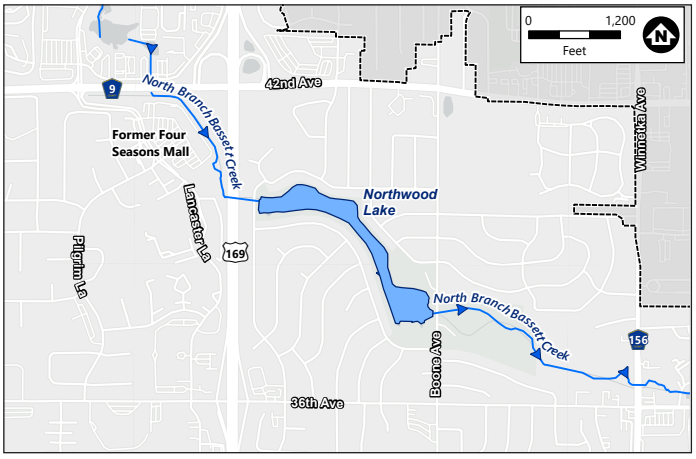


Figure 1: Northwood Lake location

About Northwood Lake	
BCWMC classification	Priority-1 shallow lake
Watershed area	1,294 acres
Lake size	15 acres
Average depth	2.7 feet
Maximum depth	5 feet
Ordinary high water level	885.5 feet
Normal water level	--
Downstream receiving water body	Ȟaȟá Wakpádaŋ/Bassett Creek
Location (city)	New Hope
MPCA impairments	Nutrients
Aquatic invasive species	Curly-leaf pondweed, purple loosestrife, reed canary grass, yellow iris, narrow-leaved cattail
Public access	Yes

Monitoring water quality in Northwood Lake

The Bassett Creek Watershed Management Commission (BCWMC) has monitored water quality conditions in the watershed's 10 priority lakes since 1972. This monitoring is performed to detect changes or observe trends in water quality, inform pollution modeling and studies, and target future projects.

Northwood Lake is a widened section of the North Branch of Bassett Creek, which enters the lake from the west and exits to the east (Figure 1). A summary of 2025 monitoring efforts on Northwood Lake is provided below.

At a glance: 2025 monitoring results

In 2025, the BCWMC monitored Northwood Lake for the following:

- Water chemistry (nutrients, chlorophyll *a,* chloride)
- Water clarity and dissolved oxygen
- Phytoplankton and zooplankton (microscopic plants and animals)
- Macrophytes (aquatic plants)

Results of the 2025 monitoring show that Northwood Lake failed to meet the applicable Minnesota Pollution Control Agency (MPCA) and BCWMC water quality standards for Secchi disc depth (a measure of water clarity), total phosphorus, and chlorophyll *a*. The lake is considered hypereutrophic due to excess nutrients and algae. Trend analyses show a significant decline in water clarity, but no significant change in total phosphorus or chlorophyll *a* concentrations over the past 10 years. Other results include the following:

- All 2025 chloride measurements met the MPCA maximum and chronic chloride standards; the 2025

annual average chloride value was lower than the values for 2016, 2019, and 2022.

- In 2025, the number of plant species in the lake in June and August, and the June floristic quality index (FQI) value, a measure of plant species quality, were better than the Minnesota Department of Natural Resources (MNDNR) plant index of biotic integrity (IBI) thresholds. In August, the FQI value was poorer than the MNDNR plant IBI threshold.
- The summer average number of phytoplankton in 2025 was substantially lower than in 2022, but within the range of summer averages from 2005 through 2019.
- The 2025 summer average number of zooplankton in Northwood Lake was the highest observed during the monitored period.

Recommendations

- The BCWMC is currently working with the MPCA to complete a Total Maximum Daily Load (TMDL) study to identify management strategies to reduce excess phosphorus in Northwood Lake. After the TMDL project is completed, the recommended projects and practices should be implemented to improve the lake's water quality.
- Continue to provide education and information to residents and lake users on best practices to improve water quality and shoreline buffers and to reduce the introduction of aquatic invasive species (AIS).
- Continue water quality and biological monitoring at a 3-year frequency.

Definitions

- ***Hypereutrophic:*** Nutrient-rich lake conditions characterized by frequent and severe algal blooms and low water clarity; excessive algae can significantly reduce lake oxygen levels
- ***Eutrophic:*** Lake condition characterized by abundant accumulation of nutrients supporting dense growth of algae and other organisms; decay of algae can reduce lake oxygen levels
- ***Mesotrophic:*** Lake condition characterized by medium levels of nutrients and clear water
- ***Oligotrophic:*** Lake condition characterized by a low accumulation of dissolved nutrients, high oxygen content, sparse algae growth, and very clear water

2025 water chemistry

Total phosphorus levels

While phosphorus is necessary for plant and algae growth, excessive phosphorus leads to excessive algae growth, decreased water clarity, and impaired water quality. Common sources of phosphorus include fertilizers, leaves, grass clippings, atmospheric deposition, soil erosion, and aquatic plant die-off (such as curly-leaf pondweed). Phosphorus can also be released from sediments when dissolved oxygen concentrations are very low.

