2023 Eight Point Lake Water Quality Report

Clare County, Michigan

Introduction

The goal of this testing protocol was to monitor various water quality parameters of the lake, compare results to historical data, and identify any potential risks to the health of Eight Point Lake. Water samples were taken at five different locations and tested for 12 different parameters. Tests were conducted with a YSI ProDSS Multiparameter Water Quality Meter or LaMotte SMART2 Colorimeter. Test results were compared to the "2022 Eight Point Lake Water Quality Report" by LakePro, Inc.

Testing Dates

Field tests and water samples were taken on June 15th, 2023. Laboratory tests were completed on June 16th, 2023. This report describes conditions at the times the samples were taken. Historical testing dates are at the end of this report.

Analyses

Water samples were tested for Temperature, Dissolved Oxygen, Total Phosphorus, Nitrates, Transparency, pH, Total Dissolved Solids, Conductivity, Alkalinity, Hardness, Salinity, and E. coli.

Water Quality Sampling Sites

The following map shows the five water quality sampling locations.

Water Quality Results

2023 Lake-wide

Parameter	Average	Target Range
Temperature	69.9	Less Than 75 ˚F
Dissolved Oxygen	8.3 mg/L	4.0 – 12.0 mg/L
Total Phosphorus	42 ppb	0 – 100 ppb
Nitrate	205 ppb	0 – 1,000 ppb
Transparency	12.5 feet	More than 6.5 feet
pH	8.5	7.0 – 9.0 S.U.
Total Dissolved Solids	121 ppm	0 – 1,000 ppm
Conductivity	181 µS	0 – 1,500 ppm
Alkalinity	75 ppm	0 – 250 ppm
Hardness	101 ppm	100 – 300 ppm
Total Salinity	90 ppm	0 – 500 ppm
E. coli	0 CFU	0 – 300 CFU
Trophic State Index – Total Phosphorus	57	Oligotrophic: 0 - 40 Mesotrophic: 40 – 50
Trophic State Index – Transparency	41	Eutrophic: 50 – 70 Hypereutrophic: 70+

Discussion:

The results of the 2023 testing showed the water of Eight Point Lake remained healthy with no immediate concerns. The data shows that the aquatic environment was suitable to support natural wildlife. There were no signs of pollution, so the lake was safe for recreational uses, such as swimming, boating, and fishing.

2023 is the sixteenth consecutive year that LakePro tested the lake water. The accumulation of data allowed us to identify variations and specific trends in the results. Each additional year of testing will continue to make the analysis more accurate.

The **Temperature** was lower than in 2022 and comfortably in the target range. Warmer water holds less oxygen, so lower water temperatures are best for the lake.

The **Dissolved Oxygen** concentrations were at healthy levels. There was enough oxygen in the water to support a healthy fish population. It is important that the lake carries enough oxygen in June to support the fishery later in the warmer summer months.

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The **Total Phosphorus** spiked in 2010 and has remained low since then. The decrease of phosphorus in the lake was a positive change and showed good stewardship by the riparians. This year, the phosphorus remained in the lower half of the target range and averaged the same as last year across the five sampling sites.

Nitrate had a slight increase but was a negligible change. So, all the nutrient concentrations were within the target ranges. It is still important all residents practice lake-safe methods for lawn fertilizers, yard waste, tree leaves, pet droppings, septic systems, and any other source of nutrients.

Transparency was slightly lower than what we measured last year but remained excellent. Water clarity is important to maintain the visual water quality of the lake. Better clarity, however, allows more sunlight penetration to warm the water and fuel plant growth. The transparency was exemplary for a developed inland lake and classified Eight Point Lake as *mesotrophic*.

pH increased slightly from last year and remained within the target range. pH has been relatively steady for the past 4 seasons. pH is a broad indicator of lake health that can show changes based on rainfall, dissolved oxygen, groundwater inputs, and pollution. It is important this parameter stays within the target range.

The **Total Dissolved Solids** and **Conductivity** both increased slightly from last year, showing the lake has gained a micro amount of new dissolved substances in the water. As this usually includes nutrients and salts, the low results are positive even with a slight increase.

