The Shell Rock River Watershed District’s mission is to implement reasonable and necessary improvements to the water-related and other natural resources of the District.
Hooray for Halls Lake

If you have ever wondered what good water quality looks like, there’s one lake you should visit in 2018: Halls. Located in a Minnesota Department of Natural Resources wildlife area, the 55-acre lake met the Minnesota state water quality standards for phosphorus, clarity, and chlorophyll-a in 2017. The lake also bested its long-term averages for all three monitoring parameters.

One reason that Halls Lake enjoys such good water quality is that it’s protected from invasive carp by the Wedge Creek fish barrier at Fountain Lake. Carp degrade water quality and destroy fish and waterfowl habitat by rooting in the lake bottom while searching for food. (For more on carp, see page 7.)

So, what does good water quality mean? For one, a healthy native plant population: narrow-leaved pond weed, coontail, water lily, and duckweed were all visible throughout the growing season. Wildlife were visible, too. In fact, if you visit in the fall, you’re likely to see a large variety of migratory waterfowl, including lesser scaup, ringneck duck, redhead, canvasback, mallard, gadwall, greenwinged teal, Canada geese, and trumpeter swans.

A large, 355-acre wetland complex upstream of Halls Lake serves as a Waterfowl Production Area, contributing to the significant biodiversity and water quality of Halls Lake.

Water Quality Monitoring in the SRRWD

Each year the Shell Rock River Watershed District collects data to help understand the health of the District’s waterbodies and what can be done to make them even healthier.

What data is collected—and how is it used to make decisions about our water resources?

- **Lake monitoring:** Eight District lakes are monitored for amounts of phosphorus and chlorophyll-a, as well as clarity. The data is used to determine whether lakes are meeting state water quality standards. The District can then measure success and target interventions.
- **Stream flow:** Stream flow is monitored at 18 locations using automated gaging equipment. The data is used to determine the amount of runoff that is conveyed to downstream water bodies.
- **Precipitation data:** The District has five rain gages throughout the watershed to measure rainfall amounts. This helps track the variability of precipitation and identify links to water quality.

How is water quality measured?

Pages 4–5 of this report contain details on water quality in area lakes, as measured in 2017. The three primary factors used to measure lake water quality are:

**Phosphorus:** Phosphorus is essential for plant life, but excessive phosphorus degrades water quality. Common sources of phosphorus in lakes are fertilizers and organic wastes from runoff and soil erosion.

**Chlorophyll-a:** One symptom of degraded water quality is a large amount of algae, which causes green scums and odors. Chlorophyll-a measures the amount of algae in a lake.

**Clarity:** The clarity or transparency of water is measured by lowering a “Secchi disk” (usually black and white) into the water until it is no longer visible from the surface. The greater the “Secchi depth,” the more transparent the water.
Fountain Lake Dredging Project Ready to Begin

After 10 years of planning and fundraising, Fountain Lake will be dredged this year to address long-term sediment build-up and water quality issues. Added to the MPCA’s list of impaired waters in 2008, this important recreational lake has high phosphorus concentrations, overabundant algae, and low clarity.

A significant part of the problem is excessive internal phosphorus loading from the lake sediments. The source of much of this phosphorous is sediment from the upstream watershed and streambank erosion. The District continues to engage upstream landowners and complete water quality improvement projects to decrease the amount of sediment that reaches Fountain Lake. The dredging will help reduce the amount of phosphorus released from lake bottom sediments that have built up over many decades.

District to Monitor Dredge Return Water

A hydraulic dredge will remove up to 635,000 cubic yards of sediment from Fountain Lake, beginning in Edgewater Bay. Sediment and water from the dredging operation (dredge slurry) will be transported via pipeline to a Confined Disposal Facility (CDF) just northwest of the Albert Lea Municipal Airport and approximately 1 mile north of Fountain Lake’s Bancroft Bay. The CDF acts as a large settling basin; sediment in the dredge slurry settles to the bottom of the CDF and clarified lake water is conveyed back to Fountain Lake through Bancroft Creek (see graphic above).

It is important to the District that the water sent back to Fountain Lake is as clean as possible. To ensure this, District staff will closely monitor the discharge water from the CDF. Flows will be measured daily and several water quality parameters will be monitored weekly. District staff will also be monitoring the flow and quality of water in the ditch upstream of the CDF discharge location and in Bancroft Creek—upstream and downstream of the ditch confluence.

