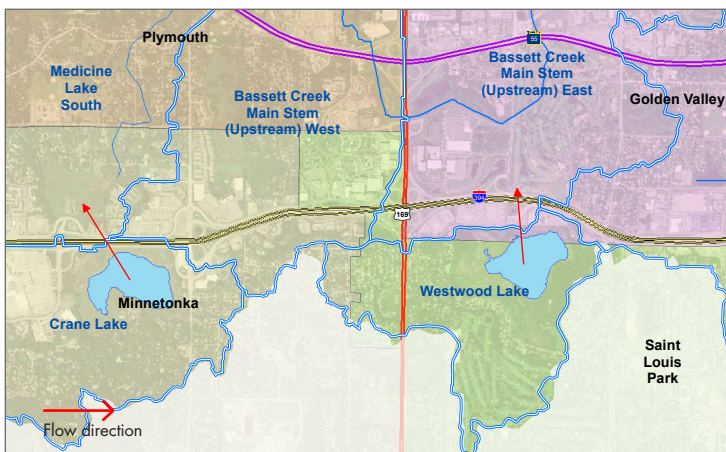
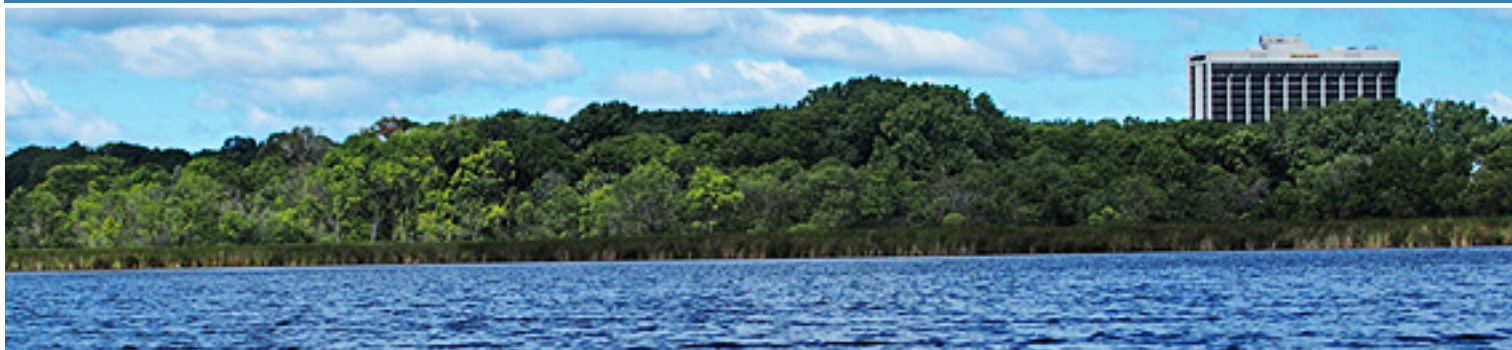




Westwood Lake 2018 water quality monitoring



Monitoring water quality in Westwood 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 done to detect changes or trends in water quality and evaluate the effectiveness of efforts to preserve or improve water quality. A summary of 2018 monitoring efforts on Westwood Lake is provided below; more comprehensive information can be found on pages 2–7.

At a glance: 2018 monitoring results

In 2018, the BCWMC monitored Westwood Lake for:

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

Results indicate that Westwood Lake meets Minnesota Pollution Control Agency (MPCA) and BCWMC water quality standards for chlorides, Secchi disc (measure of clarity), total phosphorus, and chlorophyll *a*; trend analyses show no significant changes in these parameters over the past 10 years. According to the Minnesota Department of Natural Resources (MDNR) plant IBI, a measure of aquatic plant health, the lake's plant community is relatively healthy.

Recommendations

Because current watershed management practices are adequately protecting Westwood Lake water quality from degradation, the recommendation is to make no changes. Continuation of water quality and biological monitoring at a 3-year frequency is recommended to periodically assess the condition of the lake's water quality and biological community and identify trends. Annual vegetative surveys to monitor for aquatic invasive species are also recommended.

About Westwood Lake

BCWMC classification	Priority-1 shallow lake
Watershed area	463 acres
Lake size	38 acres
Average depth	4.2 feet
Maximum depth	6 feet
Ordinary high water level	887.8 feet (NGVD29)
Normal water level	887.6 feet (NAVD88)
Downstream receiving waterbody	Main stem Bassett Creek
Location (city)	St. Louis Park
MPCA impairments	None
Aquatic invasive species	Curly-leaf pondweed, purple loosestrife, narrow-leaved cattail, reed canary grass
Public access	Yes (canoe access in park)

Note: average and maximum depths are based on actual measurements taken during the 2018 plant surveys

Water chemistry monitoring: 2018

Total phosphorus levels

While phosphorus is necessary for plant and algae growth, excessive phosphorus leads to excessive growth, decreased water clarity, and water quality impairment.

