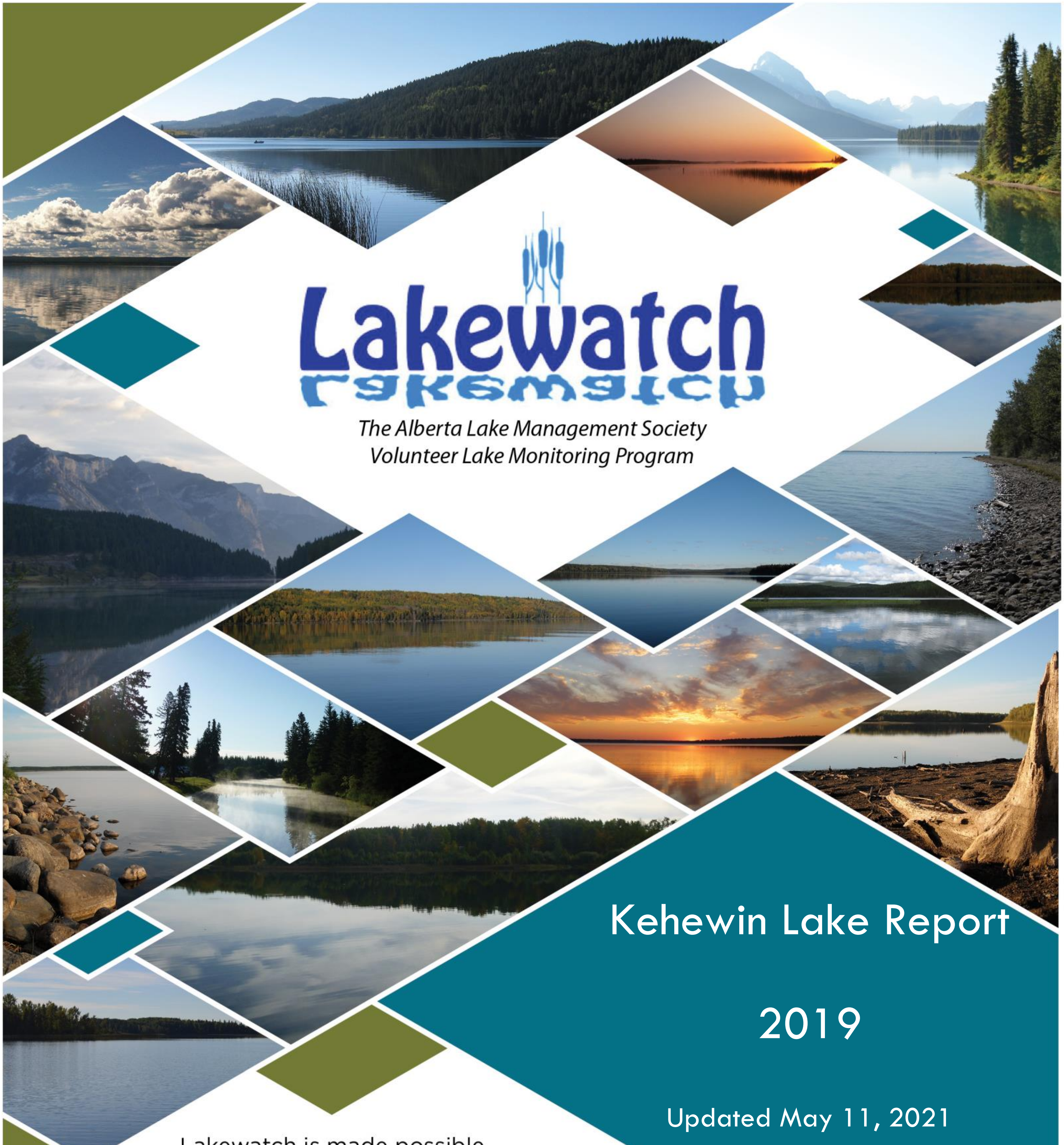

Lakewatch

The Alberta Lake Management Society
Volunteer Lake Monitoring Program

Kehewin Lake Report

2019

Updated May 11, 2021

Lakewatch is made possible with support from:

Alberta Environment and Parks

Pigeon Lake Watershed Association

Lacombe County

LICA Environmental Stewards

ALBERTA LAKE MANAGEMENT SOCIETY'S LAKEWATCH PROGRAM

LakeWatch has several important objectives, one of which is to collect and interpret water quality data from Alberta's Lakes. Equally important is educating lake users about aquatic environments, encouraging public involvement in lake management, and facilitating cooperation and partnerships between government, industry, the scientific community and lake users. LakeWatch reports are designed to summarize basic lake data in understandable terms for the widest audience, and are not meant to be a complete synopsis of information about specific lakes. Additional information is available for many lakes that have been included in LakeWatch, and readers requiring more information are encouraged to seek those sources.

ALMS would like to thank all who express interest in Alberta's aquatic environments, and particularly those who have participated in the LakeWatch program. These leaders in stewardship give us hope that our water resources will not be the limiting factor in the health of our environment.

If you require data from this report, please contact ALMS for the raw data files.

ACKNOWLEDGEMENTS

The LakeWatch program is made possible through the dedication of its volunteers. A special thank you to Paul Kip for his time sampling Kehewin Lake. We would also like to thank Sarah Davis Cornet, Caleb Sinn, and Pat Heney, who were summer technicians in 2019. Executive Director Bradley Peter and Program Coordinator Caitlin Mader were instrumental in planning and organizing the field program. This report was prepared by Pat Heney, Bradley Peter, and Caleb Sinn.

KEHEWIN LAKE

Kehewin Lake is a long, beautiful lake located on Highway 41 about 15 km north of Elk Point. The lake is surrounded by rolling pasture and hay lands. Kehewin Lake has two recreational and camping facilities: one located on the southeast shore just off Highway 41, and the other located on the southwest shore. Kehewin Lake is named after the Indian Chief who signed treaty No.6 for The Kehewin Indian Reserve No.123 in 1876[1]. The Kehewin Indian Reserve is 8212.2 ha and sits on the northeast end of the lake, with 863 residents of 1,581 members in October 2002. The reserve is in the county of Bonnyville, but most of the lake is within the County of St. Paul.

Kehewin Lake. Photo by Caleb Sinn, 2019.

Kehewin Lake is very shallow in the northwest and south portions. The lake is situated within the Beaver River drainage basin, in the westernmost part of the Churchill River system. The outflow of Kehewin Lake drains into Bangs Lake to the north via Kehewin Creek, then joins with Yelling Creek and flows into Thin Lake, finally draining into Moose Lake via Thin Lake River.

Agriculture in Kehewin's drainage basin is limited to pasture and hay fields. The drainage basin overlies geological formations that are rich in heavy oils, thus oil extraction is common in the area. Kehewin Lake lies in a large melt-water channel predominated by glacial till and alluvial deposits[1]. It is surrounded by rough, broken land with steep slopes dominated by aspen (*Populus* spp.*)*. Extensive marshes on the north and south ends of the lake provide excellent habitat for waterfowl.

Marsh vegetation includes reed grass (*Calamagrostis* spp.), bulrush (*Scirpus* spp.), sedge (*Carex* spp.), cattail (*Typha latifolia),* and arrowhead (*Sagittaria cuneata).* Common submerged and floating aquatic plants include water smartweed (*Polygomum natans),* coontail (*Ceratophyllum demersum*), Richardson's pondweed (*Potamogeton richardsonii*), northern watermilfoil (*Myriophyllum sibricum*), sago pondweed (*Potamogeton pectinatus*), large-sheath pondweed (*Potamogeton vaginatus*), and duckweed (*Lemna* spp.)[1]. Little is known about the phytoplankton community composition, though dense blue-green algal blooms have occurred in the past.

