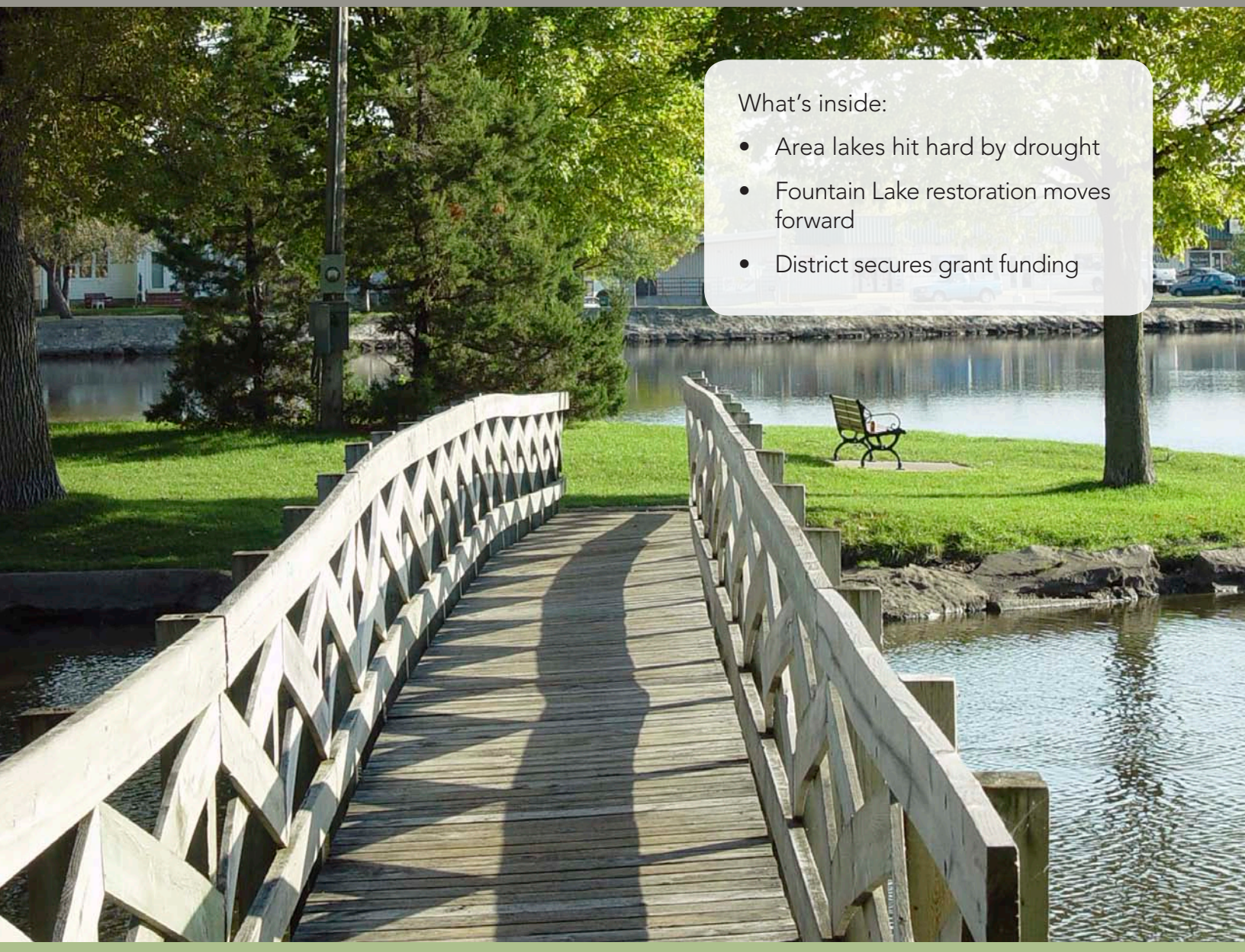
Shell Rock River Watershed District
Working Together to Improve Water Quality

Clean Water Report for 2012

Annual Summary of Water Quality Monitoring Program
Shell Rock River Watershed District



What's inside:

