Staples Lake Comprehensive Management Plan 2022

Final Draft – 7/6/22

Staples Lake
Protection &
Rehab District

Staples Lake
Comprehensive Management Plan
2022

prepared by:

Staples Lake Protection & Rehabilitation District

with planning assistance from:

West Central Wisconsin Regional Planning Commission

and technical support from:

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<insert Lake District Plan Adoption Resolution>

Table of Contents

I. Staples Lake Protection & Rehabilitation District

A. The Staples Lake District

The Staples Lake Protection & Rehabilitation District (the District) was originally established as a lake association. In July 1987, the District was formed, registered, and incorporated as a nonstock corporation.

The Lake District encompasses 92 properties on Staples Lake within the Town of Crystal Lake, Barron County, and currently does not include any properties in Polk County. In 2021, the properties within the District had a locally assessed value of real estate and personal property of over $12.6 million, which is 15.6% of all taxable real estate and personal property in the Town.

The Lake District owns three properties totaling about 2.23 acres at or near Staples Lake, including the 0.227-acre dam site on the south side of the Lake, a 0.001-acre property associated with the aerator on the east side of the Lake, and a 2.0-acre property bounded by Staples Creek and 20 ½ Avenue to the north of the Lake.

As an incorporated lake district, the District is required to meet the rules of Chapter 181 of Wisconsin Statutes for nonstock corporations as well as Chapter 33 of Wisconsin Statutes for lake districts.

Staples Lake District Board of Commissioners & Officers

District member appointments (5)
- Chris Ryan , Chairperson
- Dan Fisher, Secretary
- Howard Ketel, Treasurer
- Theresa Smiley
- Tina Ketel

Barron County Board appointment
- Jim Gores

Town of Crystal Lake appointment
- Open; appointee requested

B. About Lake Districts

Public inland protection and rehabilitation districts (or lake districts) are special purpose units of government created for the purpose of maintaining, protecting, and improving the quality of a lake (and often its watershed) for the mutual good of district members, the lake environment, and the general public. In support of this purpose, Chapter 33 gives lake districts certain, broad powers, such as:

- Sue and be sued; make contracts; accept gifts; purchase, lease, devise or otherwise acquire, hold, maintain, or dispose of property; disburse money; contract debt or use any other financing method prescribed by law; and do any other acts necessary to carry out a program of lake protection and rehabilitation. This includes undertaking projects to enhance recreational uses and, in some limited circumstances, the ability to regulate lake use.
- Levy taxes and special assessments.
- May require that a contracting party give adequate security to assure performance of the contract and to pay all damages that may arise from inadequate performance.

- May create, operate, and maintain a water safety patrol unit and contract with certified law enforcement for enforcement. Lake districts that operate water safety patrols may be eligible for state aid.
- With certain exceptions, may have the powers of a town sanitary district.
- Work cooperatively with other governmental bodies and private organizations to carry out authorized activities.

Residents who live in the district and are eligible voters and all property owners have a vote in the affairs of the district have certain powers under Chapter 33, such as authorizing the borrowing of money and approving the annual budget. Every lake district must conduct a properly noticed annual meeting. Special meetings of the district may also be scheduled and conducted if needed. Electors can also authorize the district to exercise certain additional powers, such as the inspection of septic systems, providing financial assistance for the replacement of failing private septic systems, and the appropriation of money for use by nonprofit organizations to undertake beneficial conservation effects.

Management, coordination, planning, budgeting, and most programmatic decision-making for a lake district is carried out by a Board of Commissioners, for which the composition, eligibility, officers, and responsibilities/powers are established in Chapter 33. The Board of Commissioners is required to meet at least quarterly. As a unit of government, all District meetings, including the annual, special, and board meetings, are subject to the Wisconsin Open Meetings Law and Wisconsin Public Records Law.

People of the Lakes: A Guide for Wisconsin Lake Organizations available at the UW-Stevens Point website is an excellent resource for more information on forming and operating a lake district or association:

https://www.uwsp.edu/cnr-ap/UWEXLakes/Pages/organizations/guide.aspx

II. Plan Background

A. Plan Purpose

A comprehensive lake management plan determines water condition and quality, identifies threats, problems, and causes, and provides a strategic direction and timeline for implementation of management objectives. Lake management planning also brings the lake community (e.g., lake district/association, local governmental units, non-profit conservation organizations, watershed residents) together. The planning effort can be educational, nurture partnerships, and foster a community consensus on shared goals and priorities. A lake management plan that meets Wisconsin Department of Natural Resources (WDNR) guidelines also strengthens the lake community's ability to pursue grant resources for plan implementation, though a plan is not a prerequisite for all WDNR surface water grant activities.

B. Plan Scope

This management plan analyzes available information about Staples Lake, which informs decision-making and the prioritization of objectives and strategies for lake protection and rehabilitation efforts. The planning effort also enhances the Lake District's and community's knowledge and capacity to achieve their objectives. It was also the District's desire to engage all shoreland owners as well as residents throughout the Staples Lake drainage basin in identifying long-term solutions to the water quality challenges at the Lake. Based on community surveys and meetings, the primary emphasis of this management plan are the water quality challenges facing Staples Lake and its fishery.

C. Planning Process

In 2021, with assistance from West Central Wisconsin Regional Planning Commission (WCWRPC) the Lake District secured Wisconsin Department of Natural Resources (WDNR) grant funding to create a lake management plan. After a search for planning consultants, the Lake District contracted with WCWRPC to facilitate the planning process. The District also contracted with Noah Berg, Lutra Biological, to update the aquatic plant survey and conduct a shoreline & nearshore woody habitat assessment as part of the grant project.

Community engagement during the planning process included:

- A shoreland property owner survey that was mailed and completed in Winter 2021-2022.
- A community kick-off and informational meeting on February 18, 2022, for which all watershed property owners were in invited to join in person or through Zoom.
- A web-based goal-setting survey in March 2022, for which all watershed property owners were invited to participate.
- Two planning work group meetings with Lake residents in April & May 2022.
- Multiple Zoom meetings with District Commissioners.

Technical support during the planning process was provided by the WDNR Lakes Biologist, WDNR Fisheries Biologist, and staff from the Barron and Polk county conservation offices, including their participation during the work group meetings and additional discussions.

D. Public Comments on Draft Plan

On July 13, 2022, the draft management plan was made available for public download and review at the Lake District's webpage. The Lake District notified shoreland owners, area residents, and overlapping governmental jurisdictions of the draft plan's availability and invited comment on the draft via a public notice flyer and social media.

<Add, if any, after completion of the review period on the draft plan.>

E. Plan Adoption

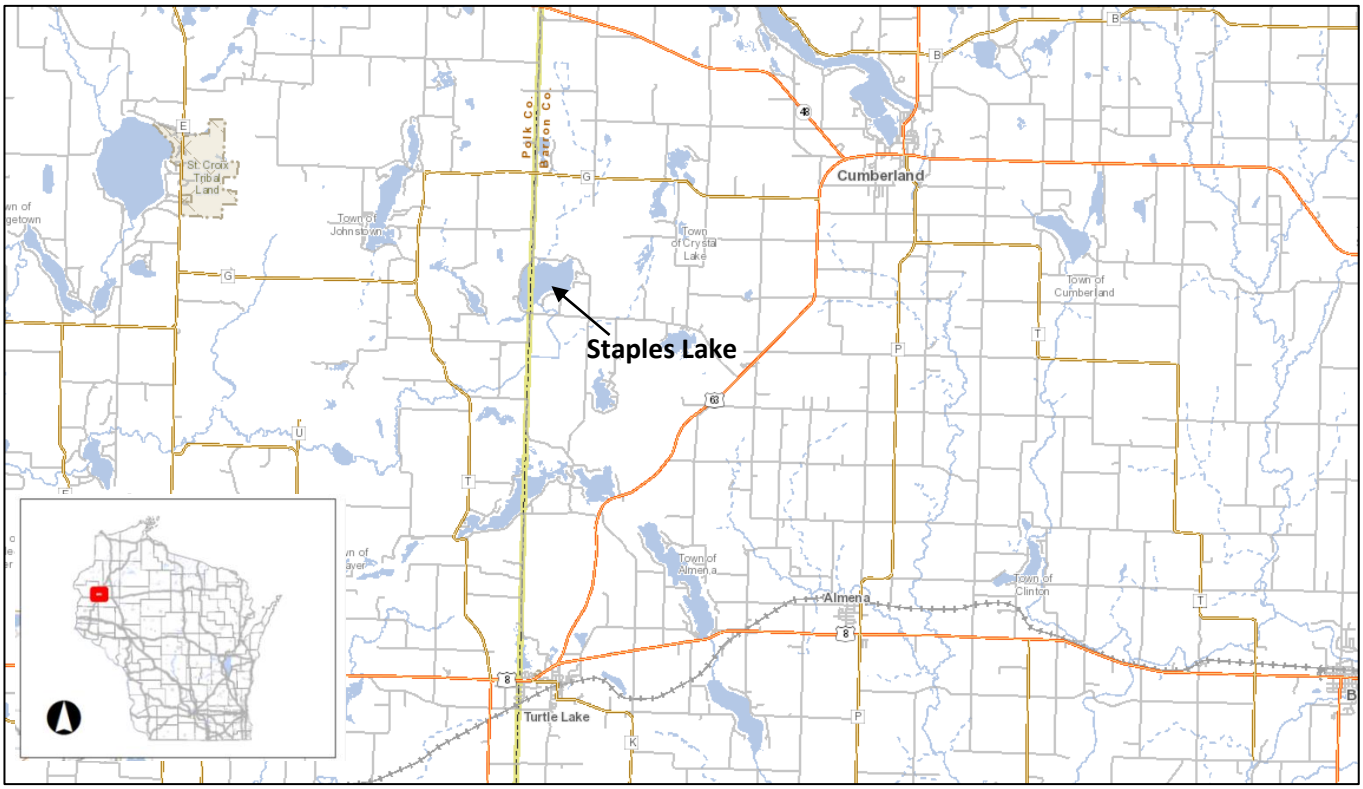
This plan was adopted by resolution by the Staples Lake District Commissioners on Month, XX, 2022.

III. Staples Lake Background

A. General Lake Description

Staples Lake is a 340-acre, shallow lowland drainage lake located in the Town of Johnston in Polk County and the Town of Crystal Lake in Barron County. The Lake is located approximately ten miles north of the Village of Turtle Lake, 6.5 miles southwest of the City of Cumberland, and four miles northwest of the unincorporated hamlet of Comstock. The outlet of Staples Lake is the headwaters of the Apple River.

Figure 1. Staples Lake Location



Map excerpt from: WDNR Surface Water Data Viewer, 2/2/2022

The Lake's primary use is for recreation, including swimming, boating, and fishing. A popular fishing lake, species present include panfish, Largemouth Bass, Northern Pike, Yellow Perch, and Walleye. Much of the shoreline is developed with homes and cottages. There are two commercial businesses near the Lake—a bar & grill and a campground. The Lake has one public boat launch and no other dedicated public access points. The lakeshore owner survey results in **Section VIII.A.** and **Appendix C** provide additional insights into Lake use.

Staples Lake has a maximum depth of 17 to 18 feet and a mean depth of 10 feet. An evaluation of aquatic plant communities found them to generally be in good condition. A number of aquatic invasive

species—Banded Mystery Snail, Chinese Mystery Snail, and Curly-Leaf Pondweed—have been verified.

Staples Lake is considered hypereutrophic (very rich in nutrients), resulting in frequent and severe blue-green algal blooms and very low transparency. Water quality assessments by WDNR has shown that both total phosphorus (P) and chlorophyll-a levels in Staples Lake water samples overwhelmingly exceeded water quality thresholds for recreational use and fish and aquatic life use. As such, Staples Lake has been added to the 303d impaired waters list for not meeting water quality standards.

Waterbody ID (WBIC):	2631200
Size:	340 acres
Maximum Depth:	17 - 18 feet
Mean Depth:	10 feet
Bottom:	45% sand, 20% gravel, 30% rock, 5% muck
Natural community:	Soft-water, shallow drainage lake
Water Residence Time:	160 days (mean summer June-Sept, median estimate)
Use Designations:	Fish & Aquatic Life; Recreation; Public Health & Welfare; Fish Consumption; General
OER Water:	Not an Outstanding or Exceptional Resource (OER) water
Impairments:	303(d) Listed[1] with eutrophication and excess algal growth.
Known Pollutants:	Total Phosphorus
Fish Consumption:	No special advisories. General limits due to mercury.

Staples Lake has two primary surface water inputs:

- **Staples Creek** – An 8-mile, largely intermittent stream that drains into Staples Lake from the north. In terms of acreage, the largest majority of the Staples Lake basin drains into Staples Creek.
- **Long Lake/Chain Lakes** – A roughly 4-mile, largely intermitted stream also drains into Staples Lake from the south and west. This stream connects a number of lakes, the largest of which is Long Lake—a 61-acre seepage lake with a maximum depth of 44 feet.

[1] A surface water that does not meet Federal Clean Water Act standards may be added to the 303(d) list as an impaired water by the Wisconsin Department of Natural Resources. WDNR is required to update the 303(d) list every two years.

B. Larger Watershed Context

Staples Lake is the headwaters of the Apple River. The 3,123-acre Loon Lake Wildlife Area, which consists of rolling upland oak, maple and aspen forest, grasslands, waterfowl flowages, pothole lakes, and lowland brush, is located immediately to the south of Staples Lake and is connected hydrologically to the Lake via the Apple River.

As shown in **Figure 2**, Staples Lake is part of the Apple River Watershed, which is part of the larger Lower St. Croix River Watershed (HUC8) and falls within the *Implementation Plan for the Lake St. Croix Nutrient Total Maximum Daily Load*, which expires in 2025. This plan and corresponding Total Maximum Daily Load (TMDL) were largely created to address excess phosphorus and algae blooms on Lake St. Croix, but recognizes that phosphorus loading is a water quality challenge throughout much of the larger watershed. To meet the Lake St. Croix TMDL goal, the plan targets a 34% phosphorus-loading reduction within the Apple River Watershed.

As will be later discussed, even greater phosphorus reductions are needed to meet the water quality standards for Staples Lake. As such, progress towards achieving the standard for Staples Lake would be a very positive step forward towards the Apple River reduction target and Lake St. Croix TMDL.

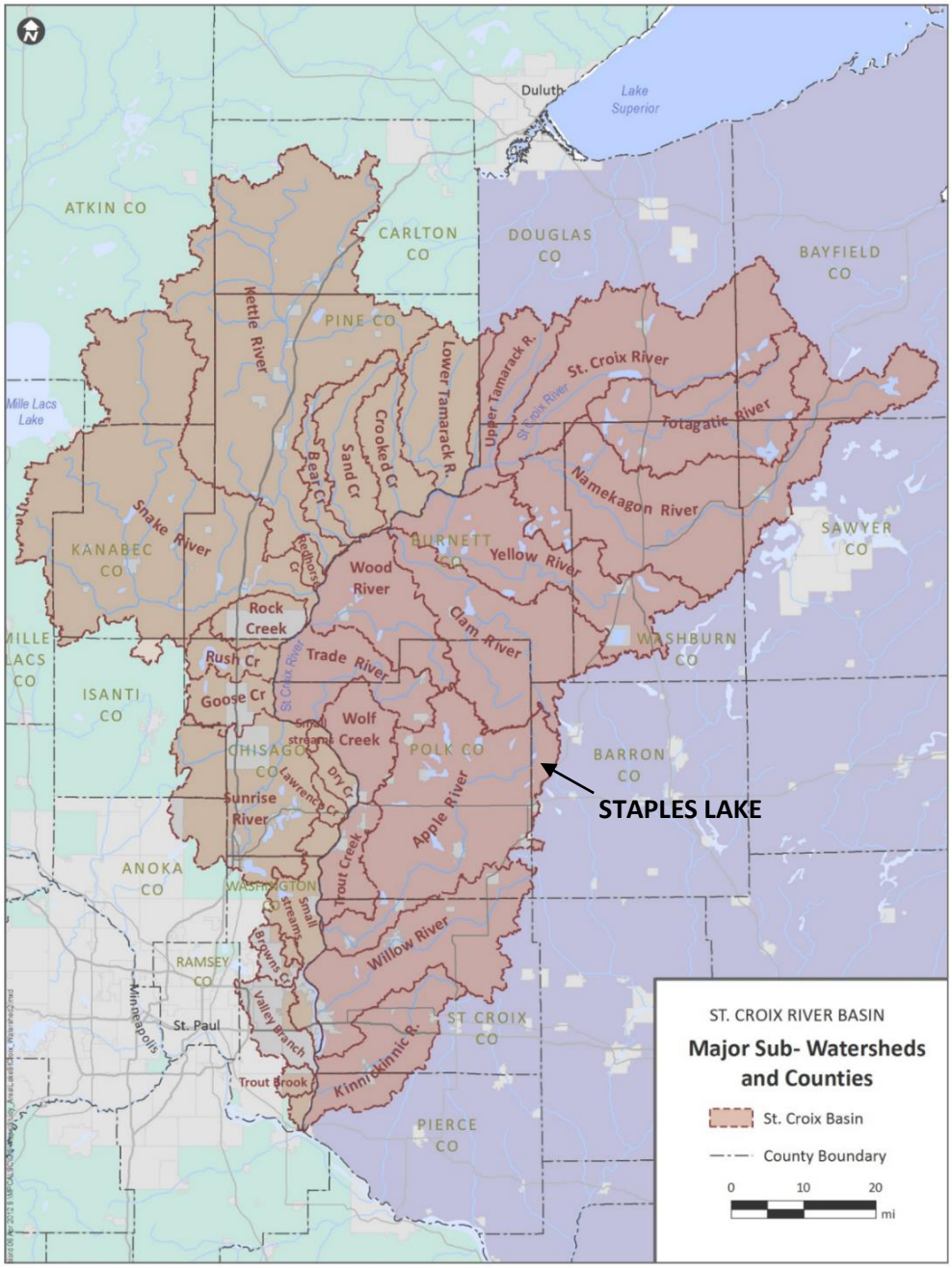


Figure 2.
St. Croix River Basin

from: *Implementation Plan for the Lake St. Croix Nutrient TMDL*, revised 2013.

C. Development of Staples Lake

As shown in the August 1938 aerial photo below, Staples Lake is not a new impoundment. Development of its shorelands was relatively slow until recent decades. For example, in 1964, lakeshore development was limited to two resorts and twelve cottages/homes.[2] However, by 2005, most areas of the lakeshore were nearly developed to what they are today. Since 2005, there are two more cabins in the northeast cove subdivision, one camper trailer in the southwest cove, and the southeast cove is for sale with at least three subdivided lakeshore parcels.

1938

2005

[2] Wisconsin Conservation Department. "Surface Water Resources of Barron County". 1964.

IV. In-Lake Conditions & Management Efforts

Excess algae growth due to excess nutrient loading is the primary water quality concern at Staple Lake, resulting in poor water clarity, degraded aquatic habitat, and reduced recreational opportunities. Nutrients, such as phosphorus, can bind with sediment, then erode or runoff to surface waters and travel downstream.

A. Lake Depth and Sedimentation

Staples Lake is relatively shallow, with an average depth of about 10 feet and a maximum depth of 17 to 18 feet. The most recent "official" bathymetric map for Staples Lake was completed in 1966 and is included as **Figure 3** on the following page. Based on depths recorded at 338 sampling points as part the *2021 Aquatic Plant Survey*, WCWRPC extrapolated a more recent bathymetric map, which is shown in **Figure 4**.

Though not a top priority, Staples Lake residents have expressed concern over sedimentation, which is the accumulation of sand, silt, and dirt on the Lake bottom. Sediment can come from different sources both near and upstream of the Lake, including erosion or runoff from upland sources and bank erosion from shoreland sources. At Staples Lake, sedimentation has been the greatest concern near the inlet from Staples Creek, including the "cove", and the inlet from Long Lake, including the bay. A comparison of Figures 3 & 4 verify that sedimentation has been occurring.

Sedimentation is a problem for most impoundment lakes. Once a river is dammed, the flow of water is slowed at the pond or lake. As a result, much of the heavier particles suspended in the water will drop to the lake floor while bedload sediment moving along the river bottom will also collect within impoundments. Excess sedimentation can degrade aquatic habitat and fisheries by smothering the lake floor and impacting water temperatures and plant growth due to decreased depths. On some lakes, sedimentation has impacted recreational use and limited access by watercraft. And since sediment can also carry nutrients, the sedimentation of lakes can further exacerbate nutrient-loading problems.

Figure 3. Staples Lake Bathymetric Map *(WI Department of Natural Resources, 1966)*

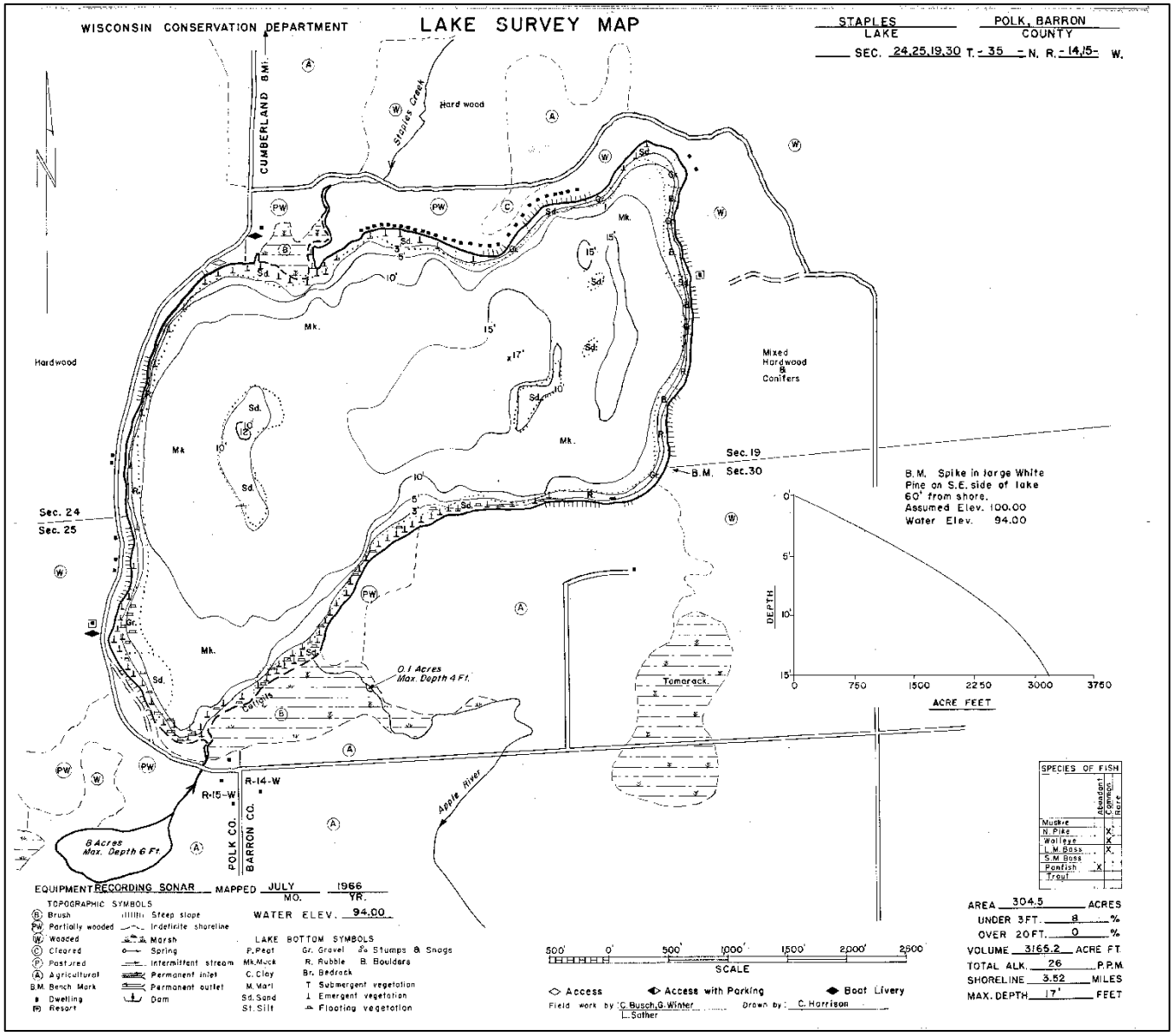
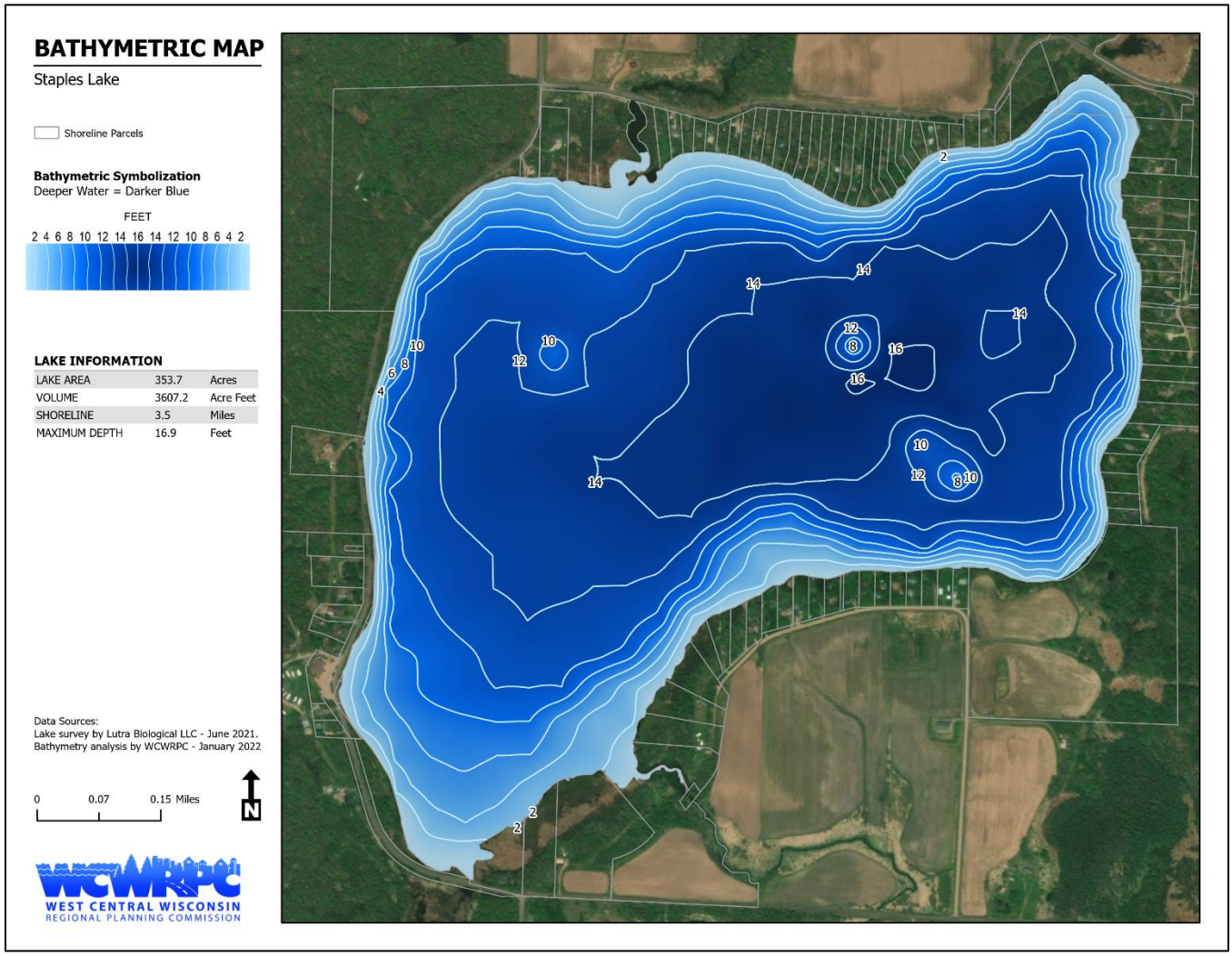


Figure 4. Staples Lake Bathymetric Map *(WCWRPC, 2022)*



B. Water Quality

Much of the data utilized in this subsection was collected by citizen volunteers between over the past 20+ years during the summer months as part of the Citizen Lake Monitoring Network (CLMN). **We thank these dedicated volunteers for their countless hours of service.**

Algae Growth at Staples Lake
Photo credit: Wisconsin DNR

What is Staples Lake Often Green in Summer?

The green color is the chlorophyll and other pigments found in algae, which can grow very fast (or bloom) in slow-moving or stagnant waters during periods of high temperatures. Too much algae reduces water clarity, meaning less sunlight reaches native plants. Algae (or algal) blooms also reduce available oxygen levels for aquatic plants and animals. And when algae dies and sinks to the bottom, its decomposition further consumes oxygen. These low oxygen (or hypoxic) conditions can cause illness and death in aquatic organisms (e.g., fish kills). This algae growth not only can degrade fisheries, but can also produce cyanobacteria (often called blue-green algae), which can be toxic to humans, pets, and other animals. While not all algae blooms are toxic, they can still promote bacteria growth, result in an unattractive green scum, and create a disagreeable odor.

Under natural conditions, algae growth would not be a problem. However, Staples Lake is nutrient rich (hypereutrophic). According to WDNR, the nutrient phosphorus is the controlling factor in plant and algae growth in Wisconsin's lakes and streams. Nutrients, like phosphorus, occur naturally and are essential to life. Typically, phosphorus is scarce in surface water under natural conditions. However, small increases in phosphorus or other nutrients can fertilize or fuel substantial increases in aquatic plant and algae growth (called eutrophication). The USGS website includes a good summary of the implications of too much nutrient loading into our lakes and streams:

> Nutrients are essential for plant growth, but the overabundance of nutrients in water can have many harmful health and environmental effects. An overabundance of nutrients—primarily nitrogen and phosphorus—in water starts a process called *eutrophication*. Algae feed on the nutrients, growing, spreading, and turning the water green. Algae blooms can smell bad, block sunlight, and even release toxins in some cases. When the algae die, they are decomposed by bacteria—this process consumes the oxygen dissolved in the water and needed by fish and other aquatic life to "breathe". If enough oxygen is removed, the water can become hypoxic, where there is not enough oxygen to sustain life, creating a "dead zone".[3]

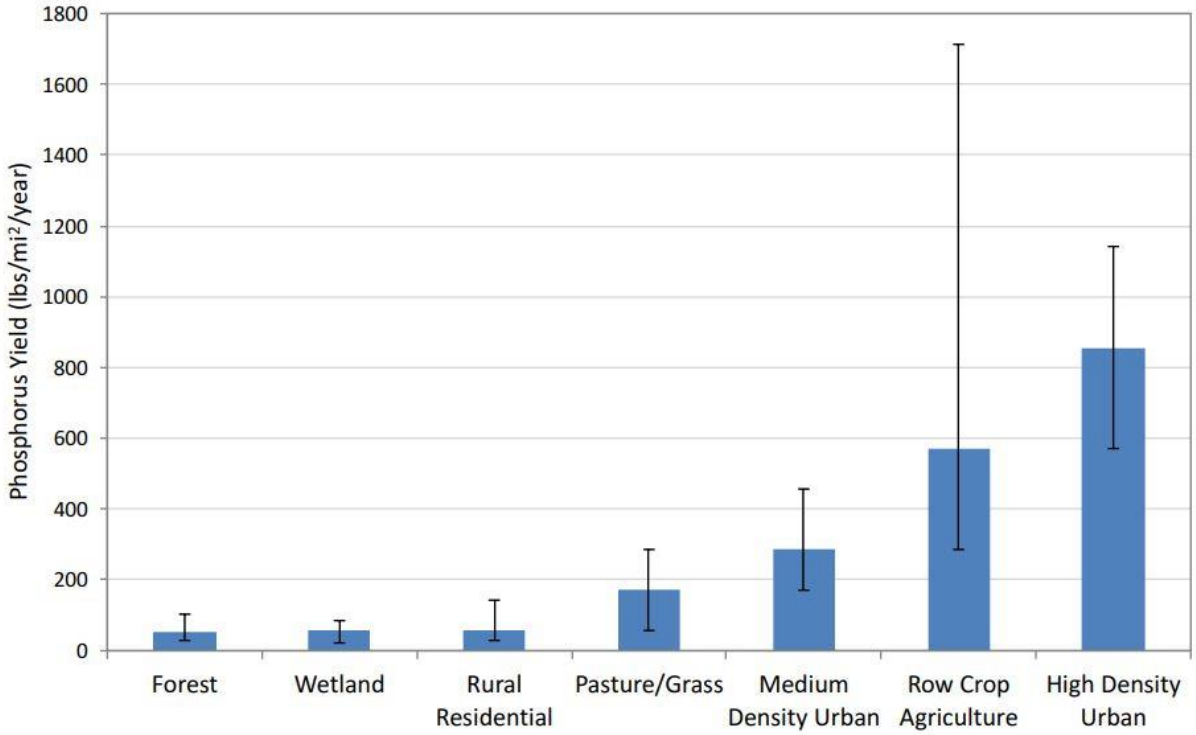
As shown in the previous photo, toxic blue-green algae blooms do occur at Staples Lake as a result of eutrophication, which is the primary water quality concern at Staples Lake. For more information on blue-green algae, visit: https://dnr.wisconsin.gov/topic/lakes/bluegreenalgae

[3] U.S. Geological Service website. https://www.usgs.gov/mission-areas/water-resources/science/nutrients-and-eutrophication?qt-science_center_objects=0#qt-science_center_objects

So, Where Do These Nutrients Come From?

Most of the nutrients in Wisconsin's surface waters come from human sources, such as leaking septic systems, lawn or agricultural fertilizers, livestock waste, and point sources, such as wastewater treatment plants or certain industries. **Figure 5** below shows that the amount of phosphorus export to surface waters in Wisconsin varies widely by land use.

Figure 5. Land Use Phosphorus Export Coefficients



Panuska, J.C. and R.A. Lillie. 1995. Phosphorus Loadings from Wisconsin Watersheds: Recommended Phosphorus Export Coefficients for Agricultural and Forested Watersheds. WDNR Research Findings Report No. 38. PUBL-RS-738 95. 8p.

The *2020 Staples Lake Phosphorus Report* found that about 60% of the phosphorus in the Lake's water is from external sources (inflow from upstream), while the remaining 40% is internal loading from Lake's sediment. One nuanced finding of the 2020 Report was that the majority of this external phosphorus loading was occurring in the spring and following very heavy summer rain events. Altogether, this suggests that any plan attempting to reduce algae blooms at Staples Lake should initially focus on reducing external loading, but will also likely need to include a strategy to address the phosphorus being released from the Lake bottom.

However, the 2020 Report did not specifically identify the upstream sources, only that about 96% of the external phosphorus-loading was coming into the Lake from Staples Creek. It is believed that the largest percentage of this external loading is from agricultural sources, given that the Staples Lake watershed is largely undeveloped. Forest and wetlands typically export little phosphorus, about 36% of the watershed is in agricultural use, and that the watershed has no large, permitted point sources. This

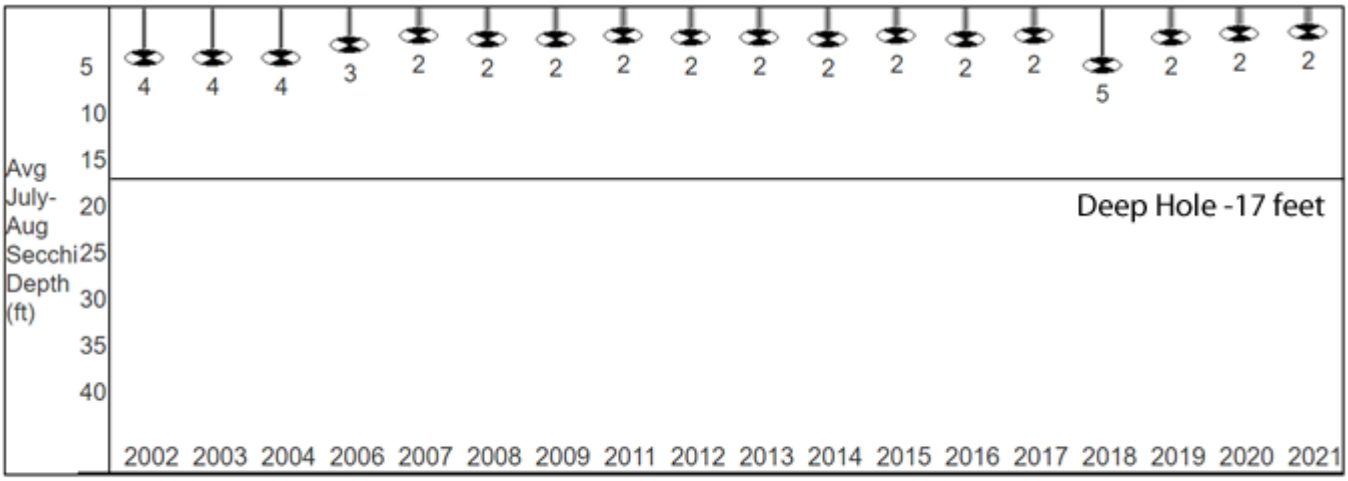
understanding of the nutrient sources led the Staples Lake District to support upland nonpoint source projects (manure storage projects) in the 1980s. In short, a key to improving the water quality at Staples Lake is to retain and infiltrate more water (i.e., reduce runoff) higher up in the watershed.

Water Clarity (Secchi Depth) Data

Water clarity, or transparency, is one measure of water quality. Plants need sunlight to grow. So, when suspended sediment, algae, or pollutants reduce clarity, the aquatic habitat can suffer. Water clarity is typically measured with a Secchi disk that is lowered into the water; then the depth is recorded when the disk can no longer be seen. Satellite imagery can also be used to estimate depth but is less reliable. It is also important to look at clarity trends over time since transparency can change significantly day-to-day due to runoff from heavy rain events or algae blooms.

CLMN volunteers have sampled Staples Lake Secchi depth at the deep hole during the summer months since 2001, which are represented in the chart below. Depth was sampled five times in summer 2021 with an average of 1.5 feet. For comparison, the 2021 average Secchi depth for the Northwest Wisconsin georegion was much better at 8.9 feet[4].

Figure 6. Staples Lake Annual Secchi (Depth) Averages

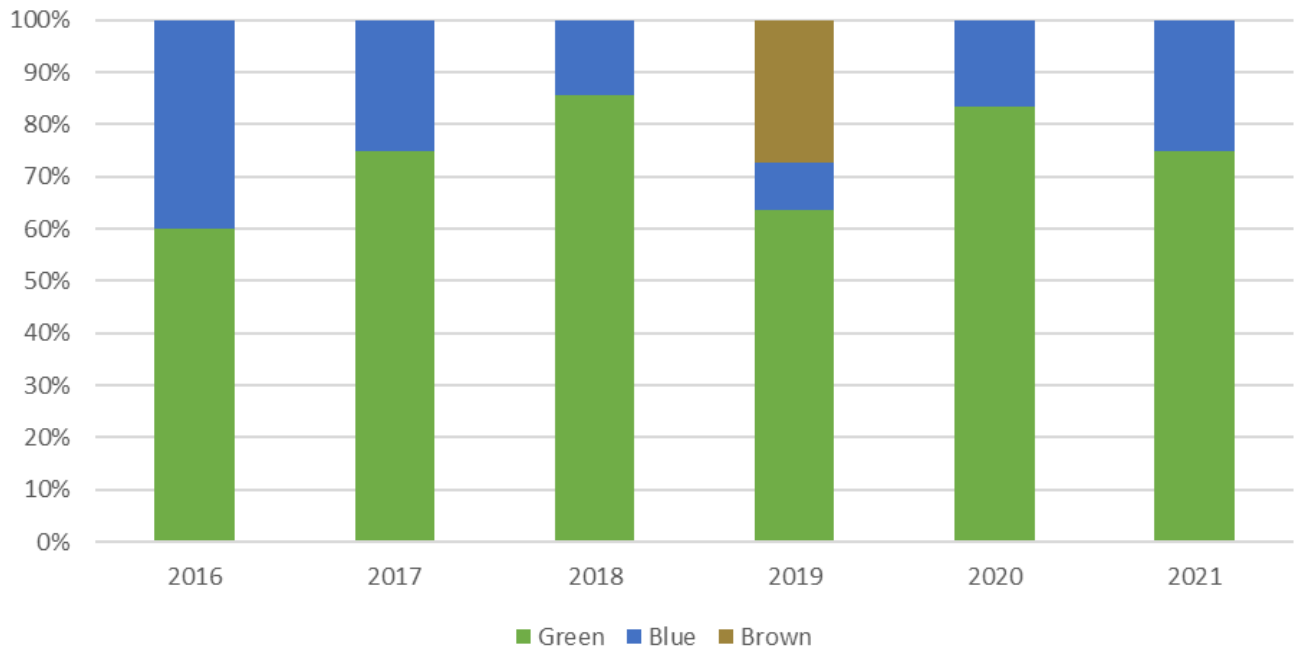


Past secchi averages in feet (July and August only).

[4] WDNR Staples Lake – Deep Hole 2021 Results.
https://dnrx.wisconsin.gov/swims/public/reporting.do?type=53&stationNo=033193&monitYear=2021&geoRegion=NW&format=html&action=post

As part of their monitoring, CLMN volunteers also report how the water looks visually, which suggests the causes of poor clarity. The chart below reflects that Staples Lake was most often reported as being green in appearance from algal blooms, which is the primary cause for such poor Secchi depths. For example, in 2021, the water appeared green on 75% of the monitoring dates with the remaining dates having relatively clear (blue) water. While only 2019 had a significant percentage of brown reports, suspended sediment may also be present during times of algae blooms and will appear green.

Figure 7.