As a popular sport fishing lake, Kehewin is noted for its large northern pike. Also present are yellow perch (*Perca flavescens*), walleye (*Sander vitreus*), cisco (*Coregonus artedi),* burbot (*Lota lota*), and white suckers (*Catostomus commersonii*). Commercial and domestic fishing has been active in the last decade, and commercial fishing has been recorded as far back as 1945[1].

[1] Mitchell, P. and E. Prepas. 1990. Atlas of Alberta Lakes, University of Alberta Press. Retrieved from http://sunsite.ualberta.ca/projects/alberta-lakes/

METHODS

Profiles: Profile data is measured at the deepest spot in the main basin of the lake. At the profile site, temperature, dissolved oxygen, pH, conductivity and redox potential are measured at 0.5 – 1.0 m intervals. Additionally, Secchi depth is measured at the profile site and used to calculate the euphotic zone. For select lakes, metals are collected at the profile site by hand grab from the surface on one visit over the season.

Composite samples: At 10-sites across the lake, water is collected from the euphotic zone and combined across sites into one composite sample. This water is collected for analysis of water chemistry, chlorophyll-a, nutrients and microcystin. Quality control (QC) data for total phosphorus was taken as a duplicate true split on one sampling date. ALMS uses the following accredited labs for analysis: Routine water chemistry and nutrients are analyzed by Maxxam Analytics, chlorophyll-*a* and metals are analyzed by Innotech Alberta, and microcystin is analyzed by the Alberta Centre for Toxicology (ACTF).

Invasive Species: : Invasive mussel monitoring involved sampling with a 63 µm plankton net at three sample sites twice through the summer season to determine the presence of juvenile dreissenid mussel veligers. Technicians also harvested potential Eurasian watermilfoil (*Myriophyllum spicatum)* samples and submitted them for further analysis at the Alberta Plant Health Lab to genetically differentiate whether the sample was the invasive Eurasian watermilfoil or a native watermilfoil. In addition, select lakes were subject to a bioblitz, where a concerted effort to sample the lake's aquatic plant diversity took place.

Data Storage and Analysis: Data is stored in the Water Data System (WDS), a module of the Environmental Management System (EMS) run by Alberta Environment and Parks (AEP). Data goes through a complete validation process by ALMS and AEP. Users should use caution when comparing historical data, as sampling and laboratory techniques have changed over time (e.g. detection limits). For more information on data storage, see AEP Surface Water Quality Data Reports at www.alberta.ca/surface-water-quality-data.aspx.

Data analysis is done using the program R.[1] Data is reconfigured using packages tidyr [2] and dplyr [3] and figures are produced using the package ggplot2 [4]. Trophic status for each lake is classified based on lake water characteristics using values from Nurnberg (1996)[5]. The Canadian Council for Ministers of the Environment (CCME) guidelines for the Protection of Aquatic Life are used to compare heavy metals and dissolved oxygen measurements. Pearson's Correlation tests are used to examine relationships between total phosphorus (TP), chlorophyll-*a,* total kjeldahl nitrogen (TKN) and Secchi depth, providing a correlation coefficient (r) to show the strength (0-1) and a p-value to assess significance of the relationship.

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[1] R Core Team (2016). R: A language and environment for statistical computing. R Foundation for Statistical Computing, Vienna, Austria. URL https://www.R-project.org/.

[2] Wickman, H. and Henry, L. (2017). tidyr: Easily Tidy Data with 'spread ( )' and 'gather ( )' Functions. R package version 0.7.2. https://CRAN.R-project.org/package=tidyr.

[3] Wickman, H., Francois, R., Henry, L. and Muller, K. (2017). dplyr: A Grammar of Data Manipulation. R package version 0.7.4. http://CRAN.R-project.org/package=dplyr.

[4] Wickham, H. (2009). ggplot2: Elegant Graphics for Data Analysis. Springer-Verlag New York.

[5] Nurnberg, G.K. (1996). Trophic state of clear and colored, soft- and hardwater lakes with special consideration of nutrients, anoxia, phytoplankton and fish. Lake and Reservoir Management 12: 432-447.

BEFORE READING THIS REPORT, CHECK OUT A BRIEF INTRODUCTION TO LIMNOLOGY AT ALMS.CA/REPORTS

WATER CHEMISTRY

ALMS measures a suite of water chemistry parameters. Phosphorus, nitrogen, and chlorophyll-a are important because they are indicators of eutrophication, or excess nutrients, which can lead to harmful algal/cyanobacteria blooms. One direct measure of harmful cyanobacteria blooms are Microcystins, a common group of toxins produced by cyanobacteria. See Table 2 for a complete list of parameters.

The average total phosphorus (TP) concentration for Kehewin Lake was 98 µg/L (Table 2), falling into the hypereutrophic, or very high productivity trophic classification. This value falls at the low end of historical averages. Detected TP was fairly consistent throughout the season aside from June, ranging from a minimum of 40 µg/L on July 23 to a maximum of 130 µg/L on September 11 (Figure 1).

Average chlorophyll-*a* concentration in 2019 was 67.2 µg/L (Table 2), falling into the hypereutrophic, or very high productivity trophic classification. Chlorophyll-*a* was lowest earliest in the season, at 27.3 µg/L on July 23 and peaked to 109 µg/L on September 25.

Finally, the average TKN concentration was 1.6 mg/L (Table 2) with the highest concentration observed on August 20 at 1.9 mg/L, and lowest on the first sampling period, July 23 at 1.2 mg/L.

Average pH was measured as 8.92 in 2019, buffered by moderate alkalinity (225 mg/L $CaCO_3$) and bicarbonate (235 mg/L HCO_3). Aside from bicarbonate, magnesium and sodium were the dominant ions contributing to a moderate conductivity of 525 µS/cm (Table 2).