- BCWMC/MPCA standard: 60 micrograms per liter ($\mu\text{g/L}$) or less.
- Range: Total phosphorus concentrations ranged from a low of 16 $\mu\text{g/L}$ in early July to a high of 28 $\mu\text{g/L}$ in mid-July and late August.
- Summer average: 21 $\mu\text{g/L}$ (met BCWMC/MPCA standard)

Chlorophyll a levels

Chlorophyll a is a pigment in algae and generally reflects the amount of algae growth in a lake. Clear lakes generally have chlorophyll a levels less than 15 micrograms per liter ($\mu\text{g/L}$).

- BCWMC/MPCA standard: 20 $\mu\text{g/L}$ or less.
- Range: Chlorophyll a concentrations ranged from a low of 1.4 $\mu\text{g/L}$ in early May to a high of 8.0 $\mu\text{g/L}$ in late August.
- Summer average: 3.6 $\mu\text{g/L}$ (met BCWMC/MPCA standard).

Water clarity

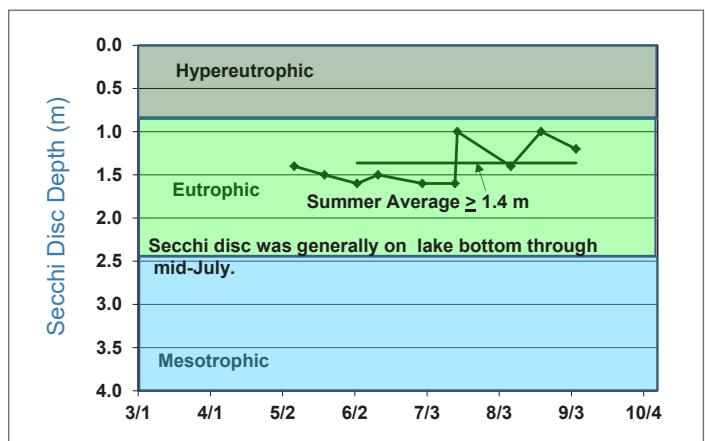
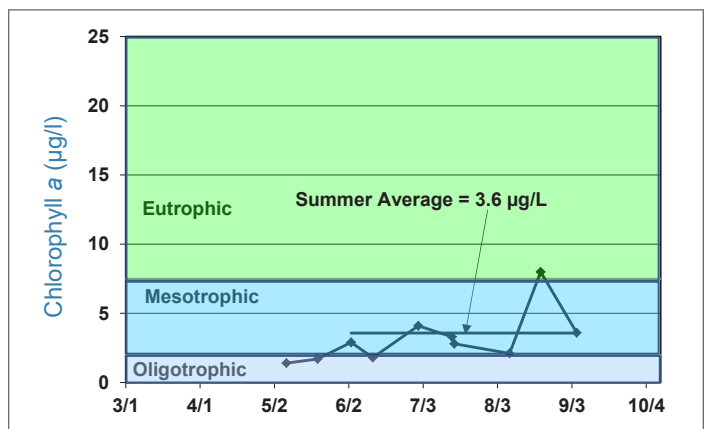
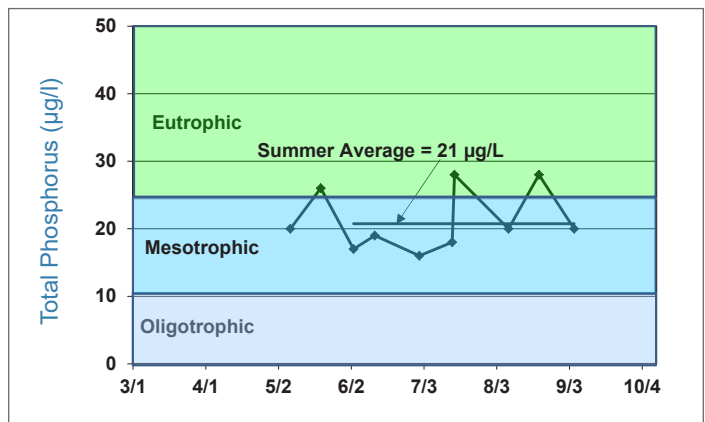
Water clarity is often affected by the amount of algae or other photosynthetic organisms in a lake. It is usually measured by lowering an 8-inch "Secchi" disc into the lake (see bottom photo); the depth at which the disc's alternating black-and-white pattern is no longer visible is considered a measure of the water's transparency.

