SOLitude Lake Management Water Quality Report

Provided for Lake Singletary Watershed Association

Annual Water Quality Report for Lake Singletary

2024

Water Quality Report- Lake Singletary

Inlet Station				
Test	**Desired Range**	**05/15/2024**	**07/10/2024**	**09/13/2024**
pH Reading	6.5 - 8.5	**7.0**	**7.5**	**-**
Alkalinity, Total (mg CaCO3/L)	20 - 200	**16.4**	**19**	**16.9**
Conductivity, (uS/cm)	<1,200	**200**	**130**	**-**
Phosphorus, Total (mg/L)	< 0.030	**ND**	**0.019**	**0.013**
Phosphorus, Soluble (mg/L)	N/A	**ND**	**0.011**	**ND**
Nitrate (mg/L)	< 0.30	**ND**	**ND**	**ND**
Ammonia (mg/L)	<0.100	**ND**	**ND**	**0.140**
Total Kjeldahl Nitrogen (mg/L)	<1.0	**0.377**	**0.447**	**0.376**
Secchi Disk (ft)	> 4	**5.9**	**5.0**	**4.5**

*ND: not detected

Red text indicates high results.

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Outlet Station				
Test	**Desired Range**	**05/15/2024**	**07/10/2024**	**09/13/2024**
pH Reading	6.5 - 8.5	**7.0**	**7.0**	**-**
Alkalinity, Total (mg CaCO3/L)	20 - 200	**16.3**	**18.6**	**17**
Conductivity, (uS/cm)	<1,200	**150**	**140**	**-**
Phosphorus, Total (mg/L)	< 0.030	**ND**	**0.010**	**0.013**
Phosphorus, Soluble (mg/L)	N/A	**ND**	**ND**	**ND**
Nitrate (mg/L)	< 0.30	**ND**	**ND**	**ND**
Ammonia (mg/L)	<0.100	**ND**	**ND**	**ND**
Total Kjeldahl Nitrogen (mg/L)	<1.0	**0.315**	**0.453**	**0.609**
Secchi Disk (ft)	> 4	**8.8**	**6.5**	**7.5**

*ND: not detected

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Middle Station							
Test	**Desired Range**	**05/15/2024**		**07/10/2024**		**09/13/2024**	
		Surface	**Hypolimnion**	**Surface**	**Hypolimnion**	**Surface**	**Hypolimnion**
pH Reading	6.5 - 8.5	**7.0**	-	**7.2**	-	-	-
Alkalinity, Total (mg CaCO3/L)	20 - 200	**14.8**	**16.5**	**17.4**	**23.4**	**17.6**	**17.8**
Conductivity, (uS/cm)	<1,200	**140**	**140**	**140**	**140**	-	-
Phosphorus, Total (mg/L)	< 0.030	**ND**	**0.012**	**ND**	**0.014**	**0.013**	**0.019**
Phosphorus, Soluble (mg/L)	N/A	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**
Nitrate (mg/L)	< 0.30	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**
Ammonia (mg/L)	<0.100	**0.090**	**ND**	**0.132**	**0.077**	**ND**	**ND**
Total Kjeldahl Nitrogen (mg/L)	<1.0	**0.316**	**ND**	**0.417**	**0.960**	**0.388**	**0.353**
Chlorophyll A	N/A	**ND**	-	**3.90**	-	-	-
Secchi Disk (ft)	> 4	**12**	-	**9.5**	-	**11.0**	-
Cyanobacteria (cells/mL)	< 70,000	**380**	-	**1,500**	-	**1,400**	-
Algae (cells/mL)	NA	**2,500**	-	**2,100**	-	**260**	-