The **Alkalinity** and **Hardness** were at good concentrations in your lake. Calcium carbonate is the main constituent of these parameters. Calcium carbonate enters the lake with groundwater that coursed through limestone. The carbonate ions buffer against shifts in the pH from other influences, so having sufficient alkalinity is beneficial to the lake. Alkalinity decreased from last year and Hardness slightly increased but showed no concerns whatsoever.

The **Salinity** was at normal levels in the water and stayed the same from last year.

Finally, there were no **E. coli** present in any of the water samples collected.
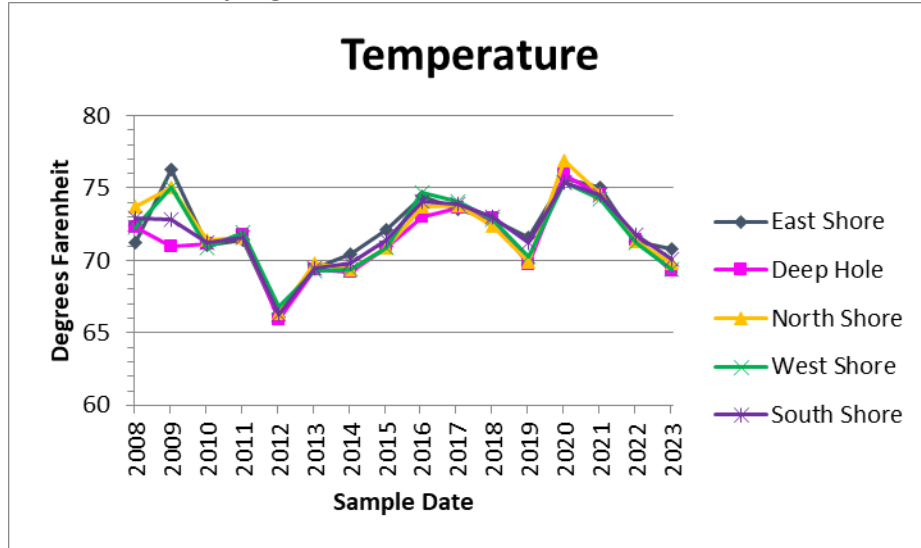
Parameter & Sampling Site Details

Temperature

Target Range: < 75˚F

2023 Results	
East Shore	70.8 °F
Deep Hole	69.3 °F
North Shore	69.8 °F
West Shore	69.4 °F
South Shore	70.1 °F
Lakewide Average	**69.9** °F

Dissolved Oxygen

Target Range: 4.0 – 12.0 mg/L
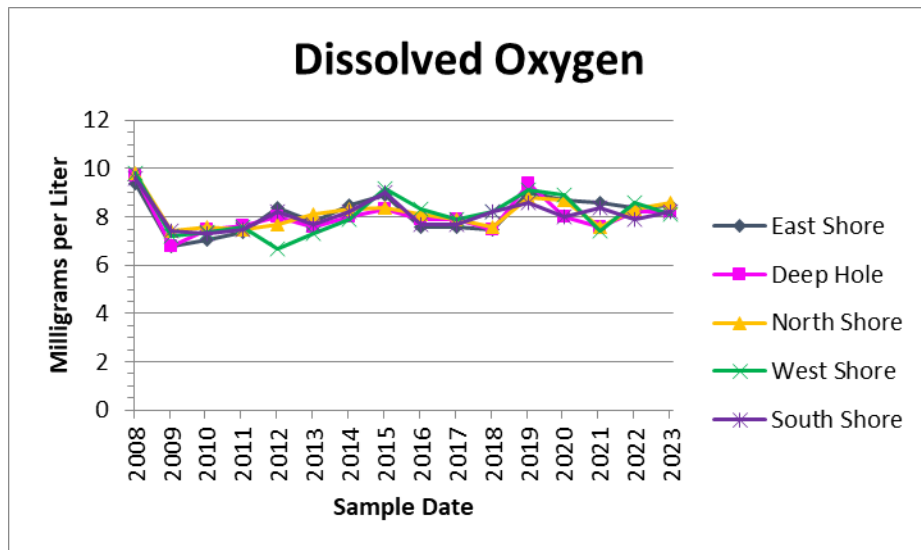
2023 Results	
East Shore	8.5 mg/L
Deep Hole	8.2 mg/L
North Shore	8.6 mg/L
West Shore	8.1 mg/L
South Shore	8.2 mg/L
Lakewide Average	**8.3 mg/L**