- BCWMC/MPCA standard: 1.0 meter or more.
- Range: From approximately 1.5–1.6 meters (lake bottom) during much of the monitoring period to 1.0 meter in late summer.
- Summer average: greater than 1.4 meters (met BCWMC/MPCA standard).



Definitions

- **Hypereutrophic:** Nutrient-rich lake conditions characterized by frequent and severe algal blooms and low transparency
- **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 level of dissolved nutrients, high oxygen content, and sparse algae growth

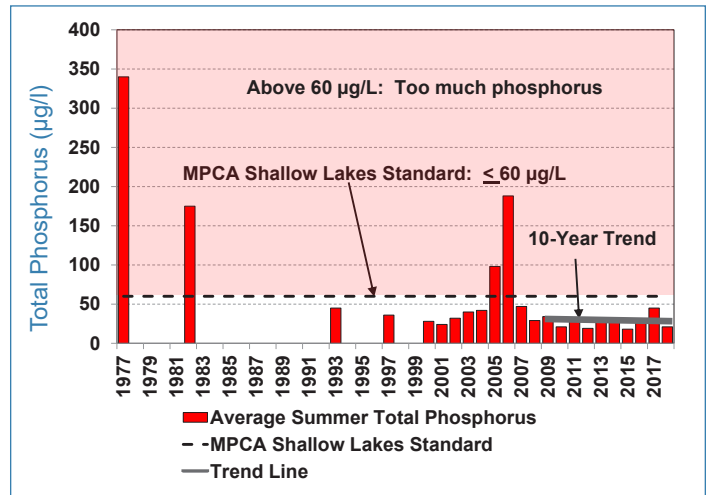


Water chemistry monitoring from 1972–2018: historical trends

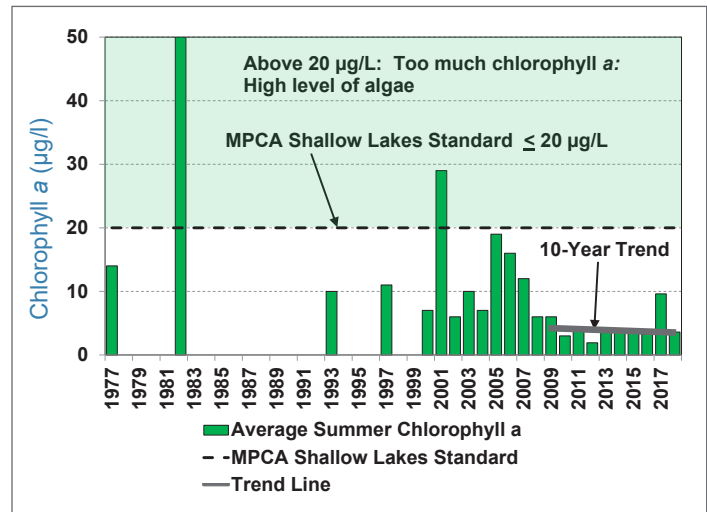
Water quality in Westwood Lake has been monitored since 1977. Data includes information collected through the Citizen Assisted Monitoring Program (CAMP). Summer averages (June through September) of total phosphorus, chlorophyll a, and Secchi disc depth from 1977–2018 are shown in the figures at right. In 1977 and 1982, these averages generally failed to meet BCWMC/MPCA standards; however, standards have generally been met since 1982. Exceptions include a high chlorophyll a value in 2001, high total phosphorus values in 2005 and 2006, and a low Secchi disc depth in 2017. Summer averages for total phosphorus, chlorophyll a, and Secchi depth met the BCWMC/MPCA standards in 2018.

In summary, although water quality appears to be improving slightly since 2009, this change is not significant. An analysis of changes in summer average total phosphorus, chlorophyll a concentrations, and Secchi disc depth over the last 10 years were not statistically significant (95-percent confidence level).