- **BCWMC/MPCA shallow lakes standard:** Summer average of 60 micrograms per liter (µg/L) or less
- **2025 range:** Low of 48 µg/L in mid-April to a high of 300 µg/L in early mid-July (Figure 2)
- **2025 summer average:** 177 µg/L (failed to meet BCWMC/MPCA shallow lake standard, Figure 2)

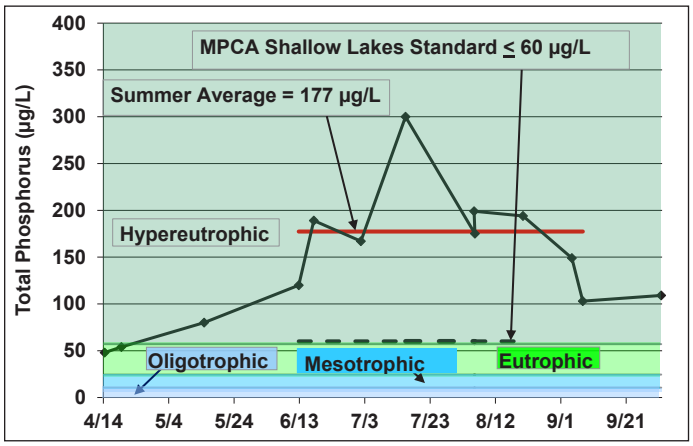


Figure 2: 2025 total phosphorus trends

Chlorophyll *a* levels

Chlorophyll *a* is a pigment in algae and generally reflects the amount of algae growth in a lake. Lakes that appear clear generally have chlorophyll *a* levels below 15 µg/L.

- **BCWMC/MPCA shallow lakes standard:** 20 µg/L or less
- **2025 range:** Low of 7.5 µg/L in mid-May to a high of 145 µg/L in mid-July (Figure 3)
- **2025 summer average:** 71 µg/L (fails to meet BCWMC/MPCA shallow lakes standard, Figure 3)

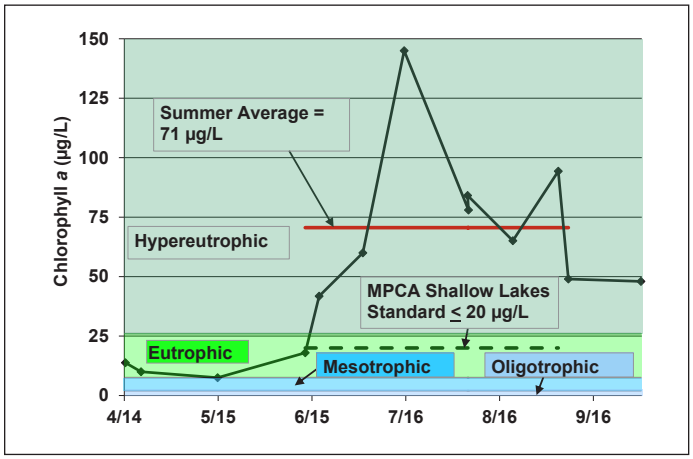


Figure 3: 2025 chlorophyll *a* trends

Water clarity

Water clarity is often affected by the amount of algae or other suspended material in a lake. It is usually measured by lowering an 8-inch “Secchi” disc into the lake and recording the depth at which it disappears from eyesight. The deeper the disc is visible, the better the water clarity.

- **BCWMC/MPCA shallow lakes standard:** 1.0 meter or more
- **2025 range:** Low of 0.3 meters in mid-June to a high of 1.4 meters in mid-April (Figure 4)
- **2025 summer average:** 0.6 meters (fails to meet BCWMC/MPCA shallow lakes standard, Figure 4)

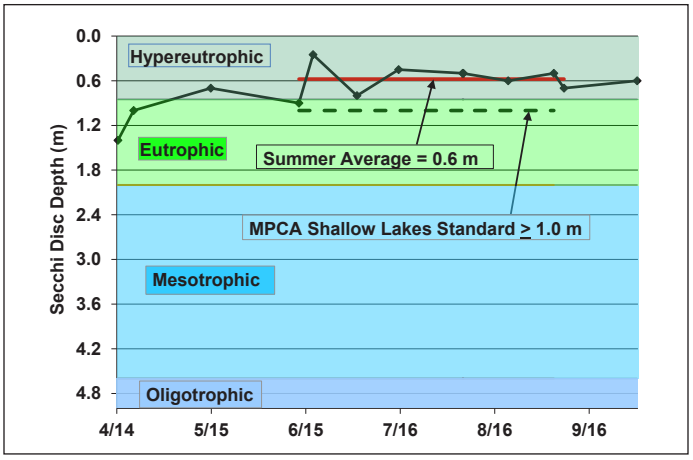


Figure 4: 2025 water clarity (Secchi disc depth) trends

Historical trends (1972–2025)

Northwood Lake's summer water quality has been monitored since 1972. Figures 5 through 7 show summer averages (June through September) for total phosphorus from 1972 to 2025 and for chlorophyll *a* and Secchi disc depth from 1977 to 2025. Over this period, all total phosphorus averages, 77 percent of chlorophyll *a* averages, and 57 percent of Secchi disc averages did not meet Minnesota state water quality standards for shallow lakes in the North Central Hardwood Forest Ecoregion under Minnesota Rules (Minn. R. Ch. 7050.0222 Subp. 4).