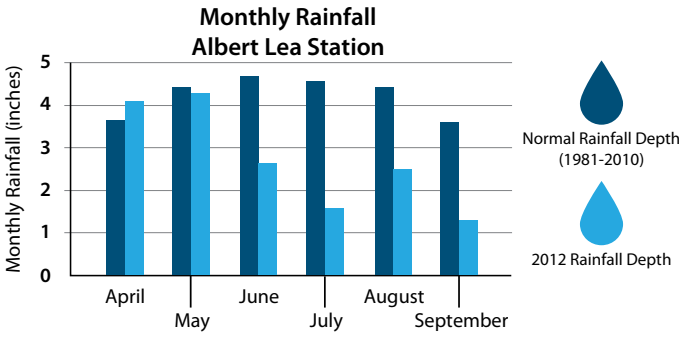
- Area lakes hit hard by drought
- Fountain Lake restoration moves forward
- District secures grant funding

March 2013

Understanding Water Quality in a Dry Year

2012 drought has major effect on lake water quality

The Shell Rock River Watershed District was hit hard by the 2012 drought. Below-normal rainfall in August 2011 followed by a mild winter set the stage for a dry 2012. Although normal rainfall in the spring of 2012 raised hopes that the drought had broken, rainfall during the summer and fall was well below normal. District lakes were severely impacted by the drought, and those impacts were visible to anyone visiting Albert Lea Lake and Fountain Lake, where algal blooms and receding shorelines told the tale. Upper Twin Lake, located in the southwest part of the District, was completely dry by summer's end.



How does rainfall affect lake water quality?

Depending on its timing and intensity, rainfall can have either positive or negative effects on lake water quality. For example, runoff from a heavy rainfall could bring large volumes of unwanted pollutants and nutrients into a lake, thus degrading water quality. But in the Shell Rock River Watershed District, the lakes rely on rainfall and runoff to maintain their water levels. As water levels decrease, pollutants and nutrients in the lake become more concentrated. Without adequate rainfall to dilute pollutants and flush out the lakes, water quality suffers.

Summer heat leads to higher water temperatures

Lake water quality is not only affected by pollutants, but also by water temperature. The 2012 drought was notable for the high temperatures that accompanied it. The hot weather raised lake water temperatures and increased evaporation rates, further depressing water levels. Higher lake water temperatures lead to a number of adverse impacts, including oxygen depletion, increased algal blooms, and fish kills (see article, page 2).

Fountain Lake showed the effects of the 2012 drought.

The 2012 drought affected the water levels and water quality of Albert Lea Lake.

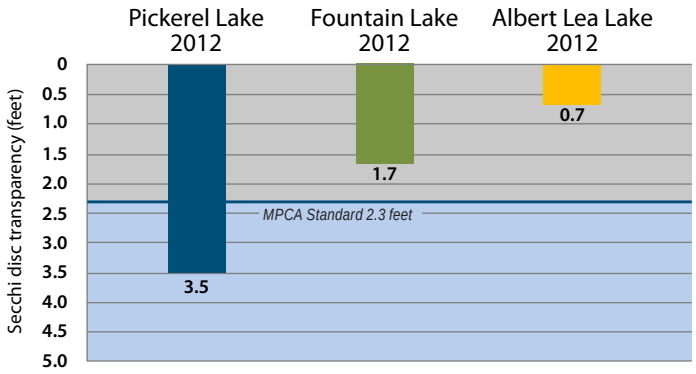
The good news

Pickerel Lake was remarkably resilient during the drought. While phosphorus and algae concentrations were higher than in 2011, water clarity was still better than MPCA guidelines. Most likely the good results can be attributed to two successful water quality initiatives: the fish barrier on Mud Lake that keeps out invasive species (2008); and the restoration project (2009) that eliminated rough fish in Pickerel Lake. These helped Pickerel Lake remain an inviting recreational amenity in the District, even with less-than-inviting heat and drought.

Looking forward to 2013

Water quality in Albert Lea Lake and Fountain Lake worsened in 2012 compared to 2011, but the results need to be put into perspective. Both of these lakes tend to have better water quality during years with a lot of rainfall, and will likely rebound once rainfall returns to normal. If precipitation levels return to normal in 2013, water quality should improve in Fountain Lake and Albert Lea Lake.