Below: Construction of the Confined Disposal Facility was completed in 2017.

Just how much is 635,000 cubic yards of sediment?
Six-hundred-thirty-five-thousand cubic yards is a lot of sediment. In fact, if you had to carry all that sediment in the trailer of a single truck that was 9 feet high by 9 feet wide, the truck would need to be about 40 miles long... Or, if you stored it on a football field, it would be 109 yards tall.
**Value of Water Monitoring**

The SRRWD regularly monitors its lakes for several water quality indicators, including phosphorus, chlorophyll-a (an algal indicator), and water transparency (for clarity). Measurements are taken from June through September. The water clarity and phosphorus levels for the summer of 2017 are summarized on this page, in collaboration with Minnesota Pollution Control Agency (MPCA). These data are used to track the impact of previous projects, gain a better understanding of natural variability in water quality due to climatic conditions, and identify algal blooms, which hurt water quality.

### Across the Watershed: Lake Water Quality

#### Value of Water Monitoring

- **Phosphorus Concentration (μg/L)**
  - Long-term avg. in 2017
  - 2017

- **Water Clarity (feet)**
  - Long-term avg.
  - 2017

### Fountain Lake

Fountain Lake failed to meet the MPCA shallow water clarity standards in 2017. However, both phosphorus levels and water clarity were better than the long-term averages. The SRWWD is hopeful that watershed and lake management projects, including the Fountain Lake dredging project, will improve water quality.

<table>
<thead>
<tr>
<th>Phosphorus Concentration (μg/L)</th>
<th>2017</th>
<th>Long-term avg.</th>
</tr>
</thead>
<tbody>
<tr>
<td>MPCA standard (&gt; 2.3 feet)</td>
<td>2.0</td>
<td>2.1</td>
</tr>
</tbody>
</table>

### White Lake

2017 was one of the best years on record for White Lake. As in 2016, summer average water clarity and phosphorus concentrations in White Lake were better than their long-term average. However, the lake narrowly missed meeting the phosphorus state standard.

<table>
<thead>
<tr>
<th>Phosphorus Concentration (μg/L)</th>
<th>2017</th>
<th>Long-term avg.</th>
</tr>
</thead>
<tbody>
<tr>
<td>MPCA standard (&gt; 2.3 feet)</td>
<td>1.5</td>
<td>1.9</td>
</tr>
</tbody>
</table>

### Pickerel Lake

While the lake’s clarity was better than in 2016, it still missed the state standard. Similarly, phosphorus levels were lower than in 2016, but failed to meet the standard. Pickerel Lake continues to be dominated by curly leaf pondweed. This invasive species dies off in the summer, producing algal blooms which hurt water quality.

<table>
<thead>
<tr>
<th>Phosphorus Concentration (μg/L)</th>
<th>2017</th>
<th>Long-term avg.</th>
</tr>
</thead>
<tbody>
<tr>
<td>MPCA standard (&gt; 2.3 feet)</td>
<td>2.4</td>
<td>2.2</td>
</tr>
</tbody>
</table>

### Albert Lea Lake

Water clarity in Albert Lea Lake decreased markedly from 2016 when transparency, as measured by the Secchi disk, was 2.8 feet. In 2017, water quality in Albert Lea Lake was poor, with summer average phosphorus levels and clarity falling to meet the state standard. While phosphorus levels were better than the long-term average, water clarity was worse.

<table>
<thead>
<tr>
<th>Phosphorus Concentration (μg/L)</th>
<th>2017</th>
<th>Long-term avg.</th>
</tr>
</thead>
<tbody>
<tr>
<td>MPCA standard (&gt; 2.3 feet)</td>
<td>1.1</td>
<td>1.9</td>
</tr>
</tbody>
</table>

The SRWWD will continue to monitor the lakes to improve water quality.
water quality indicators, including phosphorus, chlorophyll-a (an indicator of aquatic plant growth), and clarity. Average summer values are computed based on measurements collected during the long-term summer average for Upper Twin Lake.

Upper Twin Lake

Clarity and phosphorus levels on Upper Twin Lake were similar to 2016, failing to meet MPCA shallow lake standards. Phosphorus concentrations, however, were still below the long-term summer average for the lake.

Lower Twin Lake

Lower Twin Lake failed to meet state standards for summer average clarity and phosphorus concentrations. Phosphorus levels, however, were well below the long-term summer average.