Water clarity not only impacts the health of the Lake's ecosystem, but can also impact land values. For example, a recent Red Cedar Watershed study found that waterfront home values increased by $3,650 for each additional foot of Secchi depth.[5]

[5] UW-Stout, et al. *Red Cedar Basin Assessment for Water Quality Improvement*. 2016-2020. http://wcwrpc.org/Documents/RED%20CEDAR%20SUMMARY%20REPORT%20FINAL.pdf

Total Phosphorus, Chlorophyll, and Trophic State Index Data

The table below shows the average readings from the Staples Lake CLMN reports from the past 3 years over the course of June, July, August, and September. It should be noted that there were more readings taken during 2019 than the other two years due to a phosphorus study being conducted (8 Secchi disk and 19 phosphorus entries). The other years (2020 and 2021) had no more than 3 readings taken.

	2019 Average	2020 Average	2021 Average
Secchi Depth (ft)	2.8	2.1	3.2
Total Phosphorus (ug/l)	138.2	149.4	74.7*
Chlorophyll A (ug/l)	41.05	102.3	31.4*
Trophic State Index (based on Secchi)	62.1	67.0	63.0
TSI (based on Chl-A)	62.5	68.7	61.0*
TSI (based on TP)	63.0	66.3	62.0*

** Represents only one sample in June*

Total Phosphorus (TP) is the pollutant for which Staples Lake has been 303d-listed as an impaired water that does not meet surface water quality standards under the Clean Water Act.[6] **Chlorophyll A (Chl-A)** is a measure of the amount of algae growing in a water body. As such, chlorophyll increases with nutrient levels and is also a measure of water clarity.

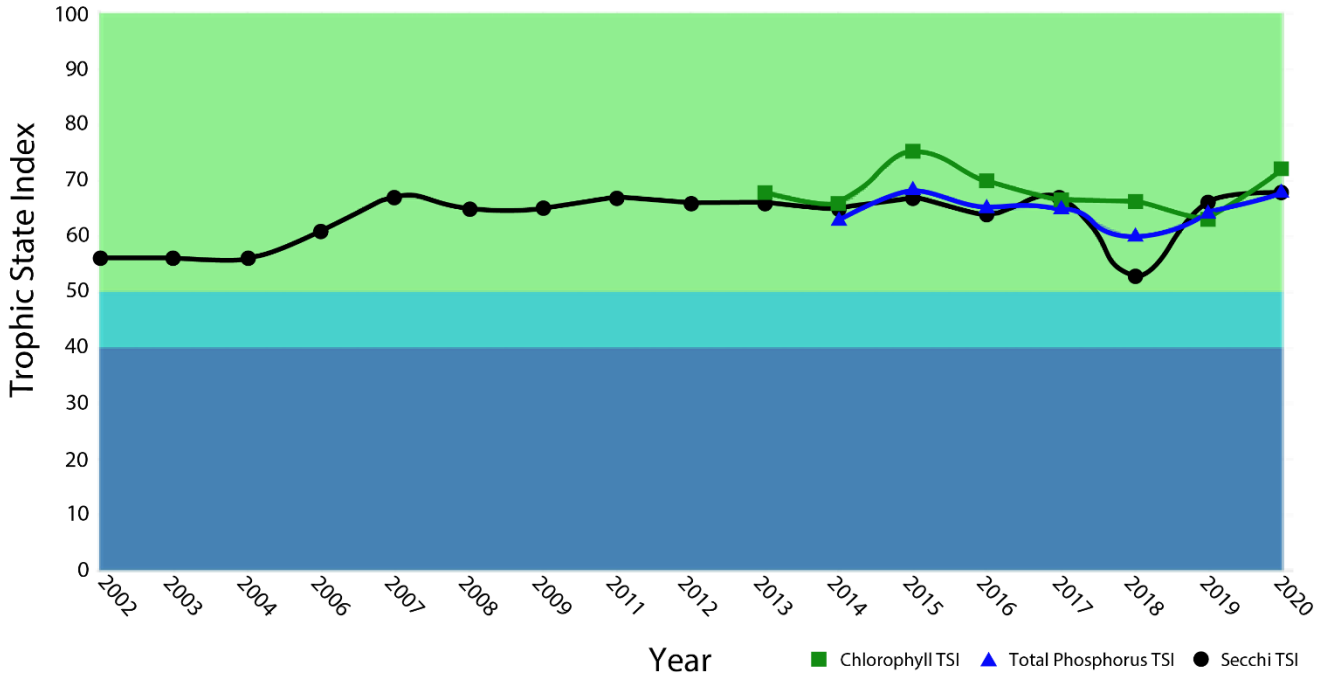
As a shallow drainage lake, the Wisconsin water quality standards (or impairment thresholds) for aquatic life use at Staples Lake are 40 ug/l for TP and 27 ug/l for Chl-A. For all three years above, Staples Lake significantly exceeding these thresholds. Even so, an evaluation of aquatic plant communities found them to be in good condition.

To make the determination of whether a lake is eutrophic or not, the Trophic State Index (TSI) is utilized based on Secchi depth, TP, and Chl-A. The TSI, which is on a scale of 0-110, considers any lake with a score of above 50 being considered eutrophic (i.e., rich in nutrients).

The chart on the next page provides the Trophic State Index (TSI) summer month averages for Staples Lake at the "deep hole" based on available CLMN data since 2002. In most years, Staples Lake exceeded 60 (hyper-eutrophic) for all three characteristics—Secchi depth, TP, and Chl-A.

[6] The Wisconsin Consolidated Assessment & Listing Methodology (WisCALM) is used to assess surface waters and determine if they meet Clean Water Act standards. Water quality impairment thresholds are established for different types of uses, such aquatic life, recreation, public health, and wildlife. Lakes and streams that do not meet these standards are added to the 303-d list as impaired waters. 2018 and 2020 WDNR assessments found that Total Phosphorus and Chlorophyll-A sample data at Staples Lake "overwhelmingly exceeded" WisCALM listing thresholds for recreation and aquatic life uses.

Figure 8. Staples Lake Trophic State Index (2002-2020)



TSI <30: Classical oligotrophy: clear water, many algal species, oxygen throughout the year in bottom water, cold water, oxygen-sensitive fish species in deep lakes. Excellent water quality.

TSI 40 -50: Water moderately clear, but increasing chance of low dissolved oxygen in deep water during the summer.

TSI 50-60: Lakes becoming eutrophic: decreased clarity, fewer algal species, oxygen-depleted bottom waters during the summer, plant overgrowth evident, warm-water fisheries (pike, perch, bass, etc.) only.

TSI 60-70: Blue-green algae become dominant and algal scums are possible, extensive plant overgrowth problems possible.

TSI 70 – 80: Becoming very eutrophic. Heavy algal blooms possible throughout summer, dense plant beds, but extent limited by light penetration (blue-green algae block sunlight).

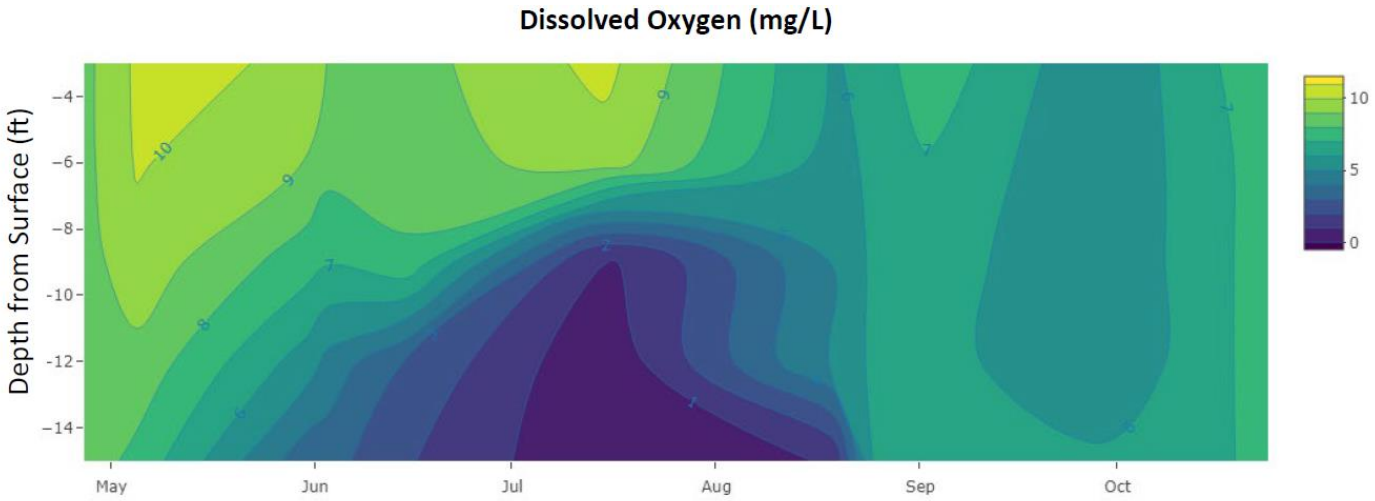
Dissolved Oxygen (DO) Data

Dissolved oxygen (DO) is another important indicator for lake ecosystem health and is critical to many chemical reactions. The DO content is highly impacted by nutrient loading and algae blooms, which can reduce oxygen to a harmful level for aquatic life. Typically, 5 mg/L is sufficient for fish. However, when dissolved oxygen levels are between 2-4 mg/L fish can become distressed, and below 2 mg/L can result in a fish kill.

From 2016-2021, 14% of all DO measurements were between 2-4 mg/L and 17% of readings were below 2 mg/L. This is not surprising given that DO will vary by depth and water temperature, especially in a stratified lake that tends to have thermal layers like Staples Lake. As reflected in **Figure 9**, the *2020 Phosphorus Study* found that Staples Lake had a minimum of 3 mg/L of DO in the water column during

the summer months. And while fish may be at times stressed, there have been no recent, significant summer fish kills due to low dissolved oxygen.

Figure 9. Staples Lake Dissolved Oxygen, Summer 2019

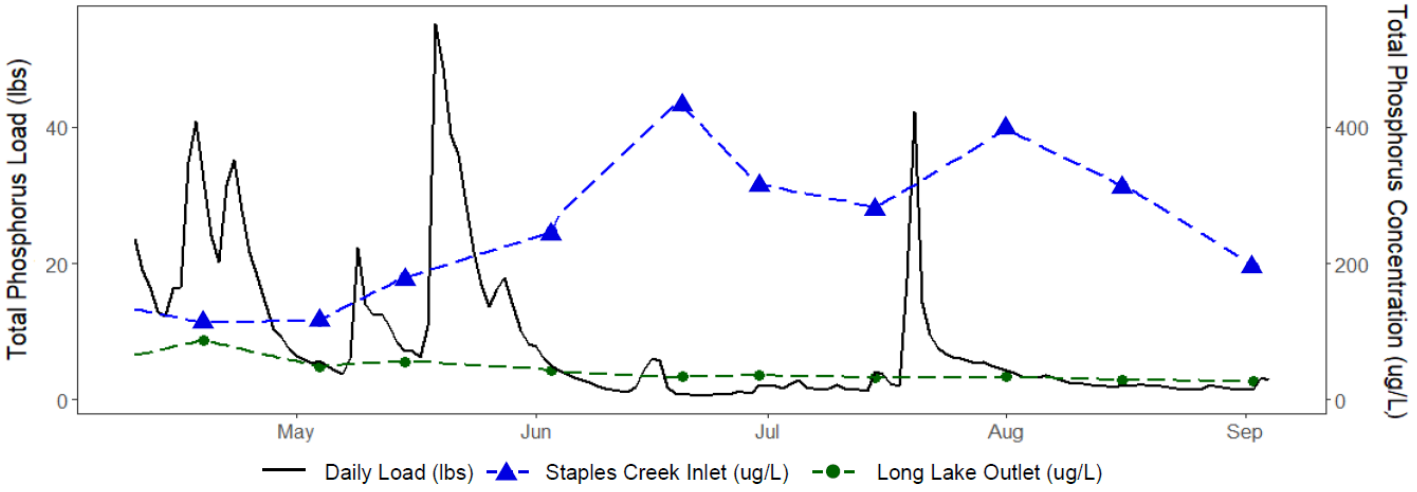


2020 Staples Lake Phosphorus Loading Study

As referenced previously, the Wisconsin Department of Natural Resources (DNR) conducted a phosphorus loading study for Staples Lake from March through October 2019. This study yielded the following findings that are particularly important to this plan, some of which have been previously noted:

- As reflected in **Figure 10** below, 96% of the external phosphorus loading into the Lake was coming from Staples Creek. Far less was coming from the stream from Long Lake.

Figure 10. Summer 2019 Phosphorus Load & Concentration



- Daily TP load (black line) very closely follows the water flow from the two creeks. The far majority of the TP load occurred in the spring months and following a heavy rain event in July. For much of the remainder of the year, both creeks are largely intermittent or very low flow with some stagnant pools where nutrients can accumulate, potentially to be flushed downstream during a heavy rain.
- During the summer and as temperatures rise, TP levels increase on Staples Creek (blue line) since there is less water flow to dilute nutrients.
- Sampling from May 15th yielded a TP concentration of 270 ug/L on Staples Creek, suggesting that high levels of phosphorus are running off the landscape during the spring. This would not be surprising given the higher load/flow during the spring.
- Overall, the study estimated that 3,052 lbs of external TP was loading into Staples Lake annually. TP averaged 242 ug/L at the Staples Creek inlet and 42 ug/L at the Long Lake outlet. The State phosphorus water quality standard for streams is 75 ug/L.
- Within the Lake itself, TP averaged 111 ug/L during the spring and 94 ug/L during the summer. The State phosphorus water quality standard is for shallow drainage lakes is 40 ug/L.
- As reflected by **Figure 11** below for the summer months (June-September), 60% of the TP loading into the Lake is coming from external sources (333 lbs) and 40% from the Lake sediment (225 lbs). Only about 37% of the total external and internal loading combined (207 lbs) was washed downstream.

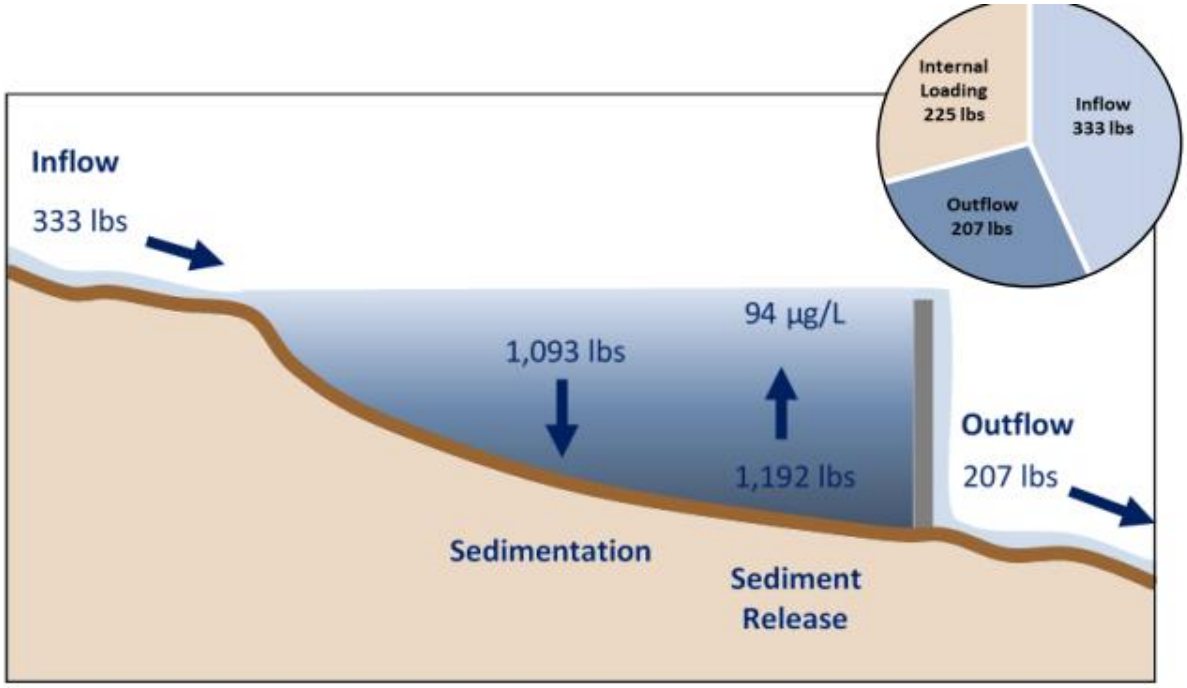


Figure 11. Staples Lake Phosphorus-Loading Model for June-Sept 2019

- Staples Lake consistently had an iron:phosphorus ratio at or above 5:1, suggesting that there is currently enough iron in the system, which is important when exploring management options

since iron binds with phosphorus and can decrease the availability of phosphorus in the water column.

- The study suggests that reductions of 50+% in external-loading and 80+% in internal reduction is one scenario in which to achieve the TP water quality standard for Staples Lake.

C. Fisheries & Aquatic Habitat

According to the responses to the 2021 shoreland owner survey in **Appendix C**, nearly all of the respondents (88%) fish at Staples Lake. A majority (60%) fish by shore and by boat with the following species preferences:

9. What species of fish do you like to catch on Staples Lake? *(choose all that apply)*

a.	Bluegill/Pumpkinhead/Sunfish	86% (44)	b.	Black Crappies	70% (36)
c.	Yellow Perch	31% (16)	d.	Largemouth Bass	70% (36)
e.	Walleye	31% (16)	f.	Northern Pike	47% (24)
g.	Bullhead	9% (5)	h.	Other *(please specify)*:	1% (1)

There were mixed opinions about the quality of fishing at Staples Lake, with 42% stating that is good or excellent, 36% describing it as fair, and 13% as poor or very poor. About half felt that the fishing is about the same since they first started fishing at the Lake, while 42% felt it was getting worse. Many shoreland owners commented in the survey about decreasing Walleye and Yellow Perch numbers.

Fish surveys were performed at Staples Lake in 1993 and 2018:

- 1993 Survey - Moderate Northern Pike numbers, which spawn in areas of emergent vegetation in 6-10" of water. Good Walleye & Largemouth Bass numbers & size distribution. Continued Walleye stocking was recommended for alternate years.
- 2018 Bass & Panfish Survey - Abundant Largemouth Bass with good size structure. Bluegill & Pumpkinseeds abundant with low size structure. Fewer Black Crappie, N. Pike, & Yellow Perch, which is not uncommon for late spring surveys.

Overall, Staples Lake has a healthy fishery with stable Largemouth Bass and most panfish populations, through natural reproduction without stocking. Northern Pike and Yellow Perch are less abundant and may benefit from additional woody habitat and periodic supplemental stocking. The Lake can produce large Northern Pike but were only found at moderate levels. An emphasis for maintaining Northern Pike spawning habitat, which includes emergent vegetation in 6-10 inches of water, is critical. Current vegetation management/harvesting zones overlap with these habitats in some areas, so minimizing aquatic plant harvesting is advised.

Like many northern Wisconsin lakes, changing climate is creating warmer lake conditions that are less than ideal for Walleye survival and natural reproduction. Due to such conditions, the State of Wisconsin is no longing managing Staples Lake for Walleye, with the last DNR stocking in 2005. The Lake District may select to continue periodic Walleye stocking for recreational purposes, though there may come a day when the costs outweigh the benefits of such stocking if oxythermal lake conditions

continue to warm. If stocking occurs, a targeted Walleye survey in the fall of non-stocking years to index abundance and survival is recommended.

Beginning in 1998, WDNR and the Lake District partnered to seasonally install and operate a 2-hp aspirating surface aerator to help maintain dissolved oxygen levels during the winter months; no significant winter fish kills have occurred since. The last significant winter kill occurred in February 1977 with the fishery recovered by 1993. Staples Lake has experienced periodic fish kills due to virus or disease in May 2007, August 2018, June 2020, and May-June 2022. The mostly likely culprit is Columnaris, a common pathogen in the region's waterways. Fish die-offs from Columnaris frequently occur during the spawning season when fish are stressed. There is no known solution, but is not expected to have an effect on the long-term health of the Lake's fish population. The Lake District could collect and remove dead fish to help prevent them from rotting and "fouling-up" shorelines, but this would not stop the spread of the disease.

It is important to keep in mind that every action has a reaction. Improving water quality and reducing algal blooms can impact the fishery, perhaps in unexpected ways, especially in relatively shallow lakes. For example, clearer water can increase submerged aquatic plant growth, which may influence predator-prey and foraging dynamics of Largemouth Bass and panfish populations leading to changes in fish abundance and size structure. Such changes may necessitate changes or more aggressive aquatic plant management to maintain a desired balance.

Aquatic plants and course wood below the water level provide important habitat. Conditions and management efforts regarding aquatic plants are discussed in **Section V**, while **Section VI.C**. discusses the results of the *2021 Shoreland & Shallows Habitat Assessment*.

D. Aquatic Invasive Species

Aquatic Invasive Plants

Curly Leaf Pondweed (Potamogeton Crispus) is the only aquatic invasive plant currently established in Staples Lake. CLP is a perennial, submerged aquatic herb that is native to Eurasia that is tolerant to low light and low water temperatures. CLP may outcompete other underwater plants and become dominant, which causes problems due to the formation of dense mats that interfere with recreational activities. It also causes an increase in phosphorus concentrations, resulting in an increase in algae blooms and a pile-up of dying CLP along the shore. CLP is one of the most common aquatic invasive species in Wisconsin. While harvesting offers some control of Curly-Leaf Pondweed, it is very unlikely that it could be totally eradicated since this

Curly-Leaf Pondweed
Photo credit: Wisconsin DNR

invasive has likely also established itself within other connected streams and waterbodies. More information about CLP at Staples Lake and its management can be found in **Section V**.

There are also large areas of the Reed Canary Grass adjacent to and nearby Staples Lake, including along many of the streams connected to the Lake. Growing up to 9 foot tall, Reed Canary Grass can form dense, monospecific stands that choke-out more desirable native plants. While there are some potential methods for elimination and control, they are time-consuming and this invasive is very widespread.

Due to its distribution throughout the region and nearly 400 lakes in Wisconsin, Eurasian Water-Milfoil is a particular high threat to Staples Lake. This emergent aquatic plant can form dense mats on the surface of water bodies. Since this milfoil can regenerate from fragmented stems, mechanical harvesting can exacerbate its spread.

Aquatic Invasive Animals

According to the DNR, Staples Lake also has two known invasive aquatic invertebrates—the Banded Mystery Snail and the Chinese Mystery Snail. The Banded species is native to the southeastern United States while the larger Chinese species is native to Asia. Both of these invasives have now become relatively common throughout much of Wisconsin, the Banded species being slightly less common than the Chinese species.

Chinese Mystery Snail
Photo credit: University of Wisconsin Sea Grant

There is not a lot yet known about these two non-native species. Their large size (1.5-3 inches tall), hard operculum (a trap door cover that protects the flesh inside), and thick, hard shell make them less edible by predators. It appears that they have a negative effect on native snail populations by competing for food and can adversely affect aquatic food webs. They can also invade the nests of native game fish (e.g., largemouth bass) and can die-off in large numbers that fouls beaches and shorelands. Chinese Mystery Snails can also clog water-intake pipes and may transmit diseases and parasites to fish and other wildlife. At this time, there are no known effective actions to control or eradicate either of these invasive snail species once they are established. Of note, Rusty Crayfish are found in the Apple River downstream of the Lake.

E. Plans & Management Efforts

In-Lake Plans and Studies

The key plans and studies specific to current conditions at Staples Lake were identified and discussed previously, most notably:

- Ongoing citizen lake monitoring
- 2020 Staples Lake Phosphorus Loading Study
- 1993 & 2018 Fish Surveys
- 2014 & 2021 Aquatic Plant Surveys

- 2016 Aquatic Plant Harvesting Plan

The *Polk County Land & Water Resources Management, 2020*, has a variety of general water quality and AIS strategies that apply to Staples Lake and other lakes in the County. This plan ranks the Staples Creek Watershed as 11th out of 42 basins for priority of County staff/workload efforts. The *Barron County Land & Water Resources Management, 2020*, recognizes Staples Lake as a popular fishing lake and ranks the Lake as medium priority for reduction of NPS pollutants, reduction of soil erosion, and susceptibility to groundwater contamination. This plan also notes the past watershed-based water-quality project to reduce barnyard runoff in collaboration with the Lake District in the 1980's. Staff from both Barron and Polk County conservation offices attended meetings and provided valuable technical input during this planning effort and agreed to collaborate with the District's in the plan's implementation as resources allow.

In-Lake Management Efforts

Sedimentation and Water Quality Projects - Outside of the use of the aerator, no other in-lake projects to address sedimentation and water quality have been undertaken at Staples Lake.

Aquatic Plant Management – The harvesting of aquatic plants, in accordance with the Harvesting Plan under an annual permit described previously, has been the Lake District's primary in-lake management activity.

Fisheries Management – In consultation with WDNR, the Lake District has supported stocking efforts in the past, though the last stocking was at least five years ago.

Aquatic Invasive Species (AIS) Management - Though the Lake District has shared some related information with members in the past, no formal or coordinated prevention, monitoring, or control efforts for aquatic invasive species have been undertaken until fairly recently. Polk County recently installed new AIS signage at the public boat ramp and the Lake District has recently begun to partner with Polk County to maintain a boat-washing station at the ramp.

V. Aquatic Plant Conditions & Management Efforts

This subsection, in combination with the aquatic plant goal, objectives, and implementation recommendations in Section IX and Appendix A, constitute the *2022 Aquatic Plant Management Plan* for Staples Lake. This lake management plan also includes information about the lake, its watershed, water quality, and its fishery, which are required as part of an aquatic plant management permit under NR 107.

A. Aquatic Plant Surveys

An aquatic plant survey was completed for Staples Lake in 2014, which was used to develop the 2016 *Staples Lake Aquatic Plant Harvesting Plan*. In 2021, the Staples Lake District hired Noah Berg, Lutra Biological, to update the aquatic plant survey, the results of which are included as **Appendix A.**

2021 Aquatic Plant Survey

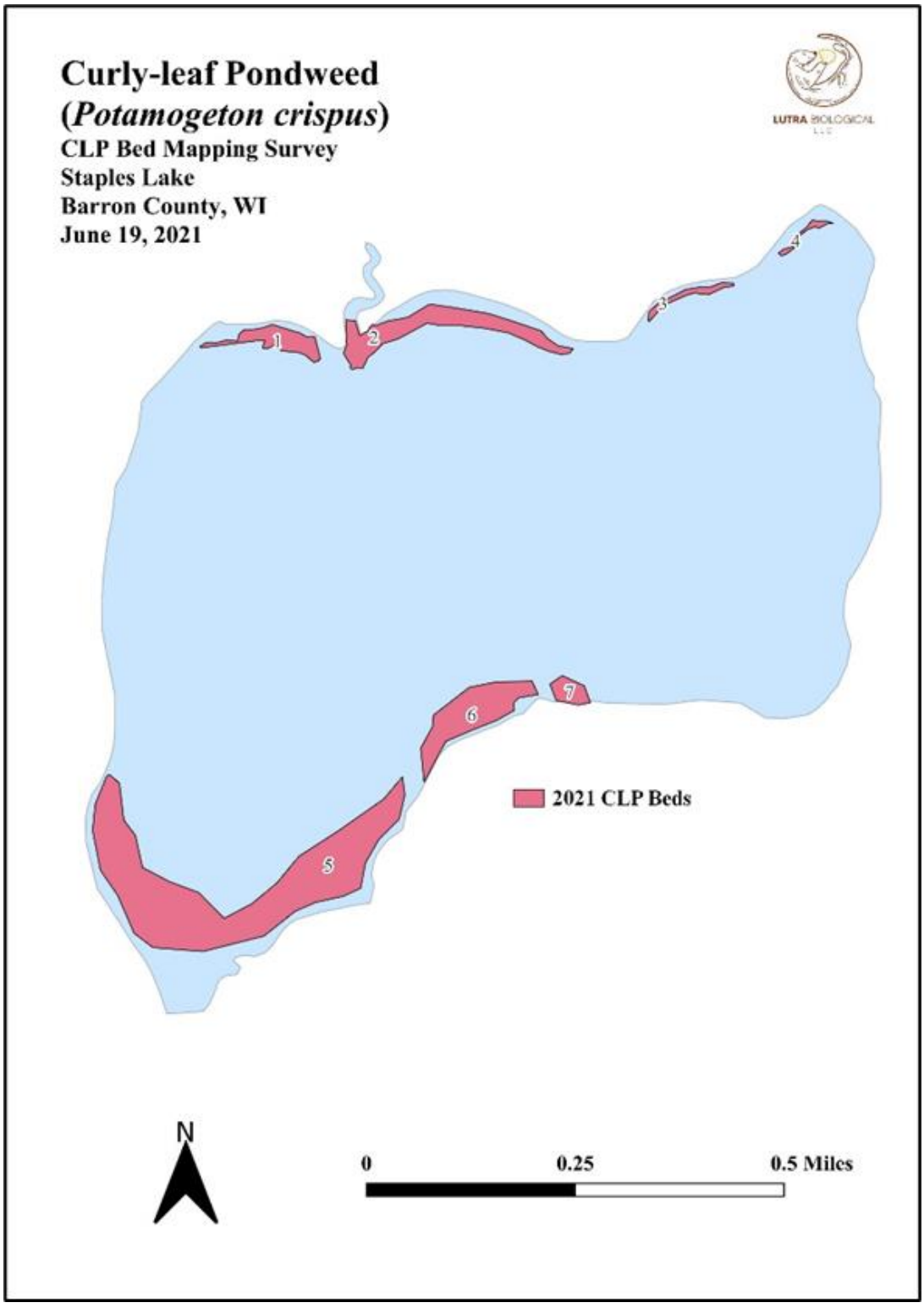
A comprehensive aquatic plant survey was conducted on August 1, 2021. The survey including raking and visual inspections at 78 sites shallower than the maximum depth of plants. Key findings from the August 1st Survey include:

- Staples Lake has healthy emergent and floating plant communities in the shallows. However, the number of sampled sites with native vegetation decreased from the 2014 survey. Only 51% of the 78 sampled sites within the littoral zone (i.e., the maximum depth at which plants were found) had aquatic plants compared to 67% in 2014.
- The littoral zone maximum depth was seven (7) feet. This was a significant decrease from eight (8) feet since the 2014 survey. Algae blooms and poor water clarity appear to lower native plant growth at deeper depths. Sedimentation could potentially also have a role in this change.
- Species diversity and richness increased in the 2021 survey. 16 new native aquatic plant species were identified during the 2021 survey, while three species in the 2014 species were not found in 2021.
- Common Waterweed, White Water Lily, and Coontail were the most commonly found native species found at 20.6%, 17.8%, and 8.4% sampled sites, respectively. These were the top three native species found in 2014.
- In all 23 native species were found by raking or visually during the 2021 survey compared to 19 in 2014. Filamentous Algae and Curly-Leaf Pondweed were also identified at eight sites. In Summer 2022, an additional native species—Humped Bladderwort—may have been identified at Staples Lake.

Curly-Leaf Pondweed (CLP) was the only invasive aquatic plant species identified during the 2014 and 2021 surveys. A CLP monitoring survey was completed on June 19, 2021, to document the abundance of CLP within Staples Lake. Overall, there does not appear to be any substantial changes in CLP distribution or intensity between 2014 and 2021. **Figure 12** delineates seven CLP beds identified during the survey. Two of the beds (#2 & #7) posed a moderate navigation impairment at that time. Most CLP

bed depths ranged from 1 to 6 feet with a mean depth of four feet; it would not be possible to mechanically harvest CLP in parts of these beds due to the shallow depth.

Figure 12. Curly-Leaf Pondweed Beds, 6/19/21



B. Aquatic Plant Management Strategy

The *2016 Staples Lake Aquatic Plant Management Plan* explored a number of aquatic plant management alternatives (e.g., manual removal, mechanical control, diver dredging, dredging with drawdown, rotovation, biological control, herbicide/chemical control) and determined that mechanical harvesting with manual removal near boat docks, as needed, to be the best solution. Overall, the aquatic plant management strategy is unchanged from the 2016 Plan, except:

- Should Curly Leaf Pondweed (CLP) become a greater nuisance to boat navigability, the Lake District may need to conduct mechanical harvesting earlier in the summer (late May-mid June).

Aquatic Plant Management Core Elements

The aquatic plant management strategy for Staples Lake consists of the following four elements, which are reflected in the goals, objectives, and strategies in Section IX:

1. Reduce nutrient-loading (phosphorus) into Staples Lake, thus improving the overall aquatic ecosystem and plant overgrowth.
2. Striving to prevent the introduction of new aquatic invasive species, such as Eurasian Water Milfoil.
3. As recommended by the 2021 Aquatic Plant Survey, continue selective mechanical harvesting in a manner that balances the important functions of native aquatic plants with watercraft navigation.
4. Continue to educate shoreland owners on the importance of aquatic plants, the negative impacts of overharvesting (e.g., spread of invasives, loss of fish habitat), and the rules regarding harvesting, including maintaining waterfront access corridors.

Harvesting Goals

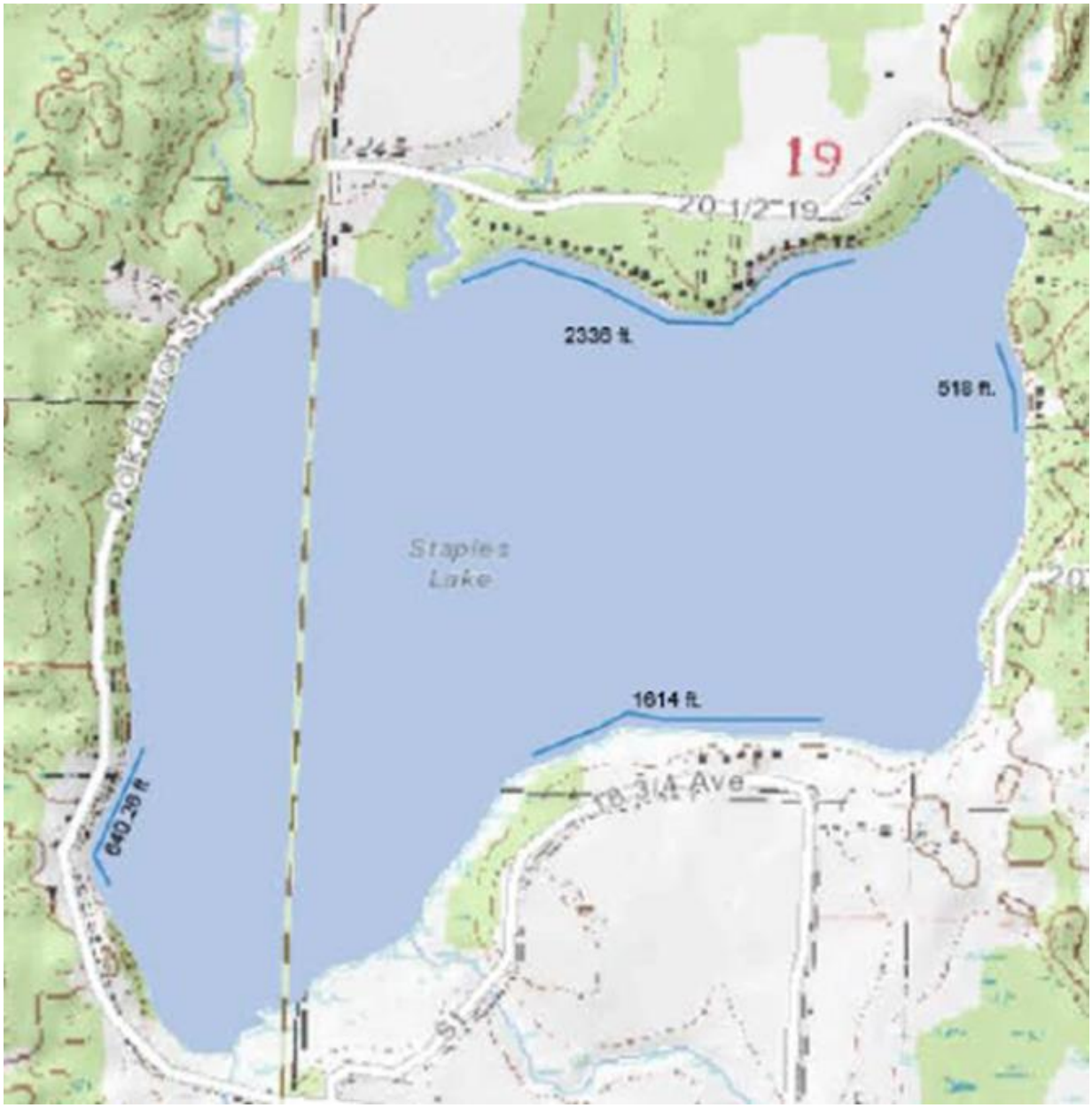
1. Allow navigation in common channels, where depths allow.
2. Allow access corridors from private property.
3. Limit removal of native aquatic plants to preserve the important lake functions they provide. Too much harvesting exacerbates the spread of invasive plants & can harm habitat

Harvesting Channels & Recent Harvesting History

From 2016 through 2022, the Lake District has utilized the same harvesting channel map in its annual permits (see **Figure 13**). The District has been mainly cutting on the north and south sides. The east side is deeper and has fewer weeds. Cutting has been occurring mainly from June through the first part of July, but will cut the entire summer if lake levels are low and plant growth more abundant. The District reports that they have been primarily cutting Duckweed and a Pondweed, with an average of about 25 loads per year depending on weather, lake levels, etc.

At this time, the Lake District anticipates that it will continue to use **Figure 13** as its harvesting map for future permit applications.

Figure 13. Harvesting Channels ***(will replace with better quality version prior to adoption)***



Mechanical Harvester Operation

The Lake District has owned and maintained an aquatic plant mechanical harvester since at least 1985. Harvesting costs are kept low through volunteer operators. Harvesting costs are not WDNR-grant eligible.

Harvesting Permit	The Lake District Board will complete and submit a harvesting permit application to WDNR annually.
Harvesting Locations/Limits	The harvesting permit will include a map showing anticipated harvesting lanes. **Figure 13** is the currently proposed harvesting map based on the 2021 survey. Mechanical harvesting can only occur at depths = or >3 feet.
Harvesting Requests	Only channels including on the current permit application will be harvested. Requests will be considered for subsequent year harvesting.
Operators	Volunteer operators will be trained in plant identification and permit record-keeping requirements. Record-keeping requirements will include a daily record of: • Date • Amount harvested (volume estimates okay) • Species harvested • Location(s) • Hours spent harvesting
Plant Disposal	The Lake District Board will identify potential sites of plant disposal, which are subject to change.
Maintenance	The Lake District is responsible for harvester and related equipment maintenance and insurance. Staples Lake harvesting equipment currently includes: a harvester with a 4 foot cutter, conveyor/trailer, dock, and tractor. Operation and maintenance costs include parts, labor (although sometimes completed by volunteers), gasoline, and winter storage rental.
Harvester Replacement	The Lake District purchased the current harvester around 2005. While a harvester's lifespan is expected to be 10 years, the previous harvester was operated for more than 20 years. Capital and operation and maintenance costs are financed by Lake District special assessment. The 2016 Plant Management Plan suggested that the District would need to begin replacing equipment in 2020+. The cost of a new, small harvester with 4' blade and other equipment could exceed $100,000.

Harvesting Education

Property owners and harvester operators should understand Staples Lake harvesting goals and follow guidelines for aquatic plant management.

For lake residents - Best methods to get information to them include presentations at the annual meeting, updating the aquatic plant management plan summary, distributing related brochures, and sharing related documents via social media or a District website. Messages/information to share:

- Importance of native plants and the reasons for limits to harvesting.
- Why was the plan needed?
- Lake district provides funding for harvesting from assessments, operators are volunteer.

- A permit guides harvesting. Any changes need to be made for following year.
- Once permit is issued, it is good for one year
- The harvesting map.
- Harvesting can occur only in areas 3 feet and deeper to establish common navigation channels when navigation is impeded. Has to be more than a nuisance; if you can boat through it, then it shouldn't be harvested.
- Owners can remove aquatic vegetation using hand removal methods in an opening up to 30 feet wide (including the dock)

For harvester operators - Best methods to get information to them are plant identification sheets, log sheets, and WDNR permit oversight. Messages/information to share:

- Native and invasive plant identification.
- Permit requirements.
- The harvesting map.
- Harvesting can occur only in areas 3 feet and deeper to establish common navigation channels.

Aquatic Plant Management Plan Updates

An update to the aquatic plant survey and management/harvesting plan is required every five years. The next update should be completed by Summer 2027.

VI. Shoreland Conditions & Management Efforts

A. Shoreland Overview

Shoreline vegetation at Staples Lake is mainly upland hardwood and white pine. Areas of emergent wetland are found in the northwest at the Lake's inlet from Staples Creek and along the south shoreline near the Lake's outlet to the Apple River. As shown in **Figure 14** and summarized in the table below, the shoreline of Staples Lake is dotted with private homes and cabins. A Polk County-owned boat ramp provides the only public access to the Lake, with access from County Line Street.

In 2021, there are 101 parcels adjacent to Staples Lake, excluding roads, with a total assessed value of $13,417,800. For comparison, this is about 7.2% of the total assessed value of all land and improvements in the Towns of Crystal Lake and Johnstown combined. Most parcels near the Lake are developed; about 82% of the 101 parcels had assessed improvements. Excluding unimproved parcels, the average assessed value of improvements was $97,000.