Total Phosphorus

Target Range: 0 – 100 ppb

2023 Results	
East Shore	30 ppb
Deep Hole	30 ppb
North Shore	60 ppb
West Shore	40 ppb
South Shore	50 ppb
Lakewide Average	**42 ppb**

Nitrate

Target Range: 0 – 1,000 ppb
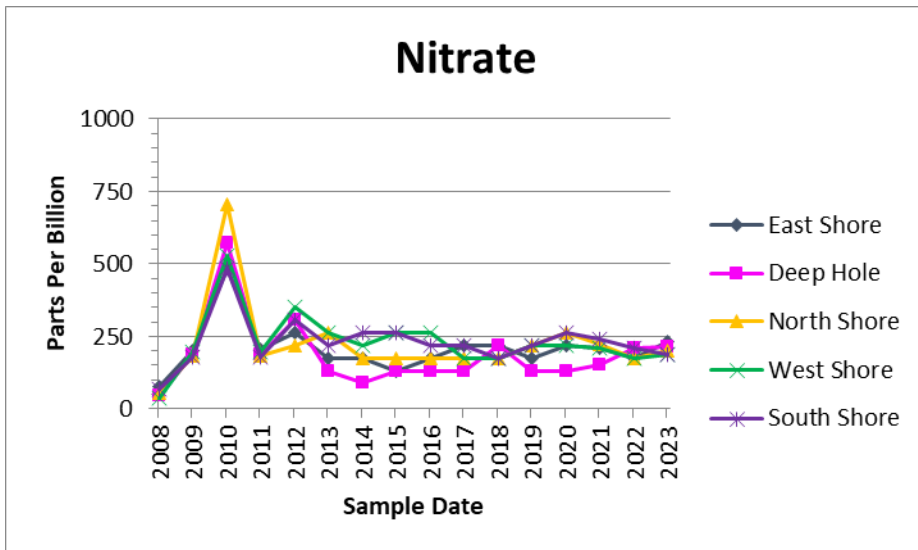
2022 Results	
East Shore	230 ppb
Deep Hole	214 ppb
North Shore	201 ppb
West Shore	189 ppb
South Shore	189 ppb
Lakewide Average	**205 ppb**

LakePro Inc.

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Transparency

Target Range: More than 6.5 feet
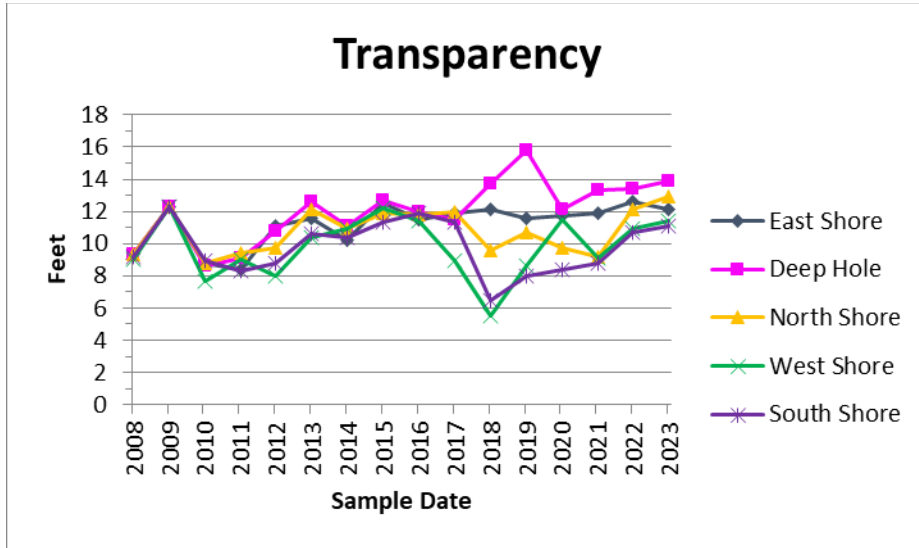
2023 Results	
East Shore	12.1 feet
Deep Hole	13.9 feet
North Shore	12.9 feet
West Shore	11.4 feet
South Shore	11.1 feet
Lakewide Average	12.5 feet