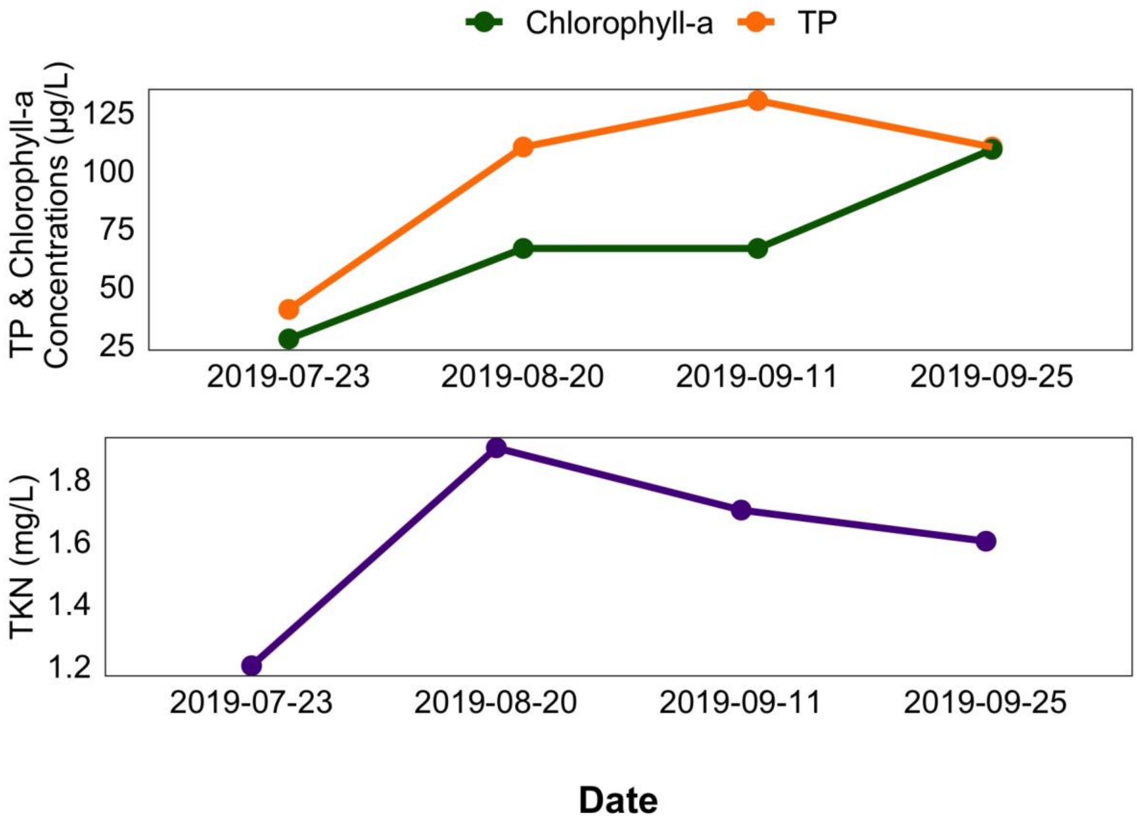


Figure 1. Total Phosphorus (TP), Total Kjeldahl Nitrogen (TKN), and Chlorophyll-*a* concentrations measured four times over the course of the summer at Kehewin Lake, 2019.

METALS

Samples were analyzed for metals once throughout the summer (Table 3). In total, 27 metals were sampled for. It should be noted that many metals are naturally present in aquatic environments due to the weathering of rocks and may only become toxic at higher levels.

Metals were measured once at Kehewin Lake and all measured values fell within their respective guidelines (Table 3).

WATER CLARITY AND SECCHI DEPTH

Water clarity is influenced by suspended materials, both living and dead, as well as dissolved colored compounds in the water column. During the melting of snow and ice in spring, lake water can become turbid (cloudy) from silt transported into the lake. Lake water usually clears in late spring but then becomes more turbid with increased algal growth as the summer progresses. The easiest and most widely used measure of lake water clarity is the Secchi depth. Two times the Secchi depth equals the euphotic depth – the depth to which there is enough light for photosynthesis.

The average Secchi depth of Kehewin Lake in 2019 was 1.18 m (Table 2). Secchi depth varied little over the season, from a maximum of 1.30 m in August, to a minimum of 0.90 m on September 25 (Figure 2).

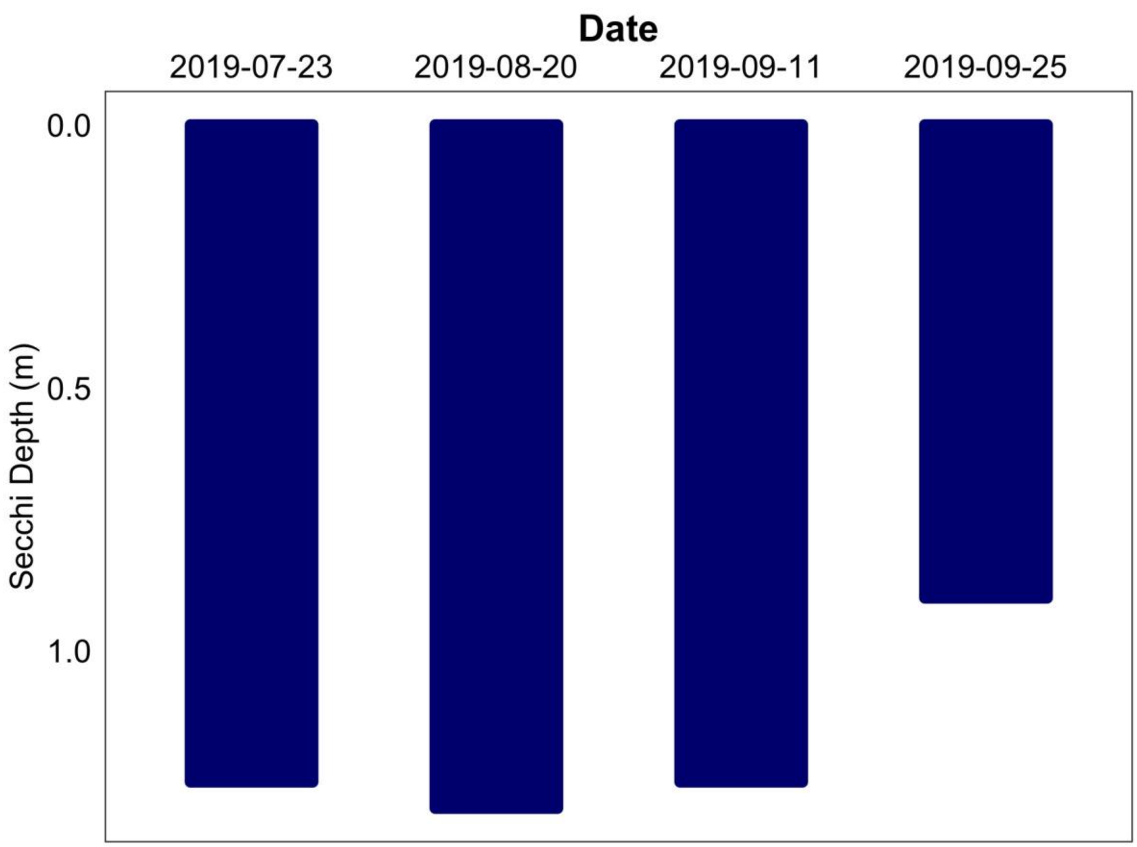


Figure 2. Secchi depth values measured four times over the course of the summer at Kehewin Lake in 2019.

WATER TEMPERATURE AND DISSOLVED OXYGEN

Water temperature and dissolved oxygen (DO) profiles in the water column can provide information on water quality and fish habitat. The depth of the thermocline is important in determining the depth to which dissolved oxygen from the surface can be mixed. Please refer to the end of this report for descriptions of technical terms.

Temperatures of Kehewin Lake varied throughout the summer, with a minimum temperature of 14.1 °C at 12m on July 23, and a maximum temperature of 23.9 °C measured at the surface on July 23 (Figure 3a). The lake was not stratified during any of the sampling trips other than in July, with temperatures fairly constant from top to bottom, which indicates complete mixing throughout most of the season.

Kehewin Lake was well oxygenated throughout the water column on September sampling dates, measuring above the CCME guidelines of 6.5 mg/L dissolved oxygen (Figure 3b). On July 23 and August 20, oxygen levels decreased to below these guidelines around 2-5 meters, likely due to decomposition of organic matter in the sediment. In addition, the thermal stratification of the water column on July 23 likely limits the amount of surface dissolved oxygen able to mix into deeper waters.

