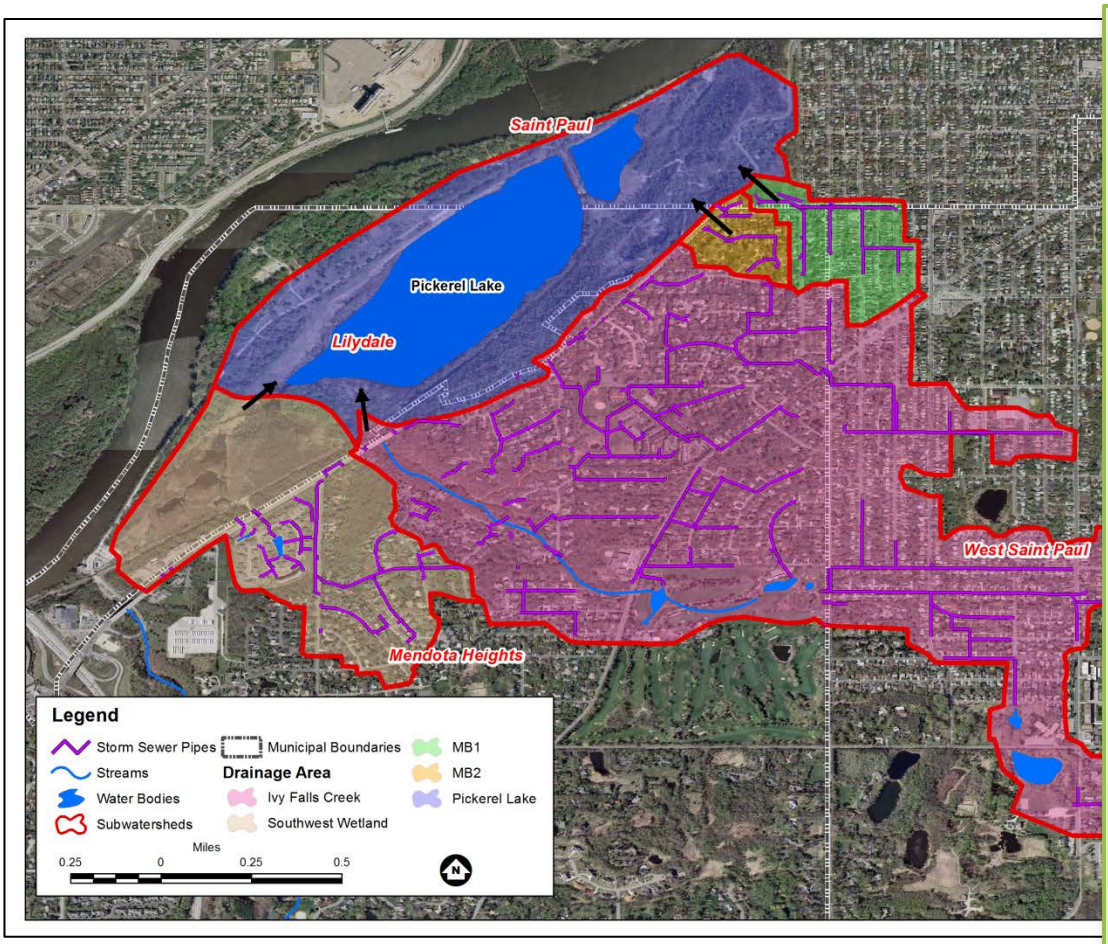
Pickerel Lake

Results of a Water Quality Study on Pickerel Lake in Lilydale and St. Paul

Sub-watershed Area: 1,320 acres Lake surface area: 115 acres Maximum lake depth: 11 feet
Lake condition: Poor water quality due to excessive nutrients (phosphorus) that spur algae growth
Sources of nutrients: Runoff from streets and yards above the bluff, Mississippi River water during floods, and recycled nutrients from the lake bottom and an adjacent wetland

In 2012 and 2013, the Lower Mississippi River Watershed Management Organization (LMRWMO) studied five lakes, including Pickerel Lake, to gain a better understanding of their water quality, sources of pollution, and the pollution reductions needed to improve the water quality and meet State standards. The Minnesota Pollution Control Agency funded the project through the Clean Water Land and Legacy Act. The project, called a "Watershed Restoration and Protection Strategy (WRAPS)" resulted in restoration plans for lakes with poor water quality, like Pickerel, and protection plans for lakes with good water quality.

