The mission of the Shell Rock River Watershed District (SRRWD) is to implement reasonable and necessary improvements to the water-related and other natural resources of the district. The Board of Managers oversees many efforts to conserve, protect and manage water resources within the watershed. The SRRWD works closely with the City of Albert Lea, Freeborn County, Farm Service Agency, and state agencies to accomplish its goal of improving water quality. The district’s activities are outlined in its 2004 Water Management Plan.

The SRRWD also employs five staff—an administrator, office manager, financial clerk, and two technicians—and provides funding for one technician who works for Freeborn County Environmental Services. This team handles the day-to-day operations of the district, from coordinating projects to grant writing to answering calls from interested citizens. SRRWD staff technicians also manage the district’s water quality monitoring program and work with landowners on best management practices such as filter strips. A volunteer citizen advisory committee also serves the SRRWD.

The Shell Rock River Watershed is located in southern Minnesota along the Iowa border. All water within the watershed eventually drains to the Mississippi River.
History of the Shell Rock River Watershed District Monitoring Program

### 1960 - 1980
A series of studies were completed related to the water quality of Albert Lea and Fountain lakes and their corresponding watersheds. The studies, driven by the City of Albert Lea, Freeborn County, and concerned citizens, involved monitoring the lakes and tributaries and addressed the following:
- sources of bacterial and chemical pollution to the lakes
- sediment and nutrient loading and historic sedimentation
- recommendations for watershed practices to improve water quality
- feasibility of different phosphorus-removal techniques

### Mid-1980s through 1990s
Albert Lea and Fountain lakes periodically sampled by local citizen volunteers through an MPCA volunteer monitoring program.

### 1992 - 1993
Assessments of Albert Lea and Fountain lakes were completed by the MPCA in partnership with Freeborn County and the Albert Lea Technical College. The studies assessed the condition of Albert Lea Lake nine years after upgrades to the city’s wastewater treatment plant and established baseline conditions for upstream Fountain Lake.

### 2000
SRRWD formed (June 2003)

### 2002 - 2003
Freeborn County began a stream monitoring program in 2002. In 2003, the program was expanded to include several area lakes (Pickerel, Fountain, Albert Lea).

### 2004
SRRWD assumed water quality monitoring from Freeborn County.

### 2005
SRRWD expanded the stream monitoring program to include flow measurements and additional water quality parameters. Lake monitoring continued at six sites on the three lakes throughout the summer.

### 2006
Stream monitoring program expanded to include bacterial analysis (fecal coliform). Lake monitoring continued.

### 2007
The SRRWD added a volunteer monitoring program to its routine annual monitoring. Volunteer monitoring was conducted at Albert Lea, Fountain, and Pickerel lakes (in addition to the SRRWD’s routine monitoring), as well as White (Chapeau) Lake, and Upper and Lower Twin Lakes. Stream monitoring continued.

### 2008
SRRWD revisited their volunteer monitoring program to focus solely on the lakes with limited historic data. SRRWD staff continued to monitor Pickerel, Fountain and Albert Lea lakes.

### 2009
MPCA began development of a TMDL (see sidebar on page 6) for the Cedar River and its tributaries. In conjunction with the ongoing TMDL, the SRRWD stream monitoring program underwent several revisions:
- Eight new stream gauging stations added
- Monitoring of stormwater discharges at two locations within the City of Albert Lea
- Automatic sampling equipment installed at new and existing stream monitoring sites to collect continuous flow and water quality data
Water Quality Monitoring Locations

How is lake water quality measured?

One method of measuring a lake’s water quality is by Secchi disc transparency. A Secchi disc is a black-and-white disc that is lowered into the water until it disappears from view. The depth at which the disc is no longer visible is measured numerous times each season. These measurements are then tracked over time. The water transparency, or Secchi depth, is dependent on the amount and type of suspended materials in the water.

Depending on the relationship between current Secchi disc readings, the water quality trends over time, and the lake’s action level, water quality management actions may be required. Examples of such actions include more intensive lake monitoring, preparation of diagnostic feasibility studies, or implementation of stormwater management practices.