Staples Lake Lakeshore Parcels (excludes road right-of-way)

	# parcels	# parcels w/ assessed improve-ments	# Improved Parcels w/ Sanitary Permits by Year				# Unimproved Parcels w/ Sanitary Permits		Assessed Use					Assessed Value	
			None	1969-1979	1980-1999	2000+	No Permit	Permits	Residential	Resid + Ag, Forest and/or Undvlpd	Commercial	Ag, Forest, and/or Undvlpd	Tax-Exempt or Public	Total	Improvements Only
Barron Co.	86	71	13	7	22	29	14	1 (1969)	76	6	0	1	3	$ 11,941,000	$ 7,133,600
Polk Co.	15	12	3	1	2	6	3	0	11	1	1	1	1	$ 1,476,800	$ 917,500
Totals	101	83	16	8	24	35	17	1	87	7	1	2	4	$ 13,417,800	$ 8,051,100

source: V7 Wisconsin Parcel Dataset, July 29, 2021

Nearly all of the parcels (94 of 101) were assessed, at least in part, for residential use. One parcel was assessed commercial—a bar & grill; a campground is set-back from the Lake and not included in the above numbers. The four tax-exempt parcels are: the boat launch owned by Polk County, an approximately 1-acre parcel of public land ("Thome Park") located on the east side of the Staples Creek inlet to the Lake, and two parcels owned by the Staples Lake District—the 0.227-acre dam site and a 0.001-acre parcel along the east side of the Lake. The Lake District owns an additional 2-acre parcel along the north side of 20½ Avenue that is not included in the above table.

B. Septic Systems

No specific issues or problems regarding failing septic systems were identified during the planning effort. Of the lakeshore parcels in the table above, there are 68 parcels with sanitary permits, which require regular inspections and reporting. Theoretically, these inspected septic systems (1969 to current) should be in good, operating order**.** There are 16 improved parcels without sanitary permits; it is likely that most of these parcels have older (pre-1969) sanitary systems that were installed prior to permitting and inspection requirements. While 87% of the systems were installed since 1980, life expectancy on some newer systems may be shorter, so regular inspection and maintenance is important regardless of the age of the system.

Many of the septic systems on the south side of the Lake are holding tanks. In theory, the septic systems located on the south side may pose higher water quality risks given that the elevation of these properties is closer to that of the Lake level and groundwater table.

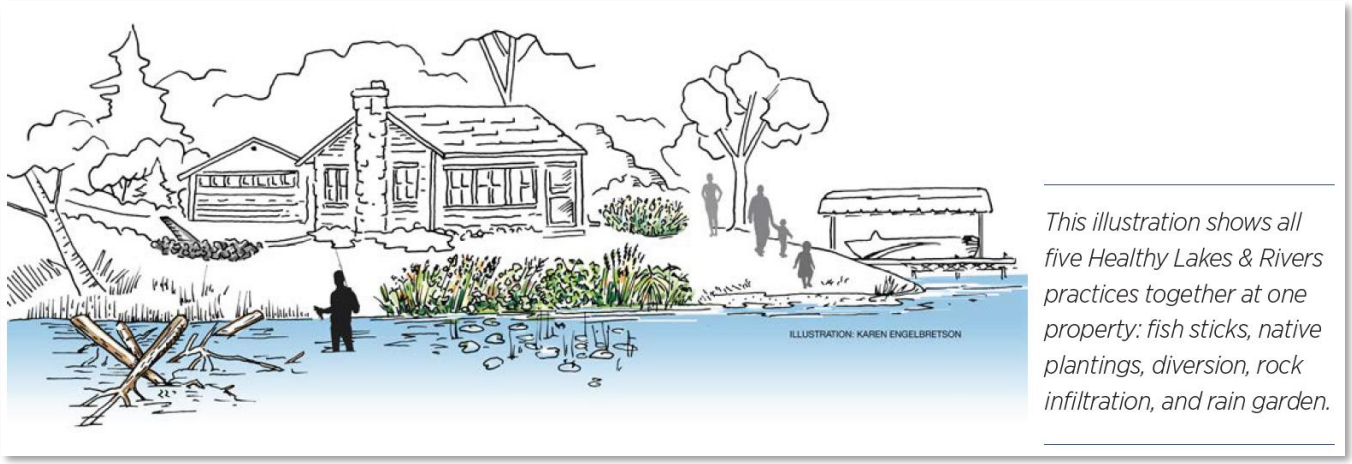
Figure 14. Staples Lake Development

C. 2021 Shoreland & Shallows Habitat Assessment

In 2021, the Staples Lake District contracted with Noah Berg, Lutra Biological, to conduct a Shoreland & Shallows Habitat Assessment consistent with WDNR protocols. As of July 12, 2022, the District had not yet received a report or the final results of this assessment. This subsection and **Appendix B** provides some initial insights and are "placeholder" should this Management Plan be amended in the future to include the 2021 Assessment results.

Once available, the 2021 Assessment results may offer the Lake District additional insights into:

- The amount of shoreland areas experiencing erosion or lacking vegetative buffers as well as areas of shoreland to potentially target for erosion control or Healthy Lakes shoreland projects.
- The amount of course wood habitat within the shallows and areas to potentially target for fish cribs or Healthy Lakes fish sticks projects.



This illustration shows all five Healthy Lakes & Rivers practices together at one property: fish sticks, native plantings, diversion, rock infiltration, and rain garden.

from the Healthy Lakes & Rivers Decision Tool, www.healthylakeswi.com

Shoreland Assessment

Shorelands often contain important habitat and erodible soils, which present a high risk to surface water pollution if not anchored with natural deep-rooted vegetation. Shoreland buffers provide habitat, hold soil in place, intercept and purify runoff water, moderate water flow, and provide natural beauty.

During the 2021 Assessment, scattered natural shoreline erosion was found, largely due to uprooted trees. A July 2019 high wind event knocked down very large numbers of trees in the area, including within the shorelands of Staples Lake. Shoreline trees have an important role in preventing erosion and bank deterioration, while reducing water temperatures. As a positive, downed trees that fell into the water have added to the Lake's course woody habitat.

Shoreline erosion and shoreland practices were also discussed at length during planning meetings. During the February 2022 Community Discussion meeting, a Lake landowner expressed concern with shoreline erosion and there was lengthy discussion regarding whether this was due to boating speeds near the shores and/or ice action. It was also noted during meetings that some Lake properties have little to no buffers with mowing up to or near the shoreline. During work group meetings, it was recommended to increase educational outreach to lake shoreland owners regarding county shoreland

zoning regulations and to explore Healthy Lakes projects improve shoreland habitat and create buffers, while reducing potential shoreland runoff and erosion.

Shallows Habitat Assessment

Course woody habitat (CWH)[7] provides shelter and feeding areas for a diversity of fish species as well as nesting and sunning areas for birds, turtles, and other animals above the water. Nearly all fish species utilize woody habitat for at least one portion of their life cycle. Providing additional CWH may help increase the Lake's Yellow Perch population, which is a concern of Lake residents; studies have shown that the lack of CWH can result in the loss of Yellow Perch due to lack of spawning habitat (Yellow Perch deposit eggs on structural habitats like large wood) and the predation on young Yellow Perch that lacked the refuge[8].

According to the 2021 Shallows Habitat Assessment, Staples Lake has abundant CWH scattered throughout the shallows from recent storms, though it could strive for more. Studies of undeveloped northern Wisconsin lakes found that their shorelines averaged 600-900 submerged trees/logs per mile.

For a lake the size of Staples Lake (>250 acres), CWH and fish sticks projects (i.e., creating new habitat through tree drops that are anchored to shore) can be particularly important in or near:

- Bays and transition areas out of bays
- Areas protected by points or islands
- Bullrush beds
- Areas with submerged aquatic plants
- Shorelines that are not "high energy" indicated by ice heave
- Not in navigation lanes, swimming areas, or very shallow waters (1' deep).

A WDNR best practice recommendation is for woody habitat structures that utilize whole trees either grouped together or single trees that result in the placement of more than 1 tree per 50 feet of shoreline.

D. Dam & Flood Controls

Located at the Lake's outlet, the Staples Lake dam is a rock pile overgrown with vegetation with signs of beaver activity. Replacement of the existing structure has been discussed in the past, which led to the development of related plans in 2002 that have not yet been implemented.

The Lake District has expressed interest in replacing the structure with a more permanent, safe dam that can be controlled for lake management (e.g., drawdowns if needed). In August 2021, the District reached out to the region's WDNR dam engineer to discuss alternatives on potential replacement or improvement. Such improvements would be very costly and further action regarding the dam is not addressed as part of this management plan.

[7] Coarse woody habitat in lakes are trees, limbs, branches, roots, and wood fragments at least 4 inches in diameter that enter a lake by natural (beaver activity, toppling from ice, wind, or wave scouring) or human means (logging, intentional habitat improvement, flooding following dam construction.

[8] http://midwestglaciallakes.org/2019/07/31/research-spotlight-coarse-woody-habitat-in-inland-lakes/

There are no other flood control structures at Staples Lake and, given that the existing dam is free flowing, there has been no significant history of overbank flooding in recent decades.

Staples Lake Dam
Photo credit:Mike Rogney, WDNR

E. Plans & Management Efforts

The Lake District, as an organization, has not coordinated or implemented any shoreland management efforts or projects to date, except for some general educational outreach to District members regarding shoreland best practices and coordinating with Polk County regarding signage, improvements, and AIS-related activities at the public boat ramp. However, based on the lakeshore owner survey results (see **Section VIII.A.**), many shoreland owners have adopted practices:

- 64% are not fertilizing or are using zero phosphorus fertilizer
- 63% have replaced septic systems
- 26% have native shoreline plantings
- 25% have bank stabilization projects
- Fewer, but some, have installed water diversions, infiltration pits, and rain gardens

Barron County and Polk County enforce shoreland and floodplain zoning standards at Staples Lake with rules regarding vegetative buffers, building setbacks, impervious surface limitations, and related mitigation options. Both the Town of Johnstown (Polk County) and the Town of Crystal Lake (Barron County) also fall under the general county zoning ordinance and related development rules for their respective counties.

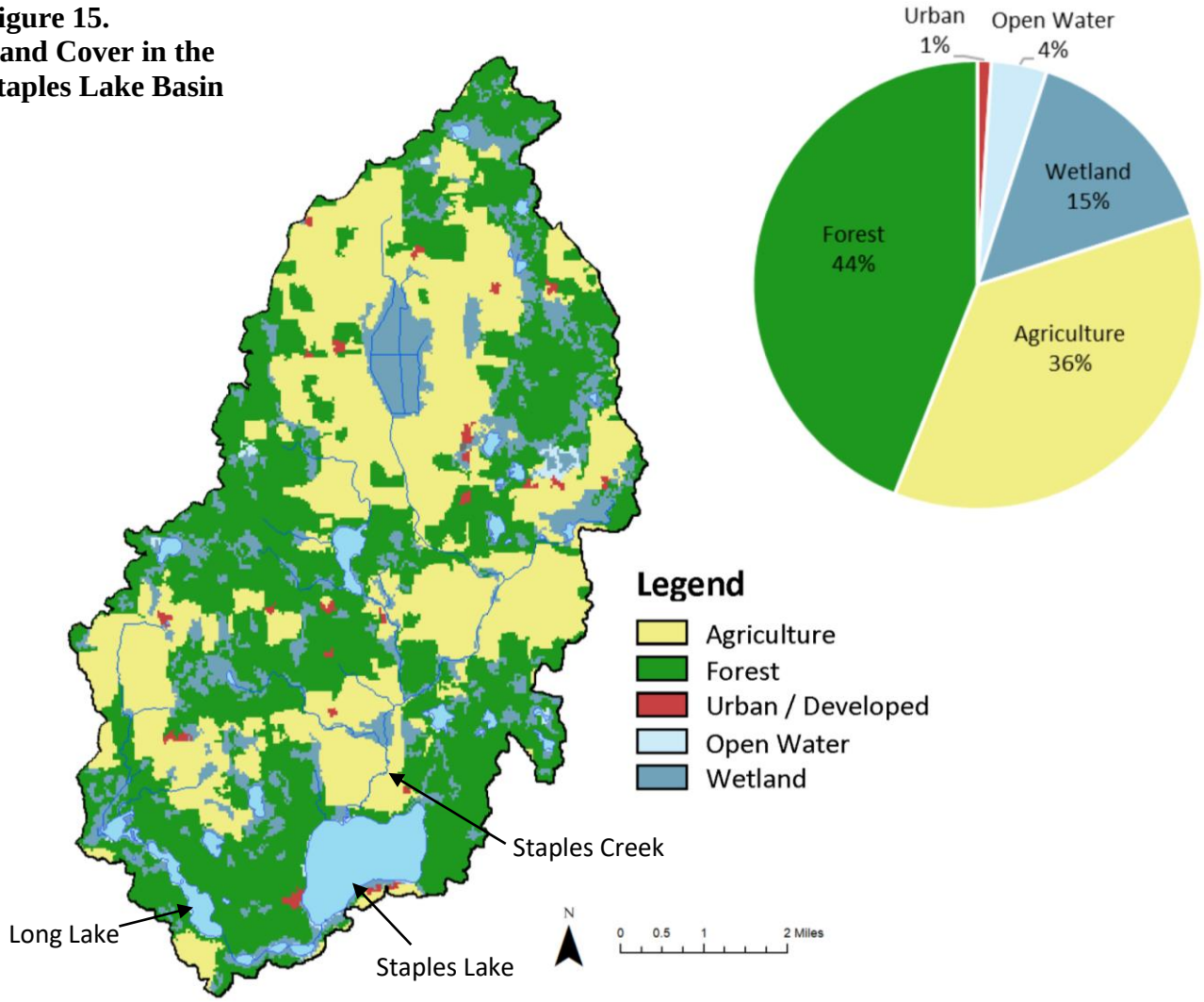
VII. Watershed Conditions & Management Efforts

A. Land Cover, Uses, & Ownership

Given that the nutrients (phosphorus) and sediment loading entering Staples Lake is largely coming from upstream, it is important to consider conditions and opportunities within the Staples Lake Watershed when exploring and prioritizing solutions to the Lake's water quality challenges.

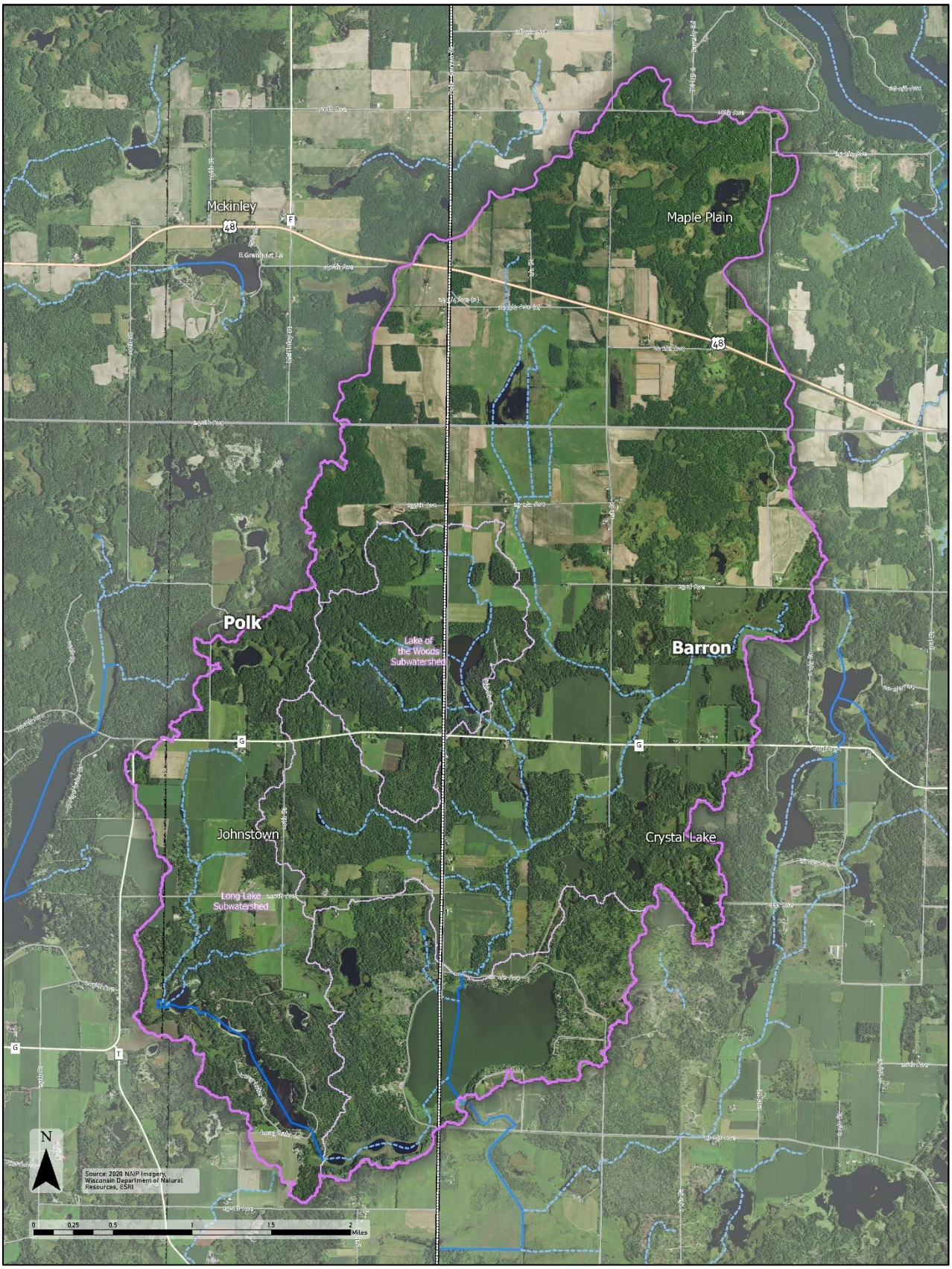
As shown in **Figures 15 and 16**, Staples Lake lies at the bottom of the Staples Creek Watershed (HUC12). The Watershed is approximately 11,500 acres (18 sq. miles) and lies within the Forest Transition Ecological Landscape, a glacial till plain that is characterized by forest (44%), agriculture (36%), and wetlands (15%) as the predominant land covers.

Figure 15.
Land Cover in the Staples Lake Basin



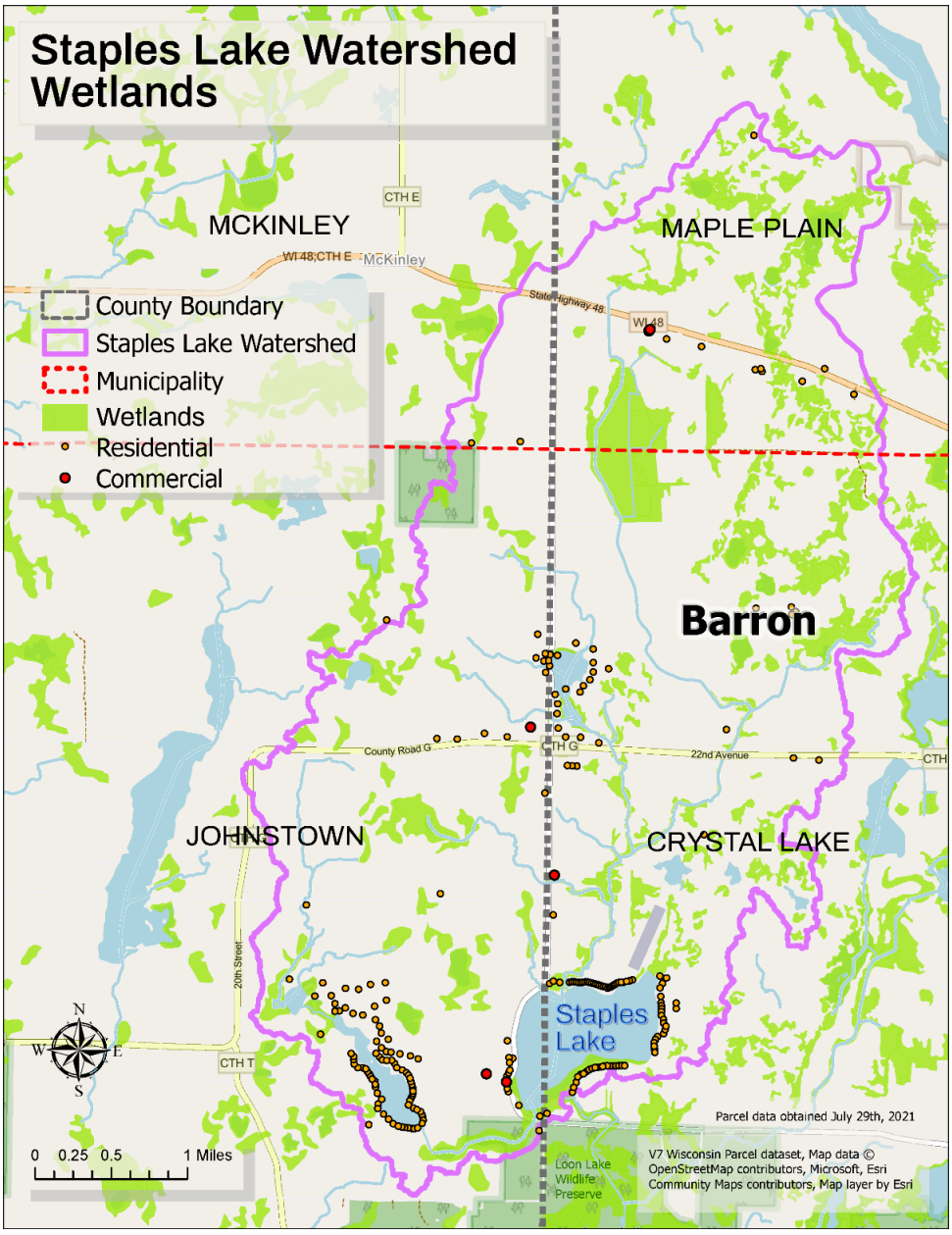
from: *Staples Lake Phosphorus Loading Study*, WDNR, 2020.

Figure 16. Staples Lake Watershed



The **wetlands** within the Watershed in **Figure 17** can be helpful in providing buffers to streams and in the capture of nutrients, though some stretches of Staples Creek lack natural or wetland buffers. A large area of wetland mitigation projects by the Wisconsin Department of Transportation (WDOT) and the Natural Resource & Conservation Service (NRCS) exists in the north part of the Watershed. Given the amount of ditching associated with these wetlands, a functional assessment of their value to protecting water quality may be valuable. Opportunities may exist to restore drained wetlands or build upon these mitigation projects. Created and restored wetlands can significantly reduce the transport of total nitrogen and total phosphorus in agricultural runoff, and may thus be effective in efforts to counteract eutrophication. However, restored wetlands on former farmland are significantly less efficient than other wetlands at nutrient removal[9].

Figure 17.
Staples Lake Watershed Wetlands



[9] Land, M., Granéli, W., Grimvall, A. et al. *How effective are created or restored freshwater wetlands for nitrogen and phosphorus removal? A systematic review.* Environ Evid 5, 9 (2016).

Figure 18 below provides additional insight into the distribution of agricultural, residential, and commercial development within the Watershed by tax assessment class. There are no parcels assessed as manufacturing and there are no permitted point sources discharging pollutants or wastewater in the Watershed.

Much of the development is concentrated along the three primary lakes. As of 2021, 188 parcels were assessed with some agriculture. According to county conservation staff, there are a very limited number of farmers actually residing in the Watershed; much of the cropped farmland is leased to farmers residing elsewhere. This limits the networking opportunities, such as the creation of producer-led groups. County staff also noted that there are only a few farms with cattle and only two active beef operations.

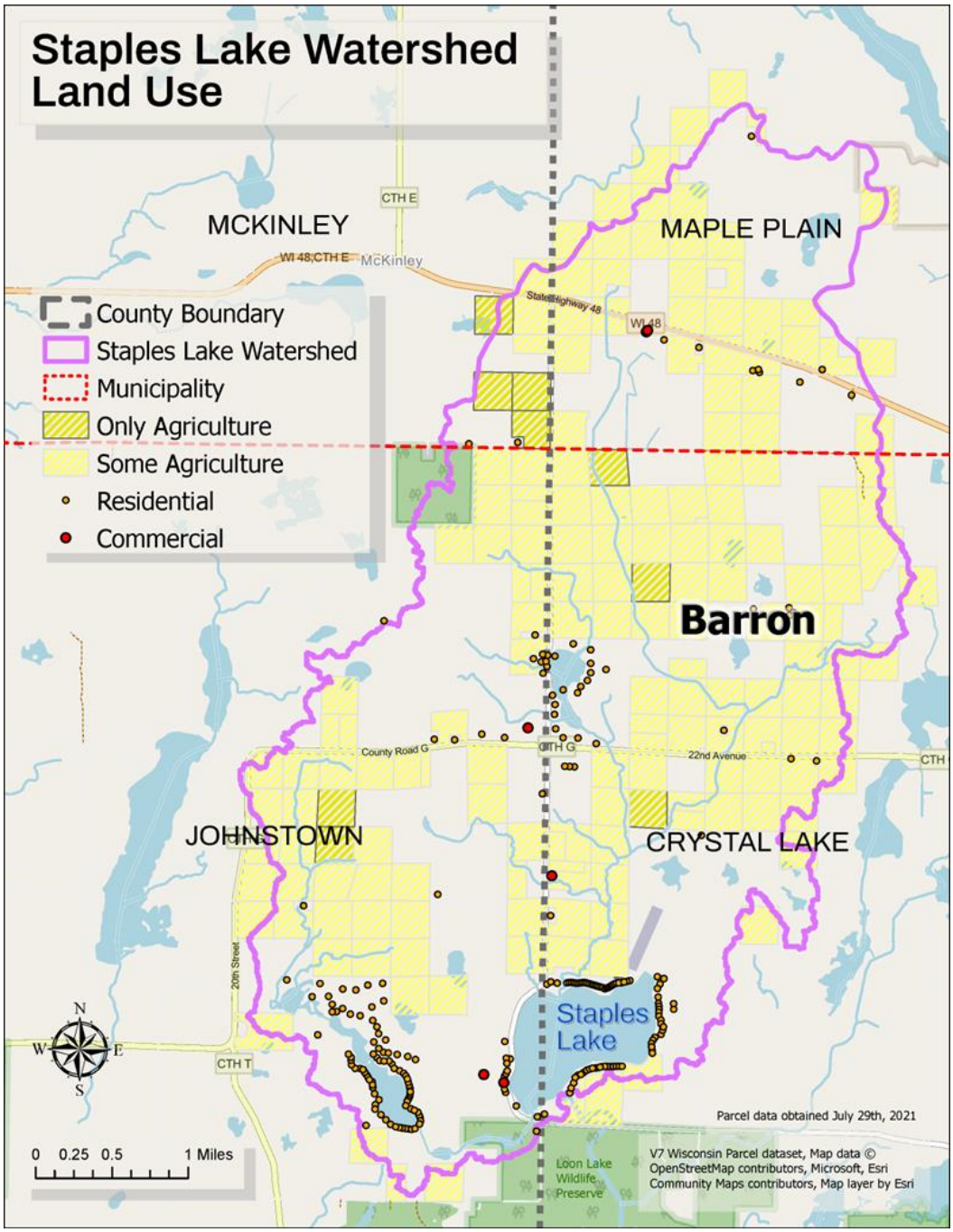


Figure 18. Staples Lake Watershed Land Use

The table below breaks down the distribution of parcels in the Watershed by municipality. Over 75% of the parcels are located in Barron County. This fact is important given that most of the Staples Creek subshed is located in Barron County, but 96% of the external phosphorus loading into Staples Lake is coming from Staples Creek.

Town	County	Acres	# of Parcels	# of Landowners	Parcels/Owner
Crystal Lake	Barron	2,994.6	86	44	2.0
Maple Plain	Barron	1,922.5	41	27	1.5
Johnstown	Polk	1,377.2	54	27	2.0
McKinley	Polk	258.1	7	6	1.2
	Totals	6,552.4	188	104	1.8

The effective number of unique landowners is smaller due to families, spousal arrangements, trusts, LLCs, etc.

B. Erosion Vulnerability Assessment for Agricultural Lands

In 2020, WDNR performed an EVAAL assessment for the Staples Lake Watershed. The Erosion Vulnerability Assessment for Agricultural Lands (EVAAL) toolset was developed by the Wisconsin Department of Natural Resources (WDNR) to identify areas that are potentially more vulnerable to erosion, and, thus, more likely to transport sediment and phosphorus to surface waters. Data inputs considered include topography, soil type, rainfall, land cover (including crop rotation), and, for gully erosion, stream power. This information can then be used to help prioritization management efforts.

Figures 19 & 20 on the following pages are two key maps from the 2020 EVAAL analysis for the Staples Lake drainage basin (watershed) performed by WDNR:

Figure 19 identifies the cropland based on a generalized crop rotation based on typical management, though land cover does change over time. Different crop rotation types have different potentials for soil loss (erosion/runoff). Figure 10 also shows the sub-basins or internally drained areas for Lake of the Woods and Long Lake; these areas drain into these other two lakes before draining into a stream that feeds into Staples Lake. While some nutrients from these inner-drained areas will pass through, they may be a lower priority for Staples Lake.

Figure 20 shows provides a relative ranking of soil loss (erosion) improvement potential (High to Low) and suggests where best management practices (BMPs) may be most effective. However this does not reflect areas where BMPs have already been implemented.

Most of the Watershed is relatively flat or gently sloping. Many of the cropland soils in the area have very low water infiltration rates and would likely benefit from soil health BMPs, such as reduced tillage and cover crops. Different agricultural BMPs vary in effectiveness at reducing phosphorus or sediment runoff with combinations of various BMPs often being most effective (e.g., nutrient management planning + cover crops + reduced tillage + buffers). Other factors, such as location and type of farming operation, also influence BMP appropriateness and effectiveness. Partnerships with farmers and farmland owners are vital, since the use of agricultural BMPs can be incentivized, but not required.

Figure 19. Staples Lake EVAAL Crop Rotation

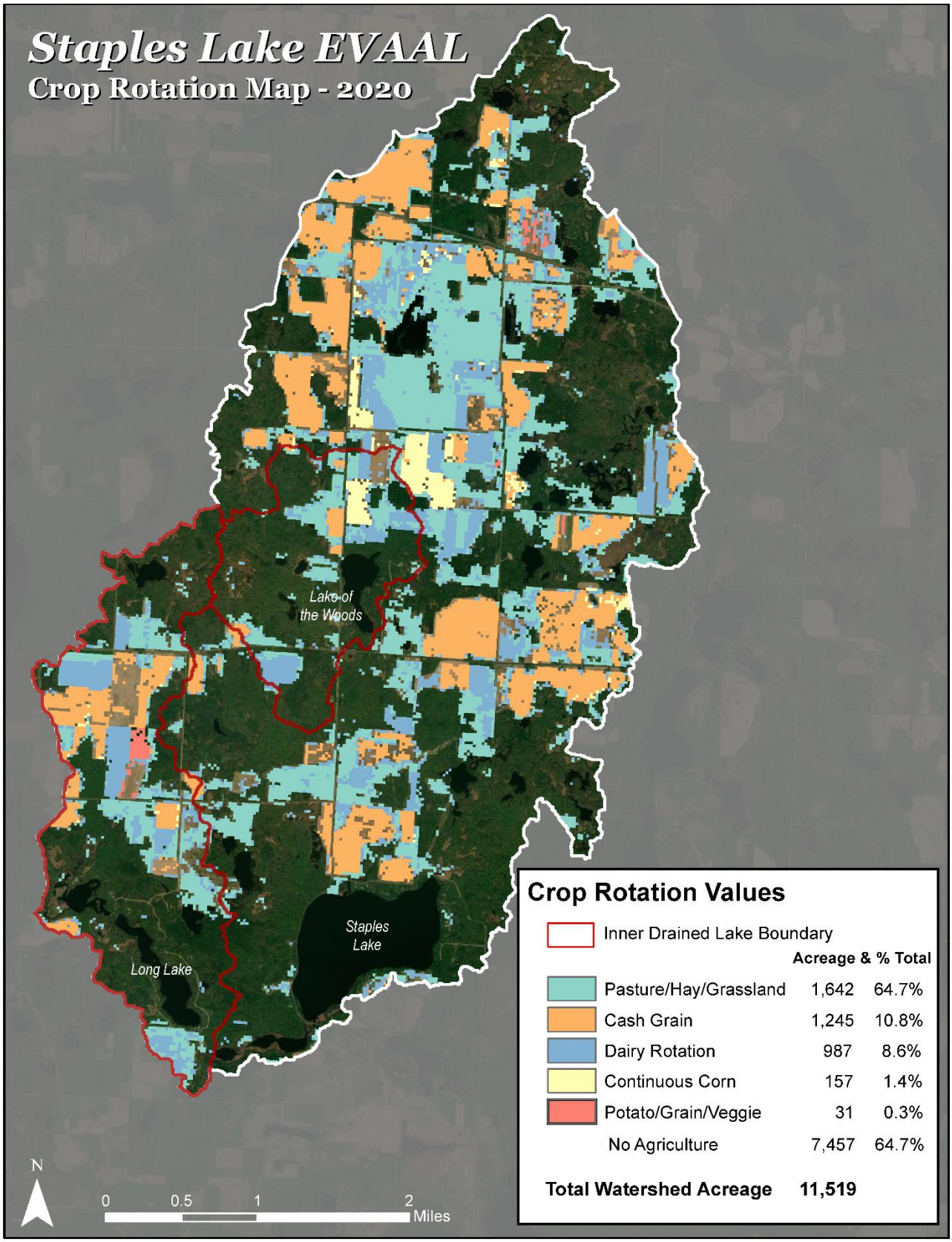
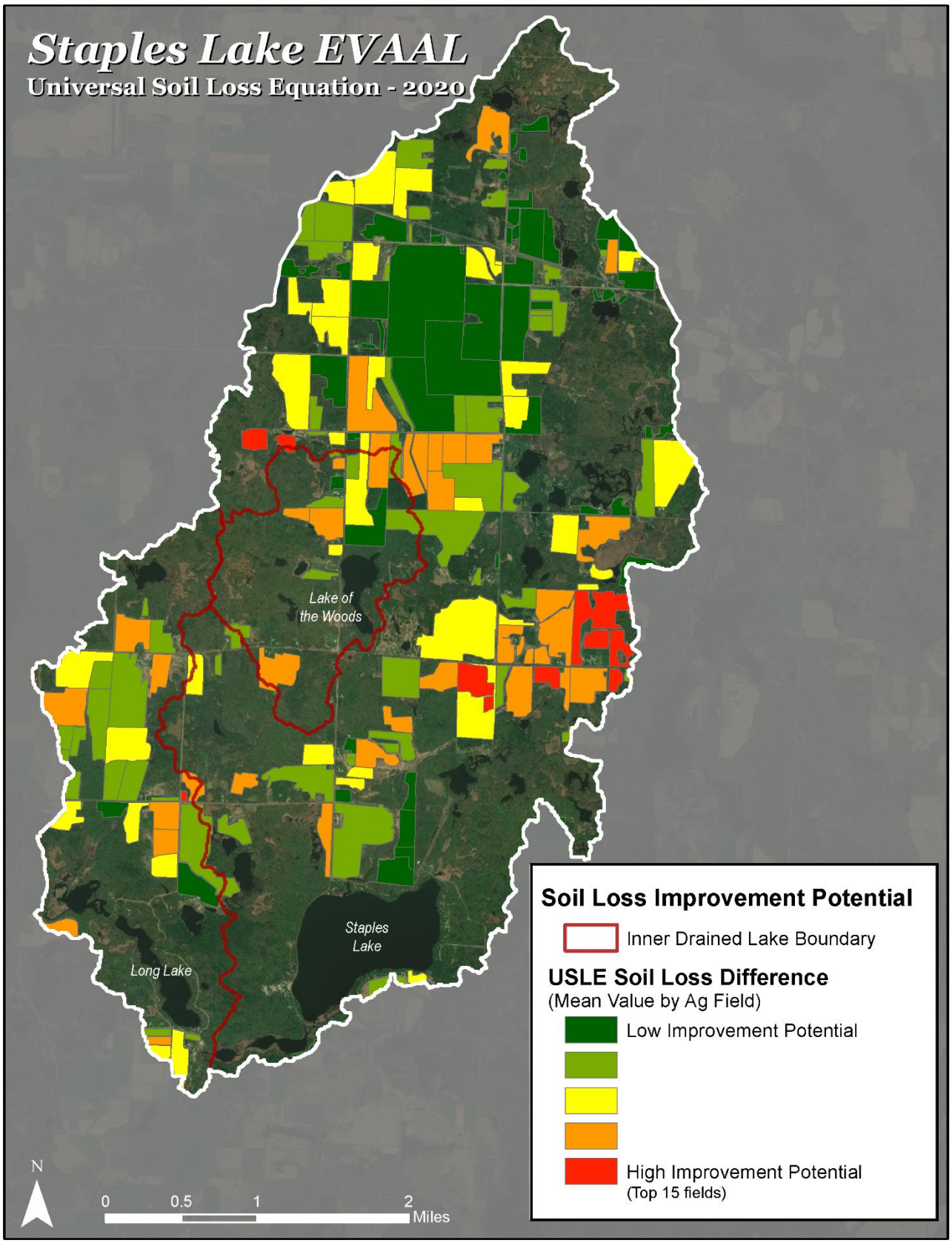


Figure 20. Staples Lake EVAAL Improvement Potential



C. Plans & Management Efforts

Lake St. Croix Nutrient Total Maximum Daily Load (2012)

A TMDL is a regulatory term in the U.S. Clean Water Act, describing the maximum amount of a pollutant allowed to enter a waterbody so that the waterbody will meet and continue to meet water quality standards. The Clean Water Act requires states to develop TMDLs for all 303d-listed (impaired) waters, according to their priority ranking on that list. Once a TMDL is approved, certain rules apply regarding planning and controlling for the point and nonpoint sources that contribute to the impairment.

This document established a Total Maximum Daily Load (TMDL) for Lake St. Croix of 2,172.8 lbs/day (360 metric tons/year) of Total Phosphorus. This equates to an overall needed phosphorus load reduction of 27 percent to meet an in-lake water quality standard with a margin of safety and reserve capacity. As mentioned previously, this plan does not specifically mention Staples Lake, but does suggest that a 34% reduction from the Apple River subwatershed would be needed to meet the Lake St. Croix TMDL goal.

Implementation Plan for the Lake St. Croix Nutrient TMDL (revised 2013)

As the title suggests, this plan provides recommended actions to achieve the TMDL for Lake St. Croix established in 2012. The plan includes a mix of point source, non-point source, education, and civic engagement strategies. For Barron and Polk counties, the largest phosphorus-loading reductions are needed in the Apple River subwatershed. The plan also notes that a Polk County transect survey found that the rate of soil erosion in the Upper Apple River Watershed has been increasing from 1999-2011. Again, the plan does not specifically mention Staples Lake, but does recommend water quality monitoring on the Apple River.

Water Quality Management Plan Update for the Upper Apple River Watershed (2011)

This plan prepared by Wisconsin Department of Natural Resources included the following recommendations specifically mentioning Staples Lake:

- WDNR Water Resources staff should monitor the present water quality conditions in Staples Lake to assess any changes that may have occurred since the implementation work of the early 1980's.
- Staples Lake, and a number of other lakes, should be considered a high priority for possible selection as priority watershed projects through the Wisconsin Nonpoint Source Pollution Abatement Program (Type B).

St. Croix Basin Strategic Plan (2017)

Prepared by the St. Croix Basin Water Resources Planning Team, this plan does not specifically mention Staples Lake, but does support ongoing Basin Team activities and includes the goal of reducing phosphorus loading to Lake St. Croix by 20% by the year 2020.

Barron & Polk County Conservation Offices

As guided by their respective Land & Water Resource Management Plans, both County conservation offices actively work with landowners and farmers in the Staples Lake Watershed to encourage best management practices, enforce manure storage standards, and advocate for soil health and water conservation. County staff are well positioned with the experience and skill sets to serve as liaisons between the Lake District and the farmers/farmland owners in the Watershed. However, such outreach

may require significant one-on-one outreach since there are a limited number of farmers and there are no producer-led groups or extensive social networks.

Other Projects

In addition to the previously mentioned WDOT and NRCS wetland mitigation projects, there has been one additional water quality-related project completed within the Watershed. In the 1980's, Barron County partnered with the Lake District to assist with the construction of five Earthen Manure Storage (EMS) facilities in the Watershed. Since the time of the project, all five of these farms have transitioned to having no cattle and two of the sites have been closed. Older EMSs are widely considered to be environmentally hazardous, making the closure of the remaining three a priority of the County.

VII. Community Input

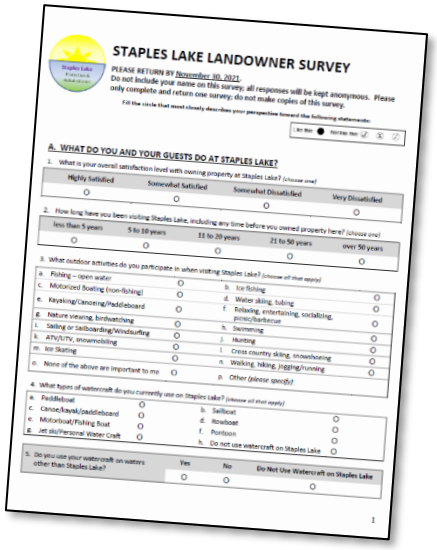
General community input into the plan's creation was obtained through two primary surveys that are summarized here. Community and District members also participated in planning meetings as described in **Section II.C.** Altogether, this input helped to identify plan issues, opportunities, goals, and objectives as well as the feasibility and priority of many of the recommended plan strategies.

A. Lakeshore Owner Opinion Survey – Fall 2021

Landowners who own shorelands at Staples Lakes were mailed a survey in November 2021 to provide insights into how the Lake is used, perceptions of Lake conditions, and interest in various practices and actions. Of the 87 surveys mailed, a total of 60 were returned, for a 69% response rate. Of the respondents, seven were Polk County landowners and two stated their properties lie in both counties.

Survey results highlights included:

- Nearly all respondents (92%) enjoy relaxing, entertaining, & socializing at the Lake.
- 88% of the respondents fish at the Lake.
- Pontoons are very popular and nearly 75% of respondents only use their watercraft at the Lake.
- The top five most frequent water quality concerns can all be traced back to excessive nutrients (i.e., poor water clarity, algae blooms, aquatic plant grow, unpleasant odors, water color).
- Opportunities for more education on shoreland practices and implementing Healthy Lakes grant projects appear to exist.


