243	GSM
Canfield-Bachmann, 1981 Natural Lake	17	156	FIT	241	GSM
Canfield-Bachmann, 1981 Artificial Lake	14	130	FIT	329	GSM
Rechow, 1979 General	14	47	FIT	515	GSM
Rechow, 1977 Anoxic	51	158	FIT	147	GSM
Rechow, 1977 water load<50m/year	32	105	FIT	226	GSM
Rechow, 1977 water load>50m/year	N/A	N/A	N/A	N/A	N/A
Walker, 1977 General	32	128	FIT	195	SPO
Vollenweider, 1982 Combined OECD	22	85	FIT	301	ANN
Dillon-Rigler-Kirchner	17	53	P	441	SPO
Vollenweider, 1982 Shallow Lake/Res.	19	73	FIT	361	ANN
Larsen-Mercier, 1976	37	111	P Pin	208	SPO
Nurnberg, 1984 Oxic	29	86	FIT	275	ANN

Phosphorus Prediction and Uncertainty Analysis Module

Date: 11/23/2022 Scenario: 7

Observed spring overturn total phosphorus (SPO): 61.2 mg/m^3

Observed growing season mean phosphorus (GSM): 61.0 mg/m^3

Back calculation for SPO total phosphorus: 40 mg/m^3

Back calculation GSM phosphorus: 40 mg/m^3

% Confidence Range: 70%

Nurenberg Model Input - Est. Gross Int. Loading: 35.2 kg

Lake Phosphorus Model	Low Total P (mg/m^3)	Most Likely Total P (mg/m^3)	High Total P (mg/m^3)	Predicted -Observed (mg/m^3)	% Dif.
Walker, 1987 Reservoir	26	52	118	-9	-15
Canfield-Bachmann, 1981 Natural Lake	31	54	100	-7	-11
Canfield-Bachmann, 1981 Artificial Lake	27	45	75	-16	-26
Rechow, 1979 General	12	25	56	-36	-59
Rechow, 1977 Anoxic	42	86	195	25	41
Rechow, 1977 water load<50m/year	27	56	127	-5	-8
Rechow, 1977 water load>50m/year	N/A	N/A	N/A	N/A	N/A
Walker, 1977 General	32	65	147	4	7
Vollenweider, 1982 Combined OECD	25	45	88	-16	-26
Dillon-Rigler-Kirchner	14	29	65	-32	-52
Vollenweider, 1982 Shallow Lake/Res.	20	38	78	-23	-38
Larsen-Mercier, 1976	30	61	138	0	0
Nurnberg, 1984 Oxic	34	50	92	-11	-18

Lake Phosphorus Model	Confidence Lower Bound	Confidence Upper Bound	Parameter Fit?	Back Calculation (kg/year)	Model Type
Walker, 1987 Reservoir	31	96	FIT	159	GSM
Canfield-Bachmann, 1981 Natural Lake	17	156	FIT	140	GSM
Canfield-Bachmann, 1981 Artificial Lake	14	130	FIT	171	GSM
Rechow, 1979 General	14	47	FIT	338	GSM
Rechow, 1977 Anoxic	51	158	FIT	96	GSM
Rechow, 1977 water load<50m/year	32	105	FIT	149	GSM
Rechow, 1977 water load>50m/year	N/A	N/A	N/A	N/A	N/A
Walker, 1977 General	32	128	FIT	128	SPO
Vollenweider, 1982 Combined OECD	22	85	FIT	180	ANN
Dillon-Rigler-Kirchner	17	53	P	288	SPO
Vollenweider, 1982 Shallow Lake/Res.	19	73	FIT	223	ANN
Larsen-Mercier, 1976	37	111	P Pin	136	SPO
Nurnberg, 1984 Oxic	29	86	FIT	141	ANN

Wisconsin Internal Load Estimator

Date: 11/23/2022   Scenario: 4

Method 1 - A Complete Total Phosphorus Mass Budget

Method 1 - A Complete Total Phosphorus Mass Budget 62.4 mg/m^3
Phosphorus Inflow Concentration: 104.9 mg/m^3
Areal External Loading: 397.6 mg/m^2-year
Predicted Phosphorus Retention Coefficient: 0.69
Observed Phosphorus Retention Coefficient: 0.41
Internal Load: 130 Lb   59 kg

Method 2 - From Growing Season In Situ Phososphorus Increases

Start of Anoxia
Average Hypolimnetic Phosphorus Concentration: 0 mg/m^3
Hypolimnetic Volume: 0.0 acre-ft
Anoxia Sediment Area: 0.0 acres
Just Prior To The End of Stratification
Average Hypolimnetic Phosphorus Concentration: 0 mg/m^3
Hypolimnetic Volume: 0.0 acre-ft
Anoxia Sediment Area: 0.0 acres
Time Period of Stratification: 1 days
Sediment Phosphorus Release Rate: 0 mg/m^2-day   0 lb/acre-day
Internal Load: 0 Lb   0 kg

Method 3 - From In Situ Phososphorus Increases In The Fall

Start of Anoxia
Average Hypolimnetic Phosphorus Concentration: 0 mg/m^3
Hypolimnetic Volume: 0 acre-ft
Anoxia Sediment Area: 0 acres
Just Prior To The End of Stratification
Average Water Column Phosphorus Concentration: 69.1 mg/m^3
Lake Volume: 826.5 acre-ft
Anoxia Sediment Area Just Before Turnover: 0 acres
Time Period Between Observations: 1 days
Sediment Phosphorus Release Rate: 0 mg/m^2-day   0 lb/acre-day
Internal Load: 155 Lb   70 kg

Method 4 - From Phososphorus Release Rate and Anoxic Area

Start of Anoxia Anoxic Sediment Area: 0 acre
End of Anoxia Anoxic Sediment Area: 0 acre
Phosphorus Release Rate As Calculated In Method 2: 0 mg/m^2-day
Phosphorus Release Rate As Calculated In Method 3: 0 mg/m^2-day
Average of Methods 2 and 3 Release Rates: 0.0 mg/m^2-day
Period of Anoxia: 0 days
Default Areal Sediment Phosphorus Release Rates:

	Low	Most Likely	High
	6	14	24
Internal Load: (Lb)	0	0	0

Internal Load: (kg)	0	0	0

Internal Load Comparison (Percentanges are of the Total Estimate Load)

Total External Load: 458 Lb 208 kg

	Lb	kg	%
From A Complete Mass Budget:	130	59	22.1
From Growing Season In Situ Phosphorus Increases:	0	0	0
From In Situ Phososphorus Increases In The Fall:	155	70	25.3
From Phososphorus Release Rate and Anoxic Area:	0	0	0

Predicted Water Column Total Phosphorus Concentration (ug/l)

	Low	Most Likely	High
Nurnberg+ 1984 Total Phosphorus Model:	0	0	0

Osgood, 1988 Lake Mixing Index: 0

Phosphorus Loading Summary:

	Low	Most Likely	High
Internal Load (Lb):	0	0	0
Internal Load (kg):	0	0	0
External Load (Lb):	0	0	0
External Load (kg):	0	0	0
Total Load (Lb):	0	0	0
Total Load (kg):	0	0	0

Date: 11/22/2022   Scenario: 2

Lake Id: Largon Direct Drainage

Watershed Id: 0

Hydrologic and Morphometric Data

Tributary Drainage Area: 363.0 acre
Total Unit Runoff: 8 in.
Annual Runoff Volume: 242.0 acre-ft
Lake Surface Area <As>: 0.0 acre
Lake Volume <V>: 0.0 acre-ft
Lake Mean Depth <z>: 0.00 ft
Precipitation - Evaporation: 3.3 in.
Hydraulic Loading: 242.0 acre-ft/year
Areal Water Load <qs>: 0.00 ft/year
Lake Flushing Rate <p>: 0.00 1/year
Water Residence Time: 0.00 year
Observed spring overturn total phosphorus (SPO): 0.0 mg/m^3
Observed growing season mean phosphorus (GSM): 0.0 mg/m^3
% NPS Change: 0%
% PS Change: 0%

NON-POINT SOURCE DATA

Land Use	Acre (ac)	Low	Most Likely	High	Loading %	Low	Most Likely	High
		Loading (kg/ha-year)				Loading (kg/year)		
Row Crop AG	14	0.50	1.00	3.00	24.4	3	6	17
Mixed AG	2	0.30	0.80	1.40	2.8	0	1	1
Pasture/Grass	2	0.10	0.30	0.50	1.0	0	0	0
HD Urban (1/8 Ac)	0.0	1.00	1.50	2.00	0.0	0	0	0
MD Urban (1/4 Ac)	24	0.30	0.50	0.80	20.9	3	5	8
Rural Res (>1 Ac)	19	0.05	0.10	0.25	3.3	0	1	2
Wetlands	11	0.10	0.10	0.10	1.9	0	0	0
Forest	291	0.05	0.09	0.18	45.6	6	11	21
Lake Surface	0.0	0.10	0.30	1.00	0.0	0	0	0

POINT SOURCE DATA

Point Sources	Water Load (m^3/year)	Low (kg/year)	Most Likely (kg/year)	High (kg/year)	Loading %

SEPTIC TANK DATA

Description		Low	Most Likely	High	Loading %
Septic Tank Output (kg/capita-year)		0.3	0.5	0.8	
# capita-years	0.0				
% Phosphorus Retained by Soil		98	90	80	
Septic Tank Loading (kg/year)		0.00	0.00	0.00	0.0

TOTALS DATA

Description	Low	Most Likely	High	Loading %

Total Loading (lb)	28.2	51.2	109.9	100.0
Total Loading (kg)	12.8	23.2	49.9	100.0
Areal Loading (lb/ac-year)	0.0	0.0	0.0	0.0
Areal Loading (mg/m^2-year)	0.0	0.0	0.0	0.0
Total PS Loading (lb)	0.0	0.0	0.0	0.0
Total PS Loading (kg)	0.0	0.0	0.0	0.0
Total NPS Loading (lb)	28.2	51.2	109.9	100.0
Total NPS Loading (kg)	12.8	23.2	49.9	100.0

Date: 11/22/2022 Scenario: 3
Lake Id: Largon West
Watershed Id: 0

Hydrologic and Morphometric Data
Tributary Drainage Area: 119.0 acre
Total Unit Runoff: 8 in.
Annual Runoff Volume: 79.3 acre-ft
Lake Surface Area <As>: 0.0 acre
Lake Volume <V>: 0.0 acre-ft
Lake Mean Depth <z>: 0.00 ft
Precipitation - Evaporation: 3.3 in.
Hydraulic Loading: 79.3 acre-ft/year
Areal Water Load <qs>: 0.00 ft/year
Lake Flushing Rate <p>: 0.00 1/year
Water Residence Time: 0.00 year
Observed spring overturn total phosphorus (SPO): 0.0 mg/m^3
Observed growing season mean phosphorus (GSM): 0.0 mg/m^3
% NPS Change: 0%
% PS Change: 0%

NON-POINT SOURCE DATA

Land Use	Acre (ac)	Low	Most Likely	High	Loading %	Low	Most Likely	High
		|---- Loading (kg/ha-year) ----|				|----- Loading (kg/year) ----|		
Row Crop AG	12	0.50	1.00	3.00	50.8	2	5	15
Mixed AG	0.0	0.30	0.80	1.40	0.0	0	0	0
Pasture/Grass	5	0.10	0.30	0.50	6.4	0	1	1
HD Urban (1/8 Ac)	0.0	1.00	1.50	2.00	0.0	0	0	0
MD Urban (1/4 Ac)	2	0.30	0.50	0.80	4.2	0	0	1
Rural Res (>1 Ac)	2	0.05	0.10	0.25	0.8	0	0	0
Wetlands	10	0.10	0.10	0.10	4.2	0	0	0
Forest	88	0.05	0.09	0.18	33.5	2	3	6
Lake Surface	0.0	0.10	0.30	1.00	0.0	0	0	0

POINT SOURCE DATA

Point Sources	Water Load (m^3/year)	Low (kg/year)	Most Likely (kg/year)	High (kg/year)	Loading %

SEPTIC TANK DATA

Description		Low	Most Likely	High	Loading %
Septic Tank Output (kg/capita-year)		0.3	0.5	0.8	
# capita-years	0.0				
% Phosphorus Retained by Soil		98	90	80	
Septic Tank Loading (kg/year)		0.00	0.00	0.00	0.0

TOTALS DATA

Description	Low	Most Likely	High	Loading %

Total Loading (lb)	11.2	21.1	51.2	100.0
Total Loading (kg)	5.1	9.6	23.2	100.0
Areal Loading (lb/ac-year)	0.0	0.0	0.0	0.0
Areal Loading (mg/m^2-year)	0.0	0.0	0.0	0.0
Total PS Loading (lb)	0.0	0.0	0.0	0.0
Total PS Loading (kg)	0.0	0.0	0.0	0.0
Total NPS Loading (lb)	11.2	21.1	51.2	100.0
Total NPS Loading (kg)	5.1	9.6	23.2	100.0

Date: 11/22/2022 Scenario: 4

Lake Id: Largon North
Watershed Id: 0

Hydrologic and Morphometric Data

Tributary Drainage Area: 344.0 acre
Total Unit Runoff: 8 in.
Annual Runoff Volume: 229.3 acre-ft
Lake Surface Area <As>: 0.0 acre
Lake Volume <V>: 0.0 acre-ft
Lake Mean Depth <z>: 0.00 ft
Precipitation - Evaporation: 3.3 in.
Hydraulic Loading: 229.3 acre-ft/year
Areal Water Load <qs>: 0.00 ft/year
Lake Flushing Rate <p>: 0.00 1/year
Water Residence Time: 0.00 year
Observed spring overturn total phosphorus (SPO): 0.0 mg/m^3
Observed growing season mean phosphorus (GSM): 0.0 mg/m^3
% NPS Change: 0%
% PS Change: 0%

NON-POINT SOURCE DATA

Land Use	Acre (ac)	Low	Most Likely	High	Loading %	Low	Most Likely	High
		Loading (kg/ha-year)				Loading (kg/year)		
Row Crop AG	4	0.50	1.00	3.00	8.8	1	2	5
Mixed AG	13	0.30	0.80	1.40	22.8	2	4	7
Pasture/Grass	2	0.10	0.30	0.50	1.3	0	0	0
HD Urban (1/8 Ac)	0.0	1.00	1.50	2.00	0.0	0	0	0
MD Urban (1/4 Ac)	3	0.30	0.50	0.80	3.3	0	1	1
Rural Res (>1 Ac)	2	0.05	0.10	0.25	0.4	0	0	0
Wetlands	9	0.10	0.10	0.10	2.0	0	0	0
Forest	311	0.05	0.09	0.18	61.4	6	11	23
Lake Surface	0.0	0.10	0.30	1.00	0.0	0	0	0

POINT SOURCE DATA

Point Sources	Water Load (m^3/year)	Low (kg/year)	Most Likely (kg/year)	High (kg/year)	Loading %

SEPTIC TANK DATA

Description		Low	Most Likely	High	Loading %
Septic Tank Output (kg/capita-year)		0.3	0.5	0.8	
# capita-years	0.0				
% Phosphorus Retained by Soil		98	90	80	
Septic Tank Loading (kg/year)		0.00	0.00	0.00	0.0

TOTALS DATA

Description	Low	Most Likely	High	Loading %

Total Loading (lb)	21.0	40.7	81.2	100.0
Total Loading (kg)	9.5	18.5	36.8	100.0
Areal Loading (lb/ac-year)	0.0	0.0	0.0	0.0
Areal Loading (mg/m^2-year)	0.0	0.0	0.0	0.0
Total PS Loading (lb)	0.0	0.0	0.0	0.0
Total PS Loading (kg)	0.0	0.0	0.0	0.0
Total NPS Loading (lb)	21.0	40.7	81.2	100.0
Total NPS Loading (kg)	9.5	18.5	36.8	100.0

Date: 11/22/2022 Scenario: 5

Lake Id: Little Largon

Watershed Id: 0

Hydrologic and Morphometric Data

Tributary Drainage Area: 1196.0 acre
Total Unit Runoff: 8 in.
Annual Runoff Volume: 797.3 acre-ft
Lake Surface Area <As>: 0.0 acre
Lake Volume <V>: 0.0 acre-ft
Lake Mean Depth <z>: 0.00 ft
Precipitation - Evaporation: 3.3 in.
Hydraulic Loading: 797.3 acre-ft/year
Areal Water Load <qs>: 0.00 ft/year
Lake Flushing Rate <p>: 0.00 1/year
Water Residence Time: 0.00 year
Observed spring overturn total phosphorus (SPO): 0.0 mg/m^3
Observed growing season mean phosphorus (GSM): 0.0 mg/m^3
% NPS Change: 0%
% PS Change: 0%

NON-POINT SOURCE DATA

Land Use	Acre (ac)	Low	Most Likely	High	Loading %	Low	Most Likely	High
		|---- Loading (kg/ha-year) ----|				|----- Loading (kg/year) ----|		
Row Crop AG	59	0.50	1.00	3.00	22.5	12	24	72
Mixed AG	104	0.30	0.80	1.40	31.8	13	34	59
Pasture/Grass	94	0.10	0.30	0.50	10.8	4	11	19
HD Urban (1/8 Ac)	0.0	1.00	1.50	2.00	0.0	0	0	0
MD Urban (1/4 Ac)	13	0.30	0.50	0.80	2.5	2	3	4
Rural Res (>1 Ac)	27	0.05	0.10	0.25	1.0	1	1	3
Wetlands	146	0.10	0.10	0.10	5.6	6	6	6
Forest	753	0.05	0.09	0.18	25.9	15	27	55
Lake Surface	0.0	0.10	0.30	1.00	0.0	0	0	0

POINT SOURCE DATA

Point Sources	Water Load (m^3/year)	Low (kg/year)	Most Likely (kg/year)	High (kg/year)	Loading %

SEPTIC TANK DATA

Description		Low	Most Likely	High	Loading %
Septic Tank Output (kg/capita-year)		0.3	0.5	0.8	
# capita-years	0.0				
% Phosphorus Retained by Soil		98	90	80	
Septic Tank Loading (kg/year)		0.00	0.00	0.00	0.0

TOTALS DATA

Description	Low	Most Likely	High	Loading %

Total Loading (lb)	113.8	233.7	479.0	100.0
Total Loading (kg)	51.6	106.0	217.3	100.0
Areal Loading (lb/ac-year)	0.0	0.0	0.0	0.0
Areal Loading (mg/m^2-year)	0.0	0.0	0.0	0.0
Total PS Loading (lb)	0.0	0.0	0.0	0.0
Total PS Loading (kg)	0.0	0.0	0.0	0.0
Total NPS Loading (lb)	113.8	233.7	479.0	100.0
Total NPS Loading (kg)	51.6	106.0	217.3	100.0

Date: 11/22/2022 Scenario: 6

Lake Id: South
Watershed Id: 0

Hydrologic and Morphometric Data

Tributary Drainage Area: 334.0 acre
Total Unit Runoff: 8 in.
Annual Runoff Volume: 222.7 acre-ft
Lake Surface Area <As>: 0.0 acre
Lake Volume <V>: 0.0 acre-ft
Lake Mean Depth <z>: 0.00 ft
Precipitation - Evaporation: 3.3 in.
Hydraulic Loading: 222.7 acre-ft/year
Areal Water Load <qs>: 0.00 ft/year
Lake Flushing Rate <p>: 0.00 1/year
Water Residence Time: 0.00 year
Observed spring overturn total phosphorus (SPO): 0.0 mg/m^3
Observed growing season mean phosphorus (GSM): 0.0 mg/m^3
% NPS Change: 0%
% PS Change: 0%

NON-POINT SOURCE DATA

Land Use	Acre (ac)	Low	Most Likely	High	Loading %	Low	Most Likely	High
		Loading (kg/ha-year)				Loading (kg/year)		
Row Crop AG	51	0.50	1.00	3.00	62.1	10	21	62
Mixed AG	0.0	0.30	0.80	1.40	0.0	0	0	0
Pasture/Grass	17	0.10	0.30	0.50	6.2	1	2	3
HD Urban (1/8 Ac)	0.0	1.00	1.50	2.00	0.0	0	0	0
MD Urban (1/4 Ac)	4	0.30	0.50	0.80	2.4	0	1	1
Rural Res (>1 Ac)	6	0.05	0.10	0.25	0.7	0	0	1
Wetlands	39	0.10	0.10	0.10	4.7	2	2	2
Forest	217	0.05	0.09	0.18	23.8	4	8	16
Lake Surface	0.0	0.10	0.30	1.00	0.0	0	0	0

POINT SOURCE DATA

Point Sources	Water Load (m^3/year)	Low (kg/year)	Most Likely (kg/year)	High (kg/year)	Loading %

SEPTIC TANK DATA

Description		Low	Most Likely	High	Loading %
Septic Tank Output (kg/capita-year)		0.3	0.5	0.8	
# capita-years	0.0				
% Phosphorus Retained by Soil		98	90	80	
Septic Tank Loading (kg/year)		0.00	0.00	0.00	0.0

TOTALS DATA

Description	Low	Most Likely	High	Loading %

Total Loading (lb)	38.8	73.3	186.6	100.0
Total Loading (kg)	17.6	33.2	84.6	100.0
Areal Loading (lb/ac-year)	0.0	0.0	0.0	0.0
Areal Loading (mg/m^2-year)	0.0	0.0	0.0	0.0
Total PS Loading (lb)	0.0	0.0	0.0	0.0
Total PS Loading (kg)	0.0	0.0	0.0	0.0
Total NPS Loading (lb)	38.8	73.3	186.6	100.0
Total NPS Loading (kg)	17.6	33.2	84.6	100.0

Appendix K

Lake Management Plan Development Meetings

Largon Lake Management Plan Development
Committee Meeting 1
Virtual Microsoft Teams

Wednesday, January 25, 2023
5:30 -7:30 PM

5:15 **Optional* opportunity to sign into Teams and check microphone, sound, video*

5:30 Introductions, roles, and responsibilities (all)
Teams overview (all)

5:40 Presentation (Polk County Land and Water Resources Department)
Purpose of the meeting
Study results and data

6:30 Brainstorming session (Management Plan Committee)
What do you value about Largon Lake?
What concerns/issues do you have for Largon Lake?

7:20 Schedule future meetings and brainstorm future meeting topics (all)

7:30 Adjourn

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Colton Sorensen
(715) 485-8639
colton.sorensen@polkcountywi.gov

Largon Lake Management Plan Development Rules and Responsibilities

Overall Objective
Develop a Lake Management Plan for Largon Lake

A management plan outlines goals and actions that everyone can live with

Ground Rules
Listen to what others are saying
Don't interrupt when others are speaking
Input is heard from everyone
Stay on topic and stick to the agenda

Management Plan Committee Responsibilities
Attend all meetings
Share your knowledge and concerns about Largon Lake
Review background information and draft documents
Develop lake management strategies
Decide when draft document is ready to submit to board for approval

Land and Water Resources Department Responsibilities
Send out agendas and materials prior to meetings
Keep discussion on track and focused
Summarize key study findings
Write goals, objectives, and action items for the plan using committee input
Write draft and final plan documents
Submit plan for public comment and WDNR review

District Board Member Responsibilities
Participate as part of the committee
Review draft Management Plan
Approve draft Management Plan and submit to WDNR or disapprove draft Management Plan and return to committee

Largon Lake Planning Meeting

Meeting 1

Wednesday, January 25th, 2023

Katelin Anderson
Colton Sorensen

Polk County Land and Water Resources Department

Purpose of the Meetings

- Review data
- Develop lake management plan
    - Goals for the lake

Grant deliverables

- Lake resident survey
- In-lake and tributary data
- Lake level and precipitation monitoring data
- Spring and fall plant surveys
- Shoreline inventory
- Septic inventory
- Watershed delineation, boundaries, and modeling
- Culvert erosion vulnerability study
- No-till and cover crop inventory
- Pontoon classroom
- Lake Management Plan

Lake resident survey

Forty surveys returned, 66% response rate

Largon Lake property owners

- Average property ownership: 20 years
- Average number of people occupying property: 2.5 people
- Number of days/year property used: 103 days/year
- Over half of respondents use their property as a weekend, vacation, and/or holiday residence (58%)
- Most respondents own lakefront property (90%)

Activities enjoyed

- Peace and tranquility (88%)
- Scenic view (80%)
- Observing birds and wildlife (70%)
- Swimming (65%)
- Boating (63%)
- Open water fishing (60%)

Issues of greatest concern

1. Excessive algae bloom
2. Decrease in overall lake health
3. Increased nutrients from failing septic systems

Preferred methods of communication

EMAIL
(80%)

NEWSLETTER
(50%)

ANNUAL MEETING
(30%)

Actions to manage the lake

- Programs to prevent and monitor invasive species (85%)
- Offer incentives to upgrade non-conforming septic systems (83%)
- Practices to improve fishing and fish habitat (74%)
- Offer incentives for shoreline buffers/rain gardens (64%)
- Enforcement of slow-no-wake zones (63%)
- Offering incentives for farmland conservation practices (53%)


Lake water quality

Impaired waters list 2020

Impaired waterbodies don't meet water quality standards

Total phosphorus: $\geq$ 40 µg/L for recreational use and fish and aquatic life use

June 1st - September 15th

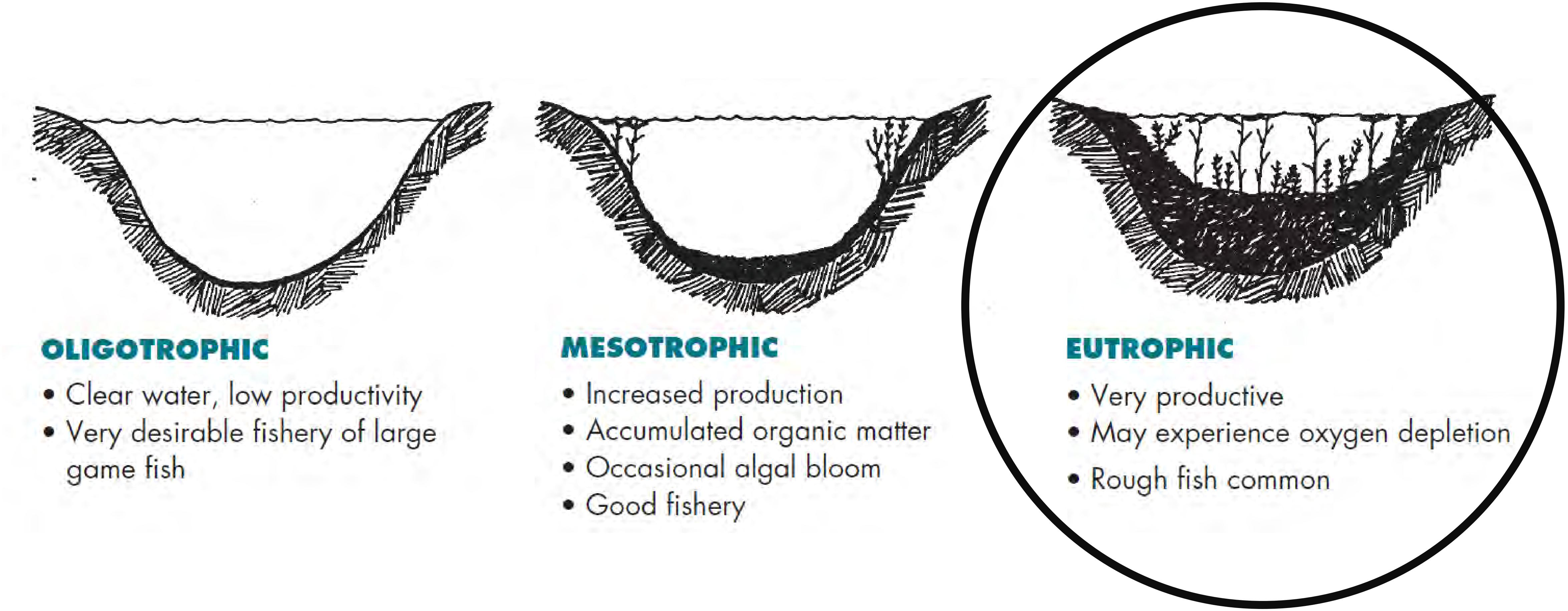
Chlorophyll a: > 30% of days have >20 µg/L for recreational use

$\geq$ 27 ug/L for fish and aquatic life use

July 15th - September 15th

Trophic state index

- Serves as an indicator of water quality
- Reflects nutrient and clarity levels
- Data for secchi depth, chlorophyll, phosphorus



Trophic state index

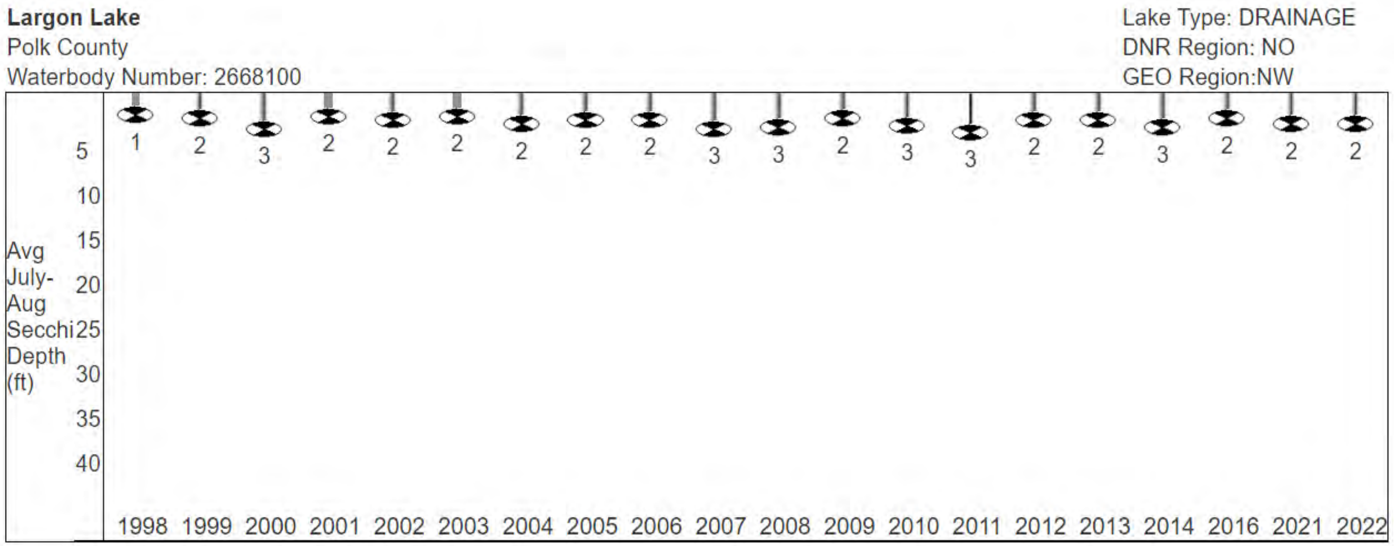
Eutrophic

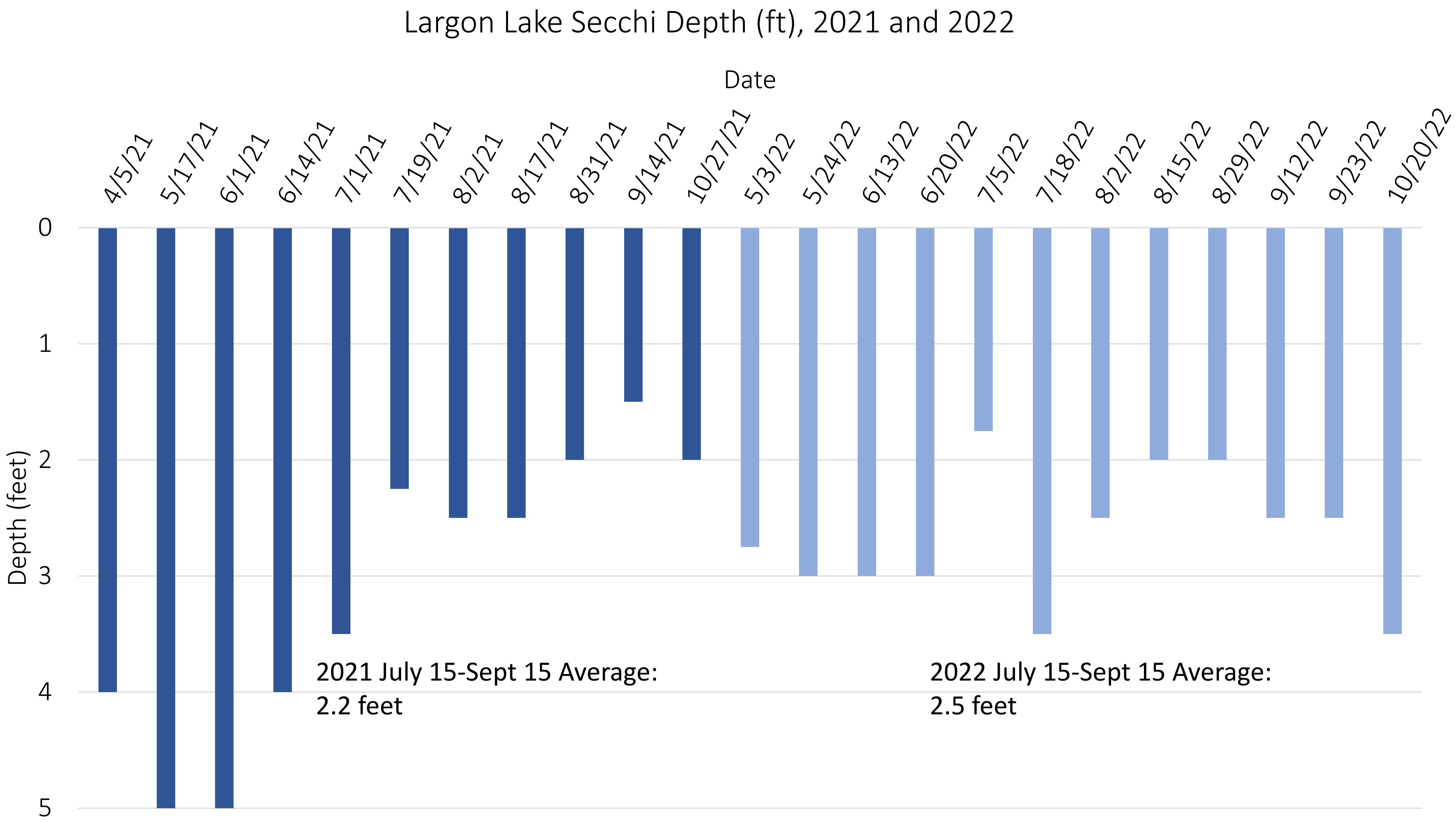
2021: 68
2022: 65

TSI	General Description
<30	**Oligotrophic** clear water, high dissolved oxygen throughout the year/lake
30-40	**Oligotrophic** clear water, possible periods of oxygen depletion in the lower depths of the lake
40-50	**Mesotrophic** moderately clear water, increasing chance of anoxia near the bottom of the lake in summer, fully acceptable for all recreation/aesthetic uses
50-60	**Mildly eutrophic** decreased water clarity, anoxic near the bottom, may have macrophyte problem, warm-water fisheries only
60-70	**Eutrophic** blue-green algae dominance, scums possible, prolific aquatic plant growth, full body recreation may be decreased
70-80	**Hypereutrophic** heavy algal blooms possible throughout the summer, dense algae and macrophytes
>80	Algal scums, summer fish kills, few aquatic plants due to algal shading, rough fish dominate