Halls Lake

2017 was one of the best years on record for Halls Lake water quality, meeting state standards for both phosphorus levels and clarity. Both measures showed improvement over long-term summer averages. Halls Lake is protected from invasive carp by the Wedge Creek fish barrier at Fountain Lake.

School Section Lake

As in 2016, School Section Lake continued to show poor water quality. Measures for both summer average phosphorus and clarity failed to meet state standards. This lake remains a target for SRRWD lake management efforts.

<table>
<thead>
<tr>
<th>Location</th>
<th>Phosphorus (μg/L)</th>
<th>Water Clarity (feet)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Upper Twin</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Average 2005-2016</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Average 2016</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Maximum 2016</td>
<td></td>
</tr>
<tr>
<td>Lower Twin</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Halls Lake</td>
<td></td>
<td></td>
</tr>
<tr>
<td>School Section</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The SRRWD regularly monitors its lakes for several water quality indicators, including phosphorus, chlorophyll-a (an indicator of aquatic plant growth), and clarity. Average summer values are computed based on measurements collected during the long-term summer average for Upper Twin Lake.

Clarity and phosphorus levels on Upper Twin Lake were similar to 2016, failing to meet MPCA shallow lake standards. Phosphorus concentrations, however, were still below the long-term summer average for the lake.

Lower Twin Lake failed to meet state standards for summer average clarity and phosphorus concentrations. Phosphorus levels, however, were well below the long-term summer average.

2017 was one of the best years on record for Halls Lake water quality, meeting state standards for both phosphorus levels and clarity. Both measures showed improvement over long-term summer averages. Halls Lake is protected from invasive carp by the Wedge Creek fish barrier at Fountain Lake.

As in 2016, School Section Lake continued to show poor water quality. Measures for both summer average phosphorus and clarity failed to meet state standards. This lake remains a target for SRRWD lake management efforts.
Keeping a Watchful Eye on Pickerel Lake Water Quality

Over the last decade, Pickerel Lake made dramatic advances in water quality. A fish barrier installed on Mud Lake in 2008 has kept carp out of the lake (preventing them from stirring up bottom sediments) and a restoration project in the fall of 2009 removed the carp from Pickerel Lake and brought in thousands of desirable game fish to help maintain a healthy ecosystem. The result was clearer, cleaner water and a greater variety of aquatic plant life.

Unfortunately, those advances are slowly beginning to recede as phosphorus levels and algal blooms increase and clarity decreases. In both 2016 and 2017 the lake has failed to meet state water quality standards.

What can be done to get the lake back on the water quality track? The SRRWD is working to reduce phosphorus and sediment inputs from the surrounding area. Three current projects are:

- **A wetland restoration** that will reduce the nutrients reaching the lake through stormwater.
- **A stream stabilization project** that will prevent eroded, phosphorus-laden material from entering the lake.
- **A two-stage ditch** that will create a “floodplain zone” by removing the ditch banks about 2–3 feet above the bottom for a width of about 10 feet on each side. This decreases the velocity of water going through the ditch by giving it a larger area to spread out. It also increases the amount of flow that the ditch can handle. The overall result is less erosion, less flooding, and better water quality.

These three projects were funded by an $826,000 grant from the Minnesota Board of Water and Soil Resources (BWSR). Future activities are expected to include establishing grass waterways to reduce soil erosion and filter runoff before it reaches the lake.

There were also some structural upgrades to the Pickerel Lake area in 2017: the new Pickerel Lake Dam (see photo above right) and a new boat landing. All of these efforts are expected to improve a lake that still boasts plenty of wildlife activity. Fish abundance has been stable, with the lake dominated by 4- to 5-year-old northern pike spawned since the restoration project in 2009.

What causes water quality fluctuations?

Lake water quality can vary not only from year to year, but from month to month, as shown in the water clarity graph (below). Here are a few things that can cause those changes:

- **Curlyleaf pondweed:** Curlyleaf pondweed is an invasive species that overshadows the rest of Pickerel Lake’s aquatic plant population. When this pondweed dies off in mid-summer the decomposing plant releases phosphorus that creates algal blooms and poor water clarity.
- **Storms:** Storms create runoff that washes nutrients into the lake. They can also destroy the lake’s well-rooted cattails, which prevent phosphorus-laden sediment from being re-suspended in the water column.
- **Wind:** High winds and lack of rooted vegetation allow waves to reach the lake bottom and resuspend sediment.