STAPLES LAKE LANDOWNER SURVEY

PLEASE RETURN BY November 30, 2021.
Do not include your name on this survey; all responses will be kept anonymous. Please only complete and return one survey; do not make copies of this survey.

Fill the circle that most closely describes your perspective toward the following statements:

A. WHAT DO YOU AND YOUR GUESTS DO AT STAPLES LAKE?

1. What is your overall satisfaction level with owning property at Staples Lake? (choose one)

Highly Satisfied	Somewhat Satisfied	Somewhat Dissatisfied	Very Dissatisfied
○	○	○	○

2. How long have you been visiting Staples Lake, including any time before you owned property here? (choose one)

less than 5 years	5 to 10 years	11 to 20 years	21 to 50 years	over 50 years
○	○	○	○	○

3. What outdoor activities do you participate in when visiting Staples Lake? (choose all that apply)

a. Fishing – open water	○	b. Ice fishing	○
c. Motorized Boating (non-fishing)	○	d. Water skiing, tubing	○
e. Kayaking/Canoeing/Paddleboard	○	f. Relaxing, entertaining, socializing, picnic/barbecue	○
g. Nature viewing, birdwatching	○	h. Swimming	○
i. Sailing or Sailboarding/Windsurfing	○	j. Hunting	○
k. ATV/UTV, snowmobiling	○	l. Cross country skiing, snowshoeing	○
m. Ice Skating	○	n. Walking, hiking, jogging/running	○
o. None of the above are important to me	○	p. Other (please specify)	○

4. What types of watercraft do you currently use on Staples Lake? (choose all that apply)

a. Paddleboat	○	b. Sailboat	○
c. Canoe/kayak/paddleboard	○	d. Rowboat	○
e. Motorboat/Fishing Boat	○	f. Pontoon	○
g. Jet ski/Personal Water Craft	○	h. Do not use watercraft on Staples Lake	○

5. Do you use your watercraft on waters other than Staples Lake?

Yes	No	Do Not Use Watercraft on Staples Lake
○	○	○

1

The full survey results are available in **Appendix C**.

B. Watershed Landowner Goal Survey – Spring 2022

Landowners throughout the Staples Lake Watershed were mailed an invitation in March 2022 to participate in a web-based survey that would guide the creation of the Plan's vision, goals, objectives, and priorities. This survey was conducted, in part, due to the limited time available for identifying goals during the February 18th community meeting. A total of 40 respondents answered one or more survey questions. Nearly half of the respondents did not attend the February 18, 2022, kick-off event and 21% of the respondent's owned property that is actively farmed or has managed forest.

The survey results in **Appendix D** were very helpful in establishing the Plan's vision, goals, and objectives. Ensuring that Staples Lake is a healthy ecosystem with decreased algae blooms was by far the most important desired water quality change, closely followed by improved water clarity. The survey results made it clear that improved Walleye numbers was desired. And the increased use of shoreland best practices (e.g., Healthy Lakes projects), shoreline erosion prevention, and wetland protections were priorities for shoreland areas surrounding Staples Lake.

VIII. Management Strategy

A. Vision Statement

The following long-term vision is aspirational and reflects why Staples Lake is important and what it is most hoped for by the Lake District and area residents:

Staples Lake is a relaxing, four-season, outdoor recreation destination. The Lake's scenic shorelines, abundant wildlife, healthy aquatic ecosystem, and clear water make Staples Lake a great place for low-intensity, water-based recreation, such as fishing, swimming, and kayaking, and for friends, family, and visitors to gather, live, and enjoy the "northwoods" setting.

B. Goals & Objectives

Priority Goal

The following is the main goal of this planning effort and reflects the priority concerns as identified in the community survey efforts and meetings:

Remove Staples Lake from the Wisconsin 303(d) Impaired Waters List due to excess phosphorus and algal growth, while providing a healthy, balanced ecosystem for aquatic plants and fish.

To accomplish this goal, total phosphorus in the Lake would need to be decreased below 40 ug/l, which is the Wisconsin phosphorus water quality standard for shallow drainage lakes. Should this be accomplished, it is expected that the trophic state indices for Chlorophyl-A, Secchi Depth, and Total Phosphorus would decrease significantly, hopefully into the mesotrophic range. The Staples Lake District desires to achieve or make very substantial progress towards the goals and objectives in this plan within ten years, and sooner if possible.

Water Quality Goal and Objectives

Goal 1: **Staples Lake water quality and clarity is improved, the number of days that algae blooms occur is decreased, and the Lake is swimmable during most days of the summer.**

Objective 1.1: Reduce the summer (June-August) average of Total Phosphorus in Staples Lake by an annual average of at least 5.5 ug/l. Over ten years, this would result in a total 55 ug/l reduction, bringing Staples Lake below the 40 ug/l water quality standard when compared to the 2020 Total Phosphorus summer average of 94 ug/l.

Objective 1.2: Reduce external Total Phosphorus loading by at least 50%, with an emphasis on loading reductions during the spring months[10].

Objective 1.3: Reduce internal Total Phosphorus loading from sediment by at least 80%[11]. Large projects towards this objective should be undertaken concurrent with or following, but not prior to efforts to address Objective 1.3 are underway.

Objective 1.4: While working to achieve the Total Phosphorus reductions in Objectives 1.1., 1.2, and 1.3, evaluate and potentially implement interim strategies to reduce the frequency and/or extent of algae blooms.

Objective 1.5: There will be no new fish kills on Staples Lake due to poor water quality or low dissolved oxygen.

Objective 1.6: Undertake projects to reduce sediment-loading into Staples Lake and increase water depth in the "cove" at the Staples Creek delta for improved navigability. Also, sediment loading will be decreased if the external nutrient loading objective (Obj 1.3) is achieved, since sediment and excess nutrients travel together in runoff.

Objective 1.7: In cooperation with Barron and Polk County conservation offices and other lake groups, increase awareness and adoption of conservation and soil health best practices among landowners and farmland renters within the Staples Lake watershed.

Objective 1.8: Landowners near the Lake will be aware of conservation practices. With the cooperation of landowners, continue to encourage shoreland practices that reduce runoff, mitigate bank erosion, encourage natural vegetation, and preserve wetland areas.

Objective 1.9: Continue to conduct and support regular monitoring to allow for tracking of progress towards the water quality and other plan goals and objectives. This is especially important for small, shallow lakes given that changes in clarity and water quality can impact aquatic plant and fishery dynamics.

Aquatic Plant Management and Invasive Species Goal & Objectives

Goal 2: **The aquatic plant community of Staples Lake will be healthy and balanced, while not impairing recreational enjoyment and navigation.**

Objective 2.1: Continue to manage and, if needed, selectively harvest aquatic plants as guided by surveys and a management/harvesting plan taking care to only harvest what is needed for navigability and invasives control based on annual growth and plant density. Increases in water clarity under the previous goal may increase aquatic macrophyte growth and necessitate changes or increases in plant harvesting and management.

Objective 2.2: Maintain a balanced, diverse native aquatic plant community and woody vegetation, which is important to the fishery and overall Lake health.

Objective 2.3: Strive to prevent the introduction of new invasive aquatic species into Staples Lake.

[10] As suggested in the 2020 *Staples Lake Phosphorus Loading Study*, a 50% external reduction and an 80% internal reduction, together, are needed to achieve the 40 ug/l water quality standard, with an emphasis on loading reductions during the spring months.

[11] Ibid. (see previous footnote)

Objective 2.4: A healthy aquatic plant community and water quality are related; implement the plan recommendations that support Goal 1.

Fisheries Goal & Objectives

Goal 3: **Staples Lake will have great year-round fishing, with a healthy, balanced fishery and strive towards a distribution of species similar to the 1993 fish inventory with good Walleye, Perch, and Largemouth Bass numbers and size distribution.**

Objective 3.1: Maintain the aeration system to prevent winter fish kills and continue year-round dissolved oxygen monitoring. Should the water quality goal and objectives be met, the need for the aeration system may decrease.

Objective 3.2: Work cooperatively with Wisconsin Department of Natural Resources to regularly stock extended growth Walleye of a larger size than in the past, so that Staples Lake is a productive, stocked Walleye fishery, even under expected climate outcomes.

Objective 3.3: Restore and maintain sufficient course woody habitat for Perch and other fish species that depend on this habitat, which can also help prevent or reduce bank erosion from wave action.

Objective 3.4: Periodically conduct a fish inventory survey to monitor changes in species distribution, size, and health at least once every nine years.

Objective 3.5: A healthy aquatic plant community, water quality, and aquatic plant management are related; implement the plan recommendations that support Goal 1 and Goal 2. Improved water quality and clarity may also impact aquatic vegetation, water temperature, and turbidity, which would impact the fisheries.

C. Management Alternatives Considered

The Staples Lake District considered a wide range of management alternatives to address the previous goals and objectives, including but not limited to:

- Phosphorus-reduction and algae-mitigation alternatives, such as in-stream phosphorus controls and filtration systems, treatment structures on the Lake and upstream, reintroducing groundwater into Staples Creek, chemical treatment and algaecides, dredging, and year-round aeration systems. For example, creating a dam or levee on Staples Creek to create wetland upstream would unlikely be permitted as a navigable stream protected as public, common highway under the Wisconsin Constitution. Many herbicides or other chemical treatments for aquatic plant or algae control will also not be permitted at this time.
- Additional educational, outreach, or regulatory strategies, such as encouraging formation of a farmer/producer-led group, additional enforcement of boating regulations, clean boat/AIS inspection program, and a variety of other educational/outreach strategies.

The selected strategy alternatives in the implementation plan were recommended based on feasibility (e.g., cost, technical barriers, appropriateness) and likely effectiveness. However, a few of the recommended strategies require additional study or analysis prior to full implementation.

D. Implementation Plan

This action plan is a guide and the recommendations will be implemented as resources allow. In some cases, a strategy may require further study or analysis, which may necessitate modification or fine-tuning prior to implementation. Many strategies are worded in a manner to allow the Lake District flexibility and discretion in implementation. Timelines for implementation may also change due to shifting priorities or changes in opportunities, such as new grant funding programs. The related grant programs are summarized after this action plan.

Strategy	Time-line	Cost Estimate (if avail.)	Suggested Resources	Notes
Water Quality Strategies – External Loading/Upstream				
1. **Evaluate Opportunities for Ag Conservation Practices (ACPF & STEPL tools)** – Partner with Polk County Land Conservation to: (i.) Use the Agriculture Conservation Planning Framework (ACPF) tool and to identify suggested site-specific opportunities to install conservation practices on farmlands in the Staples Lake Watershed. (ii) Use the Spreadsheet for Modelling Pollutant Loads (STEPL) tool to estimate phosphorus- and other pollutant-loading in the Watershed and how such phosphorus loading may change based on the adoption of agricultural best management practices (BMPs). The results will be used by Polk & Barron county conservationists to engage watershed farmers and farmland owners as part of #2 below.	2022	$1,100 (ACPF) $1,050 (STEPL)	Lake District funded 2022	In May 2022, the Lake District executed agreements with Polk County to perform the ACPF & STEPL analysis, which will supplement the 2020 EVAAL soil loss analysis. ACPF will analyze and suggest site-specific BMPs, such as stream buffers. STEPL will calculate pollutant loads (nitrogen, phosphorous, BOD, sediment) based on a variety of land use factors, including existing agricultural BMPs. It will also provide insight into how much progress towards the phosphorus-reduction goals can be achieved through the common BMPs suggested in the ACPF.
2. **Support Regenerative Agriculture & Soil Health Outreach and Practices in the Watershed** – Partner with Barron County and Polk County conservation departments to: • Encourage agricultural BMP adoption and streambank buffers as guided by the ACPF analysis. • Promote conservation lease agreements. • Explore education, pilot, or demonstration projects related to the above, including a demonstration farm, field days, edge-of-field phosphorus removal structures, or similar infiltration projects.	1-3 years, then On-going.	Special project costs will vary. Some lake groups support outreach or cost-sharing of BMPs.	Partnering w/ County CCDs is essential. WDNR Lake Mgmt Plan Impl Grants or TRM Grants	While County conservation departments (CCDs) can provide some outreach support as part of their operational budgets, special projects and initiatives will require grants and, potentially, cost-sharing by the Lake District and/or other partners. Achieving desired change on landscape that results in needed phosphorus-loading reductions will not happen overnight and will likely take many years to achieve external-loading goals.

3. **Soil Testing & NMP Initiative** - Create a program that offers free soil testing and nutrient management planning (NMP) to farmland owners in the watershed with the understanding that they will consider BMPs if elevated phosphorus levels are found during testing. A potential second phase of this project could secure a TRM grant to assist with cost sharing of the implementation of selected BMPs if there is interest by landowners and farmers.	1-3+ years	Depends on # of participants and acres. Testing & NMPs average $10-$15 per acre	WDNR Lake Mgmt Plan Impl Grants. TRM Grants	Very related to #2 above. Implement in partnership with County conservation departments. A private crop consultant will be needed to perform the testing and nutrient management planning. The ACPF will help suggest which BMPs to consider. Submit a WDNR Lake Management Plan Implementation Grant application in Fall 2022 or 2023 to help fund this project. Perhaps County CCD time could be included as local cost-share. This may be a multi-year project and could include the STEPL analysis in strategy #1.
4. **Wetland Banking Effectiveness & Opportunities** - Reach out to Wisconsin Department of Transportation (WDOT) and the Natural Resource Conservation Service (NRCS) to encourage the evaluation of the functional effectiveness of the existing wetland mitigation banking projects in the Staples Creek watershed and to encourage the improvement or expansion of these wetlands or additional new wetland banking projects.	1-3 years	none for District	Army Corps Technical Assistance may be available if a robust analysis desired	The purpose of this recommendation is two-fold: (1) Evaluate whether the existing wetland banking areas are effective at reducing runoff or if effectiveness can be enhanced, given the amount of standing water in ditches, and (2) encourage the expansion of these wetland banks or additional wetland banking and preservation in the watershed, especially in areas with an elevated potential of soil loss per EVAAL.
5. **Encourage Stream Monitoring** - If volunteers can be found, conduct Water Action Volunteer (WAV) monitoring at key road crossings on Staples Creek and/or tributaries to evaluate changes in flow, clarity, and phosphorus.	3-5 years	none for District; volunteers	WDNR WAV Program; Polk Co CCD	Such monitoring would potentially offer insights into the effectiveness of BMP adoption and the sources of runoff. Polk County CCD may offer related training. Volunteers do not need to be Lake District members.
6. **Engage Watershed Farmers, Farmland Owners, & Town/County Officials** - Conduct educational mailings, special events (e.g., pontoon rides) and other outreach activities, including sending invitations to annual fundraising events.	ongoing	varies; can be minimal	Could be part of a WDNR Lake Mgmt Plan Impl Grant	While the County CCDs will act as liaisons for #2 above, this strategy recognizes that the District should also make efforts to reach out to watershed residents and elected officials directly. The County CCDs and Extension can be good sources of ideas and examples from other lake groups.
7. **Foster Lake Partnerships** - Partner with the Little Lake in the Woods Association and Long Lake resident to implement the external loading (upstream) strategy recommendations identified above and explore joint training and data-collection and -sharing opportunities. Periodic meetings with representatives of the other lakes and, possibly, from the four town boards is recommended.	ongoing	none for District; potential cost savings	Extension & County CCDs for technical support	Since the other lakes would also benefit from many of these upstream strategies, they may be willing to participate or help provide cost-sharing or in-kind support. The Soil Testing & NMP Initiative in particular would be a great partnership opportunity. This strategy could be extended to the four local town governments to keep them informed and, potentially, involved.

Strategy	Time-line	Cost Estimate (if avail.)	Suggested Resources	Notes
Water Quality Strategies – Internal/At the Lake				
1. **Ultrasonic Algae Remediation -** Explore alternative suppliers and address any environmental and boating safety concerns. If deemed feasible, install such a system and educate shoreland owners and lake owners on their purpose and importance, including related signage at the boat ramp. It may be beneficial to include periodic algae testing as part of this strategy for a baseline and/or to monitor effectiveness.	1-3 years	$50,000 - $90,000 Algae testing about $60-$80 per sample.	potentially partner with Pipe Lake District on research, contracting, training, etc.	Newer technology that has not been widely used on "natural" lakes in Midwest; WDNR will require data to be confident in the technology's ecological safety. This is a "band aid" to immediately address blue-green algae blooms, while providing time to reduce external and internal phosphorus loading. Remediation units will need replacing over time (5-8 years average life) and some include water quality monitoring equipment at an additional cost.
2. **Shoreland BMPs & Habitat** – Periodically determine if there is interest among shoreland owners in Healthy Lakes grant-eligible shoreland projects (e.g., native plantings, rain gardens, diversions, rock infiltration) and/or fish sticks projects; if there is strong interest, submit a joint grant application on behalf of multiple shoreland owners Partner with Barron & Polk County conservation departments during their annual tree sales to encourage the planting of trees in shoreland areas, including replacement of those lost in the 2019 storm. Discourage the dumping of yard waste along Staples Creek streambank to the north of 20½ Avenue. Instead, collaborate with the towns to explore the creation of a compost/dumping site for branches, leaves, and other yard waste.	1-3+ years	Healthy Lakes Project costs can vary, but most are <$5,000 per practice. Polk CCD may provide Healthy Lakes site visits at no cost.	Healthy Lakes & Rivers grants The Lake District could prepare a joint application involving multiple properties totaling up to $25,000 in projects	Project guides and funding information is available at: https://healthylakeswi.com/ The 2021 *Shoreland & Shallows Habitat Assessment* can be used to help target potential project locations and identify any shoreline erosion concerns. Some lake groups provide cost-sharing or volunteer support for Healthy Lakes grant projects. The Lake District could also organize a team of volunteers to assist shoreland owners with tree planting. A small budget allowance may be needed to install signage to discourage the dumping of yard waste near Staples Creek. Educate shoreland residents why this is important.
3. **Watercraft Use Signage** – Partner with Polk County conservation department to install more prominent signage regarding motorized watercraft speeds and rules at the boat ramp. Conduct related educational outreach to shoreland owners to help reduce turbidity and bank erosion, while improving safety. Continue to monitor compliance and address in the future (e.g., water safety classes, enforcement options), if needed.	1-3 years	minimal cost for signage	Partner with Polk County CCD and/or WDNR on related outreach	The primary concern is compliance with the rule that a motorboat cannot operated at a s speed in excess of "slow, no wake speed" within 100 feet of any shoreline by State law. The Lake District desires to avoid establishing a water safety patrol or contracting with certified law enforcement for compliance with State boating laws.

4. **Update Bathymetric Map** – Produce an updated bathymetric map and monitor changes to Lake depth.	3-5 years	$5,000 - $15,000	WDNR Lake Planning Grant or Mgmt Plan Impl Grant	The bathymetric map created by WCWRPC from the 2021 aquatic plant survey (APS) data is an estimate. As an alternative to a map update, depth could be tracked by periodically comparing depths at a handful of selected GPS points.
5. **Update Phosphorus Loading Study** – Once significant progress is completed on external P-loading reduction, update the phosphorus loading study.	5-10 years	$5,000 - $20,000	WDNR Lake Planning Grant or Mgmt Plan Impl Grant	This study could include the creation of a water budget for Staples Lake and, potentially, Staples Creek. This could be included as part of the same grant application as the bathymetric map update above.
6. **Alum Treatment for Internal Phosphorus Loading -** Once a 50% reduction in external phosphorus loading from 2019 estimates is attained, create and implement an Alum Treatment Plan. The Plan should address anticipated dosage amounts, frequency of application, required buffering, and cost estimates.	5-10+ years	$150,000 - $200,000 per application	WDNR Lake Mgmt Plan Impl Grant	WDNR unlikely to assist with costs until at least a 50%-85% improvement in external P loading. As of 2020, dry alum treatment was costing $300-$700 per acre. Multiple applications likely needed under an adaptive management approach (i.e., monitor & adjust applications as needed).
7. **Sediment Trap & Limited Dredging** – Install & maintain a sediment trap on Staples Creek and conduct limited dredging in the Staples Creek delta or "cove" and the Long Lake delta. This will require a study & permit addressing soil core sampling, location, access, and the spoils site. Once installed, establish a maintenance fund for the sediment trap. A second sediment trap could be explored for the Long Lake inlet stream at additional cost.	5-10+ years Trap should be installed prior to dredging	Roughly estimated at $10,000 - $20,000 for planning, then $20,000 - $50,000 for installation	WDNR Lake Mgmt Planning Grant or Plan Impl Grant; Rec Boating Grant	Best to delay until a significant decrease in external sediment loading is achieved as a result of the external/upstream strategies. WDNR grant funding is available for related studies, but will rarely fund installation of sand traps and dredging, except limited dredging from a public boat ramp to the main channel. May be possible to install the trap and conduct dredging under a single 10-year permit if <3,000 cubic yards total is removed. Cost savings may be possible if work occurs when ground is frozen and if local community can provide some equipment and labor as in-kind. An adaptive management approach is necessary — monitor the trap and Lake depth to evaluate changes and see how quickly the dredged areas fill back in. Some head-cut is expected in the first 1-3 years as the bottom adjusts to the trap. Modify the maintenance schedule as needed.
8. **Staples Lake Water Quality Monitoring** – Continue to organize and support volunteer participation in the Citizen Lake Monitoring Network (CLMN) to help track changes in water quality (e.g., clarity, phosphorus, dissolved oxygen, chlorophyl-A, qualitative metrics).	ongoing	No cost to participate in CLMN	Volunteers and a boat. WDNR may provide training.	Should significant changes or concerns be found in water quality, depth, aquatic plants, AIS, etc., the WDNR Lakes Biologist should be contacted. More specialized testing may be possible under certain WDNR Lake grants.

9. **Shoreland Owner & District Member Awareness -** Continue to educate Staples Lake shoreland owners about: • the importance of regularly inspecting and maintaining septic systems; • conducting a self-evaluation of waterfront runoff; • alternative best practices to reduce waterfront runoff, such as diversions, rock infiltration, native plantings, and rain gardens, including typical costs and related Healthy Lakes grant funding; • rules related to shoreland management, wetlands, and aquatic plant harvesting near docks; • aquatic invasive species threats and mitigation; • the need for citizen lake monitoring and other volunteer opportunities; and, • the Staples Lake Management Plan, progress towards to the Plan, and the Lake District's role in improving water quality and the fisheries at the Lake.	ongoing	Basic educational outreach can be achieved at minimal expense.	WDNR lake grant funding to assist with educational outreach is available, if needed. WDNR, Extension Lakes Program, & CCDs have many educational materials	WDNR and counties have a wealth of resource materials that can assist with outreach. Copies of some educational materials can be ordered through WDNR and the Healthy Lakes website. County conservation departments can provide educational materials, pontoon classrooms, site visits, and presentations. For a more intensive educational initiative, the Lake District could pursue a WDNR Surface Water Education Grant or a Lake Management Plan Implementation Grant. See the related outreach team strategy (#2 under Organizational Strategies)

Strategy	Time-line	Cost Estimate (if avail.)	Suggested Resources	Notes
Aquatic Plant Management & AIS Strategies				
1. **Aquatic Plant Management** – Together, **Section V**, **Appendix A**, the previous aquatic plant goal and objectives, and this strategy constitutes an update to the *Staples Lake Aquatic Plant Management Plan*. The key management strategies are: • The District should continue to maintain an annual harvesting permit consistent with the Aquatic Plant Management Plan. • Continue to use the harvester to conduct selective harvesting in permit areas that are 3 or more feet in depth when necessary for navigability. • If necessary for navigation or control, consider June harvesting for Curly-Leaf Pondweed in permit areas. • Educate shoreland owners on aquatic plant management expectations and rules. • Closely monitor aquatic plant changes as clarity changes due to water quality strategies. Perform an updated aquatic plant survey in 5 to 10 years and amend the *Aquatic Plant Management Plan* as needed.	ongoing w/ annual permit update Aquatic Plant Survey in 5-10 years	maintain harvester Eventual update of the aquatic plant survey and plan may cost $2,000-$8,000	WDNR Lake Mgmt Planning Grant or Plan Impl Grant may be used for education and for the plant survey update	Key messages for related education include: (1) harvesting is only permitted in areas for 3+ foot in depth; (2) harvesting is only allowed in areas where navigability is impeded and more than just a nuisance; (3) shoreland owners may remove aquatic plants by hand in areas of 3+ foot in depth for a watercraft access corridor up to 30' wide and 150' out into the Lake; and (4) too much harvesting can harm native plants and habitat while exacerbating the spread of invasives. The District may want to update the 2016 harvesting plan summary as an educational handout. The District could pursue some WDNR lake grant dollars to assist with related education as part of a larger project if desired. The updated Aquatic Plant Management Plan in **Section V.B.** is very similar to the strategy from the *2016 Staples Lake Aquatic Plant Harvesting Strategy* with some small changes as a result of the 2021 Aquatic Plant Survey and recent lake community discussions.
2. **Aquatic Invasive Species (AIS) Education & Mitigation** – Educate shoreland owners and lake users about aquatic invasive species (AIS) threats and how to mitigate these threats by maintaining the educational signage and boat-washing station at the public boat launch. Consider participating in the annual Drain Campaign and/or Landing Blitz. Should Eurasian Milfoil or other new invasive be found in a nearby lake (e.g., Long Lake, Lake of the Woods), the District will increase educational outreach regarding the specific AIS threat.	ongoing	no cost to District, unless special outreach performed	Actions at boat launch provided by Polk County CCD. WDNR Clean Boats, Clean Waters grant, if needed	The District recognizes and thanks Polk County for its recent installation of AIS signage and boat-washing equipment. District volunteers ensure the equipment is maintained, including refilling of cleaning solution. Polk County CCD can also provide guidance for annual outreach campaigns, such as the Landing Blitz. AIS educational materials available through WDNR and County conservation departments. The District will consider partnering on such educational outreach efforts in the future, potentially, including a Clean Boats, Clean Waters grant project.

3. **AIS Monitoring** - Encourage water quality monitoring volunteers and other District members to receive training in the identification of the more common aquatic invasive species (AIS) threats. Monitor Staples Lake for new AIS. Should a potential new AIS be found, document the finding with photographs and, if possible, collect of up to 5 specimens. Share your findings with WDNR's AIS regional coordinator to verify the AIS and identify appropriate next steps.	ongoing	no cost to District	volunteer supported Polk County CCD can assist with training.	Could be combined with the Citizen Lake Monitoring Network (CLMN) strategy. Realistically, once an AIS is found, it is often too late to try to remove or exterminate. Preventing introduction of an AIS is the best means of control. Polk County CCD can provide a drop-off site for any AIS that is removed. A similar monitoring and reporting strategy could be adopted for diseased fish.

Strategy	Time-line	Cost Estimate (if avail.)	Suggested Resources	Notes
Fishery Strategies				
1. **Fish Sticks** - Based on the 2021 Shoreland & Shallows Habitat Assessment, identify locations where additional fish sticks and/or tree drops are desirable. If such habitat improvements are desired, the District should consider applying for WDNR Healthy Lakes grant funding to install tree drops and fish sticks, while training lake volunteers in these practices so that they can be duplicated in the future if needed. Fish cribs are an alternative habitat structure if good opportunities for fish sticks are not available.	1-3 years	$50-$1,300 per fish sticks cluster, plus $303 permit fee to WDNR	WDNR Healthy Lakes Grant Program, except doesn't fund fish cribs.	Will benefit Yellow Perch populations, which was frequently mentioned in the public surveys. Strategy to be guided by the shoreland assessment and interest of shoreland owners. Consult with WDNR regarding the need to anchor, including existing trees in Lake from the storm event. Can be implemented in conjunction with other Healthy Lake grant projects.
2. **Walleye Stocking** – Conduct a fall stocking of extended-growth Walleye, then every other 1-2 years thereafter. Initial stocking recommendation is 10 fish/acre (or 3,400 fish). After stocking, conduct targeted Walleye surveys in the fall of the following year to index the abundance and survival of stocked fish from the previous year. Revise the Walleye stocking plan as needed based on survey results.	3-5+ years	$6,500 - $8,000 per stocking	WDNR to perform survey as resources allow	Requires submittal of WDNR Form 9400-060 Fish Stocking Permit Application to regional Fisheries Biologist. Purchase fish from a WDNR-approved private hatchery: https://www.wisconsinaquaculture.com/ Consider conducting an annual fundraising event, potentially in conjunction with the District's annual meeting, to cover stocking costs.
3. **Periodic Fish Surveys -** In 2027 and at least every 9 years thereafter, conduct a comprehensive fisheries survey. Based on survey results, revise the stocking and fisheries management plan if needed.	2027, 2036, 2045….	none to District if WDNR provided	WDNR will likely provide	Partner with WDNR Fisheries Biologist to conduct periodic shocking/inventory as well as obtain guidance on adjustments to stocking plans and any other fisheries management actions.
4. **Maintain Winter Aeration System** - Maintain the aeration system for use during winter months to increase dissolved oxygen levels and help prevent fish kills.	ongoing	District pays electric bill	maintained in partnership with WDNR	Only used during winter months.
5. **Fisheries Education** - Work with the WDNR Fisheries Biologist to educate Lake users about the fishery, including: • the importance of woody habitat; • the need for stocking and why the Lake is not naturally producing Walleye like in the past; • encouraging the use of lead-free tackle; and, • the diversity and balance of fish species.	ongoing	varies; can be minimal cost	partner with WDNR Fisheries Biologist for technical support	This strategy could be addressed in many ways, such as articles in the Districts' newsletter, presentations/displays at the Annual Meeting or fundraising events, a web page, and/or specifically produced materials (e.g., fact sheets, brochures). Some activities could be part of a WDNR lake grant project.

Strategy	Time-line	Cost Estimate (if avail.)	Suggested Resources	Notes
Organizational or Capacity-Building Strategies				
1. **Annual Plan Review** - At least once a year prior to the Annual Meeting, the Lake District Commissioners should review and document progress towards this action plan, then share this progress during the Annual Meeting. Any recommended plan additions, changes, or amendments should be documented and shared with WDNR.	2023, then annually	none	WDNR & County Conservation Departments (CCDs)	It is recommended that the District consult with the conservation staff of Barron and Polk counties when evaluating progress. Consultation with WDNR Water Resources Mgmt Specialist and Fisheries Biologist may also be needed or desired. The Lake District may establish an ad hoc work group to conduct this activity.
2. **Form a "Lake Outreach" Team & Website** - Form a Lake Outreach Team to create a Lake District website to keep shoreland owners, Lake users, elected officials, and others informed of Lake conditions and District activities, then take the lead on other District outreach activities. Many of the action plan strategies include an educational component involving shoreland owners, other Lake users, elected officials, and farmers/farmland owners. If delegated by the District's Commissioner's the Team could also take the lead on the District's annual fundraiser and other outreach, fundraising, and networking events.	1-3 years, then ongoing	<$10,000 to create basic website, then $100-$150/yr to maintain	WDNR lake grant funding can assist with website and other outreach. WDNR, Extension, & County CCDs have many prepared educational materials	Outreach Team would be a standing committee created by the Lake District Board and may include Board members as well as public-sector staff or representatives, which would allow the Commissioners to focus on other projects and managing the District overall. Outreach can occur through the annual meeting, fundraising events, demonstration sites, site tours, pontoon classrooms, trainings, guest speakers, and newsletter and/or other direct mailings. This strategy, or part thereof, could be implemented in partnership with lake groups from Long Lake and Lake of the Woods. It could be beneficial to monitor and track changing knowledge and practices once outreach activities begin in earnest.
3. **Lake Leaders Training** - Lake District Commissioners and volunteers with a strong commitment to improving Staples Lake should consider participating in the Wisconsin Lake Leaders Institute training and attending the Wisconsin Lakes & Rivers Convention. There may also be benefits from participating in discussions, planning, and activities for the greater St. Croix River Watershed.	1-3 years, then ongoing	Conference fees and travel (e.g., $350 fee for Lake Leaders program)	Some costs could potentially be part of a larger educational grant project	Wisconsin Lake Leaders Institute consists of three retreats, each 2-days long, where participants receive intensive instruction on aquatic ecology, watershed management, organization management, and civic leadership concepts, which would be helpful in plan implementation. Such training and conferences can also be useful for networking and demonstrating the District's commitment to making positive change.

4. **Encourage Polk County to Join the District** - Involve Polk County shoreland owners and elected officials in meetings and keep them informed of District activities. Demonstrate that the District is working hard to improve water quality, the fishery, and recreational opportunities, and does not have a regulatory role. Invite Polk County shoreland owners to become part of the District.	1-5 years	none	Extension Lakes Program	Though Polk County shoreland owners can't officially vote during District meetings, this does not mean they can't be invited or participate. Encourage their involvement. And, in time, perhaps they will be willing to join the District, especially once the Walleye stocking proves fruitful.
5. **Update the Lake Management Plan** - Review and fully update the Staples Lake Comprehensive Management Plan at least once every ten years. An interim review and partial update may be required within five years.	by 2032	$15,000 - $35,000 for a full update, with studies	WDNR Lake Planning Grant	The planning grant for the management plan update could include related assessment and survey work and limited educational activities, including updates to the aquatic plant survey and the shoreland/habitat assessment.
6. **District Records** - Maintain records of Lake studies, plans, and activities, including volunteer hours, special studies, grant applications, applications/permits, contracts, and reports.	ongoing	<$5,000 to create basic website, then $100-$150/yr to maintain	WDNR lake grants can help fund the website creation	Maintain a central location and custodian for such information. As a unit of government, the District is required to provide public access to many of its records under the Wisconsin Open Records Law. Such documentation can also be helpful for evaluating plan progress as well as demonstrating the District's commitment to improving Staples Lake, which is important for grant application.
7. **District Commissioners** - Maintain an active Board of Commissioners to oversee and guide Lake District activities, including the implementation of this Management Plan. Keep all Commissioners informed of activities and meetings as required by State rules. The District's Commissioners will include: • five Commissioners who own property within the District that are elected by Lake District members, • one Commissioner appointed by the Town of Crystal Lake, and • one Commissioner appointed by Barron County Commissioners are encouraged to attend training on the role of Lake District Commissioners and related rules.	ongoing	no significant costs, unless there are training costs	Extension Lakes Program	Wisconsin Statutes 33.28 provides details on the make-up of the Board. At least one of Commissioners elected by District members shall be a resident of the District. The Staples Lake District is a unit of government. As such, its Board of Commissioners and other committees appointed by the Board are subject to Wisconsin open meetings and public records laws. Commissioners may benefit from related training, such as the annual Wisconsin Lakes & Rivers Convention. Extension may offer additional learning opportunities.

Recommended Implementation Schedule

The following is a summary of the action plan with *hoped for* timeframes. **Dark green** denotes projects or actions that could occur at any time during these years, while **light green** denotes an ongoing activity; some ongoing activities may occur periodically or become future projects.

Strategy	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	Notes
Water Quality Strategies - External Loading/Upstream												
1. Evaluate Opportunities for Ag Cons Practices (ACPF & STEPL)												District contracted with Polk County for this analysis
2. Support Regen Ag & Soil Health Outreach and Practices in Watershed												could include projects in future
3. Soil Testing & NMP Initiative												submit a WDNR Lake Mgmt Plan Imp grant in Fall 2022
4. Wetland Banking Effectiveness & Opportunities												contact WDOT & NRCS during Years 1-3
5. Encourage Stream Monitoring												WAV program
6. Engage Watershed Farmers, Farmland Owners, & Town/County Officials												initial engagement as part of Lake Mgmt Plan creation
7. Foster Lake Partnerships w/ Lake of the Woods & Long Lake groups												explore collaboration & cost sharing
Water Quality Strategies - Internal/At the Lake												
1. Ultrasonic Algae Remediation												Must first demonstrate safety to WDNR.
2. Shoreland BMPs & Habitat												potential Healthy Lakes grant projects
3. Watercraft Usage Signage												
4. Update Bathymetric Map												
5. Update Phosphorus Loading Study												in 5-10 years, if progress on external loading
6. Alum Treatment for Internal Loading												first achive a 50+% external P-loading reduction
7. Sediment Trap & Limited Dredging												may be 10+ years
8. Staples Lake Water Quality Monitoring												continue current efforts
9. Shoreland Owner & District Member Awareness												continue/ expand current efforts
Aquatic Plant Management & AIS Strategies												
1. Aquatic Plant Management												largely continue current; update survey in 5-10 yrs
2. AIS Education & Mitigation												consider participation in Clean Drains & Landing Blitz
3. AIS Monitoring												as part of lake water quality monitoring
Fishery Strategies												
1. Fish Sticks and/or Fish Cribs												potential Healthy Lakes grant project
2. Walleye Stocking												target 2024 for first years of stocking
3. Periodic Fish Surveys												2027 & every 9 years thereafter
4. Maintain Aeration System												continuing
5. Fisheries Education												continuing
Organizational & Capacity-Building Strategies												
1. Annual Lake Management Plan Review												provide a progress update at Annual Meeting
2. Form a "Lake Outreach Team" & Create Website												target 2023 for first annual Lake fundraiser
3. Lake Leaders Training												explore applying in 2023-2024; others in future
4. Encourage Polk County Landowners to Join the District												process dictated by State Statutes
5. Update the Management Plan												by 2023
6. Maintain District Records												continuing
7. Active District Commissioners												continuing

Key Funding Sources for Lakes

The following grant resources are most commonly used by qualified lake organizations and municipalities for water quality, habitat, and recreational improvements. This list does not include the many additional upstream/watershed, urban/municipal stormwater, wetlands, or flood mitigation grant and financial programs such as: WDNR Targeted Runoff Management (TRM) Grants, WDNR Urban Nonpoint Source Stormwater Management Grants, WDNR Municipal Flood Control Grants, FEMA hazard mitigation grants, Community Development Block Grants-Public Facilities, U.S.F&WS Fishers & Farmers Partnership, North American Wetlands Conservation Act (NAWCA) grants, and other agricultural conservation grants (e.g., CREP, CSP, EQIP, ACEP). WDNR and county conservation staff can assist in navigating these various grant programs and their applicability to the area.

Grant Program	Eligible Activities	Funding	Deadlines
WDNR Surface Water Education Grants	A wide-range of educational, capacity building, & data collection projects	Up to $5,000/project; 67% of total project costs	Pre-applications by Sept 2; Nov 1 deadline
WDNR Surface Water Planning Grants (small-scale & large-scale)	Assessment and planning. No more than 20% of funding may support education & outreach.	Up to $10,000/project; 67% of total project costs	Pre-applications by Sept 2; Nov 1 deadline
WDNR Comprehensive Management Planning for Lakes & Watersheds	Creating a management plan. No more than 20% of funding may support education & outreach.	Up to $25,000/project; 67% of total project costs	Pre-applications by Sept 2; Nov 1 deadline
WDNR Management Plan Implementation (projects must be consistent with an approved management plan)	Broad range of projects, including nonpoint source pollution control, habitat restoration, water quality improvements, management staffing, studies, and landowner incentives.	Up to $200k for lakes & wetlands; $50k for rivers; 75% of total project costs	Pre-applications by Sept 2; Nov 1 deadline
WDNR Healthy Lakes & Rivers	Fish sticks, native plantings, diversion practices, rain gardens, & rock infiltration installed by shoreland owners.	$1,000 per practice up to $25,000/application; 75% of total project costs	Pre-applications by Sept 2 for 1st time; Nov 1 deadline
WNDR Surface Water (Wetland & Shoreline Habitat) Restoration	Shoreland protections, in-water habitat structures, culverts, wetland restoration, & ordinance development. Wetland incentives of $10k also available.	Up to $50k for lakes & wetlands; $25k for rivers; 75% of total project costs	Pre-applications by Sept 2 for 1st time applicants; Nov 1 deadline
WDNR Clean Boats, Clean Waters	Boater education and AIS prevention, including CBCW inspections. Some additional AIS programs are available.	Up to $24,000/project; 75% of total project costs. $4,000 per landing or pair of landings.	Pre-applications by Sept 2 for 1st time applicants; Nov 1 deadline

WDNR Recreational Boating Facilities Grants There is a separate boating grant program (BIG) for marinas & other facilities for larger (26'+) recreational boats.	Dredging of boating channels, boating support facilities (e.g., ramps, docks, parking lots, sanitary facilities, lighting), navigation aids, locks, trash skimming equipment, weed harvesting equipment.	50% of total eligible costs; no hard maximum funding limit. Applications over $250k require longer review.	Apply at any time if <$250k. Applications reviewed quarterly. Dredging limited to 1x every five years.
WDNR Municipal Dam Grant	Dam repair, reconstruction, or modification. Will cover 100% of first $1 million of dam abandonment and removal costs.	50% of the first $1 million, then 25% of next $2 mil.	2022 deadline was March 4th
WDNR Targeted Runoff Management (TRM) Grant Program (small-scale & large-scale)	Funds construction of multi-year BMP projects to control nonpoint source pollution. For non-TMDL projects, only agricultural projects implementing state agricultural performance standards and prohibitions are eligible. Frequently used by county conservation offices. Lake districts may also be eligible.	70% of total eligible costs. Max of $600,000 for large-scale projects and $225,000 for small-scale projects.	2022 deadline was April 15th for projects beginning in 2023
WDNR Knowles-Nelson Stewardship Programs Includes Land & Water Conservation Fund (LAWCON) & the Recreational Trails Program (RTP). There is a separate Motorized Stewardship Program for ATV & snowmobile trail aids.	A variety of public outdoor recreational improvements, including beaches, fishing piers, riverfront/lakefront trails, boardwalks, park & picnic amenities, restrooms, signage, ADA accessibility, boat or canoe/kayak launches, viewing platforms, scuba diving platforms, lake access staircases, & land acquisition.	50% of total eligible costs, though RTP may be up to 80% grant funded. Project should be in a local government's adopted Outdoor Rec Plan.	May 1st except March 15th for NCO acquisition projects
Army Corps of Engineers Planning Assistance to Tribes & States	Local governments can request assistance for a wide variety of water-related planning and studies.	Provides technical assistance, not grant funding. Typically, value of assistance must be matched 50%.	None.
WDSPS Wisconsin Fund	Provides grants to eligible homeowners and small commercial businesses to help offset a portion of the cost for the repair, rehabilitation, or replacement of existing failing septic systems.	Not all counties participate. Amount of funding varies by type of system and the size of the home or business.	Last funding period ended 1/31/22; uncertain if more funding will be available in future.
FishAmerica Foundation https://www.fishamerica.org/	Various projects that enhance fisheries and fishing opportunities, including stream restoration, AIS removal, aquatic habitat, aquatic vegetation, debris removal, etc.	The four awarded projects in 2021 were $10k and $15k	Monitoring their website for announcements

Many of the grants in the above list allow in-kind contributions to be used as part of the local cost share. And some of these grant programs also have an annual funding limit per waterbody or grantee, though may allow multiple applications from a single grantee in the same funding cycle.