Northwood Lake is a widened section of the North Branch of Bassett Creek, so its water quality is strongly influenced by creek conditions and the substantial runoff delivered to the lake. Curly-leaf pondweed has also expanded in the lake, contributing additional phosphorus during summer following its natural die-off in late June. The Northwood Lake TMDL study will identify management measures to reduce excess phosphorus and improve water quality.

Trend analysis for the past 10 years shows:

- Increasing summer average total phosphorus concentrations.
- Increasing summer average chlorophyll *a* concentrations.
- Declining summer average Secchi disc depths.

The increases in total phosphorus and chlorophyll *a* were not statistically significant at the 95 percent confidence level, but the decline in Secchi disc depth was significant.

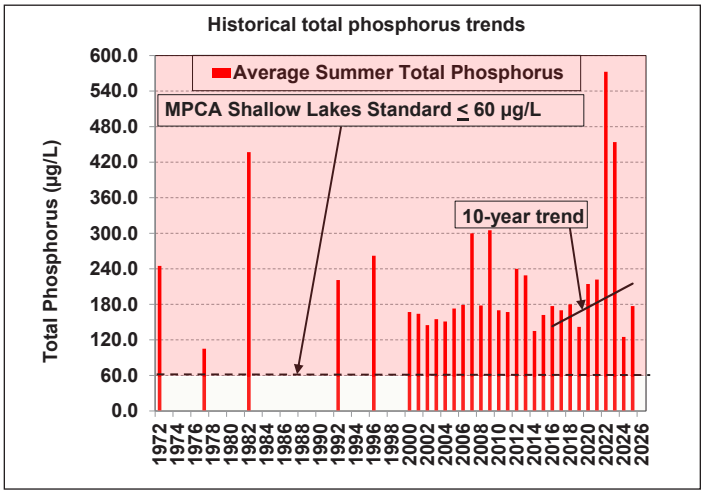


Figure 5: Historical total phosphorus trends

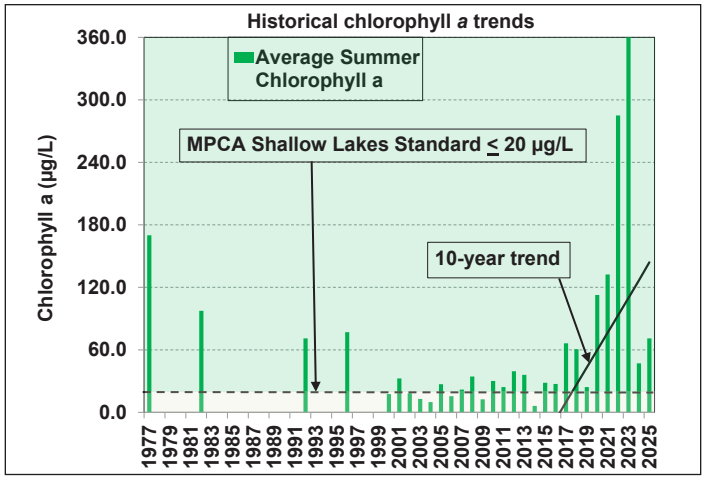


Figure 6: Historical chlorophyll *a* trends

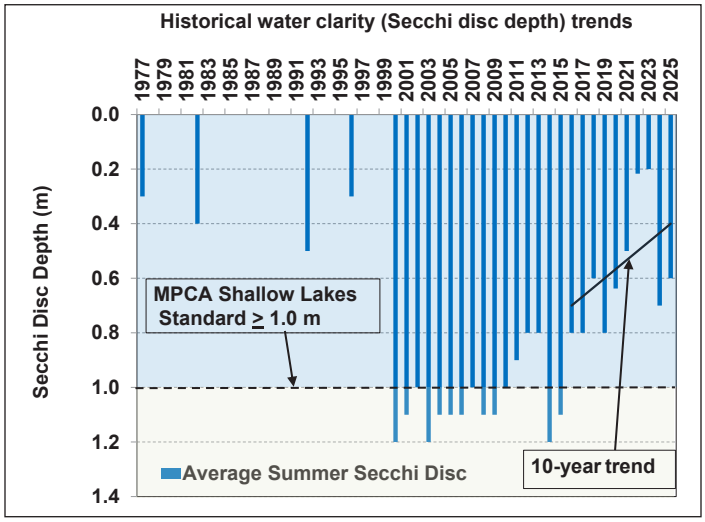


Figure 7: Historical water clarity (Secchi disc depth) trends

Chloride levels in 2016, 2019, 2022, and 2025

Chloride concentrations in area lakes have increased since the early 1990s, when many government agencies switched from sand or sand/salt mixtures to salt for winter road maintenance. When snow and ice melt, the salt goes with it, washing into lakes, streams, wetlands, and groundwater. It only takes 1 teaspoon of road salt to pollute 5 gallons of water to a point where it can no longer support freshwater life. The pollution is essentially permanent, as there is no easy or affordable way to remove chloride from water.

