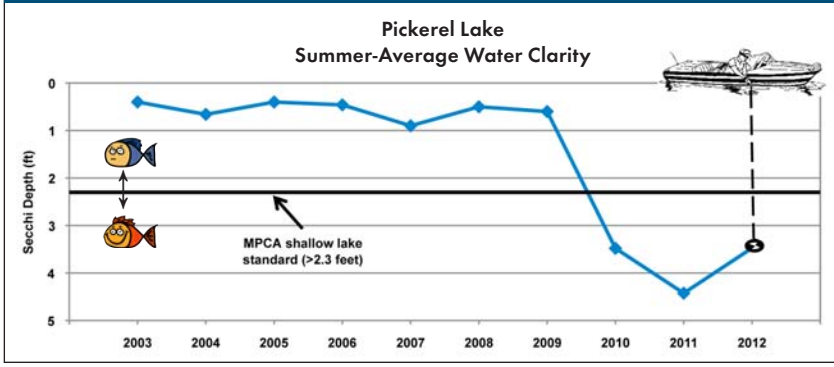
2012 Clean Water Summary: **Pickerel Lake**

Watershed area: 5,120 acres • Lake surface area: 620 acres• Maximum lake depth: 6.0 feet • Mean lake depth: 3.8 feet

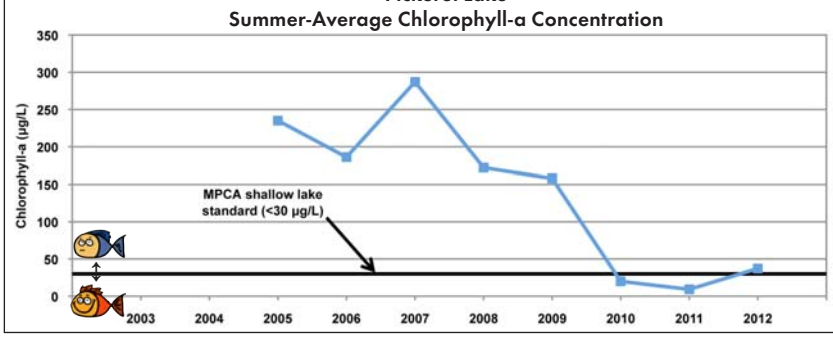
The Shell Rock River Watershed District (District) performs field surveys and collects water samples from Pickerel Lake twice a month from June through September. The District uses this information to guide watershed and lake management activities.

Water Quality Indicator: **Water Clarity**



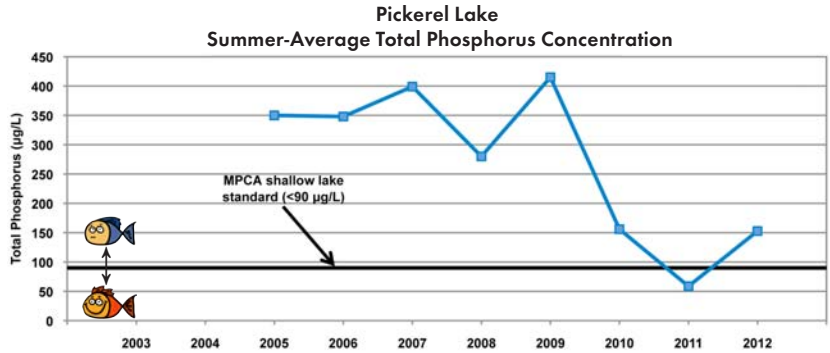
Water clarity in Pickerel Lake has been monitored regularly since 2003. The clarity of the water is measured by lowering a black and white disk (Secchi disk) into the water and recording the depth at which it is no longer visible. For the third straight year the summer-average clarity of Pickerel Lake met the Minnesota Pollution Control Agency's (MPCA) standard. This improvement can be attributed to the District's Pickerel Lake reclamation project.

Water Quality Indicator: **Chlorophyll-a**



The District has monitored chlorophyll-a, the main photosynthetic pigment found in algae, in Pickerel Lake since 2005. In each of the five years prior to the Pickerel Lake reclamation project (fall 2009), the summer-average chlorophyll-a concentration in the lake was over five times the MPCA's standard for shallow lakes in southern Minnesota. After the project, summer-average chlorophyll-a concentrations met the standard in 2010 and 2011, and narrowly exceeded the standard in 2012.

Water Quality Indicator: **Phosphorus**



The District has monitored phosphorus—a plant nutrient that stimulates the growth of algae in lake water—in Pickerel Lake since 2005. Summer-average phosphorus concentrations in the lake have historically been higher than the MPCA's standard for shallow lakes in southern Minnesota. In 2012, summer-average phosphorus concentration did not meet the standard, but remained lower than the historical concentrations seen prior to the Pickerel Lake reclamation project (fall 2009).

Continued on reverse

In-Depth: **Tracking Pickerel Lake's Recovery**

The District has closely tracked Pickerel Lake's remarkable recovery from a pea-green, carp-infested lake to a clear-water lake that is much more inviting to fish and wildlife. Improved water clarity has resulted in a resurgence of aquatic plants in the lake, including the undesirable curly-leaf pondweed (CLP), a non-native invasive aquatic plant that can degrade water quality. CLP grows vigorously in the spring and then dies back by mid-summer, releasing phosphorus into the water as it decomposes. This phosphorus release often stimulates rampant algal blooms.

On Curlyleaf's Trail

Controlling the spread of CLP in a lake can be a daunting and expensive challenge. To help determine if an intensive CLP management effort is advisable for Pickerel Lake, the District has been vigilantly monitoring its spread and potential water quality impacts. The spring 2012 survey showed that CLP was present in most of Pickerel Lake and particularly abundant at the south end of the lake near the boat landing and in the central part of the lake (see photo at top right). The thick beds of CLP found during 2012 had the potential to impact Pickerel Lake's water quality by adding large amounts of phosphorus to the water column. To assess the impact, District staff monitored physical water quality parameters, such as water clarity, and chemical indicators of water quality, including phosphorus and chlorophyll-a.

The District collected water samples every 7 to 14 days and analyzed the samples using two different tests for phosphorus. One test detects orthophosphate (OP), a dissolved form of phosphorus which is released when CLP decomposes and is easily taken up by algae. The second test detects total phosphorus (TP), which includes all forms of phosphorus in the water sample, including OP, phosphorus clinging to suspended sediment, and biological phosphorus in algae or zooplankton. The water samples were also tested for chlorophyll-a to evaluate how algal populations changed in response to varying phosphorus levels.

Piecing Together the Clues

The graph below summarizes the 2012 water quality monitoring results, with OP concentration shown in light blue shading, TP concentration in dark blue shading, and chlorophyll-a concentration as the light green line. The data show that algal populations were low during the early season even though TP concentrations were high. When higher concentrations of OP became available in late June—a likely result of the CLP dieback—algae reproduced rapidly to reach high densities. While the 2012 data suggest a water quality response to CLP dieback, it is difficult to establish a clear cause-and-effect relationship based on one year of data. Continued monitoring of CLP abundance and water quality impacts in Pickerel Lake in upcoming years will help the District assess the need for future CLP management activities.