E. Plan Monitoring & Updates

As identified in the previous organizational and capacity-building strategy recommendations, the Lake District should conduct an annual review of this management plan at least once a year starting in 2023 (see Strategy #1) and fully update this plan by 2033 (see Strategy #5).

The implementation plan includes additional monitoring and study updates, including encouraging stream monitoring, continued lake monitoring, updating the bathymetric map, updating the phosphorus-loading study (perhaps with a water budget), monitoring of aquatic invasive species, and periodic fish survey updates.

APPENDIX A:

2021 Aquatic Plant Survey

WCWRPC prepared the following summary based on the available 2021 Aquatic Plant Survey results collected and provided by Noah Berg.

Point-Intercept Method and Sample Points

A grid of Lake sampling points were generated using a standard formula that takes into account the estimated size of the littoral zone and the shape of the lake (Hauxwell et al., 2010). The same number of sampling points as the previous 2014 Aquatic Plant Survey (338) were created using GIS and located in the field using GPS.

At each sampling point, a point-intercept survey was conducted with several measurements collected:

- Depth
- Which aquatic plant species were encountered
- The abundance (rake fullness or visual) of each species present as described bull
- The dominant sediment type (muck, sand, or rock), if plants were present

A rake attached to a long pole was drug along the bottom for about 2.5 feet in order to detach and bring up plants growing in the sediment. The rake was then brought to the surface and given a total fullness rating (1, 2, or 3) based on the amount of plant matter collected (**Figure A-1**). Each species was also given a fullness rating based on the amount of that species collected on the rake. A voucher was collected for each species. In addition to the Rake Fullness Rating, a**ny plant seen within 6 feet of the boat was recorded as a "visual" on the data sheet.** The results do not include Filamentous Algae, aquatic moss, freshwater sponges, or liverworts.

Rake Fullness Rating	Description	Rake Coverage
1	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. Rake is about ½ full.	
3	The rake is completely covered or overflowing; tines are not visible.	

Figure A-1. Rake fullness ratings are based on the amount of plant matter collected at each sampling point *(Hauxwell, et. al, 2010).*

The survey was conducted on two dates:

June 19, 2021 – An initial Curly Leaf Pondweed (CLP) survey occurred in mid-June to correspond with the approximate peak season of this invasive.

August 1, 2021 – The full plant survey occurred, which included all aquatic plants found.

Summary Survey Results – 2014 vs 2021

The table below compares the summary results from the July 30, 2014, survey conducted by WDNR to the August 1, 2021, survey. Overall, the results are similar. A slightly higher number of native species were found in 2021, which is likely a positive finding.

However, perhaps the most significant differences are the decrease in the number of sites with native vegetation and that the maximum depth of plant colonization has decreased by about one foot since 2014 and the frequency occurrence of plants found within the littoral zone has dropped. This does not appear to be solely due to a change in sampling, since the number of site sites visited were identical and more sites were sampled with the rake in 2021. Instead, this downward trend is likely due to deteriorating water clarity and, perhaps, increasing sedimentation. In fact, the 2021 surveyor noted that Staples Lake had "extremely low water clarity in August [which] limited plant growth in deep water compared to species observed during the June CLP Survey" and "blue-green algae blooms were abundant in still shallow areas"

	2014	2021
Total number of sites visited	338	338
Total number of sites with vegetation	54	40
Total number of sites shallower than maximum depth of plants	81	78
Frequency of occurrence at sites shallower than maximum depth of plants	66.7	51.28
Simpson Diversity Index	0.84	0.89
Maximum depth of plants (ft)**	8.0	7.00
Number of sites sampled using rake on Rope (R)	0	0
Number of sites sampled using rake on Pole (P)	106	120
Average number of all species per site (shallower than max depth)	1.4	1
Average number of all species per site (veg. sites only)	2.1	2.68
Average number of native species per site (shallower than max depth)	1.4	1.27
Average number of native species per site (veg. sites only)	2.0	2.54
Species Richness	14	17
Species Richness (including visuals)	20	24
Species Richness (including visuals and boat survey)	n.a.	32

August 1, 2021 Survey Results

As shown on **Figure A-2** below, 120 sites of the 338 sampling points were raked for aquatic plants. The remaining points were deemed too deep for plants to grow.

Of these 120 sites, 43% had a dominate sediment type on the lake bottom consisting of sand, 40% was muck, and the remaining 17% was rock. In comparison, in 2014, 52% of the points sampled were muck covered, 24% sand, and 16% rock. **Figure A-3** shows that the south bay in particular as well as the area near the public boat ramp are dominated by a mucky bottom. A rock bottom appears to be most common along the west and east shorelines.

Figure A-2.

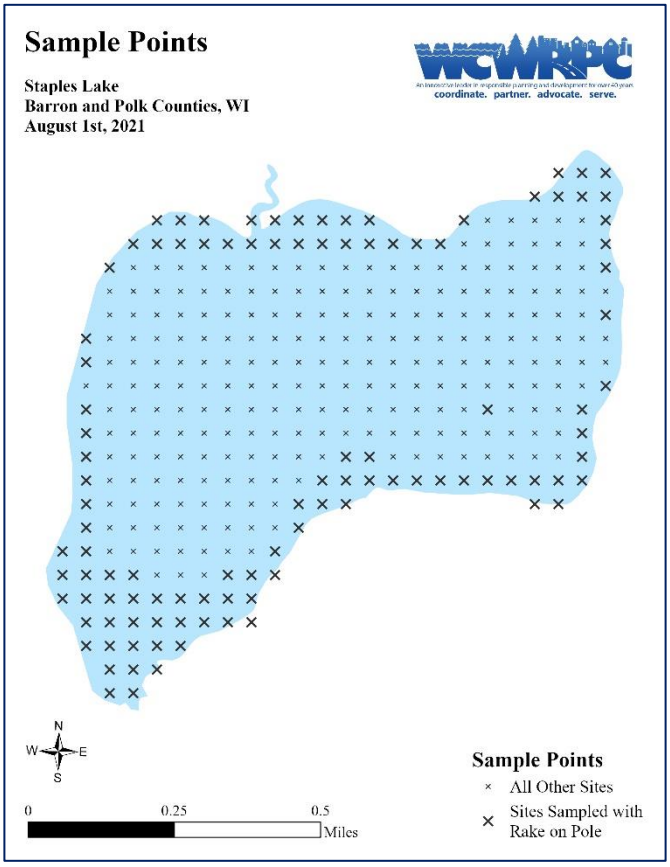
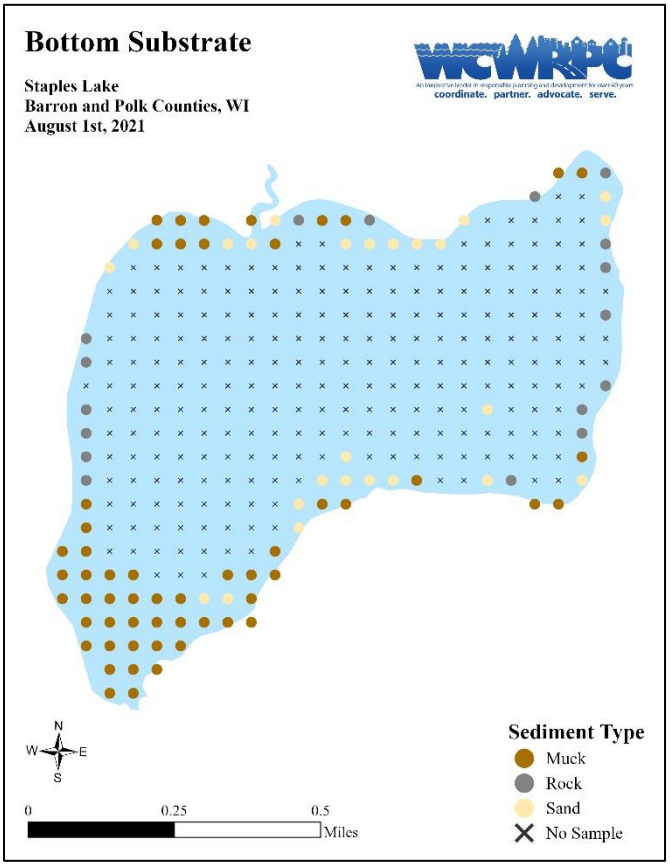


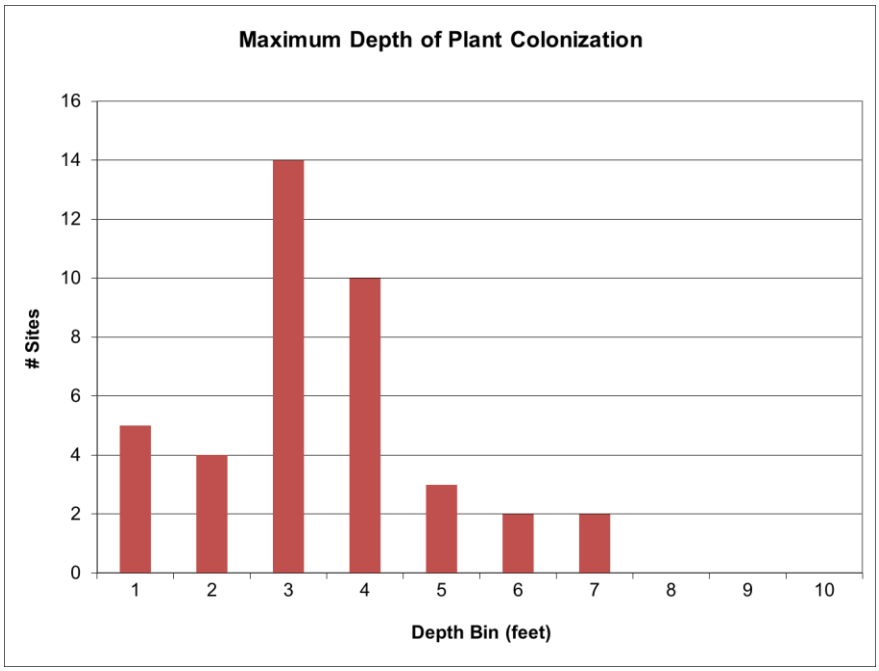
Figure A-3.



As noted previously, the maximum depth of plant growth was 7 feet. **Figure A-4** on the following page shows the depth distribution for sites at which native aquatic plants were found. Over half of the sampled sites with plants had a maximum depth of 3-4 feet. This maximum depth represents the littoral zone[12]. However, only 40 of the 78 (or 51%) sampled sites with a maximum depth of 7 feet had native aquatic plants.

[12] NR 193.03(22) defines the **littoral area** as the light-rich shallow-water zone of a lake extending from the ordinary high water mark to the greatest depth capable of supporting submersed aquatic plants.

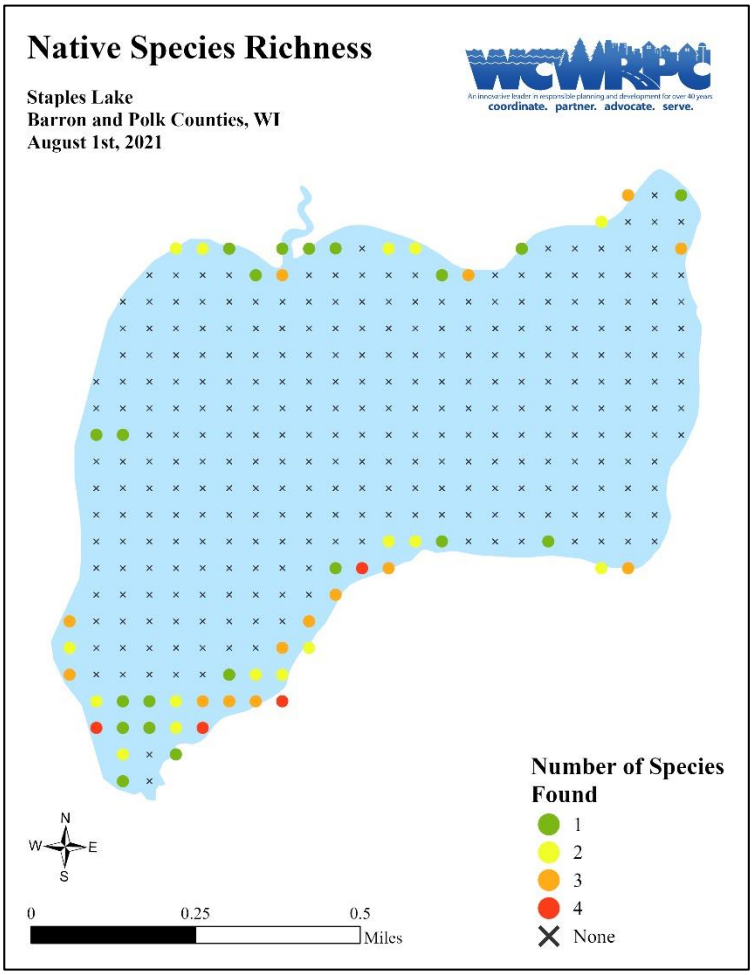
Figure A-4.



The number of species found in 2021 was higher than during the 2014 survey. There were 16 native aquatic plant species found during raking samples, plus one invasive (Curly-Leaf Pondweed). **Figure A-5** to the right shows the number of species found using the rake at each sampled point. An additional 7 species were visually noted, but not part of a raked sample and not shown on the map. Filamentous Algae was also found at 8 sites, but it is excluded from the frequency analysis.

Overall, the top-seven most diverse sites with 5 or more raked or visually identified native species had a depth of 3.5 feet or less and most had sand bottoms. The Simpson's Diversity Index value for Staples Lake was 0.89, slightly higher than in 2014. This means that two randomly sampled individual plants will be different species 84% of the time.

Figure A-5.



The table below shows the frequency of the individual species at the 40 sites were vegetation was found. Common Waterweed (20.56%) and White Water Lily (19%) had the highest relative frequency. There are some notable differences comparing the results below to the 2014 results. In particular:

- Coontail was the second most common species in 2014 (19.3%), but was less common in 2021
- In 2014, there were 3 native species with a relative frequency greater than 12% -- Common Waterweed (28.9%), Coontail (19.3%), and White Water Lily (12.3%). In 2021, there were only 2 such species.
- In 2014, there were 4 native species with a relative frequency between 5% to 10%. In 2021, there were 7 such species.

Scientific Name	Common Name	Number of sites where species found	Relative Frequency (%)	Frequency of occurrence within vegetated areas (%)	Frequency of occurrence at sites shallower than maximum depth of plants	Average Rake Fullness	# of Visual Sightings
Elodea canadensis	Common waterweed	22	20.56	55.00	28.21	1.45	0
Nymphaea odorata	White water lily	19	17.76	47.50	24.36	2.42	6
Ceratophyllum demersum	Coontail	9	8.41	22.50	11.54	1.89	1
Potamogeton crispus	Curly-leaf pondweed	8	7.48	20.00	10.26	1.25	0
Potamogeton pusillus	Small pondweed	8	7.48	20.00	10.26	1.38	1
Vallisneria americana	Wild celery	8	7.48	20.00	10.26	1.50	1
	Filamentous algae	8	*	20.00	10.26	1.25	0
Spirodela polyrhiza	Large duckweed	7	6.54	17.50	8.97	1.29	0
Wolffia columbiana	Common watermeal	7	6.54	17.50	8.97	1.00	0
Lemna minor	Small duckweed	6	5.61	15.00	7.69	1.00	0
Potamogeton praelongus	White-stem pondweed	4	3.74	10.00	5.13	1.25	0
Nuphar variegata	Spatterdock	2	1.87	5.00	2.56	2.00	5
Utricularia minor	Small bladderwort	2	1.87	5.00	2.56	1.00	0
Chara sp.	Muskgrasses	1	0.93	2.50	1.28	1.00	0
Pontederia cordata	Pickerelweed	1	0.93	2.50	1.28	3.00	3
Schoenoplectus acutus	Hardstem bulrush	1	0.93	2.50	1.28	1.00	0
Schoenoplectus tabernaemontani	Softstem bulrush	1	0.93	2.50	1.28	2.00	0
Utricularia vulgaris	Common bladderwort	1	0.93	2.50	1.28	1.00	0
Calamagrostis canadensis	Blue-joint grass	**	**	**	**	**	1
Eleocharis ovata	Ovate spikerush	**	**	**	**	**	1
Lemna trisulca	Forked duckweed	**	**	**	**	**	1
Najas flexilis	Slender naiad	**	**	**	**	**	1
Phalaris arundinacea	Reed canary grass	**	**	**	**	**	1
Sagittaria rigida	Sessile-fruited arrowhead	**	**	**	**	**	1
Typha latifolia	Broad-leaved cattail	**	**	**	**	**	1

The 2014 survey found three species that were not identified in 2021:

- Clasping-Leaf Pondweed (5.3%)
- Fern Pondweed (5.3%)
- Grass-Leaved Arrowhead (visual)

The 2021 survey found 16 species that were not identified in 2014:

- Large Duckweed (6.54%)
- Common Watermeal (6.54%)
- Small Bladderwort (1.87%)
- Muskgrasses (0.93%)
- Common Bladderwort (0.93%)
- Blue-Joint Grass (visual)
- Ovate Spikerush (visual)
- Reed Canary Grass (visual)
- Sessile-Fruited Arrowhead (visual)
- River Bulrush (visual)
- Wild Calla (visual)
- Bottle Brush Sedge (visual)
- Northern Blue Flag (visual)
- Rice Cutgrass (visual)
- Water Smartweed (visual)
- Common Arrowhead (visual)

All of the native plants rake-sampled in Staples Lake had an assigned Coefficient of Conservation (C) in the Floristic Quality Index (FQI) as shown in the table below. C values ranged from 3 to 10 with a mean of 5.9[13]. This resulted in a FQI value of 23.8, which is slightly higher than the 2014 value of 21.1.

Species	Common Name	C
Ceratophyllum demersum	Coontail	3
Chara	Muskgrasses	7
Elodea canadensis	Common waterweed	3
Lemna minor	Small duckweed	4
Nuphar variegata	Spatterdock	6
Nymphaea odorata	White water lily	6
Pontederia cordata	Pickerelweed	8
Potamogeton praelongus	White-stem pondweed	8
Potamogeton pusillus	Small pondweed	7
Schoenoplectus acutus	Hardstem bulrush	6
Schoenoplectus tabernaemontani	Softstem bulrush	4
Spirodela polyrhiza	Large duckweed	5
Utricularia minor	Small bladderwort	10
Utricularia vulgaris	Common bladderwort	7
Vallisneria americana	Wild celery	6
Wolffia columbiana	Common watermeal	5
N		**16**
Mean C		**5.9**
FQI		**23.8**

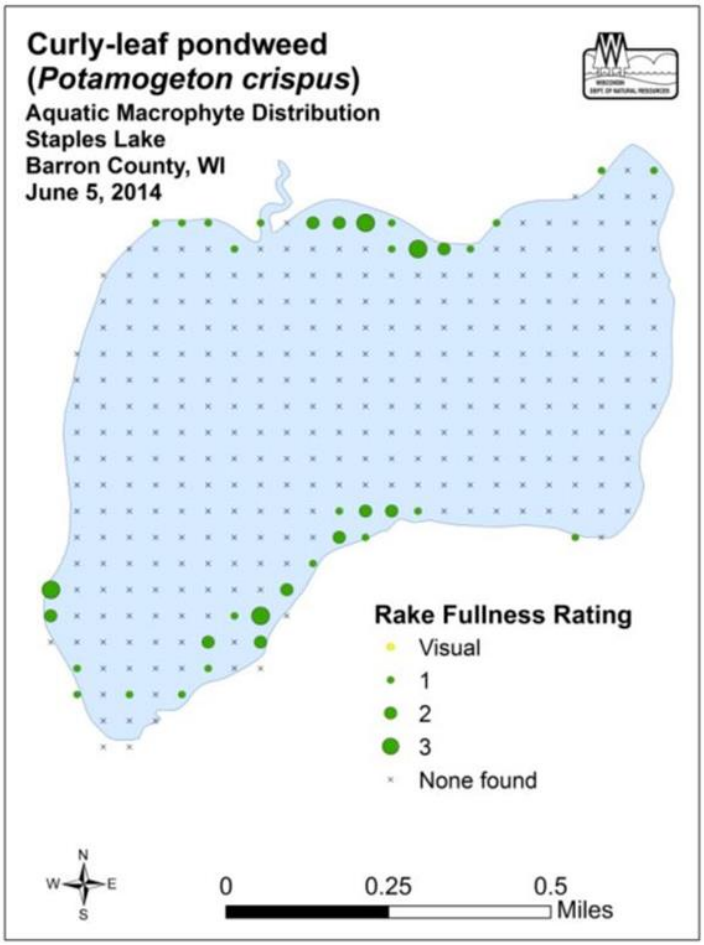
[13] Species with higher C values (10 is maximum) have a high fidelity to a natural community, while plants with a low C value can be found in a wider variety of places and, potentially, more disturbed or impacted sites.

June 2021 Curly-Leaf Pondweed Survey

A CLP monitoring survey was completed on June 19, 2021, to document the abundance of CLP within Staples Lake. As shown on Figure A-6 below and in the table below, 120 of the 338 sites were sampled. CLP was present at 32 sites with an average rake fullness of 1.77. Dense CLP, with a rake fullness of 3, was found at 4 sites. CLP was found at a maximum depth of 7.0 feet with a 41% frequency occurrence within the littoral zone. Overall, in terms of CLP, there does not appear to be any substantial changes between 2014 and 2021.

Curly-Leaf Pondweed	2014	2021
Total number of sites visited	338	338
Total number of sites with vegetation	36	32
Total number of sites shallower than maximum depth of plants	75	78
Frequency of occurrence at sites shallower than maximum depth of plants	48	41.03
Maximum depth of plants (ft)**	7.50	7.00
Number of sites sampled using rake on Rope (R)	0	0
Number of sites sampled using rake on Pole (P)	116	120
Mean Rake Fullness	2	1.77
Number of sites with maximum rake fullness of 3	4	4

Figures A-6. 2014 vs. 2016 CLP Distribution



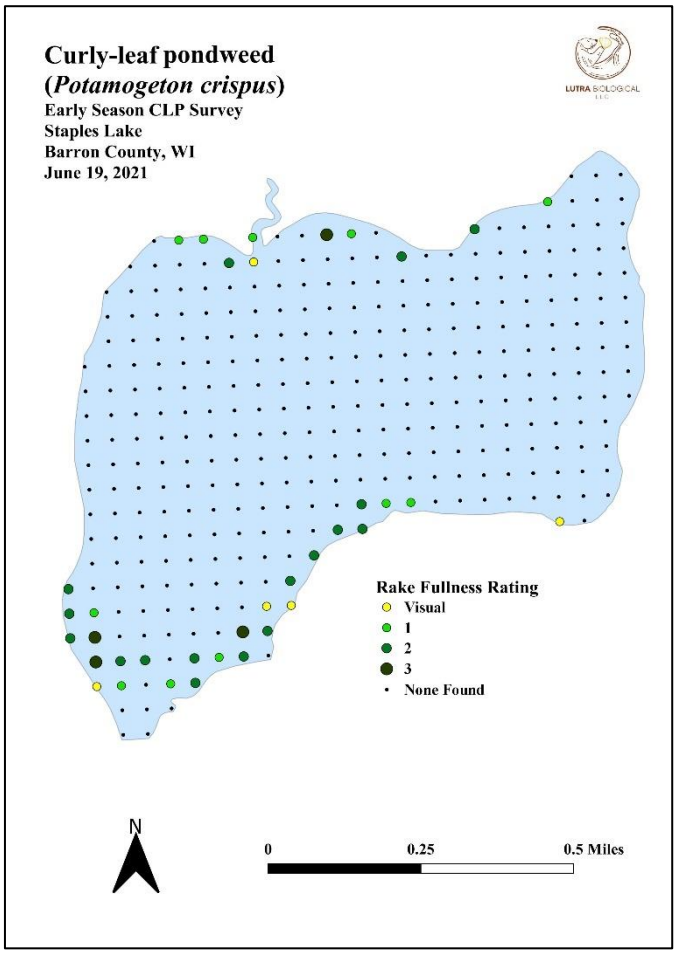
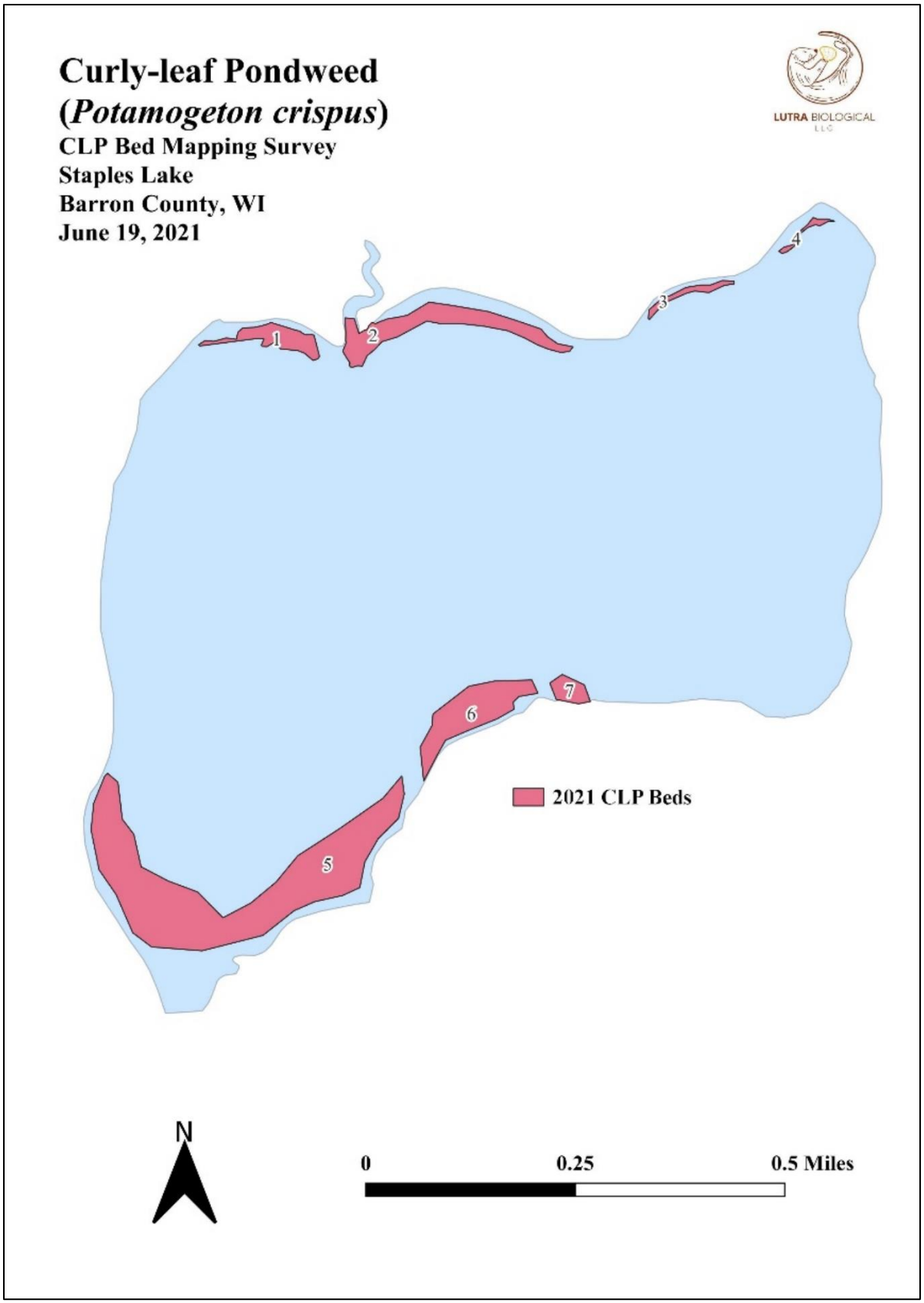


Figure A-7 and the table below delineates seven CLP beds identified during the June 2021 survey. Totaling 26.8 acres on 6/19/21, the beds are located along the north and south shorelines, including the south bay, and fully canopied the water's surface. Two of the beds posed a moderate navigation impairment on that date.

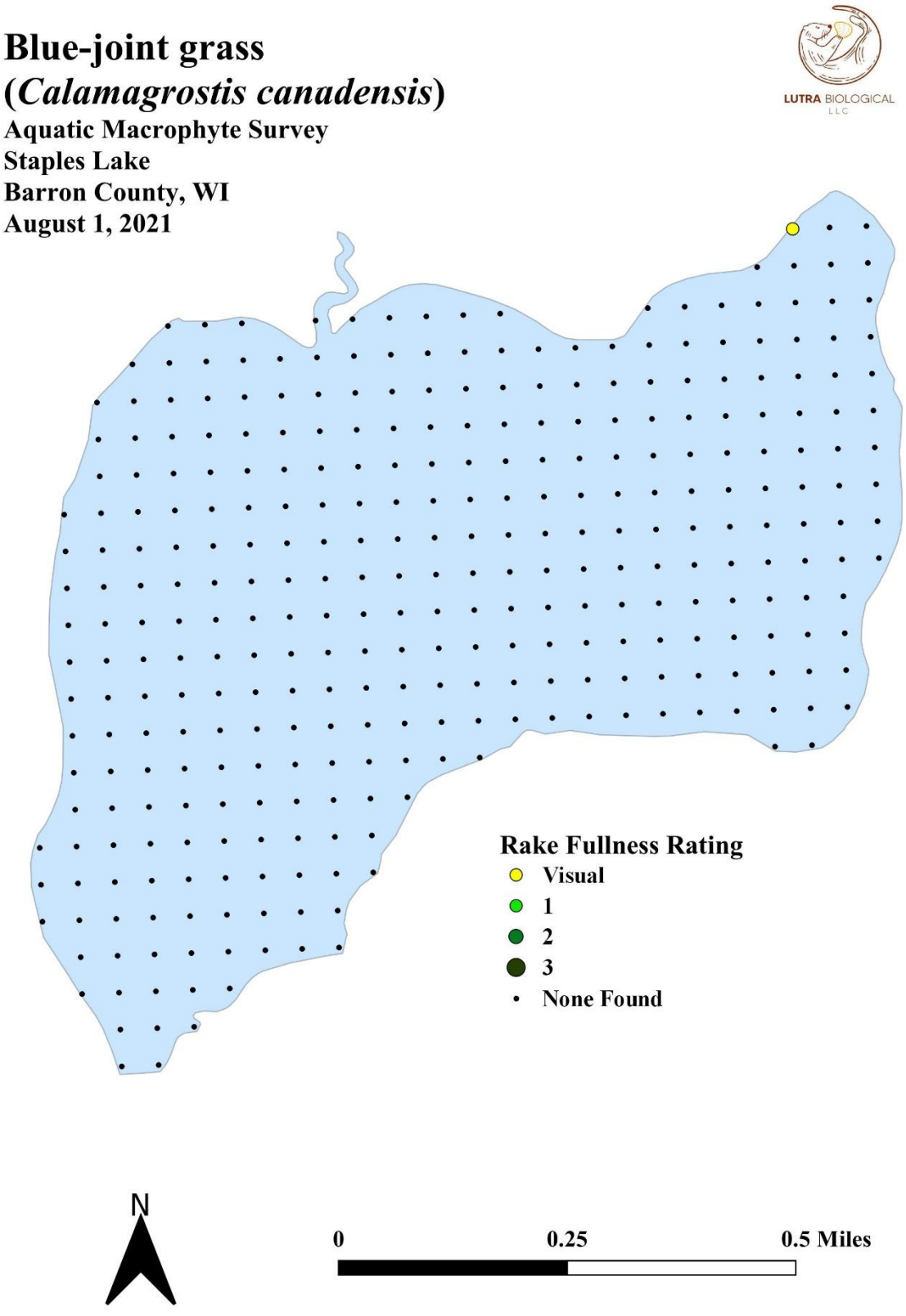
Bed Number	2021 Acreage	2021 Range and Mean Rake Fullness	2021 Range and Mean Depth	2021 Canopied	2021 Potential Navigation Impairment
1	0.47	<<<1-2; 1	1-6; 4	Yes	None
2	0.22	<<<1-2; 2	1-6; 4	Yes	Moderate
3	1.46	<<<1-2; <1	1-6; 4	Yes	None
4	0.7	<<<1-2; <1	1-6; 4	Yes	None
5	16.5	<<<1-3; 2	1-7; 4.5	Yes	Moderate
6	3.84	<<<1-2; <1	1-6; 4	Yes	None
7	3.62	<<<1-2; <1	1-6; 4	Yes	None
Total Acres	**26.81**				

Figure A-7. Curley-Leaf Pondweed Beds

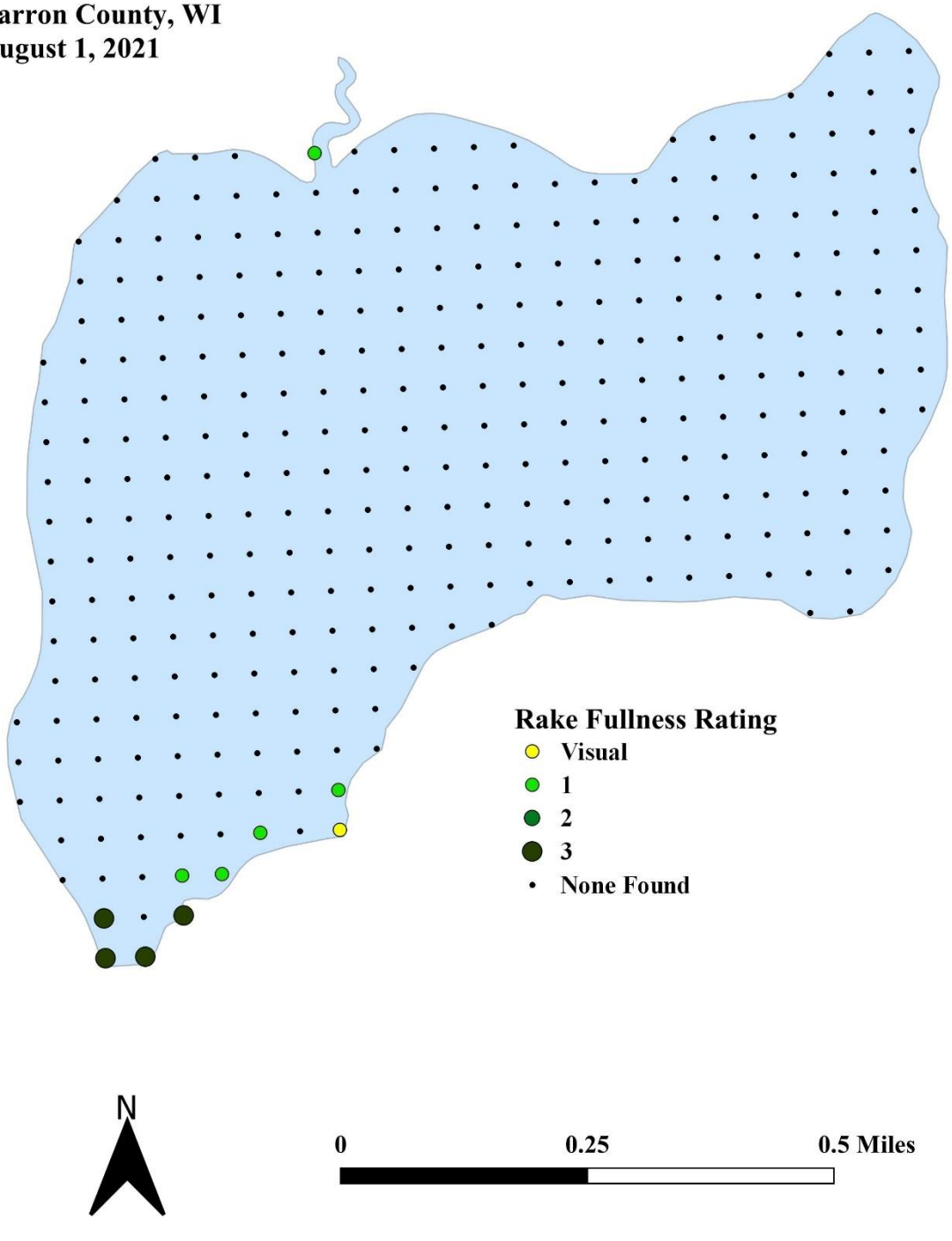


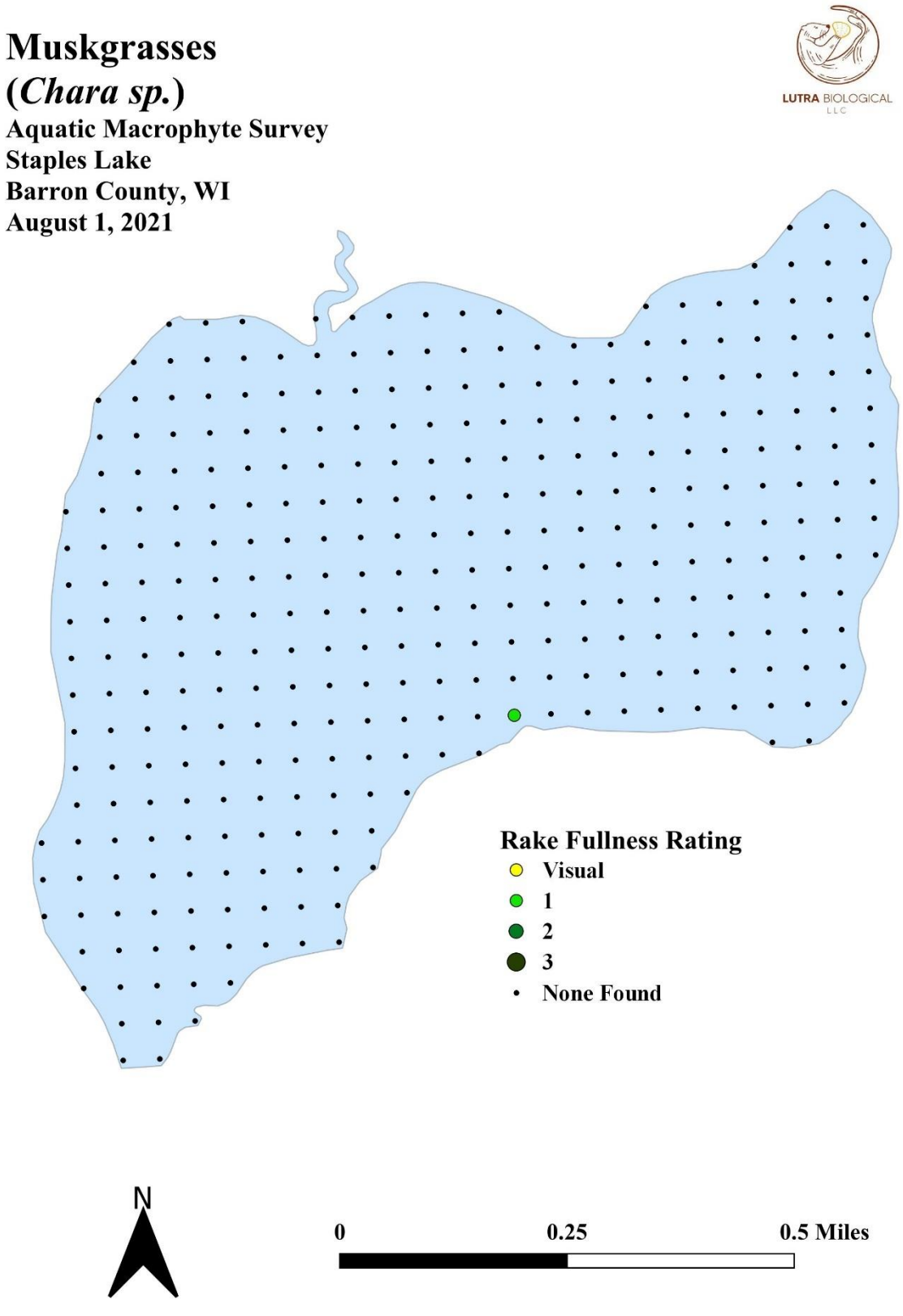
On the following pages are the species-specific distribution maps prepared by Noah Berg organized by their scientific names.