Because high chloride concentrations can harm fish, zooplankton, and plant life, the MPCA has established maximum and chronic chloride standards. The maximum standard is the highest concentration of chloride that aquatic organisms can be exposed to for a brief time with zero-to-slight mortality. The chronic standard is the highest chloride concentration to which aquatic life can be exposed indefinitely without causing chronic toxicity. Chronic

toxicity is defined as a stimulus that lingers or continues for a long period, often one-tenth of the life span or more. Chronic effects can include mortality, reduced growth, reproductive impairment, harmful behavioral changes, and other nonlethal effects. A lake is considered impaired for chlorides if two or more measurements exceed the chronic criterion (230 mg/L) within a 3-year period or if one measurement exceeds the maximum criterion (860 mg/L).

Chloride measurements collected from Northwood Lake in 2016, 2019, 2022, and 2025 are shown in Figure 8; all measurements were well below the maximum standard. The measurements collected in April 2016 and April 2022 exceeded the chronic chloride standard; however, all other measurements collected from 2016 through 2025 met the standard. Northwood Lake is not considered impaired for chloride because the two exceedances of the chronic chloride standard occurred more than 3 years apart. The 2025 average annual chloride concentration (74 mg/L) was lower than those measured in 2016 (110 mg/L), 2019 (99 mg/L), and 2022 (193 mg/L).

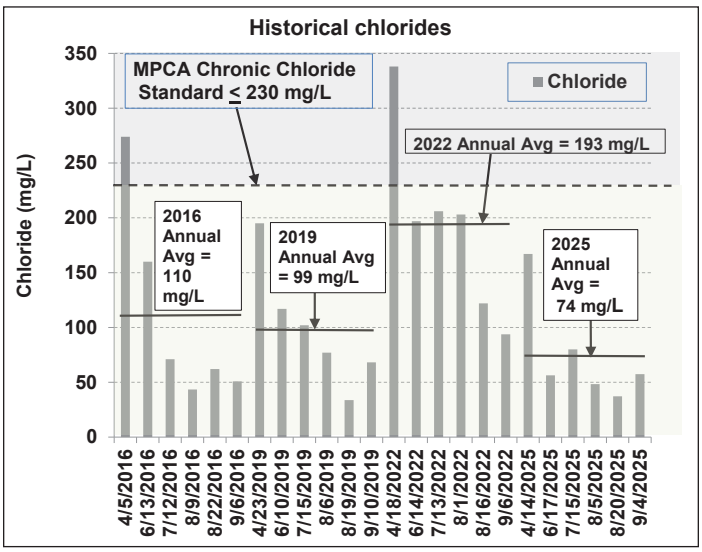


Figure 8: Historical chloride concentrations

Macrophytes (aquatic plants): Lake plant eutrophication index of biological integrity (IBI)

Eutrophication (excessive nutrients) can have detrimental effects on a lake, including reducing the quantity and diversity of plants. The MNDNR developed a lake plant eutrophication index of biological integrity (IBI) to measure the response of a lake plant community to eutrophication. The lake plant eutrophication IBI includes two metrics: (1) the number of species in a lake and (2) the "quality" of the species, as measured by the floristic quality index (FQI). The MNDNR has determined a threshold for each metric. Lakes that score below the thresholds contain degraded plant communities and are likely stressed from anthropogenic (human-caused) eutrophication.

Northwood Lake plant survey data from 1992 to 2025 were assessed to determine plant IBI trends. Figures 9 and 10 show the number of species and FQI scores for that period, compared with the MNDNR plant IBI thresholds.

- **Number of species:** A shallow lake, such as Northwood Lake, meets the MNDNR plant IBI threshold when at least 11 species are present. During the period examined, the number of species in Northwood Lake ranged from 0 to 15, exceeding the MNDNR plant IBI threshold during August 2019, August 2022, June 2025, and August 2025. Due to poor water clarity, plants were not observed in the lake in 1992 and 1996.

  A water quality improvement project completed by the City of New Hope from 2000 through 2003 improved water clarity by using barley straw to inhibit algal growth in the lake. Consequently, aquatic plants became established in the lake in 2000.

  The number of plant species in the lake consistently increased from four in 2000 to 15 in 2019. A severe algal bloom in 2022 reduced water clarity, and the number of plant species declined, ranging from 10 to 12. Water clarity improved in 2025, and the number of plant species increased, ranging from 13 to 16. 2025 was the first year since monitoring began in 1992 that the number of species met the MNDNR plant IBI threshold during both June and August; the June value of 16 was the highest number of species present during the period of record.

- **FQI values (quality of species):** The MNDNR plant IBI threshold for shallow lakes, as measured by FQI, is a minimum value of 17.8. During the period examined, FQI values in Northwood Lake ranged from 10.5 to 18.5. All values except the June 2025 value were below the MNDNR plant IBI threshold. FQI could not be computed in 1992 and 1996 because plants were not observed in the lake. As noted above, plants became established in the lake in 2000. FQI consistently increased from 10.5 in 2000 to 17.6 in 2019. A severe algal bloom in 2022 reduced water clarity and FQI. FQI increased in 2025, and the June value of 18.5 was the highest FQI value recorded to date.
- **2025 results:** The number of species in the lake was better than the MNDNR plant IBI threshold in June and August. The FQI value in June was better than the MNDNR plant IBI threshold, but the August value was below the MNDNR plant IBI threshold.

