Wamplers Lake 2024 Aquatic Vegetation, Water Quality, & 2025 Management Recommendations Report

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Table of Contents

Section 1

Wamplers Lake 2024 Aquatic Vegetation, Water Quality, & 2025 Management Recommendations Report

The following information is a summary of key lake findings collected during 2024.

The overall condition of Wamplers Lake continues to be ranked in the top 25% of developed lakes of similar size in the state of Michigan according to RLS scientists. The lake has good water clarity and also has enough nutrients (phosphorus and nitrogen) to support some algae and submersed aquatic plant growth. Invasive species such as Eurasian Watermilfoil (EWM), Curly-leaf Pondweed (CLP), and Starry Stonewort are able to grow in moderate nutrient waters and thus are a challenge to the Wamplers Lake ecosystem. In 2015, there were approximately 140 acres of invasive EWM in Wamplers Lake which have been successfully reduced over the past several years. A new program began in 2024 and included treatment of 12 acres of EWM, 23 acres of invasive Curly-leaf Pondweed (CLP), and 2.8 acres of invasive macroalga, Starry Stonewort. An additional 13 acres of nuisance pondweeds and Elodea were also treated.

The unprecedented mild winter conditions in 2023-2024 lead to a significant increase in weeds and algae for most inland lakes. Aquatic plants are highly opportunistic and already experience a brief growing season. Because many lakes, including Wamplers Lake were ice-free during the recent winter, this allowed for an overactive seedbank and early germination of many native and invasive aquatic plant species. This necessitated rigorous treatments where needed, especially in the canal which has also recently experienced very low water levels due to drought conditions throughout the entire state.

Protection of the 22 native aquatic plant species is paramount for the health of the lake fishery and these plants should not be managed unless they are a nuisance to lakefront property owners and possess navigational and recreational hazards (i.e., lily pads or nuisance growth in the canals). The plan for 2025 will include whole-lake aquatic vegetation sampling and scanning and spot-treatment of remaining invasives (milfoil, Curly-leaf Pondweed, and Starry Stonewort) as needed. The new systemic herbicide ProcellaCOR® will also be used for more sustained control of the milfoil.

Section 2

Wamplers Lake Water Quality Data (2024)

Water Quality Parameters Measured

There are hundreds of water quality parameters one can measure on an inland lake, but several are the most critical indicators of lake health. These parameters include water temperature (measured in °F), dissolved oxygen (measured in mg/L), pH (measured in standard units-SU), conductivity (measured in micro-Siemens per centimeter-µS/cm), total dissolved solids (mg/L), Secchi transparency (feet), total phosphorus and total nitrate nitrogen (both in µg/L), chlorophyll-*a* (in µg/L), and algal species composition. Water quality was measured in the deep basin of Wamplers Lake on July 3, 2024.

Table 1 below demonstrates how lakes are classified based on key parameters. Wamplers Lake would be considered mesotrophic (relatively productive) since it does contain ample phosphorus, nitrogen, and aquatic vegetation growth but has excellent water clarity and moderate algal growth. 2024 water quality data for Wamplers Lake is shown below in Table 2.

Table 1. Lake trophic classification (MDNR).

Lake Trophic Status	*Total Phosphorus (µg L^{-1})*	*Chlorophyll-a (µg L^{-1})*	*Secchi Transparency (feet)*
Oligotrophic	**< 10.0**	**< 2.2**	**> 15.0**
Mesotrophic	**10.0 – 20.0**	**2.2 – 6.0**	**7.5 – 15.0**
Eutrophic	**> 20.0**	**> 6.0**	**< 7.5**

Table 2. Wamplers Lake water quality parameter data collected in the deep basin (July 3, 2024).

Depth (m)	*Water Temp ºC*	*DO mg L^{-1}*	*pH S.U.*	*Cond. µS cm^{-1}*	*Total Kjeldahl Nitrogen mg L^{-1}*	*Chl-a µgL^{-1}*	*Total Phos. mg L^{-1}*
0	24.0	9.1	8.9	339	0.8	2.0	< 0.010
4.5	23.7	9.2	9.0	339	1.1	--	< 0.010
9.0	18.3	1.3	7.7	392	2.5	--	< 0.025

Water Clarity (Transparency) Data

Secchi transparency is a measure of water clarity using a weighted disk with black and white markings. The depth is recorded as a mean of the depth at which the disk disappears and reappears. Elevated Secchi transparency readings allow for more aquatic plant and algae growth. The standard transparency throughout Wamplers Lake is adequate (7.8-17.5 feet in 2024) to allow abundant growth of algae and aquatic plants in the majority of the littoral zone of the lake during the season. Secchi transparency depends on the amount of suspended particles in the water (often due to windy conditions of lake water mixing) and the amount of sunlight present at the time of measurement. **During the 2024 sampling event, the total dissolved solids in Wamplers Lake ranged from 217-251 mg/L with a Secchi reading of 7.8 feet, which is favorable.** These values could have been lower than preferred due to recently observed heavy boating activity which can reduce water clarity and were much higher in the spring.