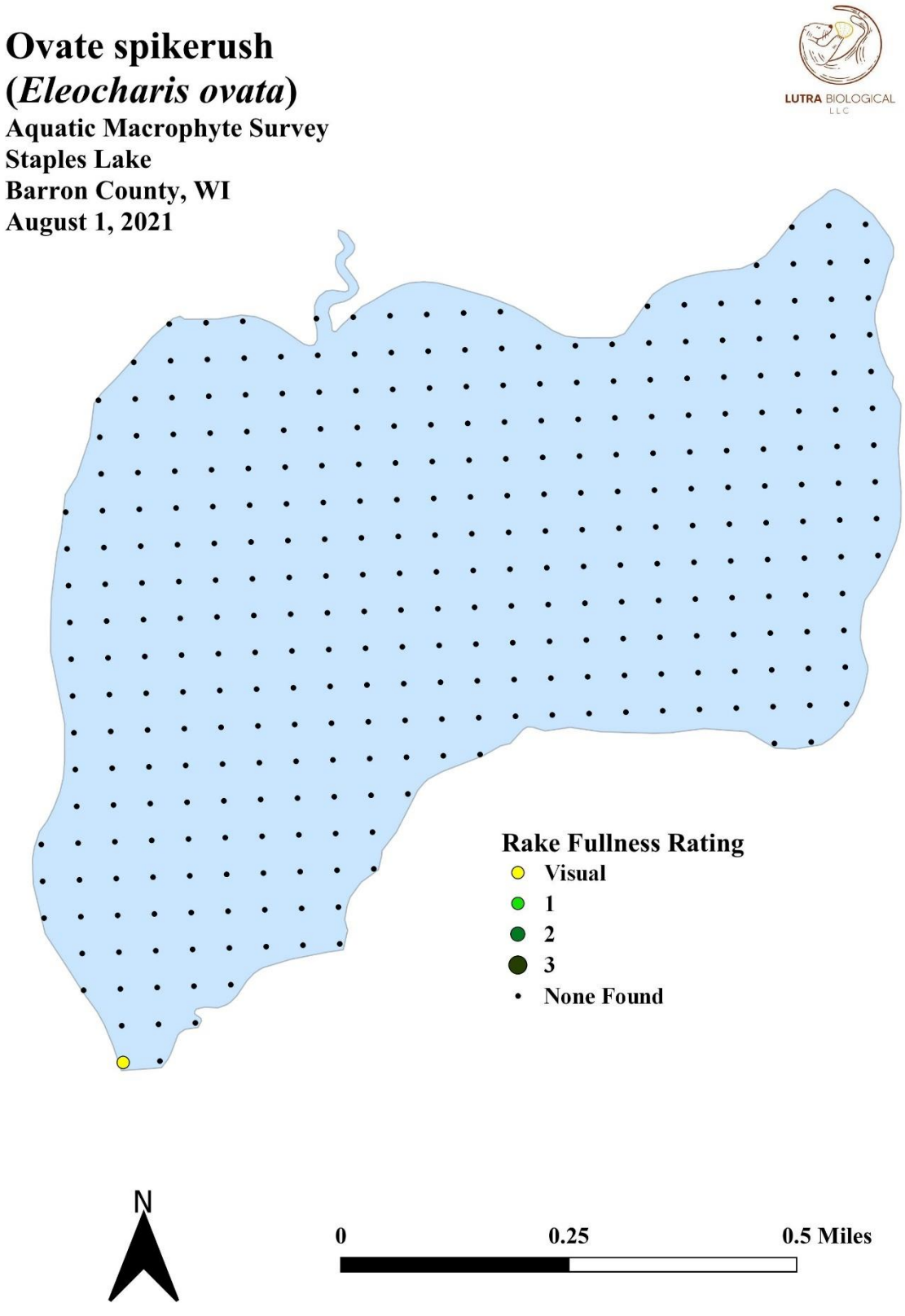
Scientific Name	Common Name
Calamagrostis canadensis	Blue-joint grass
Ceratophyllum demersum	Coontail
Chara sp.	Muskgrasses
Eleocharis ovata	Ovate spikerush
	Filamentous algae
Elodea canadensis	Common waterweed
Lemna minor	Small duckweed
Lemna trisulca	Forked duckweed
Najas flexilis	Slender naiad
Nuphar variegata	Spatterdock
Nymphaea odorata	White water lily
Phalaris arundinacea	Reed canary grass
Pontederia cordata	Pickerelweed
Potamogeton crispus	Curly-leaf pondweed
Potamogeton praelongus	White-stem pondweed
Potamogeton pusillus	Small pondweed
Sagittaria rigida	Sessile-fruited arrowhead
Schoenoplectus acutus	Hardstem bulrush
Schoenoplectus tabernaemontani	Softstem bulrush
Spirodela polyrhiza	Large duckweed
Typha latifolia	Broad-leaved cattail
Utricularia minor	Small bladderwort
Utricularia vulgaris	Common bladderwort
Vallisneria americana	Wild celery
Wolffia columbiana	Common watermeal


Blue-joint grass
(Calamagrostis canadensis)
Aquatic Macrophyte Survey
Staples Lake
Barron County, WI
August 1, 2021
LUTRA BIOLOGICAL LLC
Rake Fullness Rating
Visual
1
2
3
None Found
N
0
0.25
0.5 Miles

Coontail
(*Ceratophyllum demersum*)
Aquatic Macrophyte Survey
Staples Lake
Barron County, WI
August 1, 2021

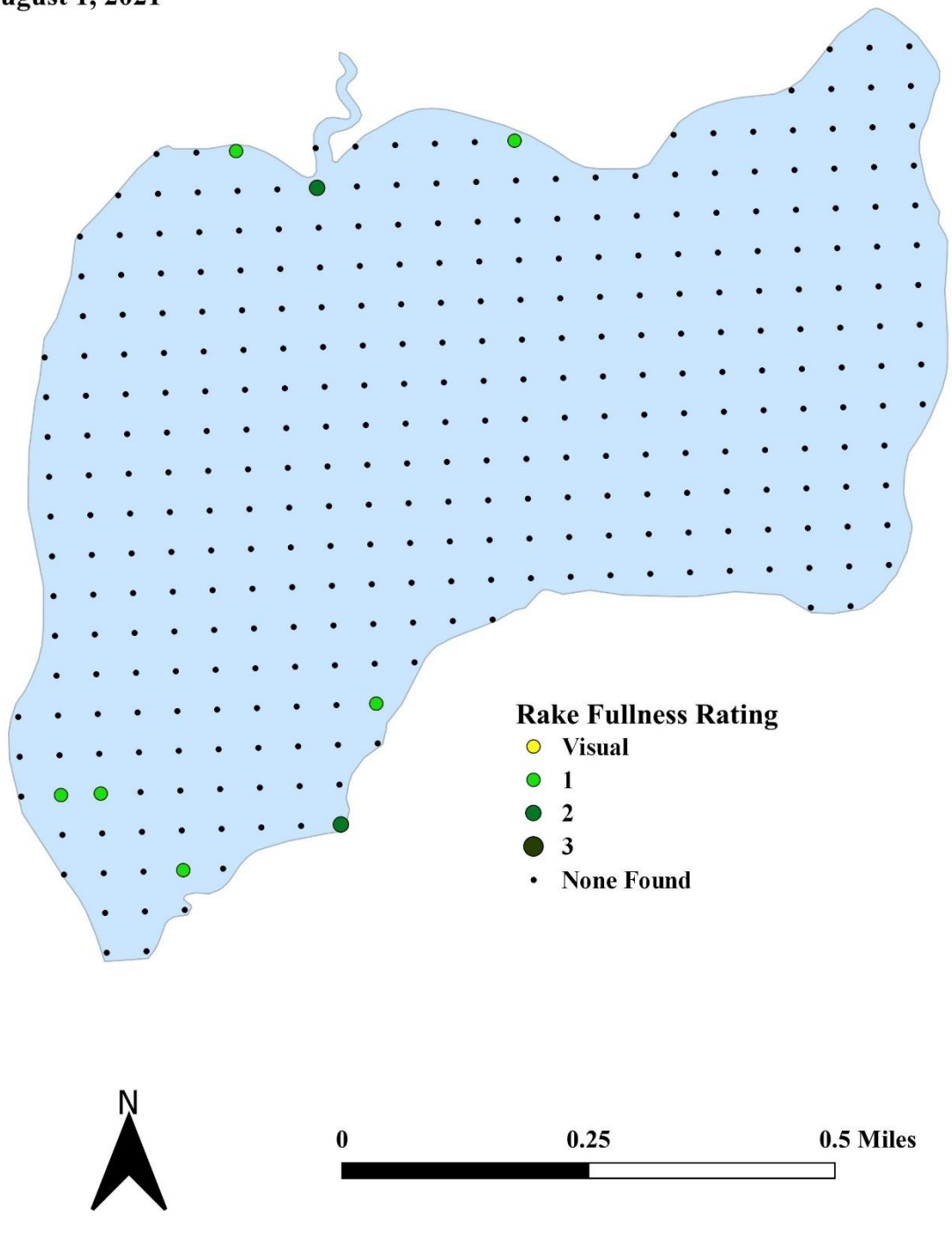


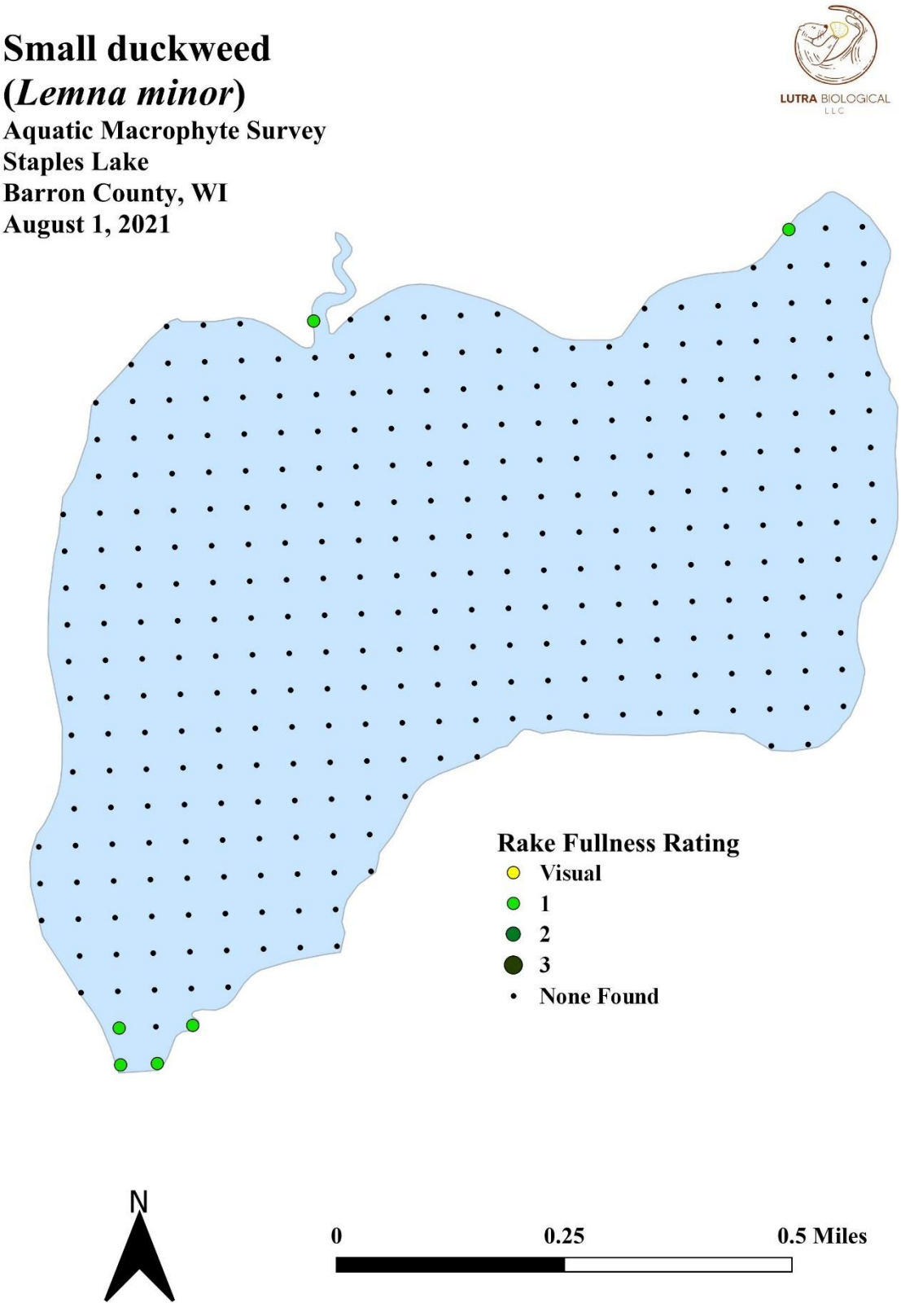

Muskgrasses
(Chara sp.)
Aquatic Macrophyte Survey
Staples Lake
Barron County, WI
August 1, 2021
LUTRA BIOLOGICAL LLC
Rake Fullness Rating
Visual
1
2
3
None Found
N
0
0.25
0.5 Miles

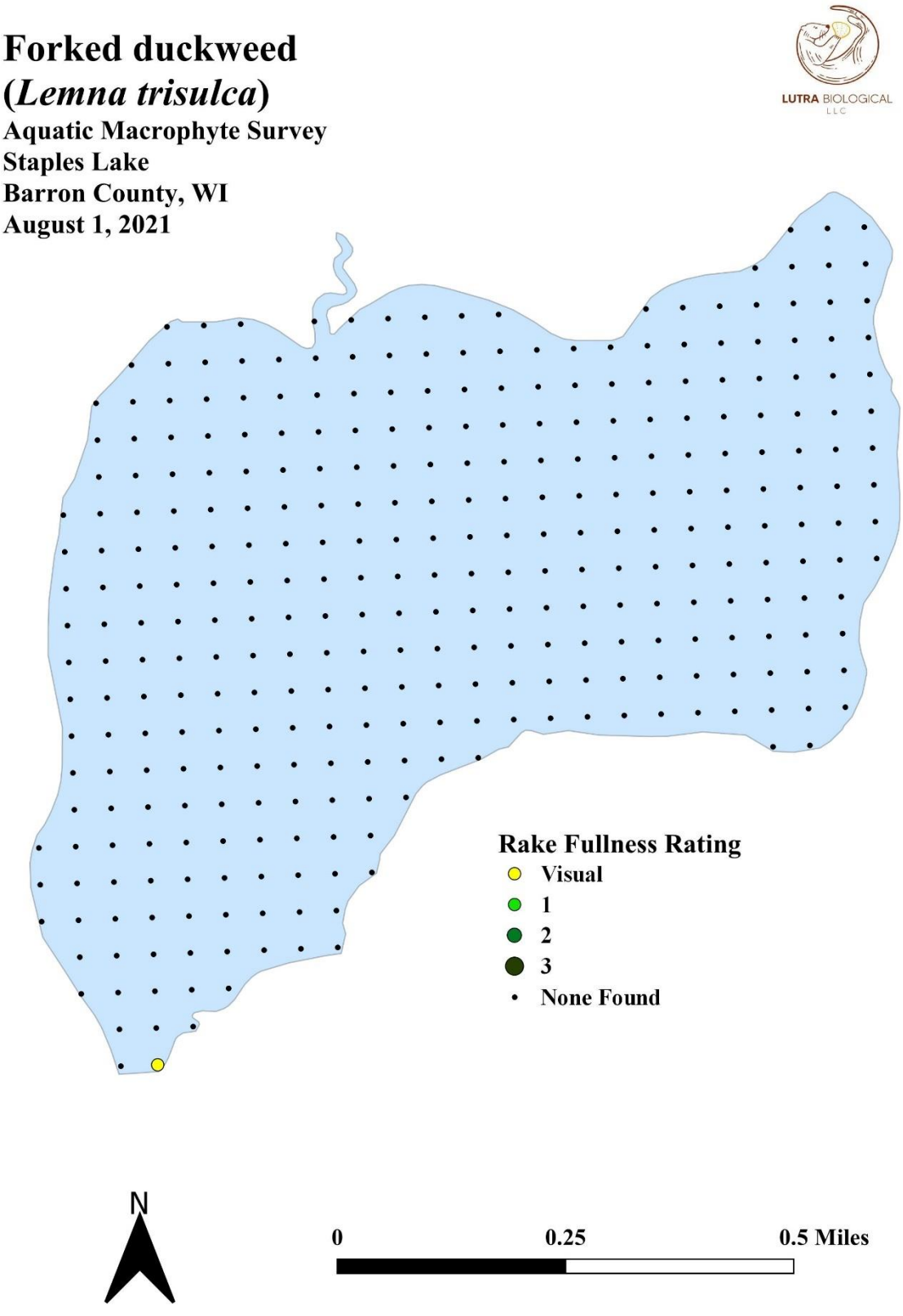

Ovate spikerush
(Eleocharis ovata)
Aquatic Macrophyte Survey
Staples Lake
Barron County, WI
August 1, 2021
LUTRA BIOLOGICAL LLC
Rake Fullness Rating
Visual
1
2
3
None Found
N
0
0.25
0.5 Miles

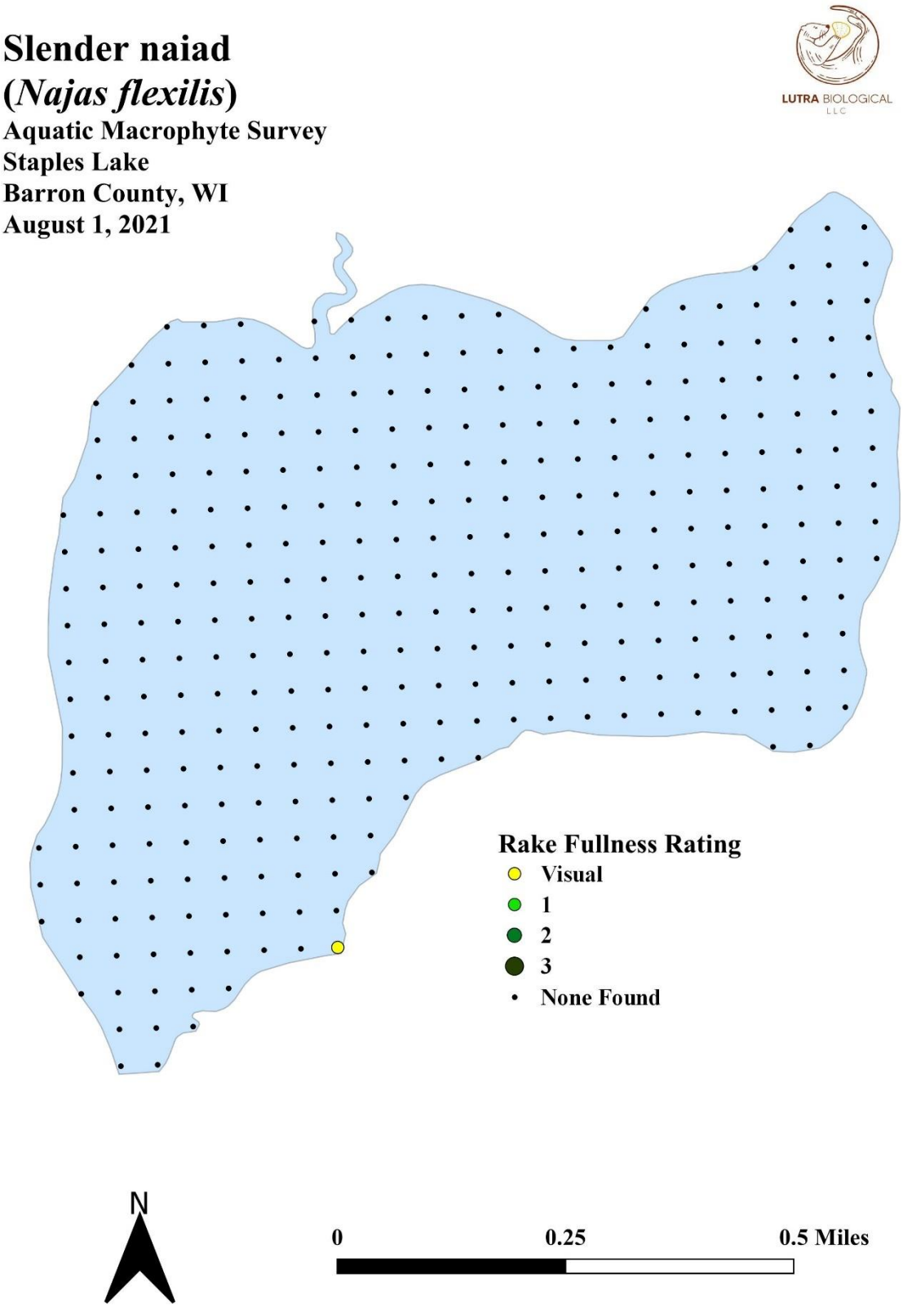
Filamentous Algea

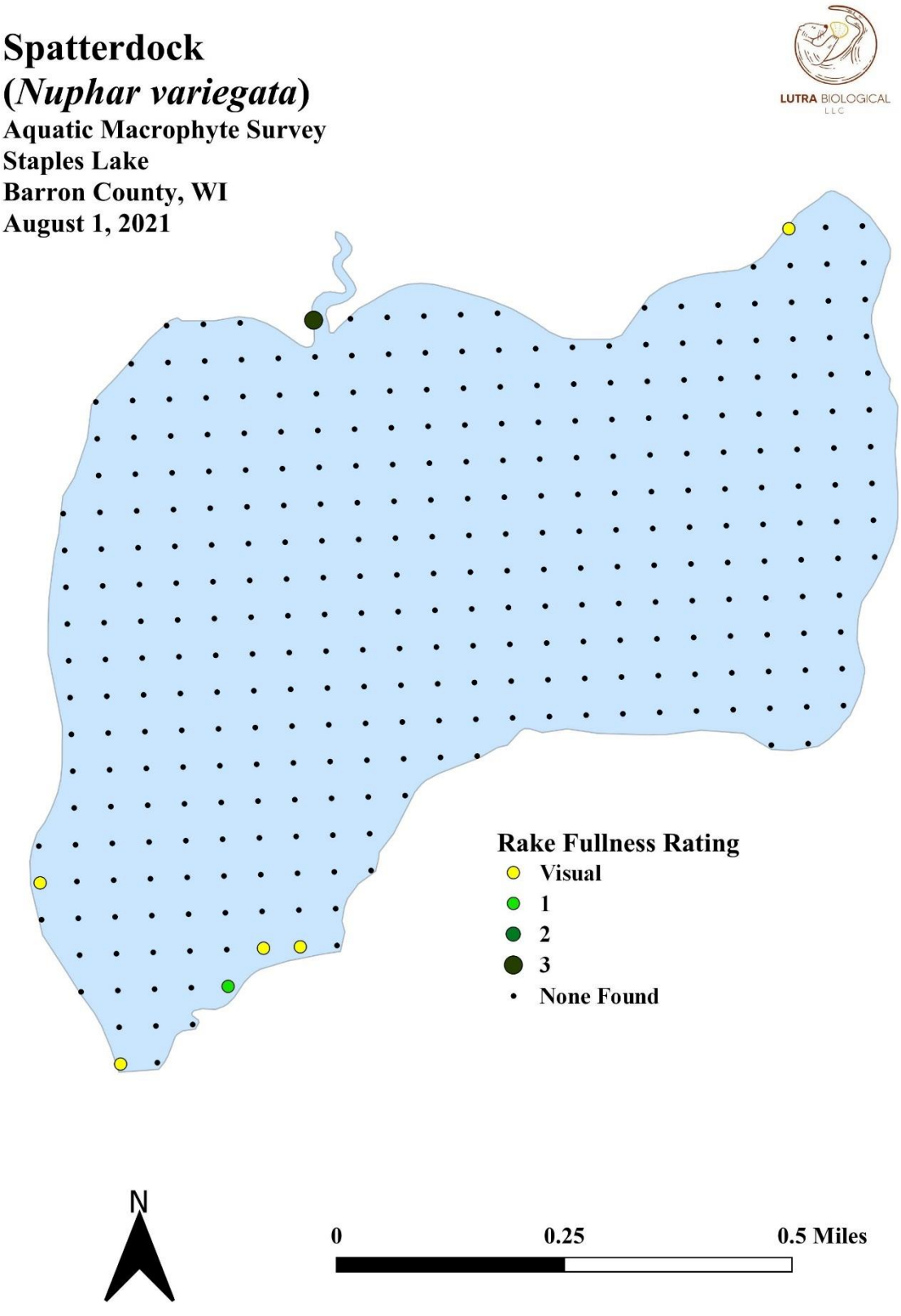
Aquatic Macrophyte Survey
Staples Lake
Barron County, WI
August 1, 2021

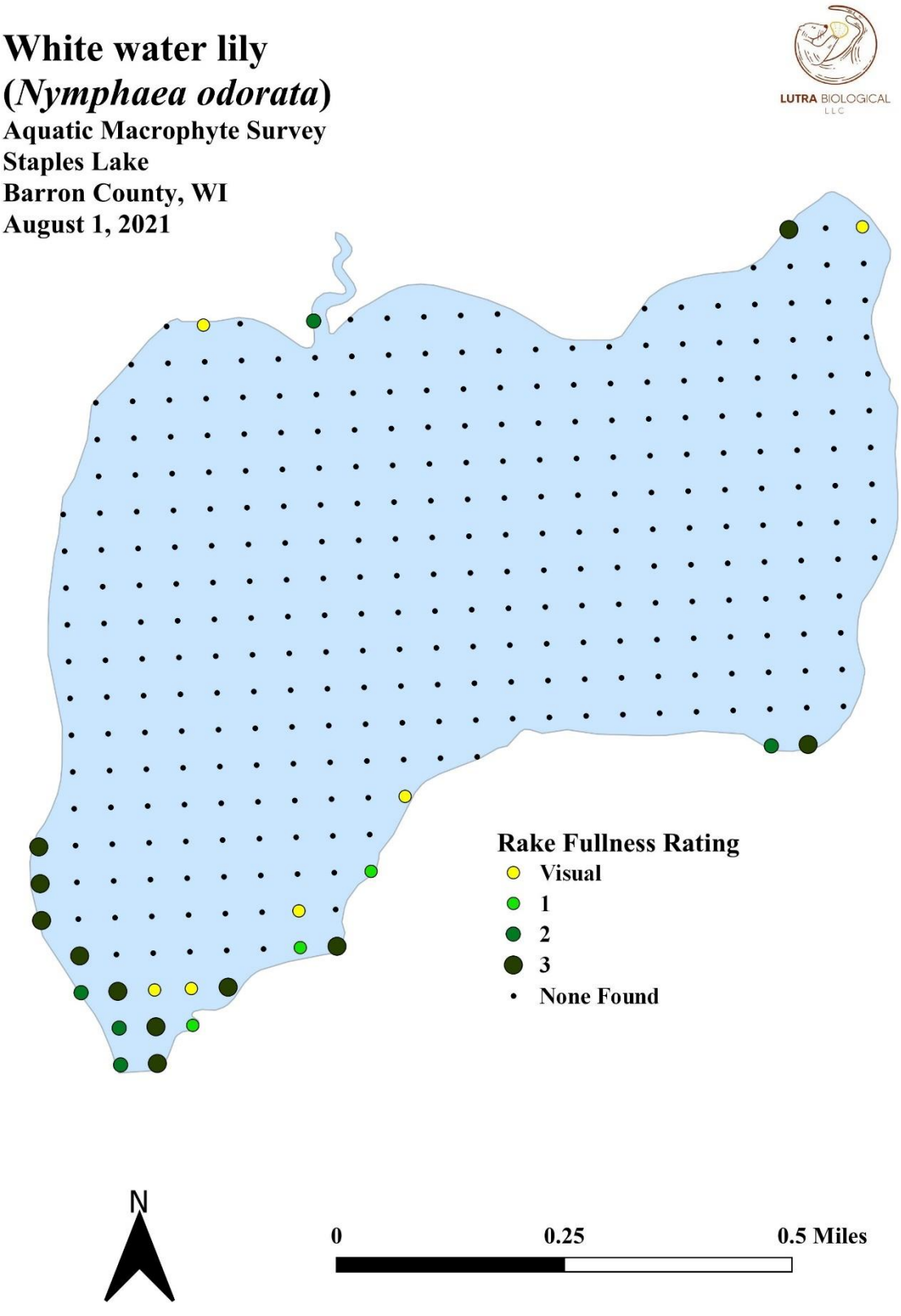


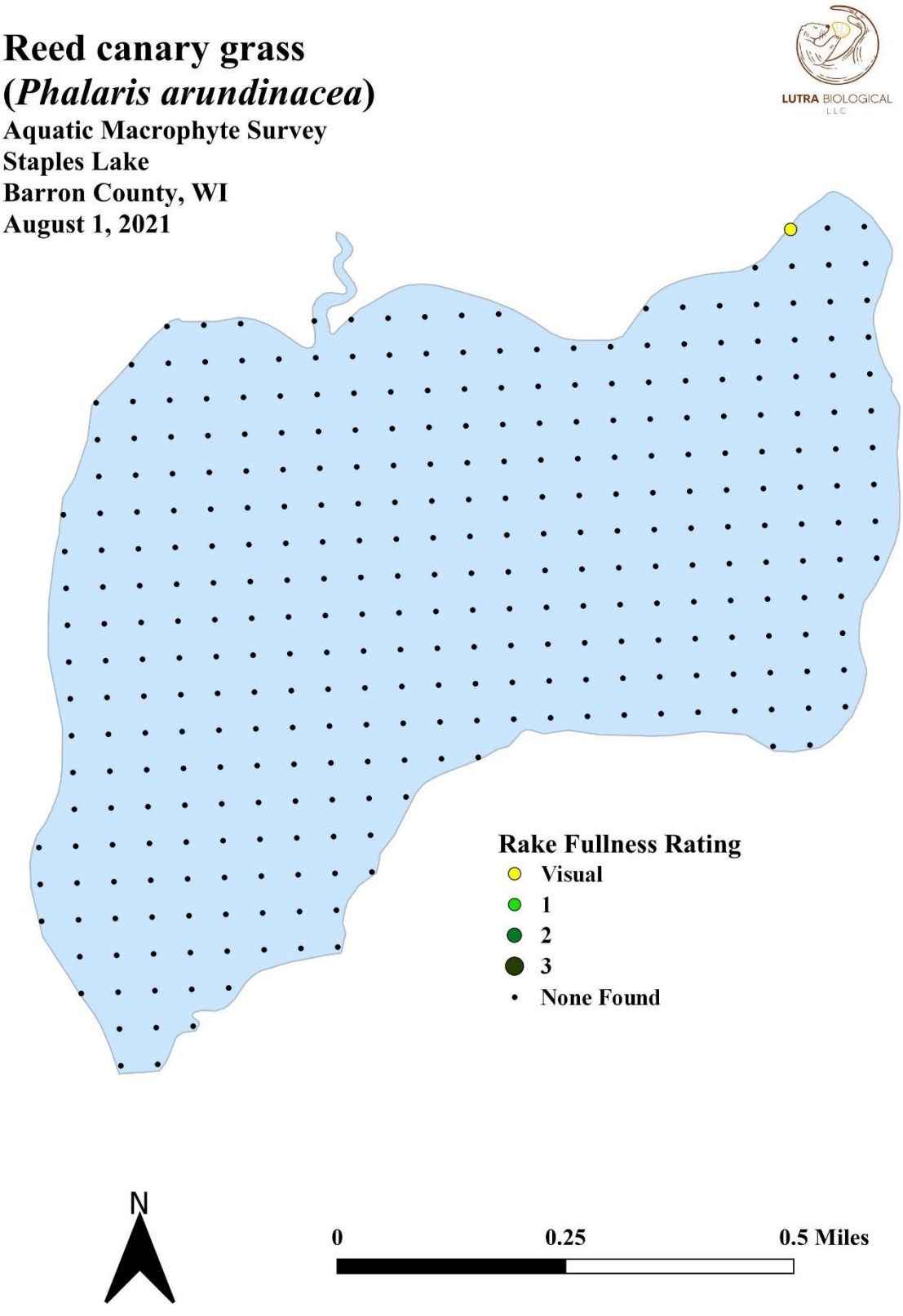

Small duckweed
(Lemna minor)
Aquatic Macrophyte Survey
Staples Lake
Barron County, WI
August 1, 2021
LUTRA BIOLOGICAL LLC
Rake Fullness Rating
Visual
1
2
3
None Found
N
0
0.25
0.5 Miles


Forked duckweed
(Lemna trisulca)
Aquatic Macrophyte Survey
Staples Lake
Barron County, WI
August 1, 2021
LUTRA BIOLOGICAL LLC
Rake Fullness Rating
Visual
1
2
3
None Found
N
0
0.25
0.5 Miles

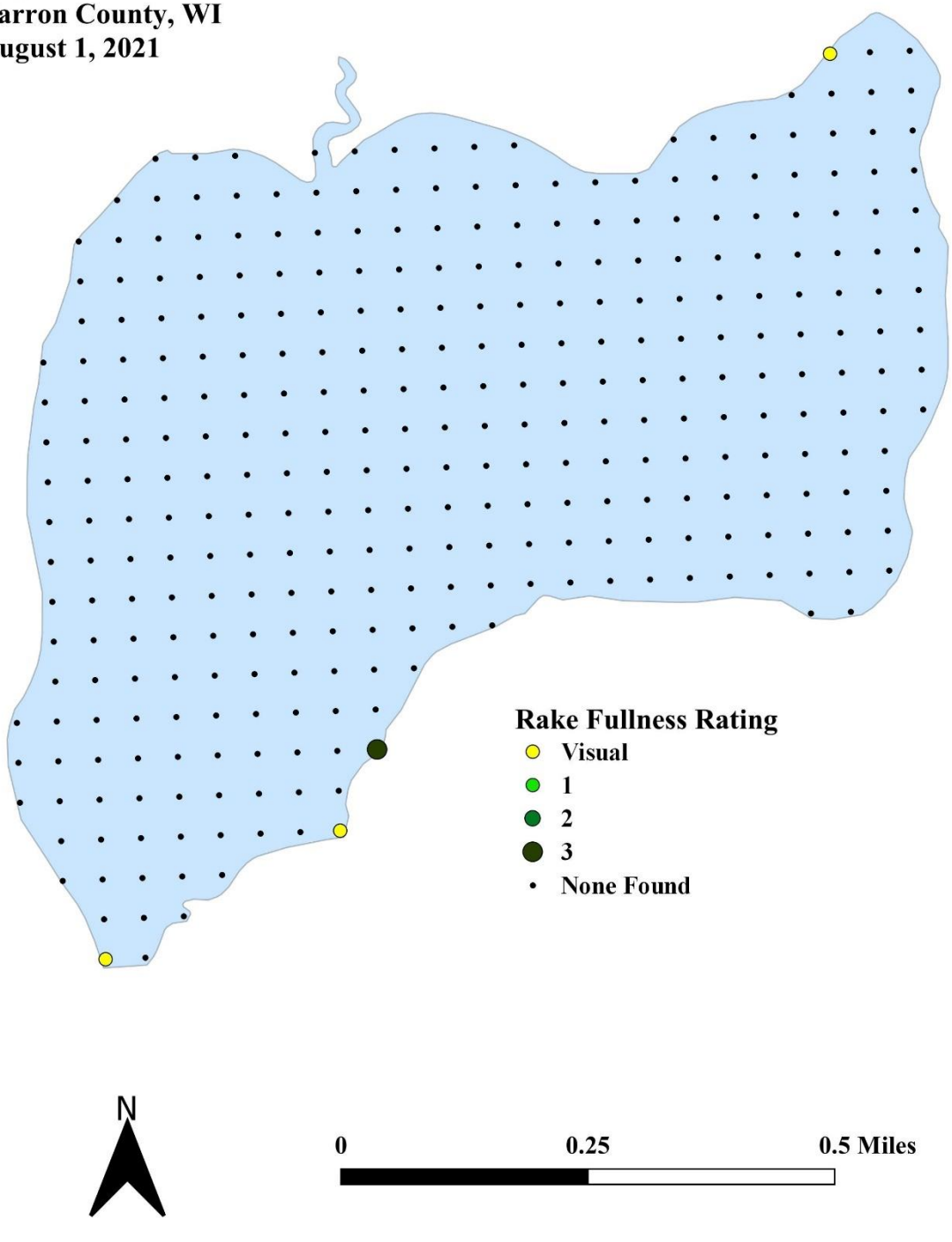

Slender naiad
(Najas flexilis)
Aquatic Macrophyte Survey
Staples Lake
Barron County, WI
August 1, 2021
LUTRA BIOLOGICAL LLC
Rake Fullness Rating
Visual
1
2
3
None Found
N
0
0.25
0.5 Miles

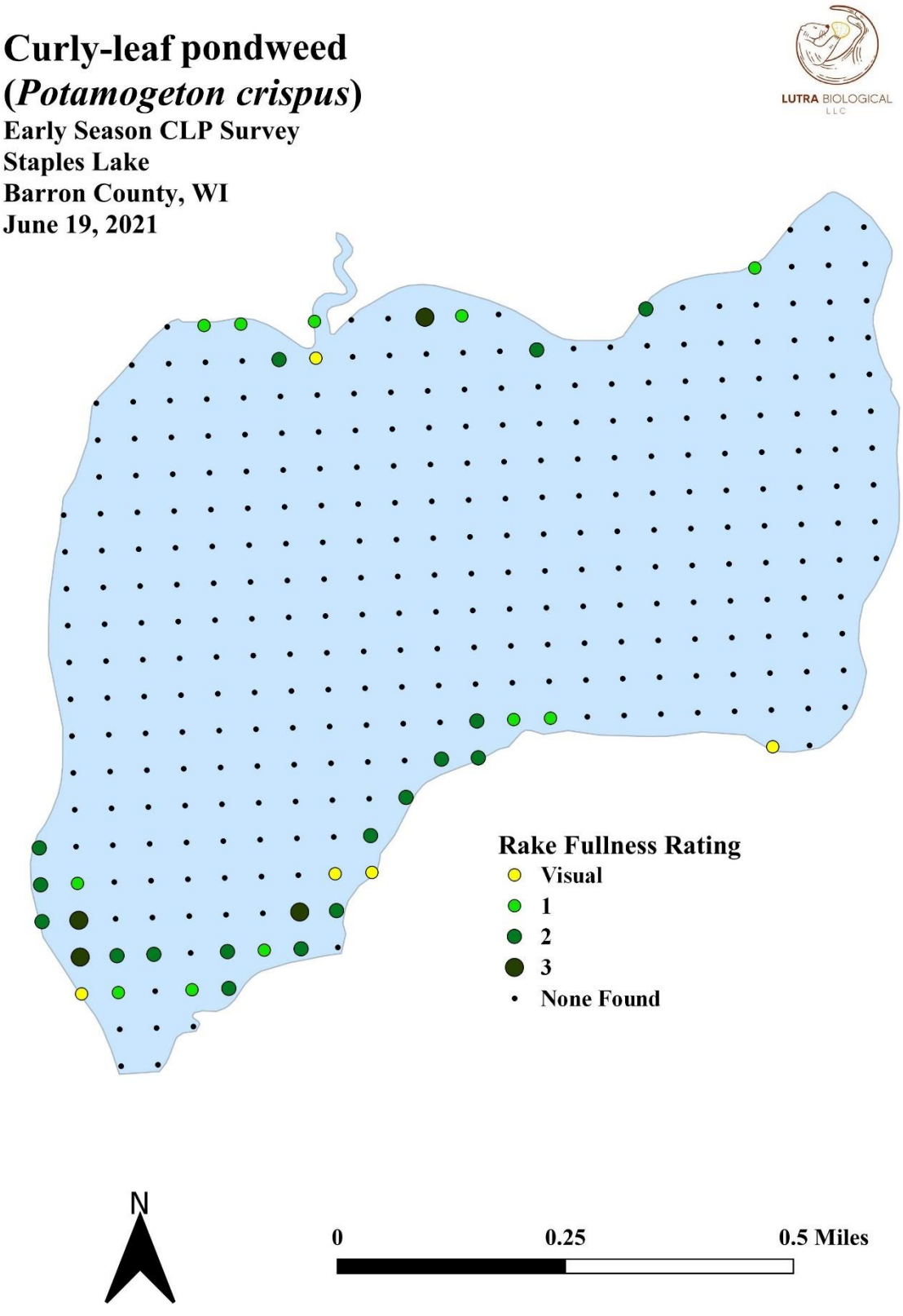

Spatterdock
(Nuphar variegata)
Aquatic Macrophyte Survey
Staples Lake
Barron County, WI
August 1, 2021
LUTRA BIOLOGICAL LLC
Rake Fullness Rating
Visual
1
2
3
None Found
N
0
0.25
0.5 Miles

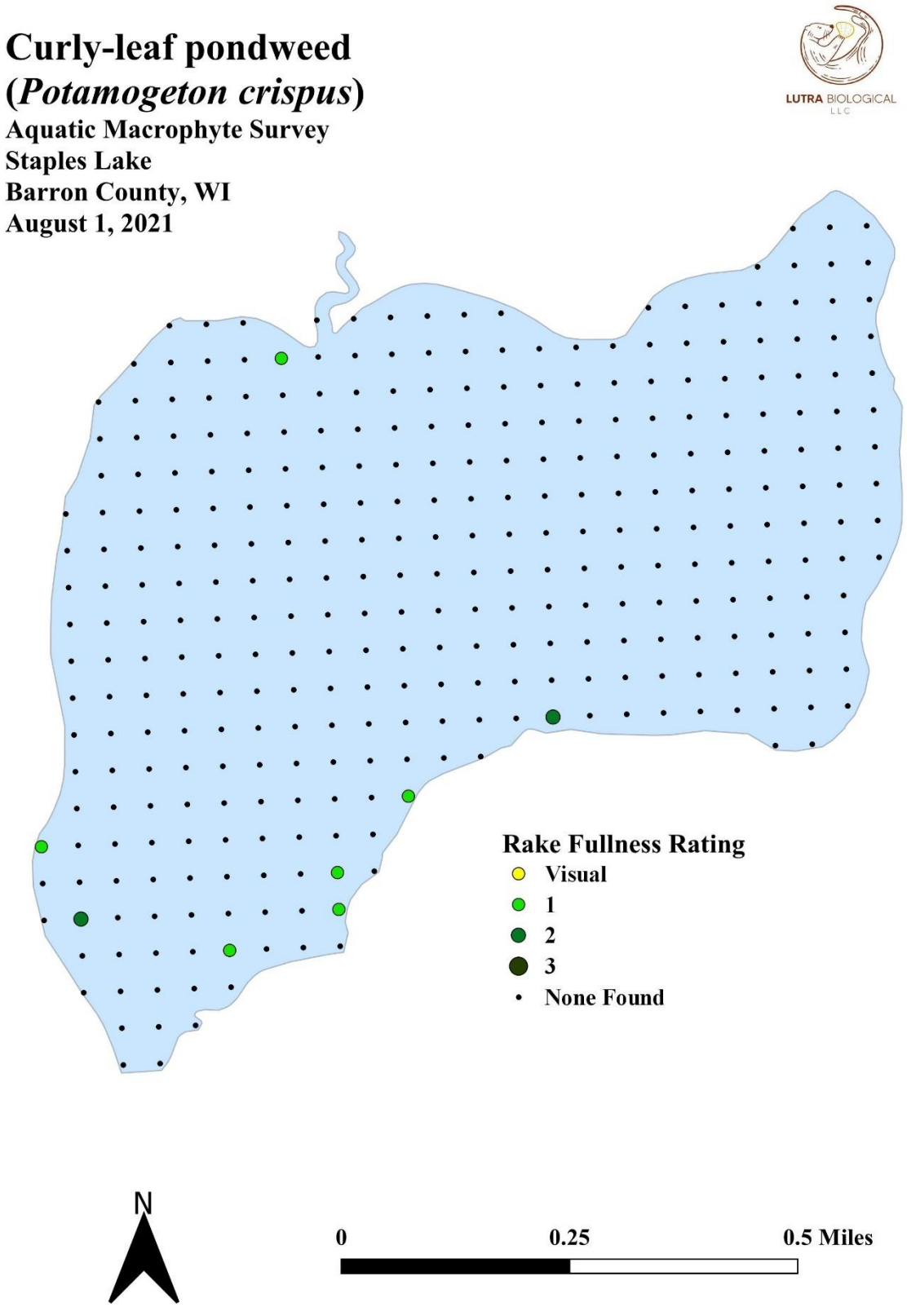

White water lily
(Nymphaea odorata)
Aquatic Macrophyte Survey
Staples Lake
Barron County, WI
August 1, 2021
LUTRA BIOLOGICAL LLC
Rake Fullness Rating
Visual
1
2
3
None Found
N
0
0.25
0.5 Miles