pH
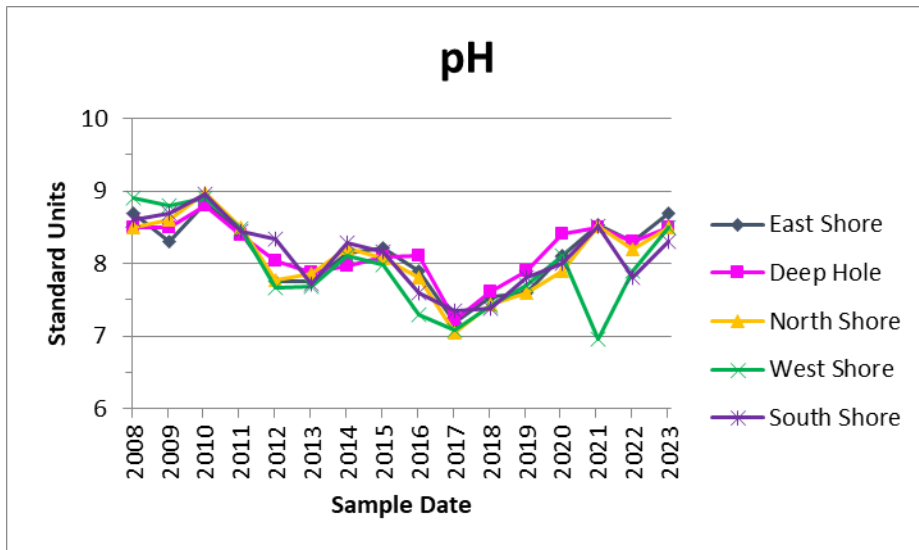
Target Range: 7.0 – 9.0

2023 Results	
East Shore	8.7
Deep Hole	8.5
North Shore	8.5
West Shore	8.5
South Shore	8.3
Lakewide Average	8.5

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Total Dissolved Solids

Target Range: 0 – 1,000 ppm
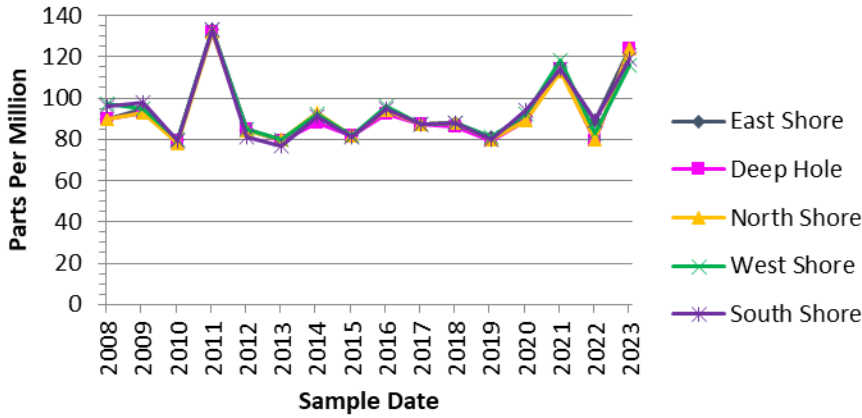
2023 Results	
East Shore	124 ppm
Deep Hole	124 ppm
North Shore	124 ppm
West Shore	116 ppm
South Shore	113 ppm
Lakewide Average	**121 ppm**

Conductivity

Target Range: 0 – 1,500 µS
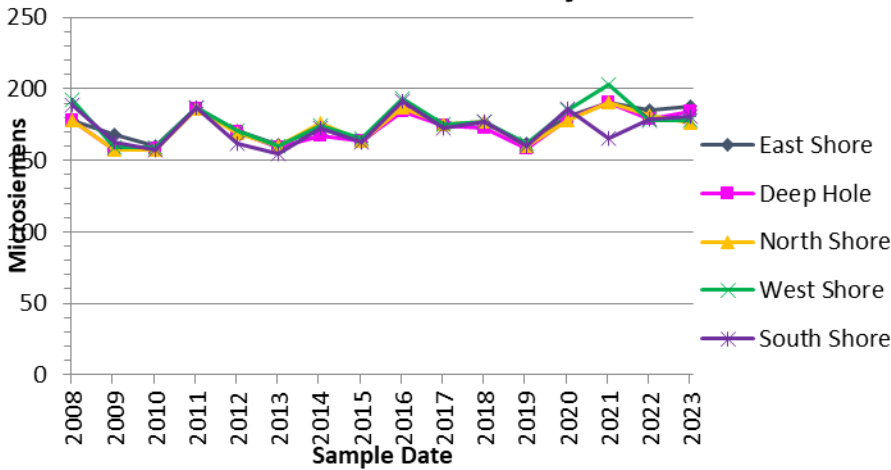
2023 Results	
East Shore	188 µS
Deep Hole	184 µS
North Shore	176 µS
West Shore	178 µS
South Shore	181 µS
Lakewide Average	**181 µS**