Pickerel Lake is located in the Mississippi River floodplain and normally discharges to the River under normal conditions. However, when Mississippi River levels are high enough, the lake is inundated with river water – either from water flowing back into the lake's normal outlet to the river, or from river water flooding across land to the lake, or both. This greatly affects the water quality of the lake. Pickerel Lake's water quality has been monitored for three years: from 2010 through 2012. During that time, the Mississippi River inundated the lake during portions of 2010 and 2011.



Pickerel Lake is located in the Lilydale-Harriet Island Regional Park in the cities of Lilydale and St. Paul and is owned and maintained by the city of St. Paul. The lake has a launch for non-motorized boats and shoreline fishing access from Lilydale Rd. The land area contributing runoff to the lake (the watershed) is located mostly above the bluff and flows into the lake through Ivy Falls Creek and other storm water outfalls. Land use in the watershed is mostly low-density residential, with some high-density residential and institutional land use, along with park and recreational space around the lake.

Water Monitoring Results

Pickerel Lake has a maximum depth of 11 feet and therefore must meet Minnesota water quality standards for shallow lakes (see table below). Pickerel Lake was monitored in 2010, 2011 and 2012. In 2010, total phosphorus and chlorophyll a concentrations did not meet State standards and in 2011, none of the parameters met State standards. These were years in which the lake was inundated with Mississippi River water during flooding. In 2012, the lake was not impacted by River water and while its water clarity did not meet State standards, total phosphorus and chlorophyll -a remained below State standards.

Parameter	Result (average of multiple summer samples)		Meets state water quality standard?
Total phosphorus concentrations during the summer must be less than 60 micrograms per liter (ug/l)	2010	91 ug/l	No
	2011	123 ug/l	No
	2012	46 ug/l	Yes
Chlorophyll-a concentrations must be less than 20 ug/l	2010	46 ug/l	No
	2011	69 ug/l	No
	2012	13 ug/l	Yes
Water clarity (Secchi disk depth) must be greater than 1 meter (3.3 ft)	2010	1.1 m	Yes
	2011	0.60 m	No
	2012	0.94 m	No

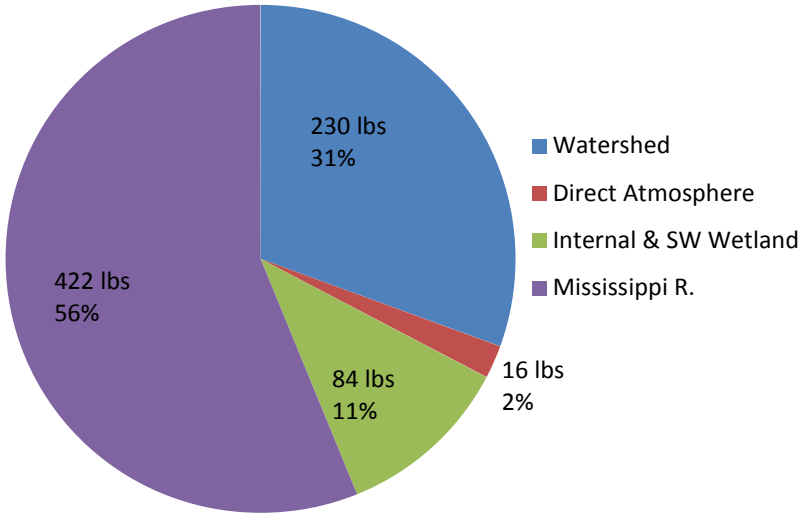
Phosphorus is the plant nutrient that most often stimulates the growth of algae. A lake that is rich in phosphorus has the potential for abundant algal growth, which can reduce water clarity.

Chlorophyll a is the main photosynthetic pigment in algae. Too much chlorophyll-a indicates an abundance of algae in the lake.