Secchi depth

- Measure of water clarity
- Greater numbers = greater clarity

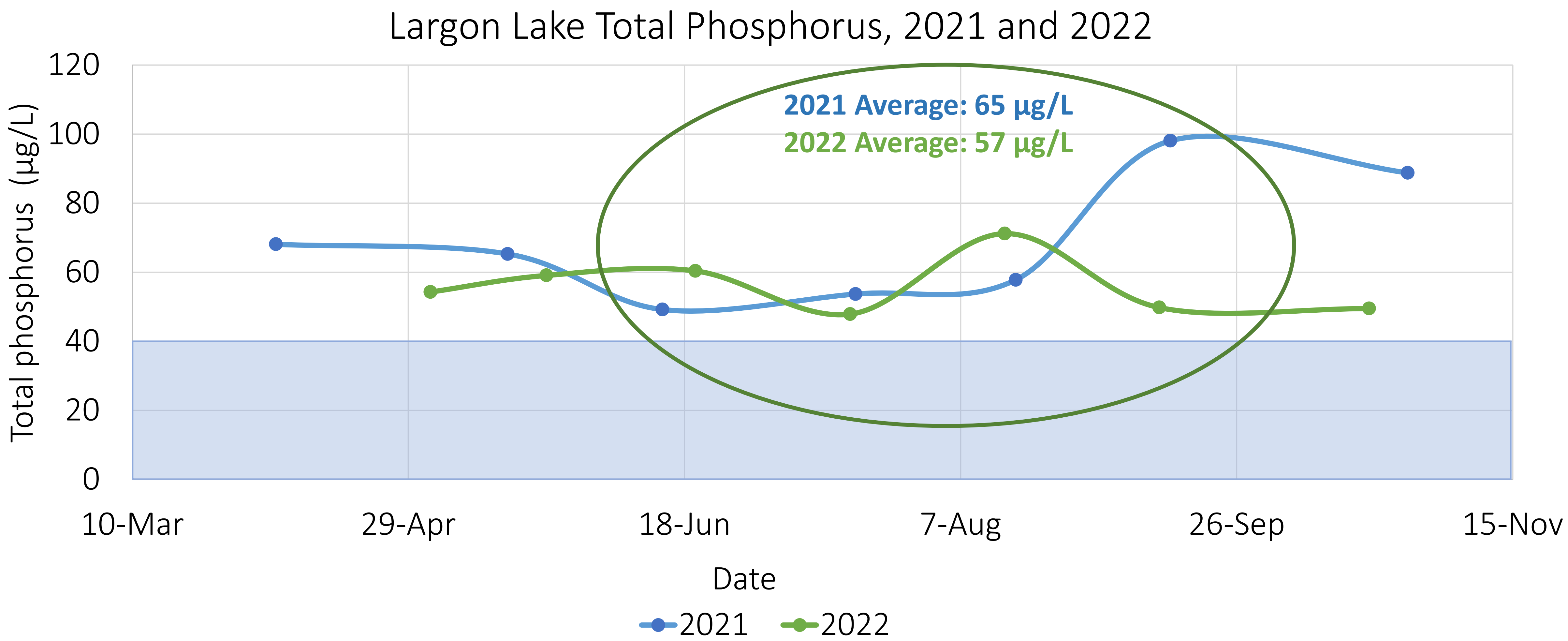


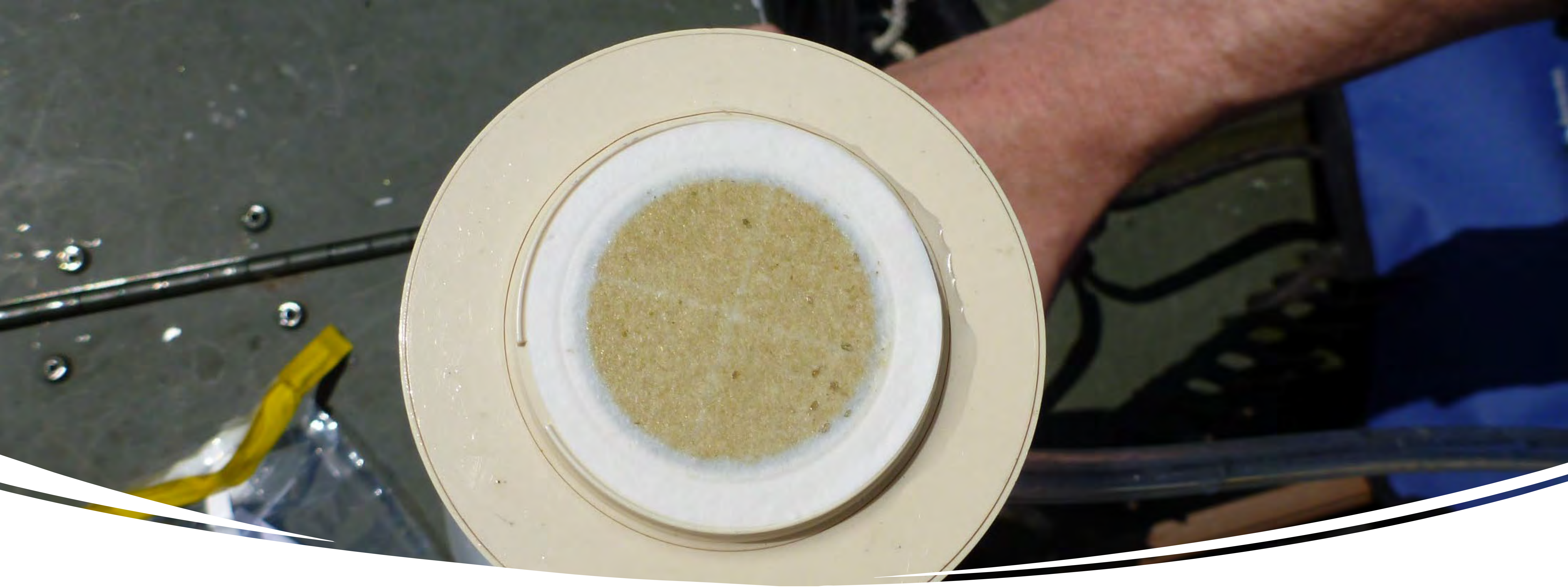

Largon Lake Secchi Depth (ft), 2021 and 2022
Date
4/5/21
5/17/21
6/1/21
6/14/21
7/1/21
7/19/21
8/2/21
8/17/21
8/31/21
9/14/21
10/27/21
5/3/22
5/24/22
6/13/22
6/20/22
7/5/22
7/18/22
8/2/22
8/15/22
8/29/22
9/12/22
9/23/22
10/20/22
Depth (feet)
0
1
2
3
4
5
2021 July 15-Sept 15 Average:
2.2 feet
2022 July 15-Sept 15 Average:
2.5 feet

Phosphorus (P)

- Excess amounts cause plant and algae growth
- Occurs naturally in soil
- Component of fertilizer
- 1 pounds of P = 500 pounds of algae

Impaired if average is ≥ 40 µg/L

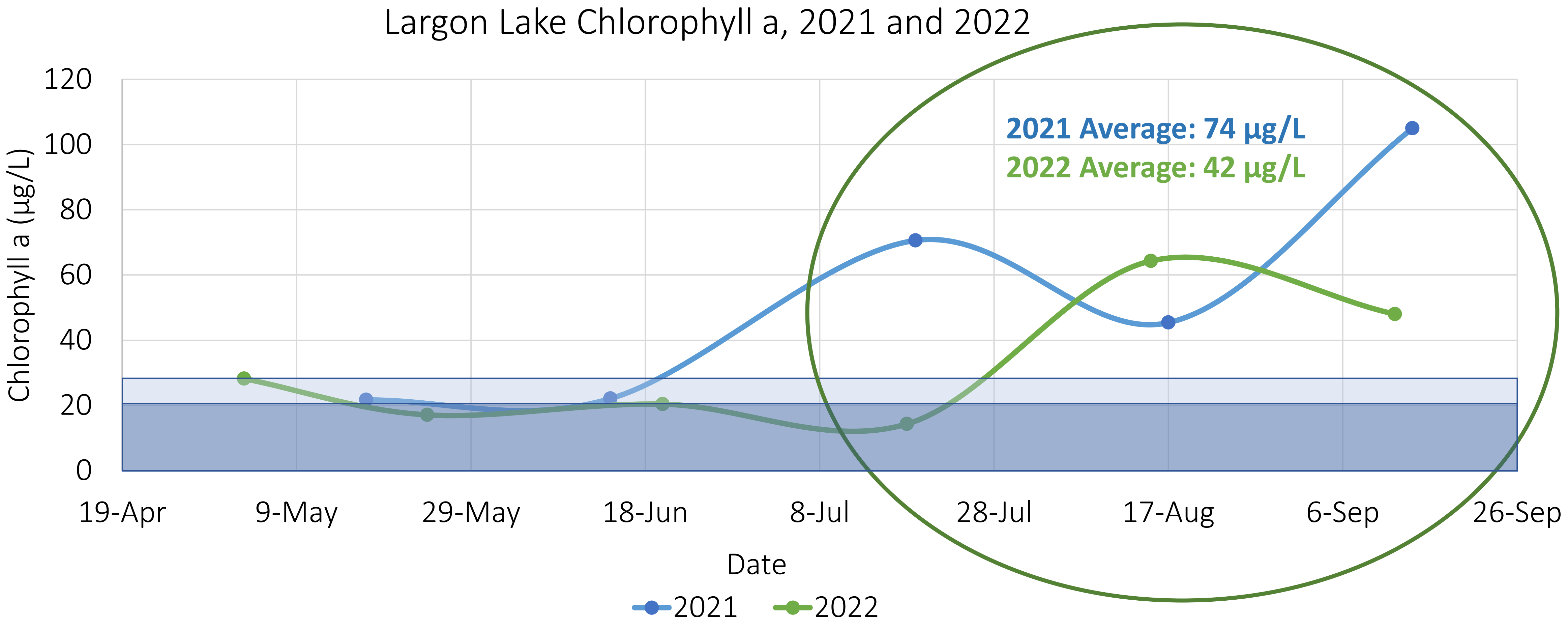


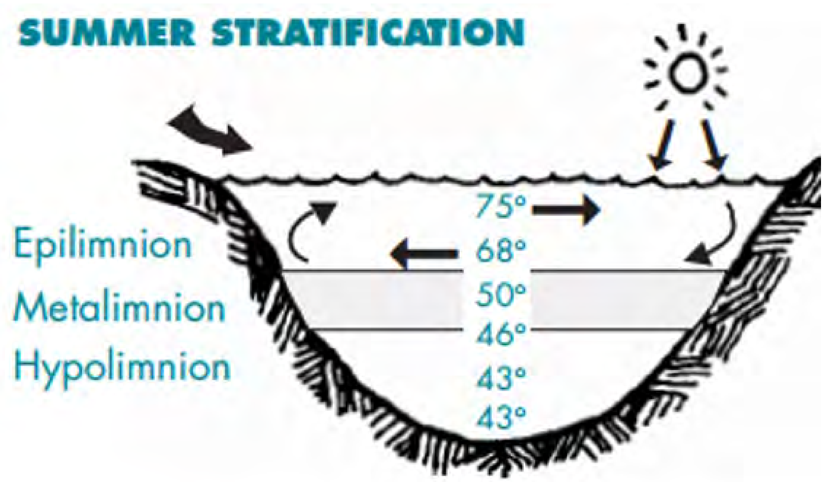


Chlorophyll

- Pigment in plants and algae
- Provides an indication of the amount of algae in a lake
- Higher values = more algae

Impaired for recreation if > 30% of days have > 20 µg/L
Impaired for fish and aquatic life use if $\geq$ 27 µg/L





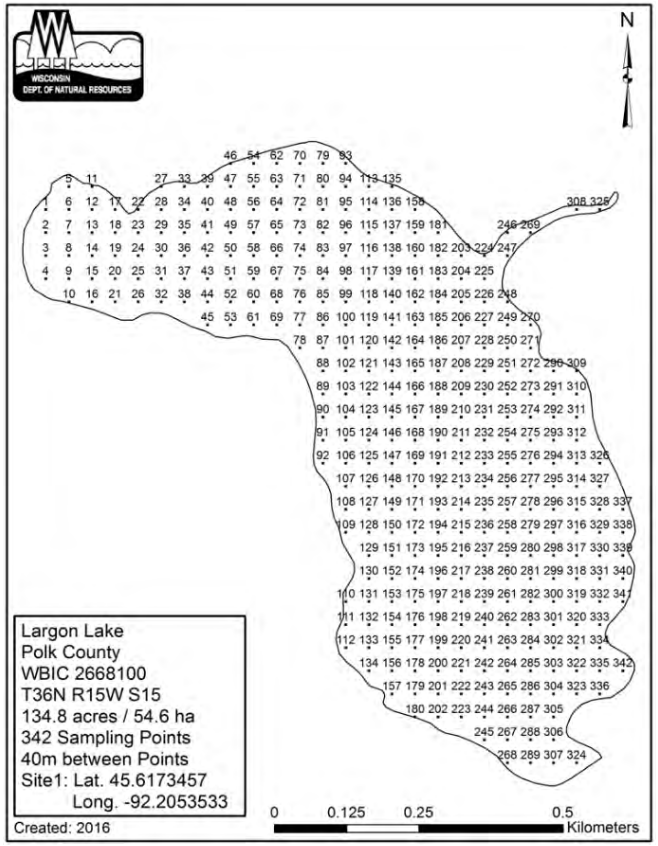
Stratification

- Stratification occurs when a lake sets up density dependent layers
- During this time, water at the top of the lake is not mixed with water at the bottom of a lake
- This can cause oxygen depletion at the bottom of a lake
- Largon Lake remained well mixed for most of the growing season

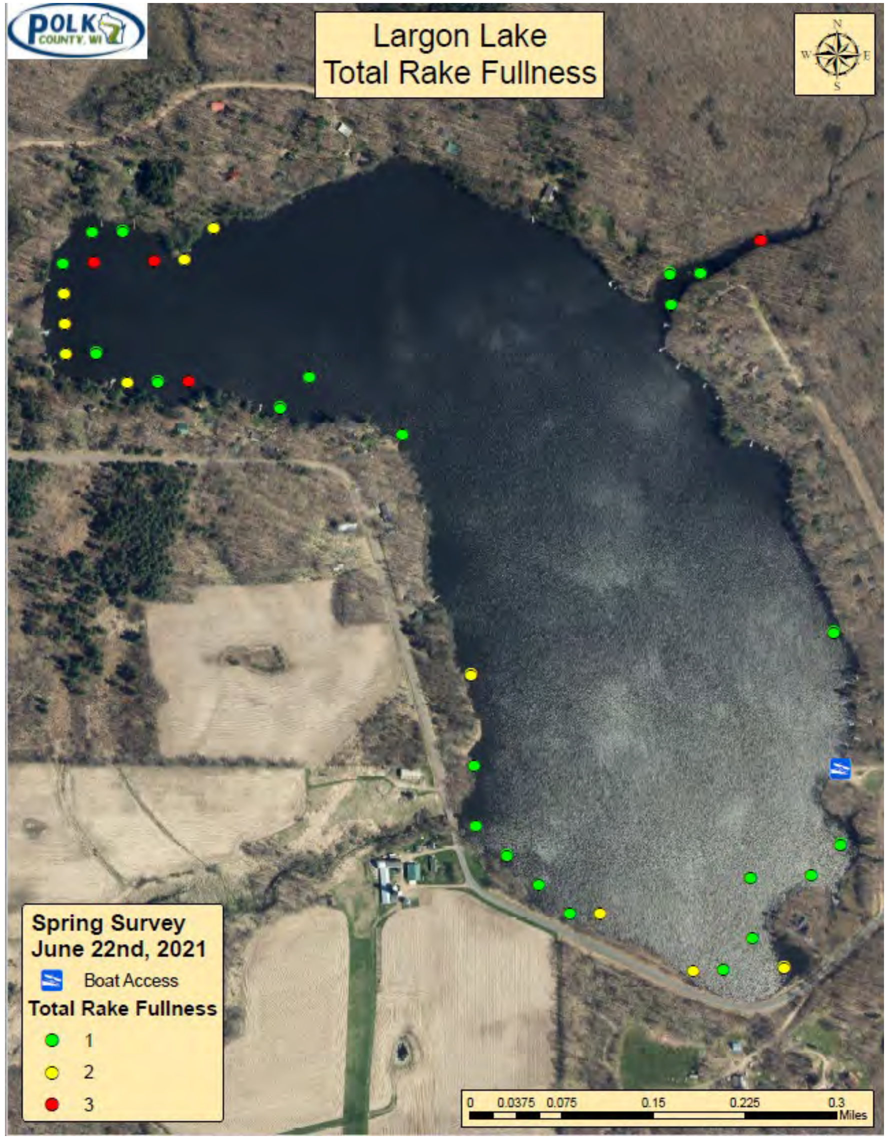
Internal loading

Phosphorus release from sediments

- Under periods of no oxygen, phosphorus bound to lake sediments can be released into the water column
- If a lake is stratified, the phosphorus will remain in the bottom waters of a lake, unavailable for algae
- If a lake mixes, then the phosphorus will be made available throughout the water column

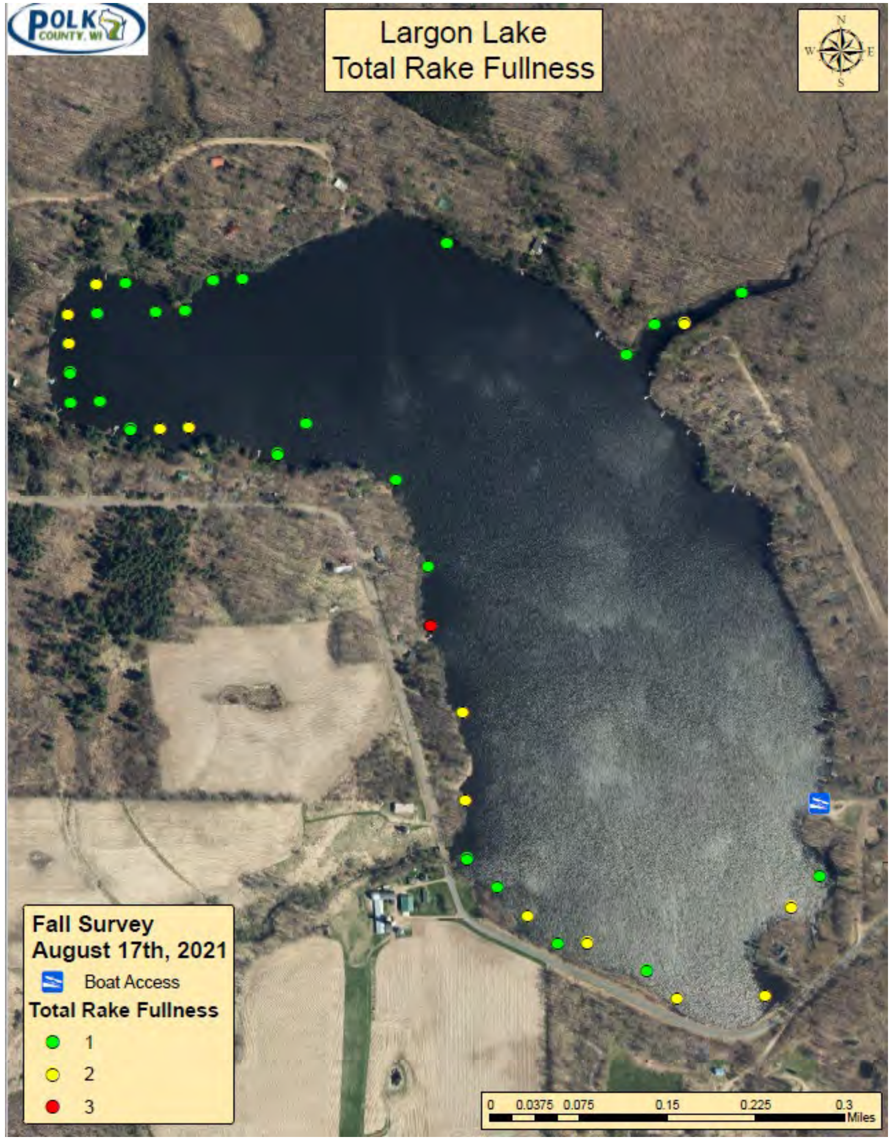


Plant survey



Fullness Rating	Coverage	Description
1		Only few plants. There are not enough plants to entirely cover the length of the rake head in a single layer.
2		There are enough plants to cover the length of the rake head in a single layer, but not enough to fully cover the tines.
3		The rake is completely covered and tines are not visible.

Plant growth
2016: 10% of lake
2021: 15% of lake



Plant survey data

2021: 14 species present in the lake
2016: 16 species present in the lake

Common species 2021
- White water lily
- Watershield
- Spiny hornwort

Common species 2016
- Nitella
- White water lily
- Floating leaf pondweed

No aquatic invasive plants


White Water Lily

Watershield


Spiny Hornwort

Nitella

Floating Leaf Pondweed

Benefits of aquatic plants

USE PHOSPHOROUS (NOT AVAILABLE FOR ALGAE GROWTH)

DIVERSITY OF HABITAT

MAINTAIN WATER QUALITY

HELPS SUSTAIN FISH POPULATIONS

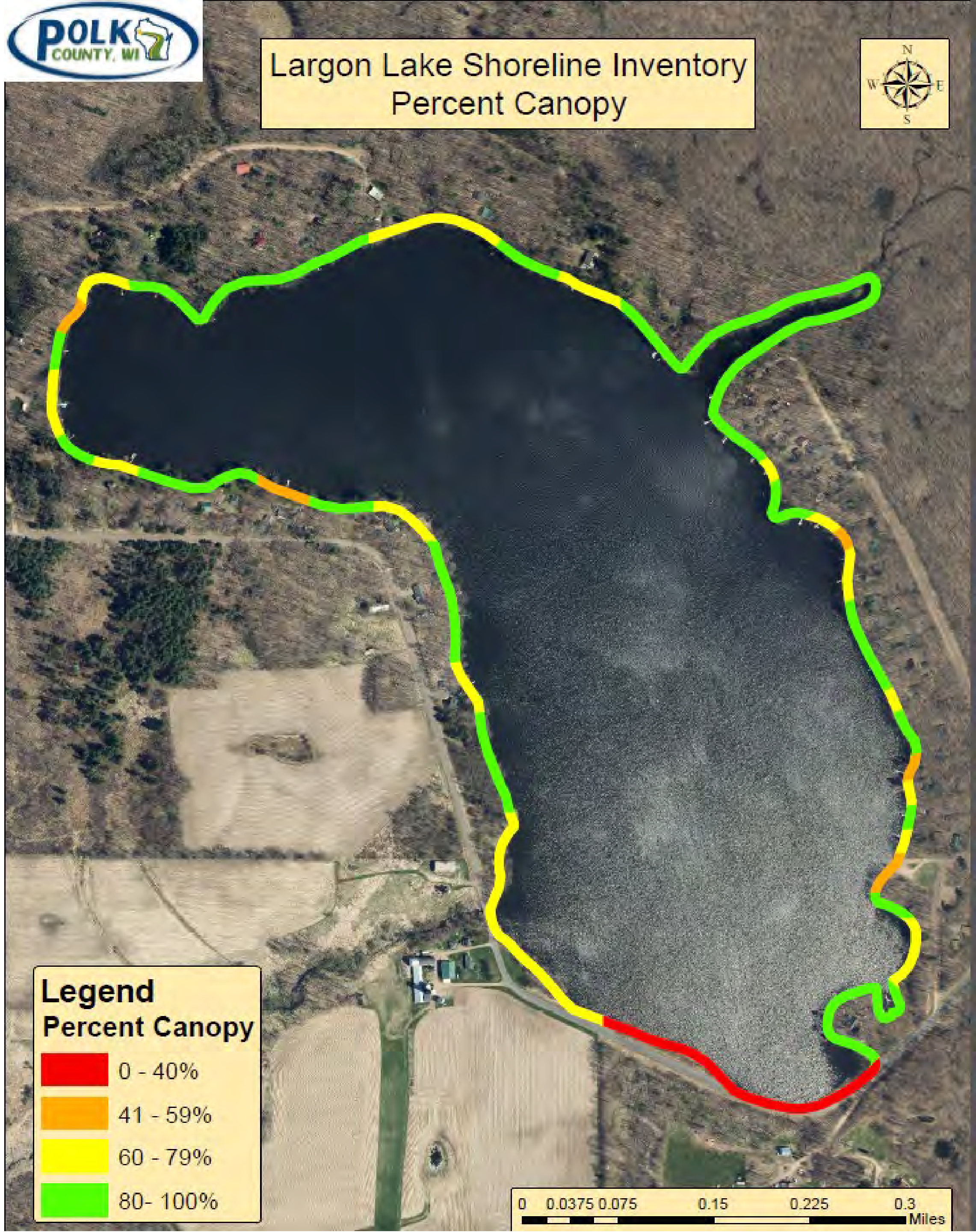
Shoreline inventory

Percent Canopy

Determined for the first 35 feet of shoreline

100% of the parcels on Largon Lake had canopy cover present

89% of parcels had canopy cover of greater than 80% (green parcels on map)



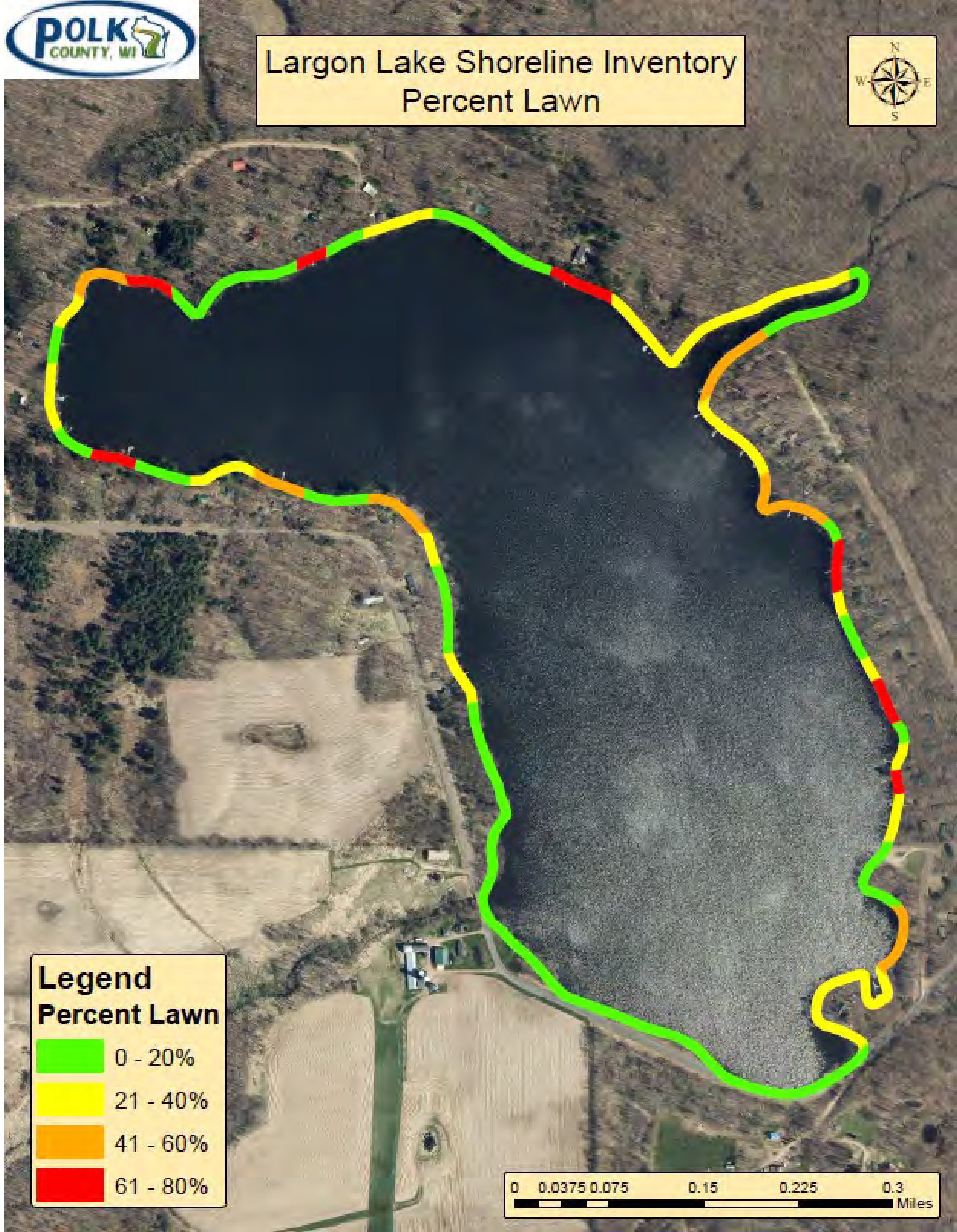
Percent Lawn

Determined for the first 35 feet of shoreline

72% of the ground cover was shrubs and herbaceous plants

25% of the ground cover was lawn

Parcels in red (map) have between 61% and 80% lawn



Wood Inventory

113 pieces of wood (at least 4 inches in diameter and 5 feet long) and 2 beaver lodges

68% of wood touched the shoreline

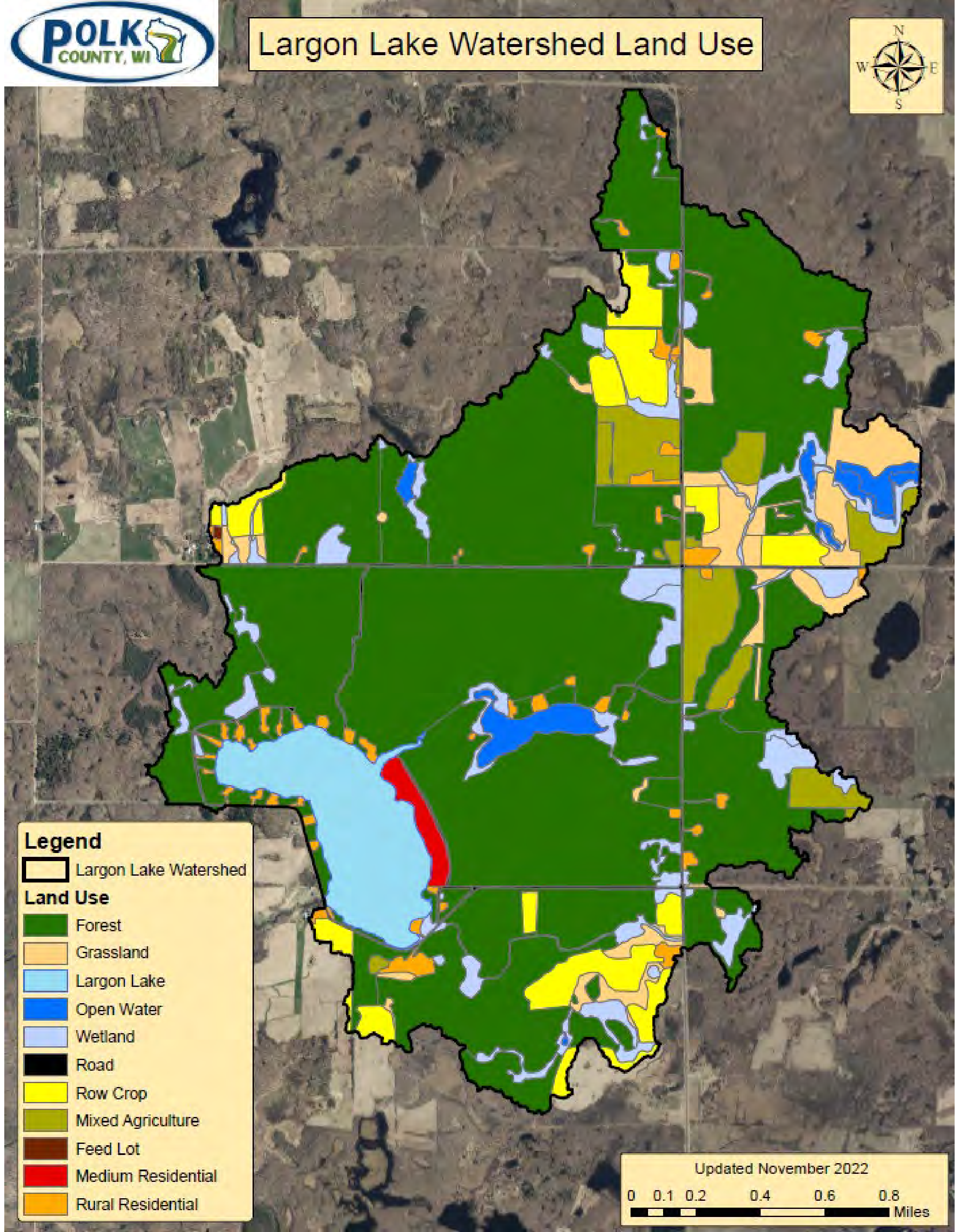
95% of the wood had at least 5 feet underwater