Total Phosphorus

Total phosphorus (TP) is a measure of the amount of phosphorus (P) present in the water column. Phosphorus is the primary nutrient necessary for abundant algae and aquatic plant growth. TP concentrations are usually higher at increased depths due to higher release rates of P from lake sediments under low oxygen (anoxic) conditions and due to mineralization. Phosphorus may also be released from sediments as pH increases. In summer, the dissolved oxygen levels are lower at the bottom and likely cause release of phosphorus from the bottom. **TP concentrations from <0.010-0.025 mg L^{-1} from top to bottom during the 2024 sampling event. These TP concentrations are moderately low for a lake the size and depth of Wamplers Lake but are still ample enough to promote aquatic vegetation and algae growth.**

pH

Most Michigan lakes have pH values that range from 6.5 to 9.5 with typical being slightly basic (pH>7.0). Acidic lakes (pH < 7) are rare in Michigan and are most sensitive to inputs of acidic substances due to a low acid neutralizing capacity (ANC). Wamplers Lake is considered "slightly basic" on the pH scale. **The pH of Wamplers Lake ranged from 7.7-9.0 S.U. during the 2024 sampling event, which is ideal for an inland lake.** pH is usually lower at the lake bottom and can increase when aquatic vegetation is actively growing due to photosynthesis.

Conductivity

Conductivity is a measure of the amount of mineral ions present in the water, especially those of salts and other dissolved inorganic substances. Conductivity generally increases as the amount of dissolved minerals and salts in a lake increases, and also increases as water temperature increases. **The conductivity values for Wamplers Lake were moderate during the 2024 sampling event and ranged from 339-392 µS/cm.** Severe water quality impairments in freshwater lakes do not occur until values exceed 800 µS/cm and are toxic to aquatic life around 1,000 µS/cm.

Chlorophyll-*a* and Algal Species Composition

Chlorophyll-a is the primary photosynthetic pigment found in all plants and algae. Chlorophyll-*a* is a measure of the amount of green plant pigment present in the water, often in the form of planktonic algae. High chlorophyll-*a* concentrations are indicative of nutrient-enriched lakes. Chlorophyll-*a* concentrations greater than 6 µg L^{-1} are found in eutrophic or nutrient-enriched aquatic systems, whereas chlorophyll-*a* concentrations less than 2.2 µg/L ^{are} found in nutrient-poor or oligotrophic lakes**. The chlorophyll-*a* concentration during the 2024 sampling event in Wamplers Lake was 2.0 µg/L which is moderate and lower than in 2023.**

The algal genera were determined from composite water samples collected over the deep basin of Wamplers Lake in 2024 and were analyzed with a compound bright field microscope. The genera present included the Chlorophyta (green algae; Figure 1): *Chlorella* sp. and *Ulothrix* sp.; The Cyanophyta (blue-green algae; Figure 2): *Microcystis* sp.; and the Bascillariophyta (diatoms; Figure 3)*: Synedra* sp., *Rhoicosphenia* sp., *Fragilaria* sp., and *Navicula* sp. With such diverse algal flora and an abundance of diatoms that are indicative of great water quality, conditions were favorable to support zooplankton such as *Bosmina* sp. (Figure 4). Photos of the general algae and zooplankton types are shown below.

Figure 1. A Green Alga

Figure 2. A Blue-Green Alga

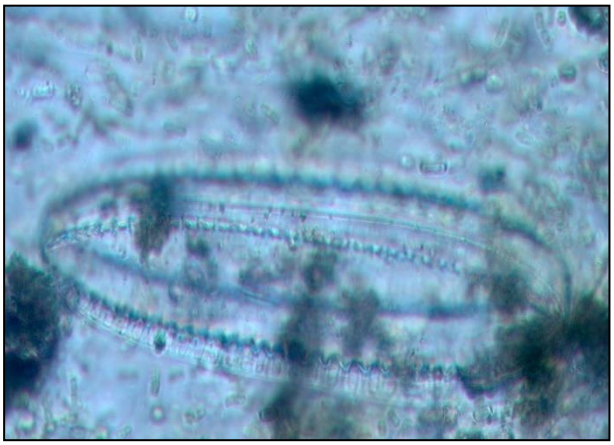

Figure 3. A Diatom Alga

Figure 4. A Zooplankton

Section

3

Aquatic Vegetation Data (2024)

Status of Native Aquatic Vegetation in Wamplers Lake

A whole-lake grid survey (n=372 sampling points) and bottom scanning survey of Wamplers Lake was conducted on May 1 and July 3, 2024, by RLS scientists. The native aquatic vegetation present in Wamplers Lake is essential for the overall health of the lake and the support of the lake fishery which is quite robust.