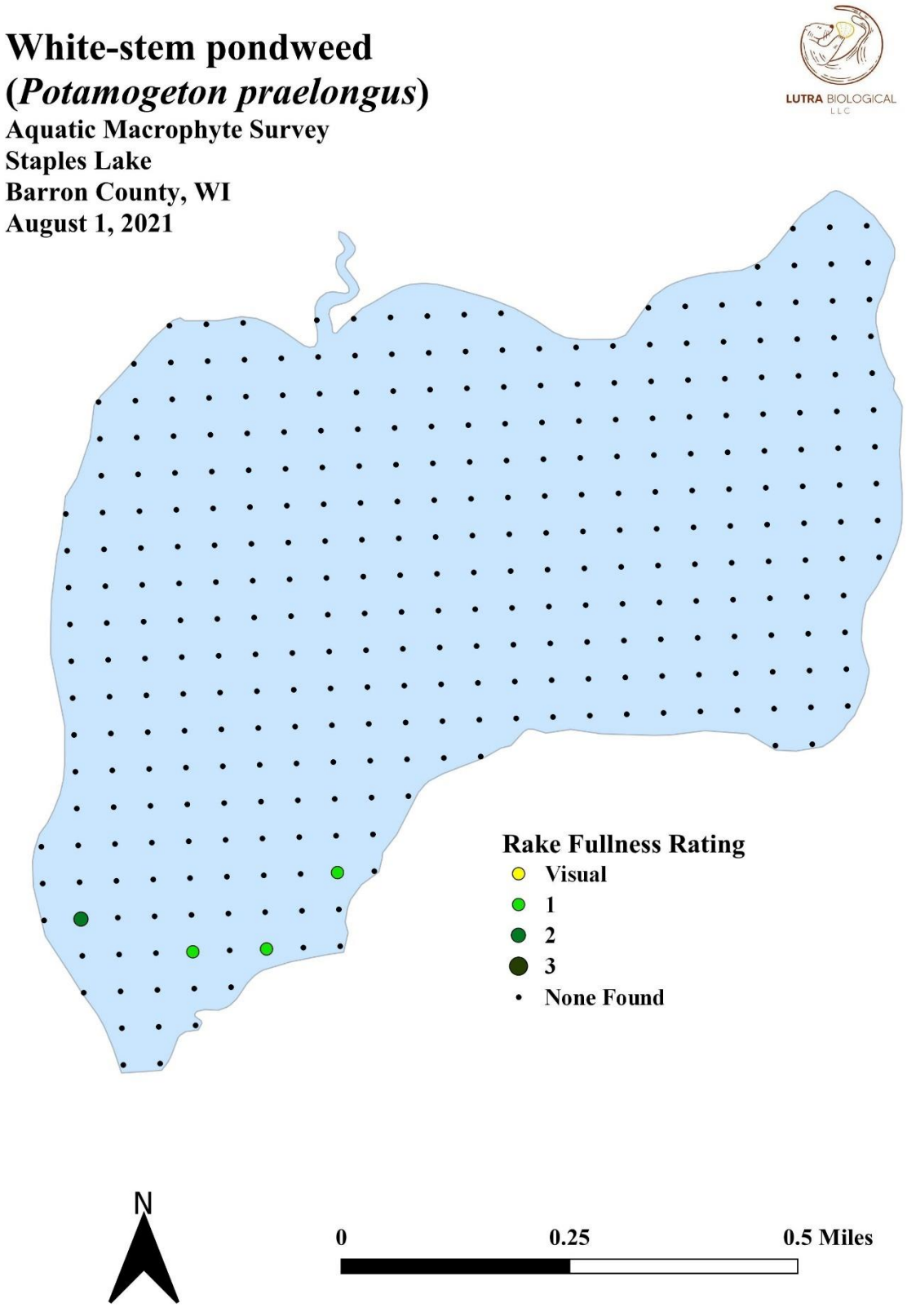

Reed canary grass
(Phalaris arundinacea)
Aquatic Macrophyte Survey
Staples Lake
Barron County, WI
August 1, 2021
LUTRA BIOLOGICAL LLC
Rake Fullness Rating
Visual
1
2
3
None Found
N
0
0.25
0.5 Miles

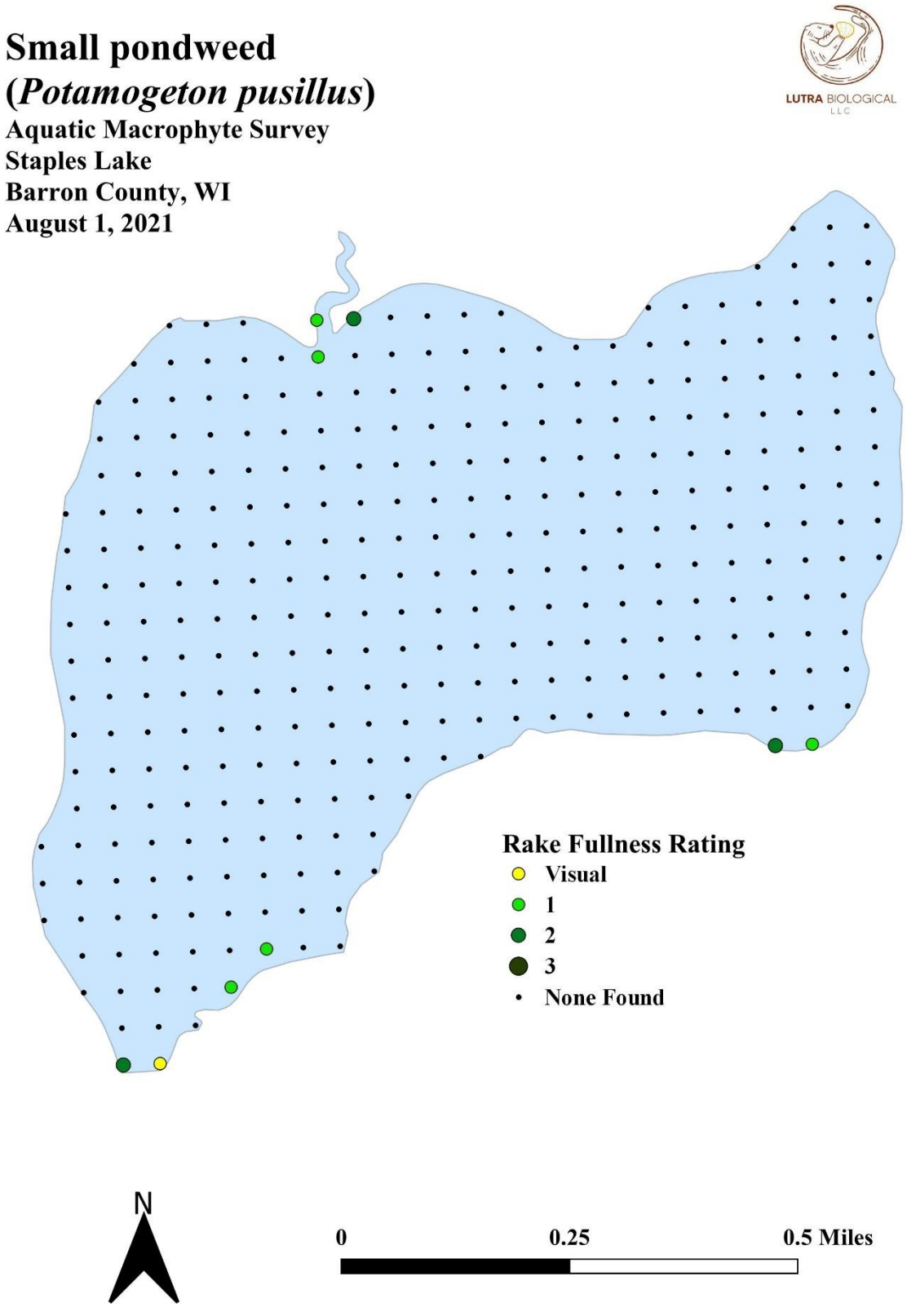
Pickerelweed
(*Pontederia cordata*)
Aquatic Macrophyte Survey
Staples Lake
Barron County, WI
August 1, 2021




Curly-leaf pondweed
(Potamogeton crispus)
Early Season CLP Survey
Staples Lake
Barron County, WI
June 19, 2021
LUTRA BIOLOGICAL LLC
Rake Fullness Rating
Visual
1
2
3
None Found
N
0
0.25
0.5 Miles

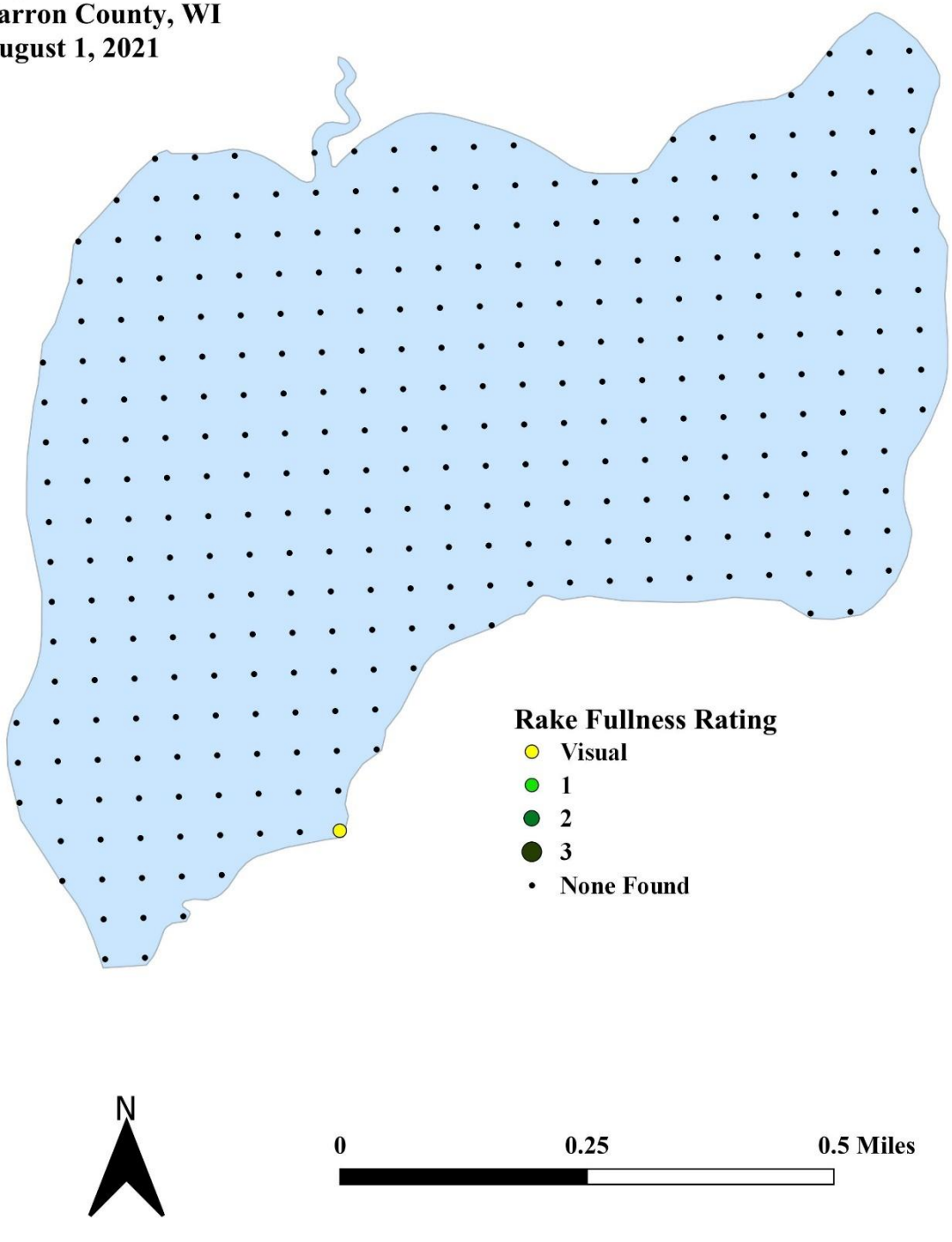

Curly-leaf pondweed
(Potamogeton crispus)
Aquatic Macrophyte Survey
Staples Lake
Barron County, WI
August 1, 2021
LUTRA BIOLOGICAL LLC
Rake Fullness Rating
Visual
1
2
3
None Found
N
0
0.25
0.5 Miles

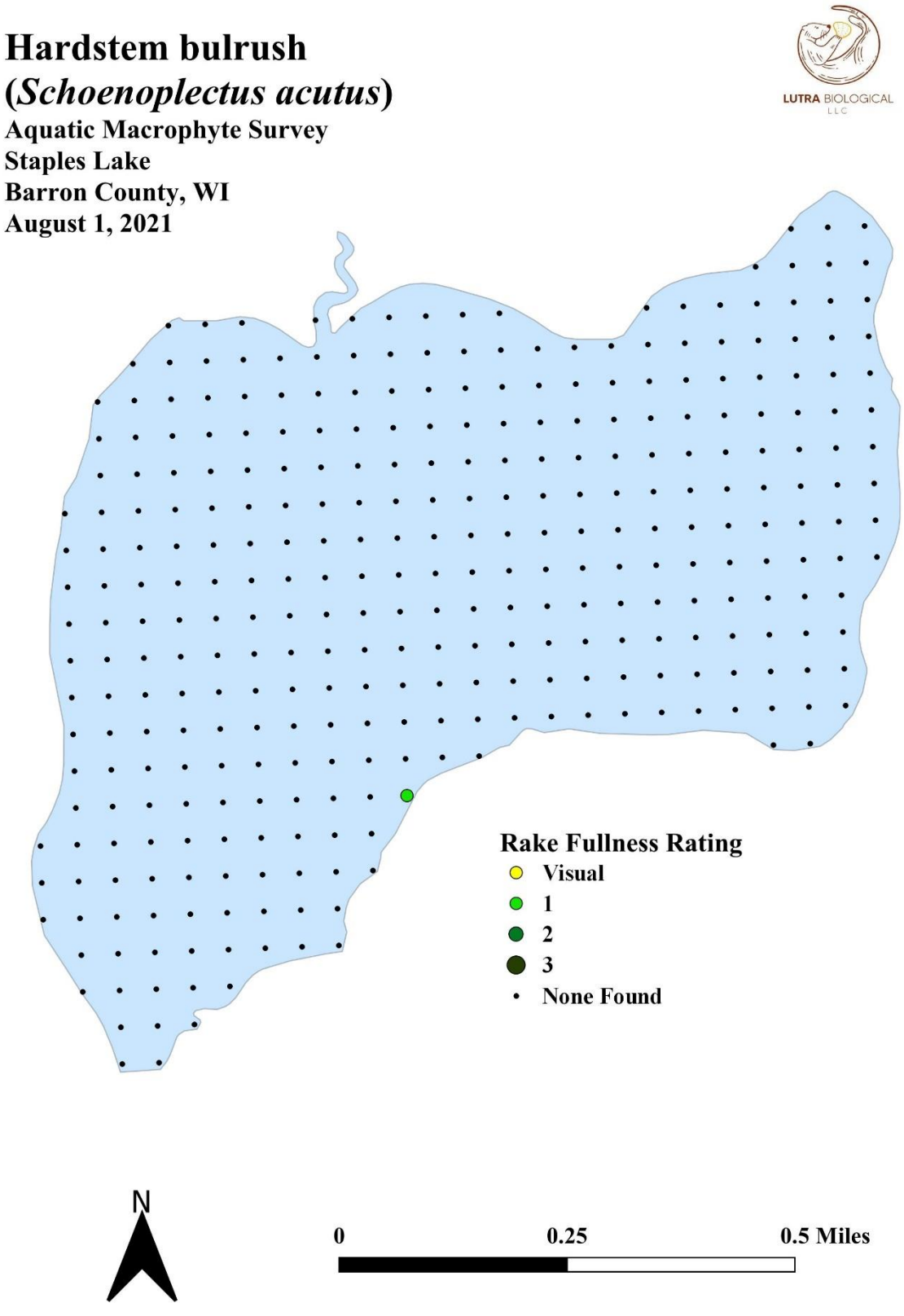

White-stem pondweed
(Potamogeton praelongus)
Aquatic Macrophyte Survey
Staples Lake
Barron County, WI
August 1, 2021
LUTRA BIOLOGICAL LLC
Rake Fullness Rating
Visual
1
2
3
None Found
N
0
0.25
0.5 Miles


Small pondweed
(Potamogeton pusillus)
Aquatic Macrophyte Survey
Staples Lake
Barron County, WI
August 1, 2021
LUTRA BIOLOGICAL LLC
Rake Fullness Rating
Visual
1
2
3
None Found
N
0
0.25
0.5 Miles

Sessile-fruited arrowhead
(*Sagittaria rigida*)

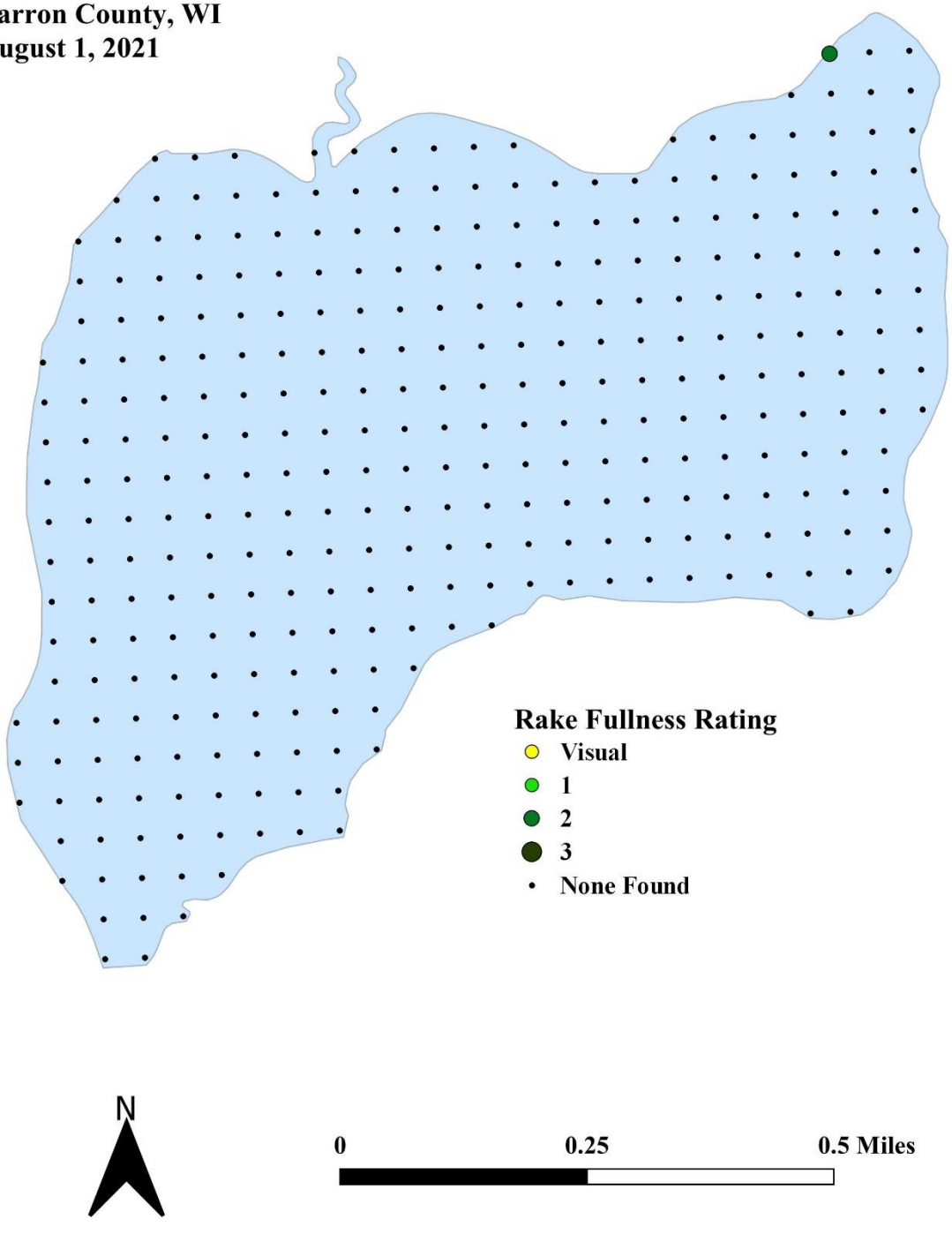
Aquatic Macrophyte Survey
Staples Lake
Barron County, WI
August 1, 2021

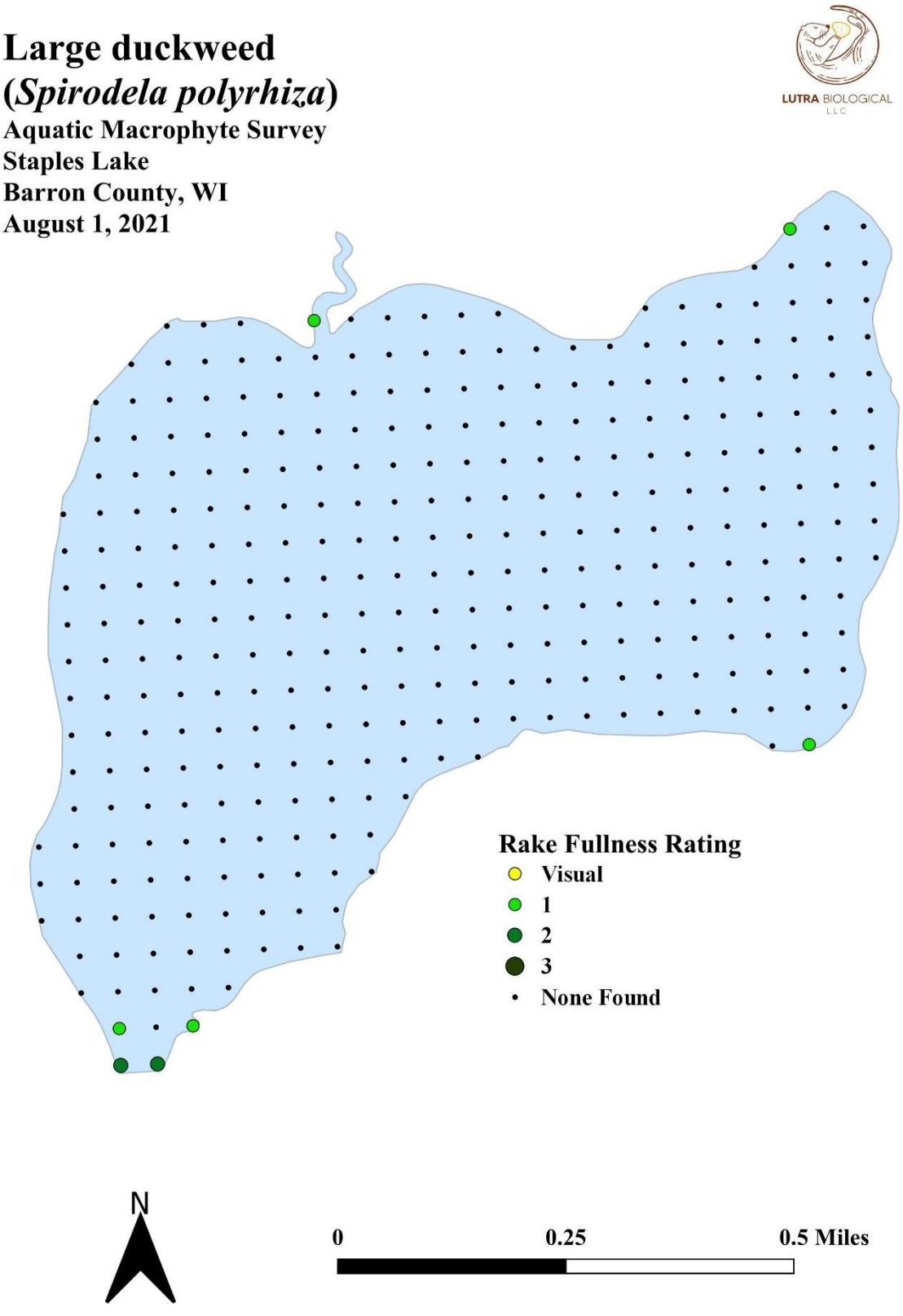


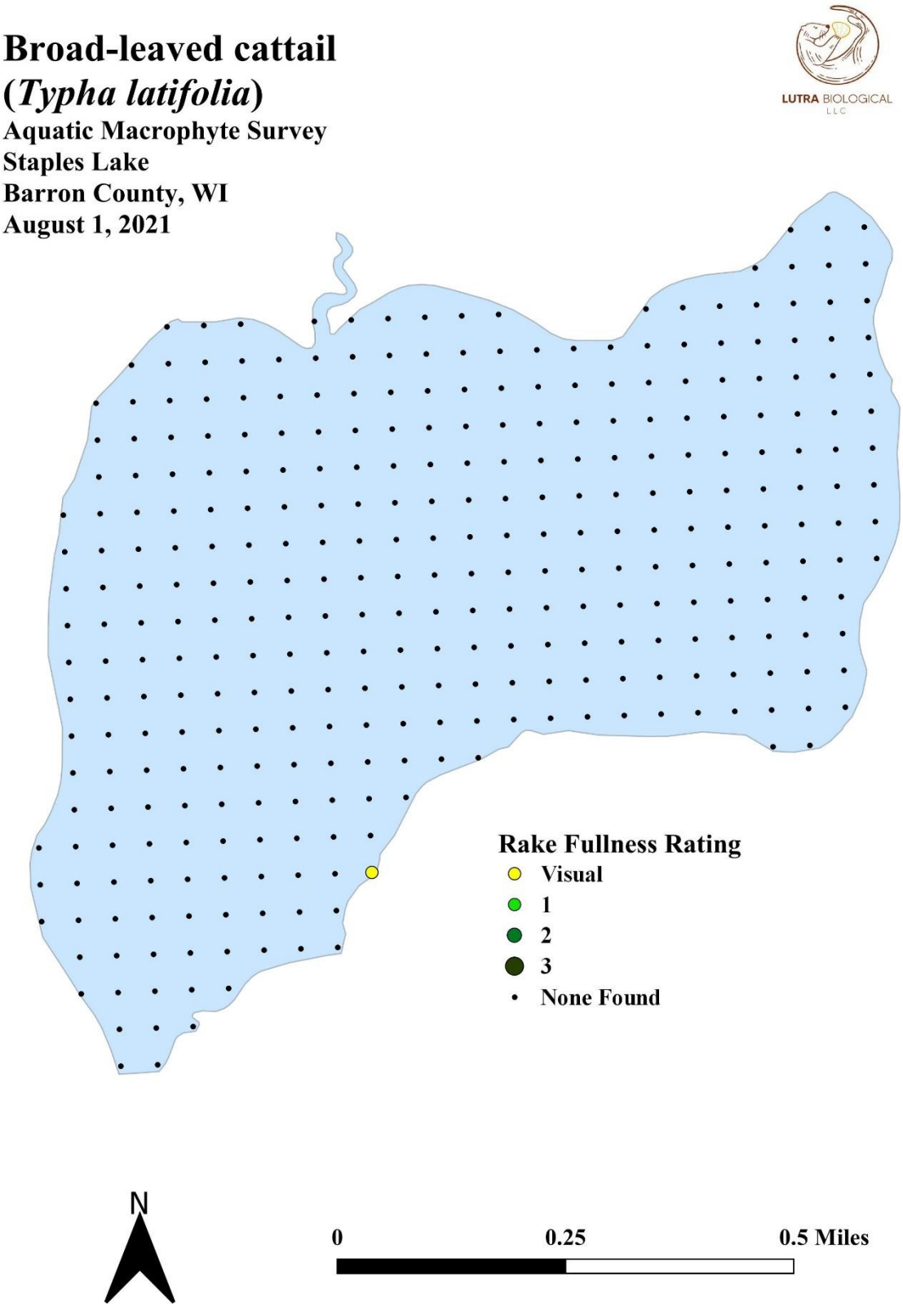

Hardstem bulrush
(Schoenoplectus acutus)
Aquatic Macrophyte Survey
Staples Lake
Barron County, WI
August 1, 2021
LUTRA BIOLOGICAL LLC
Rake Fullness Rating
Visual
1
2
3
None Found
N
0
0.25
0.5 Miles

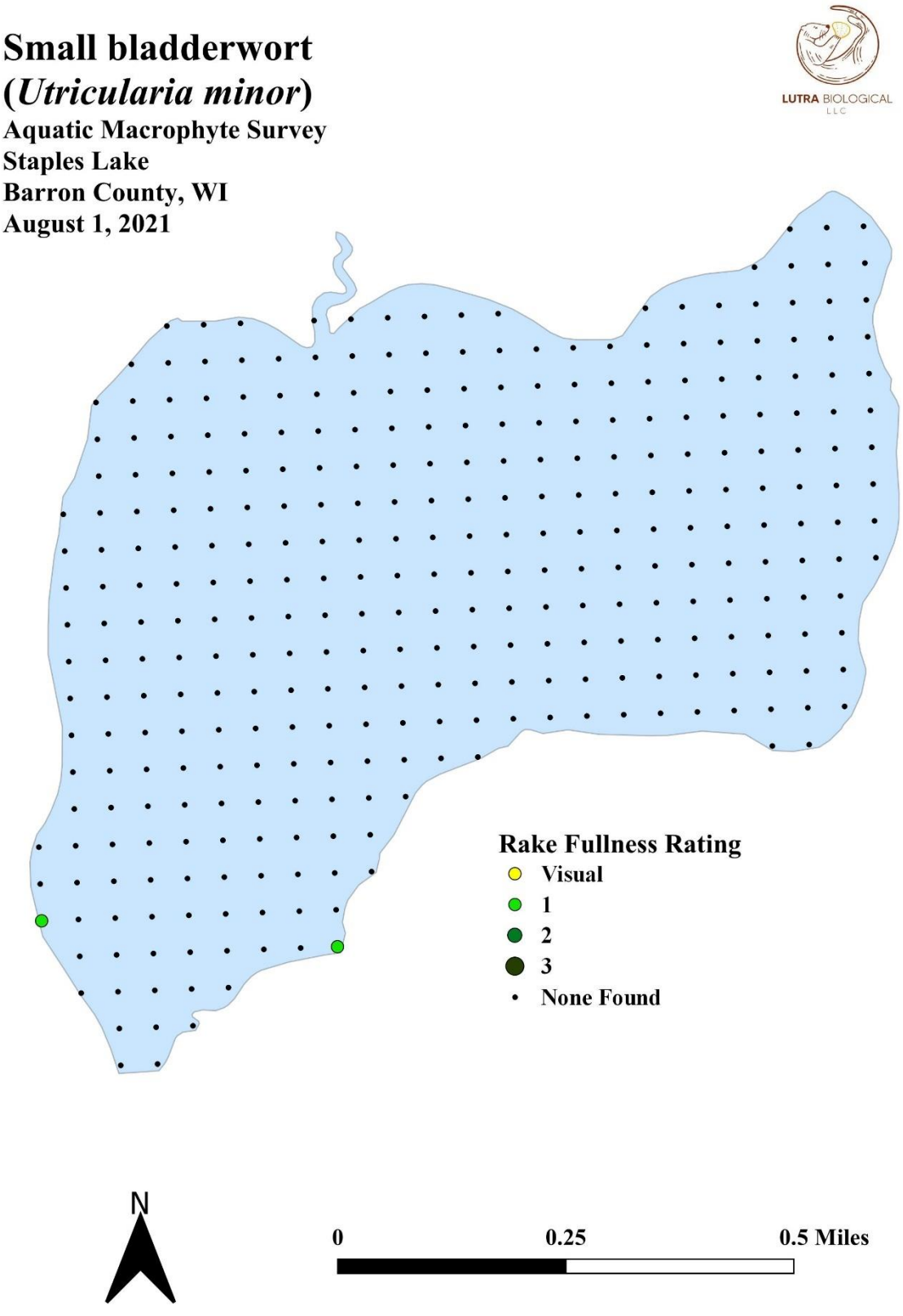
Softstem bulrush
(*Schoenoplectus tabernaemontani*)

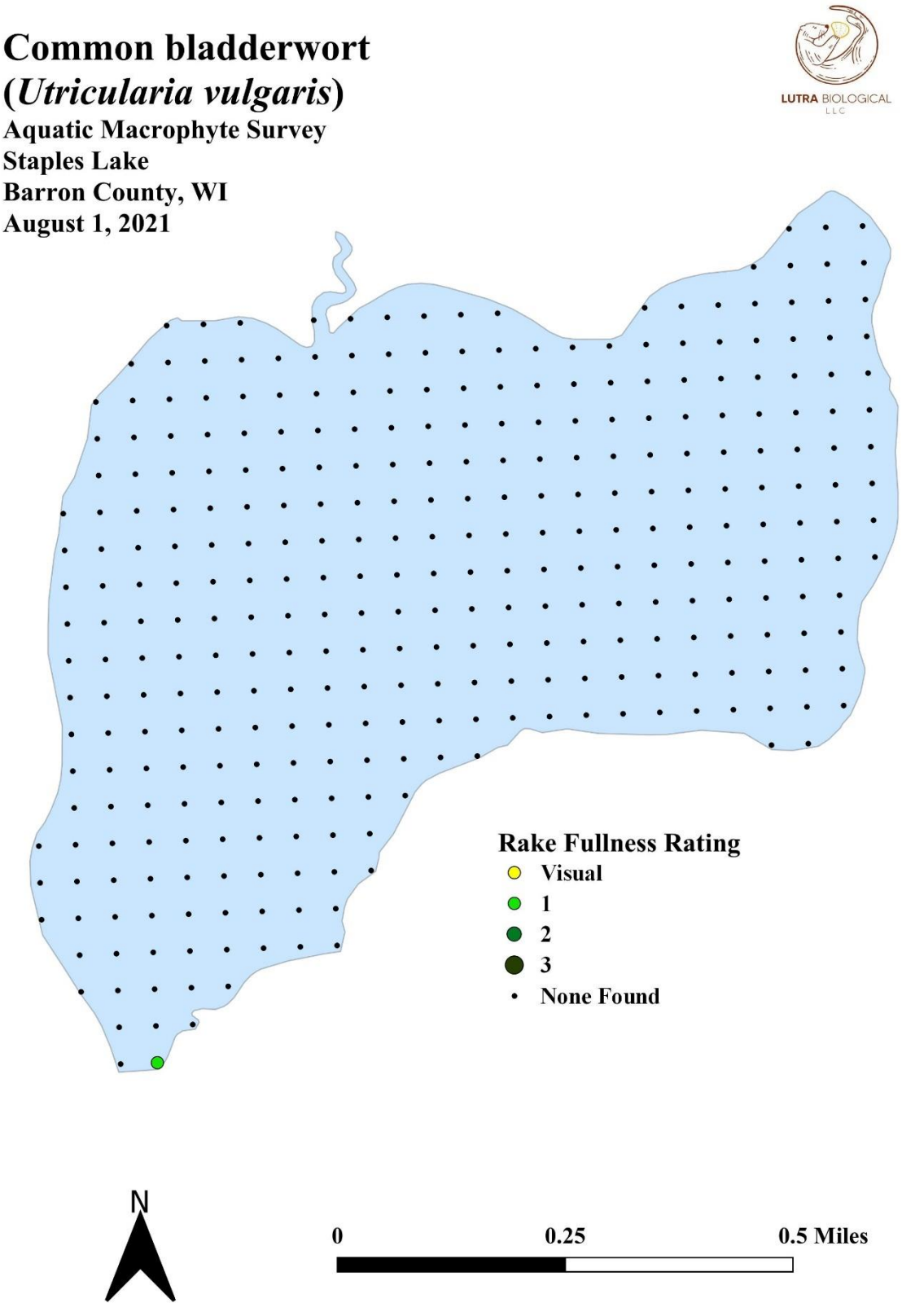
Aquatic Macrophyte Survey
Staples Lake
Barron County, WI
August 1, 2021

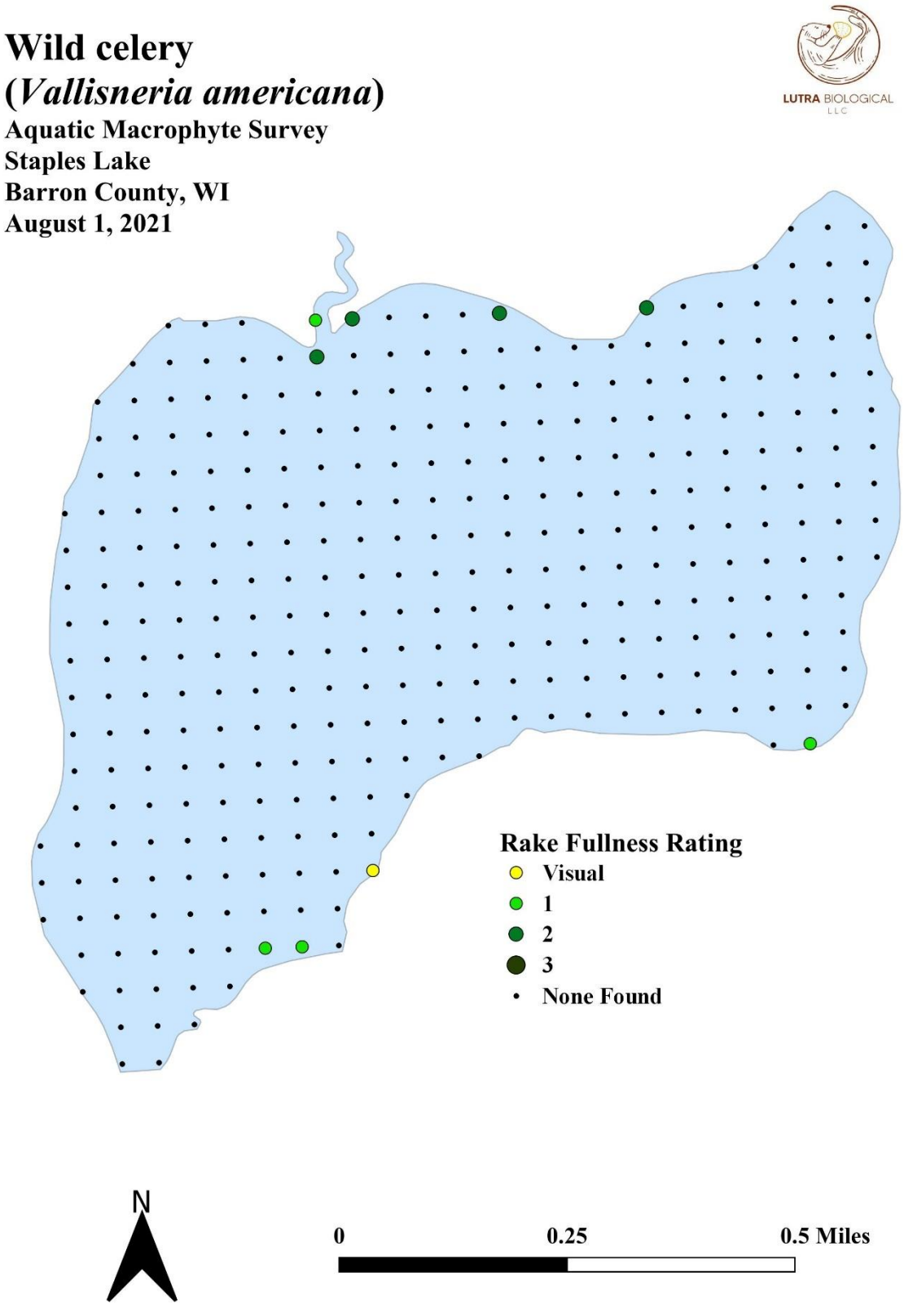


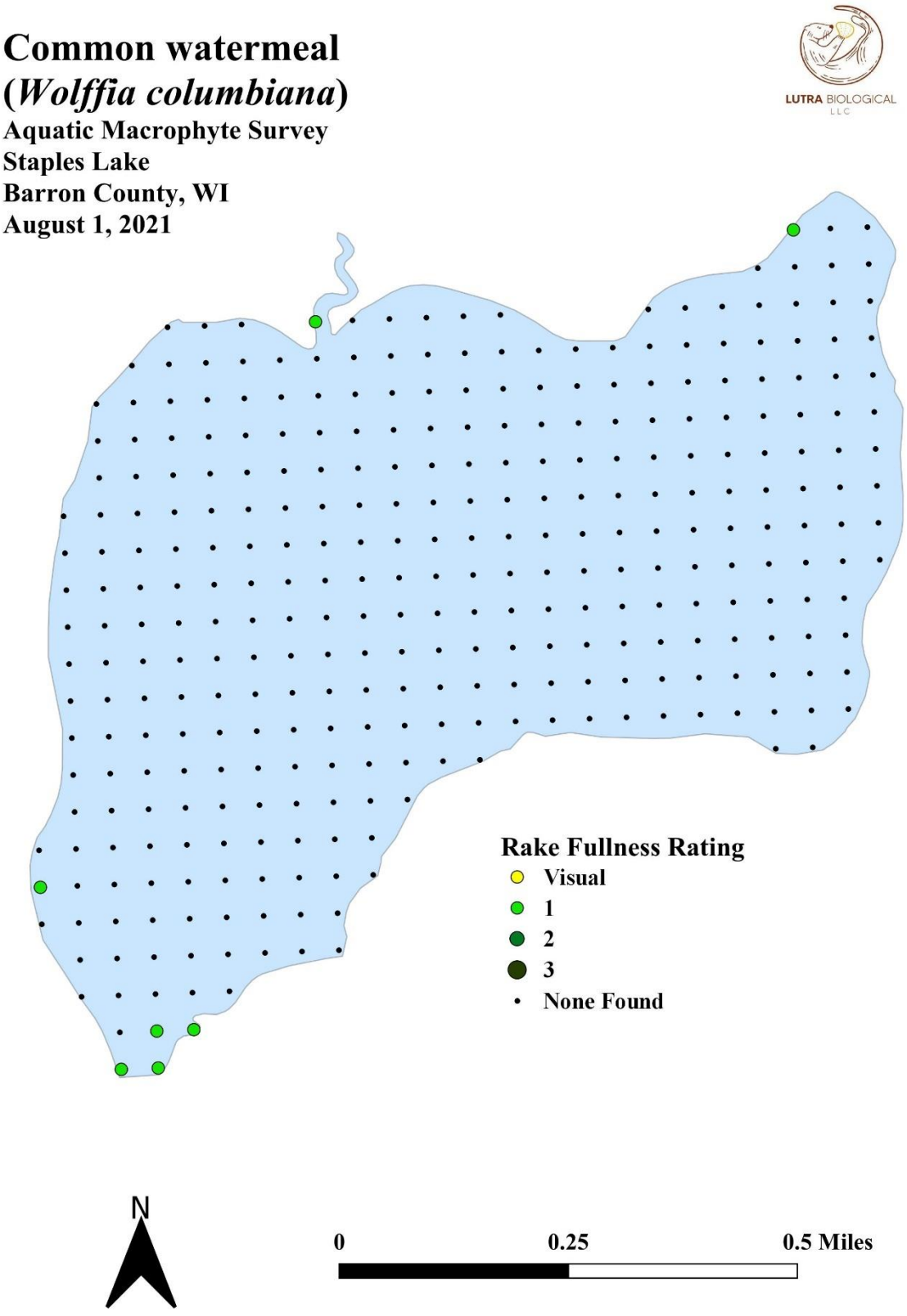

Large duckweed
(Spirodela polyrhiza)
Aquatic Macrophyte Survey
Staples Lake
Barron County, WI
August 1, 2021
LUTRA BIOLOGICAL LLC
Rake Fullness Rating
Visual
1
2
3
None Found
N
0
0.25
0.5 Miles


Broad-leaved cattail
(Typha latifolia)
Aquatic Macrophyte Survey
Staples Lake
Barron County, WI
August 1, 2021
LUTRA BIOLOGICAL LLC
Rake Fullness Rating
Visual
1
2
3
None Found
N
0
0.25
0.5 Miles


Small bladderwort
(Utricularia minor)
Aquatic Macrophyte Survey
Staples Lake
Barron County, WI
August 1, 2021
LUTRA BIOLOGICAL LLC
Rake Fullness Rating
Visual
1
2
3
None Found
N
0
0.25
0.5 Miles


Common bladderwort
(Utricularia vulgaris)
Aquatic Macrophyte Survey
Staples Lake
Barron County, WI
August 1, 2021
LUTRA BIOLOGICAL LLC
Rake Fullness Rating
Visual
1
2
3
None Found
N
0
0.25
0.5 Miles


Wild celery
(Vallisneria americana)
Aquatic Macrophyte Survey
Staples Lake
Barron County, WI
August 1, 2021
LUTRA BIOLOGICAL LLC
Rake Fullness Rating
Visual
1
2
3
None Found
N
0
0.25
0.5 Miles


Common watermeal
(Wolffia columbiana)
Aquatic Macrophyte Survey
Staples Lake
Barron County, WI
August 1, 2021
LUTRA BIOLOGICAL LLC
Rake Fullness Rating
Visual
1
2
3
None Found
N
0
0.25
0.5 Miles

APPENDIX B:
2021 Shoreland & Shallows Habitat Assessment

As of 7/12/22, results or a summary report from the 2021 Shoreland Assessment were not yet available. These will be added in the future when available.