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Alkalinity

Target Range: 0 – 250 ppm

2023 Results	
East Shore	75 ppm
Deep Hole	74 ppm
North Shore	76 ppm
West Shore	76 ppm
South Shore	75 ppm
Lakewide Average	**75 ppm**

Hardness

Target Range: 100 – 300 ppm
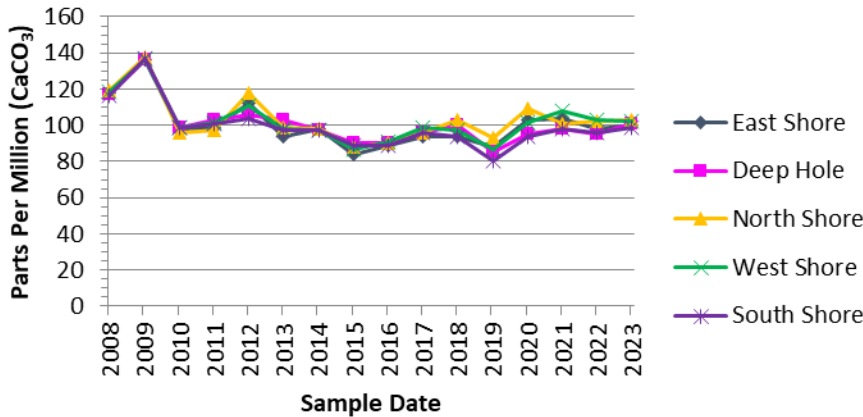
2023 Results	
East Shore	100 ppm
Deep Hole	101 ppm
North Shore	103 ppm
West Shore	102 ppm
South Shore	99 ppm
Lakewide Average	**101 ppm**

Salinity

Target Range: 0 – 500 ppm
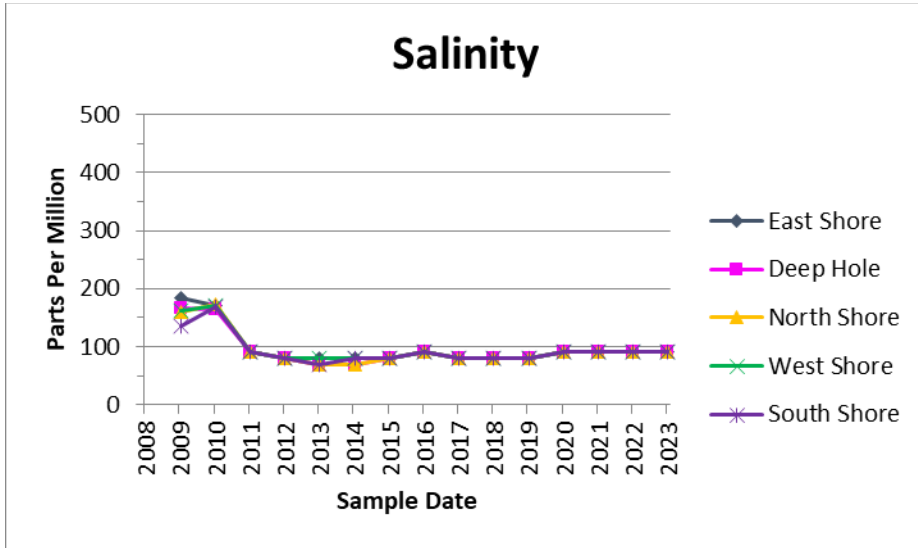
2023 Results	
East Shore	90 ppm
Deep Hole	90 ppm
North Shore	90 ppm
West Shore	90 ppm
South Shore	90 ppm
Lakewide Average	**90 ppm**