This most recent survey determined that there was a total of 22 native aquatic plant species in Wamplers Lake. These included 12 submersed species, 5 floating-leaved species, and 5 emergent species. This indicates a very high biodiversity of aquatic vegetation in Wamplers Lake and an increase in two species relative to 2023. The overall % cover of the lake by native aquatic plants is low relative to the lake size and thus these plants should be protected unless growing near swim areas at nuisance levels.

Among the most dominant native aquatic plants was the macro alga, Chara (Figure 5) which lies close to the lake bottom and serves as excellent fish spawning habitat. In addition, Chara also helps to keep the small sediment particles from being suspended in the water column. The plant has a distinctive musky odor which smells skunk-like. Also abundant was the emergent Arrowhead (Figure 6), which was dominant along areas of the shoreline and canal. This plant serves as excellent cover for aquatic wildlife.

A list of all native aquatic plant species found in Wamplers Lake in 2024 is shown in Table 3 below. The May survey data was used for the overall relative abundance tabulation since all native species usually present were all germinated and ready to sample. Sometimes surveys must be used from late summer during harsh winter years since many native aquatic plant species do not germinate until much later during those years.

Figure 5. Chara (aka Muskgrass)

Figure 6. Arrowhead (*Peltandra* sp.)

Table 3. Wamplers Lake Native Aquatic Plant Species (May 1, 2024).

Aquatic Plant Species	Common Name	Growth Form	Frequency (%)
Chara vulgaris	Muskgrass	Submersed	61.6
Potamogeton zosteriformis	Flat-stem Pondweed	Submersed	0.3
Potamogeton gramineus	Variable-leaf Pondweed	Submersed	0.3
Potamogeton filiformis	Thin-leaf Pondweed	Submersed	2.4
Potamogeton illinoensis	Illinois Pondweed	Submersed	7.5
Potamogeton praelongus	White-stem Pondweed	Submersed	4.8
Potamogeton amplifolius	Large-leaf Pondweed	Submersed	5.4
Vallisneria americana	Wild Celery	Submersed	0.2
Myriophyllum heterophyllum	Variable Watermilfoil	Submersed	1.1
Ceratophyllum demersum	Coontail	Submersed	0.1
Utricularia vulgaris	Bladderwort	Submersed	3.8
Ranunculus sp.	White Water Crowfoot	Submersed	0.3
Lemna minor	Duckweed	Floating leaved	1.9
Spirodella sp.	Giant duckweed	Floating leaved	0.3
Azolla sp.	Water velvet	Floating leaved	0.3
Nymphaea odorata	White Lily	Floating leaved	9.4
Nuphar advena	Yellow Lily	Floating leaved	5.6
Peltandra virginica	Arrow Arum	Emergent	10.8
Typha latifolia	Cattails	Emergent	5.1
Schoenoplectus sp.	Bullrushes	Emergent	1.9
Decodon verticillata	Swamp Loosestrife	Emergent	0.3
Iris sp.	Wild Iris	Emergent	1.3

Status of Invasive (Exotic) Aquatic Plant Species in Wamplers Lake

The amount of Eurasian Watermilfoil (Figure 7) present in Wamplers Lake varies each year and is dependent upon climatic conditions, especially runoff-associated nutrients. This year, we saw above average temperatures and many lakes experienced nuisance milfoil and algal outbreaks. The May 2024 survey revealed that approximately 12.0 acres of hybrid milfoil and 23 acres of invasive CLP (Figure 8) were found throughout the entire lake. On May 14, 2024, the milfoil was treated with the systemic herbicide ProcellaCOR® (at a dose of 6 PDU) and contact herbicide diquat (at 1 gal/acre dose) and the CLP was treated with the contact herbicide diquat. RLS was present to oversee the treatments conducted by Aqua-Weed Control, Inc. An additional survey in mid-June 2024 revealed the presence of 13 acres of nuisance Starry Stonewort, pondweeds, and Elodea in the canal and nearby area. That mixture was treated with diquat, flumioxazin, and chelated copper. A mid-July survey revealed 2.8 acres of Starry Stonewort (Figure 9) that were treated on July 15, 2024, with SeClear®. The additional EWM was treated with ProcellaCOR®, and the canals were treated with diquat. A late summer (September 13, 2024) whole-lake aquatic plant survey revealed that the treatments were very successful. The Treatment maps for milfoil for each of these invasive species are shown in the maps below (Figures 10-11).