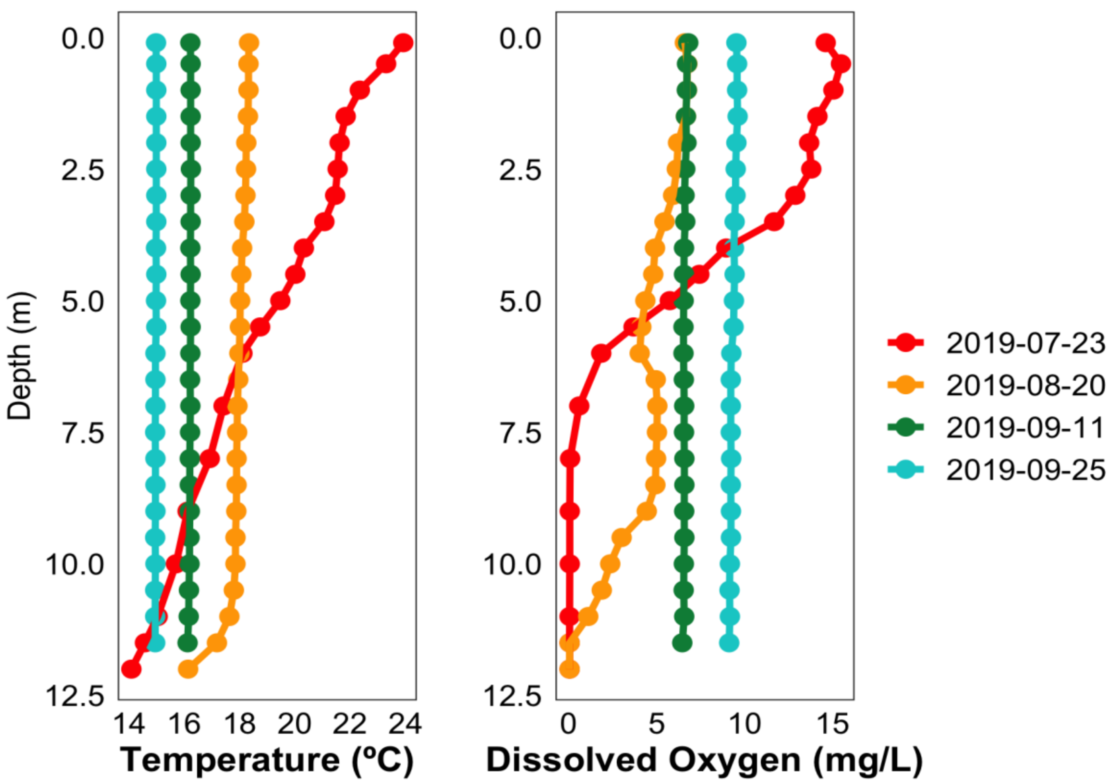


Figure 3. a) Temperature (°C) and b) dissolved oxygen (mg/L) profiles for Kehewin Lake measured four times over the course of the summer of 2019.

MICROCYSTIN

Microcystins are toxins produced by cyanobacteria (blue-green algae) which, when ingested, can cause severe liver damage. Microcystins are produced by many species of cyanobacteria which are common to Alberta's Lakes, and are thought to be the one of the most common cyanobacteria toxins. In Alberta, recreational guidelines for microcystin are set at 20 µg/L. Blue-green algae advisories are managed by Alberta Health Services. Recreating in algal blooms, even if microcystin concentrations are not above guidelines, is not recommended.

Microcystin levels in Kehewin Lake fell below the recreational guideline of 20 µg/L in 2019.

Table 1. Microcystin concentrations measured four times at Kehewin Lake in 2019.

Date	Microcystin Concentration (µg/L)
23-Jul-19	0.26
20-Aug-19	0.28
11-Sep-19	0.29
15-Sep-19	0.34
Average	0.29

INVASIVE SPECIES MONITORING

Dreissenid mussels pose a significant concern for Alberta because they impair the function of water conveyance infrastructure and adversely impact the aquatic environment. These invasive mussels have been linked to creating toxic cyanobacteria blooms, decreasing the amount of nutrients needed for fish and other native species, and causing millions of dollars in annual costs for repair and maintenance of water-operated infrastructure and facilities.

Monitoring involved using a 63 µm plankton net at three sample sites to look for juvenile mussel veligers in each lake sampled. No mussels were detected at Kehewin Lake in the summer of 2019.

Eurasian watermilfoil is non-native aquatic plant that poses a threat to aquatic habitats in Alberta because it grows in dense mats preventing light penetration through the water column, reduces oxygen levels when the dense mats decompose, and outcompetes native aquatic plants.

Suspect samples collected from Kehewin Lake on July 23 were confirmed to be the native Northern watermilfoil (*Myriophyllum sibiricum)*.

WATER LEVELS

There are many factors influencing water quantity. Some of these factors include the size of the lake's drainage basin, precipitation, evaporation, water consumption, ground water influences, and the efficiency of the outlet channel structure at removing water from the lake. Requests for water quantity monitoring should go through Alberta Environment and Parks Monitoring and Science division.

Water levels at Kehewin Lake have remained relatively stable since monitoring began in 1967. Fluctuations have ranged between a maximum of 540.4 meters above sea level (m asl) in 1997 to a minimum of 538.9 m asl in 1993. Kehewin Lake receives a steady inflow of water because its drainage basin is very large (156 km^2) as compared to its surface area (7.4 km^2).

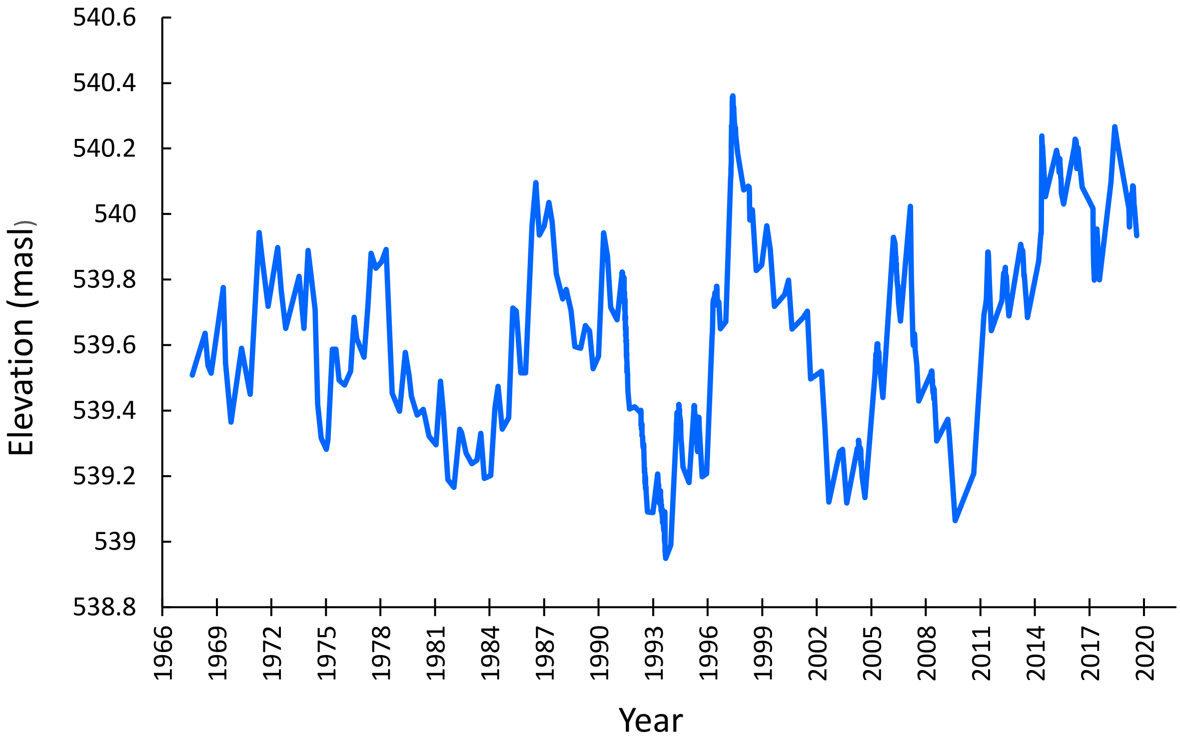


Figure 4. Water levels measured in meters above sea level (masl) for Kehewin Lake (1967-2019). Data obtained from Alberta Environment and Parks.