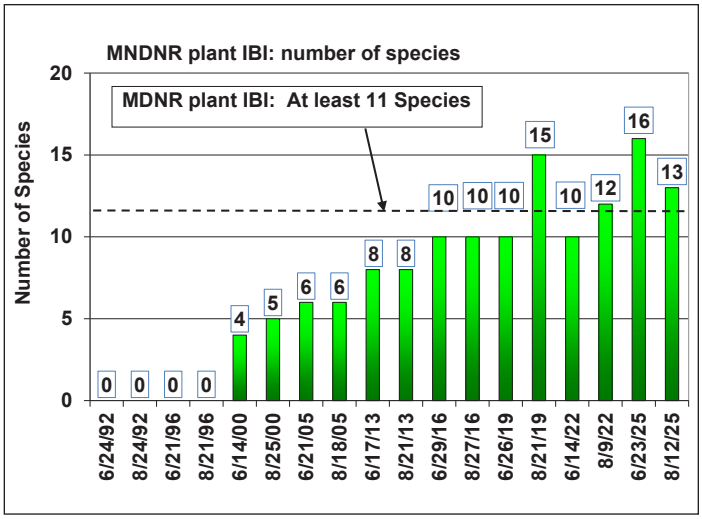


Figure 9: MNDNR plant IBI: number of species

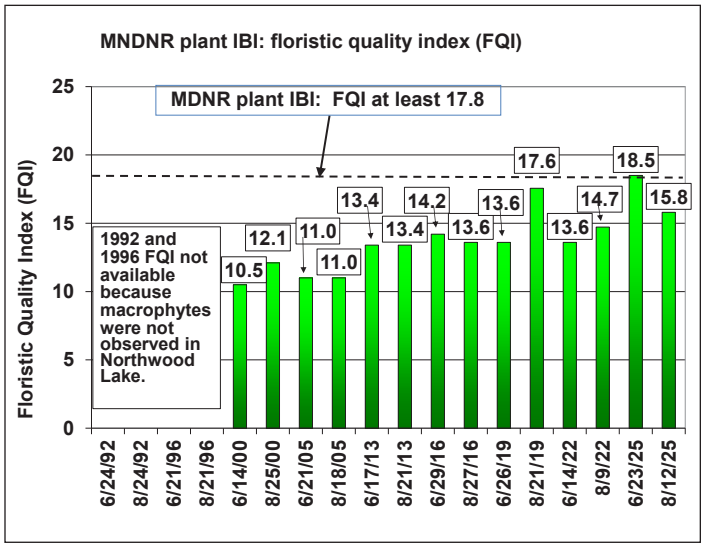
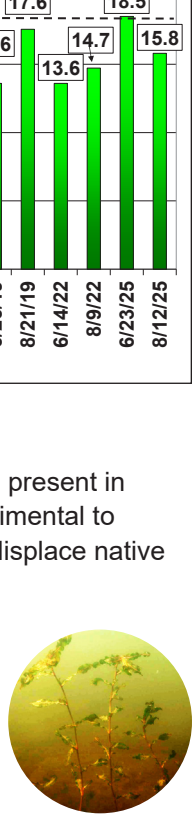


Figure 10: Floristic quality index

In 2025, five aquatic invasive species were present in Northwood Lake. Invasive species are detrimental to habitats because they spread rapidly and displace native species.

- **Curly-leaf pondweed (*Potamogeton crispus*):** Curly-leaf pondweed has been observed in Northwood Lake since 2000. Curly-leaf pondweed increased in extent and density from 2016 (50 percent of sample locations) through 2019 (92 percent of sample locations). Curly-leaf pondweed was again observed at 92 percent of sample locations in June 2022, and then declined to 86 percent of sample locations in June 2025. It was problematic in June of 2019, 2022, and 2025, with average rake densities of 2.1 (2025) to 2.5 (2016 and 2019) on a 1 to 3 scale. The surge and subsequent die-off of curly-leaf pondweed added phosphorus to the lake, resulting in increased algal growth and decreased clarity.



- **Purple loosestrife (*Lythrum salicaria*):** This emergent species has been observed along the shoreline since 2000. Its extent has declined since 2016, when it was scattered around the lake. In 2019, it was observed at one location in June and two in August. In 2022, it was observed at one location in both June and August. In 2025, it was observed at two locations in both June and August. Purple loosestrife observed in 2016, 2019, 2022, and 2025 showed damage from beetles introduced for biological control of the population, suggesting the treatment was effective.

- **Reed canary grass (*Phalaris arundinacea*):** Reed canary grass has been observed along the shoreline since 2016. It was found at one location in 2016, and at two locations in 2019 and June 2022. Its extent increased to six locations in August of 2022, remained at six locations in June of 2025, and declined to four locations in August 2025.

- **Yellow iris (*Iris pseudacorus*):** Yellow iris was first observed in 2019 at one location on the south end of the lake. In 2022, it was found at one south-end location in June and one northeast-side location in August. In 2025, it was observed at one northeast-side location in both June and August.

