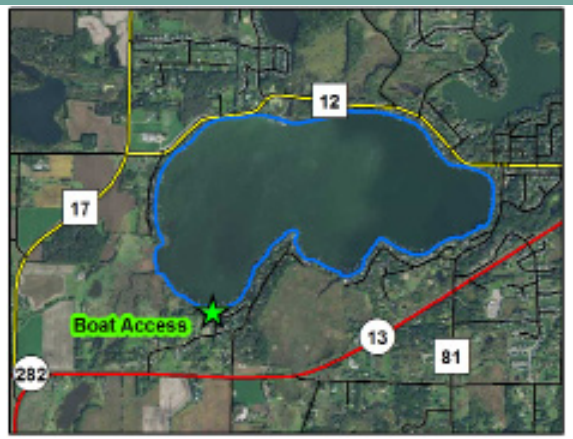
SPRING LAKE: Water Quality Report Card

PRIOR LAKE - SPRING LAKE WATERSHED DISTRICT

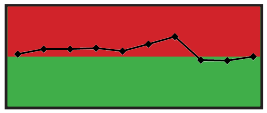
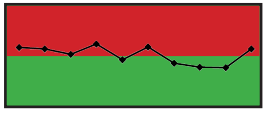


Quick Facts

Surface Area: 587 acres
Watershed Area: 12,430 acres
Average Depth: 18 feet
Maximum Depth: 34 feet
Ordinary High Water Level and No Wake Zone: 912.8 feet above sea level
Connectivity to waterbodies: Spring Lake receives water from the upper watershed and drains into Upper Prior Lake.
Impairment Status: The lake is "impaired" for excess nutrients, specifically phosphorus.

Grading System

The District monitors serveral lake water quality indicators, including the four that are shown in the table below. To assess the lake quality on Spring Lake, a letter grade was assigned for each water quality indicator based on how well the parameter met a water quality standard over a three-year period. Trends and graphs show how water quality changed over a ten-year period to help determine how well we're improving our lake quality. More information on how these grades and trends were developed can be found on our website: www.plslwd.org.

Water Quality Indicator	Risk to Water Quality	Grade (2014-2016)	10-Year Trends & Goals (2007-2016)		Summary
			Trends	Graph	
PHOSPHORUS	Phosphorus is needed by plants and animals to survive, but can cause algae blooms if too much is available. In some cases, algae can contain a toxin which could cause illness or death in animals if ingested. Some sources of high phosphorus are fertilizer, human and animal waste, and soil erosion.	B	*Improving*		34% improvement over the last 10 years, much of it since the 2013 alum treatment.
CHLOROPHYLL-A	Chlorophyll-a is a measurement of the amount of algae in a lake. Some algae can produce dangerous toxins and the decomposition of algae consumes oxygen that would otherwise be used by fish and beneficial organisms. High algal concentrations threaten aquatic life and can impede recreation and enjoyment of the lake.	D	*No Trend*		No discernable trend over the last 10 years, despite very recent improvements. Blooms remain frequent.
CLARITY	Clarity is affected by the amount and algae or sediment in the water. The amount of algae and sediment present is dependent on many factors including nutrients, temperature, wind, rain, and boat traffic. Low clarity means water is more "cloudy" and less sunlight is available for aquatic plants to grow. Low clarity can also negatively impact a lake user's enjoyment and harm aquatic life.	C	*Improving*		Water clarity remains an issue in Spring Lake, although it witnessed a 70% improvement over the last 10 years.
CHLORIDE	Chlorides can enter lakes through de-icing road salts, water softeners, and human and animal waste. Unnaturally high levels of chloride are toxic to plants and aquatic life. Once in the water, there is no easy or inexpensive way to remove chloride.	A	Insufficient data to determine trend.		Samples well below threshold. Additional years of data needed to determine any trend over time.

Grading Scale: Determined by three-year data analysis (2014-2016).

Excellent	Good	Average	Marginal	Poor
A	B	C	D	F
All or most samples meet the desired threshold.	Many samples meet or are near the desired threshold.	Some samples meet or are near desired threshold.	Many samples do not meet the desired threshold.	Most samples do not meet the desired threshold.