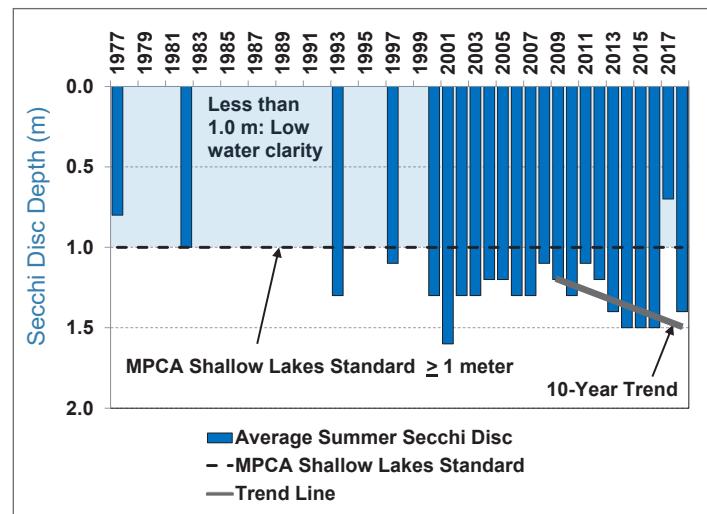
Total phosphorus trends



Chlorophyll a trends



Water clarity trends



Macrophytes (aquatic plants)

Lake Plant Eutrophication Index of Biological Integrity (IBI)

The MDNR recently developed metrics to determine the overall health of a lake's aquatic plant community. The Lake Plant Eutrophication Index of Biological Integrity (IBI) is used by the MPCA to determine whether a lake is meeting the federal Clean Water Act standards intended to protect aquatic life. The plant 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).

Plant survey data from 1993 through 2018 were assessed to determine plant IBI trends. Trends show an improvement in the plant community that is likely a result of the trend toward improving water quality. The figures at right show the Westwood Lake number of species and FQI scores for that period compared to the MDNR plant IBI impairment threshold.

- Number of species:** A shallow lake is considered impaired when it has fewer than 11 species. During the period examined, the number of species in Westwood Lake ranged from 5 to 14, exceeding the impairment threshold in 2015 and 2018.
- FQI values (quality of species):** The impairment threshold for shallow lakes, as measured by FQI, is a minimum value of 17.8. During the period examined, FQI values ranged from 9.8 to 19.1, exceeding the threshold during August of 2015 and June and August of 2018.
- 2018 results:** Both the number of species in the lake and FQI values exceeded the minimum IBI thresholds that define impairment. As such, the waters are not currently considered impaired for aquatic plants. 2018 was the first year since monitoring began that the number of species and FQI values exceeded the minimum IBI thresholds during both June and August.

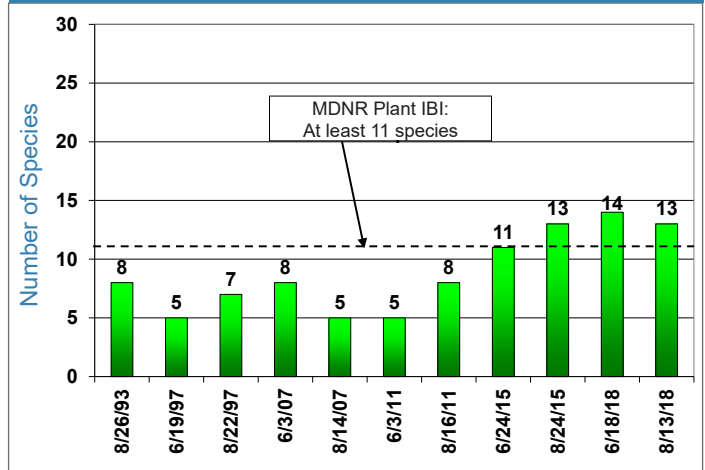


Species richness

<11 species: considered impaired

14 and 13: number of species in Westwood Lake in June and August 2018

Outcome: lake is not impaired and meets standards

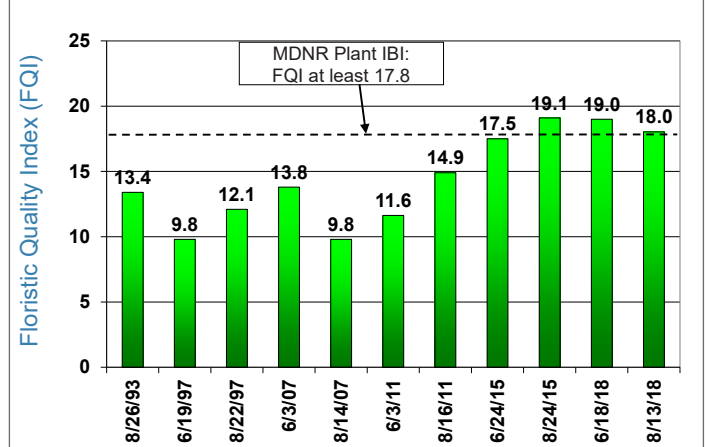


Species quality (FQI values)