E. coli

Target Range: 0 – 300 CFU
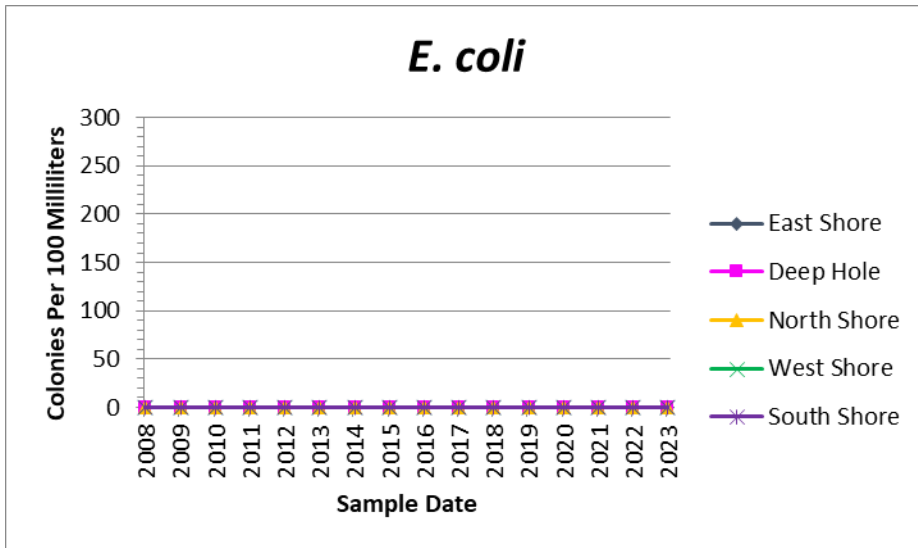
2023 Results	
East Shore	0 CFU
Deep Hole	0 CFU
North Shore	0 CFU
West Shore	0 CFU
South Shore	0 CFU
Lakewide Average	**0 CFU**

