Krohns Lake (94700) Monitoring Summary

Krohns Lake, Kewaunee County, WI
2023

This report describes the results of 2023 monitoring of West Alaska Lake in Kewaunee County, WI. As part of the DNR Directed Lakes Monitoring Program, multiple sampling techniques were completed to determine overall lake health. This included an aquatic plant survey conducted on July 13, 2023. This was complemented with three monthly chemistry sampling events. This report details the plant survey and water chemistry results. Additional information about the lake can be found on the DNR webpage: Wisconsin Lakes.

Water Chemistry

Krohns Lake is a 19-acre lake in Kewaunee County, with a maximum depth of 38 feet. It is a spring lake and considered mesotrophic. Mesotrophic lakes are characterized by moderately clear water but have an increasing chance of low dissolved oxygen in deep water during the summer. Three water chemistry samples were taken on the lake during summer 2023. Parameters measured include total phosphorus, chlorophyll-a, water clarity, temperature, and dissolved oxygen. An addition, the August sample included extra parameters for analysis: chloride, color, alkalinity, calcium, magnesium, hardness, total nitrogen, and NO_3+NO_2.

A trophic state index (TSI) is calculated for Secchi depth, total phosphorus, and chlorophyll-a. This provides a measure of the lake's trophic state or the amount of nutrients available and allows for comparison across the three parameters. As shown below in Table 1, TSI values are roughly similar for the three parameters, with TSI (Secchi) the highest. TSI values between 40-50 indicate a lake with moderate water clarity but with a chance of low dissolved oxygen during the summer, which is expected for a mesotrophic lake. Comparing the 2023 samples with samples from 2016, TSI values are very similar, with a slight increase in the TSI for TP. The 2023 mean data closely follows the 10-year average for Secchi depth, chlorophyll-a, and total phosphorus.

Table 1. Monthly sample results for Secchi depth, chlorophyll-a, and total phosphorus, including the 2023 mean and 10-year average for these parameters as well as the trophic state index for 2016 and 2023.

Date	Secchi depth (ft)	Chl-a (ug/L)	TP (ug/L)
7/25/2023	8.3	2.56	10.8
8/15/2023	8.0	5.31	12.4
9/5/2023	6.7	3.21	12.3
Mean	**7.7**	**3.69**	**11.8**
TSI (2023)	**48.4**	**44.2**	**47.2**
TSI (2016)	**49.4**	**43.9**	**49.7**
10-year average	**7.8**	**3.3**	**13.0**

Table 2. Summary of additional water chemistry parameters sampled on August 15, 2023.

Parameter		
Chloride	19.4	mg/L
Color	20	SU
Conductivity	519	uS/cm
pH	8.63	SU
Alkalinity	243	mg/L
Calcium	47.0	mg/L
Magnesium	39.3	mg/L
Hardness	279	mg/L
NO3+NO2	1.58	mg/L
Total nitrogen	2.18	mg/L
Dissolved organic carbon	8.51	ppm C

Aquatic Plant Point Intercept Survey

Based on area and depth specific to Krohns Lake, we mapped a 94-point sampling grid over the entire lake surface. Using a GPS, we navigated by boat to each of the grid points. At each point we used a two-sided rake to sample approximately 1 foot along the bottom. After pulling the plants to the surface, the overall rake was assigned a fullness rating of 0, 1, 2, or 3 to estimate the density of plant growth. Each species identified on the rake is also assigned a fullness rating. Visual sightings of a species within six feet of the sample point are recorded, as well as any additional species seen in the lake during a general boat survey. For more detailed information on the point-intercept sampling method and how data were collected, please visit: http://www.uwsp.edu/cnr-ap/UWEXLakes/Documents/ecology/Aquatic%20Plants/PI-Protocol-2010.pdf

Species frequency of occurrence reflect the percentage of times a species was found out of the total number of points sampled. Littoral frequency of occurrence (reported in Table 3) indicates how often a species was found considering only areas of the lake that are capable of supporting plant growth (known as the "littoral area"). The maximum depth of plant growth is the deepest depth at which plants were found in the lake. Species richness is a count of the total number of different plant species found in a lake. The Floristic Quality Index (FQI) is a metric that evaluates the closeness of the flora in a lake to that of an undisturbed condition. The higher an FQI value, the closer that plant community is to an undisturbed ecosystem. Statewide and ecoregion averages are calculated from a subset of over 1,000 lakes across Wisconsin. For additional data on aquatic plant surveys including maps, species specific distributions, and previous surveys, visit Aquatic Plant Explorer.

Table 3. Species Present
% Frequency of Occurrence (Littoral): This estimate of frequency of occurrence is calculated by taking the total number of times a species is detected in a lake divided by the total number of points in a lake at which the growth of plants is possible.

Common Name	Scientific Name	Growth Form (Floating, free floating, submerged, emergent)	% Frequency of Occurrence
Eurasian water-milfoil	*Myriophyllum spicatum*	Submerged	19.35
Coontail	*Ceratophyllum demersum*	Submerged	3.23
Muskgrasses	*Chara spp.*	Submerged	83.87
Slender naiad	*Najas flexilis*	Submerged	12.9
Spatterdock	*Nuphar variegata*	Floating	9.68
White water lily	*Nymphaea odorata*	Floating	3.23
Cattail	*Typha spp.*	Emergent	Visual

Table 4. Overall survey summary statistics for Krohns Lake.