17.8: impairment threshold

19.0 and 18.0: Westwood Lake values, June and August 2018

Outcome: lake is not impaired and meets standards



Bearded stonewort in Westwood Lake

In 2015, *Lychnothamnus barbatus* (bearded stonewort), was first observed in Westwood Lake (and in Minnesota). Bearded stonewort is in the family *Characeae*, an algae that resembles rooted aquatic plants. This species was not seen in North America until 2012 and few populations have been documented in the world. Bearded stonewort obtains all of its nutrients from the water. This nutrient absorber can reduce phosphorus concentrations and improve water quality.

Displacing another species in the *Characeae* family, *Chara contraria* (fetid stonewort), bearded stonewort expanded its extent by approximately an order of magnitude from 2015–2018 and was observed at 34 percent of sample locations in August of 2018. In 2018, giant canopied mats of bearded stonewort were observed in the north half of the lake and satellite clusters in the southern half. Because bearded stonewort obtains all of its nutrients from the water, the dense growth in Westwood Lake is helping improve water quality in the lake.



Bearded stonewort

Aquatic invasive species

In 2018, four aquatic invasive species (AIS) were known to be present in Westwood Lake, although no species was considered problematic.

- **Curly-leaf pondweed (*Potamogeton crispus*):** Though prevalent, the curly-leaf pondweed coexisted with native plants at relatively low densities.
- **Purple loosestrife (*Lythrum salicaria*):** This emergent species was found in one location along the north central shoreline and three locations at the northwestern corner of the lake. It was found in six similar locations in August 2015. Galerucella beetles were present in 2015, causing heavy damage to the purple loosestrife plants and managing the infestation. In 2018, Galerucella beetles were again present and by August had killed most of the purple loosestrife plants in the lake.
- **Narrow-leaved cattail (*Typha angustifolia*):** Narrow-leaved cattail was observed at five locations along the north shoreline. It was observed in similar locations in 2015.
- **Reed canary grass (*Phalaris arundinacea*):** Reed canary grass was found for the first time since aquatic plant monitoring began in 1993. It was found at three locations along the north shoreline in June, but was only observed at one location in August.

Suitability of Westwood Lake for AIS

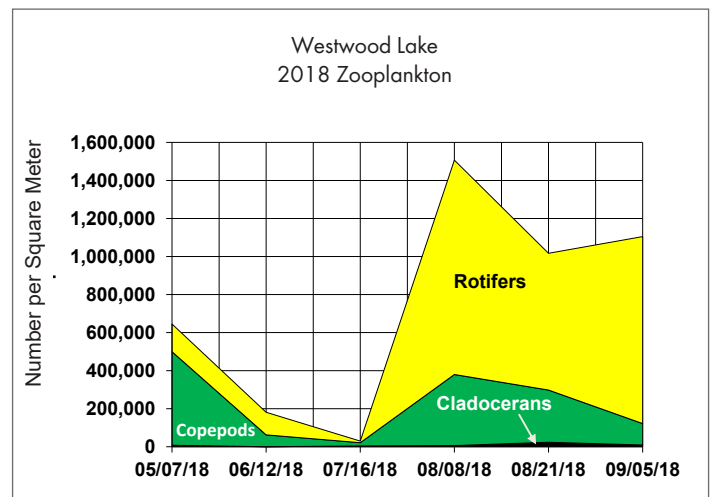
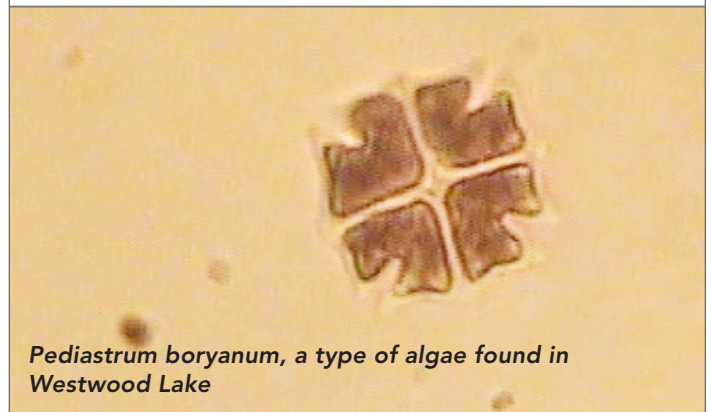
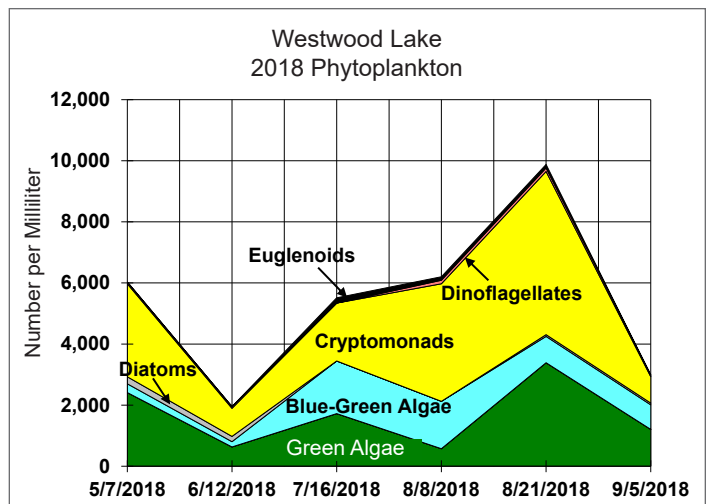
A large number of AIS residing in Minnesota have not, yet, been observed in Westwood Lake, but could be introduced. For example, both zebra mussels and stary stonewort were recently found in nearby Medicine Lake. To determine whether Westwood Lake water quality would support the introduction of six AIS—stary stonewort, zebra mussels, spiny waterflea, faucet snail, Chinese mystery snail, and rusty crayfish—a suitability analysis for each species was performed.