APPENDIX C:

Shoreland Owner Opinion Survey Results

Methodology

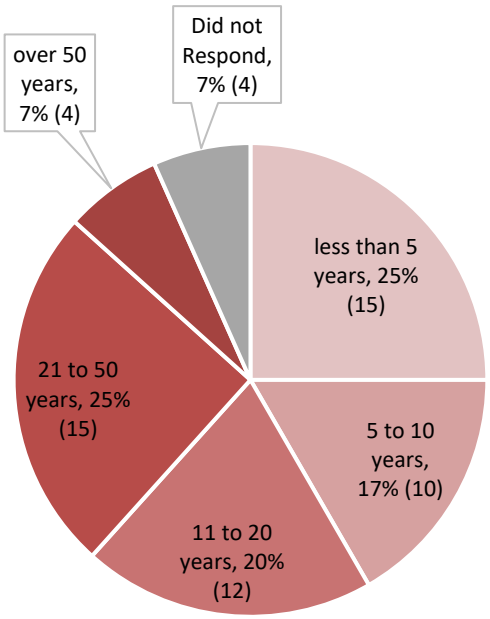
To gather lakeshore residents' input on the different uses and current state of Staples Lake, a paper survey was distributed via the lake districts mailing list. Once completed, surveys were entered into SurveyMonkey to track the results and run some analysis. Prior to the survey being distributed; the lake district, a DNR representative and WCWRPC met to discuss the format and questions of the survey. A paper survey method was selected, as opposed to a web-based survey, in an attempt to reach as many lake landowners as possible.

A total of 87 surveys were mailed to landowners around the lake in November 2021. The final response was received on January 31st, 2022. In total, 60 surveys were completed and sent back which made for a 69% response rate.

About the Survey Participants

Based on the responses to the demographic questions, a quarter of respondents have owned property on the lake for less than 5 years, and another quarter have owned for 21 to 50 years.

Most respondents live in Barron County, however 7 landowners responded from Polk county and another 2 that their property lies between both counties. Half of landowners indicated that they use the lake seasonally on a weekend, holiday, or hunting basis.



1. **What is your overall satisfaction level with owning property at Staples Lake? *(choose one)***

Highly Satisfied	Somewhat Satisfied	Somewhat Dissatisfied	Very Dissatisfied
36% (21)	49% (28)	14% (8)	0% (0)

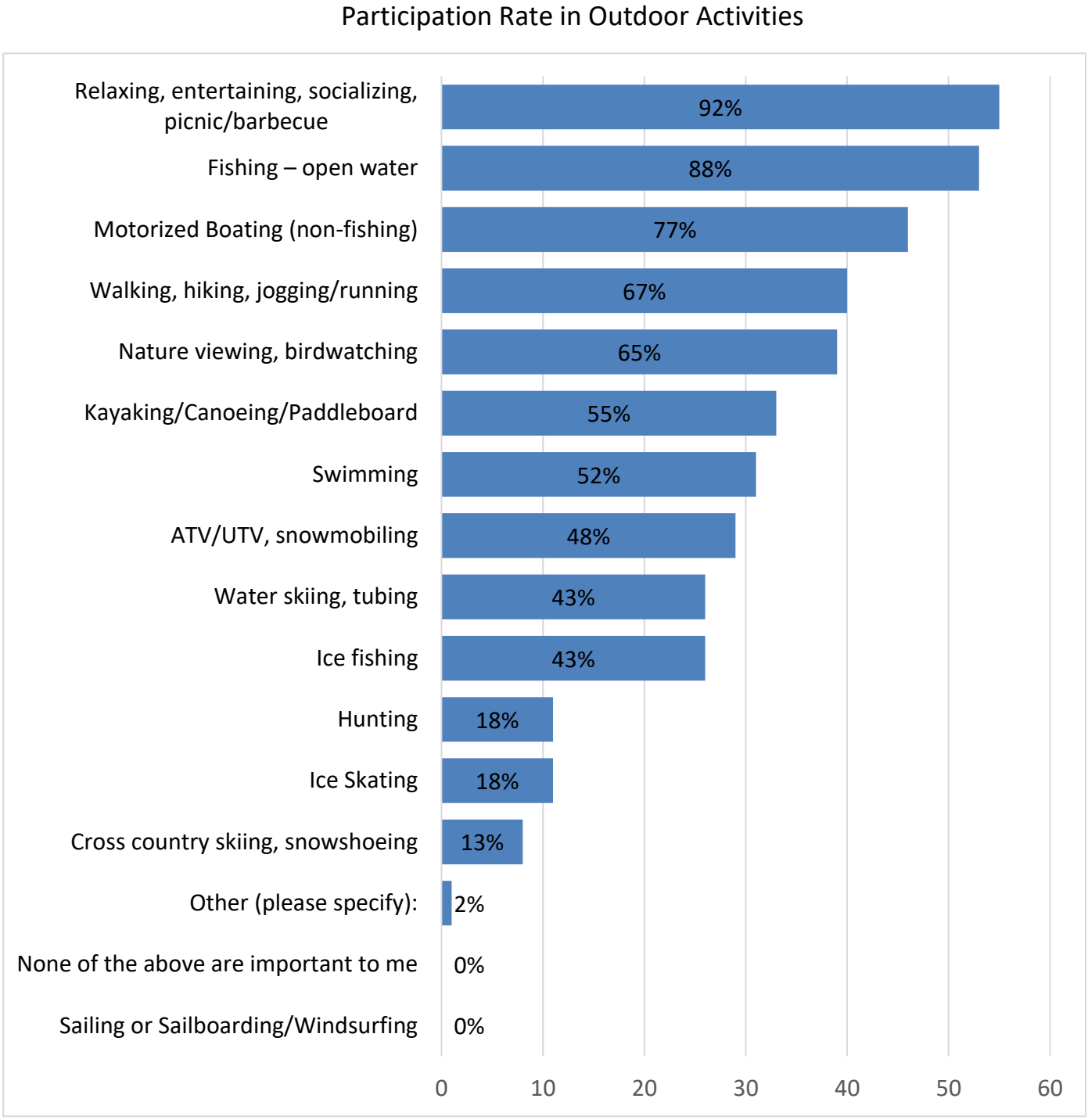
2. **How long have you been visiting Staples Lake, including any time before you owned property here? *(choose one)***

less than 5 years	5 - 10 years	11 - 20 years	21 - 50 years	Over 50 years
26% (16)	16% (10)	20% (12)	25% (15)	11% (7)

Outdoor Activity

Respondents were asked to **select all outdoor activities you participate in when visiting Staples Lake**. All 60 survey participants responded to this question. Nearly all respondents 92% enjoy relaxing, entertaining and socializing while at the lake. The next most popular activity was fishing while at the lake (88%). While fishing in open water was the second most popular activity, ice fishing participation over half as popular. Winter activities, such as ice-skating, cross-country skiing, and ice fishing, were also significantly less popular. This suggests that Staples Lake is primarily a summer destination for outdoor recreation, but does have some year-round use.

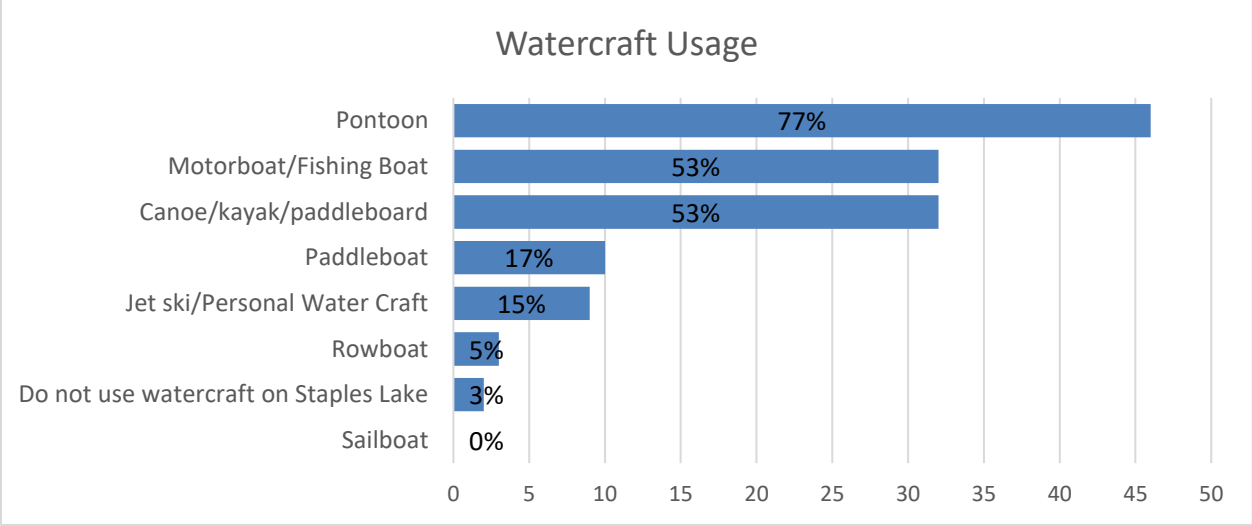
There was one “Other” response that indicated “jet skiing” as an activity.


Participation Rate in Outdoor Activities
Relaxing, entertaining, socializing, picnic/barbecue
92%
Fishing – open water
88%
Motorized Boating (non-fishing)
77%
Walking, hiking, jogging/running
67%
Nature viewing, birdwatching
65%
Kayaking/Canoeing/Paddleboard
55%
Swimming
52%
ATV/UTV, snowmobiling
48%
Water skiing, tubing
43%
Ice fishing
43%
Hunting
18%
Ice Skating
18%
Cross country skiing, snowshoeing
13%
Other (please specify):
2%
None of the above are important to me
0%
Sailing or Sailboarding/Windsurfing
0%
0
10
20
30
40
50
60

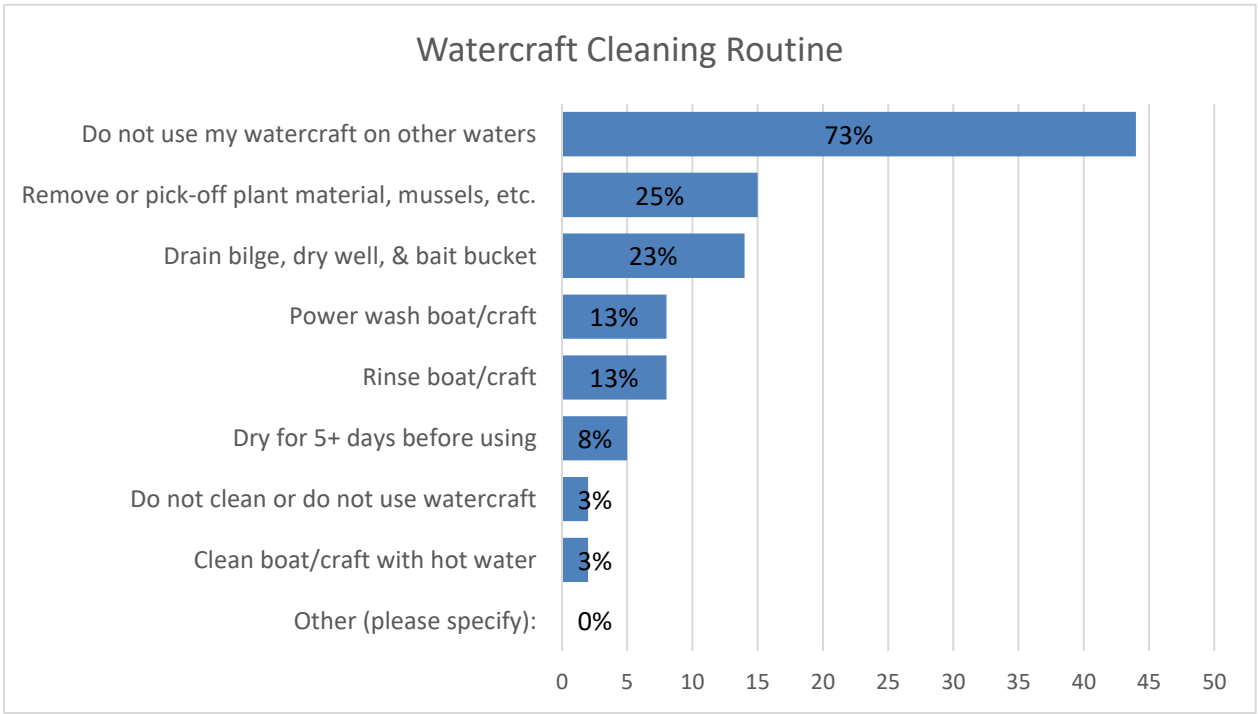
Watercraft and Cleaning Practices

Over three quarters of respondents use a pontoon boat on the lake.

Nearly three-quarters of respondents said they did not use their watercraft on any other lakes besides Staples. The two participants that chose "do not clean or do not use watercraft" were the same participants that said they do not use watercraft on the lake. Which means, at least among the respondents, most perform some sort of cleaning procedure for their watercraft.



Do you use your watercraft on waters other than Staples Lake?	Yes	No	Do Not Use Watercraft on Staples Lake
	21% (13)	73% (44)	5% (3)



Fishing

In an average year, how often do you fish at Staples Lake? ***(choose one per row)***

	1-10 days	11 to 20 days	21 to 30 days	31 to 60 days	61 to 90 days	90+ days	None
Open Water Fishing	30% (16)	13% (7)	18% (10)	24% (13)	5% (3)	7% (4)	0% (0)
Ice Fishing	42% (12)	25% (7)	17% (5)	3% (1)	3% (1)	7% (2)	0% (0)

For open water fishing (not ice fishing), how do you usually fish at Staples Lake? ***(choose one)***

from Pier, Dock, or Shore	from Boat or Watercraft	Both Equally
24% (13)	15% (8)	60% 32

What species of fish do you like to catch on Staples Lake? ***(choose all that apply)***

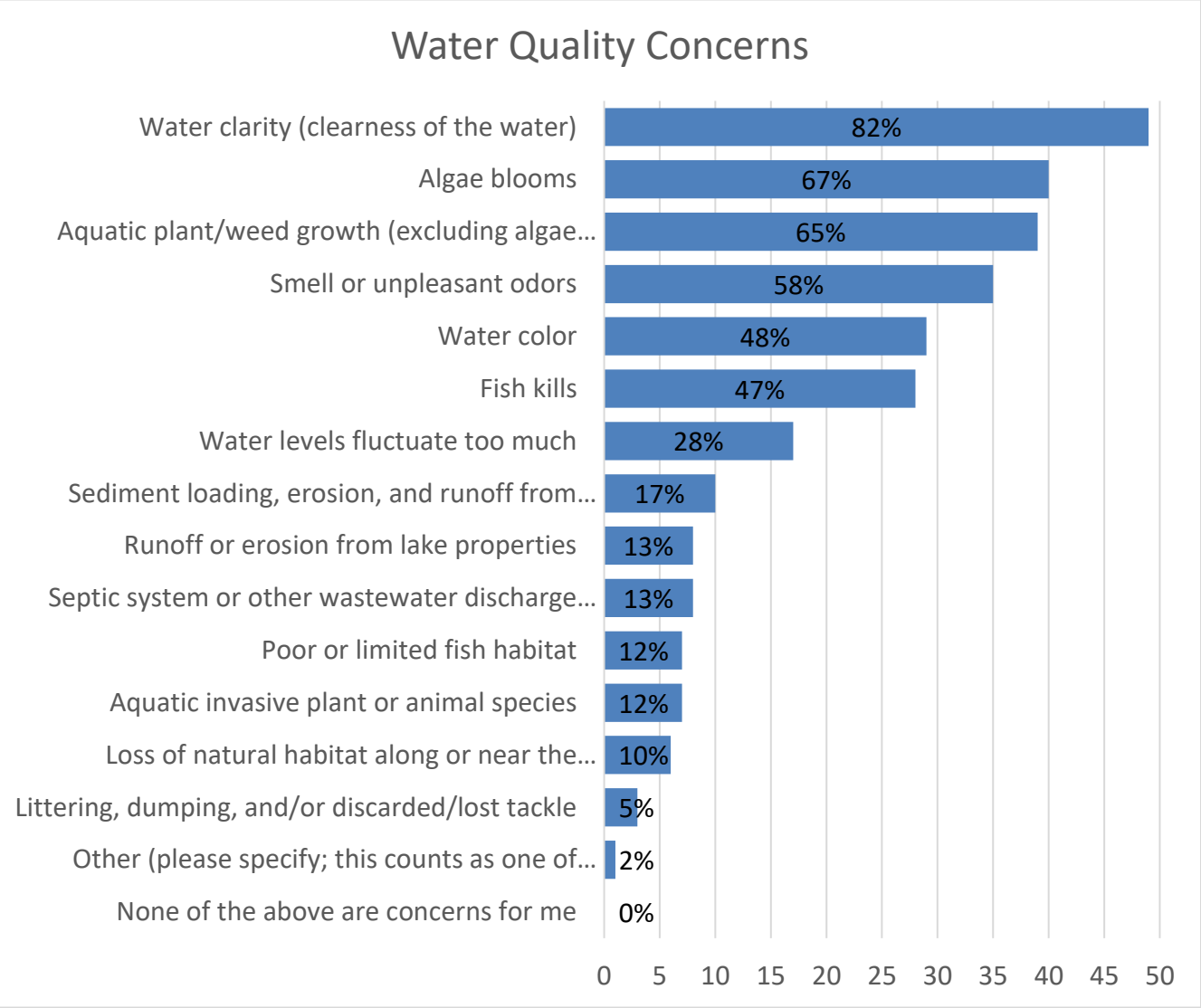
a. Bluegill/Pumpkinseed/Sunfish	86% (44)	b. Black Crappies	70% (36)
c. Yellow Perch	31% (16)	d. Largemouth Bass	70% (36)
e. Walleye	31% (16)	f. Northern Pike	47% (24)
g. Bullhead	9% (5)	h. Other *(please specify)*:	1% (1)

The one other response was: “Yellow perch all died!”.

Water Quality Concerns

Water quality issues is the focal point of this lake management plan. The survey asked "**What concerns you most about water quality at Staples Lake?**" and then were given a list of options to choose from; one respondent left this question blank.

The most frequent responses focus on landowners' perception of the Lake and can be linked back to excessive nutrient (phosphorus) loading.

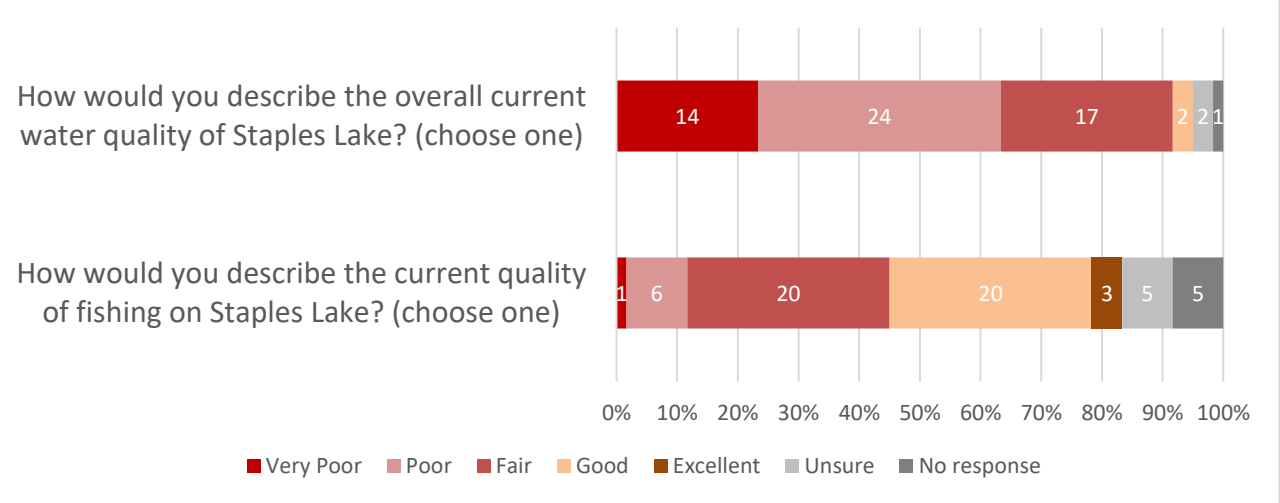


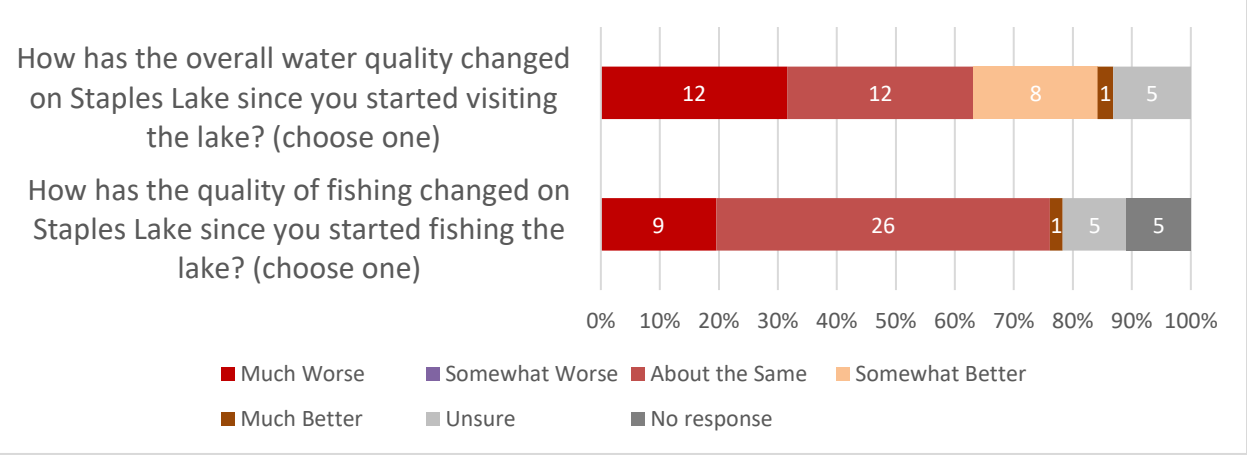
A single write-in concern was submitted: "Farm fertilizer runoff is killing the lake."

The following charts look at water quality compared to fishing on Staples Lake and how it has changed over time.

Perceptions of the Lake's water quality seems to be much worse than the perceived quality of fishing. Most respondents indicated that the fishing was either fair or poor.

20% of survey respondents indicated that the water quality has gotten much worse during their time living on Staples lake, with another 20% saying that it is about the same. Over half (63%) of respondents to the question about their fishing experience over time thought that it had stayed the same overall.





Below is a list of landscaping and other practices designed to reduce nutrient and soil runoff from shoreland properties and/or to improve aquatic or riparian habitat. Please let us know how familiar you are with each practice. ***(choose one per row)***

	Unfamiliar with the practice	Familiar, but not installed	Planning to install	Already Installed
a. Rain gardens	42% (23)	46% (25)	5% (3)	5% (3)
b. Native shoreline plantings	28% (15)	35% (19)	9% (5)	26% (14)
c. Bank stabilization, rip rap	38% (21)	35% (19)	1% (1)	25% (14)
d. Infiltration pits or trenches	67% (36)	24% (13)	0% (0)	7% (4)
e. Water diversions	62% (32)	25% (13)	0% (0)	11% (6)
f. Not fertilizing or using zero phosphorus fertilizer	18% (10)	15% (8)	1% (1)	64% (34)
g. Replacement of septic system	18% (10)	18% (10)	0% (0)	62% (33)
h. Other *(please specify)*:	0% (0)	0% (0)	0% (0)	0% (0)

Please indicate what barriers have prevented you from installing the practices described in Question 15 to reduce runoff or improve habitat on your property. ***(choose all that apply)***

a. I don't want to install any practices	9% (5)	b. Cost prohibitive	31% (16)
c. I have already installed practices	45% (23)	d. Unsure how to install a practice	31% (16)
e. I don't believe it will help water clarity	13% (7)	f. Takes too much time to install	5% (3)
g. My neighbors may not like it.	3% (2)	h. Concerned about how it will look	7% (4)
i. Not enough space on my lot	17% (9)	j. Other *(please specify)*:	5% (3)

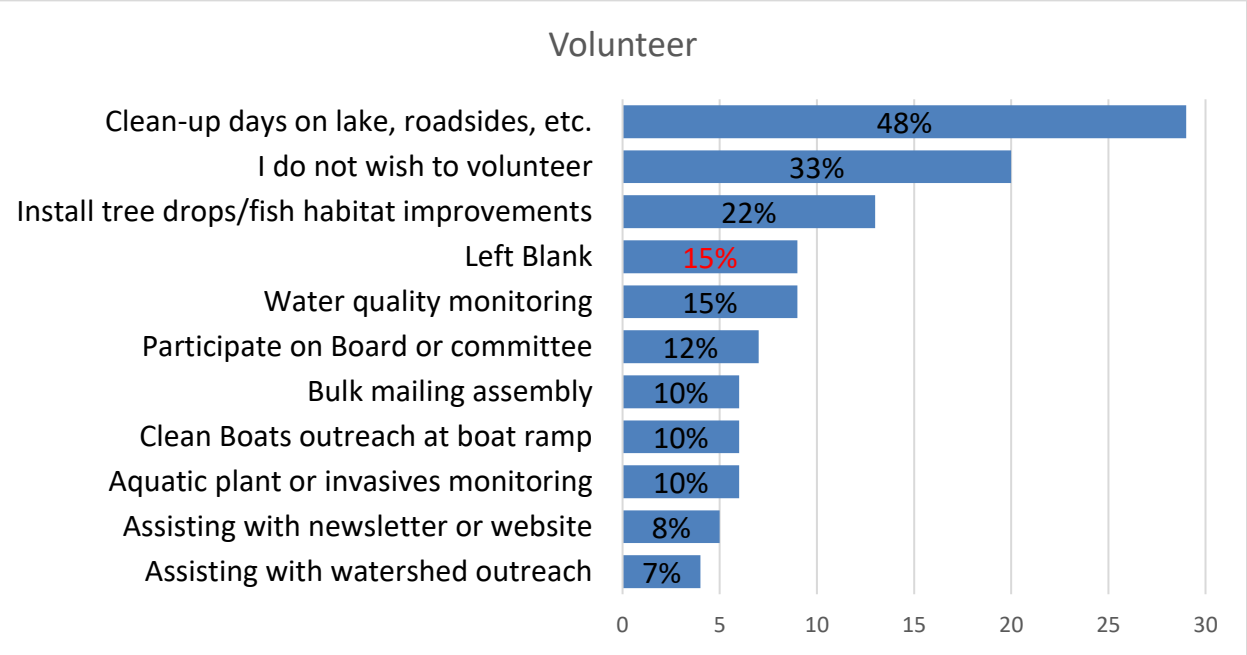
The 3 "other" responses included "Going to install but have tall grass", "Road borders lake", and "Have not gotten to it yet."

Do you desire more information regarding any of the practices described in Question 15?

There were 8 responses that would like additional information on rip rap, rain gardens, bank stabilization, shoreline plantings, pits or trenches, and water diversions. This suggests that there may be opportunities for Healthy Lakes projects in the future.

Volunteers

About half of respondents were **interested in some form of volunteering** around the Lake, with the 29 respondents indicating they would participate in a clean-up day on the Lake or on roadsides nearby. Respondents also showed interest in helping to create additional fish habitat.



Polk County Landowner Interest in the Lake District

When residents from Polk county were asked **whether or not they would like to join the Lake District**:

- 6 responded – "Somewhat interested, but need more information"
- 3 responded – "Not at all interested"

Other Comments Received

At the end of the survey, 10 respondents chose to share additional thoughts and comments:

- Boat launch slab is VERY uneven. Boat launch dock needs replacement.
- Since the 7/19/19 storm took and destroyed all the trees, I've decided to let the property go back to wild. The step kids will get the property to do with as they wish.
- Looking forward to see progress on the lake becoming healthier.
- We come up most weekends and plan to move up permanently in next five years. Thank you for your volunteering efforts. It also appears that the weed harvester causes the water to be much greener. Possible solution would be to leave weeds, except for a 20 foot path to docks and lifts. Please consider this solution.
- People that have seasonal usage leave garbage out Sunday eve. They go back to Minnesota. Black bear and raccoon become a problem. People have also placed unbagged garbage in my Waste Management container. I have to clean it out!
- We voluntarily paid dues for a number of years. We saw no improvement in lake quality. Additionally, we were never considered part of the lake "group".
- Why is there a wave restriction on the lake the size of Staples. No other lakes in the area have any restrictions. Most of the time there are very few boats on the lake especially during the week. Very dissatisfied. There was no restrictions when we bought the property so we could use the lake at any time for water skiing especially when water is calm.
- We are happy and have been for 20+ years - not sure who or why all of this is necessary.
- Since moving in on August 1, 2021, the water clarity has been disappointing. In comparison to surrounding lakes, it seems we have a problem with green water and algae. Our family would be willing to contribute to clean up efforts and efforts to restocking walleye in the lake. That may take some strategic thinking and I would be willing to participate in those conversations.
- Walleye and perch seem to be gone from the lake. Nothing will change until the fertilizer coming in from the river is stopped.

APPENDIX D:

Watershed Landowner Goal Survey Results

The goal-setting survey was a web-based survey. Invitations to participate were mailed to all landowner addresses in Staples Lake basin in March 2022 as a follow-up to the community kick-off event. Forty respondents answered one or more questions. Approximately half of the respondents did not attend the February 18, 2022, kick-off event. The majority of respondents owned waterfront property at Staples Lake, but did not reside within the watershed.

Question 1. Realistically, how should water quality change over the next 25 years? Select up to 3 goals. Note: The plan goals should focus on Staple Lake, not changes upstream in the watershed. (40 answered)

	PRIORITY #1	PRIORITY #2	PRIORITY #3	TOTAL
The water quality at Staples Lake will not change much, but will not get worse.	40.00% 2	20.00% 1	40.00% 2	5
Staples Lake is swimmable.	35.71% 5	21.43% 3	42.86% 6	14
Staples Lake is drinkable.	0.00% 0	50.00% 1	50.00% 1	2
On average, the clarity of water depth is improved significantly.	23.53% 4	35.29% 6	41.18% 7	17
The number of days that the lake is green due to algae blooms decreases.	44.00% 11	36.00% 9	20.00% 5	25
There is less aquatic plant growth, especially Curly-Leaf Pondweed.	0.00% 0	33.33% 2	66.67% 4	6
No new invasive species are introduced into Staples Lake.	12.50% 1	25.00% 2	62.50% 5	8
There is a significant decrease in sediment-loading into Staples Lake.	38.46% 5	23.08% 3	38.46% 5	13
The depth of Staples Lake has improved in the "cove" and delta areas near feeder streams.	0.00% 0	50.00% 1	50.00% 1	2
Staples Lake provides a health ecosystem and habitat for aquatic plants and fish.	42.31% 11	42.31% 11	15.38% 4	26

Other (6 write-in):

- All adjacent and upstream/downstream farm land is required to have run off mitigation in place to eliminate phosphorous and other byproducts getting into the lake and streams
- All these goals are interconnected. They should all be top priority.
- Lets start as soon as possible
- no
- To significantly improve the water quality of staples lake.
- We will sell if lake hasn't improved substantially in next 2-4 years. Not a threat, a fact!

Question 2. Briefly, for the goal(s) you selected above, do you have any suggested 10-year milestones or shorter-term goals? What might be accomplished by 2032? (18 answered, 22 skipped)

Algae & Water Quality Related

- Decrease the algae blooms and smell
- Less algae
- Less green during the year
- Reducing the Green water due to Algie growth
- The amount of algae growth is decreased 5% per year.
- The green algae bloom should be decreased 5% + per year.
- Clearer water and less sediment
- The water quality doesn't get worse.

Actions or Suggested Timelines

- Accomplish by 2025
- All farmland adjacent and upstream/downstream is required to have a run off mitigation in place within 3 years.
- Have the needed changes for this trajectory set in place.
- I don't want to wait 10 years, let be aggressive and start cleaning this lake this year. Spray it with Alum and then lets go after the load from the creek.
- If the above goals are 25 yrs those goals are also our 10 yr goals. Meaning, we should see improvements with water clarity, healthy ecosystem and depth of the 'cove'. In 10 yrs we should see a difference. While it will not be where we want to be it should still be better than today.
- Much shorter goal attainment. Need immediate action. Our retirement destination losing effectiveness.

Other

- Follow the suggestions of experts
- I would think that the professionals would be better suited to set achievable milestones..
- no
- No, but willing to help with plans and projects

Question 3. 88% of shoreland residents fish at Staples Lake, but only 42% said fishing was good or excellent. How might fishing, the fishery, or fish habitat at Staples Lake change in the next 20 years? (25 answered, 15 skipped)

Water Quality-Related

- Cleaner water equal less fish kill
- Eliminate die offs, larger fish.
- Fishing will improve with improved water quality.
- Hopefully improve. cleaner water, less sediment choking spawning (sand and gravel)
- Less algae growth might be better for fish.
- We need to improve water quality

Walleye or Specific Species

- If there is a way to get walleye back in the lake
- Increase in Walleye's
- Walleye planting
- Stapes Lake used to be a premier lake for Walleye in the area. It needs to be restored to its Improve the quality (size) of panfish and reintroduction of walleye
- introduce Juvenile walleye and work more closely with DNR fisheries. they are the experts
- Less bass and increase pan fish supply and walleyes.
- Return perch, walleye to lake. Set size limits, thx to DNR for new pan fish taken limits
- Stocking of some fish, Walleye and other fish.

Other Diversity & Balance

- Find a way to balance fish species and improve walleye population
- Add more species. I believe the population of crappie is so high they are stunted.
- Cull the lake.
- keepable size currently.
- conditions to support or facilitate larger fish in each species. They are stunted or not growing to
- Less bag limit
- former self. DNR needs to actively monitor and stock the lake.
- Variety and quantity will improve

General

- Hopefully get better
- I hope they improve significantly.
- Improve!
- With cleaner water. Better looking fish.

Question 4. Generally, do you envision any changes over the next 20 years to the shorelands surrounding Staples Lake? Select up to 3 goals. Keep in mind, the purpose of the plan is not to tell landowners what they can or cannot do with their property. (38 answered, 2 skipped)

	PRIORITY #1	PRIORITY #2	PRIORITY #3	TOTAL
Increase natural vegetation, including replacing trees lost during the wind storm.	18.75% 3	56.25% 9	25.00% 4	16
Prevent further shoreline erosion.	47.62% 10	23.81% 5	28.57% 6	21
Provide cost-sharing to help replace aging septic systems when needed.	40.00% 4	30.00% 3	30.00% 3	10
Increased use of landscaping best practices (e.g., rain gardens, native plantings, water diversions) to reduce runoff from residential & commercial properties.	29.17% 7	29.17% 7	41.67% 10	24
Woody vegetation and aquatic habitat should be maintained in shallow areas close to shore when possible.	0.00% 0	77.78% 7	22.22% 2	9
If possible, some shoreland areas should be preserved in a natural, undeveloped state.	40.00% 4	10.00% 1	50.00% 5	10
Encourage the preservation of wetland areas near Staples Lake	42.11% 8	21.05% 4	36.84% 7	19
The plan should not include any goals for shoreland areas.	100.00% 1	0.00% 0	0.00% 0	1

Other (5 write-in):

- As head of Apple River keep streams clean. Storm damage did a number how make the lake n area as beautiful as before 2019
- Be short-sighted. Cabin owners have had just about all they can take- so it now!
- educate property owners to the benefit of shoreland plantings.
- Make sure that lakeshore residents aren't fertilizing their lawns.
- Never put access at chain lakes

Question 5. While the Staples Lake Management Plan will focus on water quality, the plan may include goals on things such as lake recreation/use, wildlife, education, volunteerism, or even the Lake District itself. Do you have any other short-term or long-term goals to recommend? (10 answered, 30 skipped)

- No or None (5)
- Collaboration between counties and farmers
- I hope we can get staples lake water quality as good as the chain lakes.
- Plant trees!
- Recommend no water skiing, maybe a speed limit for boats.
- Swimmable

Question 6. I attended the February 18th Staples Lake Community Meeting.

ANSWER CHOICES	RESPONSES	
Yes	47.37%	18
No	52.63%	20
TOTAL		38

Question 7. Please check all that apply.

ANSWER CHOICES	RESPONSES	
I live in the Staples Lake watershed.	18.42%	7
I own property within the Staples Lake watershed.	50.00%	19
I own waterfront property at Staples Lake.	65.79%	25
I own property that is actively farmed or has managed forest.	21.05%	8
I own waterfront property at Long Lake or Lake of the Woods.	5.26%	2
I do not live or own property in the Staples Lake watershed.	0.00%	0
Total Respondents: 38		