46% of wood had no branches, 29% had a few branches, and 25% had a full crown

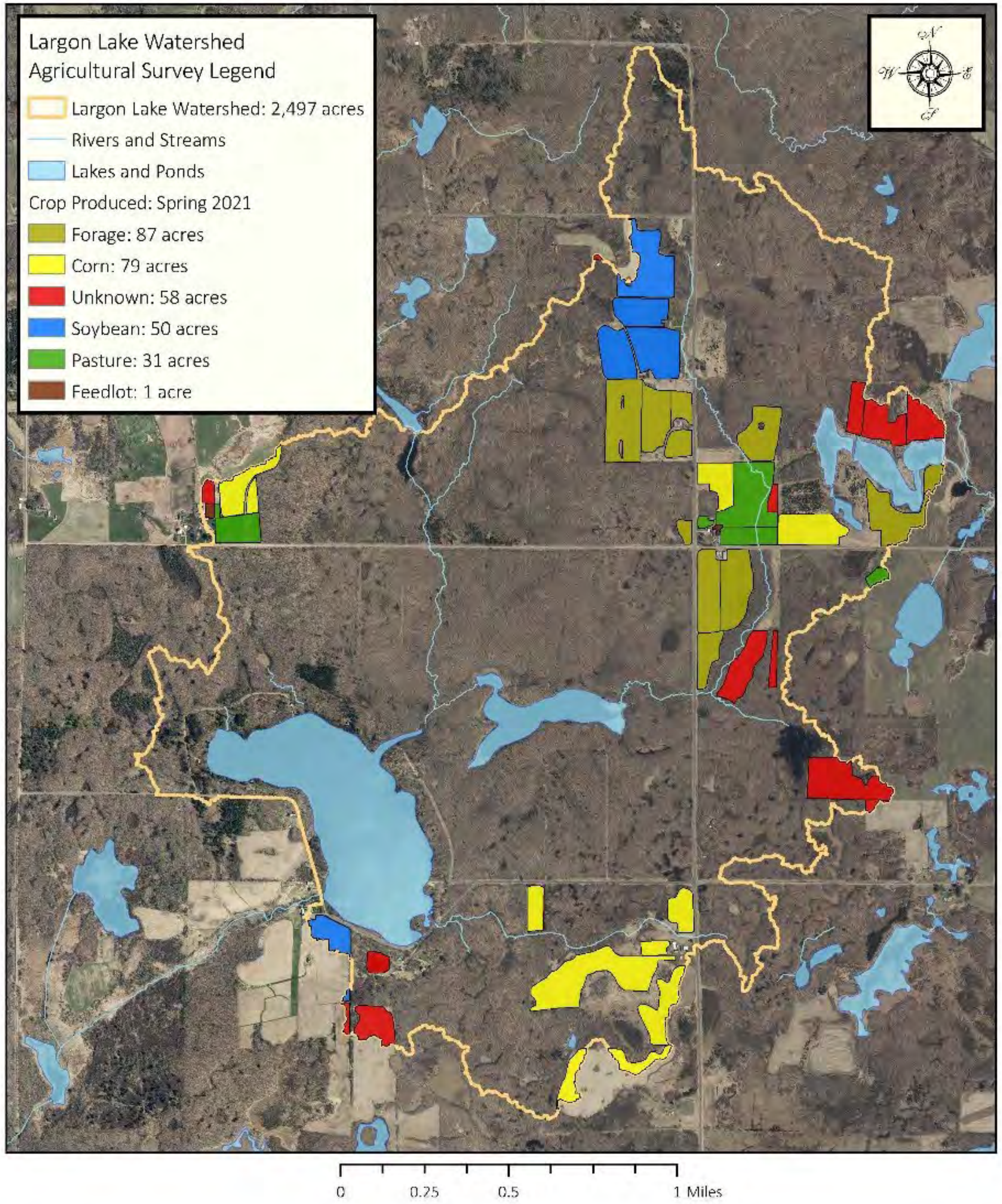
Undeveloped lakes have nearly 900 logs per mile of shoreline

Largon Lake has 42 logs per mile of shoreline

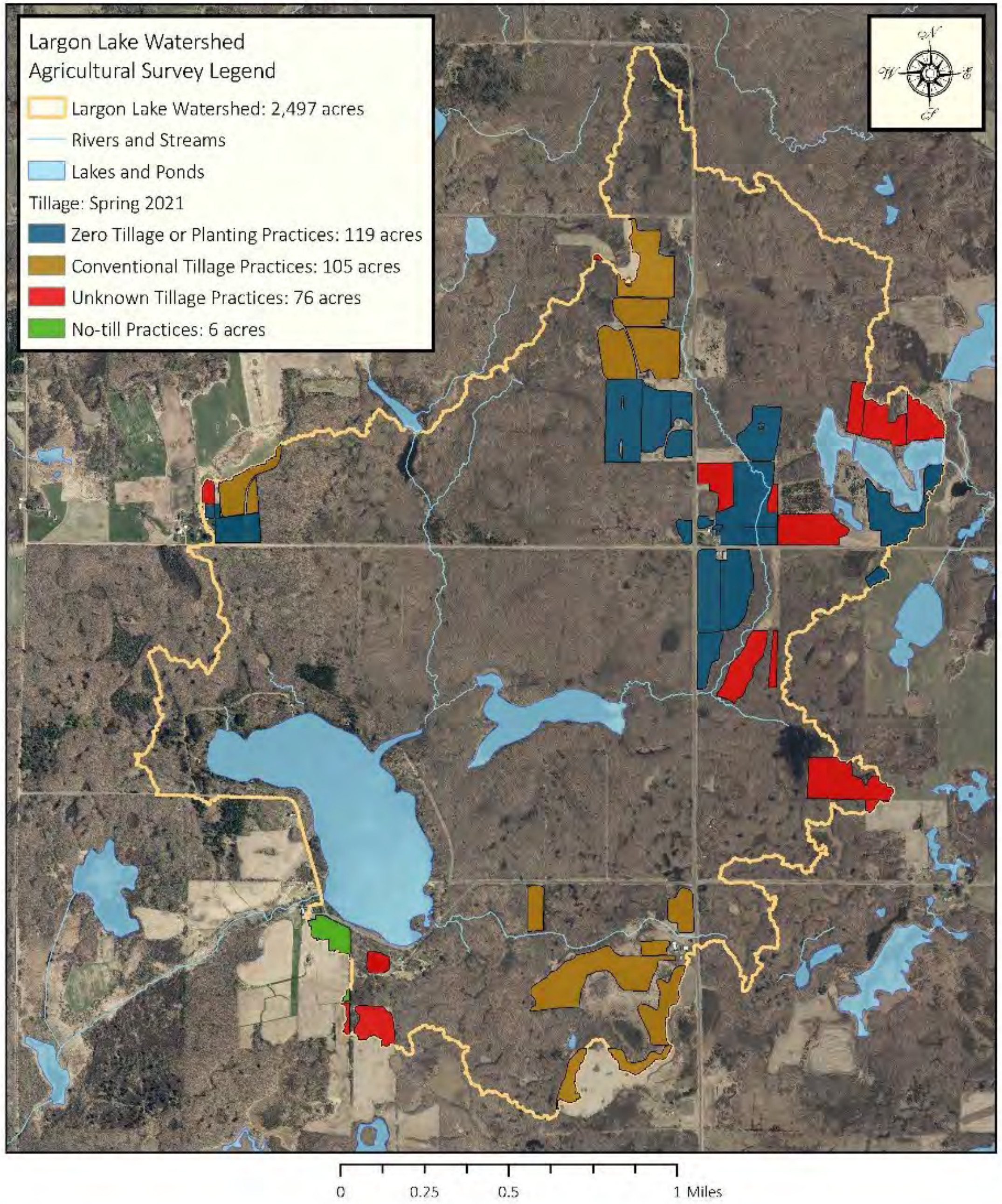
Land Use	Acres	Acres (%)
Forest	1,660	70%
Wetland	167	7%
Row crop	139	6%
Grassland	121	5%
Mixed agriculture	118	5%
Rural residential	56	2%
Open water	48	2%
Road	30	1%
Medium density residential	16	1%
Feed lot	1	< 1%



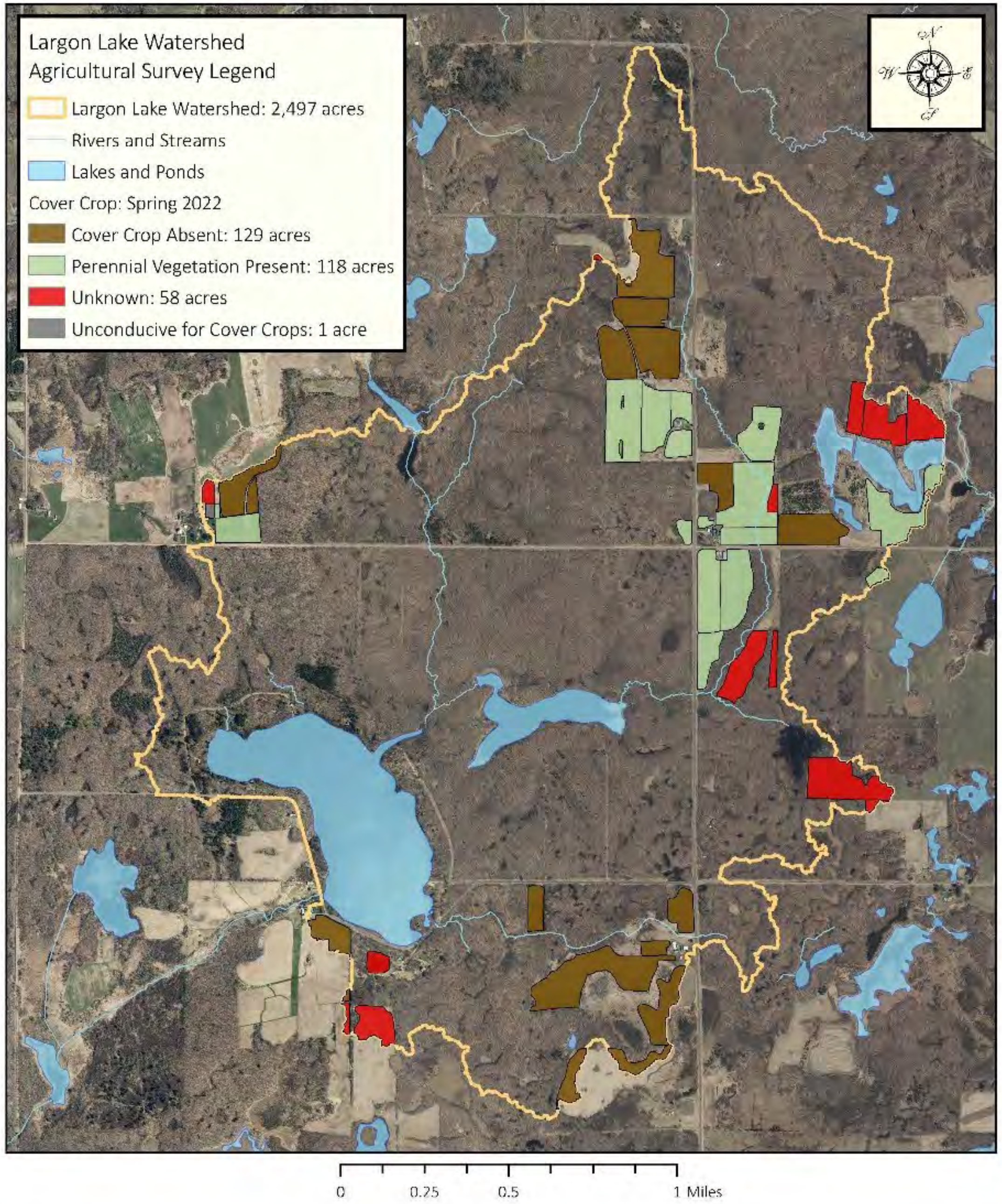
Largon Lake Watershed: 2021 Crop Inventory

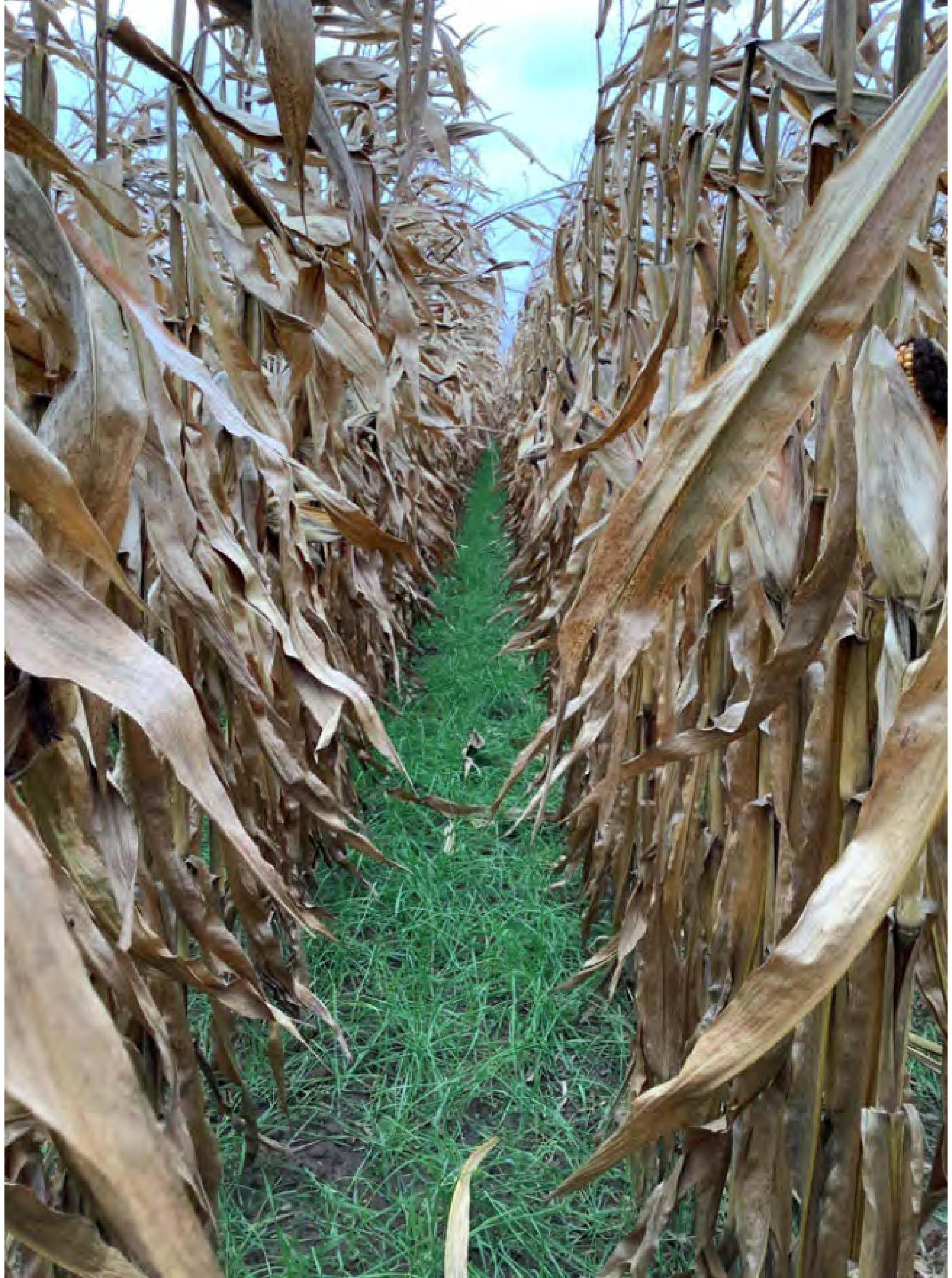


Largon Lake Watershed: 2021 Tillage Inventory



Largon Lake Watershed: 2022 Cover Crop Inventory



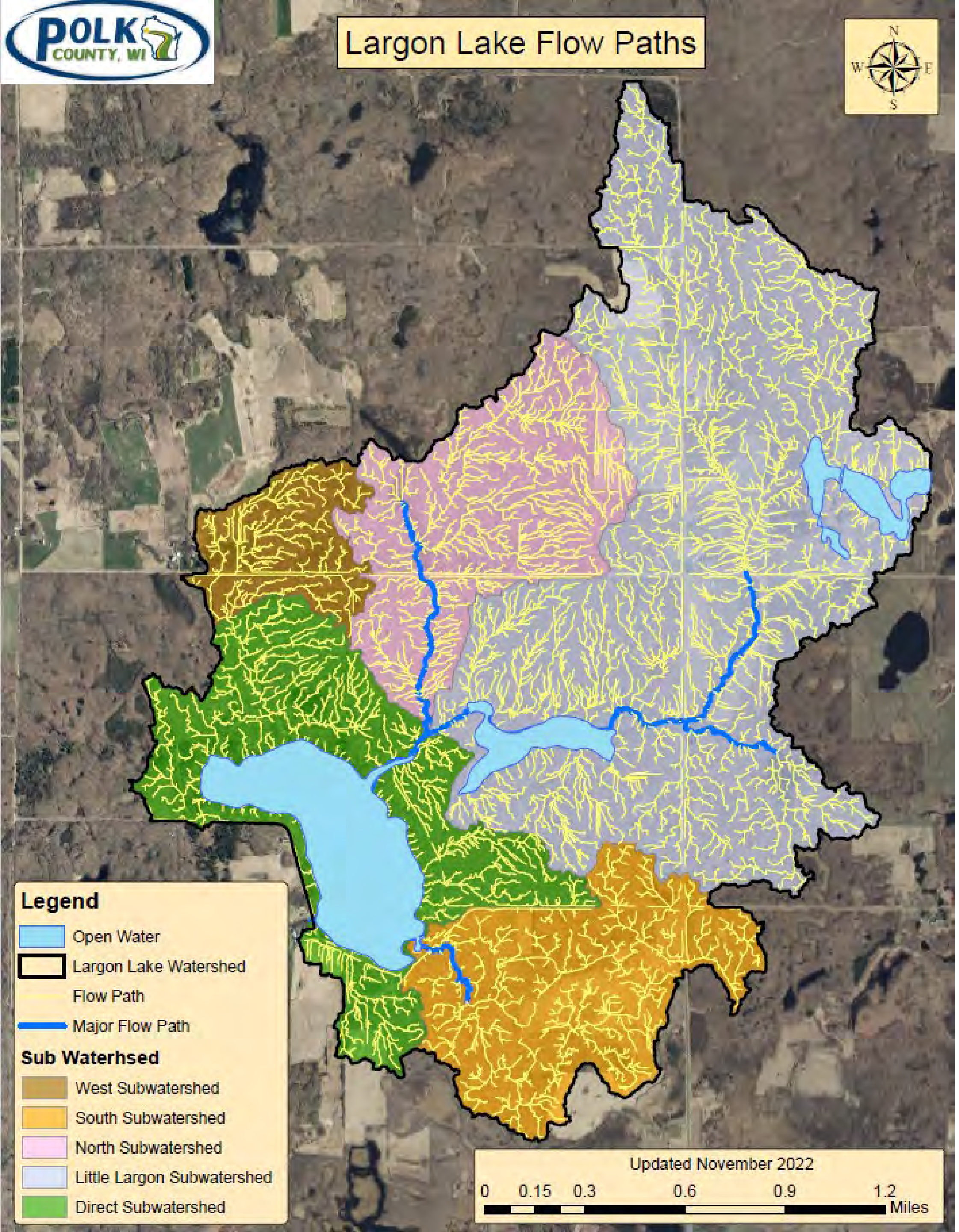


Watershed Modeling

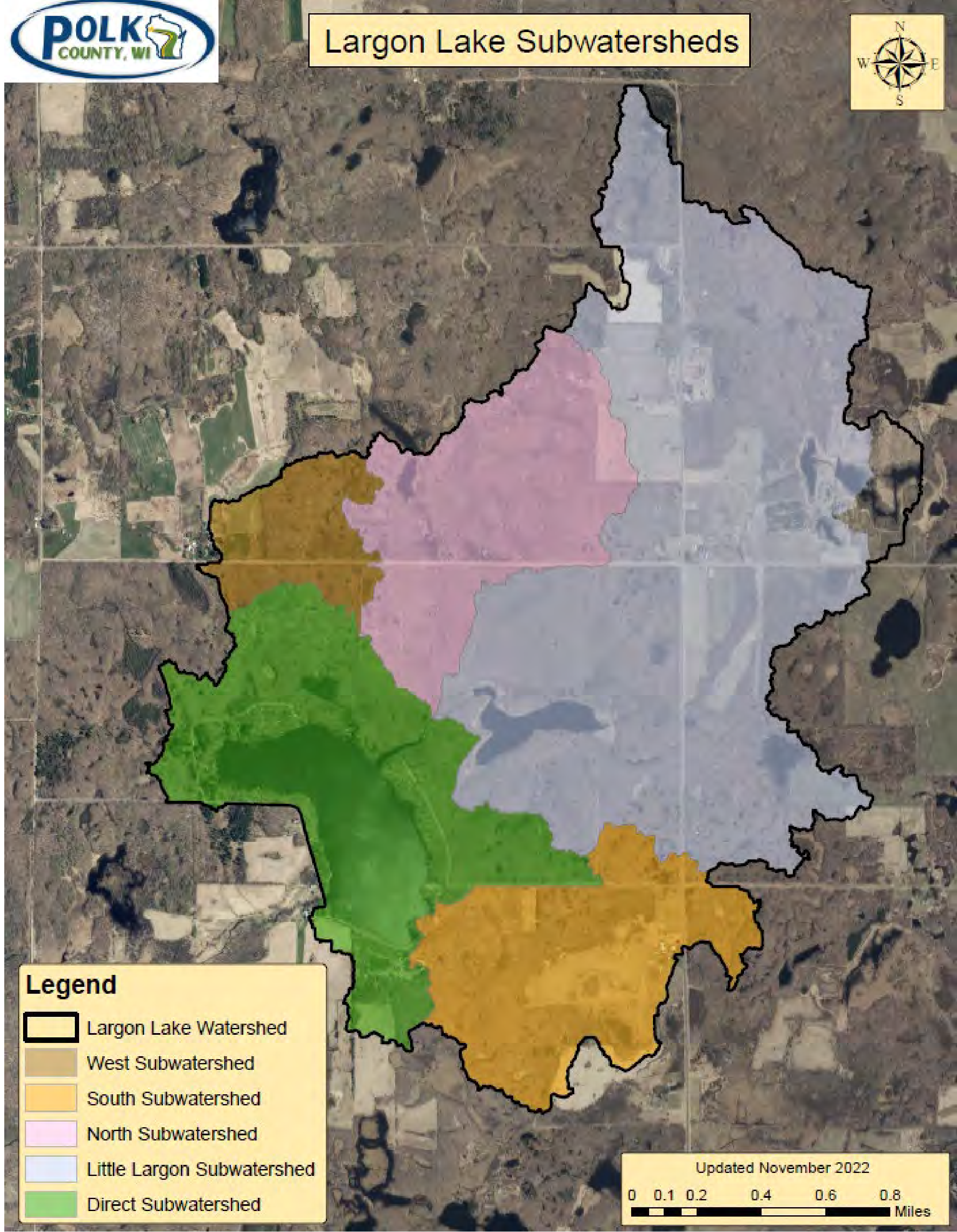
WiLMS Watershed Modeling

- External phosphorus load: 454 pounds
  - Forest: 132 pounds
  - Row crop: 126 pounds
  - Mixed agriculture: 84 pounds
  - Pasture/grass: 33 pounds
  - Wetland/open water: 20 pounds
  - Medium density residential: 20 pounds
  - Rural residential: 4 pounds
  - Largon Lake surface: 35 pounds

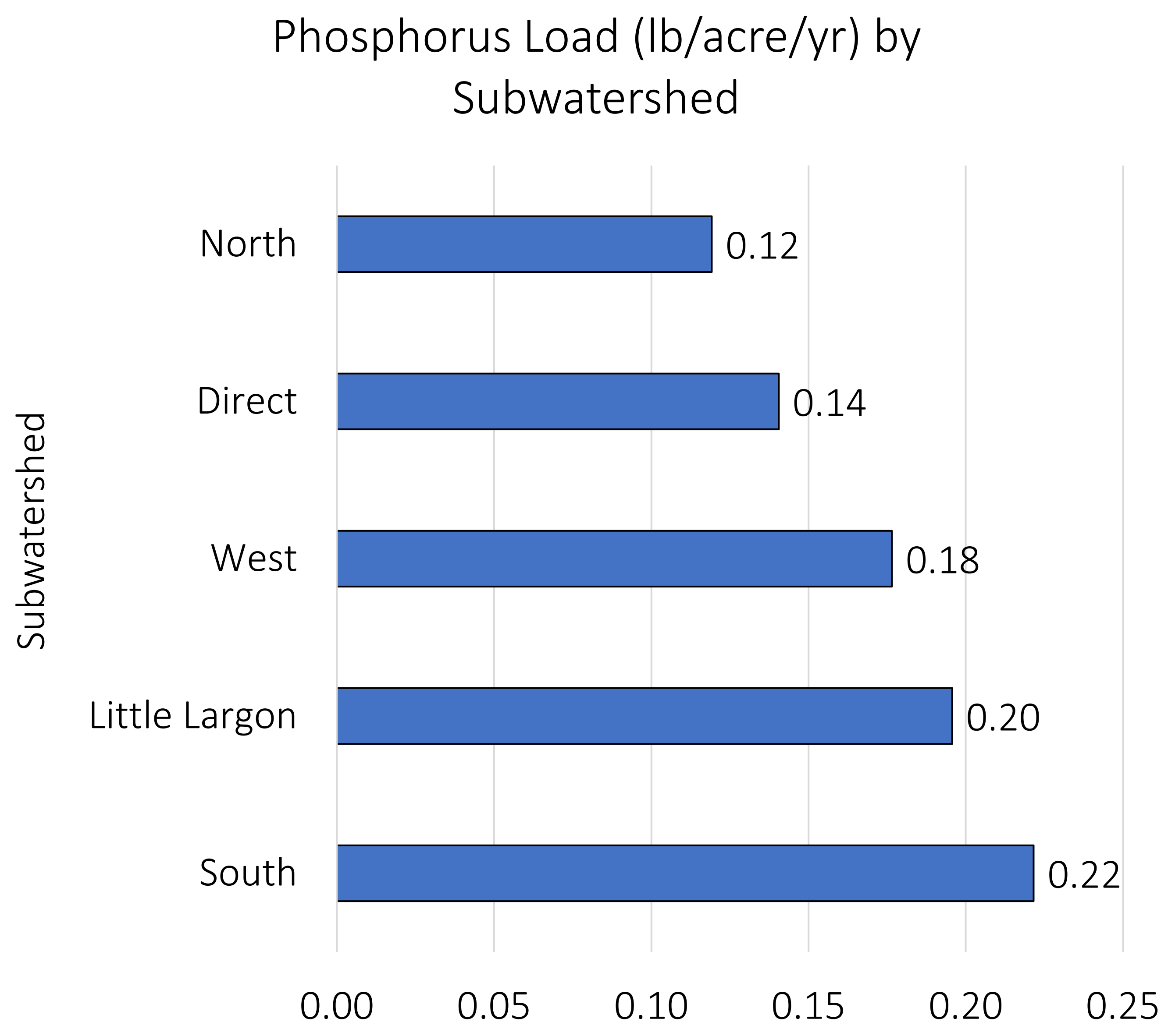
- Internal phosphorus load: 55-110 pounds
- Septic loading: 2 pounds



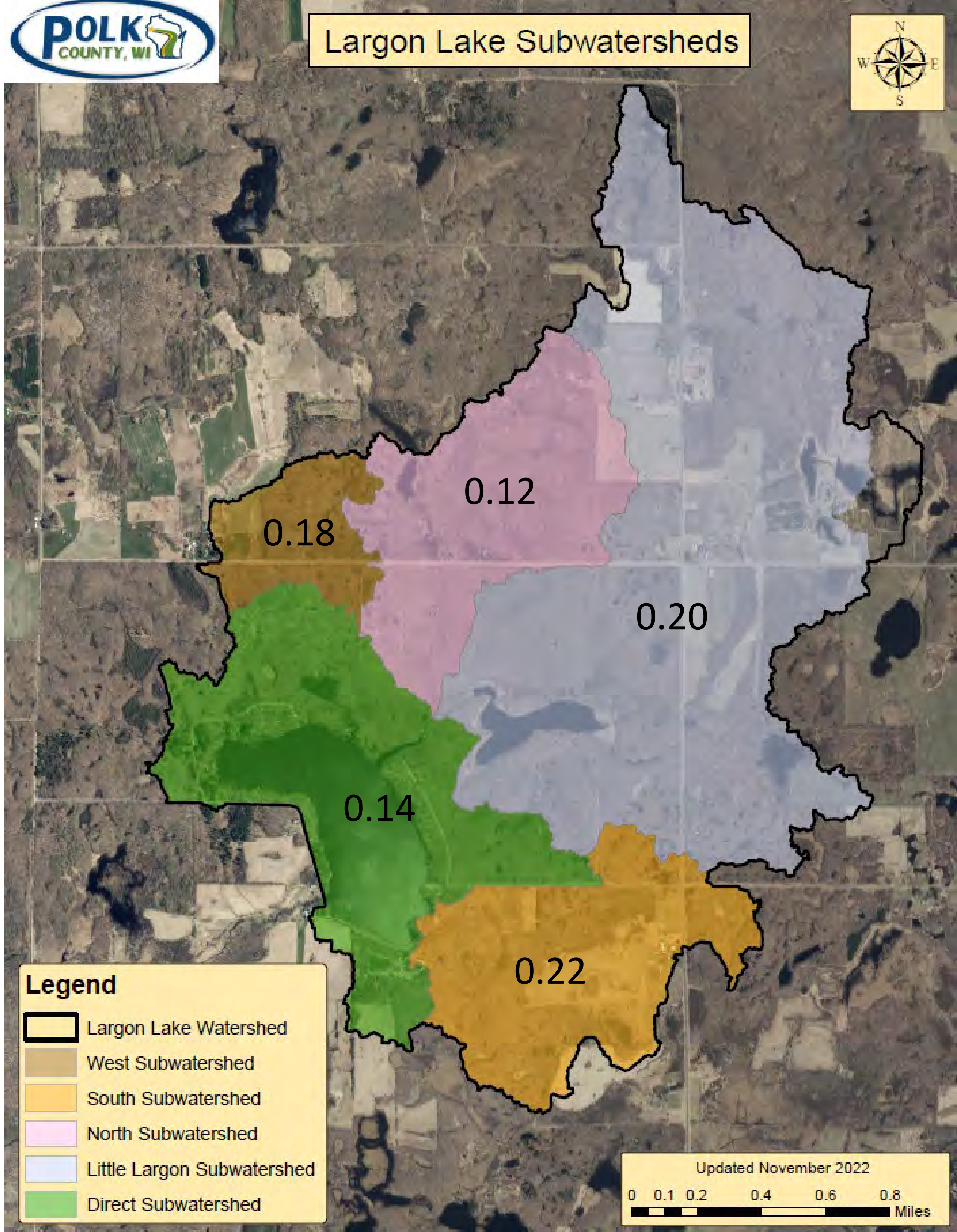
POLK COUNTY, WI
Largon Lake Flow Paths
N
W
E
S
Legend
Open Water
Largon Lake Watershed
Flow Path
Major Flow Path
Sub Waterhsed
West Subwatershed
South Subwatershed
North Subwatershed
Little Largon Subwatershed
Direct Subwatershed
Updated November 2022
0 0.15 0.3 0.6 0.9 1.2
Miles



POLK COUNTY, WI
Largon Lake Subwatersheds
N
W
E
S
Legend
Largon Lake Watershed
West Subwatershed
South Subwatershed
North Subwatershed
Little Largon Subwatershed
Direct Subwatershed
Updated November 2022
0 0.1 0.2 0.4 0.6 0.8
Miles



Phosphorus Load (lb/acre/yr) by Subwatershed
Subwatershed
North
Direct
West
Little Largon
South
0.12
0.14
0.18
0.20
0.22
0.00
0.05
0.10
0.15
0.20
0.25



POLK COUNTY, WI
Largon Lake Subwatersheds
N
S
W
E
0.18
0.12
0.20
0.14
0.22
Legend
Largon Lake Watershed
West Subwatershed
South Subwatershed
North Subwatershed
Little Largon Subwatershed
Direct Subwatershed
Updated November 2022
0 0.1 0.2 0.4 0.6 0.8
Miles