Table 2. Average Secchi depth and water chemistry values for Kehewin Lake.

Parameter	2002	2003	2004	2005	2007	2008	2009	2011	2013	2017	2019
TP (µg/L)	106	105	123	98	171	162	130	117	89	121	98
TDP (µg/L)	65	62	67	33	116	127	53	45	17	35.5	36
Chlorophyll-*a* (µg/L)	30.0	49.0	45.0	40.0	50.7	19.6	32.9	131.9	38.4	85.7	67.2
Secchi depth (m)	2.10	1.90	1.90	1.90	1.10	2.90	1.13	1.50	1.10	1.65	1.18
TKN (mg/L)	1.4	1.4	1.5	1.4	1.9	1.6	1.8	2.1	1.7	1.98	1.6
NO_2 and NO_3 (µg/L)	20	19	35	14	101	19	5	8	3	6.4	13
NH_3 (µg/L)	149	69	65	15	89	261	24	90	35	66.25	105
DOC (mg/L)	/	/	/	/	14	14	14	14	17	14.5	15
Ca (mg/L)	25	26	24	26	24	25	25	22	25	29.25	27
Mg (mg/L)	29	29	25	30	28	27	29	28	27	32.5	30
Na (mg/L)	32	35	36	35	36	34	35	35	37	40.5	37
K (mg/L)	14	12	12	13	13	14	12	13	16	15.5	14
SO_4^{2-} (mg/L)	20	27	28	26	23	26	17	14	20	27.75	29
Cl^- (mg/L)	16	16	17	17	19	19	20	21	21	25.25	27
CO_3 (mg/L)	6	14	14	17	14	20	21	20	23	12.06	19
HCO_3 (mg/L)	189	245	238	234	226	229	228	221	222	242.5	235
pH	8.50	8.70	8.70	8.80	8.70	8.90	8.93	8.99	8.95	8.63	8.92
Conductivity (µS/cm)	/	/	/	/	481	499	485	480	513	513	525
Hardness (mg/L)		184	166	191	177	173	/	171	175	207.5	190
TDS (mg/L)	/	/	/	/	269	278	272	262	280	310	300
Microcystin (µg/L)	/	/	/	0.28	0.54	0.56	/	0.16	0.40	2.23	0.29
Total Alkalinity (mg/L $CaCO_3$)	165	224	218	220	209	221	222	215	220	222.5	225

Table 3. Historical concentrations of metals measured at Kehewin Lake. The CCME heavy metal guidelines for the Protection of Freshwater Aquatic Life (unless otherwise indicated) are present for reference.

Metals (Total Recoverable)	2003	2004	2005	2007	2008	2009	2011	2013	2017	2019	Guidelines
Aluminum μg/L	24	13	8.8	23.4	12.3	13.2	11.8	5.21	9.2	8.4	100[a]
Antimony μg/L	0.072	0.1	0.105	0.09	0.088	0.092	0.0812	0.0683	0.065	0.077	6[e]
Arsenic μg/L	2.1	2	1.84	2.17	2.5	2.84	2.14	1.76	2.38	2.28	5
Barium μg/L	54	56	58	50.9	51.7	52.3	55.5	51.7	52.9	49.6	1000[e]
Beryllium μg/L	0.037	0.0015	0.0015	<0.003	<0.003	/	0.0015	0.0034	0.0015	0.003	100[d,f]
Bismuth μg/L	0.0037	0.0005	0.054	0.002	<0.001	0.0273	0.0005	0.0005	0.0015	0.0015	/
Boron μg/L	84	87	81	79	89	88	100	95.4	93.2	95	5000[ef]
Cadmium μg/L	0.02	0.0016	0.0043	0.017	0.0071	0.0137	0.0064	0.0022	0.005	0.005	0.085[b]
Chromium μg/L	0.18	0.25	0.21	0.244	0.324	0.261	0.269	0.161	0.05	0.05	/
Cobalt μg/L	0.04	0.037	0.04	0.056	0.0379	0.0525	0.0532	0.0432	0.049	0.069	1000[f]
Copper μg/L	0.43	0.52	0.47	1.31	0.675	0.439	0.351	0.261	0.17	0.17	4[c]
Iron μg/L	27	7.7	3.4	19.2	10.55	9.3	24.6	24.3	17	31.2	300
Lead μg/L	0.11	0.042	0.354	0.07	0.0467	0.0708	0.0275	0.0022	0.007	0.006	7[c]
Lithium μg/L	26	29	26	26.5	27.3	29.3	36.8	31.2	29.4	31.1	2500[g]
Manganese μg/L	30	26	32	23.9	25.6	32.5	14.5	12.9	28.9	21.5	200[g]
Molybdenum μg/L	0.8	0.83	0.82	0.77	0.748	0.767	0.647	0.49	0.633	0.748	73[d]
Nickel μg/L	0.15	0.16	0.18	0.27	0.373	0.182	0.283	0.358	0.44	0.49	150[c]
Selenium μg/L	0.42	0.05	0.2	0.35	0.183	0.214	0.327	0.221	0.4	0.3	1
Silver μg/L	/	/	/	0.005	<0.0005	0.00115	0.00025	0.0213	0.002	0.001	0.1
Strontium μg/L	229	235	226	214	208	222	226	217	230	263	/
Thallium μg/L	0.093	0.001	0.022	0.002	0.0005	0.0131	0.0006	0.00015	0.004	0.001	0.8
Thorium μg/L	0.012	0.004	0.06	0.005	0.0014	0.0033	0.0105	0.00015	0.02	0.004	/
Tin μg/L	0.05	0.026	0.015	<0.03	<0.03	0.0358	0.015	0.015	0.03	0.03	/
Titanium μg/L	1.23	1.33	0.98	1.8	0.878	1.42	0.777	0.983	1.55	0.87	/
Uranium μg/L	0.57	0.6	0.64	0.56	0.617	0.678	0.6	0.489	0.545	0.734	100[e]
Vanadium μg/L	0.66	0.56	0.4	0.45	0.426	0.458	0.369	0.24	0.369	0.422	100[f,g]
Zinc μg/L	2	11.8	2.8	1.03	0.646	0.148	0.386	0.274	0.1	0.4	30

Values represent means of total recoverable metal concentrations.
[a] Based on pH ≥ 6.5
[b] Based on water hardness > 180mg/L (as CaCO3)
[c] CCME interim value.
[d] Based on CCME Guidelines for Agricultural use (Livestock Watering).
[e] Based on CCME Guidelines for Agricultural Use (Irrigation).
A forward slash (/) indicates an absence of data or guidelines.

LONG TERM TRENDS

Trend analysis was conducted on the parameters total phosphorus (TP), chlorophyll-*a* and Secchi depth to look for changes over time in Kehewin Lake. In sum, non-significant increases were observed in chlorophyll-*a* and TP, a significant but very slight increase was observed in TDS, and non-significant decreasing trends were observed in Secchi depth. Secchi depth can be subjective and is sensitive to variation in weather - trend analysis must be interpreted with caution. Data is presented below as both a line graph (all data points) and a box-and-whisker plot. Detailed methods are available in the *ALMS Guide to Trend Analysis on Alberta Lakes.*

Table 4. Summary table of trend analysis on Kehewin Lake data from 2003 to 2019.