*ND: not detected

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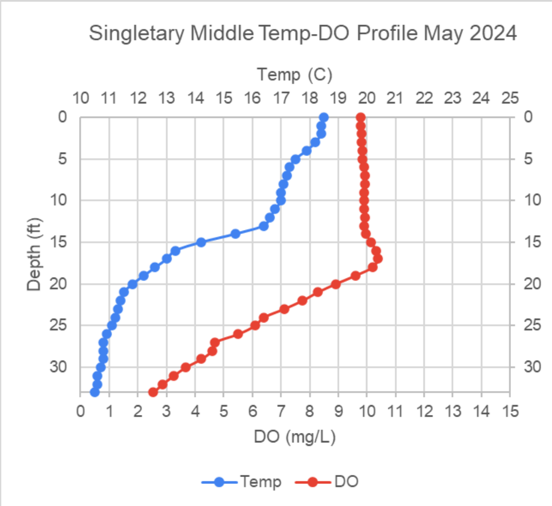
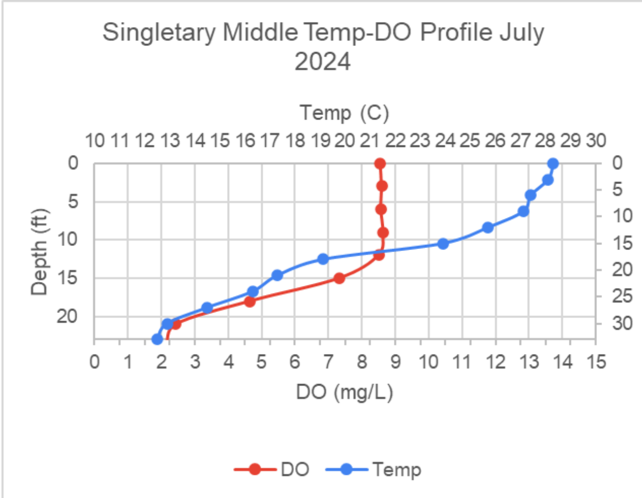
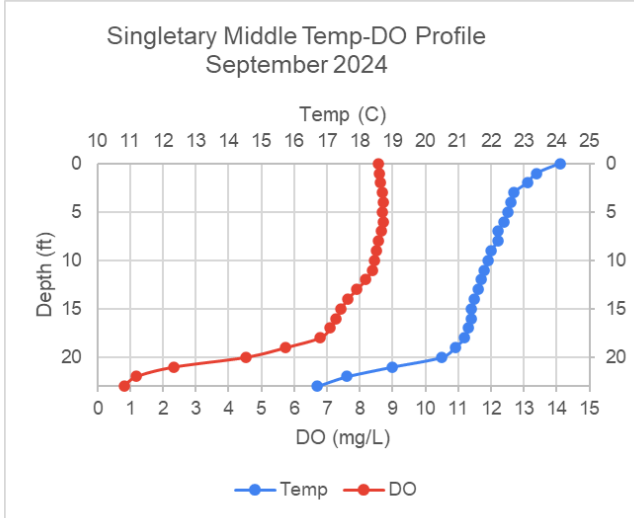
Temperature/Dissolved Oxygen Profiles - Healthy







Definitions

Algae is a naturally occurring organism different from cyanobacteria. Overgrowth can impact water clarity, flow, and nutrient balance.

Alkalinity – The alkalinity of a waterbody is a measure of the acid-neutralizing or "buffering" capacity of the water. Water bodies with higher alkalinity are more resistant to broad swings in pH, which can be stressful for aquatic organisms. Water bodies with lower levels are more susceptible to pH shifts. Alkalinity is influenced by bicarbonates and is reported as the concentration of calcium carbonate (CaCO3) in the water.

≤50 mg/L as CaCO3 low buffered; 51-100 moderately buffered; 101-200 buffered; >200 high buffered

Ammonia is a measure of two constituents, NH3 and NH4+, and is a transitional product in the breakdown of organic nitrogen (from plants, waste, etc) into nitrate. It is typically short-lived in the pond environment except under conditions of low dissolved oxygen. Waterbodies that have a high pH and temperature are susceptible to high ammonia concentration; the higher the pH, the more ammonia will be present within the water column. External sources of ammonia include: fertilizers, wastewater effluent discharge, animal waste, and runoff from agricultural lands. High levels of ammonia are toxic to the aquatic environment, notably fish, and typically indicate a eutrophic pond. Levels higher than 0.100 mg/L can be problematic for aquatic biota, however available dissolved oxygen, pH, and temperature are key factors in 'toxic' levels.

Chlorophyll a – When measured in the water column, Chlorophyll a is the green pigment found in algae and cyanobacteria. It is responsible for the absorption of light for the process of photosynthesis. Analysis of Chlorophyll a can indicate the productivity of the photic zone, and can be used to calculate the Trophic State of the waterbody. Analysis can be compared over time to determine peak algae growth periods during a growing season, and if algae growth is changing year-over-year.