- **Narrow-leaved cattail (*Typha angustifolia*):** This emergent species was first observed in 2022 at five locations and was seen at four locations in 2025.

Phytoplankton and zooplankton

Phytoplankton, or algae, are small aquatic plants naturally present in lakes. Phytoplankton derive energy from the sun through photosynthesis and provide food for several types of aquatic organisms, including zooplankton (microscopic animals), which are, in turn, eaten by fish. An inadequate phytoplankton population limits a lake's zooplankton population and indirectly limits fish production in a lake. Excess phytoplankton can reduce water clarity.

Phytoplankton samples were collected from Northwood Lake to evaluate water quality and the quality of food available to zooplankton. Figure 11 summarizes the

number and major phytoplankton groups observed in Northwood Lake for the monitored years. Green algae, diatoms, and cryptomonads, good sources of food for zooplankton, were well represented. The summer average number of phytoplankton in 2025 (23,147 units per milliliter) was substantially lower than in 2022 (187,401 units per milliliter) but within the range of summer averages from 2005 through 2019 (17,495–27,591 units per milliliter).

The phytoplankton monitoring also included blue-green algae, a type of bacteria called cyanobacteria. This type of bacteria thrives in warm, nutrient-rich water and can grow rapidly under certain conditions, causing "blooms." Blue-green algae can produce toxins that can harm humans and other animals. Blue-green algae are also a poor-quality food for zooplankton; they can be toxic to zooplankton and may not be assimilated if ingested.

Figure 12 summarizes the number of blue-green algae observed in Northwood Lake for monitored years compared with World Health Organization (WHO) thresholds for health impacts. Blue-green algae numbers in samples collected from 2000 through 2025 were consistently below the lowest WHO adverse health-impact threshold, except for one sample in 2009 and four samples in 2022:

- August 12, 2009, sample: The number of blue-green algae was above the WHO threshold for "low probability for adverse health impacts."
- July 13, August 1, August 16, and September 6, 2022, samples: The number of blue-green algae was above the WHO threshold for "moderate probability for adverse health effects."

Blue-green algae numbers in 2025 samples were well below the threshold.