Summer-Average Transparency



Fish not immune to drought

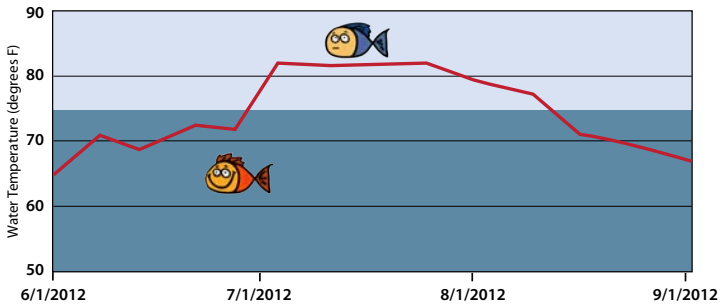
Excessive heat that accompanied the 2012 drought raised lake water temperatures and lowered water levels. Warm water holds less oxygen, and the combination of warm water and low oxygen can stress some fish species. In early July of 2012, more than 200 fish were found floating in Fountain Lake. A similar fish kill was observed on Pickerel Lake later in the month. In both cases most of the dead fish were Northern Pike, which prefer cool waters and are stressed when water temperatures exceed 75 degrees. The District's lake monitoring program showed that Pickerel Lake's daytime water temperature was over 80 degrees for most of July, well into the stressful range for pike (see graph below).

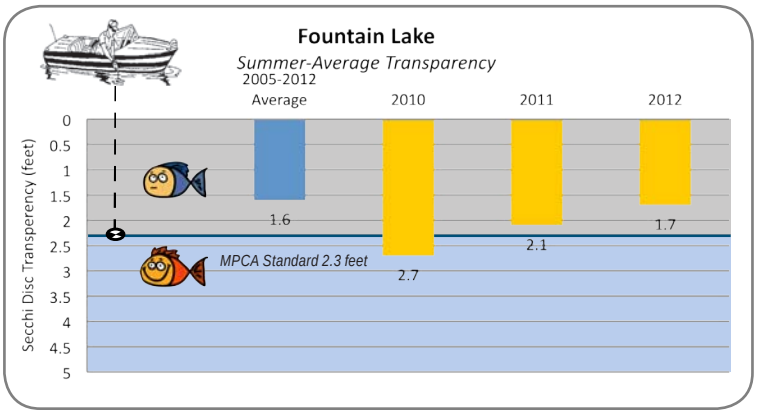
Source: Fountain Lake Sportsmen's Club

Over 200 fish were found dead in Fountain Lake in July, 2012.

Because Fountain Lake and Pickerel Lake are so shallow, there are no deeper, cooler waters where fish can seek refuge. Fortunately, the fish kills were relatively minor, and the number of fish that died represented a small portion of the lake-wide populations.