Historical Test Results

Date	Sample Station	Temperature ˚F	Dissolved Oxygen mg/L	Total Phosphorus ppb	Nitrate ppb	Transparency feet	pH	TDS ppm	Conductivity µS	Alkalinity ppm	Hardness ppm	Salinity ppm	E. coli CFU
6/30/2008	ES	71.2	9.4	19	78	9.3	8.7	90	178	81	118	-	0
	DH	72.3	9.7	12	46	9.3	8.5	90	178	80	117	-	0
	NS	73.7	9.8	12	56	9.3	8.5	90	178	81	119	-	0
	WS	72.3	9.8	19	38	9.0	8.9	97	192	81	118	-	0
	SS	72.9	9.6	17	68	9.2	8.6	96	189	80	116	-	0
6/22/2009	ES	76.3	6.8	160	200	12.3	8.3	95	168	108	137	183	0
	DH	71.0	6.8	125	186	12.3	8.5	93	157	107	136	167	0
	NS	75.0	7.4	120	185	12.3	8.6	93	157	107	138	159	0
	WS	75.0	7.2	115	195	12.3	8.8	95	159	106	136	163	0
	SS	72.8	7.4	115	180	12.3	8.7	98	163	107	137	136	0
6/16/2010	ES	71.0	7.1	180	484	8.8	8.8	80	160	102	98	170	0
	DH	71.2	7.5	180	572	8.6	8.8	79	158	100	99	165	0
	NS	71.4	7.6	290	704	8.8	9.0	78	157	104	96	174	0
	WS	70.9	7.4	240	528	7.7	8.9	80	159	104	99	171	0
	SS	71.2	7.3	110	484	8.9	9.0	79	157	102	99	169	0
6/21/2011	ES	71.4	7.4	105	207	8.4	8.4	133	187	86	99	90	0
	DH	71.8	7.6	98	189	9.1	8.4	132	186	86	103	91	0
	NS	71.6	7.5	128	185	9.5	8.5	132	186	89	98	90	0
	WS	72.0	7.6	119	198	9.1	8.5	133	187	88	102	91	0
	SS	71.6	7.5	83	180	8.3	8.5	133	187	85	101	91	0
6/4/2012	ES	66.1	8.4	60	264	11.1	7.8	85	171	84	112	80	0
	DH	65.9	8.0	70	308	10.8	8.0	85	170	77	106	80	0
	NS	66.4	7.7	140	220	9.8	7.8	84	169	88	118	80	0
	WS	66.8	6.7	60	352	8.0	7.7	85	171	80	111	80	0
	SS	66.3	8.2	60	308	8.8	8.3	81	162	77	104	80	0
6/4/2013	ES	69.5	7.8	30	176	11.6	7.8	80	161	79	94	80	0
	DH	69.4	7.6	20	132	12.6	7.9	79	159	84	103	70	0
	NS	69.8	8.1	40	264	12.1	7.9	80	160	82	99	70	0
	WS	69.3	7.3	60	264	10.4	7.7	80	160	80	98	80	0
	SS	69.5	7.7	50	220	10.6	7.7	77	155	82	97	70	0
6/10/2014	ES	70.4	8.5	30	176	10.2	8.1	91	173	83	98	80	0
	DH	69.2	8.0	20	88	11.1	8.0	88	167	79	97	70	0
	NS	69.4	8.3	40	176	10.9	8.2	93	176	81	98	70	0
	WS	69.4	7.9	30	220	10.9	8.1	92	174	79	97	80	0
	SS	69.8	8.2	40	264	10.4	8.3	91	173	82	97	80	0
6/9/2015	ES	72.1	8.9	30	132	12.5	8.2	82	163	71	84	80	0
	DH	70.9	8.3	30	132	12.7	8.1	82	164	78	90	80	0
	NS	70.8	8.4	40	176	11.9	8.1	82	164	72	88	80	0
	WS	70.9	9.2	40	264	12.2	8.0	82	165	71	87	80	0
	SS	71.4	9.0	60	264	11.3	8.2	81	163	76	89	80	0
6/17/2016	ES	74.4	7.6	60	176	11.5	7.9	94	187	75	89	90	0
	DH	73.0	7.9	30	132	12.0	8.1	92	184	77	90	90	0
	NS	73.7	8.1	50	176	11.8	7.8	94	187	75	90	90	0
	WS	74.7	8.3	70	264	11.4	7.3	96	193	74	91	90	0
	SS	74.1	7.7	40	220	11.9	7.6	95	191	75	89	90	0
6/20/2017	ES	73.5	7.6	50	220	11.9	7.2	87	174	81	94	80	0
	DH	73.6	7.9	30	132	11.5	7.2	87	174	84	96	80	0
	NS	73.8	7.9	50	176	12.0	7.1	87	175	82	96	80	0
	WS	74.1	7.9	60	176	8.9	7.1	87	175	82	99	80	0
	SS	73.9	7.7	50	220	11.3	7.3	87	173	83	96	80	0
6/15/2018	ES	72.8	7.5	50	220	12.1	7.5	88	176	82	94	80	0
	DH	72.9	7.5	40	220	13.7	7.6	86	173	88	100	80	0
	NS	72.4	7.6	30	176	9.6	7.4	88	177	85	103	80	0
	WS	72.8	8.2	30	176	5.5	7.4	88	177	86	97	80	0
	SS	73.0	8.2	50	176	6.5	7.4	88	177	89	94	80	0
6/11/2019	ES	71.6	9.0	50	176	11.6	7.6	81	162	77	88	80	0
	DH	69.7	9.4	30	132	15.8	7.9	79	158	75	85	80	0
	NS	69.9	8.8	50	220	10.7	7.6	80	160	77	93	80	0
	WS	70.3	9.1	40	220	8.6	7.7	81	162	77	87	80	0
	SS	71.2	8.6	30	220	8.0	7.8	80	160	76	80	80	0