Septic Inventory

Ascent Permit Management Suite System for tracking sanitary permits

45 systems were in compliance (83%)

9 systems were out of compliance (17%)

- 4 have no records
- Remaining last serviced in 2019, 2018, 2016, 2002, and 1989

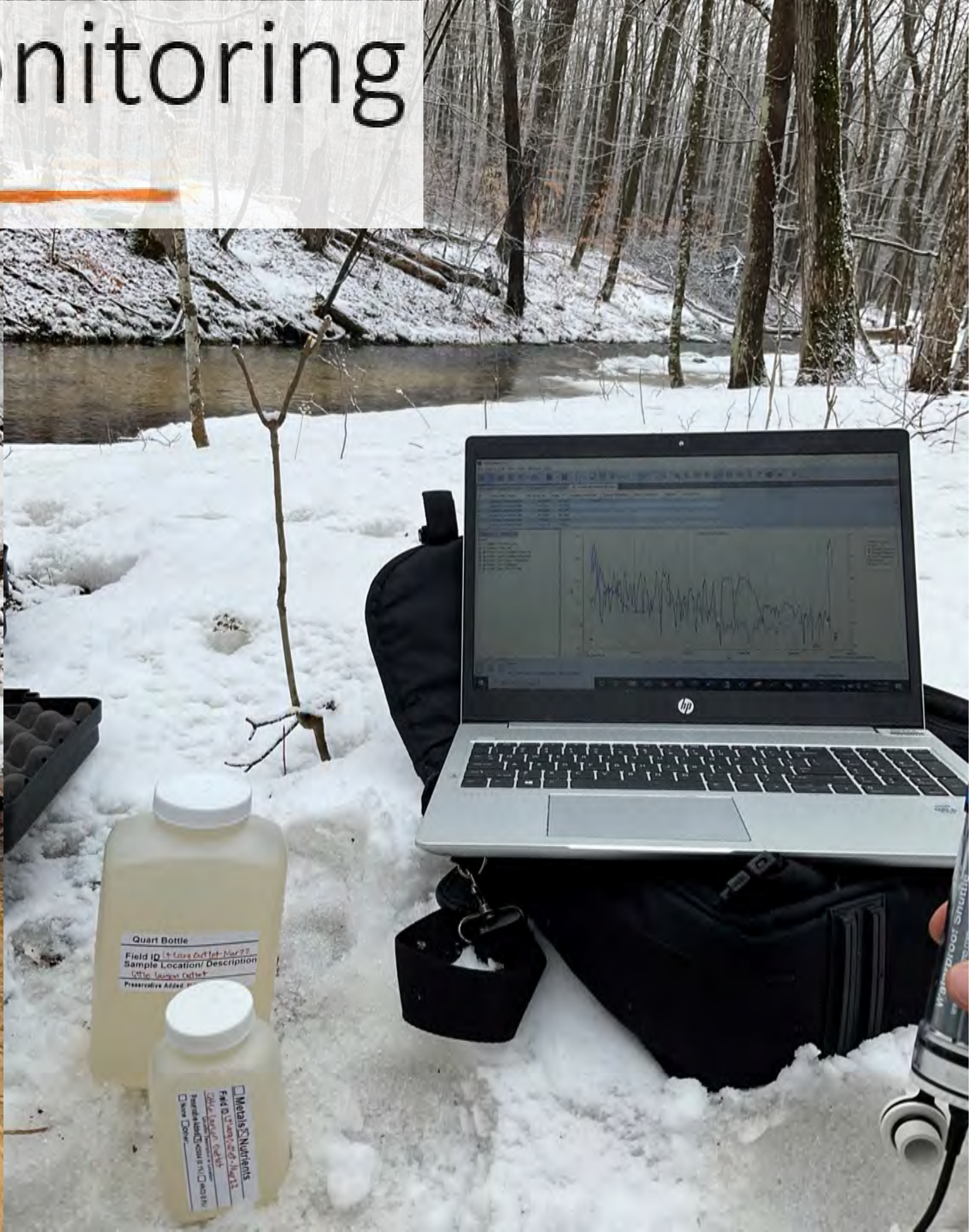
Gully 1 has a soil loss of 5.89 tons per year (4.3 cubic yards of soil)

Gully 2 has a soil loss of 12.60 tons per year (9.3 cubic yards of soil)

Largon Lake Gullys
N
W
E
S
Legend
Gully 1
Gully 2
0 0.0375 0.075 0.15 0.225 0.3
Miles

5.89 tons/year (4.3 yd^3)
12.60 tons/year (9.3 yd^3)
Typical dump truck can hold 10-15 yd^3

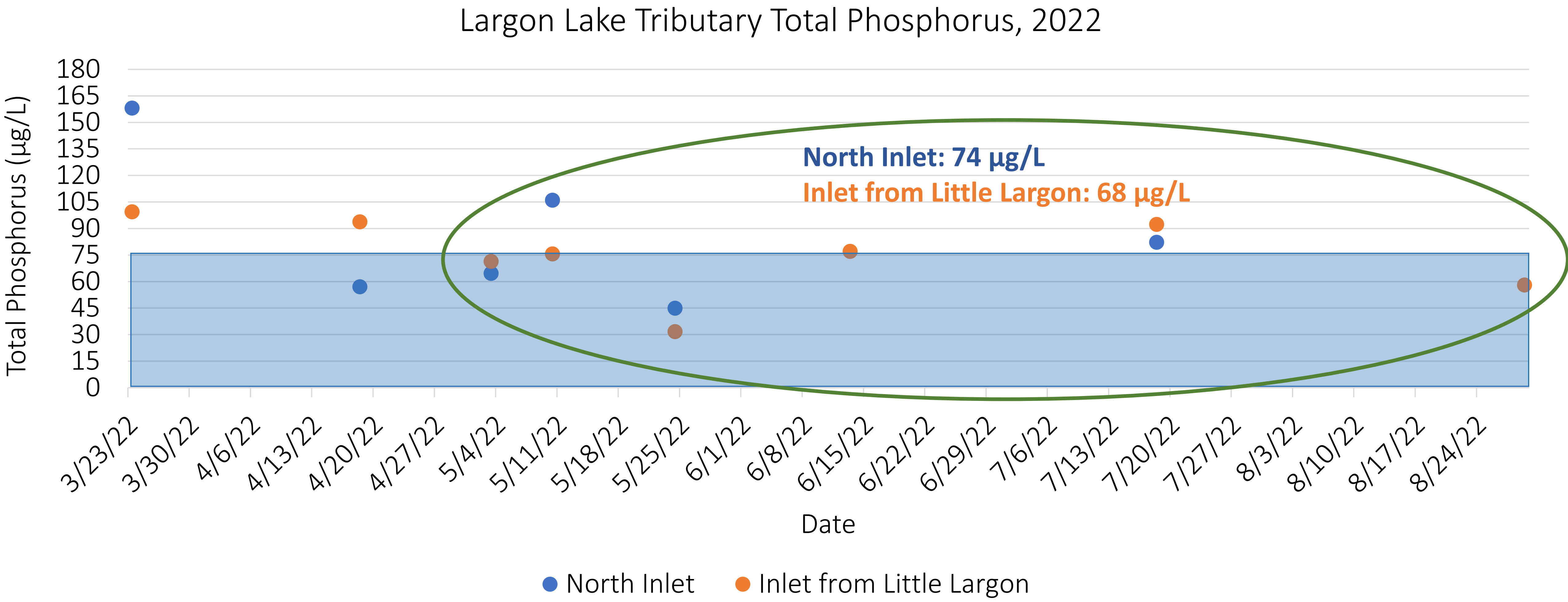
Tributary Monitoring

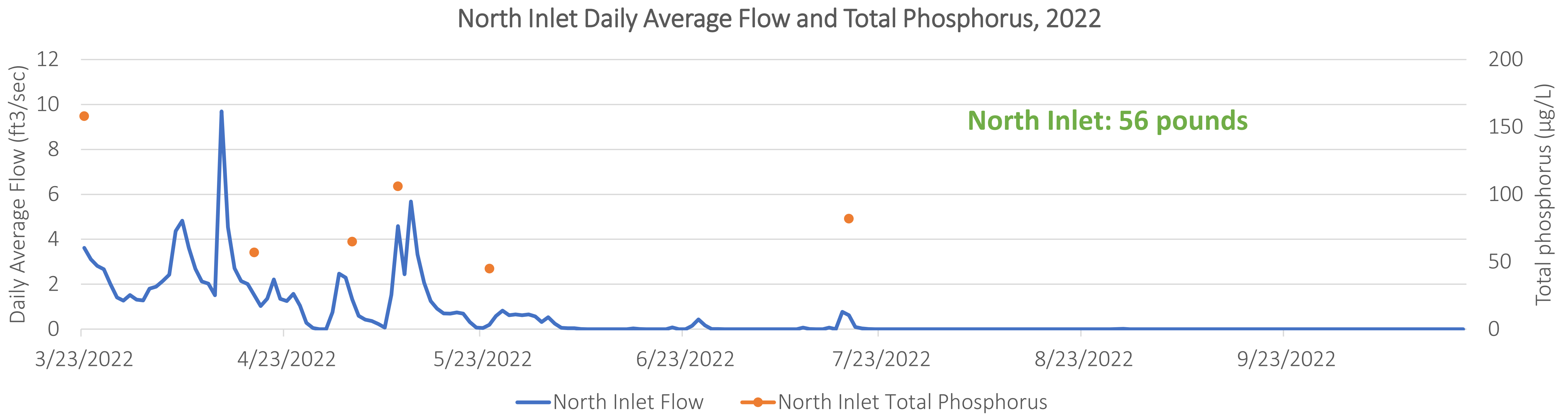


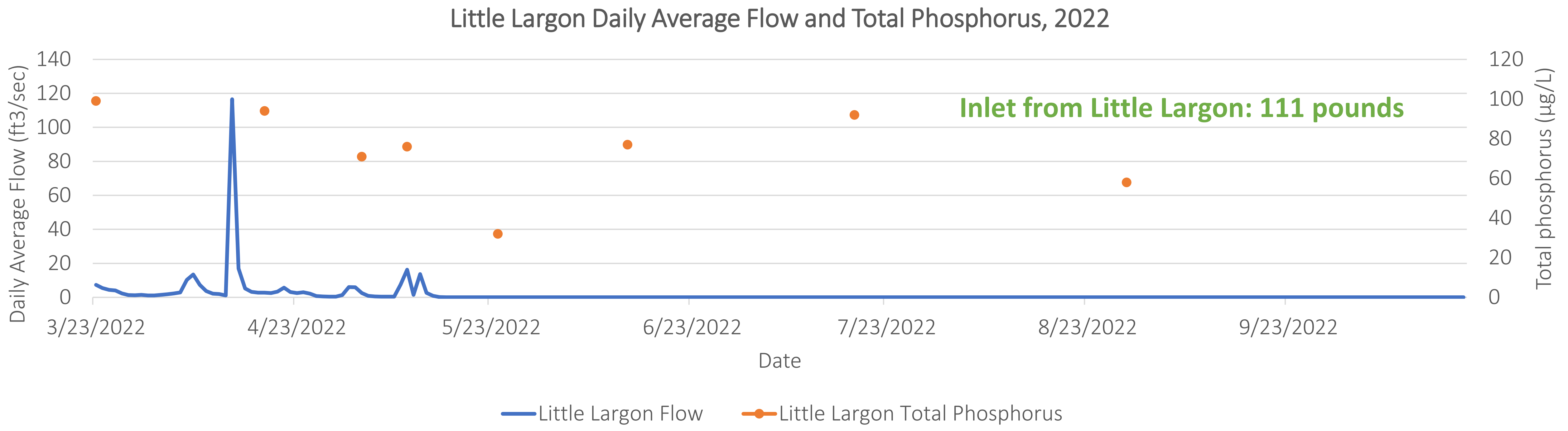
Largon Lake Tributary Sample Locations
POLK COUNTY, WI
N
W
E
S
Legend
Sample Locations
0 0.03750.075 0.15 0.225 0.3
Miles

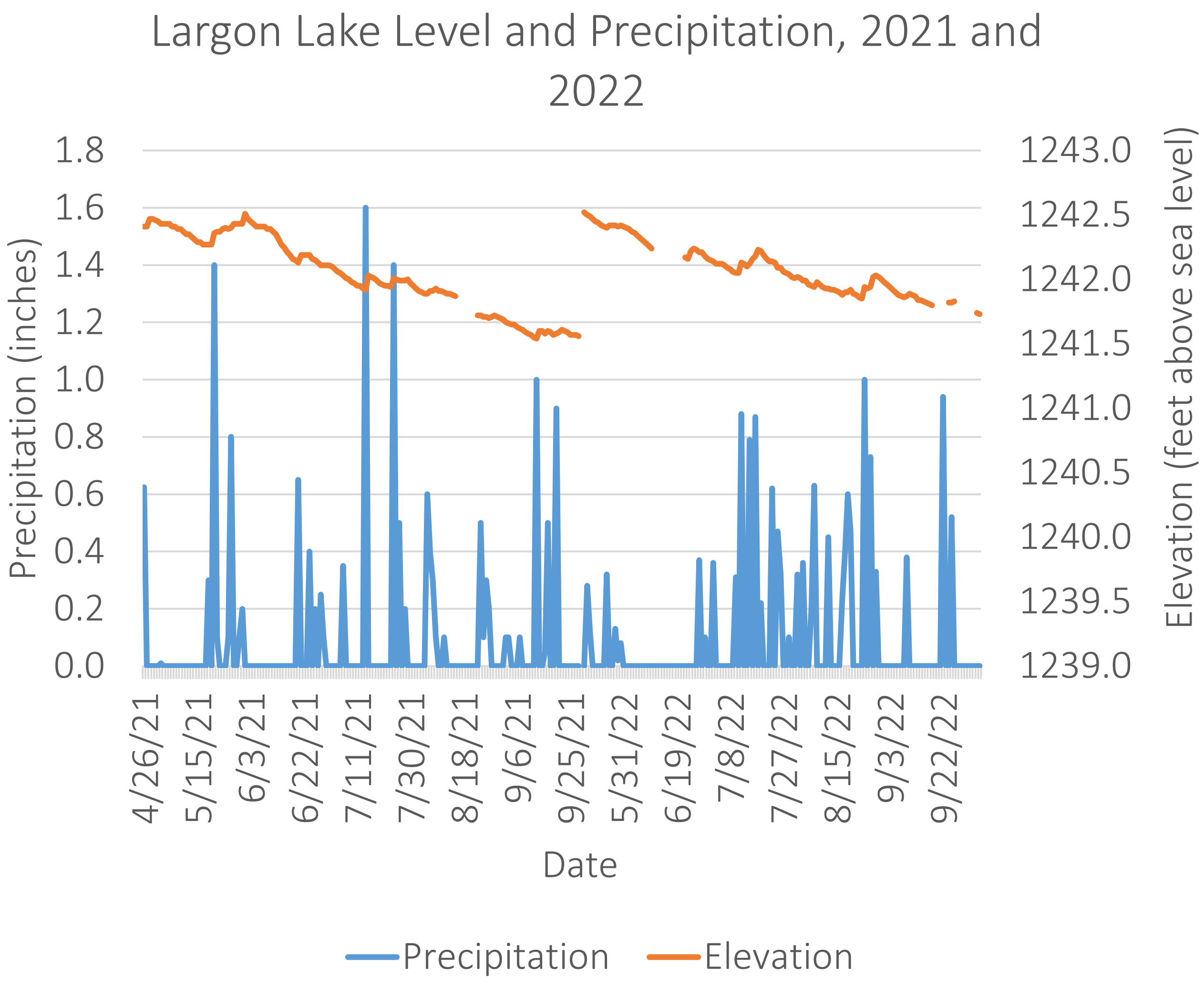
North Inlet
Inlet from Little Largon

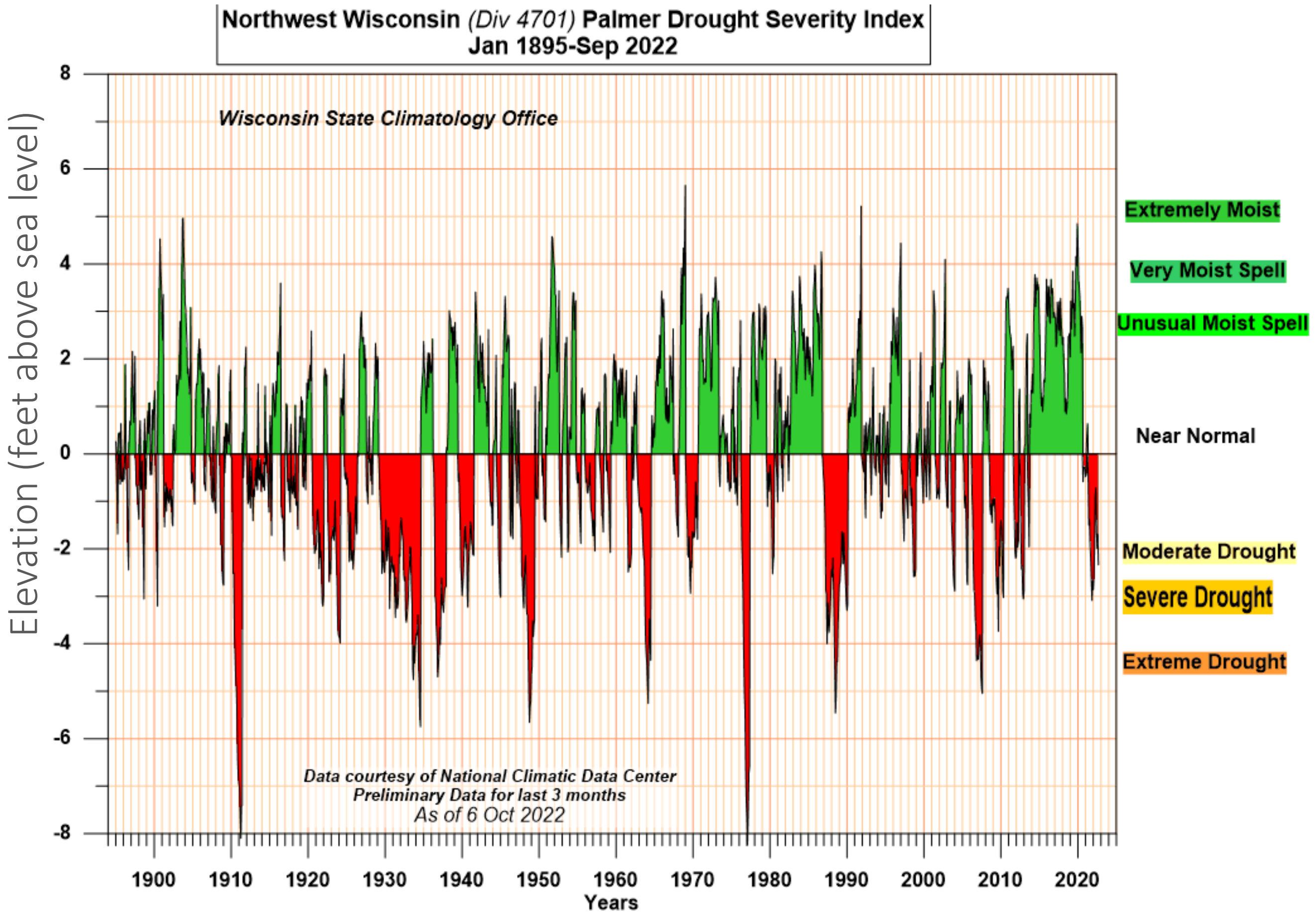
State standard for streams:75 µg/L




North Inlet Daily Average Flow and Total Phosphorus, 2022
Daily Average Flow (ft3/sec)
Total phosphorus (µg/L)
North Inlet: 56 pounds
12
10
8
6
4
2
0
200
150
100
50
0
3/23/2022
4/23/2022
5/23/2022
6/23/2022
7/23/2022
8/23/2022
9/23/2022
North Inlet Flow
North Inlet Total Phosphorus


Little Largon Daily Average Flow and Total Phosphorus, 2022
Daily Average Flow (ft3/sec)
Total phosphorus (µg/L)
Inlet from Little Largon: 111 pounds
140
120
100
80
60
40
20
0
120
100
80
60
40
20
0
3/23/2022
4/23/2022
5/23/2022
6/23/2022
7/23/2022
8/23/2022
9/23/2022
Date
Little Largon Flow
Little Largon Total Phosphorus


Largon Lake Level and Precipitation, 2021 and 2022
Precipitation (inches)
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
Elevation (feet above sea level)
1243.0
1242.5
1242.0
1241.5
1241.0
1240.5
1240.0
1239.5
1239.0
4/26/21
5/15/21
6/3/21
6/22/21
7/11/21
7/30/21
8/18/21
9/6/21
9/25/21
5/31/22
6/19/22
7/8/22
7/27/22
8/15/22
9/3/22
9/22/22
Date
Precipitation
Elevation


Northwest Wisconsin (Div 4701) Palmer Drought Severity Index
Jan 1895-Sep 2022
Wisconsin State Climatology Office
Extremely Moist
Very Moist Spell
Unusual Moist Spell
Near Normal
Moderate Drought
Severe Drought
Extreme Drought
Data courtesy of National Climatic Data Center
Preliminary Data for last 3 months
As of 6 Oct 2022
8
6
4
2
0
-2
-4
-6
-8
1900
1910
1920
1930
1940
1950
1960
1970
1980
1990
2000
2010
2020
Years

How to achieve in-lake phosphorus standard of 40 ug/L…

Next meeting will focus on options to achieve this goal

Questions?

What do you value about Largon Lake?

- Natural beauty, scenic view
- Wildlife attracted to Largon Lake
- Recreational opportunities throughout the different seasons
    - Swimming
        - Do not get swimmers itch
    - Boating
- Fishing opportunities
- Lake health/water quality
    - Lake quality is important and always a top priority, if the lake is not healthy, it is not a fun place to be
    - A healthy lake benefits fish and aquatic life
    - Submerged trees along shoreline are beneficial for the lake
    - Plant life is good for the health of the lake
- Peace and tranquility
    - Quiet
    - Not a busy lake
    - No commercial properties
    - Appear to have more issues with larger high traffic lakes
- Friendly residents and the lake community make for an enjoyable experience on the lake

What concerns/issues do you have for Largon Lake?

- Erosion on the shoreline of Largon Lake
- Boating regulations not being followed/understood
    - General lake recreation regulations
    - Slow no wake regulations
    - Recreating near docks
- Driving through plant beds creating lanes and reducing plant abundance
- Water quality/clarity of Largon Lake
    - Visually unappealing
    - Only swimming in beginning of season due to algae
    - Not enjoyable conditions for swimming, concern for residents and visitors
    - Residents considering swimming may go to a different lake
    - Maintaining or improving water quality with the expectation that the lake won't be crystal clear
- Making sure actions on and around the lake are in the lakes best interest
- Fishing
    - Catching large numbers of bullheads
    - Improving fish habitat
- Failing septic systems on properties surrounding Largon Lake

- Increasing educational opportunities for lake residents promoting good habits
  - Impacts on clearing vegetation/tree removal
    - Regulations
    - Mitigation
  - Practices for maintaining a healthy shoreline
    - Vegetation establishment has proven to be difficult
  - Corrie has copies of the Shoreland Property Owner Handbook available
    - Handbook also available online at: https://cms5.revize.com/revize/polk/Document%20_Center/Divisions%20and%20Departments/Environmental%20Services%20Division/Land%20Information/Division%20of%20Zoning/Zoning%20FAQs/HandbookShorelandPropertyOwners.pdf

Largon Lake Management Plan Development
Committee Meeting 2

Wednesday, February 15th, 2023
5:30 – 7:30 PM

5:15 **Optional* opportunity to sign into Teams and check microphone, sound, video*

5:30 Introductions (all)

5:35 Presentation (Polk County Land and Water Resources Department)
Review management options (in-lake, shoreland, watershed)

6:30 Brainstorming session (Management Plan Committee)
Additional values/concerns for Largon Lake
Begin to develop goals for Largon Lake

7:25 Schedule future meetings and brainstorm future meeting topics (all)

7:30 Adjourn

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dane.christenson@polkcountywi.gov

Colton Sorensen
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colton.sorensen@polkcountywi.gov

Microsoft Teams meeting

Join on your computer, mobile app or room device
Click here to join the meeting
Meeting ID: 258 500 488 903
Passcode: gAtsCp
Download Teams | Join on the web

Or call in (audio only)
+1 715-900-2020,,215526012# United States, Eau Claire
Phone Conference ID: 215 526 012#
Find a local number | Reset PIN
Learn More | Meeting options

Largon Lake Planning Meeting

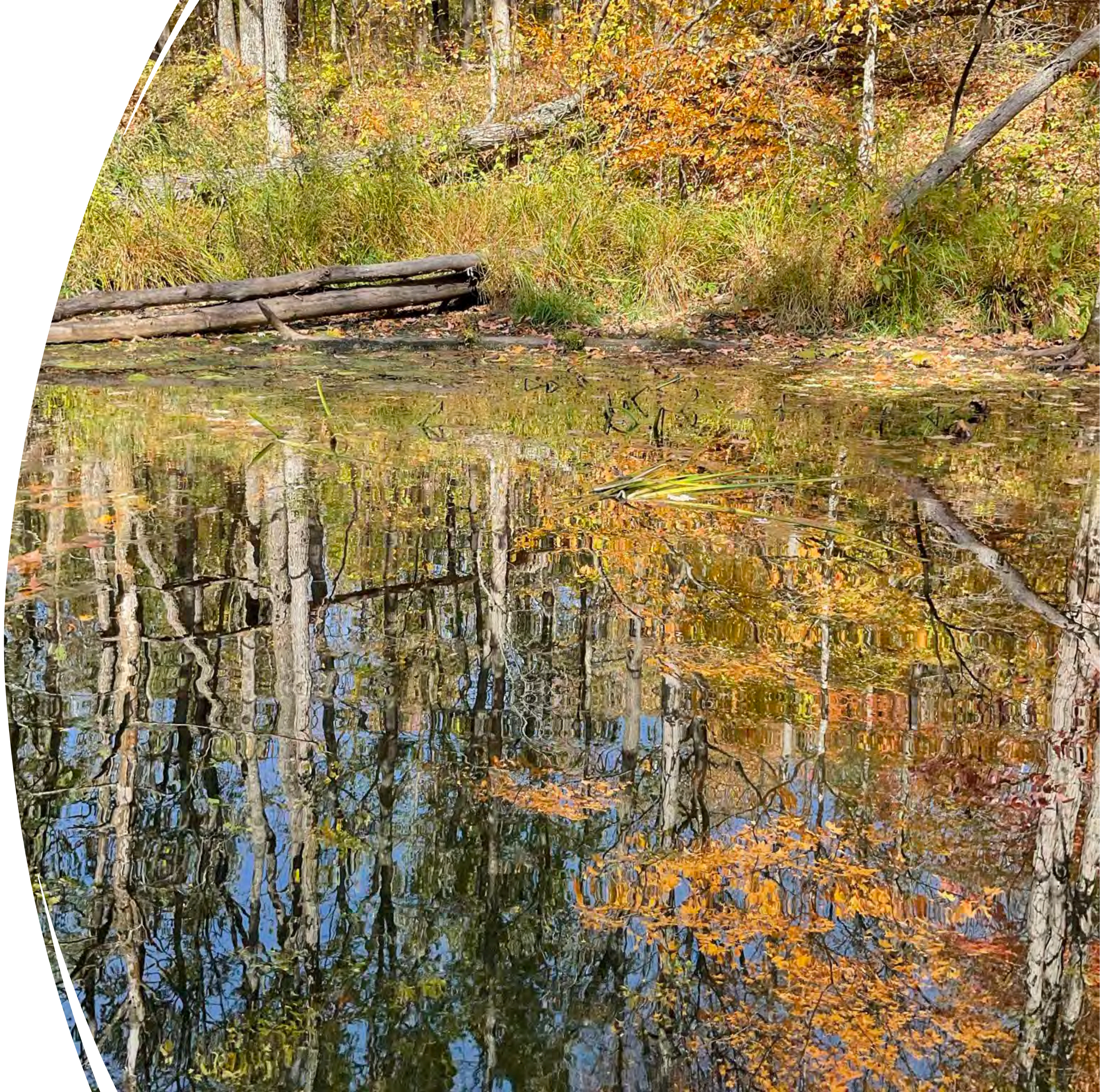
Meeting 2: Wednesday, February 15th, 2023

Katelin Anderson
Colton Sorensen
Dane Christenson

Polk County Land and Water Resources Department

Purpose of the Meeting

- Options to achieve in-lake phosphorus standard of 40 ug/L (Impaired Waters)
    - In-lake
    - Shoreland
    - Watershed
- During the discussion we will be prioritizing these options to assist with goal development for the lake (lake management plan)



Achieving 40 ug/L

- WiLMS modeling estimates that the phosphorus load to the lake would need to be reduced by:
  - 194 pounds per year
  - 37% reduction

In Lake Best Management Practices

Plants and Habitat

- Leave aquatic plants unless removal is necessary for access or recreation
  - Plants use nutrients, making them unavailable for algae
  - Protect shoreline from erosion
  - Prevent infestation of invasive species
- Leave fallen trees, logs, or branches in place
  - Fish habitat

Waves and Wakes Best Practices

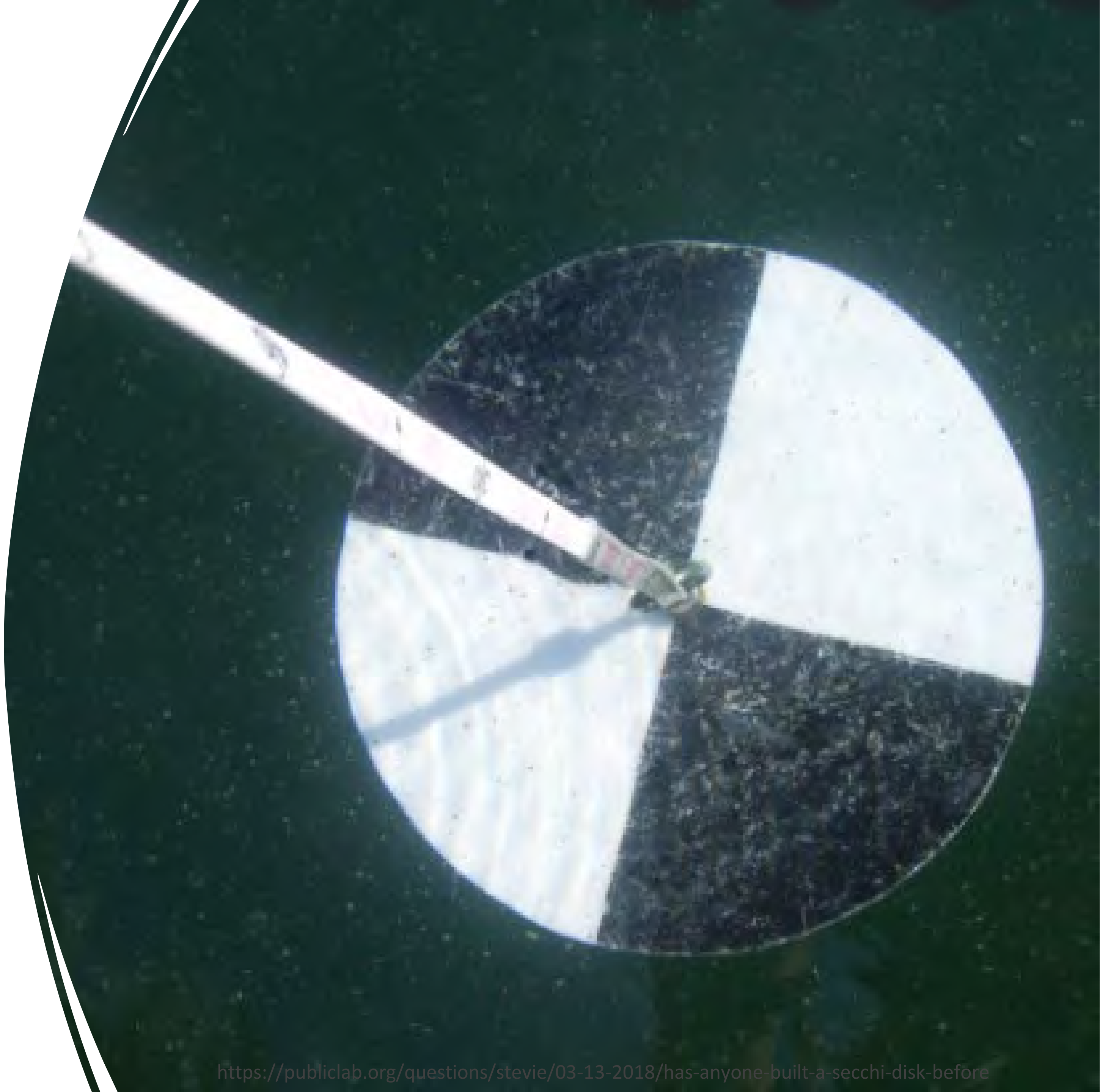
- Slow no wake is slow enough to not put out any wake behind the boat (idling speed)
- Slow no wake is required within:
  - 100 feet of the shoreline for boats
  - 200 feet of the shoreline for personal watercraft
- Slow no wake in areas less than 8 feet deep
- Motors disturb lake bottom sediment, releasing nutrients
- Wakes can cause shoreline erosion

Aquatic Invasive Species

- Encourage boaters/anglers to clean boats/trailers to prevent the spread of AIS
  - Decontamination stations
  - Clean Boats, Clean Waters
    - Drain Campaign
    - Landing Blitz
- Learn to identify AIS and watch for them
  - Early detection allows for better chance of eradication
  - People who are on the lake have the best chance of finding new AIS