Pickerel Lake Water Temperature

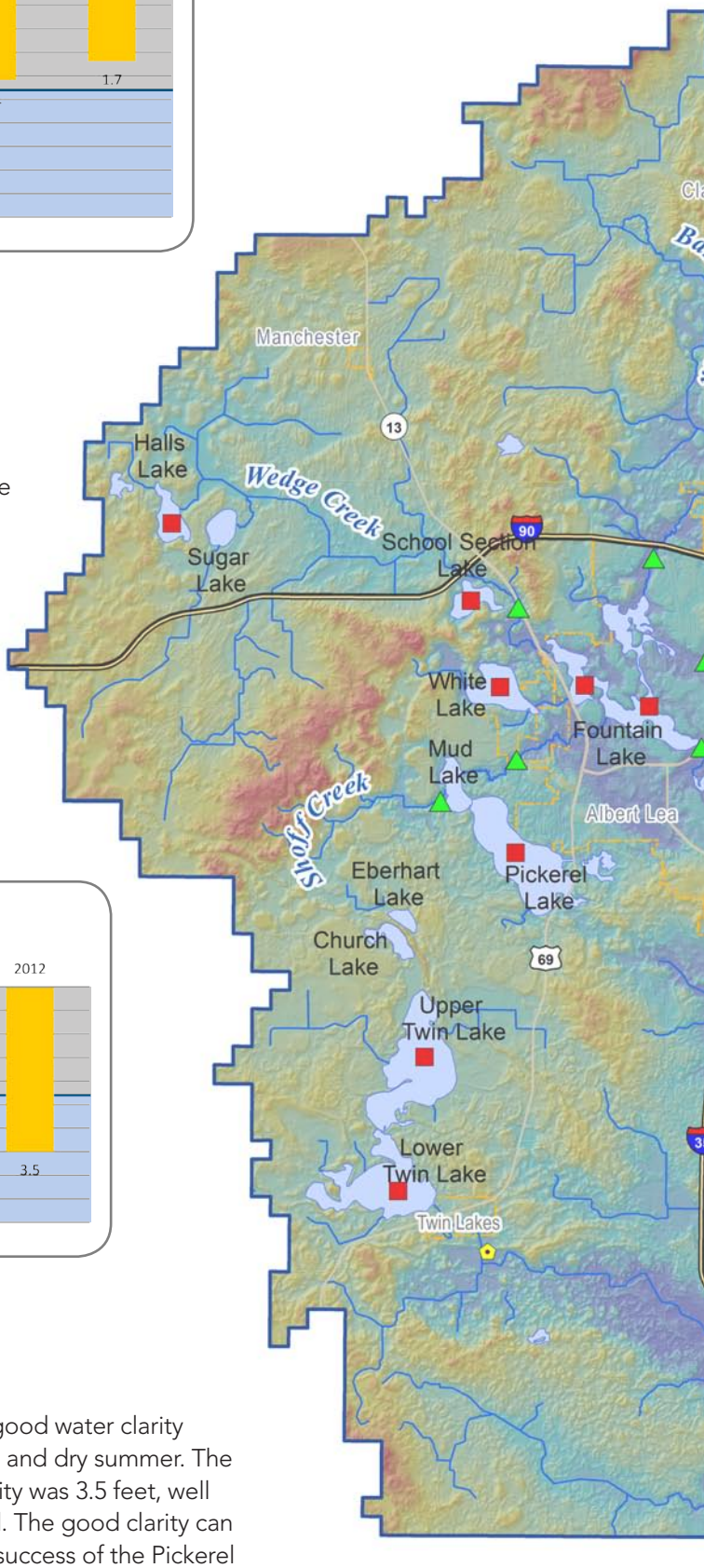


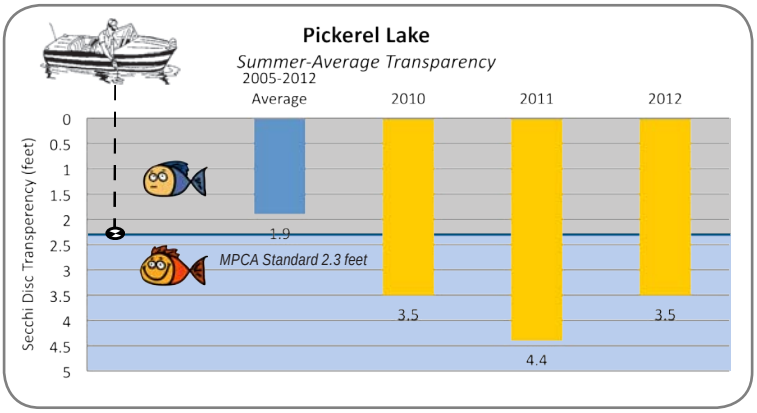


Fountain Lake

Drought takes a toll

The summer-average water transparency in Fountain Lake in 2012 was 1.7 feet—worse than the MPCA's standard but still slightly better than the lake's long-term average. Clarity has declined in each of the last two years due to an extended drought, which began in July of 2011.