6/9/2020	ES	75.6	8.7	40	220	11.7	8.1	91	181	88	103	90	0
	DH	75.9	8.0	30	132	12.1	8.4	89	179	82	95	90	0
	NS	76.9	8.7	50	264	9.7	7.9	89	178	89	109	90	0
	WS	75.4	8.9	50	220	11.5	8.1	92	185	90	102	90	0
	SS	75.4	8.0	40	264	8.4	8.0	94	186	88	94	90	0
6/8/2021	ES	75.0	8.6	50	210	11.9	8.5	114	190	82	104	90	0
	DH	74.5	7.6	30	151	13.3	8.5	114	191	86	98	90	0
	NS	74.6	7.6	40	223	9.2	8.5	113	190	83	101	90	0
	WS	74.2	7.4	50	210	9.1	7.0	118	203	85	108	90	0
	SS	74.5	8.4	40	240	8.8	8.5	114	165	88	98	90	0
6/8/2022	ES	71.3	8.4	40	176	12.6	8.3	89	185	81	98	90	0
	DH	71.4	8.2	40	210	13.4	8.3	79	179	82	95	90	0
	NS	71.3	8.3	50	176	12.1	8.2	80	182	81	102	90	0
	WS	71.2	8.6	40	176	10.9	7.9	83	178	83	103	90	0
	SS	71.8	7.9	40	210	10.7	7.8	89	179	82	96	90	0
6/15/2023	ES	70.8	8.5	30	230	12.1	8.7	124	188	75	100	90	0
	DH	69.3	8.2	30	214	13.9	8.5	124	184	74	101	90	0
	NS	69.8	8.6	60	201	12.9	8.5	124	176	76	103	90	0
	WS	69.4	8.1	40	189	11.4	8.5	116	178	76	102	90	0
	SS	70.1	8.2	50	189	11.1	8.3	119	181	75	99	90	0

Analysis Information

Temperature: The water temperature directly affects the amount of oxygen that is able to dissolve into the water. The temperature of surface waters is not indicative of the entire water column.

Dissolved Oxygen: D.O. is a measure of the amount of oxygen dissolved in the water. This oxygen is available to fish and other animals for respiration. Vegetation generally increases DO, particularly during the day and early evening. Animals and other respiring organisms consume the oxygen, mostly during the day. Oxygen is also added to the lake through wave action, rain, fountains and aerators.

Total Phosphorus: Phosphorus is an essential nutrient for plant growth. However, concentrations exceeding 100 ppb can impair the water and results in nuisance vegetation growth.

Nitrate: Nitrogen is also essential for plant growth. Nitrate is the predominant form of nitrogen in water. Excessive nitrate concentrations may also result in pollution and increased vegetation.

Transparency: The ability of light to penetrate the water column is determined by the amount of dissolved and suspended particles in the water. Although aesthetically desirable, transparent water allows increased light to reach the lake bed and may result in vegetation growth.

pH: pH is a measure of acidity or alkalinity. pH is a general measure of lake health and can roughly indicate the range of other measurements such as alkalinity and hardness.

TDS: Total Dissolved Solids is the amount of all organic and inorganic substances in the water in a molecular or ionized state. Higher values generally indicate richer and more productive water. Lower values usually indicate cleaner and less productive water.

Conductivity: Conductivity is a measure of the ability of water to conduct electricity. Dissolved ions in the water increase conductivity, thus TDS and Conductivity are closely related.

Alkalinity: Alkalinity refers to the ability of the water to neutralize acids, mainly through the hydrogenation of carbonate ions. This is why the alkalinity is expressed as "ppm as $CaCO_3$". However, other basic molecules in the water can also contribute to alkalinity.

Hardness: Hardness is very closely related to alkalinity. It is a measure of the dissolved salts and metals in the water, including but not limited to $CaCO_3$.

Salinity: Salinity is the measure of the dissolved salt content of water. Salinity influences the types of organisms that are able to survive in the water. Salinity also affects the chemistry of the water and including conductivity and potability.

Fecal Coliforms: Non-fecal coliforms are naturally found as soil organisms. Fecal Coliforms, such as *E. coli*, are coliforms found in the intestines of warm-blooded animals and humans. The presence of fecal coliforms indicates contamination from either animals or humans.

Trophic States

Oligotrophic: Water is very clear. Nutrient levels are generally low. Plant and algae productivity is also low. Sufficient dissolved oxygen in the bottom, cooler waters allows cold-water fish to survive, such as salmon and trout.

Mesotrophic: Water is moderately clear. Nutrient levels are slightly elevated. Plant and algae productivity is present, but generally not a nuisance. Oxygen and temperature in the lower portion of the lake allow walleye and perch to survive.

Eutrophic: Water is not clear due to high nutrients levels, increased turbidity, and excessive algal growth. There is no oxygen in the bottom, cooler waters, restricting the lake to warm water species, such as bass and bluegill.

Hypereutrophic: Nutrient levels are extremely high, promoting very high algae productivity. Blue-green algae blooms are likely. High turbidity and algae growth make the water opaque. Little plant growth is restricted to invasive plants. The only fish that can survive this environment are rough fish, such as carp, catfish, and mudminnows.