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WATER SAMPLING REPORT

Prepared For: Camp and Center Lake
April 25, 2024

LAB RESULTS

SAMPLE DATE	SAMPLE LOCATION	TEST	RESULTS (ppm)	ANALYSIS
4/15/2024	Camp Lake	Turbidity (NTU)	6.1	**ELEVATED**
		Conductivity (uS/cm)	622	**ELEVATED**
		Free Reactive Phosphorus	<0.005	LOW
		Chlorophyll a (ppb)	13.9	MESOTROPHIC
		Total Phosphorus	0.0371	NORMAL
		Alkalinity	180	LOW
		Total Hardness	229	VERY HARD
		Total Nitrate and Nitrite	0.71	**ELEVATED**
		Nitrite	0.02	LOW
		Nitrate	0.69	**ELEVATED**
		Total Kjeldahl Nitrogen	0.92	NORMAL
		Total Nitrogen	1.63	**ELEVATED**
		pH	7.0	NORMAL
		Ammonia	0.0628	LOW
		Chloride	73.2	**ELEVATED**

SAMPLE DATE	SAMPLE LOCATION	TEST	RESULTS (ppm)	ANALYSIS
4/15/2024	Center Lake	Turbidity (NTU)	4.7	NORMAL
		Conductivity (uS/cm)	630	**ELEVATED**
		Free Reactive Phosphorus	0.0080	LOW
		Chlorophyll a (ppb)	39.6	**EUTROPHIC**
		Total Phosphorus	0.0515	NORMAL
		Alkalinity	174	LOW
		Total Hardness	230	VERY HARD
		Total Nitrate and Nitrite	0.88	**ELEVATED**
		Nitrite	0.03	LOW
		Nitrate	0.85	**ELEVATED**
		Total Kjeldahl Nitrogen	1.22	**ELEVATED**
		Total Nitrogen	2.10	**ELEVATED**
		pH	7.3	NORMAL
		Ammonia	0.0706	LOW
		Chloride	76.1	**ELEVATED**

RECOMMENDATIONS

Nitrogen, chloride, and conductivity are all elevated but have not changed significantly over time. Aside from examining watershed stormwater inputs for potential improvements, there are no further recommendations at this time.

WATER QUALITY ANALYSIS DESCRIPTIONS

Reactive Phosphorus: A measure of readily available phosphorus. The reactive form of this nutrient is in a usable form for aquatic plants and especially algae. Fertilizers, animal wastes and septic systems are main sources of this nutrient. Ideally, reactive phosphorus concentrations during the spring should be 0.020 ppm for natural water bodies and 0.030 ppm for impoundments. Values greater than 0.030 ppm may lead to algal blooms.

Total Phosphorus: Usually considered more representative of a waterbody's nutrient level because it remains more stable than reactive phosphorus. Total Phosphorus includes reactive phosphorus plus particulate phosphorus (what is being taken up in growth or contained in suspended sediments). Fertilizers, suspended sediments, animal wastes, and septic systems are the main sources of this nutrient. Average concentrations are 0.025 ppm for natural lakes while impoundments may be around 0.065 ppm. Our extensive data also shows that stormwater ponds typically have average total phosphorus concentrations that are 48% higher than non-stormwater ponds. Total phosphorus can be used to estimate the trophic status (biological condition) of a waterbody. Generally total phosphorus <0.012 ppm oligotrophic; 0.012 – 0.024 ppm mesotrophic; 0.025 – 0.096 ppm eutrophic; >0.096 hypereutrophic.

Nitrite plus Nitrate Nitrogen (NO2+NO3): These are inorganic forms of nitrogen important for plant and algae growth. High levels (>10 ppm) are dangerous to infants and expectant mothers. Typically, if the sum of nitrite plus nitrate and ammonia exceeds 0.30 ppm in the spring, there is sufficient nitrogen to support summer algal blooms. Because nitrate is readily mobilized in water, it is often considered an early indicator that a pollution source is reaching a water supply. Common sources include septic systems, refuse dumps, fertilizers, manure, and decaying plant matter.