Data Collection and Monitoring

- Continue existing water quality monitoring program (1998-2014, 2016, 2021)
  - Analyze long term trends
  - See improvements from BMP implementation
  - Managing water quality is a long-term goal, good data set is helpful



https://publiclab.org/questions/stevie/03-13-2018/has-anyone-built-a-secchi-disk-before

Alum Treatment

- Alum can be used to address internal loading (phosphorus release from the sediment)
- Need to address external load first
- Need further studies to determine feasibility, likelihood of success, and costs
- Expensive
- Could be controversial
- Would address estimated 11-20% of the Largon Lake phosphorus load

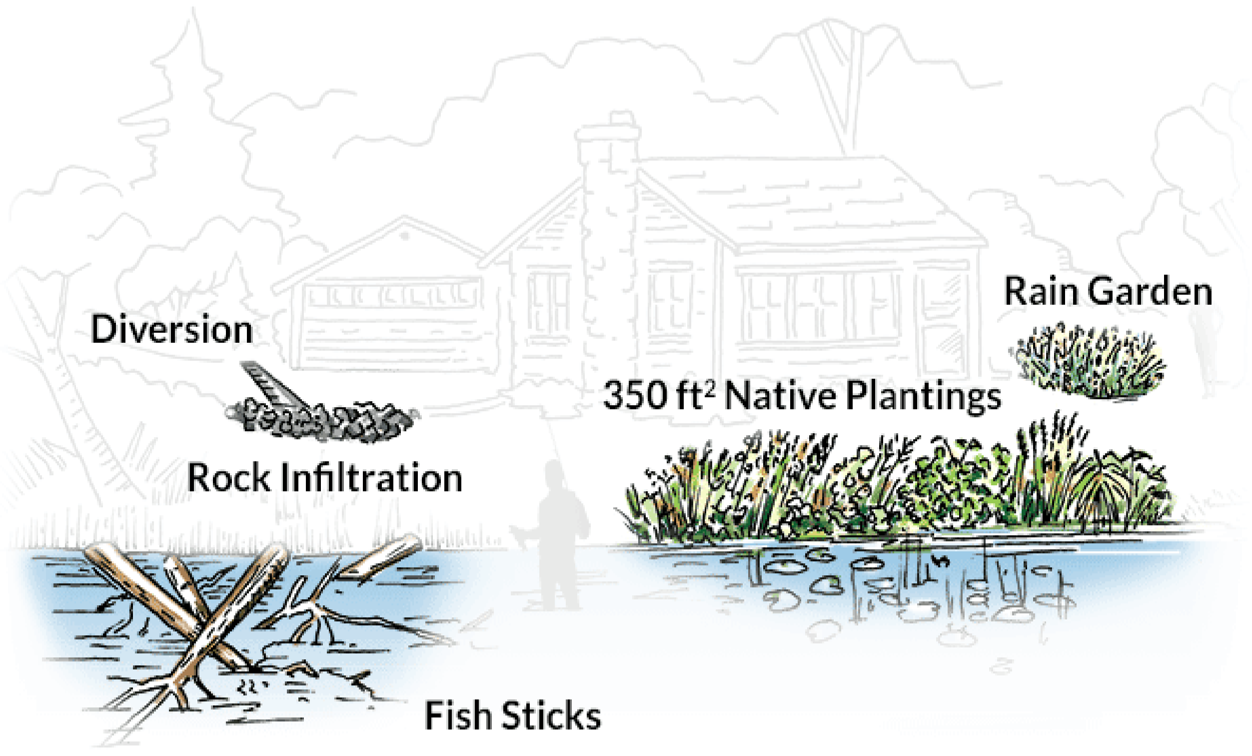
Shoreland Best Management Practices

Eliminate Lawn Fertilizers

- The phosphorus in fertilizers that make your lawn and garden green also make lakes and rivers green.
- One pound of phosphorous can produce 500 pounds of algae

Healthy Lakes Practices

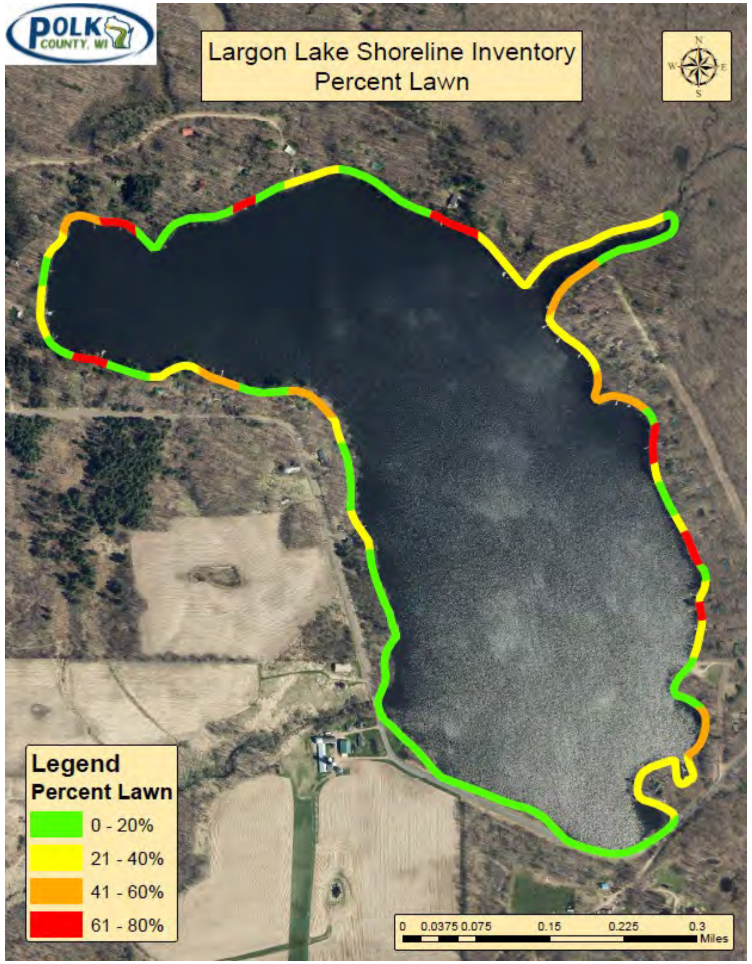
- 5 grant eligible practices
- Cost share (75%) up to $1,000 per practice
- Projects are designed to control runoff from shoreline properties
- Shovel ready projects
- Projects can be completed by landowner or contractor




Fish sticks
350 ft2 native plantings
Rain garden
Diversion
Photos from https://healthylakeswi.com
Rock infiltration

Healthy Lakes Practices

- Areas in red on the map would be a starting point, but every property could benefit from practices
- Lawn has shallow roots
- Lawn has increased overland flow
- Resources for implementing projects exist even if a grant isn't applied for



Septic Systems

- Locate your drain field as far from the lakeshore as possible
- Pump your septic tank at least once every three years
  - Leaking septic systems release nutrients into the soil eventually making its way to the lake
- Grant funding could cost-share system replacement

<u>Analyzed data for 54 septic systems</u>

- 9 systems (17%) are out of compliance
  - 5 systems have not been serviced within 3 years, 4 have no records

More Practices

- Meandering, not direct, access to the lake
  - Slow overland flow to lake
- Maintain buffers around wetlands
- Land acquisition
- Provide education to new property owners
  - Create a new property owner packet (Property Owner Handbook)

Watershed Residential Best Management Practices

Stormwater Best Management Practices

- Work with the Town to replace culverts on Largon Lake Court
  - Rock riprap channel protection
  - Drop structure
  - Water and sediment control basin
- Diversions or rock infiltration
- Divert roof runoff to vegetated areas or rain barrels

Watershed Agricultural Best Management Practices

Watershed Characteristics

- Agricultural Inventory Results
  - 12% (306 acres) of watershed is agricultural land use
    - 45 fields (29 entirely in WS, 16 partially in WS)
    - 129 acres row crop (corn, soybean)
    - 87 acres forage (grass/alfalfa)
    - 58 acres unknown
    - 31 acres pasture
    - 1 acre of feedlot (heavy use areas preventing vegetative cover)
  - Tillage practices
    - 105 acres of conventional tillage
    - 6 acres no-till
  - Livestock observed in watershed
    - 36 beef cattle (31 adult and 5 young stock)
  - No cover crops observed in watershed

Crop Residue Management - Tillage

Conventional Tillage

Little residue

High probability of erosion

Conservation Tillage

>30% residue

Reduced erosion

No Tillage

High residue

Low probability of erosion

Cover Crops


- "Crops" grown outside of the main production crop specifically for their benefits to soil or main crop
- Vegetation and roots protect soil when main crop is absent
- Reduce erosion, increase infiltration, capture unused nutrients, build soil structure, promote soil bacteria and fungi growth, break compaction layers, suppress weeds, and other benefits
- Reductions in runoff and nutrient loss from agricultural fields
- Common cover crops: winter (cereal) rye, winter wheat, clovers, and radish

Surface Runoff Affected by Management and BMPs

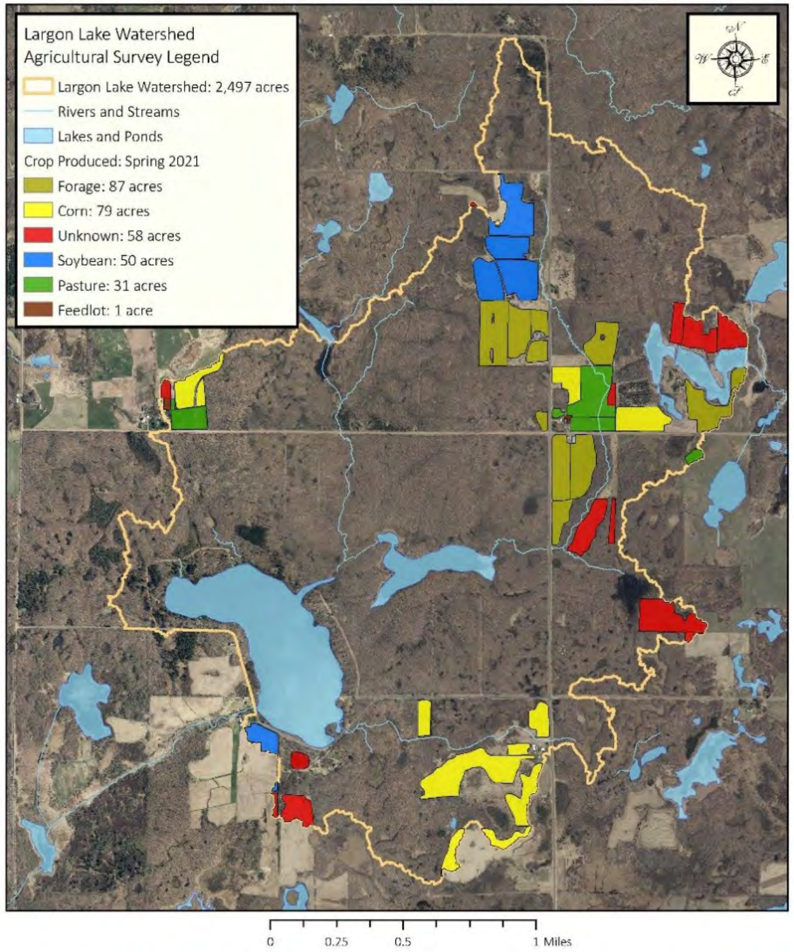
High Intensity Tillage
No Cover Crops

No-Till
With Cover Crops

Agricultural Land Use Inventory & STEPL Modeling

- Inventory current agricultural practices
- Identify potential conservation practices
- Single year representation
- Predict current pollutant loading
- Calculate best management practice load reduction numbers

Largon Lake Watershed: 2021 Crop Inventory



Spreadsheet Tool For Estimating Pollutant Loads (STEPL)

- Spreadsheet based tool that calculates:
  - Nutrient and sediment loads from different land uses
  - Load reductions that would result from the implementation of various best management practices (BMPs)
- Customizable inputs based on watershed characteristics
  - Land use – urban, cropland, pasture, forest, feedlots, user defined
  - Local rainfall data
  - Animal type and numbers
  - Septic systems
  - Field and soil characteristics
  - Universal Soil Loss Equation
  - Runoff curve numbers
- Nutrient load and reductions for key pollutants
  - Nitrogen, phosphorous, and sediment
- Incorporated agricultural survey data
  - Tillage practices, crop type, livestock type & numbers

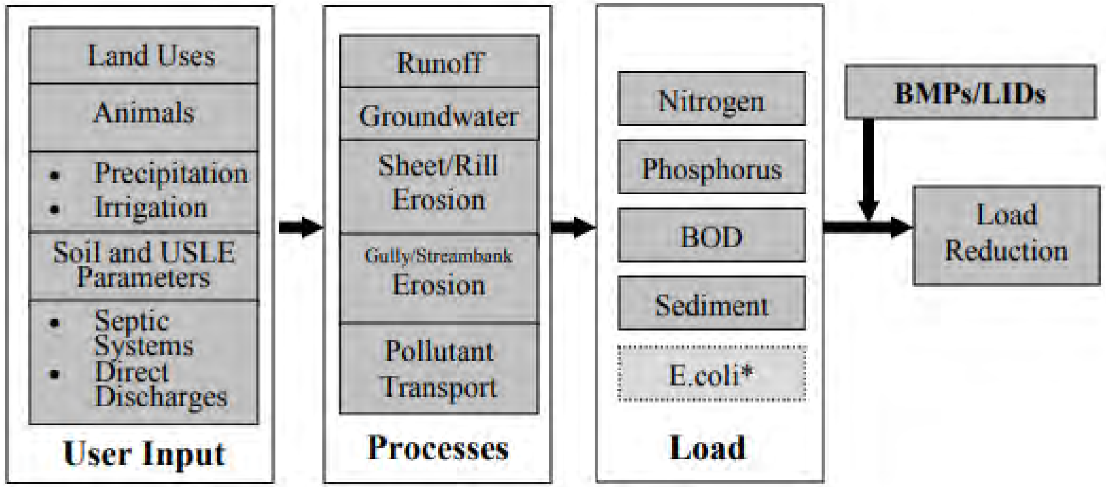


Figure 2. Spreadsheet structure (*place holder for next release).

STEPL Results

- Baseline pollutant loading with current use of no-till
  - 5,605 lbs./year nitrogen (<1% reduction from no-till)
  - 2,410 lbs./year phosphorous (1.2% reduction from no-till)
  - 630 tons/year sediment (1.5% reduction in from no-till)
- Calculated per acre pollutant load reductions for ag conservation BMPs
  - Cropland practices (examples: conservation tillage, cover crop)
  - Combined cropland practices (2 or more practices treating the same area)
  - Pastureland practices (examples: critical area planting, livestock exclusion fencing)
  - Feedlot practices (examples: diversions, waste storage facilities)
- Calculate annual load reductions
  - 100 acres of **new** conservation tillage (no-till)

  100 acres x 4.99 lbs of phosphorous/acre = 499 lbs. P reduced
- Calculate percent reduction and compare to WiLMS goal

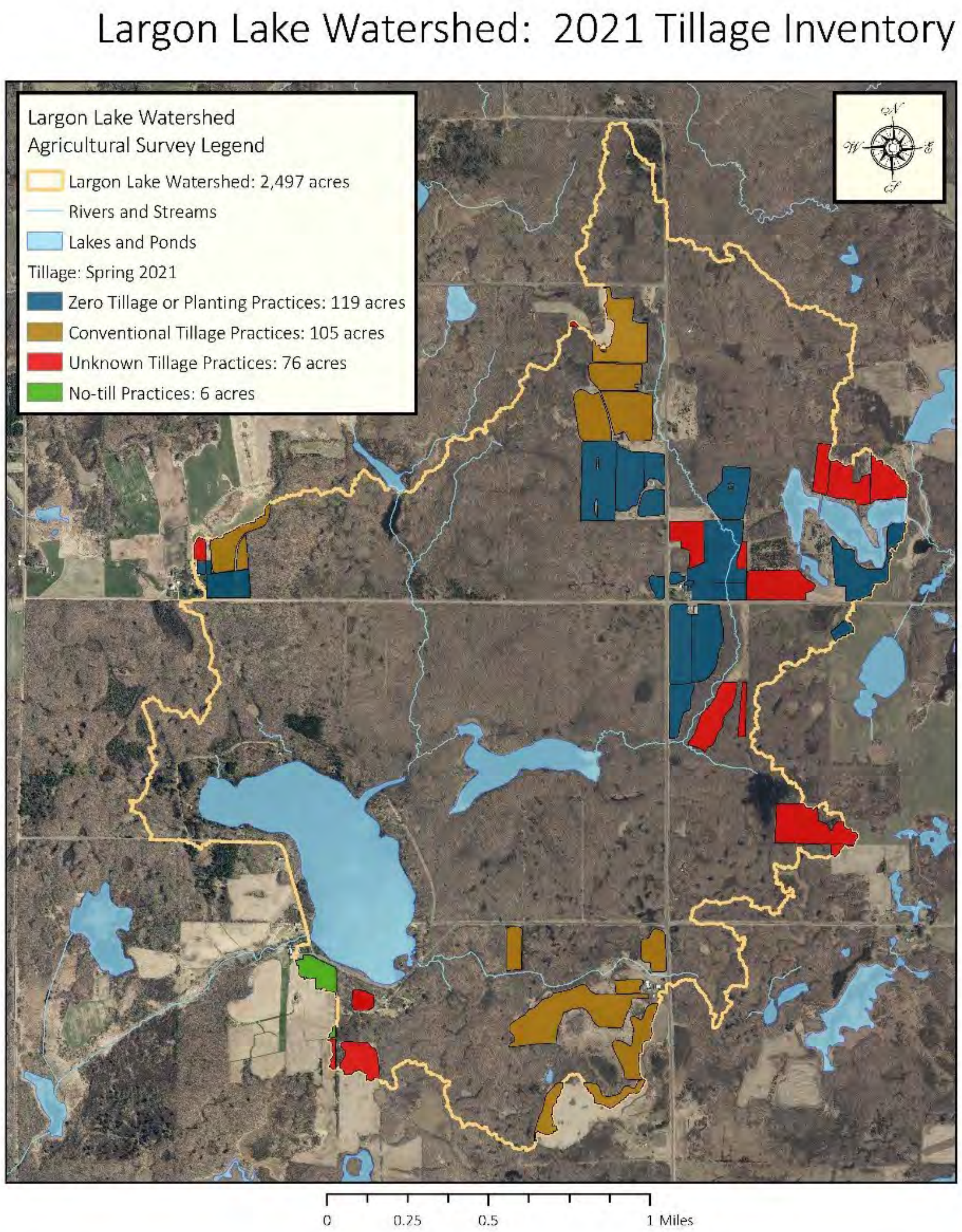
  499 (lbs P/acre) ÷ 2,410 (lbs P/year) = 21% phosphorous reduction

Total Pollutant Load by Land Use (with current use of no-till as documented by agricultural inventory)

Sources	Land Use Area (acres)	N Load (lbs/year)	P Load (lbs/year)	Sediment Load (tons/year)
Urban	99	683	112	16
Cropland	187	2,211	1,201	389
Pastureland	31	244	54	15
Forest	1,657	588	354	57
Feedlots	1	1,346	269	0
User Defined	171	488	402	153
Septic	73 (systems)	45	18	0
Total Load		**5,605**	**2,410**	**630**

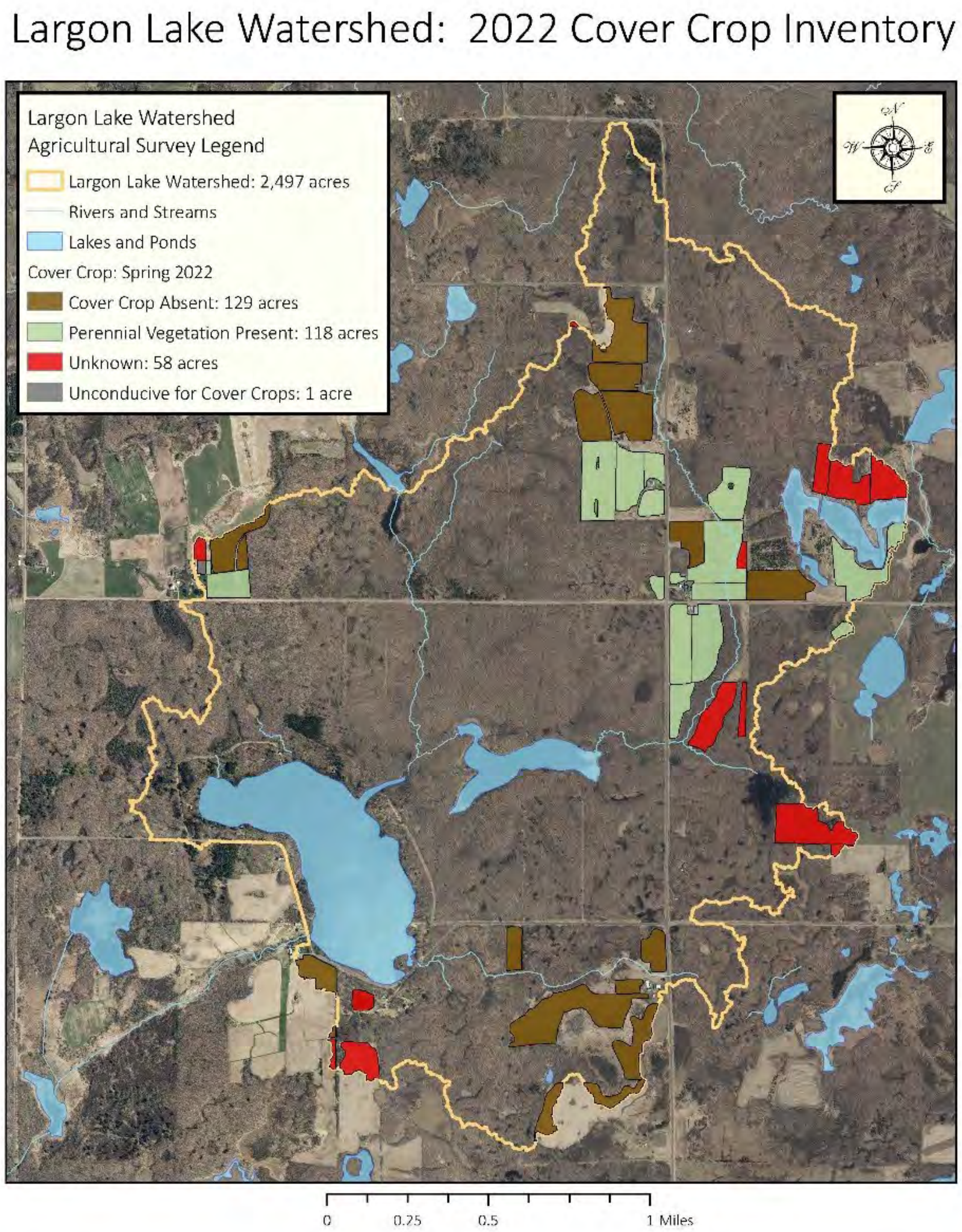
	Pollutant Reductions		
Cropland BMPs	**Nitrogen (lbs/acre)**	**Phosphorus (lbs/acre)**	**Sediment (tons/acre)**
Buffer - grass (35ft wide)	5.4	3.42	1.14
Conservation tillage >=60% residue cover (no-till)	6.56	4.99	1.64
Contour farming	3.78	2.3	0.73
Cover crop 2 (traditional, normal planting time)	1.7	0.63	0.21
Cover crop 3 (traditional, early planting time)	2.43	1.27	0.43
Land retirement (taken out of crop production)	11.16	6.12	2.03
Nutrient management 1 (determined rate)	0.8	0.43	No Data
Nutrient management 2 (determined rate plus additional considerations)	1.29	0.53	No Data

No-till Adoption



- 123 known acres suitable for no-till
- No-till per acre phosphorus reduction = 4.99 lbs.
- Phosphorus loading reduced by 25% (goal is 37%)

Cover Crop Adoption



- 128 known acres suitable for cover crops
- Cover crop per acre phosphorus reduction = 0.63 lbs.
- Phosphorus loading reduced 3% (goal is 37%)

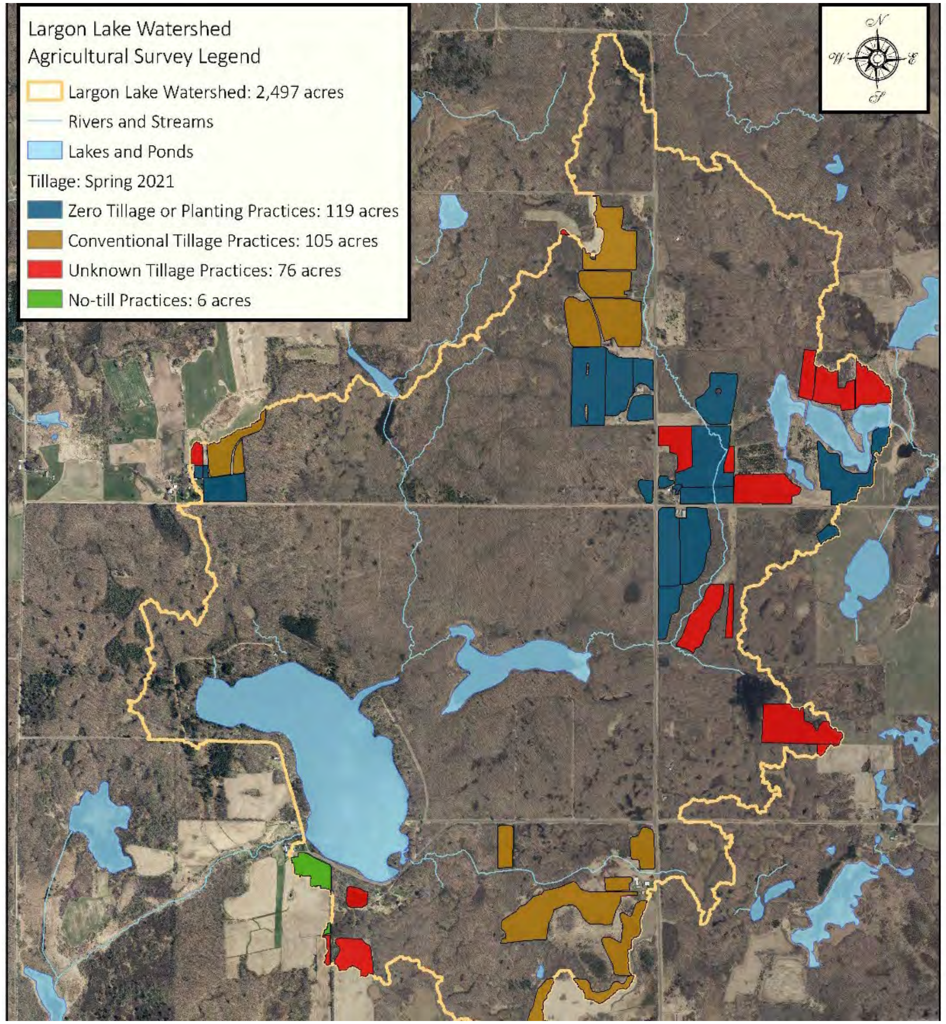
Combining Practices

- If both no-till and cover crops were adopted
- Per acre phosphorus reduction = 5.15 lbs.
- Phosphorus loading reduced 26%

Note: *Reduction % are not cumulative*

Key Takeaways

- Adoption of no-till alone will not reach reduction goal
  - No-till high per acre load reduction
  - 25% phosphorus reduction if all suitable acres converted to no-till
  - Full adoption of no-till may not be feasible
  - Barriers – equipment, manure/nutrient incorporation, crop rotations
- Combining practices boost reductions
  - No-till + cover crops (26% reduction) > no-till
- Implement BMPs in other land uses to help meet reduction goal
  - Pastureland, feedlot, urban
- Utilize reduction values to calculate annual reductions, use in future grant reporting, and gauge progress towards management plan goal



Conservation Practice

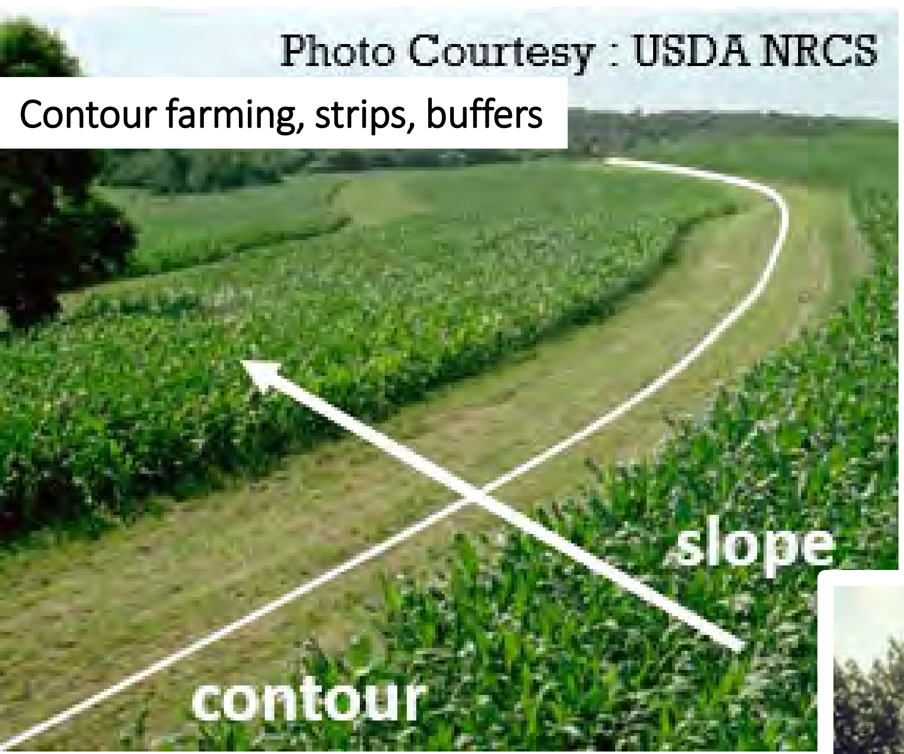
- A facility or practice that is designed to prevent or reduce soil erosion
- Prevent or reduce non-point source water pollution
- Achieve or maintain compliance with soil and water conservation standards

WI Admin. Code ATCP 50.01

https://asearchhistory.weebly.com/grass-waterway.html

Other BMPs

Heavy use area protection
Waste storage facility
Nutrient management
Detention and sedimentation basins
Wetland restorations
Streambank & shoreline stabilization
Grade stabilization structure
Critical area planting



Agriculture Conservation Planning Framework (ACPF)

- ACPF uses high resolution topography data (DEM)
- ACPF prescribes conservation practices on the landscape
- Conservation practices were limited because the watershed is dominated by forest, only 6% of land use is row crop

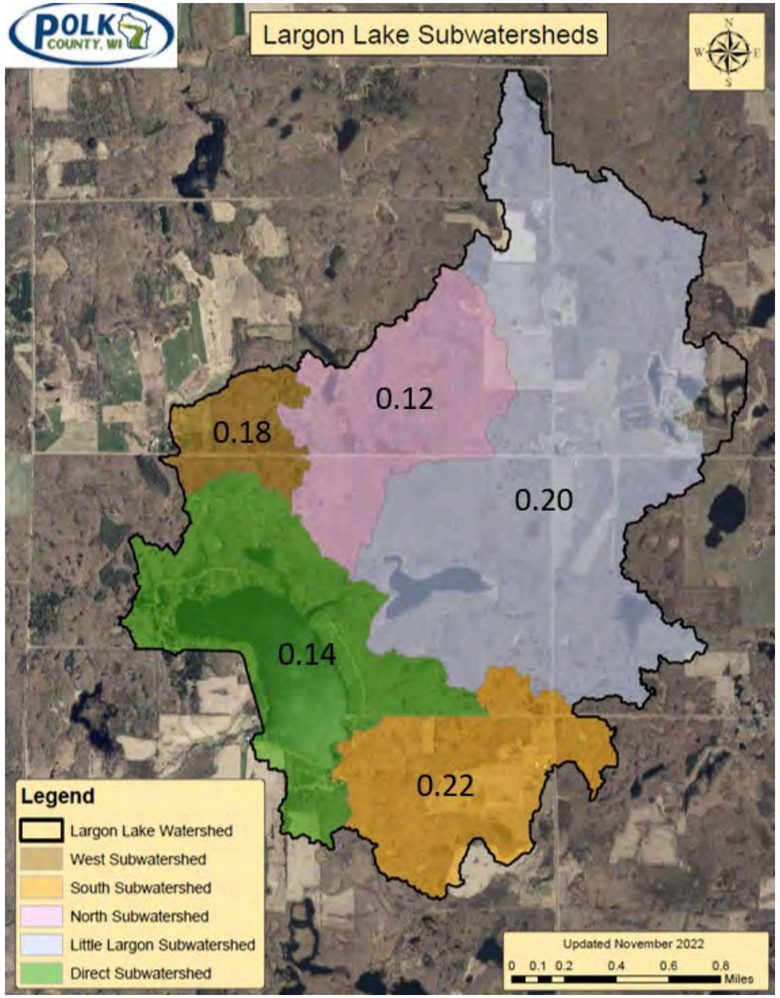
ACPF: Grass Waterways

- Installed within a concentrated flow path in an agricultural field
- A flow path has high probability of concentrated runoff
- Planted with perennial grasses and maintained in permanent vegetation
- ACPF identified 25 potential sites in the watershed

ACPF: Run-off Risk by-Field

- Identify areas of concern by ranking agricultural fields based on their runoff risk
- This tool takes into consideration slope, soil type, distance to stream, and land use classification (row crop or pasture)
- Most of the fields in the watershed were classified as a low risk
- Data could be used to prioritize locations for cover crops and reduced tillage

Focus Areas


POLK COUNTY, WI
Largon Lake Subwatersheds
N
W
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0.12
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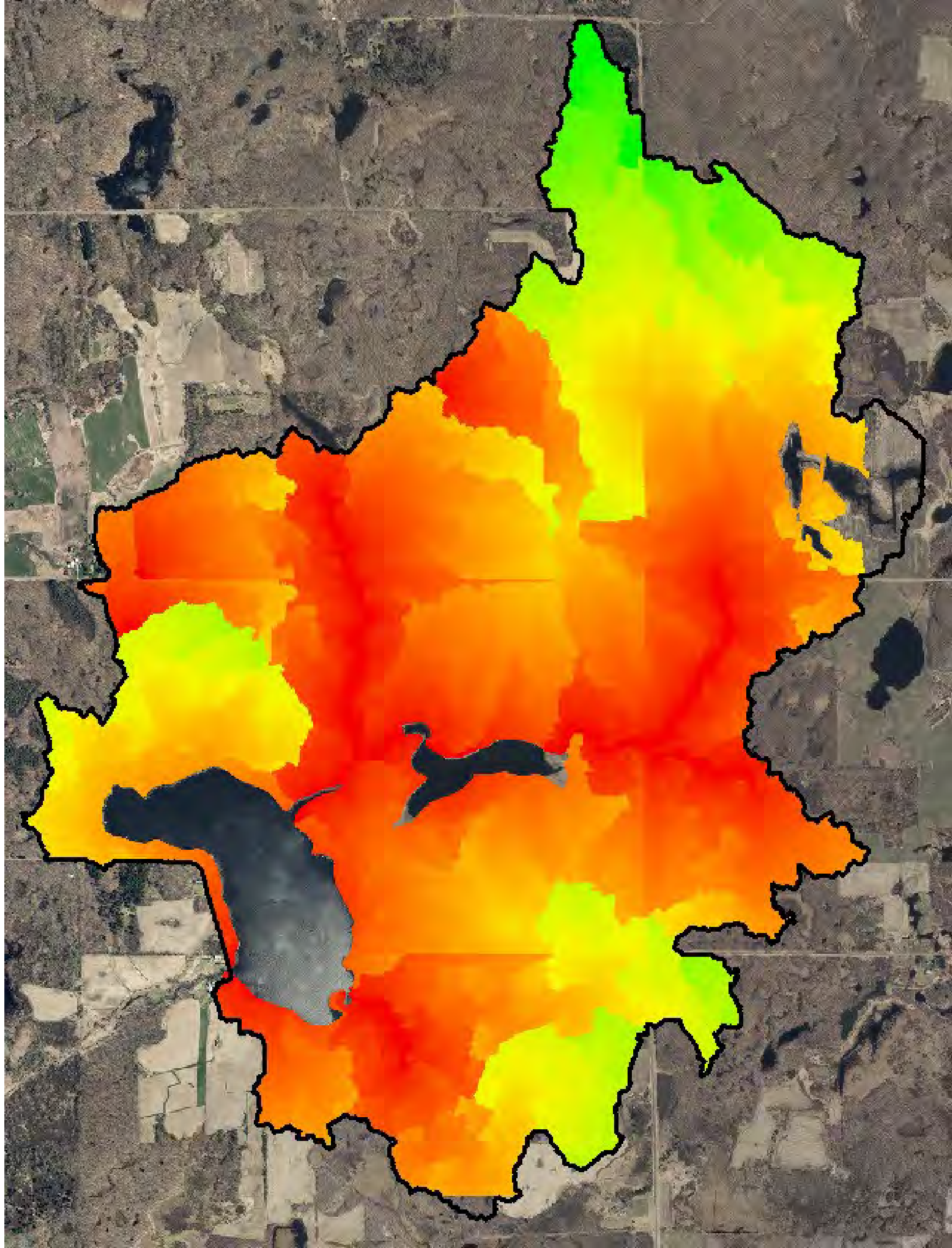
Direct Subwatershed
Updated November 2022
0 0.1 0.2 0.4 0.6 0.8
Miles



Next Steps

- Use existing data to prioritize management options for implementation
  - In-lake
  - Shoreland
  - Watershed residential
  - Watershed agricultural
- Things to consider
  - Implementation requires landowner participation
    - Where do partnerships already exist?
    - What is currently being implemented that could be expanded?
  - Implementation requires resources (time and money at the District and individual level)
    - Grants can help fund implementation (75% of total project)
    - Landowner could pay the 25%, district could pay the 25%, combination
    - District could incentivize practice adoption

Questions?