Pickerel Lake

A new normal

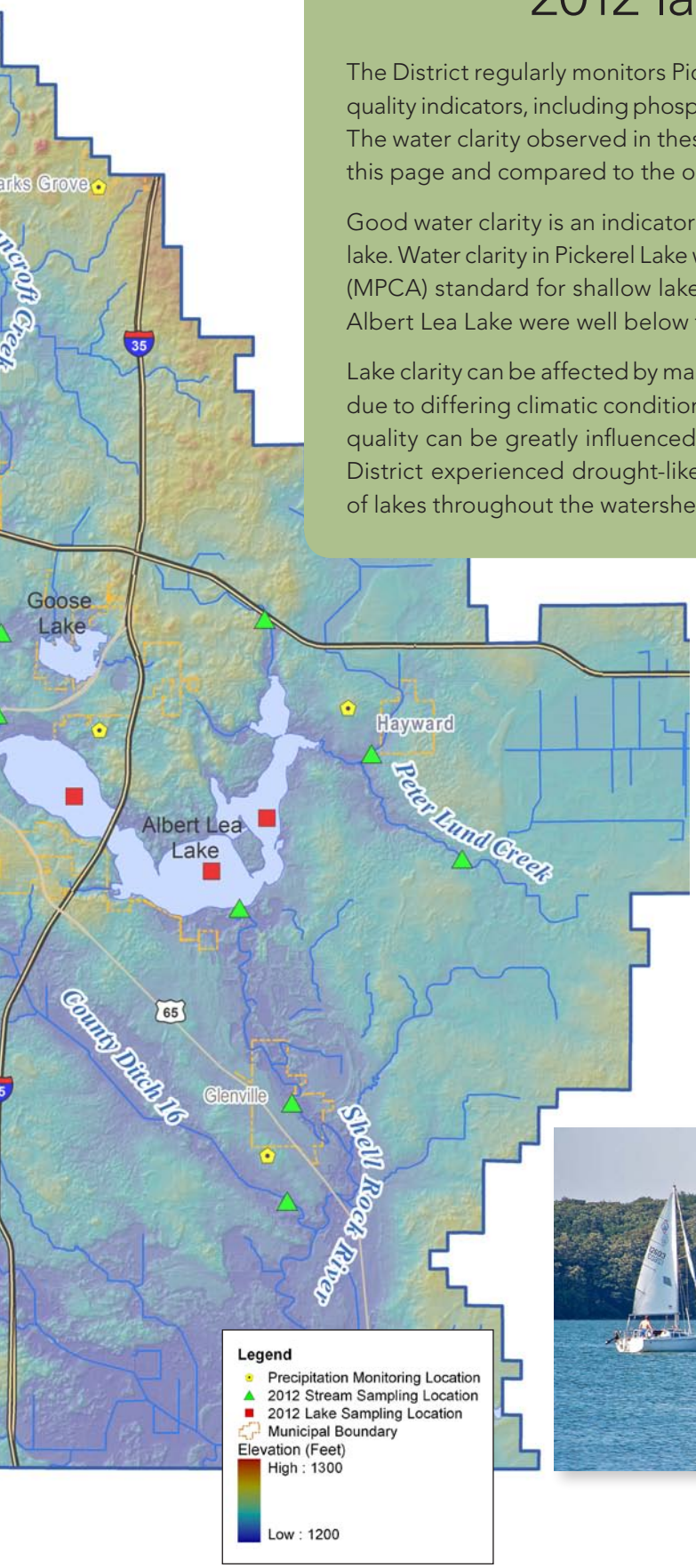
Pickerel Lake maintained good water clarity despite a historically warm and dry summer. The 2012 summer-average clarity was 3.5 feet, well above the MPCA standard. The good clarity can likely be attributed to the success of the Pickerel Lake restoration project.

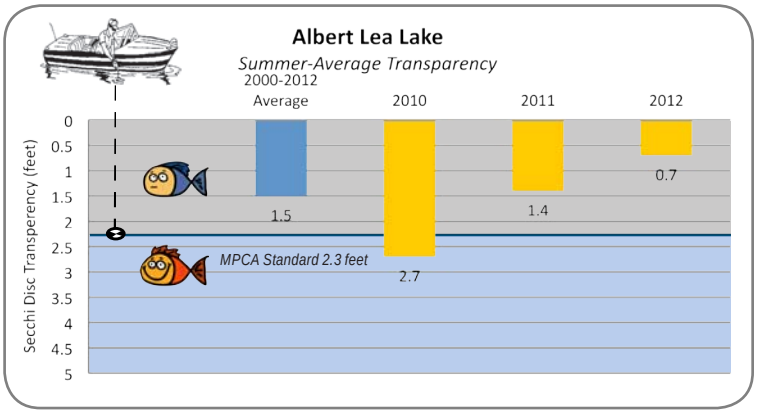
Across the Watershed: 2012 lake water quality

The District regularly monitors Pickerel, Fountain, and Albert Lea lakes for several water quality indicators, including phosphorus, chlorophyll-a, and water transparency (or clarity). The water clarity observed in these three lakes in the summer of 2012 is summarized on this page and compared to the observations from recent years.

Good water clarity is an indicator of low levels of algae and suspended sediment in the lake. Water clarity in Pickerel Lake was well above the Minnesota Pollution Control Agency (MPCA) standard for shallow lakes in this region of the state, while Fountain Lake and Albert Lea Lake were well below the standard.