Total Kjeldahl Nitrogen (TKN): TKN is a measure of organic nitrogen plus ammonia (NH3). Typically, the organic-N in TKN is the largest portion and found in proteins, amino acids, urea, living or dead organisms, decaying plant material, and organic based sediments like muck. When TKN is added to nitrite plus nitrate, the resulting value is the total nitrogen of a waterbody which can be used to calculate nitrogen to phosphorus ratios. For our area, TKN values range between 0 and 1.0 ppm. Although the organic portion is usually not available for growth, plants and algae do convert other forms of nitrogen back to the organic form. Ultimately high TKN values can indicate potential growth impacts, runoff issues or organic sediment accumulation.

Total Nitrogen: Total nitrogen (TN) is the sum of all the organic and inorganic nitrogen. It is derived by adding the Total Kjeldahl Nitrogen (TKN) and Nitrite plus Nitrate. There has been a recent effort to develop total nitrogen related water quality criteria but interpretations above our using our extensive database. The average TN in this area is 0.66 ppm for lakes, 0.90 ppm for ponds, and 1.23 ppm for stormwater ponds.

Ammonia Nitrogen (NH3): Ammonia (NH3) is the first form of nitrogen released when organic material decays which is converted to nitrate if oxygen is present. It is a waste product of fish and aquatic invertebrates and found in organic materials and many fertilizers. If the sum of ammonia nitrogen and nitrite plus nitrate nitrogen exceeds 0.30 ppm in the spring, there is sufficient nitrogen to support summer algae blooms. Animal manure and fertilizers are other important sources of this nutrient. We often find higher levels of ammonia in stormwater ponds.

Alkalinity: A measure of the level of carbonates, bicarbonates, and hydroxide present in water that largely determines a waterbody's pH level. Low alkalinity (0 – 199) is the main indicator of susceptibility to acid rain. High alkalinity (200+) means a low impact from acid rain. Increasing alkalinity is often related to increased algae productivity. Additionally, high alkalinity can result in the formation of marl, which is a combination of calcium (Ca) and carbonate (CO3). It can often be observed as a white precipitate on plant leaves and is responsible for bonding with phosphorus resulting in algae reductions.

Conductivity: A measure of water's ability to conduct electrical current. This number is directly related to the total dissolved inorganic chemicals in the water. Values are commonly two times the water hardness unless the water is receiving high concentrations of contaminants introduced by humans.

Total Hardness: A measure of mineral content, typically calcium and magnesium ions. This value is affected by the type of minerals in the soil and bedrock and by how much groundwater comes into contact with it. Values over 180 ppm are considered to be "very hard". Much of Wisconsin and N. Illinois generally have very hard water.

pH: An index of waterbody's acid level. A pH of 7 is neutral, below 7 is acidic, and above is considered basic. Moderately low pH levels do not usually harm fish, but some metals can become soluble and be released into the water which may harm fish. Waterbodies dominated by a large amount of plants or algae can experience large fluctuations in pH levels from day to night. pH is measured logarithmically meaning a pH of 6 is ten times more acidic than a pH of 7 and one hundred times more acidic than a pH of 8.

Turbidity: One of the two components that affect water clarity. Measures the materials suspended in the water such as algae and silt which ultimately affects the depth at which plants can grow. Suspended particulates are an indicator of overland flow (run-off) and disturbances within the water body itself (bottom-feeding fish, crayfish, muskrat activity, etc.). Levels > 50 NTU have the potential to impact aquatic life.

Chloride (Cl): The presence of chloride where it does not occur naturally indicates possible water pollution, commonly from human activity. Human and animal wastes, fertilizers, and road salts are major chloride sources. In the U.S., there is a secondary (non-enforced) drinking water standard of 250 ppm. Additionally, research shows at levels greater than 210 ppm, aquatic life may be impacted. Typically, an increase in chloride is found during the spring turnover due to runoff from roads that have been salted over the winter.

Chlorophyll a: This is a primary light-harvesting pigment found in algae and a measure of the algal productivity and water quality in a system. Chlorophyll a is considered the best indicator of trophic status (biological condition). Generally, chlorophyll a <2.6 ppb oligotrophic – clear water, low productivity, large game fish; 2.7 - 20.0 ppb mesotrophic – increased production, accumulated organic material, occasional algal bloom, good fishery; 20.0 - 56.0 ppb eutrophic – very productive (fishery and growth), increased organic material, depleted oxygen, declining clarity, rough fish common; >56 ppb hypereutrophic – highly productive (growth), excessive organic material, depleted oxygen with frequent winterkills, poor clarity, declining fish population with rough fish common.