Largon Lake Management Plan Development
Committee Meeting 3

Wednesday, March 1st, 2023
5:30 – 7:30 PM

5:15 **Optional* opportunity to sign into Teams and check microphone, sound, video*

5:30 Introductions (all)

5:35 Refine Draft Goals for Largon Lake document

7:25 Schedule next meeting

7:30 Adjourn

Katelin Anderson
(715) 485-8637
katelin.anderson@polkcountywi.gov

Colton Sorensen
(715) 485-8639
colton.sorensen@polkcountywi.gov

Microsoft Teams meeting

Join on your computer, mobile app or room device

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Or call in (audio only)
+1 715-900-2020,,323510124# United States, Eau Claire
Phone Conference ID: 323 510 124#
Find a local number | Reset PIN
Learn More | Meeting options

Vision An overall statement for what you want Largon Lake to look like

Largon Lake is a healthy lake that provides habitat for fish and wildlife while providing peace, tranquility, and recreational opportunities to all that use and enjoy the lake.

Goal 1. Improve the overall health of Largon Lake
Goal 2. Increase natural beauty and habitat for wildlife and fish on Largon Lake
Goal 3. Use multiple strategies to ensure the goals of the plan are met

Goal 1. Improve the overall health of Largon Lake

This goal will be met when Largon Lake is removed from the Impaired Waters List: average total phosphorus is less than 40 µg/l and chlorophyll a is less than 20 µg/l for 70% of the days during the sampling season

A. Partner with shoreline residential property owners to install shoreline best management practices (BMPs) including native plantings, rain gardens, diversions, and rock infiltration projects to reduce phosphorus entering Largon Lake
   1. Use the annual meeting and other communications to provide information on shoreline BMPs and to encourage property owners to install BMPs
   2. Identify property owners interested in installing BMPs
   3. Make site visits with a consultant available to property owners interested in installing BMPs
   4. Apply for a Healthy Lakes Grant to fund BMP installation
   5. Install WDNR Healthy Lakes signs at Healthy Lakes project sites
   6. Offer tours of properties where Healthy Lakes practices have been installed to generate interest in BMP installation
   7. Recognize property owners who have installed BMPs

B. Partner with the Town of McKinley to install BMPs at the Largon Lake Boat Landing that will reduce phosphorus entering Largon Lake
   1. Work with the Town of McKinley and/or a consultant to design BMPs to reduce phosphorus entering Largon Lake at the boat landing
   2. Explore grant funding to assist with BMP installation at the boat landing
   3. Use signage and other means to highlight practices implemented at the boat landing to promote shoreline BMP installation

C. Implement practices to slow the flow of water and/or reduce soil loss and erosion associated with the culverts on Largon Lake Court
    1. Partner with the Town of McKinley to determine a plan to replace the culverts on Largon Lake Court and discuss opportunities for rock riprap channel protection, a drop structure, and/or a water and sediment control basin
    2. Partner with the Town of McKinley and/or a consultant to design and implement BMPs to address erosion at the culvert sites on Largon Lake Court
    3. Request property owners along the culvert outflows to divert water away from the outflows using rain gutters/barrels, diversions, or infiltration projects

D. Upgrade non-compliant septic systems near Largon Lake
    A 2022 septic system inventory determined that 17% of the systems near the lake were out of compliance.
    1. Develop and deliver an educational message regarding the relationship between non-compliant septic systems and water quality
    2. Partner with shoreline property owners with non-compliant systems to bring their system back into compliance (pump or replace)
    3. Apply for a lake protection grant to replace non-compliant systems

E. Build relationships with agricultural landowners to increase awareness of grant funding for BMPs that will reduce phosphorus reaching Largon Lake
    1. Partner with the Polk County Land and Water Resources Department (LWRD) to communicate with agricultural landowners in the Largon Lake Watershed through a mailing
    2. Provide agricultural landowners with an action plan that allows them to reach out to LWRD or the District if they are interested in funding for implementing BMPs
    3. Invite agricultural landowners in the watershed to Lake District meetings
    4. Recognize agricultural landowners who have taken steps to reduce phosphorus from reaching Largon Lake

F. Reduce sediment disturbance and shoreline erosion on Largon Lake
    1. Use boat landing signage to ensure residents and visitors are aware of the slow-no-wake requirements within 100 feet of the shoreline for boats and within 200 feet of the shoreline for personal watercrafts

Goal 2. Increase natural beauty and habitat for wildlife and fish on Largon Lake

A. Expand habitat for fish and wildlife
   1. Increase native plants on the shoreline of Largon Lake, see goal 1A
   2. Work with DNR fisheries biologist to identify locations for habitat additions (fish sticks, fish cribs, etc.)
      Fish sticks are a grant eligible project through the Healthy Lakes Program
   3. Maintain the winter aeration system on Largon Lake
   4. Partner with DNR to explore Northern Pike management

B. Prevent the establishment of aquatic invasive species (AIS)
   1. If a new AIS is found on the lake, research and determine control options
   2. Partner with LWRD to ensure that the local AIS ordinance sign and state prevention AIS sign at the boat landing are maintained in good condition
   3. Consider updating the kiosk at the boat landing to include an AIS educational message
   4. Consider installing a decontamination station at the boat landing to provide tools for cleaning boats and trailers
   5. Explore opportunities to participate in statewide AIS education initiatives such as the Drain Campaign and Landing Blitz
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C. Monitor for new aquatic invasive species
   1. Maintain a volunteer to participate in the AIS Citizen Lake Monitoring Network Program
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A. Form committees to implement the goals of the plan
   1. Identify current and future barriers to implementing goals
   2. Seek funding to implement goals
   3. Report actions completed, in progress, or not completed to the Lake District Board and Lake District members
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B. Evaluate the progress of lake management efforts through data collection efforts
   1. Ensure that a volunteer is in place to collect secchi disk data each year
   2. Repeat the 2021-2022 water quality study in ten years to determine impacts of BMP installation and plan implementation

C. Communicate with lake stakeholders using the information and education strategy

Information and Education Strategy

The information and education strategy includes target audience, methods used to reach the target audience, and messages to convey. The District will determine a key issue of focus each year. Information and education efforts will begin at the annual meeting and continue throughout the year using additional methods.

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- *Presentations and trainings at Lake District Board and Annual Meetings*
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Messages to convey

Messages to engage stakeholders in improving water quality by increasing their understanding of the importance of installing BMPs to reduce phosphorus

- *Phosphorus is the nutrient responsible for excessive plant and algae growth in Largon Lake*
- *Major sources of phosphorus to a lake include lawn and agricultural fertilizers, soil erosion, human and animals waste, and runoff from the landscape*
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- *BMPs exist to reduce the harmful effects of runoff and soil erosion: shoreline restoration, rain gardens, infiltration projects, diversions, sediment ponds, and grassed waterways/buffers*
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Messages to engage property owners in increasing natural beauty and habitat by increasing their understanding of the importance of native vegetation and coarse woody habitat and the negative impacts of aquatic invasive species (AIS)

- *Ninety percent of a lake ecosystem depends on what happens in the littoral zone, or the area of a lake close to shore*
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Largon Lake Management Plan Development
Committee Meeting 4

Wednesday, March 8th, 2023
5:30 – 7:30 PM

5:15 **Optional* opportunity to sign into Teams and check microphone, sound, video*

5:30 Introductions (all)

5:35 Finalize draft goals for Largon Lake document
Review and finalize implementation chart
Review next steps

7:30 Adjourn

Katelin Anderson
(715) 485-8637
katelin.anderson@polkcountywi.gov

Colton Sorensen
(715) 485-8639
colton.sorensen@polkcountywi.gov

Microsoft Teams meeting

Join on your computer, mobile app or room device

Click here to join the meeting

Meeting ID: 247 036 269 147
Passcode: EAwZrc

Download Teams | Join on the web

Or call in (audio only)
+1 715-900-2020,,146875570# United States, Eau Claire
Phone Conference ID: 146 875 570#
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- *Lake Management Plans are designed to be working documents that adapt as new issues and conditions arise*
- *Lake Management Plan implementation success relies on participation by landowners in the Largon Lake Watershed*
- *Grant funding is available from WDNR to cost share up to 75% of the costs of eligible projects in the Largon Lake Management Plan*

Goal 1. Improve the overall health of Largon Lake	Priority	$ Estimate	Volunteer hours	Partners with LLPRD	Funding sources
A. Partner with shoreline residential property owners to install shoreline best management practices (BMPs) including native plantings, rain gardens, diversions, and rock infiltration projects to reduce phosphorus entering Largon Lake	High	$ - $$$		LWRD, CON	SWMG, SWMG-HL
1. Use special meetings, the annual meeting, and other communications to provide information on shoreline BMPs and to encourage property owners to install BMPs		No cost/$	5 hrs		
2. Identify property owners interested in installing BMPs		-	5-10 hrs	LWRD	
3. Make site visits with a consultant available to property owners interested in installing BMPs		No cost/$	10-15 hrs	LWRD, CON	
4. Apply for a Healthy Lakes Grant or Management Plan Implementation Grant to fund BMP installation		No cost/$	15-20 hrs	LWRD, CON	
2. Install WDNR Healthy Lakes signs at Healthy Lakes project sites		-	5 hrs	LWRD	
3. Offer tours of properties where Healthy Lakes practices have been installed to generate interest in BMP installation		-	5-10 hrs	LWRD, CON	
4. Recognize property owners who have installed BMPs		No cost/$	5 hrs		
B. Partner with the Town of McKinley to install BMPs at the Largon Lake Boat Landing that will reduce phosphorus entering Largon Lake	High	$-$$$		TM, CON, LWRD	SWMG
1. Work with the Town of McKinley and/or a consultant to design BMPs to reduce phosphorus entering Largon Lake at the boat landing		$-$$	5-10 hrs	TM, CON, LWRD	
2. Explore grant funding to assist with BMP installation at the boat landing		-	5-10 hrs	TM, CON, LWRD	-
3. Use signage and other means to highlight practices implemented at the boat landing to promote shoreline BMP installation		No cost/$	5-10 hrs	TM, CON, LWRD	

	Priority	$ Estimate	Volunteer hours	Partners with LLPRD	Funding sources
C. Implement practices to slow the flow of water and/or reduce soil loss and erosion associated with the culverts on Largon Lake Court	High	$$-$$$		TM, LWRD, CON	SWMG
1. Partner with the Town of McKinley to determine a plan to replace the culverts on Largon Lake Court and discuss opportunities for rock riprap channel protection, a drop structure, and/or a water and sediment control basin		$$-$$$	5-10 hrs	TM, CON, LWRD	
2. Partner with the Town of McKinley and/or a consultant to design and implement BMPs to address erosion at the culvert sites on Largon Lake Court		$$-$$$	5-10 hrs	TM, CON, LWRD	
1. Request property owners along the culvert outflows to divert water away from the outflows using rain gutters/barrels, diversions, or infiltration projects		$-$$	10-15 hrs	LWRD, CON	
2. Apply for a Management Plan Implementation Grant to address soil loss and erosion associated with the culverts on Largon Lake Court		No cost/$	10-15 hrs	TM, CON, LWRD	
D. Upgrade non-compliant septic systems near Largon Lake	~~Medium~~ High	$$-$$$			SWMG
1. Develop and deliver an educational message regarding the relationship between non-compliant septic systems and water quality		No cost/$	5-10 hrs		
2. Partner with shoreline property owners with non-compliant systems to bring their system back into compliance (pump or replace)		$$-$$$	10-15 hrs	ZON, LWRD	
3. Apply for a Management Plan Implementation Grant to replace non-compliant systems		No cost/$	10-15 hrs	CON, LWRD	

	Priority	$ Estimate	Volunteer hours	Partners with LLPRD	Funding sources
E. After steps have been taken to reduce phosphorus entering Largon Lake from shoreline properties, build relationships with agricultural landowners to increase awareness of grant funding for BMPs that will reduce phosphorus reaching the Lake	Medium	No Cost/$$$		LWRD, CON	SWMG
1. Partner with the Polk County Land and Water Resources Department (LWRD) to communicate with agricultural landowners in the Largon Lake Watershed through a mailing		No cost/$	5-10 hrs	LWRD	
2. Provide agricultural landowners with information on the progress that has already been taken to reduce phosphorus entering Largon Lake and provide an action plan that allows producers to reach out to LWRD or the District if they are interested in funding for implementing BMPs		No cost/$	10-15 hrs	LWRD, CON	
3. Partner with interested agricultural landowners to apply for a Lake Management Plan Implementation Grant and implement BMPs		$-$$$	15-20 hrs	LWRD, CON	
4. Invite agricultural landowners in the watershed to Lake District meetings		-	5 hrs		-
5. Recognize agricultural landowners who have taken steps to reduce phosphorus from reaching Largon Lake		No cost/$	5 hrs		
F. Reduce sediment disturbance and shoreline erosion on Largon Lake	Medium	No cost/$			
1. Update the kiosk at the boat landing to include signage to ensure residents and visitors are aware of the slow-no-wake regulations within 100 feet of the shoreline for boats and within 200 feet of the shoreline for personal watercrafts		No cost/$	5 hrs		
2. Provide education on slow-no-wake regulations at the annual meeting		No cost/$	5 hrs		

Goal 2. Increase natural beauty and habitat for wildlife and fish on Largon Lake	Priority	$ Estimate	Volunteer hours	Partners with LLPRD	Funding sources
A. Expand habitat for fish and wildlife					
1. Maintain the winter aeration system on Largon Lake	High	$-$$$	20+ hrs		
2. Increase native plants on the shoreline of Largon Lake, see goal 1A	High	$-$$$	20+ hrs	LWRD, CON	SWMG-HL
3. Work with DNR fisheries biologist to identify locations for habitat additions (fish sticks, fish cribs, etc.)	Medium	-	5-10 hrs	WDNR	SWMG-HL
4. Partner with DNR to explore Northern Pike management	Medium	-	5-10 hrs	WDNR	
B. Prevent the establishment of aquatic invasive species (AIS)					
1. If a new AIS is found on the lake, research and implement control options	As need arises	$-$$$	10-15 hrs	LWRD, CON	AISCG
2. Partner with LWRD to ensure that the local AIS ordinance sign and state prevention AIS sign at the boat landing are maintained in good condition	High	-	2 hrs	LWRD, WDNR	-
3. Update the kiosk at the boat landing to include an AIS educational message	High	No cost/$	10-15 hrs	LWRD	AISCG
4. Consider installing a decontamination station at the boat landing to provide tools for cleaning boats and trailers	Low		15-20 hrs	LWRD	AISCG
5. Explore opportunities to participate in statewide AIS education initiatives such as the Drain Campaign and Landing Blitz	Low	-	5 hrs	LWRD	AISCG
C. Monitor for new aquatic invasive species					
1. Maintain a volunteer to participate in the AIS Citizen Lake Monitoring Network Program	High	-	10-15 hrs	LWRD, WDNR	-
2. Ensure that lake residents and visitors know how to identify common AIS and where to report new findings	High	No cost/$	5-10 hrs	LWRD, WDNR	AISCG

Goal 3. Use multiple strategies to ensure the goals of the plan are met	Priority	$ Estimate	Volunteer hours	Partners with LLPRD	Funding sources
A. Form committees to implement the goals of the plan	High				
1. Identify current and future barriers to implementing goals		-	20+ hrs	-	-
2. Seek funding to implement goals		No cost/$	20+ hrs	-	-
3. Report actions completed, in progress, or not completed to the Lake District Board and Lake District members		-	5 hrs	-	-
4. Adapt the plan as new issues arise		-	20+ hrs	-	-
B. Evaluate the progress of lake management efforts through data collection efforts	Medium				
1. Ensure that a volunteer continues to be in place to collect secchi disk data each year on Largon Lake		-	10-15 hrs	LWRD, WDNR	-
2. Add total phosphorus and chlorophyll a sampling for Largon Lake		$300/yr	10-15 hrs	LWRD, CON	EPG
3. Collect data for secchi depth, total phosphorus, and chlorophyll a on Little Largon Lake		$300/yr	10-15 hrs	LWRD, CON	EPG
4. Repeat the 2021-2022 water quality study in ten years to determine impacts of BMP installation and plan implementation		$$$	50+ hrs	LWRD, CON	EPG
C. Communicate with lake stakeholders using the information and education strategy	High	No cost/$	50+ hrs		

Appendix L

Largon Lake Handbook

Photo Credit: George Day

Largon Lake

(Also known as Larrigan, Laragon or Larigan)

McKinley, Wisconsin

1890 – 2023

Largon Lakes P&R District Mission:

The Largon Lakes P&R District works together to protect and enhance the quality of the water and the fishing in our lakes. We are committed to preserving the health of our lakes for present and future generations.

Photo Credit: Robert Rose

Largon Lakes P&R District Handbook

Table of Contents

Photo Credit: Michelle Frantzen

Introduction to Largon Lake

Largon Lake is located entirely in the Town of McKinley, which is 37 square miles and had a 2020 population of 285 people. The lake has four areas that are designated as Areas of Special Natural Resources Interest (ASNRI) Sensitive Areas, most of which occur on the western side of the lake. These areas of aquatic vegetation offer critical or unique fish and wildlife habitat. According to Natural Heritage Inventory data, one special concern species (slender bulrush) occurs in the Town of McKinley.

Largon Lake is 135 acres in size with a maximum depth of 10 feet. Largon Creek enters Largon Lake from Little Largon Lake on the northeast side of the lake and exits the lake on the southwest side of the lake, eventually flowing to the Clam River and the St. Croix River. An unnamed tributary converges with Largon Creek before entering Largon Lake.

Two invasive species (Chinese mystery snails and banded mystery snails) have been documented on Largon Lake.

The Town of McKinley owns a parcel of land on the southeast side of the lake that includes the public access. Public use (fishing) is low-moderate in both summer and winter.

The Largon Lakes Protection and Rehabilitation District was formed in 1975.

Largon Lake is situated within the Clam River Watershed which is 207 square miles. The watershed has 218 miles of streams and rivers, 5,389 acres of lakes, 24,387 acres of wetlands, and is dominated by forest (59%), wetland (20%), and grassland (9%).[1]

On a smaller scale, the area of land that drains to Largon Lake is defined as the Largon Lake Watershed. The Largon Lake Watershed, is 2,497 acres. The most common land use is forest (70%).

Lakes are hydrologically classified according to their primary source of water and how that water enters and leaves the system. Largon Lake is classified as a shallow mixed drainage lake. Drainage lakes receive most of their water from the surrounding watershed in the form of stream drainage, have a prominent inlet and outlet that moves water through the system, and commonly have high nutrient levels due to inputs from the watershed.

The trophic state is a measure of a lakes health which relates to the amount of algae in the water. The average summer trophic state for 2021 and 2022 was eutrophic. Volunteers have been monitoring water clarity since 1998. Largon Lake was placed on the 303(d) Impaired Waters List in 2020 for total phosphorus and chlorophyll a for recreation, fish and aquatic life use.

[1] https://dnr.wi.gov/water/waterDetail.aspx?key=16784

Largon Lake Characteristics

Largon Lake Characteristics[2] Area: 135 acres Maximum depth: 10 feet

Mean depth: 6 feet Bottom: 40% sand, 0% gravel, 0% rock, and 60% muck

Hydrologic lake type: drainage Invasive species: Chinese mystery snail and banded mystery snail.

Fish: Panfish, largemouth bass, northern pike, and yellow belly bullheads

Trophic Status: Eutrophic

Largon Lake Classification

Lake classification in Polk County is a relatively simple model that considers:

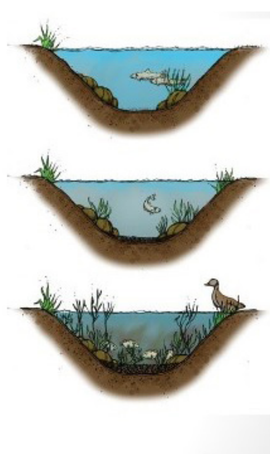
- Lake surface area
- Maximum depth
- Lake type
- Watershed area
- Shoreline irregularity
- Existing level of shoreline development

These parameters are used to classify lakes as class one, class two, or class three lakes. Largon Lake is classified as a class one lake.

Class one lakes are large and highly developed. Class two lakes are less developed and more sensitive to development pressure. Class three lakes are usually small, have little or no development, and are very sensitive to development pressure.

Trophic Classification

- Oligotrophic – Low levels of organic matter – tend to be deep and clear , oxygen rich bottom supports cold water fish such as trout , Phosphorus is limiting
- Mesotrophic – more organic matter, oxygen level in lake bottom is low
- Eutrophic- High levels of organic matter – abundant plant growth , poor clarity , stratified with oxygen poor bottoms
- A dead zone is an area where oxygen levels fall below 2 ppm



[2] https://dnr.wi.gov/lakes/lakepages/LakeDetail.aspx?wbic=2668100&page=facts

Fisheries

The most recent fisheries surveys conducted on Largon Lake was in 2021 (electrofishing).

In 2021 a comprehensive fisheries study was completed to estimate the Northern Pike population in Largon Lake. Previous surveys were completed in 1998 and 2003. In the winter of 2013-2014 there was a severe fish kill on Largon Lake.

Fyke netting was completed between March 30th and April 2nd, 2021. Fish caught in the net were weighed, sexed, and given a mark to indicate capture. Fish were aged by removing a portion of the pelvic fin ray and examining it under a microscope.

In 2021 the adult Northern Pike population was estimated as 10.9 fish/acre with a total of 721 fish collected. These results are similar to the population estimates completed prior to the winter kill (7.8 fish per acre in 2003 and 14.2 fish/acre in 1998). The catch per unit effort was 34.3 fish per net night which was above the 99th percentile (25.7 fish/net night) for similar lakes in Wisconsin. This is indicative of a high-density population.

The average Northern Pike length was 19.5 inches, which is near the 90th percentile (19.3) for similar lakes in Wisconsin. Males ranged from 15 to 28.5 inches and females ranged from 18 to 38.5 inches, with a male to female ratio of 3:1. The Northern Pike population relative length frequencies were not statistically different between 2003 and 2021, but the relative abundance of the largest individuals has decreased. The decrease in size structure is likely attributed to the 2013-2014 winter kill. However, the overall size structure remained good.

The age of Northern Pike in Largon Lake ranged from 2 to 9 years old, with females ranging from 3 to 9 years old and males ranging from 2 to 7 years old. The average length of Northern Pike at each age class is greater than the median for similar lakes in Wisconsin and is similar to the Polk/Barron County average.

Lymphosarcoma

In 2019 fishermen noticed several Northern Pike having Lymphosarcoma and asked Aaron Cole, DNR if Lymphosarcoma in fish can affect the Crappie population on Largon Lake and this was his reply:

> *The presence of Lymphosarcoma has no impact on the crappie population in Largon Lake.*
>
> *Largon Lake had a severe winter kill back in the winter of 2013-2014. We did a winter kill investigation shocking survey and found a couple*

crappies and three northern pike, both species are more tolerant of low dissolved oxygen and tend to survive winter kills. We stocked largemouth bass and bluegill following the survey to get those populations reestablished and to keep the fish community in balance. I bet you were catching more crappies after the winter kill because that was one of the few catchable species in the lake 5 years ago. Usually crappie, northern pike, and bullhead populations drastically increase following a winter kill because they are often the main species that survived the winter kill and there is a void in the lake with the loss of all the other species.

Crappie populations are often cyclical where they have good year classes followed by several poor ones. Largon Lake usually has a fairly respectable crappie fishery. Also, I will say that crappie are less susceptible to electrofishing than most other species. So usually our electrofishing catch rate under represents the true population.

It is OK to release pike with lymphosarcoma back into the lake because the fish can survive the outbreak. There is no evidence that suggests the disease poses a human health hazard. However, in general we still don't recommend eating fish that have lesions partly because they could have a secondary infection from the lesion/wound.

Talking points from Aaron Cole, DNR Fisheries Biologist

People expressed interest in 2019 about changing the northern pike regulation because few fish were of legal size. I was not able to propose a different regulation until we did a netting survey, which was completed in spring 2021.

In spring 2021, the Barron DNR fisheries crew conducted a northern pike fyke netting survey. They clipped fins on all northern pike captured in their nets were able to determine a population estimate based on the proportion of northern pike with and without fin clips throughout the survey. They handled 721 individual northern pike from Largon Lake and estimated the population size to 1,402 adult northern pike, which resulted in a density of 10.9 adults/ac, which was greater than the 2003 estimate (7.8 adults/ac) and less than the 1998 estimate (14.2 adults/ac).

The northern pike population is characterized as having a higher density and lower size structure population. This was likely influenced by the 2013-2014 winter kill. Northern pike survive winter kills better than other species like bass and bluegills.

Northern pike are the dominant predator in Largon Lake. Low numbers of largemouth bass were collected during the 2019 spring electrofishing survey. Largemouth bass took it hard after the winter kill, which is typical.

The current 32″ minimum length limit (MLL) is overly protective with the current pike population, as only 0.7% of the pike population is of legal size.

Largon Lake is one of only eight lakes in the entire state of Wisconsin currently with a 32″ MLL northern pike regulation. In general, this regulation was found to be ineffective in most places. Many of those water bodies have since gone from the 32″ MLL/1 bag to the 26″MLL/2 fish bag limit. Allowing more harvest of pike could decrease their density and increase size structure.

The best available fishing regulations are the 26″ MLL/2 fish daily bag limit, or the base regulation, which is no MLL/5 fish daily bag limit. The 26″ MLL/2 fish bag limit would allow some harvest (16% of current population legal size) and should be as effective as the 32″ MLL at preserving size structure. This regulation would not harvest small pike, but should preserve size structure. Since this is not the default regulation, it would have to go through the Wisconsin Conservation Commission Spring Hearings in 2023 and could be implemented at the 2024 fishing opener at the earliest.

The No MLL/5 fish bag limit would allow for significantly more harvest opportunities and would likely do a better job at decreasing density and increasing size structure.

This regulation could go through a more streamlined process, which would consist of a public notice and public hearing (only if requested).

This regulation could be implemented at the 2022 fishing opener. I would be comfortable with either the 26″ MLL/2 fish daily bag limit or the No MLL/5 fish bag limit.

Largon Lake District members voted for the 26″ MLL/2 fish daily limit at the September 2022 annual meeting to be implemented by the spring of 2024 fishing opener at the earliest.

Photo Credit: Craig Landes

Largon Lakers Catch of the Day!

Photo Credit: Nichole Larson

Photo Credit: Unknown

Photo Credit: Gail Schrooten

Photo Credit: Tim Frantzen

Aquatic Invasive Species

Two invasive species are present in Largon Lake: Chinese and banded mystery snails.

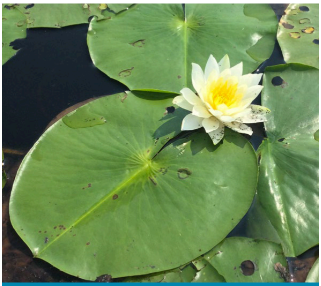
The Chinese mystery snail is an aquatic invasive animal originally from Asia that can tolerate many different living conditions. The Chinese mystery snail has a brown colored spiral shell up to 2 inches in length. The snails feed on lake and river bottom material.

The Chinese mystery snail out competes native aquatic animals, affecting the food web. They are often a concern to recreation because they can die off in large numbers and wash up on shore.

The banded mystery snail is also brown in color but is smaller than the Chinese mystery snail and is easily distinguished by the presence of reddish bands which are arranged parallel to the whorl of the shell. Banded mystery snails are native to the southeastern United States, being found primarily in the Mississippi River System up to Illinois. The banded mystery snail is popular in the aquarium trade which likely explains the presence of this species outside its native range.

Photo Credit: Michelle Frantzen

Aquatic Native Plants



American White Lily
Nymphaea odorata

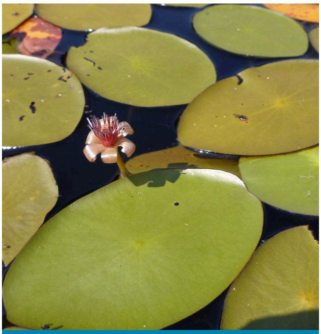
Yellow Lily
Nuphar variegata

Wild Rose
Rosa carolina

Pickerel weed
Pontederia cordata

Milkweed
Asclepias

Large Flowered Trillium
Trillium grandiflorum



Watershield
Brasenia schreberi

In 2021 the most common aquatic plants were: White Water Lily, Watershield, and Spiny Hornwort. In 2016 they were Nitella, White Water Lily and Floating Leaf Pondweed.

Algae

Algae, also called phytoplankton, convert sunlight and nutrients into biomass and form the base of the food chain. Algae are consumed by zooplankton which are, in turn, eaten by fish. Algae can live on bottom sediments, in the water column, and on plants.

The types of algae present in a lake will change over the course of a year and are influenced by many environmental factors (climate, nutrients, silica, substrate, etc.). Typically, there is less algae in winter and spring because of ice cover and cold temperatures. As a lake warms up and sunlight increases, algae communities begin to increase. Additionally, as nutrient levels increase the number of algae present in a lake also increase. When high levels of nutrients are available, blue green algae often become predominant and create light limited conditions for other groups of algae and plants.