Lake clarity can be affected by many things; there is natural variability in lake water quality due to differing climatic conditions and rainfall patterns. As described on page 1, water quality can be greatly influenced by the amount of rainfall in a given year. In 2012, the District experienced drought-like conditions, which greatly affected the water quality of lakes throughout the watershed.





Albert Lea Lake

A step backwards

The summer-average water clarity in Albert Lea Lake in 2012 was 0.7 feet—below the long-term average and well below the two previous years. Algae density in Albert Lea Lake reached a five-year high in 2012, causing the poor water clarity.

Spotlight on Fountain Lake

Fountain Lake's water quality issues

Fountain Lake has a phosphorus hoarding problem. Over the years, runoff from its large tributary watershed has carried tons of phosphorus-rich soil to the lake. Now, that soil has accumulated to form a layer of soft sediment several feet thick. During the summer months, phosphorus from the sediment migrates into the overlying lake water, where it fuels algal growth, but never really gets consumed. When algae decay, the phosphorus settles back to the lake bottom. From there it gets released into the water to restart the cycle. This process is called "internal phosphorus loading," because the phosphorus comes from within the lake itself, not from external sources like runoff or sewage.

Addressing the internal loading problem

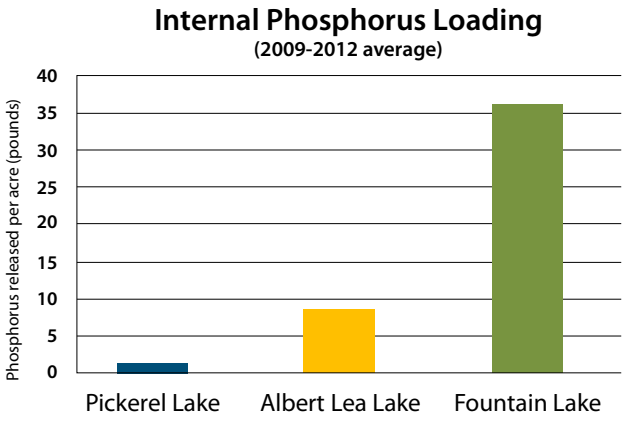
There are no easy solutions for reducing internal phosphorus loading. Two commonly-used strategies are: 1) stabilizing the phosphorus at the lake bottom so it doesn't enter the water column; and 2) removing the phosphorus from the lake.

Alum treatment is a proven method for stabilizing phosphorus at the lake bottom. Alum (aluminum sulfate) is added to the water, where it binds to phosphorus and settles to the lake bottom. There, it forms a layer over the sediment that acts as a barrier to phosphorus release. Alum treatments are effective for a period of several years, but eventually need to be repeated.

Excessive phosphorus can result in algal blooms.

At issue: internal phosphorus loading

Monitoring of Fountain Lake shows high concentrations of phosphorus from internal phosphorus loading, much higher than in Pickerel and Albert Lea Lakes. This is due to the long-standing problem of excessive phosphorus in the sediment in Fountain Lake.



Removal of phosphorus entails the removal of sediment. This is where dredging comes in. The district plans to remove some of the accumulated sediment from Fountain Lake, using a hydraulic dredging process. The dredged material is removed using a specialized boat that vacuums sediment and water from the lake bottom, then pumps it through temporary pipes to a disposal site. There, the soil settles out and clean water is separated and returned to the lake. In time the dredged sediment could be hauled offsite and used as organically rich fill, road sub-base, or in land applications.

Dredge boat purchased, funding sought

In the fall of 2012, the District purchased a 51-foot hydraulic dredge and related equipment needed to pump the dredged sediment away from the lake shore.

With the dredge boat ready for action, the District now looks to the next steps in the Fountain Lake restoration process, including engineering, permitting, land acquisition, and securing additional funds. Visit the District's website at www.shellrock.org for up-to-date information on the important work being done to improve Fountain Lake's water quality, fishery, and recreational opportunities.

The District's dredge boat is ready for action.

Looking Ahead

Draft TMDL implementation plan offers guidance

Protecting and restoring waterbodies can require a lot of planning, as it is important for decision makers and project partners to understand the benefits and costs of various lake and watershed management practices before pursuing them. The District, along with the Minnesota Pollution Control Agency and City of Albert Lea, has been actively involved in a total maximum daily load (TMDL) study in recent years to identify pollutant reductions required for several district waterbodies to meet established water quality standards. The TMDL implementation plan, which is nearing completion, identifies watershed projects and other management activities that can reduce phosphorus inputs and help protect and restore district lakes. The District and other partners will use this plan to help establish management strategies and priorities.