The analyses compared 2018 lake water quality with the water quality conditions required for each species, specifically evaluating total phosphorus, chlorophyll *a*, Secchi disc depth, trophic state index (TSI), water temperature, dissolved oxygen, specific conductance, calcium, magnesium, sodium, alkalinity, hardness, and calcium carbonate. The results indicate the water quality of Westwood Lake meets the suitability requirements for two of the species: rusty crayfish and faucet snail. These species would likely thrive if introduced to the lake. The lake partially meets the suitability requirements of the Chinese mystery snail, zebra mussels, spiny waterflea, and stary stonewort. If these species were introduced to the lake, they would likely survive, but may not thrive.

Phytoplankton and zooplankton

Samples of phytoplankton, microscopic aquatic plants, were collected from Westwood Lake to evaluate water quality and the quality of food available to zooplankton (microscopic animals). Phytoplankton numbers followed a pattern similar to chlorophyll *a*, both reflecting good water quality. These numbers increased between June and August, then decreased in September, as shown in the upper-right figure. Cryptomonads and green algae, good sources of food for the lake's zooplankton, were dominant throughout the summer. Blue-green algae, which are associated with water quality problems and can be a source of health concerns, were present in very low numbers.

The composition of the 2018 zooplankton community was consistent with recent years. All three groups of zooplankton (rotifers, copepods, and cladocerans) were represented (see figure at bottom right). Small rotifers and copepods have generally dominated the community. Because these species do not graze as heavily on algae as the larger cladocerans, they generally have limited impact on the lake's water quality. This suggests that future Westwood Lake water quality efforts should focus on phosphorus management to reduce the nutrients that contribute to algae growth.





Increased use of chloride for road maintenance has had an impact on chloride levels in Twin Cities metro area lakes.

Chloride levels in 2018

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 melts, the salt goes with it, washing into lakes, streams, wetlands, and groundwater. It only takes 1 teaspoon of road salt to permanently pollute 5 gallons of water. And, once in the water, there is no way to remove chloride.

Because high concentrations of chloride can harm fish and plant life, the MPCA has established a chronic exposure chloride standard of 230 mg/L or less.

- **Range of chloride concentrations in Westwood Lake:** From a high of 79 mg/L, measured in September, to a low of 57 mg/L, measured in May
- **Average concentration:** 72 mg/L (meets MPCA standard)



A Thank You to Our Volunteers

Each year volunteers from across the watershed participate in the Citizen Assisted Monitoring Program (CAMP) coordinated and funded by the Metropolitan Council with assistance and additional funding from the BCWMC. These volunteers spend hours on their lakes collecting water samples and data that augment data collected through BCWMC routine monitoring. Their work is an important piece of the overall BCWMC monitoring program and their time and dedication are greatly appreciated!

Bassett Creek Watershed Management Commission
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Cleaner, healthier water for a growing community