Parameter	Date Range	Direction of Significant Trend
Total Phosphorus	2003-2019	No Change
Chlorophyll-a	2003-2019	No Change
Total Dissolved Solids	2003-2019	Increasing
Secchi Depth	2003-2019	No Change

Definitions:

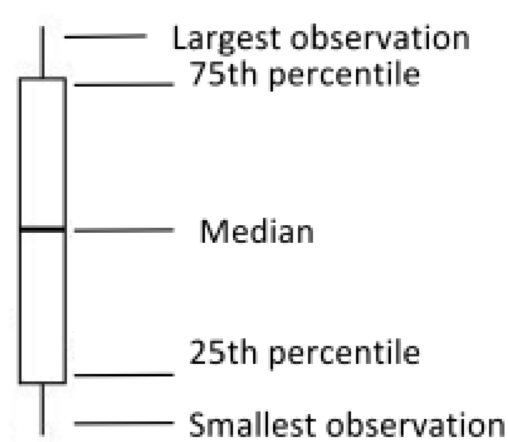
Median: the value in a range of ordered numbers that falls in the middle.

Trend: a general direction in which something is changing.

Monotonic trend: a gradual change in a single direction.

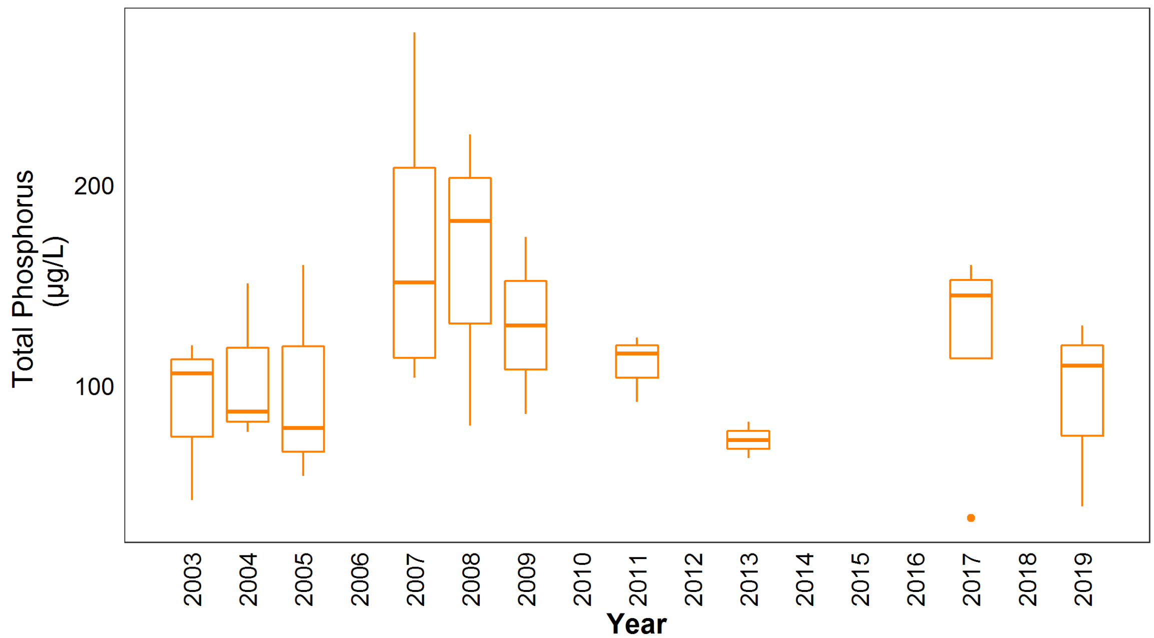
Statistically significant: The likelihood that a relationship between variables is caused by something other than random chance. This is indicated by a p-value of <0.05. Variability: the extent by which data is inconsistent or scattered.

Box and Whisker Plot: a box-and-whisker plot, or boxplot, is a way of displaying all of our annual data. The median splits the data in half. The 75th percentile is the upper quartile of the data, and the 25th percentile is the lower quartile of the data. The top and bottom points are the largest and smallest observations.



Total Phosphorus (TP)

TP has not significantly changed over the course of data collection at Kehewin Lake (Tau = -0.04, p = 0.80).



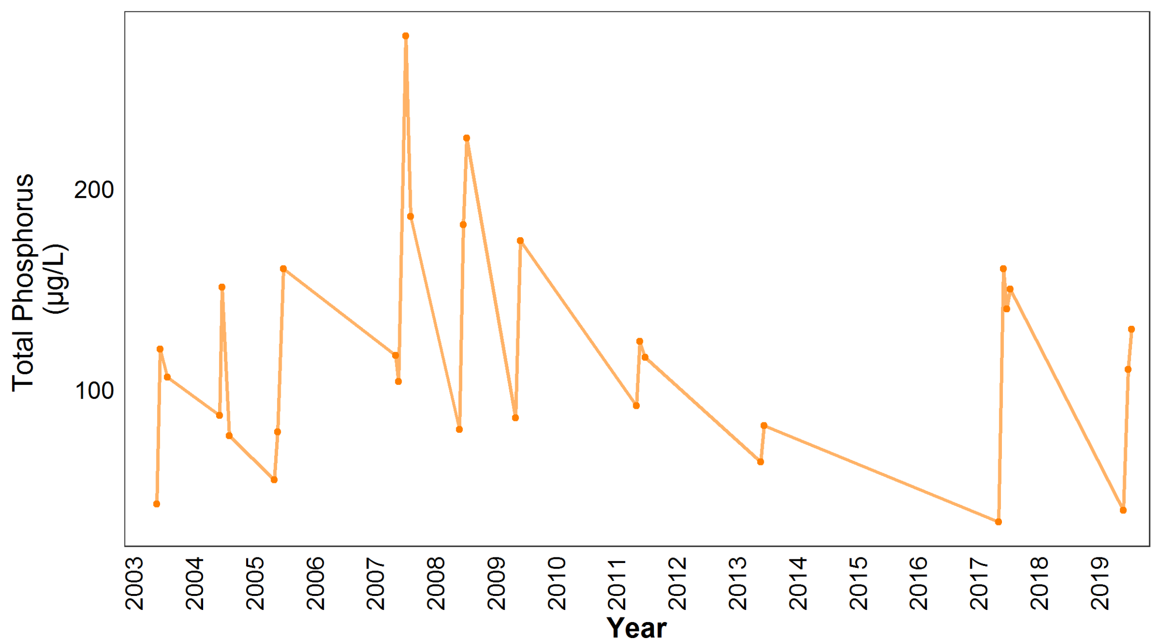
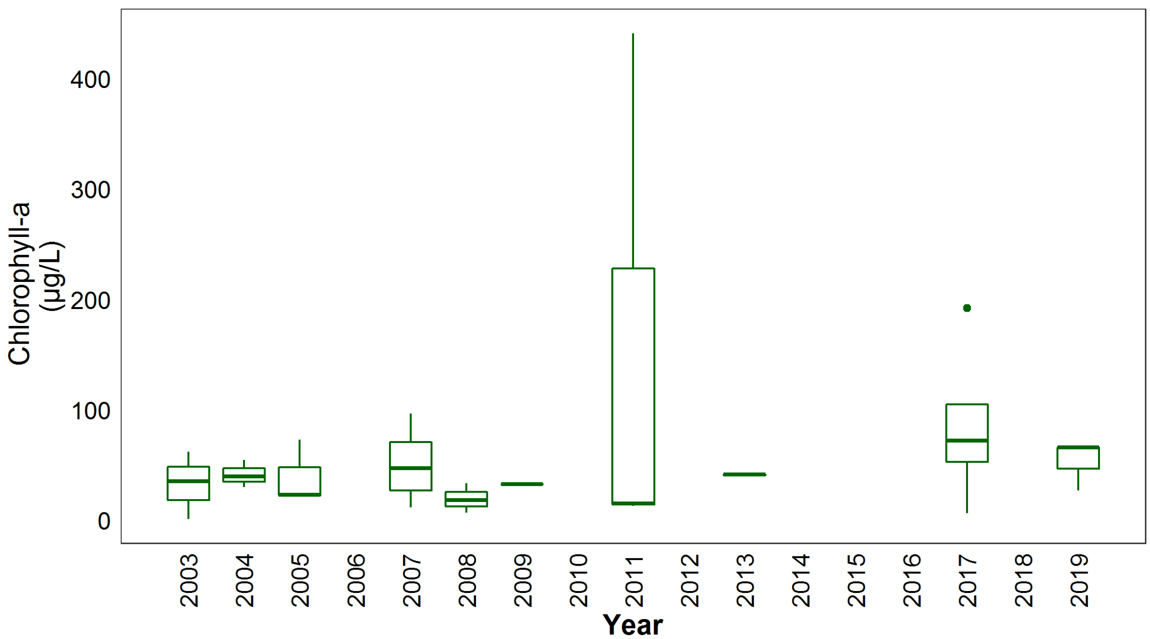