District monitoring program helps measure success

Water quality monitoring is recommended as part of the District's TMDL implementation plan. The data derived from past monitoring efforts was instrumental in establishing the TMDL phosphorus reduction goals. Continued monitoring of the lakes and streams within the watershed will be vitally important in tracking water quality improvements achieved, as the District and its partners continue to implement watershed improvement and in-lake management practices.

2013 Water Quality Improvement Projects

The Shell Rock River Watershed District and its partners have a busy year ahead, including the design and implementation of the following 2013 water quality improvement projects:

- Albert Lea Lake outlet replacement and fish barrier
- Goose Lake fish barrier
- Fountain Lake restoration project
- Mn/DOT rainwater garden project
- Wedge Creek streambank stabilization project
- Pollution prevention programs
- BMP cost-share programs

For more information on these projects, visit the District website at www.shellrock.org.

District secures grant funding

District awarded grant for Albert Lea Lake dam replacement and fish barrier

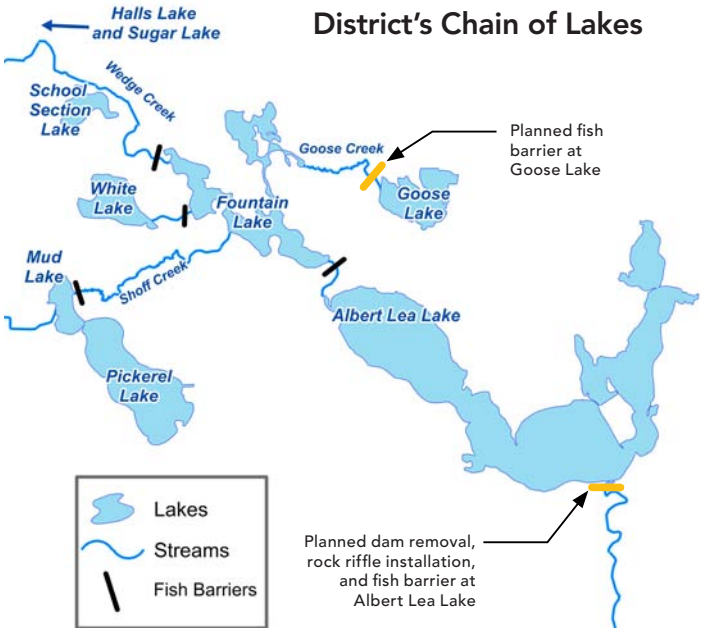
The Lessard-Sams Outdoor Heritage Council recommended to the legislature that $1.1 million in funding go toward Albert Lea Lake, specifically to improve habitat and control invasive species. The project will involve installing a naturalized outlet (rock riffle) and an electric fish barrier to keep out asian carp.

This project is just one of many within the District designed to improve the water quality throughout the watershed.

An example of an engineered rock riffle at a dam removal site in Hutchinson, MN.

Goose Lake fish barrier gets funding

The Conservation Partners Legacy (CPL) Grant Program issued a $395,000 grant to the District for the installation of an electric fish barrier at the outlet of Goose Lake. The barrier will prevent invasive and rough fish species from spawning in Goose Lake and repopulating downstream lakes. This project is part of the District's comprehensive effort to improve water quality in Albert Lea Lake and Fountain Lake.



About the Shell Rock River Watershed District

The mission of the Shell Rock River Watershed District is to implement reasonable and necessary improvements to the water-related and other natural resources of the District.

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Alan Bakken
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Andy Henschel, Director of Field Operations
Connie Kaupa, Office Manager
Carmen Christensen, Financial Clerk and Recording Secretary
Jerad Stricker, Conservation Technician

For more information:
www.shellrock.org

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Cities and towns in the District:

- Albert Lea
- Hayward
- Glenville
- Twin Lakes
- Manchester
- Clarks Grove (partial)

Lakes in the District:

- Pickerel and Mud
- White (Chapeau)
- Fountain
- Albert Lea
- Goose
- School Section
- Upper and Lower Twin
- Halls
- Sugar
- Church
- Eberhart

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