State-sponsored grant funding is helping the SRRWD implement water quality projects in the Pickerel Lake subwatershed.

Pickerel Lake’s water quality varies greatly from month to month, as shown in this graph (right).
Carp Management Strategy

You may not think of common carp as an invasive species; but, these large fish (up to 3 feet long) are actually native to Eastern Europe and Asia. Now that they’re here, managing them is important to protecting the water quality of area lakes. Carp degrade water quality by rooting in the lake bottom to search for food. This releases large quantities of nutrients from the sediment, which spurs algae growth. Their foraging also destroys habitat for waterfowl and other fish.

The Shell Rock River Watershed District is working on a sustainable carp management strategy for both Fountain Lake and Albert Lea Lake, which have large carp populations. The District’s approach includes:

Removing carp: Approximately 97,000 pounds of carp were removed during 10 seine events (fishing with a vertical net) in late 2017 on Albert Lea Lake.

Discouraging spawning: Each female carp can produce several hundred offspring per year. These young fish flourish in areas lacking native fish, such as bluegills, that forage on carp eggs. To escape these predators carp tend to migrate to marshes to spawn. In Fountain Lake, four fish barriers are preventing that migration. The carp in Fountain Lake are large, old (they can live over 60 years), and fertile, yet no young-of-year carp were found in 2017. To definitively establish the effectiveness of barriers, 200 carp have been implanted with Passive Integrated Transponder (PIT) tags. An antenna, designed to detect the PIT tags, was installed on each side of the White Lake electric barrier. The PIT tag data will be reviewed in 2018 to determine the fish barrier effectiveness.

Tracking with radio tags: Twenty-eight carp in Fountain Lake and 30 carp in Albert Lea Lake have been implanted with radio tags. These carp are then tracked using radio telemetry. The intent is to locate seasonal aggregations of carp for potential removal and to locate spawning areas.

The District and the Minnesota Department of Natural Resources are also considering carp management for Halls, Sugar, and School Section lakes in the upcoming year. This would consist of rotenone chemical treatment.

Rotenone is found in the roots, seeds, and leaves of several subtropical plants and is commonly used to kill unwanted fish. Because it acts by inhibiting respiration, it can be fatal to any fish; however, by controlling the dose and duration of exposure it can be used to selectively eradicate species (such as carp) that are particularly sensitive. The benefits of rotenone are that it degrades quickly in the environment and from fish tissue, does not bio-accumulate, and is less toxic to birds, mammals, and aquatic insects.
Brookside Boathouse

There are a lot of good reasons to get out and enjoy the water resources in the Shell Rock River Watershed District. The Brookside Boathouse, located along the shores of Fountain Lake, gives you plenty of easy access. A kayak, a paddle board, a bike, snowshoes—they’re all available for trips around the lake, across its bays, or along the 20-mile Shell Rock River State Water Trail.

More people than ever have taken advantage of the boathouse and its rental equipment. In 2011-2012 a total of 384 visitors got on the water from the boathouse. In 2017, that number was 3,202—a 734% increase that included visitors from local and regional communities and even other countries. Boathouse hours vary by season. For details, contact Community Education at (507) 379-4834.

Shell Rock River State Water Trail

If you haven’t already visited, make sure to put the Shell Rock River State Water Trail on your 2018 summer schedule. Minnesota’s 35th water trail opened in June of 2016. The trail starts at the headwaters of Fountain Lake and ends at the Minnesota-Iowa border. Along the way you’ll pass through the city of Albert Lea, Myre-Big Island State Park, the city of Glenville, and two wildlife management areas.

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.

Board of Managers
Dan DeBoer, Chair
Gary Pestorious, Vice Chair
Alan Bakken, Treasurer
Mick Delger, Secretary
Brad Kramer
Mike Hanson
Joe Pacovsky

For more information: www.shellrock.org

Staff
Andy Henschel, Director of Field Operations
Carmen Christensen, Financial Clerk
Scott Christenson, Conservation Technician
Courtney Christensen, Resource Technician
Leah Lawrence, Administrative Assistant

Lakes in the SRRWD:
Pickerel and Mud
White (Chapeau)
Fountain
Albert Lea
Goose
School Section
Upper and Lower Twin Halls
Sugar
Church
Eberhart

Cities/Towns in the SRRWD:
Albert Lea
Hayward
Glenville
Twin Lakes
Manchester
Clarks Grove (partial)