Figure 5. Total phosphorus (TP) concentrations measured between June and September over the long term sampling dates between 2003 and 2019 (n = 30). The value closest to the 15th day of the month was chosen to represent the monthly value in cases with multiple monthly samples.

Chlorophyll-*a*

Chlorophyll-*a* has not significantly changed over the course of data collection at Kehewin Lake (Tau = 0.14, p = 0.26).



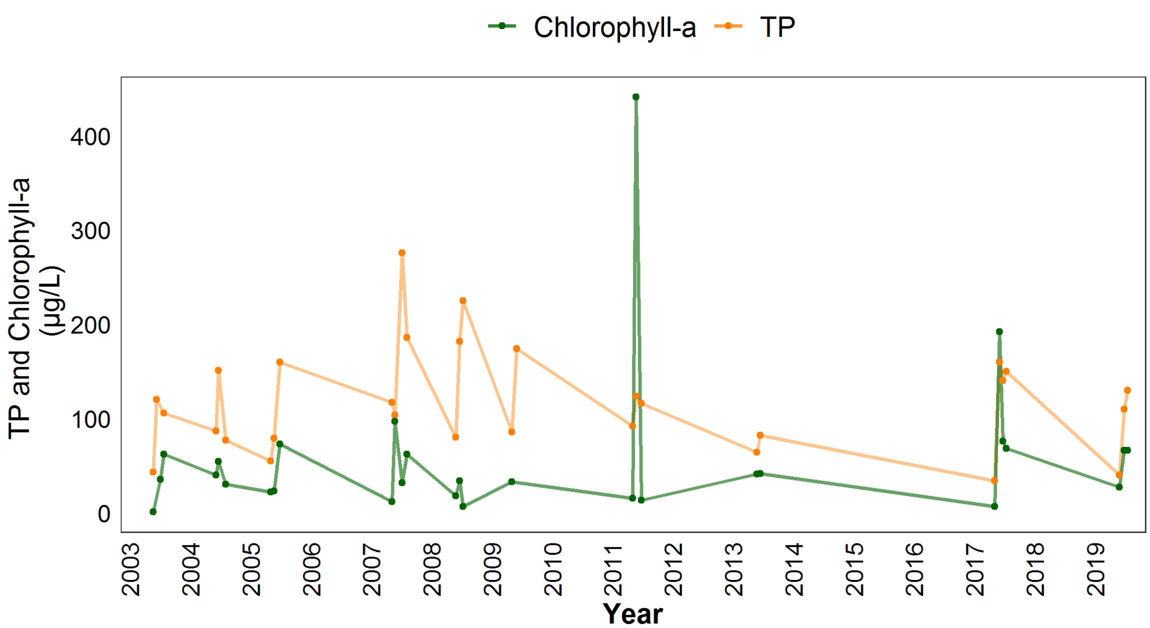
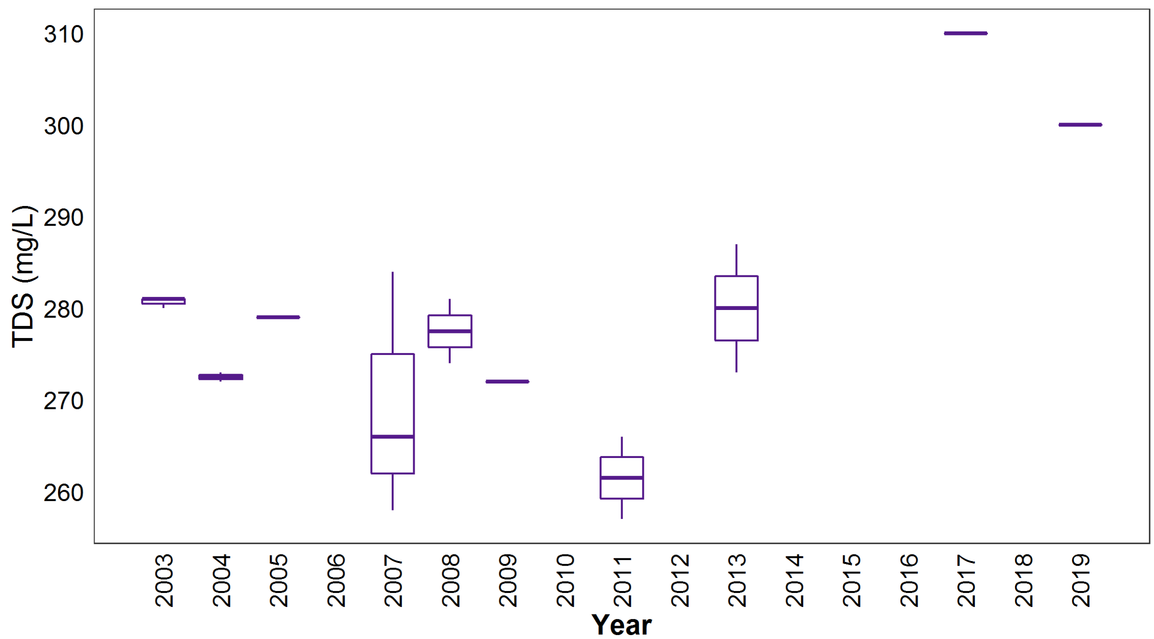


Figure 6. Chlorophyll-*a* concentrations measured between June and September over the long term sampling dates between 2003 and 2019 (n = 29). The value closest to the 15th day of the month was chosen to represent the monthly value in cases with multiple monthly samples.

Total Dissolved Solids (TDS)

TDS concentrations have significantly increased over the course of data collection at Kehewin Lake (Tau = 0.45, p = 0.013).