Conductivity – Conductivity is the ability of water to conduct an electrical current. Conductivity increases when more dissolved inorganic solids (positive and negative ions) are present. High sediment loads do not generally increase conductivity readings since sediment particles are generally considered to be suspended rather than dissolved because of their larger size (greater than 2 microns). The geology of the area around the waterbody is the primary factor affecting conductivity, and the readings for a waterbody will generally be within a relatively constant range. Once baseline data for a waterbody has been determined, periodic conductivity readings can be useful to identify potential problems that may need future investigation. <50 uS/cm relatively low concentration may not provide sufficient dissolved ions for ecosystem health;

50-1500 typical freshwaters; >1500 may be stressful to some freshwater organisms, though not uncommon in many areas

Cyanobacteria is a naturally occurring organism that can produce cyanotoxins that can cause physical reactions or health issues in people and animals. A cyanobacteria bloom is considered over 70,000 cells/mL.

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Dissolved Oxygen – Dissolved oxygen (DO) is the amount of oxygen gas dissolved in the water column. Small amounts of oxygen enter the water column by direct diffusion at the air/water interface. However, the primary source of oxygen in a lake or pond is production during photosynthesis by aquatic plants and algae. Lakes and ponds impacted by heavy sediment loads may experience low DO levels since the increased turbidity (cloudiness) caused by suspended clay and soil particles can restrict light penetration and limit photosynthesis. The breakdown of organic matter (i.e., aquatic plants, leaf litter, manure, fish waste) also consumes large amounts of oxygen from the water column. Fish require oxygen for respiration, and become stressed at levels less than 5 mg/L. Colder water is physically able to hold a greater concentration of oxygen then warmer water, and waterbodies may become naturally stressed with low dissolved oxygen levels during the warmer months.

<2 mg/L likely toxicity with sufficient exposure duration; <5 stressful to many aquatic organisms; ≥5 able to support most fish and invertebrates

Phosphorus – Phosphorus can be found in several forms in freshwater, but the biologically available form for nuisance plant growth is soluble, inorganic orthophosphate. Organic phosphates quickly bind to soil particles and plant roots, and consequently, much of the phosphorus in aquatic systems is bound and moves through the system as sediment particles. This organic form of phosphorus is considered to be biologically unavailable. However, under anoxic (zero oxygen) conditions, bound phosphorus can be released from bottom sediments, and the concentration of biologically available orthophosphate can increase dramatically. The erosion of soil particles from steep slopes, disturbed ground, and streambeds is the primary source of phosphorus in aquatic systems. Surface runoff containing orthophosphates from fertilizers and decaying organic matter will also contribute to biologically available phosphorus enrichment.

Total Phosphorus is the measure of all phosphorus in a sample as measured by persulfate digestion and includes inorganic, oxidizable organic and polyphosphates. This includes what is readily available, potential to become available and stable forms.

Soluble Phosphorus remains in the water column, while particulate phosphorus settles to the lake bottom or is attached to suspended particles. Dissolved phosphorus is biologically available, used in aquatic processes such as plant and algae growth. Measures any type of phosphorus dissolved in the water column.

Nitrogen – Nitrogen is a vital nutrient in the pond environment for plant and algae growth. Nitrogen exists in water as various compounds, with relative amounts governed by such things as atmospheric influence, precipitation, biological activity and water chemistry. Total Nitrogen is the sum of Total Kjeldahl Nitrogen (TKN) and Nitrate-Nitrite.

Nitrate – Nitrate is usually the most prevalent form of inorganic nitrogen in the water and results from natural aerobic bacterial activity, fertilizer use, and air-water exchange. It is also the form that is most readily available for plant and algae growth. Levels of Nitrate are ideal at <0.30 mg/L. A maximum of 10 mg/L is set for EPA drinking water standards.

Total Kjeldahl Nitrogen is a measure of the nitrogen contained in organic compounds, such as proteins and amino acids; the summation of ammonia and organic and reduced nitrogen. It is created from biological growth and decomposition. A concentration of 1.0 mg/l or below is considered desirable.

pH – The concentration of acids and bases in the water determines its pH. A low pH (less than 7) is considered acidic, while a high pH (greater than 7) is basic. A pH of 7 is considered neutral. Most aquatic organisms survive best in waters with a pH between 6.5 and 8.5.

Secchi Disk – This is an instrument used to measure water clarity, which is how deep the light can penetrate the water column. Measuring water clarity defines the approximate photic zone, where the greater the clarity, the deeper the photic zone. Turbidity and water clarity are directly related to one another; high turbidity indicates a low water clarity. Low water clarity can be an indicator of high waterbody productivity.