Blue green algae are a group of photosynthetic bacteria that are most often responsible for creating scum layers or surface mats that can cause negative aesthetics, including smell. Blue green algae are of specific concern because of their ability to produce toxins that when ingested or inhaled can cause short- and long-term health effects.

To quantify the presence of algae blooms in Largon Lake, a volunteer recorded perception of water color and water appearance using the Citizen Lake Monitoring Network (CLMN) protocols for perception ranging from 1 (beautiful, could not be nicer) to 5 (swimming and aesthetic enjoyment of lake substantially reduced because of algae levels).[3]

In 2021, Largon Lake received a perception rating of 5 on twenty days in July and six days in September. In 2022, a perception rating of 5 began in mid-August and persisted through the end of September.

(Tributary on the North end of the lake).

[3] Beautiful, could not be nicer (1), very minor aesthetic problems, excellent for swimming and boating (2), swimming and aesthetic enjoyment of lake slightly impaired (3), desire to swim and level of enjoyment of lake substantially reduced because of algae i.e. would not swim, but boating is okay (4), and swimming and aesthetic enjoyment of lake substantially reduced because of algae levels (5).

Eagle Fun Facts

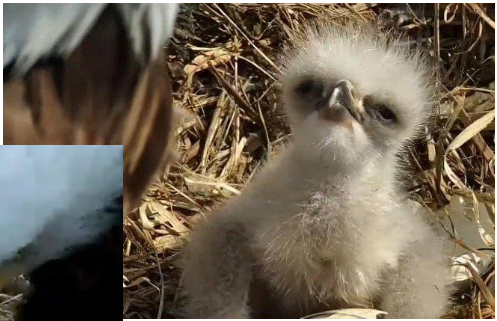


Photo Credit:
Decorha Iowa Eagles and Eaglets

Eagles *(Taken on Largon Lake)*

Photo Credit: Taken from Jim and Roxanne Paulicks


Photo Credit: Carol Moretti

Other Wildlife on Largon Lake

Photo Credit: Robert Rose

Photo Credit: Carol Moretti

Photo Credit: Carol Moretti

Photo Credit: Tim Frantzen

Photo Credit: Michelle Frantzen

Photo Credit: Marv and Joan Marshall

Photo Credit: Gail Schrooten

Summary of Largon Lake 2021-22 Study

- A lake resident survey completed by 40 property owners (66% response rate) ranked top concerns for Largon Lake as: excessive algae blooms, decrease in overall lake health, and increased nutrients from failing septic systems.
- The lake resident survey asked respondents to indicate which actions should be completed by the Largon Lakes Protection and Rehabilitation District to manage the lake. The management options with the greatest support by respondents included: programs to prevent and monitor invasive species (85%), offering incentives for upgrades to non-conforming septic systems (83%), and practices to improve fishing and fish habitat (74%). Two-thirds of respondents supported offering incentives for property owners to install shoreline buffers/rain gardens (64%) and enforcement of slow-no-wake zones (63%). Half of respondents supported offering incentives for farmland conservation practices (53%).
- In both years of the study the upper two meters of the water column were well oxygenated and the bottom waters fell below the 5 mg/L standard for fish. In both years of the study, the bottom waters became depleted of oxygen. In 2021, the bottom waters of Largon Lake were below 1 mg/L dissolved oxygen from mid-June through the beginning of August. In 2022, the bottom waters were below 1 mg/L dissolved oxygen in July (second sampling date only).
- Largon Lake is classified as a eutrophic lake. Eutrophic lakes are generally high in nutrients and support many plants and animals. They are usually very productive and subject to frequent algae blooms. Eutrophic lakes often support large fish populations but are susceptible to oxygen depletion.
- The average summer index period (July 15th – September 15th) trophic status was eutrophic in 2021 and 2022.
- Largon Lake was placed on the 303(d) Impaired Waters List in 2020 for total phosphorus and chlorophyll a for recreation use and fish and aquatic life use.
  - The impairment threshold for total phosphorus is greater than or equal to 40 μg/L for both recreational use and fish and aquatic life use.
  - The impairment threshold for chlorophyll a for recreational use is exceeded if greater than 30% of the days in the sampling season have moderate algal levels (greater than 20 μg/L chlorophyll a).
  - The impairment threshold for chlorophyll a is greater than or equal to 27 μg/L for aquatic life use.

- Fourteen aquatic plant species were found in Largon Lake. In June and August, plant growth covered 10% of the lake. The floristic quality index evaluates the closeness of the flora in an area to that of an undisturbed condition. The value for Largon Lake is lower than the value for the North Central Hardwood Forest region which Largon Lake is located in.
- A shoreline inventory indicated that 89% of the properties on the shoreline of Largon Lake have canopy cover present greater than 80% and that 72% of the ground cover in the riparian buffer zone is shrubs/herbaceous plants. Twenty-five percent of the ground cover in the riparian buffer zone was lawn. Runoff concerns including point sources, channelized water flow/gully, lawn/soil sloping to lake, bare soil, and bank erosion exist on Largon Lake.
- The Ascent Permit Management Suite system for tracking sanity permits was used to determine compliance for the fifty-four septic systems near Largon Lake. Forty-five systems (83%) were in compliance, with the remaining nine systems (17%) being out of compliance. Of the non-compliant systems, four have no records and the remaining systems were last serviced in 2019, 2018, 2016, 2002, and 1989.
- The state standard for total phosphorus for streams is set at 75 ug/L. The North Inlet and the Inlet from Little Largon Lake were below the standard in 2022.
- Erosion commonly occurs at culverts because of the concentration of water into a confined flow path. Two gullies have formed downstream of two culverts underneath Largon Lake Court. The potential rate of soil loss attributed to the two gullies are 5.89 tons per year and 12.60 tons per year.
- WiLMS determined the annual external phosphorus load to Largon Lake as 454 pounds of phosphorus per year. Overall, internal loading is predicted to be between 55 and 110 pounds of phosphorus per year, or 11-20% of the nutrient budget for Largon Lake. Septic loading was estimated at 2 pounds of phosphorus per year, or less than 1% of the nutrient budget.
- Modeling predicts that to achieve the phosphorus standard for Largon Lake (40 µg/L) the combined external and internal phosphorus load to the lake would need to be reduced by 194 pounds (37% reduction).
- The agricultural land base in the Largon Lake Watershed consists primarily of row crops (corn and soybeans) (42%) and perennial vegetation (forage and pasture) (38%). Row crop fields were more likely to use conventional tillage (81%) compared to no-till (5%). Cover crops have not been adopted in the watershed. Beef (36 head) are the only livestock in the watershed.

- The Agriculture Conservation Planning Framework was used to identify and prioritize conservation practices on agricultural lands in the Largon Lake Watershed. The program recommended and prioritized locations for grass waterway and determined field runoff risk and distance to stream.
- In 2023, stakeholders met to develop an implementation plan for Largon Lake which included goal development.
- Many of the goals in the implementation plan are eligible for grant funding through the Wisconsin Department of Natural Resources Surface Water Grant Program.

Formation of the Largon Lakes District

CREATED NOV 12, 1975

48-812

RESOLUTION AND ORDER NO. 106.

RESOLUTION AND ORDER ESTABLISHING PUBLIC INLAND LAKE PROTECTION AND REHABILITATION DISTRICT FOR LARGON LAKES

On October 31, 1975, a verified petition was filed with the Polk County Clerk requesting establishment of a Public Inland Lake Protection and Rehabilitation District pursuant to Chapter 33 of the Wisconsin Statutes, to be known as the Largon Lakes Protection and Rehabilitation District.

A hearing was held on November 7, 1975, pursuant to Section 33.26 of the Wisconsin Statutes, with the following Committee presiding:

Mr. Earl Paulson, Chairman; Mr. Ray Bauerfield, and Mr. George Vollert.

FINDINGS OF FACT

Based on the report of the Committee holding the hearing in the matter, this Board finds:

1. That the Petition filed on October 31, 1975, was signed by at least 51% of the landowners in the proposed district.
2. That the Public Inland Lake Protection and Rehabilitation District is necessary and will promote the public health, comfort, convenience, necessity or public welfare.
3. That the property included in the district will be benefited by the establishment thereof.
4. That formation of a district will not cause or contribute to long range environmental pollution as defined by Wisconsin Statute Section 144.30(9).

ORDER

IT IS, THEREFORE, ORDERED THAT:

1. Pursuant to Wisconsin Statutes, Section 33.24 and 33.26, the Polk County Board of Supervisors does hereby establish a Public Inland Lake Protection Rehabilitation District to include the area within the following boundaries:

   TOWN OF MCKINLEY 48-038

   All of Section 11, Township 36 N, Range 15W, except the West half of the northwest quarter, the northeast quarter of the northeast quarter, and the southeast quarter of the southeast quarter; Government lots 1, 2 and 3, Section 10, Township 36N, Range 15W; Government Lot 1, Section 15, Township 36N, Range 15W, Government lot 1, Section 14, Township 36N, Range 15W.

2. The District shall be a body corporate to the extent provided by Chapter 33 of the Wisconsin Statutes, and shall be known as the Largon Lakes Protection and Rehabilitation District.

Dated this 12 day of November, 1975.

Elroy A. Sponenberg
Polk County Clerk

Implementation Plan Development

Lake management plans help protect natural resource systems by encouraging partnerships between concerned citizens, lakeshore residents, watershed residents, agency staff, and diverse organizations. They identify concerns of importance and set realistic goals, objectives, and action items to address each concern. Additionally, lake management plans identify roles and responsibilities for meeting each goal and provide a timeline for implementation.

Lake management plans are living documents which are under constant review and adjustment depending on the condition of a lake, available funding, level of volunteer commitments, and the needs of lake stakeholders.

The vision statement, guiding principles, and lake management plan goals presented below were created through collaborative efforts using current and past water quality data and a series of four meetings by the Largon Lake District Plan Committee held in 2023. Key study details were presented to the Largon Lake District over the course of the project.

The draft plan was posted on the Polk County Land and Water Resources Department website and opened for a 30-day public comment period ending on April 19th, 2023. A notice of public comment was published in the Inter-County Leader and the Cumberland Advocate on March 15th, 2023. There were no public comments received. The plan was approved by the Largon Lakes Protection and Rehabilitation District on July 21, 2023.

Vision

The vision and goals statement below were developed for implementation for the 2023-2033 time frame.

> *Largon Lake is a healthy lake that will be removed from the Impaired Waters list that provides habitat for fish and wildlife while providing peace, tranquility, and recreational opportunities to all that use and enjoy the lake.*

Goal 1 Improve the overall health of Largon Lake.

Goal 2 Increase natural beauty and habitat for wildlife and fish on Largon Lake.

Goal 3 Use multiple strategies to ensure the goals of the plan are met.

Best Practices for Septic Systems On and Around the Lake

Private septic systems are regulated under Chapter 40 of the Code of Ordinances of Polk County, Wisconsin. All septic tanks must be visually inspected by a plumber, a private onsite wastewater treatment system (POWTS) inspector, or person licensed under Wisconsin Statutes 281.48 and pumped within 3 years of the date of installation and at least once every 3 years thereafter. The Polk County Zoning Department mails maintenance reminder notifications every 3 years, but it is the owner's responsibility to follow their pumping schedule. Pumping intervals will vary depending on the system type. Keep your septic system working properly and help extend its life by following these maintenance tips.

- **INSPECT** Have your system inspected and pumped at least every 3 years.
- **CONSERVE** Use water wisely to avoid overloading your septic system. Fix leaky faucets, check that the float in your toilet is adjusted correctly,and consider installing low flow shower heads and dual flush toilets.
- **DISPOSE** Grease, paints, solvents, and other materials should be disposed of properly rather than poured down a drain. Items such as diapers, coffee grounds, and feminine hygiene products should never be flushed down the toilet.
- **PROTECT** Care for your drainfield. Driving or parking on your drainfield increases compaction and shortens the life of your septic system. Keep trees and other deep-rooted vegetation from establishing above your drainfield. Point down spouts away from your septic system since excess runoff can overload your system.


Photo Credit: Michelle Frantzen

Shoreline Restoration

The health of lakes and rivers depends on decisions that landowners make on their properties. When waterfront properties are developed, a shift from native plants and trees to hard surfaces and lawn occurs. This change increases the amount of rainwater containing nutrients like phosphorus that runs off a property and into a waterbody.

Increases in hard surfaces and lawns cause a loss of habitat for birds and wildlife. Overdeveloped shorelines remove critical habitat that species such as loons, frogs, songbirds, waterfowl, and otters depend on. Fish species depend on the area where land and water meet for spawning. Trees and branches that fall into a lake provide habitat for fish and aquatic organisms. Canada geese, which can be a nuisance, favor lawns over taller native grasses and flowers.

Shoreland restoration restores a healthy transition between land and water. The goal of shoreland restoration is to establish native vegetation that is acclimated to existing soil, moisture, and sunlight conditions. Once established, native vegetation is superior to non-native plants and lawn as wildlife habitat, as a pollutant filter, and for protection against shoreline erosion.

Shoreline restoration can add many desirable features to your shoreline. At a minimum, a restoration will provide a seasonal array of colors, textures, and aromas as well as consistent wildlife activity from songbirds and pollinators.

To get started on your own shoreland restoration, contact the Polk County Land and Water Resources Department for technical assistance and possible funding sources at 715-485-8699.

Photo Credit: Carol Moretti

Previous Lake Studies

Past studies and grant awards on Largon Lake include:

Largon Lake Sensitive Area Survey Report and Management Guidelines, 1999, Wisconsin Department of Natural Resources

This survey identified four areas along the shoreline of Largon Lake that merit special protection of aquatic habitat. These areas of aquatic vegetation offer critical or unique fish and wildlife habitat, provide necessary seasonal or life stage requirements for the fishery, offer water quality benefits, and provide erosion control benefits.

Sensitive area A includes the bay on the northeastern end of the lake where Largon Creek enters Largon Lake and includes around 400 feet of shoreline. Sensitive area B includes the bay on the northwestern side of Largon Lake and is largely dominated by a shallow open water wetland.

Sensitive area C is located off the small point on the western shore of Largon Lake and Sensitive area D is located along the southwestern and southern shoreline of Largon Lake and covers around 3,000 feet of shoreline and extends 100-300 feet into the lake. Most of sensitive area C and D are dominated by a deep marsh and shallow open water wetland. The western shoreline included in sensitive area D contains large amounts of logs and woody debris.

All four sensitive areas provide important habitat for spawning and nursery areas for bass, panfish, and northern pike along with important habitat for forage species. The sensitive areas also provide valuable habitat for loons, eagles, herons, waterfowl, songbirds, fur bearers, turtles, and amphibians.

The report strongly discourages chemical and mechanical aquatic plant removal in all four sensitive areas except for the creation of an individual riparian access lane to access open water.[4]

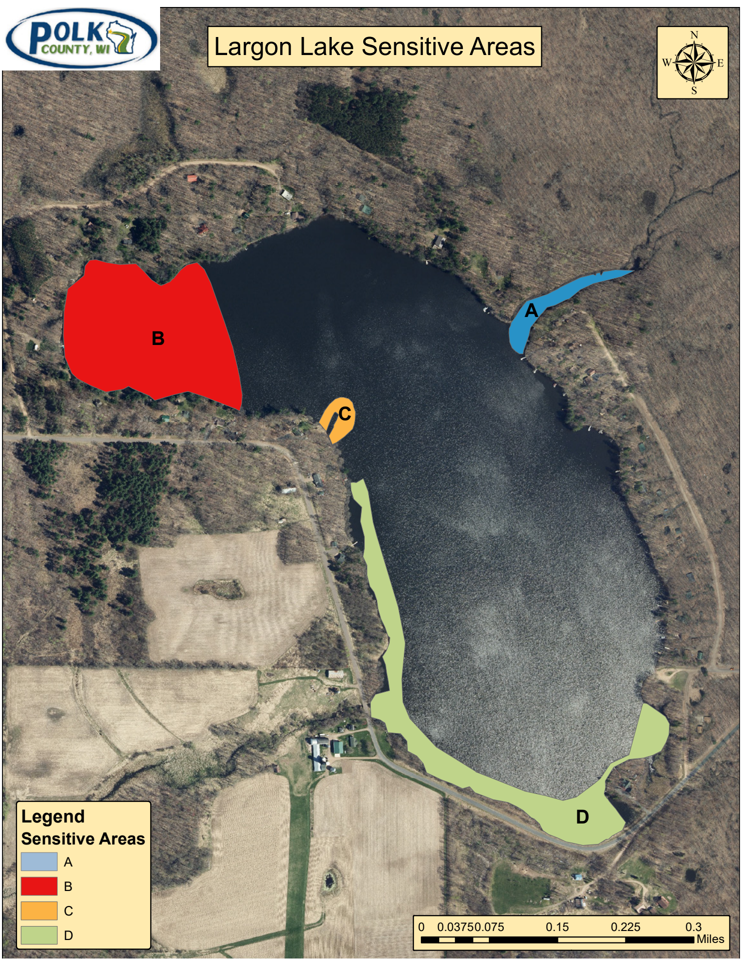
The report recommends that: whenever possible aquatic vegetation is not eliminated but is instead removed only as necessary to allow for navigation, that littoral zone (shallow water area) alternations are prohibited, that large logs/trees/stumps are left in the littoral zone, and that adequate shoreline buffers of un-mowed vegetation at the water's edge are left intact. Additionally, the report recommends that erosion is

[4] Individual riparian access lanes are limited to a maximum width of 30 feet per property measured along the shoreline and includes the area where a dock, boat lift, swim raft, and other recreational equipment is located. Boundaries of the riparian access lane cannot be moved from year to year. Plant removal in the individual riparian access lane can only be done by hand with a tool such as a rake. There can be no assistance from machinery, boats, rollers, etc. unless a permit is obtained. When plants are cut/uprooted they must be taken out of the lake. Wild rice can never be removed even if it is present in a riparian access lane.

prevented at construction sites, that zoning ordinances are enforced, and that nutrient inputs to the lakes by lawn fertilizers and failing septic systems are eliminated.

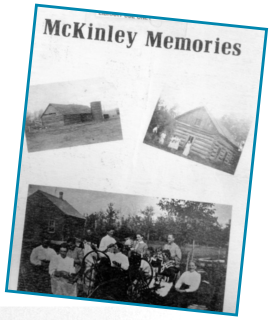
Largon Lake Comprehensive Planning Report, 2002, Polk County Land and Water Resources Department

Data on Largon Lake was collected in 2000 and 2001. At this time, data showed that the lake was eutrophic with potential for persistent algae and nuisance plant growth. This study identified the gully on the north end of the lake as having the highest concentration of dissolved reactive phosphorus. The primary management strategy suggested in this study involved armoring the two primary gullies on the east side of the lake. At this time land use in the watershed was primarily forest (69%), followed by agriculture (14%), wetlands (12%) and residential (5%).



McKinley Memories

From McKinley Memories Booklet



Introduction

Who were these immigrants, so many who came from a town named Piteo in Sweden; what called them to America to settle in a place named Lorain? And the others who came, with names of Kobel, Stotts, Macnamara, Mathias, Momchilovich -- did they really believe the advertisements that land was free and cleared? Some came alone, others with families - a long difficult journey where the dream soon faded, faced as they were by the great stumps of pine trees, thick brush, tote roads and sparse homesteads. Their lives fascinate us, in this year of the Bicentennial of America, 1976. The depths of dependence on each other, the lack of money, their courage and their faith and always having time for the fun of life. Oh, there was intolerance too - at the same time a Literary Society flourished so did the Guardians of Liberty. They helped each other raise their houses and barns, deliver the babies, took in the ill or destitute to their homes and shared the sorrow and happiness of their lives.

We, on the committees of their historie , have pored over records, interviewed the "old timers" and have read many journals and memoirs. We would like to acknowledge our debt to the writings of Fred Grenquist, Tom and Emma Odell and Naomi Lundmark; to Clara and Paul Anderson for scrap-books, material supplied by Mrs. John Peterson of Amery and Obeline Pouliot Donalds of Balsam Lake - all the many of you who took the time to answer the questionaires or called and write to us. If anyone was overlooked it was by accident and we are truly sorry. Of the question, "did you or do you like McKinley?" not one answered "no." For this, too, we of the town are grateful.

The Town

– by Mary Curnow

In 1872 the townships No. 36 and 37, County of Polk, State of Wisconsin, was set aside from the town of Luck to become Lorain, so named after Gen. C. Lorain Ruggles, a pioneer of the northern area. 1888 saw the postoffice established on the old road to Cumberland in the southeastern area of Lorain and township 36 voted to separate to become McKinley, after the President then in office. It was also suggested it be named Emil after Emil Risberg.

Back in 1883, three immigrants from Piteo, Sweden walked from Cumberland to Lorain to investigate possible homesteads, back to Cumberland, and later to Osceola, the Polk County seat. A Mr. Kinney, who owned a compass, guided Samuel Grenquist, P.G. Bjorkland (Berklund) and Maria Heselius, the mother of John Nystrom's wife.

Samuel settled by the lake, soon named Grenquist in his honor, built a sawmill and blacksmith shop with P.G., referred to as Gustav. The sawmill is recorded as having burned down several times. Gustav chose 80 acres further north and west and Maria filed 80 acres to the west of Grenquist Lake for her son-in-law. Relatives of the Nystroms helped homestead until John and his family settled permanently in 1898. Maria was a remarkable woman in any age. When her daughter, Maria Nystrom, died quite young of a ruptured appendix, leaving a large family, she helped John raise the children, losing her identity as Maria Heselius to always be known as Grandma Nystrom in McKinley.

Most people came between 1904 and 1920. Three of the first log cabins still stand; Samuel Grenquist's on the lake (now a tourist cabin), Gustav Berklund's and Oscar Erickson's. The last two are quite buried beneath improvements and remodelings at this date.

In these early years there were logging camps, sawmills, three blacksmith shops, a McKinley Community Hall, the Town Hall, Emil Risberg's Hall, three stores, a postoffice, a cheese factory, the 4-Corners Creamery, 4 school houses, four churches, a tailor, a barber, a McKinley Telephone Company, the Cemetery Association, Kendahls Lodge on Larigan Lake, a greenhouse, a sorghum mill and a Coop. Threshing Association. Only the churches remain.

The farms are now much larger, many lived on by the same families whose fathers and grandfathers cleared them by hand with the help of the horse, the ox, and the neighbor. Only the remains of an old foundation, here and there, an apple tree or a lilac bush remind us that once was heard the sound of children playing, milk drumming into the pail, the sound of the axe and saw, of the fiddle and the bells of schools and churches. They rest on the hill by the lake, in land they cleared themselves. They have become part of America.

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The People

By Mary Curnow, Bror Holmbeck,
Stanley Anderson, Oscar N. Peterson

In April 1898 the first election was held, 20 votes cast and a tie in all offices except for Anton Lundmark as clerk. This issue was settled by a drawing and John Loberg became the first chairman; supervisors: Oscar Risberg and Leo St. Germain; Treasurer, Oscar Erickson; Assessor, O'Neil St. Germain; Justices Anton Lundmark, Samuel Grenquist; Constables: O. Lundmark and O. Risberg. First town tax set at $350, $150 for the poor fund, Clerk's salary to be $125, 4 mills for highways. Israel Risberg and Charles Sero, the first road commissioners, to by 1/2 dozen shovels and 1/2 dozen grubbers plus a plow. There was a town grader (no one knows where from), Peter Stenick fixed it for $2.00. In the fall of 1898 John Loberg moved to Cumberland, Charlie Renstrom appointed to fill out his term. The town paid $1.90 a week to anyone taking care of a needy person. If the recipient of money from the poor fund did not repay it before the next election, he could not vote. Transportation to town (Cumberland) for medical help was paid for, and medicines, from the poor fund also. A building fund was voted in to "set up at $30." The Hunter and Drake roads were discussed.

1899 - Israel Risberg elected town chairman. Fighting fires was a $2.00 a day job, if dynamite included, $3.50. Jacob Risberg and John Nystrom paid for this. $600 voted for the town hall to be built. Oscar Risberg, Oscar Erickson and Anton Lundmark's name appear.

1900 - Frank Hunter, Chairman; Voted to "let the Katle run at large." Grass in the cemetery sold to Carl Lundmark for $2.00. Ole Everson paid to bring out books from library in Cumberland.

1901 - Carl Lundmark killed (a wagonload of logs overturned on the road to Cumberland) while serving as Board Supervisor, Jacob Risberg filled the rest of Carl's term. Poll tax of $1.50 was voted to be paid in labor, mostly road work and brushing. John Peterson was the 4th town chairman, followed by Israel Risberg, three terms; Elroy Baer, five; E. J. Pflueger, three; Nils Anderson, six terms.

1902 - Clerk's salary fell to $75.00. Voted $65.00 for poor fund. A sum of $5.30 to H. H. Poukey for medicines. Charlie Renstrom to take one in need of medical help "to see the doctor and if he tanks it necessary, leave him 8 or 10 days." A town wheelscraper bought from $35.00 from Beaver Dam Lumber Company.

1903 - $50.00 for poor fund. Gust Risberg paid $30 damages for a highway through his land. A compass was bought for $30 and a road machine from Fleming Mfg. Co. for $178.21.

1904 - H. Anderson cared for by Matt Forsman, Gust Bodin, Fred Bodin, Oscar Erickson, Clause Hegg, Holmberg, Jack Risberg, Israel Risberg, Emil Risberg, Claus Berklund, Emma Long and Sam Grenquist. A coffin for said Anderson bought from P. D. Jacobsen for $23.50.

1905 - Voted "to race" $150 poor fund.

1906 - Jasper Otis on election board. Clerk and asse sor to get $50 each. The town hall "open to rent to anybody. Free for church and schools - $3.00 a common dance, $5.00 for the 4th of July and Big Times. No dances on Sat. night." August Lundmark and George Grover on the board.

1907 - Emil Risberg paid $10.00 from poor fund and Mrs. Plumb $25.00 for the care of St. Germain. Dr. Arvenson of Frederick paid $8.00 and medicine $2.35 to Hopkins Drug Store. Sebastian Rose "to help John Ek out to his land on section 34 on old tote road."

1908 - D. C. Keeler's name appears. Discussions on the Kendahl, Anton Klomfers and Tatro roads. Voted to raise $200 "to a foundation for a telefonline line from Cumberland to McKinley, W. to Johnstown, N to Lorain." Axel Nystrom, Lawrence Nystrom and H. E. Grover serve. John Peterson got $9.95 for "watching Winkleman" and August Smith $3.00 for "care of Winkleman."

1909 - Holst road discussed.

1910 - Oscar Risberg to keep the key to the town hall. $100 to be raised for two more wheelscrapers.

1911 - Poor fund set at $400. Carl Rusch paid a day's wages to take "a sickman" to a doctor. 25 folding chairs (maple), 2 benches and 2 lamps bought for town hall.

1912 - Jack Risberg, Lenus Lundmark and Oscar Tappon new names on board. No poor fund. Board "desided to put up gide boards on all corner roads." Voted to charge cemetery lots for $1.50 to residents, $3.00 to $10.00 for non residents. Odell and Lindahl roads worked on. Tuition voted in to Cumberland High School - $42.00.

1913 - Town board wanted to borrow $50 from the State Bank of Cumberland to pay out for the election. Added 6 more road scrapers. Clause Hagge, Wm. Odell and Frank Mathias serve.

1914 - Axel Renstrom paid $8.00 for painting the town hall, shed and backhouse. Gustav Hettling, Elroy Baer and Anton Lundmark serve and are paid for "hauling out books."

1915 - Burial place shall be sold in single graves, $1 residents, $2 non-residents. Poor fund, $60.00. Hickman, Backman, Stotts roads discussed.

1916 - Voted on following roads: Jake Kost, George Behling, Louis Flemnal, Chauncey Bragg, M. B. Bowen and Gruebner. Alton Plum paid $10.00 for wood and care of St. Germain. Town scale to be kept locked - usage to cost 10¢, 5¢ to town and 5¢ to weigher. Use of town hall, $1.00. "Party gives dances responsible for damages done." Surprise party given at hall for Earl Levy. A lecture given by "Harder on Katolics." Jake Kost serves as a supervisor of elections.

1917 - Albert Zager and Floyd Harder constables. People paid by town to shovel snow on highways. Two speed signs bought for $12.30. For Berklund bridge, $200 and a grader $435.

1918 - Edward Morden, Earl Levy and Clarence Nystrom serve, Anton Jensen the road overseer.

1919 - F. L. Hackett road commissioner. M.B. Bowen road overseer.

1920 - Cleaning town hall, $3.50 to Arnold Anderson and Ed Risberg. Anton Lundmark agrees to mow weed and quackgrass around hall for privilege of planting the background to potatoes. New names of Wm. Wearer and Chris Hettling are here. Roads voted on: Bill Meyers, Tatros, Henry Jensen, Bachmann's and Bonde. Art Peterson to be given first preference as highway overseer, to be paid $4. 00 for 8 hours work. Use of hall for dances, $5.00. Ole Holmbeck Chris Giest, Fred Wickstrom, John Rose and George Frazier on election board in September. Road work pay: man alone 30¢ per hour, with team 60¢. Paid $203.75 for a grader.

1921 - Poll tax abolished. First women appear on election board; Mrs. Tom Odell, Mrs. Will Odell and Teckla Lundmark. Walter Berklund, Will Miller and Chas. Peterson serve at caucus. Hans Hettling, constable. Mr. Mazey and Mr. Pflunger donate land for Mazey road. Emil Pouliot given highway damages. Hackett and Frank Oberg roads discussed. Frank Lansin painted inside of town hall for $15.00. Scale torn out, hole filled in. Fence built around cemetery.

1922 - Town reassessed for $101. Resolved to beautify sadly neglected cemetery. Town hall wired for electricity, rented at $2.50 per use. Members of the board of review, C. C. Porter and Albert Zager.

1923 - Town hall enlarged. Cemetery lots on west side to residents, $8.00, to non-residents on East side $16.00 and entire block 28 to serve as pauper lots. Roy Curnow paid in for use of hall 25 nights, $100. Dr. Grinde to vaccinate school children as Mildred Risberg has smallpox. Voted to charge Ernest Risberg 50¢ a week to practice for an entertainment for New Year's Eve, to be given 3 nights at $4.00 rent a night.

1924 - Mrs. Roy (Jessie) Curnow elected a constable.

1925 - Oscar Johns paid 45¢ an hour to paint the hall. H. S. tuition, $576., Poor fund $500. Sent to Sears Roebuck for constable stars, 2 for $1.27.

1926 - 27 - 28 - Road work for man and team 50¢ per hour and a shovel, 35¢. Bought an adding machine. McKinley Cemetery Association formed.

1929 - Health board decided to have schools 6 & 7 vaccinated due to smallpox present.

1930 - The presiding town board being ineligible for inspector or election, others appointed. Ole Holmbeck made a motion for schools and churches to use the hall free. Voted down 49 to 36.

1932 - Board meets to discuss town funds tied up in the State Bank of Cumberland because of bank closures. Free use of hall for church and school voted in. All grading to be done with teams, people from town to be hired; Alfred Peterson road patrolman North end, and Edgar Anderson South end in charge, so town people in depressed economic time could earn some money. 20 rolls of snowfences at $40 roll purchased. Very dry and bad forest fires, special meeting called to discuss paying fire fighters from highway fund.

1933 - Policemen on 4th of July to get $1.50. Town chairman asked to vote for cuts in county officials salaries, to abolish agriculture agents and County Fair appropriations. $200 levied to fight fires. In November a beer and light wine license granted to Milan Momchilovich for $10.00, good until May (when it was not renewed). Rules: No one under 18 on premises without parent or guardian; no sales between 12 mn and 6 a.m. or 12 mn. Sat. until 6 a.m. Mon. (1st and only liquor license in McKinley, although there were customers of the local "moonshiners" during prohibition.)

1934 - Floyd Davis name on records. Agreed George Miller could procure a license for dances at town hall and assume the responsibility. Voted to post fire notices, Eric Renstrom the fire warden. Highway fund $200, town fund $100, Clerk $105, treasurer $95, $2.00 town board meeting. Wages per man, 25¢, man and team 50¢. Moved to make 8 hour day. Motion lost. Voted to leave relief situation on county system.

1935 - WPA and CWA appear with $20,000 allotted for farms in need of feed and seed, farmers to pay off said loans by labor. Snow plowing done with wooden side plows, horses and bobsleds. Sundvahl, Pouliot and Oberg roads discussed. Johnstown-McKinley road to be maintained, McKinley the west 2-1/2 miles, Johnstown the east 2-1/2. Allotted $2,340 for graveling and road work from WPA funds.

1936 - County road E relocation voted on, failed. Voted to form a Highway 48 Booster Club of Frank Lansin, Israel Risberg, Fred Grenquist, Tom Odell and Roy Curnow.

1937 - Bought 50 more folding chairs for hall.

1940 - Board meeting at John Hovelsons, decided to buy a W.C. Modell Drott town grader with power hydraulic, 12 foot mould board, with trade in of Adam leaning wheel grader, cost $1,650. Allen Peterson power patrolman at 35¢ per hour.

1941 - Wages 30¢ per hour,. 55¢ for man and team. Voted to give Axel Renstrom old piano from hall and buy a new one.

1942 - Voted to give Bill Miller a vote of thanks for his many years as town chairman.

1943 - Little road work done due to war shortages. Put $1000 in War Bonds.

1944 - Wages up - 60¢ per hour for patrolman and 45¢ per man.

1946 - Contributed $5 to St. Croix River Development Assoc.

1948 - Town 50 years old. Eight people present who were here 50 years: Fred Grenquist, Chas. Renstrom, Emil Risberg, Israel and Ida Risberg, Clarence Nystrom, Sanford Erickson and George Risberg. (Sanford only one of this group living in 1976). $100 to spend on grasshopper control. Herb Rust hired as patrolman.