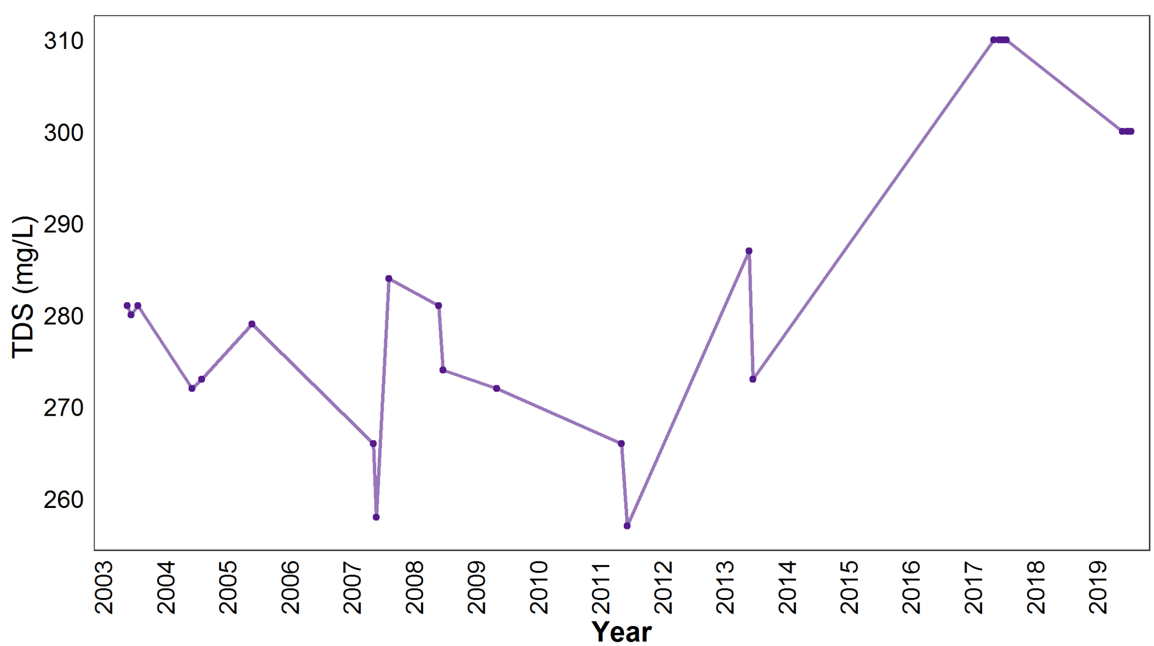
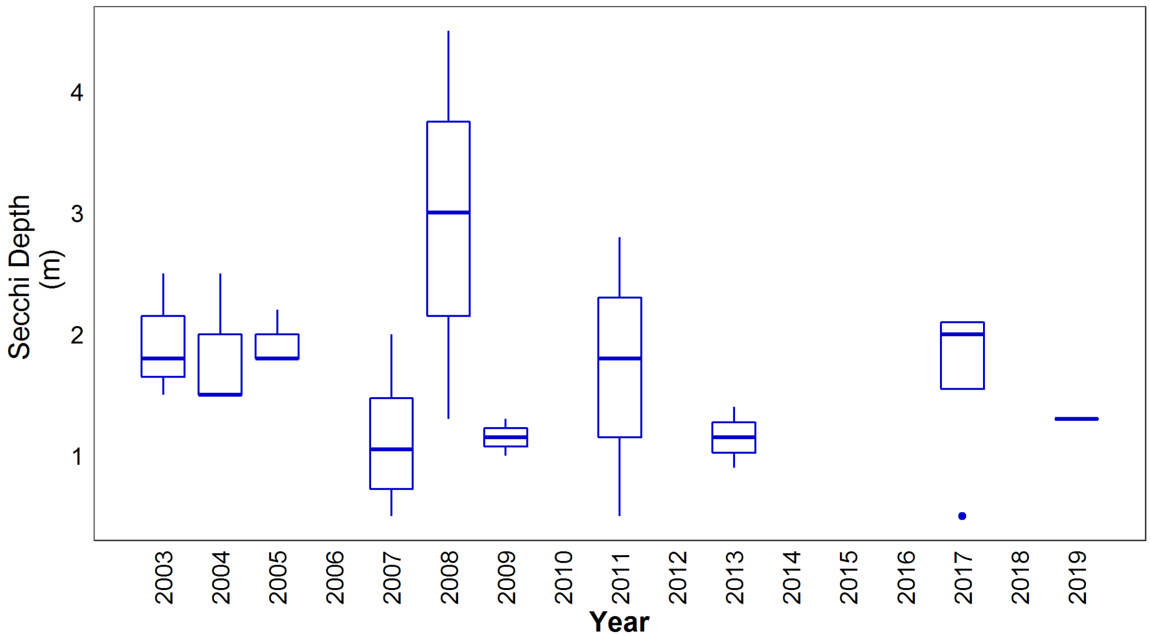


Figure 7. TDS measured between June and September over the long term sampling dates between 2003 and 2019 (n = 23). The value closest to the 15th day of the month was chosen to represent the monthly value in cases with multiple monthly samples.

Secchi Depth

Secchi depth has not significantly changed over the course of data collection at Kehewin Lake (Tau = -0.16, p = 0.13).



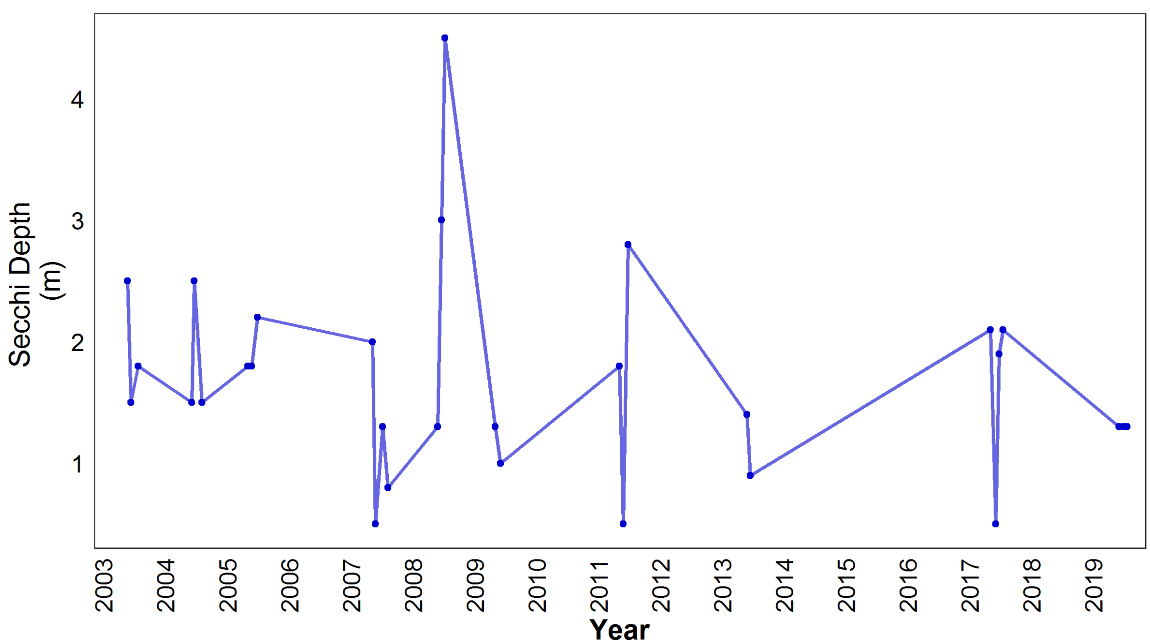


Figure 8. Secchi depth values measured between June and September over the long term sampling dates between 2003 and 2019 (n = 30). The value closest to the 15th day of the month was chosen to represent the monthly value in cases with multiple monthly samples.

Table 5. Results of Mann-Kendall and Seasonal Kendall Trend tests using monthly total phosphorus (TP), chlorophyll-*a*, total dissolved solids (TDS) and Secchi depth data from June to September on Kehewin Lake data.

Definition	Unit	Total Phosphorus (TP)	Chlorophyll-a	Total Dissolved Solids (TDS)	Secchi Depth
Statistical Method	-	Seasonal Kendall	Seasonal Kendall	Seasonal Kendall	Seasonal Kendall
The strength and direction (+ or -) of the trend between 0 and 1	Tau	-0.04	0.14	0.46	-0.16
The extent of the trend	Slope	-0.56	0.79	1.80	-0.05
Number of samples included	n	30	29	23	30
The significance of the trend	*p*	0.80	0.26	0.013*	0.13