	Krohns Lake 2016	Krohns Lake 2023	Statewide Average	SWTP Ecoregion Average
Littoral Frequency of Occurrence (%)	87.5%	81.6%	63%	66%
Maximum Depth of Plant Growth (ft)	20.0	21.0	13.4	13.1
Species Richness	8	7	19.8	15
Floristic Quality Index (FQI)	14.4	12.5	25.7	18.5

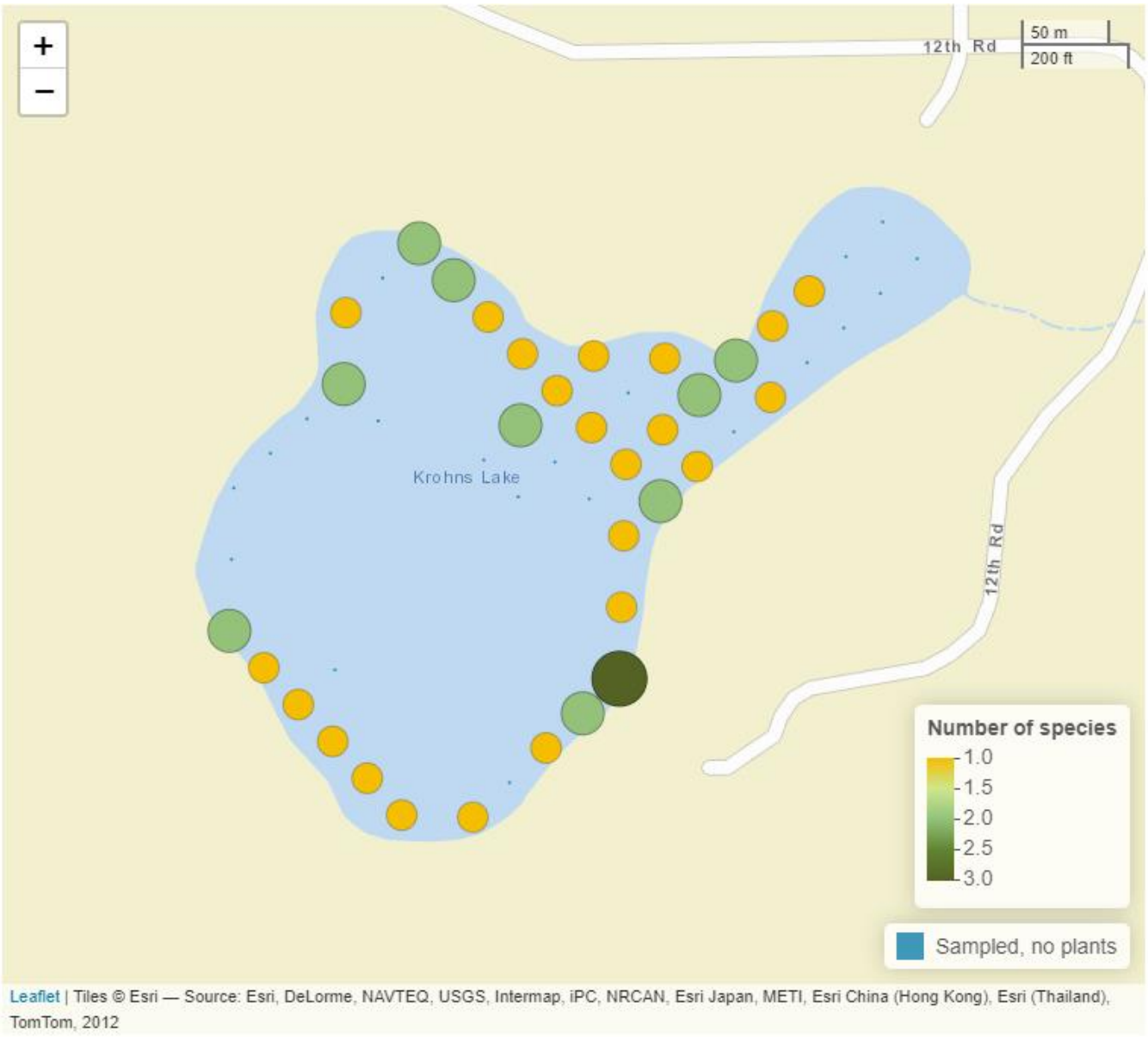

Figure 1. Species richness at all locations surveyed on Krohns Lake in 2023.

Plant Survey Results

Based on the 2023 aquatic plant survey data, Krohns Lake has a lower quality plant community than the statewide and ecoregion averages. Both the species richness and FQI scores were well below average in 2016 and 2023, with a slight decrease in 2023 from the 2016 survey. This is reflected in the few species found within Krohns Lake, with a plant community comprised mostly of muskgrasses (*Chara spp.*), Eurasian watermilfoil (*Myriophyllum spicatum*), and slender naiad (*Najas flexilis*). The low FQI score indicates that the species present are not tolerant to harsh conditions and do not contain any high quality or rare species. An FQI below 19 indicates a low-quality plant community, and Krohns Lake had an FQI of 12.5, well below the metric for a plant community in good condition. Plant growth in the littoral areas were higher in Krohns Lake than the statewide average, around 82% of the littoral zone had plant growth. This is consistent with the 2016 survey, though slightly lower. The deep bathymetry of the lake restricts plant growth to the shallower shoreline areas, and combined with water quality and clarity characteristics, may limit a diverse plant community from establishing. Continued aquatic plant monitoring in the future is recommended to maintain the long-term record and assess the plant community for any changes.