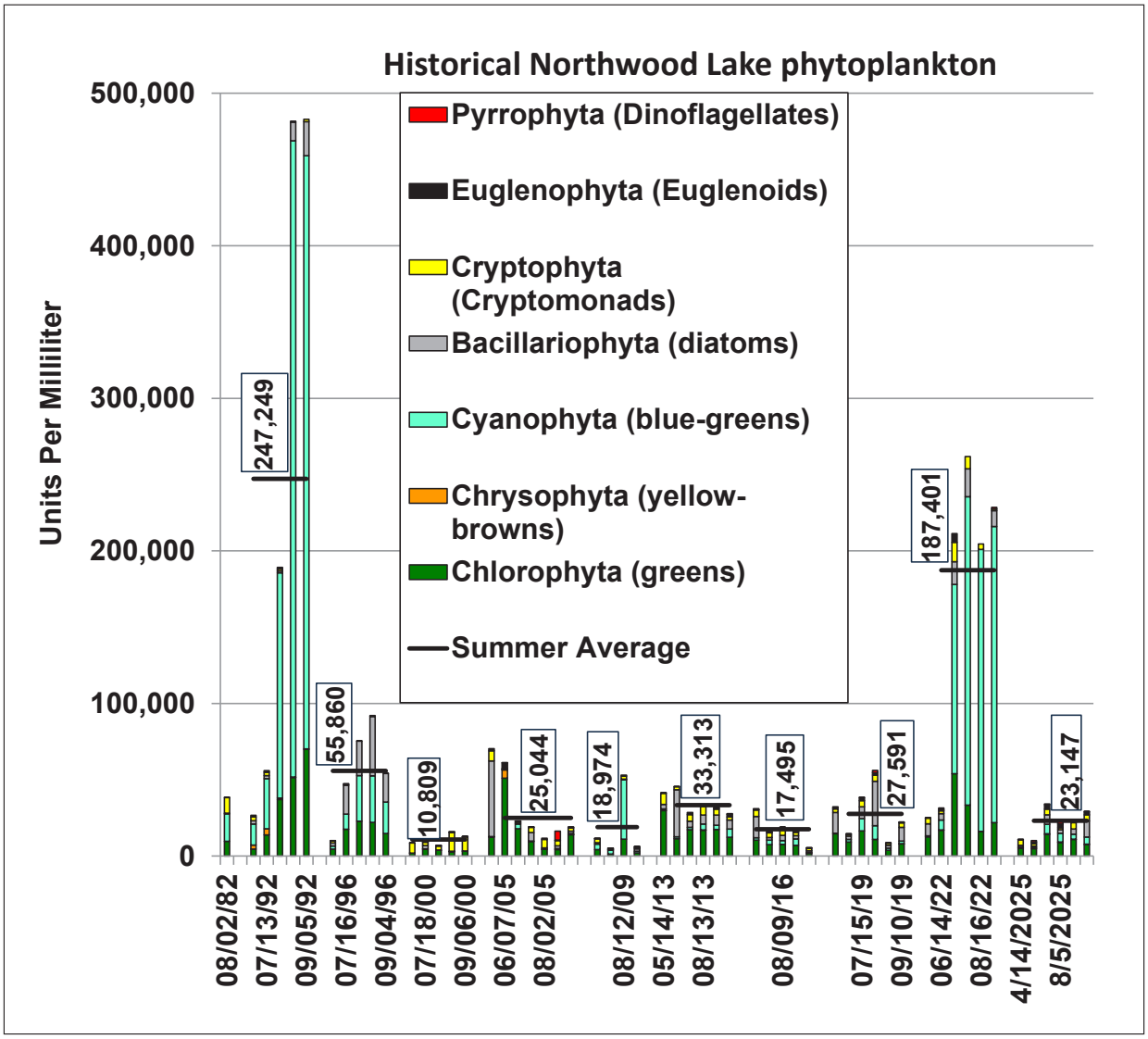


Figure 11: Historical phytoplankton

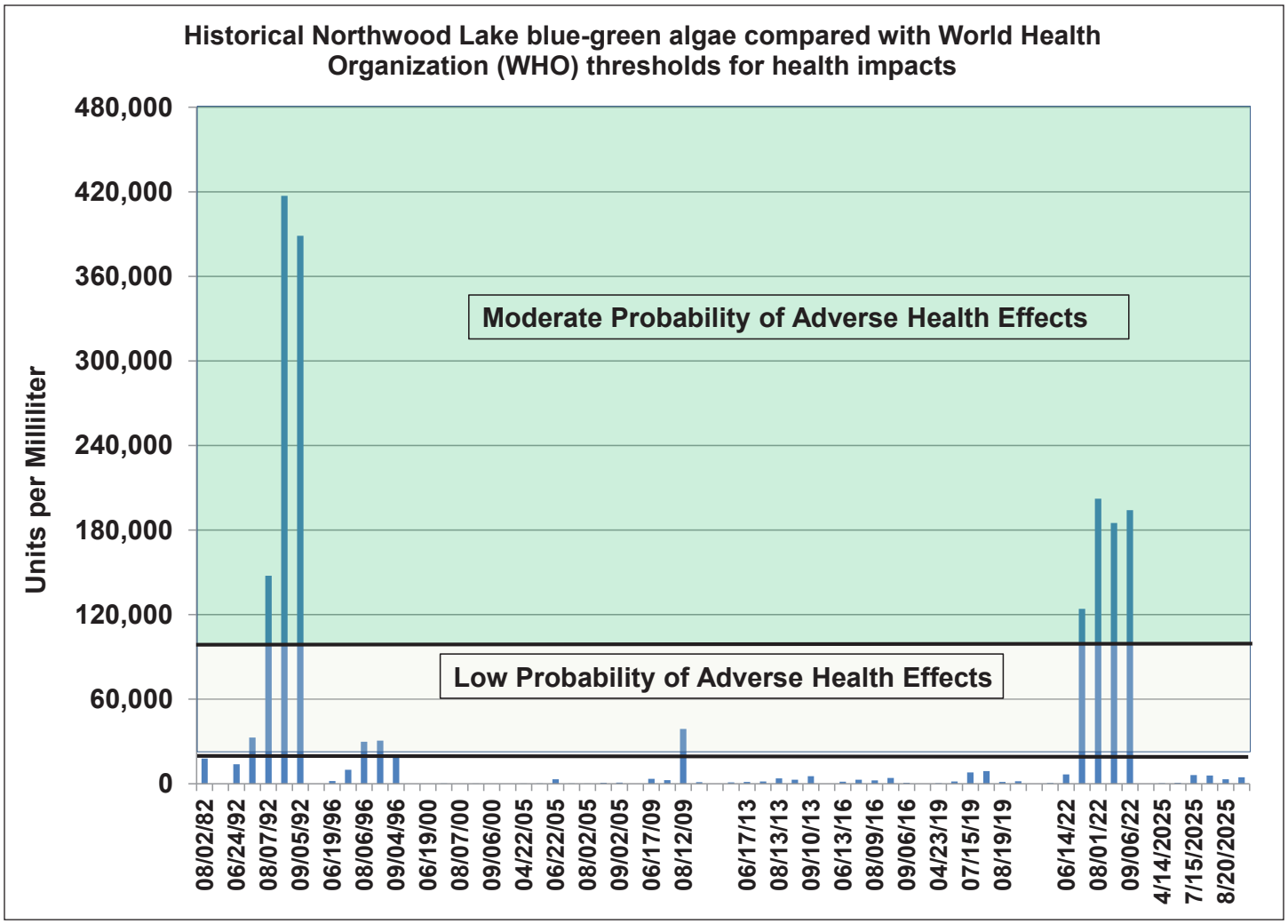


Figure 12: Historical blue-green algae compared with World Health Organization (WHO) thresholds for health impacts

Unlike phytoplankton, zooplankton do not produce their own food. As "filter feeders," they eat millions of small algae; given the right quantity and species, they can filter the volume of an entire lake in a matter of days. They are also valuable food for planktivorous fish and other organisms. Fish generally select the largest zooplankters they see and prefer cladocerans to copepods. Cladocerans swim slowly and lack the copepods' ability to escape predation by jerking or jumping out of the way.