Water clarity, or transparency, is often measured with a **Secchi disk -** a black and white disk that is lowered into the water until it disappears from view. The depth at which it is no longer visible is measured numerous times to get an average for the summer.

Sources of Phosphorus

Pickerel Lake receives nutrients, like phosphorus, from a variety of sources. Monitoring and modeling results indicate the majority of the phosphorus in Pickerel Lake comes from the Mississippi River when it inundates the lake. Another significant source of phosphorus is stormwater and snow melt running off residential areas in the watershed on top of the bluff. Grass clippings, fertilizers, and leaves collecting in streets and flowing into storm drains contribute to the phosphorus levels in the lake.



Phosphorus is also released internally from lake bottom sediments (which accumulated from past floodwaters and watershed runoff) and from the wetland adjacent to the southwest corner of the lake.

Strategies for Reducing Phosphorus in Pickerel Lake

The WRAPS report and restoration plan for Pickerel Lake indicates that phosphorus coming from the Mississippi River, the adjacent wetland, and lake sediments will require significant reductions. Phosphorus carried in stormwater runoff from areas above the bluff should also be reduced. These reductions in phosphorus are needed to improve the water quality of the lake and reduce algae growth. This will, in turn, allow sunlight to reach more of the lake bottom, improving rooted aquatic plant growth, habitat, and lake oxygen levels.

Additional recommended strategies for Pickerel Lake include:

- Monitoring water quality and lake levels in Pickerel Lake and the inflow from Ivy Falls Creek
- Monitoring the southwest wetland to determine water quality impacts on Pickerel Lake
- Studying ravine/bluff stabilization options along Ivy Falls Creek and areas contributing phosphorus in the northeast section of the lake to identify and prioritize individual sources of erosion and stabilize ravines
- Improving Mississippi River water quality (as part of overall implementation actions for the Lake Pepin watershed)

What Can You Do? Treat Your Curb Like a Shoreline

We all live in a watershed. Sometimes it's obvious our property drains to a particular body of water; sometimes it's not. Those in the Pickerel Lake watershed above the bluff may not be aware their property eventually drains through Ivy Falls Creek and into the lake (see map on front). Even if you live several blocks or miles from the lake, runoff from your property drains to the lake through stormsewer pipes under your street – essentially turning every curb into a shoreline. Stormsewer systems are different from the sanitary sewer systems in which water used *inside* your home is treated at a wastewater treatment plant before being discharged to a waterbody. *Outside* your home, stormsewers collect rainwater and snowmelt leaving your property and convey them to Pickerel Lake without treatment.

A storm drain funnels rain and snowmelt into stormwater pipes to prevent flooding. But, they also carry pollutants (like oil, deicers, and fertilizers) along with leaves and grass clippings into nearby lakes, streams, or wetlands.

Pollutants carried in that runoff include lawn fertilizers, nutrients from decaying grass clippings and leaves, pesticides, toxins from coal-tar driveway sealants, oil from leaking cars, pet waste, and salt, sand and other deicers. In the lake, these pollutants result in poor water quality – effecting aesthetics and recreational enjoyment of the lake as well as fish, bugs, birds, and their habitats.

You can be part of the solution by using some easy practices at home

- ✓ *Sweep up grass clippings, fertilizer, leaves, and extra sand and salt before they get into the storm drain (compost grass and leaves; save fertilizer, sand and salt for reuse)*
- ✓ *Clean up after your pet (put waste in trash)*
- ✓ *Install a rain barrel to collect rainwater for use in gardens*
- ✓ *Keep your car in good repair to avoid leaks*
- ✓ *Use asphalt-based driveway sealants (or if using a service, ask the company to use them)*
- ✓ *Wash your car on the lawn (where city rules allow) so water soaks into the ground*
- ✓ *Install a raingarden to capture runoff from your roof or driveway and let it soak into the ground. (Note: this may not be possible or appropriate for properties on the river bluff or with shallow depth to bedrock.)*

Ivy Falls Creek flows into Pickerel Lake from the watershed above the bluff.