1951 - Bought a Nagle Hart grader - 212 caterpiller - $7800.

1960 - Bought a used Cat 112, $6,500 with trade in. 1969 a WABCO grader cost $26,475 with trade.

1964 - Bought lakeshore property from Dan Renstrom, $3,000 for bathhouses, beach and picnic area.

1967 - Got deed from Jack Nessen for some extra feet of land for beach and picnic area on Larigan Lake. (He has built and sold about 23 cabins there). 40 acres from Mrs. Hans Nielsen for recreation land on Andrus Lake (Little Round).

1968 - Old buildings moved out of McKinley as 48 widened. Helen's store, Emil's store, home and barn, town hall, Charlie Renstrom home (where Arnold (Chuck) and Irene Hansen now lived) all moved away or destroyed.

1969 - Built an Armco steel building for machine shop and town garage. Cost $11,200, put up next to old schoolhouse. Bought schoolhouse from Cumberland school system for $1.00. Used as new town hall.

1970 - Green Thumb workers repaired and painted town hall.

1973 - Paid Harold Ash $525 for part access to LaMont Lake.

1975 - Behling bridge rebuilt and discussed, also a dam.

1976 - Committees formed for a history to be written of McKinley, to be published and sold for a homecoming planned on July 3rd, year of the Bicentennial.

The Pioneers

By PAUL GRENQUIST

First house built in McKinley, built by Samuel Grenquist. (left to right) Edna Lundstrom, Lucille Risberg Johnson, Clara Peterson Anderson.

PFLUGERS IN MCKINLEY
By Clarke Damon

The Pfluger family E. J. Pfluger 31, Mayme 23 and sons Sam 3, and Frank 1-1/2 came to McKinley in 1900. Later daughters Rose and Florence were born. Only Florence is now living. The original home was a Beaver Dam Lumber Company logging camp on the SW shore of Big Laragon Lake, so named for a fancied resemblance to the shape of a lumber-jacks boot which was called a laragan. The spelling often used now, Largan was given by Mrs. A. J. Mazey, a Scotch lady who owned property on the lake and wanted to give the lake a Scottish sound and call it Loch Largan.

The father, Edward, or E. J. as he always signed his name, was interested in many things. He served on the township and county boards, early telephone company and cooperative creamery boards. The parents attended the Lutheran church and the children to Laragon Lake School. The Pfluger grand-parents came from Germany on the fathers side. Mother Mayme was Pennsylvania Amish on her fathers side, Mayflower de-scendant on her mother's. Both grandfathers were Civil War veterans.

The Pfluger farm was larger than most of the earlier farms, not necessarily in acres owned, but in terms of acres cleared, drained and plowed. Where most early settlers relied on brushing and clearing their own land with family help, E.J hired Indians. Pat Kasabin, John King and their families, sided by other Indians who lived on the back of the Pfluger farm for five years. Due to the early brushing plus drainage of a marsh it was possible to maintain a larger herd of cattle and more teams of horses. The cattle were supposed to be a dual purpose breed known as Milking Shorthorns but were not as good for milking as the dairy breeds or as satisfactory for beef as the straight beef breeds. The cows were milked, milk separated and the cream sold, the skimmed milk was fed to the calves. E. J. also kept a flock of sheep.

In most spring thaws the hill west of Laragon Lake become so soft that the road slid down hill.

Harry Lundmark at Grenquist Mill.

Paul Oberg is the only resident still active in logging.

There were a number of blacksmith shops in the logging days, owned by Samuel Grenquist, Gustav Berklund, Gustav Haas, Ralieghs and Boedins. Boedins shop later became Harry Lundmark's garage (1918 until he retired in 1961). Anton, his father, used the building as a carpenter-machine shop before this. Harry sold to Leo Moe, Sylvester Butzler bought it in 1964 and moved in a small house from the lake to the lot where Oscar Lund now lives.

Emil Risberg opened a general store in 1900, with Oscar his brother joining him it became the Risberg Pioneer Store. After Emil's death his daughter Belinda ran it until she moved to Milwaukee in 1955.

Oscar Risberg opened up the second store across the road in 1908 - 09. He sold it to B. W. Pritchard in 1916. Bierman's bought him out in 1920 and it was then sold to R. F. Curnow, Sr. in 1922. R. Francis reopened the store (closed in 1941 except the year or so during WWII Eleanor Curnow and Irene Berklund managed it) in 1946, selling it to Everett Erickson in 1961. The doors closed for good in 1965. August Just now owns the building, renting it out as a home.

The Four Corners Creamery was operated by James Hanson with butter making on the ground floor and dances held townships, E. J. Pfluger and M. Hackett were two of the first officers. Butter makers were: H. Hanson, Henry Bille, Peterson, Charles Schermer and Harold Wallich. Miller Bros. of Cumberland ran it many years after the banks closed in the 1930's.

The McKinley Cheese Factory Assoc. ran from 1908 to 1926. First officers were: Sebastian Rose, E. J. Pflueger, Chas. Renstrom and Anton Lundmark. Oscar Tappoln was the first cheese maker, Fred Moser operated it for a number of years; about 1924 the Association sold it to Mr. Thill. It burned down in 1926.

The McKinley Community Hall was about 1-1/4 miles north of the stores. Oscar Tappon was the big push behind it, about 1910-11. Gus Risberg offered dances, boxing and sparring matches.

Kendahls had a resort on the upper end of Largan Lake, tourists coking by train to Cumberland where they were met with wagons.

The McKinley Telephone Co. was formed in 1908 and in business until 1938.

The McKinley Threshing Association was active from 1919 to 1941. It was made up of farmers from McKinley and Maple Plain. Members were: K. F. Heinecke, Henry Peterson, Victor Nystrom, Robert Millin, Israel Risberg, Chas. Renstrom and W.F. Weaver. They bought a 10 ton steam engine and grain separator.

Helen's Store opened in 1933 as a tavern by Milan and Sam Momchilovich. When the town voted "dry" Sam started selling farm machinery then moved to "Sam's Corner" in Cumberland. Helen ran the attached grocery store until 1950.

Neilson's Trucking was run by Alfred who bought a truck from Art Lundstrom, one of the first to haul cattle to South St. Paul from his area. Charlie Odell worked for Alfred for a number of years.

Farming is the only home business left in McKinley.

McKinley Telephone Company

Compiled by Stanley and Irene Risberg

The first meeting called to organize the Telephone Company was in September of 1908. E. J. Pfluger was appointed chairman and Anton Lundmark the secretary. A motion was made to appoint one man from each direction to go around to see if they could get enough signers to build a line. In due time the McKinley Telephone Company was organized, selling shares at twenty-five dollars a share, which entitled each shareholder to one phone, each party to furnish his own instrument. Lines were built and kept up by the farmers. In an article from the Cumberland Advocate files of May 13, 1909, it states that a final adjustment of the differences between the McKinley Telephone Company and the Cumberland Telephone Company had been reached: the McKinley people to purchase the country lines of the Cumberland Company and establish an exchange in this city for the accommodations of their lines, but will not seek local business, The Cumberland Company will make no extension into the country, and there will be free exchange service between the two. This new agreement was signed to last seven years.

Some of the first officers elected were E. J. Pfluger - President, Carl Hanson - Vice President, C. J. Poulter - secretary, Oscar Risberg - Treasurer, the following as directors - John LeJeune, Anton Lundmark, John Peterson, and D. C. Keeler.

With phones installed in the homes of the farmers, connected with business places of the city, it became a mutual advantage to everyone.

Oscar Risberg, Stanley's Dad, purchased the first share in March of 1909, which was never redeemed and is still in existence, as are three other twenty-five dollar shares.

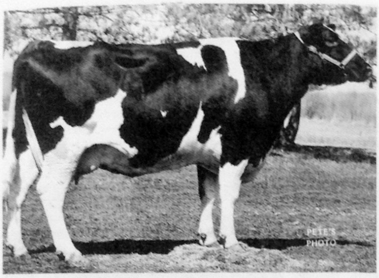
Ed Hunnicut became manager of the McKinley Telephone Company when it became a part of the Cumberland Exchange. on April 1, 1938, the Cumberland Company bought the former McKinley Telephone Company, absorbing it into its system.

- - - - - - - - - - - - - -

Dairying In McKinley

By Robert Behling, Clark Damon & Roland Renstrom

Shortly after the first settlers arrived the need for dairy cows became apparent. With the first purchases of dairy cows in McKinley a difference was established between this and other communities as they started the breeding of high quality cattle which continues to the present. The first recorded owner of dairy cows was Samuel Grenquist. He bought a red and white cow from Ole Englebrit of Comstock for $40.00. She was adorned with long horns decorated with brass knobs. A second cow purchased from Mr. Skoug on Straight River for $28.00. As McKinley became more settled dairy cattle owners increased rapidly until there were nearly 100 herds from 1910 -20. At first most milk and dairy products were used at home but as

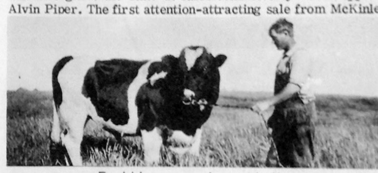


Hibb Acres - Lucifer Prilly Lou EX 2 E - Highest priced female ever sold in McKinley 4500 1975. Sold by Gordon Hibbs.

numbers of cows increased butter was sold in Cumberland. Later cream was hauled and sold to the Bone Lake Creamery but as the need for milk handling facilities increased the local farmers organized the McKinley Cheese Factory in 1908. A second facility was the Four Corners Creamery on Clam River. With better roads and transportation there was a move away from small creameries and cheese factories to larger plants nearby. In 1929 the first Grade A milk was sold to Abbotts dairies at Cameron. This was the first Grade A milk from Polk County. With improvement of these dairy herds interest developed in purebred cattle. We don't know dates of the first purchases of registered cattle but it was around World War I. Evald Larson had a purebred Holstein bull, another early owner was Clau Hagge. His first registered cow was Beauty of Breezebrook, a Holstein. He made numerous purchases of high quality cattle from Minnesota and the influence of these cows was felt in many McKinley herds for a long time through his sales of bulls. Fred Metcalf, who farmed on land now owned by Robert Behling, purchased Duwaney breeding stock. His purchases included offspring of Sir Peteitje Ormsby Mercede 38th, foundation of the Ormsby bloodlines. He paid up to $800 for females, financed by the Island City Bank of Cumberland. Walter Behling purchased Segis Pontiac breeding Roy Damon Alcartia breeding and offspring of these animals were around for many years. Fred and Ernest Mazey owned registered Guernseys in 1918.

Ellis Behling and Harry Sherman farmed in partnership on the farm now owned by Paul Steelhammer. They had some registered cows but registration was dropped in the depression of 1929. Other breeds of purebred cattle were also introduced. E. J. Pflueger purchased registered Milking Shorthorns in the early 1900's. These cattle were walked from Cumberland to their farm on Larigon Lake and were sold after his death in 1930.

A number of families have enjoyed several generations of farm and dairy ownership: Grenquists now in 4th generation, Renstrom,s John Peterson, Lundmarks all developing high producing herds on fine farms. First Lundmark foundation stock purchased from Herb Germanson in 1931. Among early purchases was the great Becker cow for $800. First herd tested for production was Frank Lundmarks' in 1933. With the start of Polk County DHIA in 1938 many other farmers started production testing. W. W. Bowers moved to the Mazey farm about 1943 and brought with him a small herd of very high quality registered Holsteins. Robert Behling started his herd of registered Holsteins in 1945 while farming with his father Ellis. This all registered herd is now enjoying 4th generation of dairymen, with children of Robert Behling. Continuing the trend of high quality was the herd owner by Gordon Hibbs, dispersed in 1975 because of the loss of barns by fire but now in the process of rebuilding, and the all registered herd owned by Wayne Picknell on the former Robert Peterson farm. While the number of dairy herds has declined in recent years dairying remains No. 1 in McKinley. New dairymen ar e Richard Nordquist on the farm once owned by Claus Hagge; Vernon Tiggeman on the former George Lansin farm owns foundation purebreds from the Hibbs herd, Harley Pederson purchased the Irvin Peterson farm and herd which has some registered Holsteins operated by three generations of Petersons; Stanley Anderson recently added registered Holsteins. Clarke Damon recently sold his purebreds. Although a small herd, Clarke always maintained high interest in bloodlines. To show the full impact of a high quality dairy industry we relate a few accomplishments of the Purebred herds of McKinley that have made their mark on the industry in the U.S. and even in foreign countries. As these fine herds developed surplus stock was offered at auction and private sales. In the late 1930's the Barron Sales Association began to bring in out of state cow buyers. We must remember Glen Krahenbull and Otto Borowski who assisted us in selling many spring cows and heifers. We remember large sales by Renstroms, Lundmark and others and buyers such as Jacob Greenberg from Pennsylvania. These people had great confidence in McKinley area cattle. Many animals have been sold through consignment sales at Barron, Polk County sales at Balsam Lake and throughout the state at sales conducted by Bob Koepp and Alvin Piper. The first attention-attracting sale from McKinley



Evald Larson and prize bull.

was that of the highly proven Midlane Vale Ormsby Duke by Frank and Lee Lundmark and Carl Nelson of Barron to Wisconsin Scientific Breeding Institute for $5,000. This organization was the forerunner of the American Breeders Service which purchased Green Notch Segis Ginger from Ellis and Robert Behling and Vincent Jesse of Barron for $10,000 in 1959. The Behling herd provided bulls to two domestic bull studs and sold one bull to France. The first female to exceed $2,000 in price, Lundmark Pride Lass Nanette, was sold by Lee Lundmark for $2200 in 1963. Highest priced female ever sold from McKinley was Hibbs-Acres Lucifer Prilly Lue sold for $4500 following the Hibbs fire. McKinley's only Gold Medal cow Larigon Fond Hope Annette was bred and is owned by Robert Behling. She is former Wisconsin State Butterfat record holder for Junior four year olds. Behlings are Polk County's only Progressive Breeders Registry award winners to earn this recognition more than one year. Polly Segis Ormsby is Wisconsin's highest lifetime cow for milk and butterfat. She was bred and owned in the Behling herd.

To show the exact spot in history as of this year, 1976, we list the present dairymen. * denotes purebreds.

A. Stanley Anderson*, Milford Anderson, Robert Behling*, Owney Bowen, Gordon Conrad, Clark Damon*, Jack Denver, Carl Erickson, Leonard Grenquist and Sons*, Gordon Hibbs*, Walter Hibbs, Frank Hiller, Alfred Holst, Lee Lundmark and Sons*, Ralph Monchilovich, Steven Nystrom, Richard Nordquist, Harley Pederson*, John Peterson*, Wayne Picknell*, Roland Renstrom and son*, Jerry Sundvall, Vernon Tiggeman*.

In conclusion the committee hopes this will highlight some of the accomplishments of the dairy industry in McKinley. We apologize for errors and omissions.

Committee: Robert Behling, Clark Damon and Roland Renstrom.

and her family are now in Bolivia, S.A.; Esther, Mrs. August Dombrock, lives in St. Croix; Margaret, Mrs. Ed Johnson, in Hudson and Vera in Minneapolis. Clara and Paul have a daughter, Sarah, Mrs. Allen Olsen, who lives in Salem, Oregon as does Elsie Grenquist Slottum. The Olsens have two children.

EDGAR ANDERSONS
By Connie, Mrs. Russ Anderson

The fall of 1957 was the first time I became acquainted with the area of McKinley; I'd met Russ Anderson and one Sunday evening we were taking a ride out to the Anderson farm in Johnstown to do the chores while the folks were gone. The next trip out there about a week later was to meet the folks in person and Edgar and Mary got to be important names in our lives. Russ and I were married in Frederic in 1957, and lived there until the following year, when we purchased a trailer home and set it up on the farm. The animals we dragged home I suppose were a source of irritation for Gramp and Gram; these included dogs, pigs and chickens. The chickens were a rare kind and Gramp said they were birds with their bloomers on. But Gramp and Gram like to make tapes of the cows mooing and the chickens cackling to send to their grand-daughter in California. These people worked hard, as did all folks their age, the endless rock-picking and long days in the fields; but evenings still brought fun and laughing with friends and relatives. Many of their relatives' kids spent their summers at Uncle Edgar's.

When Mary, as a young girl, arrived in the area, they walked from Golden Valley with possessions and cattle and lived on the Land place, which later became known as the Quasbart farm and now is owned by Stanley Anderson. Grampa Edgar lived and grew up on the farm now owned and lived on by the Stanley Anderson's. Dad loved to tell how he'd walk over to the Land farm to "court" Mary. When they married in 1922, they owned what is now the Dueholm place and after Russ was in High School they bought the present home place from Fred Anderson (no relation). Through the years they built and remodeled all the buildings there. Their first son, Burnett, was born in 1923, Russ in 1927, and daughter Carol in 1930. Burnett and Geraldine live in Minneapolis; they have two children. Carol (Mrs. Donald Haesman) lives in California; she has one child.

Russ and Conniejeane live in their new home just south of the place they bought after Tom and Minnie Odell died and where Raymond Weavers now live.

They have Michael, in the Navy, Tim at Eau Claire, and Jeff at home. Russ and Connie have been Foster Parents for 12 years with Ed Wichelmann and Jim Morris now with them. Also an adopted daughter Karen who is married and lives in Fla. With the help of super grandparents Edgar and Mary, who pulled these extra grandchildren under their wings, Edgar's humor and tricks, and Mary's gentleness and full cookie jar, the fear barrier was broken for all these foster children, and every child loved them.

I remember our second visit and Mary saying, "Russ and Connie are here, Dad", and Edgar, from the living room asking, "Who the hell is Connie?" Well, he sure found out, and our family bond has meant very much to all of us.

Mary's mother, Grandmother Land, lived with Edgar and Mary until she died. We never knew Grandpa Land, but Russ remembers many hours of fishing with him in the area lakes. We once attended a Land family reunion in Minneapolis and I remember looking at all those people, not believing they all belonged to the Land clan. After 18 years, I still don't know them all. When Jeff was born, he was the 57th Land grandchild.

I have loved the McKinley area ever since Russ and I were married. It is a warm, friendly area. When I was a child we lived in many places but not until here did I feel my "roots" were home. Russ is in carpentry, like his father. Mary moved to Edina, Minn. after Edgar died in 1972. He left us in body, but his spirit remains with all his family and in the buildings in every direction he helped build or remodel.

ELLIS AND STASIA BEHLING

What a wonderful time we had dancing in the Town Hall at McKinley. George Risberg, John Rose and Art Wickstrom played dance music. The young people were so friendly. In winter boys would take their dad's team of horses, get a sleigh load of boys and girls and we would drive several miles to a barn dance. These are days I will never forget. Had lots of fun skating on Grenquist Lake. Henry Weaver broke through the ice and nearly drowned. He lost one skate, took the other one off and threw it in the lake. He never went skating again. We had lots of basket socials at the Hall to raise money for churches and school, and the women made things to sell.

I left home and went to work in a hospital at Worthington. My oldest sister was expecting a baby and I went to her home to care for her. A Dr. was called but the roads were so bad with snow it took him too long to go nine miles and by the time he arrived everything was taken care of and the baby girl was fine. After I quit working at the hospital I went to Marcus, Iowa to take care of a bed ridden lady and her three year old brain damaged son. I took care of my mother when she had her last two children and helped Margaret Hettling when she was with Mrs. Laurence Nystrom. Again, a doctor had been called but his horses couldn't get through the three feet of snow but a fine boy was born and the mother was fine. I worked with Drs. in taking care of mothers and babies, they showed me what to do, and I never lost a mother or baby. Mothers didn't go to the hospital in those days and all together I took care of fourteen babies and mothers.

I had signed up to take training to be a registered mother and baby nurse but got a letter from Ellis asking me not to enter the LeMars hospital for training since he was coming home soon and wanted to get married.

The war was over. We were married November 12, 1919 at Corpus Christi church. Father Colejauni married us. We went to St. Paul to live. Ellis was a Yellow cab driver until joining the work crew building the Montgomery Ward building. He was foreman of a concrete crew until the building was done. He was signed up to go to California to work on another building. A depression had started and the labor crew struck for more wages. The company could not pay more so cancelled the building contract. We left the Cities and came home. Ellis worked on the road, I cooked. In the winter he logged. When spring came we went farming. Horses were $300 or more. We bought a young mare that had a foot badly damaged from a wire cut, got her for $150. She was a good brood mare and had lots of colts. We had to keep her shod. She was a good work horse. Ellis bought another horse and a pair of mules from Jack Frost. We did get our farm work done. Ellis' parents helped us all they could. I raised chickens and made a garden. We picked lots of wild berries of all kinds. One time I canned 60 quarts of wild strawberries and made lots of jam. I used to can 500 quarts of fruits and vegetables, also meat. One winter Ellis had a logging job with Gus Risberg. We got up at three thirty in the morning had all our chores done and ready by six o'clock to go to work. The logs were cut and hauled to Cumberland. I had all the chores done by the time Ellis came home at night.

One day while I was eating dinner I began to cry and was thinking about Ellis being hauled home with a broken leg. I tried to think I was nervous from too much work but walked to the window and saw Ellis, with a broken leg, being hauled home on a stone boat. A log had rolled off a sled they were loading. They had to phone to a neighbor for a car that could come within a mile of our place to take Ellis to the hospital. Brother Henry helped me with chores and another young man took Ellis' place in the woods. It was late spring when Ellis got out of the hospital. We hired his brother Ed to do the farming. Robert was born March 31, 1931. At that time we bought the Metcalf farm and moved on it when Robert was two years old. The house was a shed setting on stones on the shore of Largon Lake. The barn across the creek (and a very poor barn) and we had no well. We had a basement dug for the house and the County road crew moved our house on it. We let them tear out a root cellar to get gravel from our pit. Had a well drilled and got very good water.

We paid interest on the mortgage and nothing on the principal for five years, then we were to pay on the mortgage. The depression of 1935 hit us so we couldn't do it. Roosevelt was our president. He stopped all banks from closing and put a moratorium on all farm mortgages for five years. By the end of five years we could pay on what we owed. We built a barn, machine shed, granary and started using a tractor. When we got electricity we bought a Gibson refrigerator from Roy Curnow, which has been working all these years. We also got a deepfreeze from Talbots in Cumberland around 1947 and it is still running.

We also had some good times. Ellis' largest deer was a 10 pointer, I got a 9 point buck and Bob has gotten quite a few deer. When Bob was fourteen his father was shot when a boy's gun discharged and hit Ellis three inches below the thigh. This happened on Charlie Peterson's place. Duane Damon drove the car to town over very icy roads and got Ellis to the hospital. He was there 72 days. We hired my brother Joe to help with the work but couldn't afford to hire any longer and Bob had to quit high school to help farm. I had my flock of chickens, sold eggs, dressed the old hens and cockrels and with money remodeled the house, built a bathroom and closed in porch, also enlarged the front room. The house is comfortable.

Ellis helped to organize the Farmers Union. Bob got his high school diploma by going to night school. Bob, Shirley and six children are taking care of the farm. They have a nice home, I have a lovely daughter-in-law and enjoy my grandchildren. I am feeling very good. Am 77 years old. Ellis died the 16th of January 1960.

Mr. and Mrs. Walter Behling lived in Indian Creek before they bought a farm in McKinley. Their first child, a little girl, died of diptheria. They had four boys. George and Ellis were in World War One, Ed was rejected for a heart condition. George married Laura Delaney; Ellis married Stasia Weaver; Edward, Anna Larson; and William, Pauline Hagus. The Behlings were hard workers. They raised rutabagas for cash crop and had a very good herd of Holstein dairy cows. Mr. Behling always bought a registered bull. Mr. Behling repaired and made harness for the logging camps. They did their share of work for Corpus Christi church. Mrs. Behling was a very good cook and everyone that came to their home was welcome to eat.

I don't know of anybody that could pick so many wild berries. We took fifty pound flour sacks with us and went picking cranberries on Kelly Lake. It was very boggy. We each picked the sack full of large cranberries. The bog was springy when we walked on it but we never broke through. I don't know how deep the water was. Mrs. Behling had a horse she drove as far as she could, then we walked. One day we went blueberrying. We found a patch about a mile away and each had two 14 quart pails full when we started for home. Bill Behling met us and helped to carry the berries home. After dinner Mr. Behling, Ellis, Bill, Mrs. Behling and myself went back to finish picking the patch. In the afternoon we picked 100 quarts. Ellis and I sold ours to the Company Store for 10¢ a quart. We haven't had blue berries for many years. No fires to burn the old plants, insects moved in, most of the land is pastured and cleared now.

After Walter Behling died one of his brothers came to our place. He was the youngest of nine children. That was the first we heard about his family. Mr. Behling came from Milwaukee, the oldest of the nine children. When he died he was 90 years old, 10 years older than he said he was. Never had a sick day in his life and had most of his teeth. He died suddenly of a heart-attack and is buried in Corpus Christi Cemetery. Mrs. Behling passed away at the age of 80. George, Ellis and Edward have passed away, William lives in California.

Mrs. Behling's name was Adelaide. She and her twin sister Adele Bonneprise planted an elm tree on the home place at Farmington when they were girls. The tree is very large. When I saw it last year (1975) it still looked healthy.

P. G. BERKLUND FAMILY
By Norman and Irene Berklund

Gustav Berklund (Bjorklund) and his wife Amanda came from Piteo, Sweden where Claus and Bertha were born. Olga was the first white child born in McKinley and now lives in Cumberland at the age of 91. Naomi, Hilda, Lottie, Maurice and two Walters were born to them here. The first Walter drowned in the well by the porch at a very early age. There were nine children in all.

Gustav Berklund Family – (left to right) Back row: Claus and Bertha. Bottom row: Gustav, Naomi, Maurice, Lottie, Olga, Hilda and Amanda.

Gustav was one of the three first homesteaders and the farm was in the family until Norman and Irene moved near Luck. Amanda lost her left leg when still a young girl in Sweden and walked on a "peg leg." Very active, a noted tailor and dressmaker and quilter, she loved to attend religious "camp meetings," and would take her horse and buggy and several of the children and drive off to Trade Lake or Poskin or Cumberland to attend. Gus made all their shoes from deer and cattle hides, using boiled pine pitch to strengthen the thread. He died in 1901 and Amanda lived on to be 96.

Maurice and Mattie (Paulson) Berklund once lived in a home owned by Axel Renstrom and built by Anton Lundmark back of the cheese factory. He worked for Oscar and Emil Risberg, hauling freight from Cumberland, and helped Oscar Erickson build the school on Big Round Lake. The family lived in Duluth, where he was employed as a drayman, and he remembers taking bodies to the mortuaries during the 1918 flu epidemic. In 1921 they settled at McKinley and took over the home farm. He also worked for the Polk County Highway Dept. with Everett Phillips, Carl Nystrom, Frank Lundmark, Dude, Adrian, Elmer and Art Lundmark. Neighbors were Frank Ericksons, Jim Lazier (where Heggestads now live), Billy Kasabin, Anton Erickson and Gus Lindahl. Mattie died in 1947

Largon Lake Historical Documents

The following documents (submitted by Robert Rose) show the owners before his Grandfather (Robert T. Browne) and who he bought it from Ernest H. Mazey's widow Agnes J. Mazey in 1948.

CONTINUATION OF ABSTRACT OF TITLE TO

Part of Government Lot 1, Section 10-36-15, Polk County, Wisconsin.

5

County Court, Polk County, Wisconsin
In the Matter of the Estate of
Ernest H. Mazey, deceased

Judgment Assigning Estate
Dated June 8, 1922
Filed June 24, 1922, Instr#152973
Recorded in Vol. 2, page 55

The Court finds: that there is no income tax due or to become due or unpaid against said decedent or said estate.
That said estate is not liable to the payment of a transfer tax.
That said decedent died seized of the following real estate in Polk County, Wisconsin:
Lot 1, Section 10-36-15, and otherR.E.
That said decedent left him surviving Agnes J. Mazey, his widow, his only heir at law.
Wherefore, It is Ordered and ADjudged that the account of said adminstrator as stated aforesaid be and the same is hereby allowed.
And it is further ordered and adjudged that the real estate aforesaid be and the same is hereby assigned to the said heirs at law in common and undivided, to wit: to Agnes J. Mazey. Carl M. Lynn, Judge. Seal.
Certificate of transcript dated June 8, 1922, by Register in Probate. Seal.

6

Agnes J. Mazey, a widow
to
Robert T. Browne

Warranty Deed
Dated Dec. 21, 1948
Filed Feb. 27, 1950, Instr#255846
Recorded in Vol. 145 Deeds, pg. 126
Consideration - $1.00 and O.V.C.

Conveys and Warrants, all that part of Lot 1, Section 10-36-15, described as follows: Beginning at the point where the East line of Lot 1 intersects the North shore of Largin Lake; thence North along the East line of Lot 1, 440 feet; thence West 180 feet, thence South 50 feet, thence West 20 feet, thence South 95 feet, thence South at 20 a distance of 160 feet, more or less to the shore of Largin Lake; thence Easterly along the shore of Largin Lake to the point of beginning.
Also an easement for the purpose of ingress and egress to and from the premises thereto fore described, and for all other purposes connected with the use thereof, to pass and re-pass along and over a strip of land approximately 12 feet wide extending from the Northwestely boundary of the premises heretofore described in a northerly direction across said Lot 1, Section 10-36-15, to the road which runs East and West across the Northerly portion of said Lot 1. Said strip of land to coincide with the present travelled route.

7

County Court, Polk County, Wisconsin
In the Matter of the Estate of
Robert T. Browne, Deceased

Ancillary Letters
Dated Aug. 18, 1972
Filed Jan. 19, 1973, Instr#350941
Recorded in Vol. 348 Records, pg. 387

Richard A. Browne is hereby appointed Ancillary Personal Representative of the Estate of Robert T. Browne, deceased, who died on July 21, 1971, and fully qualified.
Charles D. Madsen, Judge. Seal.

8

Register in Probate,
Polk County, Wisconsin
to
Public

Certificate
Dated Jan. 19, 1973
Filed Jan. 19, 1973, Instr#350941
Recorded in Vol. 348 Records, pg. 387

Certifies that the instrument shown at No. 7 hereof is a true copy of the original on file insaid office.
I furter certify that said letters are still in full force and effect. Seal.

POLK COUNTY ABSTRACT CO. — Balsam Lake, Wisconsin

PREPARED BY

POLK COUNTY ABSTRACT COMPANY

BALSAM LAKE, WISCONSIN

To The Following Described Lands, Situated In Polk County, Wisconsin, To Wit:

Part of Government Lot One (1), Section Ten (10), Township Thirty-six (36) North of Range Fifteen (15) West, described as follows: Beginning at a point where the East line of Lot 1, intersects the North shore of Largin Lake; thence North along the East line of Lot 1, 440 feet, thence West 180 feet, thence South 50 feet, thence West 20 feet; thence South 95 feet, thence South 20° West a distance of 160 feet more or less, to the shore of Largin Lake; thence Easterly along the shore of Largin Lake to the point of beginning. - From August 9, 1949, 8:00 A.M. - Except Patent, which was recorded prior thereto.

1

United States
to
William Westover and Horace H. Culver

Patent
Dated Dec. 10, 1872
Filed Dec. 5, 1908, Instr#77863
Recorded in Vol. 17 Deeds, pg. 194

Grants, Lot 1, Section 10-36-15, and other R.E. Pursuant to act of Congress approved April 24, 1820.
Certificate dated November 24, 1908, Seal.

2

The United States of America
to
William Westover and Horace H. Culver

Patent
Dated Dec. 10, 1872
Filed Aug. 14, 1968, Instr#328701
Recorded in Vol. 298 Records, page 518

Grants, Lot 1 of Section 10-36-15, and other R.E.
Pursuant to an Act of Congress of April 24, 1820, entitled "An Act making further provisions for the sale of public lands" in the district of lands subject to sale at Falls of St. Croix, Wisconsin
Executed by U.S. Grant, President, by Secretary and Recorder of General Land Office. L.S.
I hereby certify that this photograph is a true copy of the patent record, which isin my office, Dated August 2, 1968. William K. Dorasavage, Certifying Officer, U.S. Department of Interior, Bureau of Land Management. Seal.

3

Ida Kendall
to
Ernest H. Mazey

Warranty Deed
Dated Oct. 13, 1919
Filed Dec. 1, 1919, Instr#135892
Recorded in Vol. 94 Deeds, pg. 61
Consideration - $3000.00

Conveys and Warrants, Lot 1, Section 10-36-15. Revenue $3.00.

4

Ernest H. Mazey and Agnes J. Mazey, his wife
to
State Bank of Cumberland

Mortgage
Dated Oct. 13, 1919
Filed Dec. 1, 1919, Instr#135893
Recorded in Vol. 80 Mtges., pg. 505
Consideration - $1000.00

Mortgages, Lot 1, Section 10-36-15.
Insurance, option and tax clause.

POLK COUNTY ABSTRACT CO. — Balsam Lake, Wisconsin

Beaver Dam Lumber Co. Camp Larrigan Lake: 1896-1897

FROM ST. GERMAINE'S CAMP
IN THE LARRIGAN LAKE AREA.

1907 to 1908 – Section 32, Township 36, Range 15

N E POIR CO
WATER TANK FOR ICING ROADS,
ST. GERMAINE'S CAMP. LOGGING
ROAD WAS ON A SECTION OF WHAT
IS NOW COUNTY TRUNK "E," EAST
OF LARRIGAN LAKE. -LATE 90'S-

Photo Credit: Michelle Frantzen

Photos from Largon Lakers

Design Editor
Michelle Frantzen Red Pine Concept & Design 2023

~ Special thanks to all the Largon Lakers for sending their photos! ~