Figure 7. Eurasian Watermilfoil (*Myriophyllum spicatum*)

Figure 8. Curly-leaf Pondweed (*Potamogeton crispus*)

Figure 9. Starry Stonewort (*Nitellopsis obtusa*)

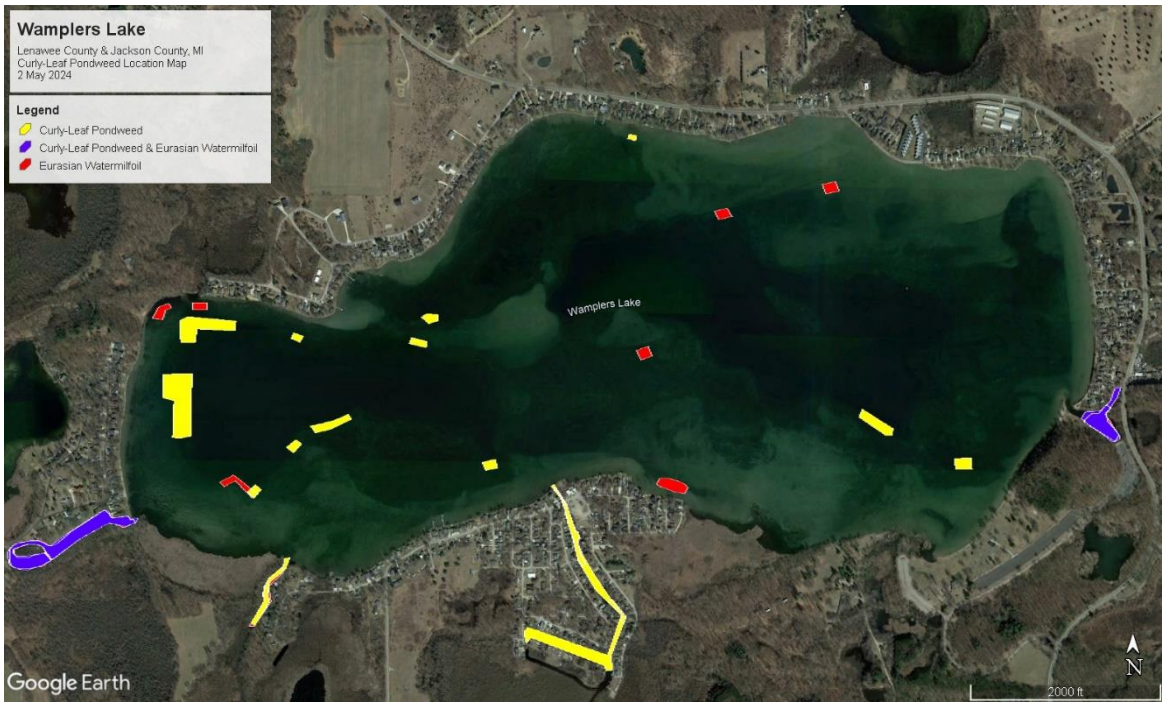

Figure 10. Eurasian Watermilfoil and Curly-leaf Pondweed distribution in Wamplers Lake (May 2, 2024).

Figure 11. Eurasian Watermilfoil and Starry Stonewort distribution in Wamplers Lake (July 3, 2024).

Figure 12. Photo of nuisance weed growth in the west canal (May 2024).

Figure 13. Photo of nuisance weed growth in the west canal (May 2024).

Section

4

Management Recommendations for 2025

Continuous aquatic vegetation surveys are needed to determine the precise locations of EWM, CLP, or Starry Stonewort (primarily found in the canals) or other problematic invasives in Wamplers Lake. Ten locations around the Wamplers Lake shoreline contained Purple Loosestrife which is invasive and should be removed by hand. These surveys should occur in mid to late-May to early-June and again post-treatment in 2025.

Due to the relative scarcity of native aquatic vegetation in Wamplers Lake for the lake size, the treatment of these species with aquatic herbicides is not recommended (one exception is the overgrowth of nuisance weeds in the canals). The plan for 2025 includes the use of higher doses of systemic aquatic herbicides due to the genetically determined strains of hybrid milfoil that require such doses for effective treatment. A new systemic herbicide ProcellaCOR® may also be used and has demonstrated good efficacy. It is costly but has sustained control. The nuisance growth in the canals would respond well to a combination of diquat and hydrothol. Curly-leaf Pondweed will respond well to Aquathol-K® at 1-2 gallons per acre or with diquat at the same doses. Starry Stonewort will respond well to SeClear®.

In conclusion, Wamplers Lake is a healthy lake with good aquatic plant biodiversity, good water clarity, moderate nutrients, and a healthy lake fishery. Management of the EWM, CLP, and Starry Stonewort are paramount for the long-term health of the lake. Thus far, the invasive species management efforts have been very successful with over 80% of the original milfoil infestation reduced.