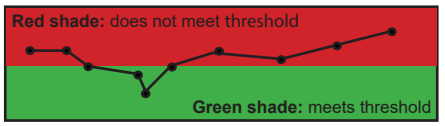
Trend Explanation: Water quality trends over ten years (2007-2016).

Improvement in water quality from indicator over 10-year period.

No significant increase or decrease in data over 10-year period.

Decline in water quality from indicator over 10-year period.

Example graph of average annual departure from threshold (2007-2016)



SPRING LAKE: What is PLSLWD doing to improve water quality?

BACKGROUND

Spring Lake is a recreational lake located directly upstream (southwest) of Upper Prior Lake. Both Spring and Upper Prior Lakes are listed on the state's Impaired Waters List. They are impaired (polluted) for aquatic recreation due to excess nutrients. Water quality monitoring, completed by the Prior Lake-Spring Lake Watershed District (PLSLWD), identified phosphorus as the nutrient contributing the most to the lake's water quality impairment and algal blooms.

Phosphorus is a nutrient that is important for animal and plant life in lake ecosystems and Spring Lake has historically had high phosphorus levels. However, too much phosphorus can cause a chain reaction of undesirable events. If there is too much phosphorus in the water, this pollutant can feed algal blooms which can cause fish kills, dog deaths, human sickness, or interfere with recreation.

PLSLWD is helping to improve water quality of Spring Lake in many ways. Some smaller projects to improve water quality include raingardens, shoreline restorations, and public infrastructure partnership projects. A few of PLSLWD's major water quality projects are highlighted on this page.

MANAGING CARP POPULATIONS

Common carp are an invasive species, originally from Eurasia, and very common in Prior and Spring Lake. Carp adversely impact water quality by uprooting aquatic plants and stirring up sediments from the lake bottom and releasing phosphorus which can lead to harmful algal blooms.

Carp removal on Spring Lake using seine nets

PLSLWD's carp management program includes ongoing efforts to reduce the carp population by tracking carp movement with radio-tags, installing barriers to block pathways to their prime spawning habitat, and continuing to remove carp from the lake using seine nets.

In 2017, roughly 70% of the carp in Spring Lake were removed during a winter seine (netting) event. This event brought the lake's carp population well under the level at which carp are considered detrimental to lake water quality. Efforts to remove carp will continue, but removals in Upper Prior Lake will be prioritized since the population is over three times the target population level.

REDUCING INTERNAL SOURCES OF POLLUTION

Alum treatment on Spring Lake

Phosphorus can enter the lake from external sources, like streams and ditches. After years of accumulation, phosphorus builds up internally in the sediments on the lake bottom. Phosphorus stored in lake sediments can be difficult to control because, under certain circumstances, phosphorus in the lake sediments can be released back into the lake water.

Alum Treatment: In order to help control the internal phosphorus, an aluminum sulfate (alum) treatment on Spring Lake was completed in 2013, which improved water quality in the lake and led to fewer algal blooms and clearer water. Two more doses of alum will be completed, one of them is planned for 2018. Following an alum treatment, water quality initially improves but eventually declines over time. Treatments are a short-term solution, and help to manage the phosphorus level while more permanent solutions are implemented. External pollution sources must be managed for long-term improvements.

REDUCING EXTERNAL SOURCES OF POLLUTION

Removing phosphorus from the water before it reaches Spring Lake is important because any phosphorus entering the lake is added to the internal phosphorus already in the lake.

Ferric Chloride Treatment System: In 1998, PLSLWD constructed a ferric chloride treatment system to reduce phosphorus in the largest ditch flowing into Spring Lake. This treatment system reduces phosphorus by an average of 60% before it flows into Spring Lake.

Agriculture Projects: PLSLWD also works with farmers to prevent erosion, and therefore, soil and nutrients, from entering streams and ditches which flow to the lakes. In 2015, PLSLWD formed the Farmer Led Council, a group of farmers that research and implement agricultural projects on their land to improve water quality.

Wetland Restorations: Large volumes of water can also have a negative impact on water quality. Three wetlands have been restored in the watershed that flows to Spring Lake. This reduces downstream flooding by storing water upstream and lowering peak lake levels. The wetlands also filter the water that flows through it which improves the quality of the water.

Wetland Restoration, Filter Strips, and Terraces in the Spring Lake watershed

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What Can You Do to Help?

Visit www.plslwd.org/get-involved to learn how today!