Figure 13 summarizes the number and major zooplankton groups observed in Northwood Lake for the monitored years. Small rotifers, the least preferred food for fish, dominated the zooplankton community throughout 2025. Copepods were also prevalent, while the number of cladocerans was so low that they are not generally visible on Figure 13. The low number of cladocerans is likely due to fish predation. Low numbers of cladocerans in shallow lakes are common because they lack a deep-water refuge from fish. Deeper waters have sufficient oxygen for zooplankton but insufficient oxygen for fish. Consequently, deeper lakes often have higher numbers of cladocerans than shallow lakes. Northwood Lake's 2025 summer average zooplankton abundance was the highest recorded during the monitoring period: 3,865,167 per square meter, compared with 104,158 to 3,148,538 per square meter from 2000 through 2022.

There were more zooplankton from 2013 through 2025 than before 2013. This is likely due to the increased extent and density of aquatic plants within the lake. Aquatic plants provide hiding places for zooplankton to avoid predation by fish. Aquatic plants were not observed in Northwood Lake before 2000, and zooplankton numbers were very low. Using barley straw to inhibit algal growth and improve water clarity from 2000 to 2003 increased the extent and density of the aquatic plant community. Zooplankton numbers have also increased.

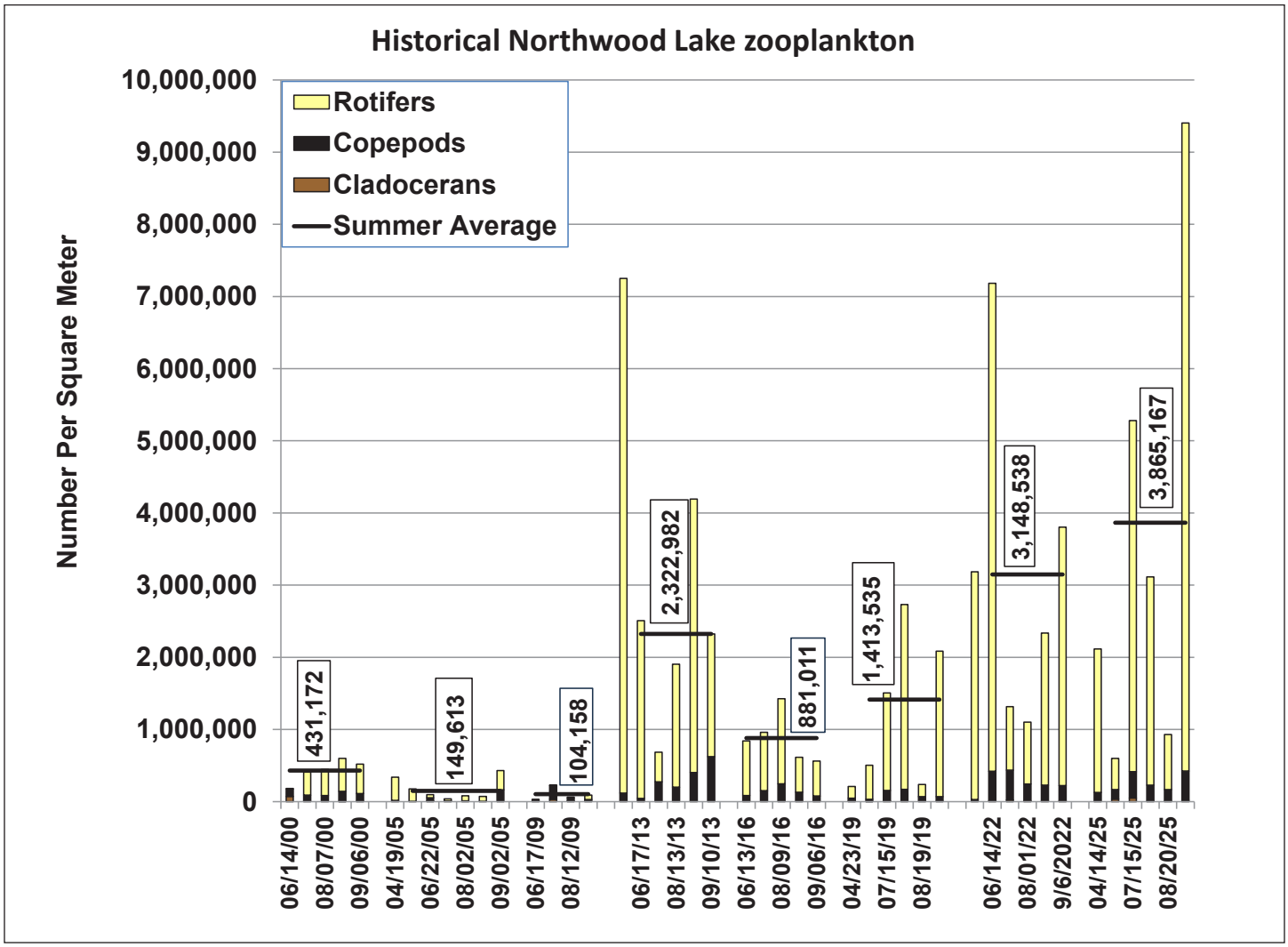


Figure 13: Historical zooplankton