![Secchi Disc Transparency Graphs](image)

Albert Lea Lake
Summer-Average Transparency

Historic
Average
2008

MPCA Water Quality Standard (2.3 feet)

Secchi Disc Transparency

1.1 ft
1.3 ft

Pickerel Lake
Summer-Average Transparency

Historic
Average
2008

MPCA Water Quality Standard (2.3 feet)

Secchi Disc Transparency

0.4 ft
0.5 ft

Fountain Lake
Summer-Average Transparency

Historic
Average
2008

MPCA Water Quality Standard (2.3 feet)

Secchi Disc Transparency

1.5 ft
1.7 ft

SRRWD Stream Monitoring

The SRRWD contains a vast network of ditches and creeks. Many of the ditches and creeks flow into SRRWD lakes, transporting pollutants to the lakes from the upstream watershed. Stream monitoring data is used to help determine the amount of sediment and pollutants being transported to downstream waterbodies. The data is also used to help assess long-term water quality trends, determine achievable water quality management goals, and track the SRRWD’s progress towards achieving management goals.

The Shell Rock River and eight other tributaries to the SRRWD’s major lakes have regularly been monitored for flow, nutrients, sediments, and bacteria as part of the district’s water quality monitoring program. Stream monitoring locations are shown in the figure to the left.

Historically, grab samples have been taken at each monitoring site twice a month between April and October. Flow measurements were also taken at each site based on a similar schedule. During the summer of 2008, the SRRWD installed automatic flow measurement and sampling equipment at many of its stream monitoring sites. This continuous data collection will help to determine the quantity and quality of watershed runoff during both low and high flow conditions.
What is a TMDL?
A water body is “impaired” or polluted if it fails to meet one or more water quality standards established by the Minnesota Pollution Control Agency (MPCA). The federal Clean Water Act requires that impaired waters be identified and restored. Several water bodies within the SRRWD are currently considered impaired, including Pickerel, Fountain, and Albert Lea Lakes and the Shell Rock River from Albert Lea Lake to the Iowa border.

A Total Maximum Daily Load (TMDL) must be completed for all impaired waters. The term “TMDL” describes both a process and a number. The process typically involves two to four years of technical study and intensive stakeholder and public input. The number is a calculation of the maximum amount of a pollutant the water body can receive and still meet water quality standards.

The MPCA is currently completing a TMDL for the Cedar River Basin, which includes the Shell Rock River watershed. Past water monitoring in the Shell Rock River watershed shows that sediment and total phosphorus are the top pollutants the water body can receive and still meet water quality standards.

Wedge Creek, Bancroft Creek and the Shell Rock River have been monitored for total suspended solids since the onset of the SRRWD’s monitoring program. Total suspended solids is a measurement of the amount of suspended material (soil particles, algae, plankton, microbes, etc.) in a waterbody, and is often used as a surrogate measurement for turbidity (cloudiness of water). Although there is not a specific water quality standard for in-stream total suspended solids, a MPCA factsheet indicates a target threshold of 58 milligrams per liter (mg/L) is generally thought to be consistent with the turbidity standard for this region of the state (25 nephelometric turbidity units). Data collected from Wedge Creek, Bancroft Creek, and the Shell Rock River at Glenville between April and November of 2008 indicate that the in-stream total suspended solids concentrations were generally less than the target threshold.

In-Stream Total Suspended Solids (TSS) Concentrations

Pickerel Lake covers approximately 715 acres and is located upstream of Fountain and Albert Lea Lakes. It is a shallow lake (maximum depth of 6 feet) with historically poor water quality. The lake has had problems with high turbidity, frequent winter kills, heavy algal blooms, high rough fish populations, and a lack of aquatic vegetation. Pickerel Lake has a long history of fisheries management. However, the historic water quality record is somewhat limited. The summer-average transparency of Pickerel Lake between 2004 and 2008 is shown in the above figure. Note that the summer-average includes data collected between late-May through September.

Pickerel Lake is considered impaired by the MPCA, with nutrient levels beyond the state standards for recreational use. One of the methods commonly used to assess the water quality is Secchi disc transparency. Based on the water quality standards, shallow lakes in this region of the state should have a summer-average transparency greater than 2.3 feet. The historic water quality data indicates that the summer-average transparency in Pickerel Lake has been significantly less than the standard throughout the period of record.

Pickerel Lake Fish Barrier
In the last four years, the water clarity in Pickerel Lake has averaged less than one foot by mid-June. One cause of the poor water quality in Pickerel Lake is carp. Carp uproot aquatic vegetation and stir up bottom sediment, resuspending phosphorus into the water column. The algae consume the phosphorus, creating large algal blooms and making the lake look like pea soup.

Test netting performed by the Minnesota Department of Natural Resources (DNR) in Pickerel Lake indicates that there are currently over 1,000 pounds of carp per acre in the lake. SRRWD staff suspect that Pickerel and downstream Mud lakes have been acting as carp nurseries, with carp traveling to downstream lakes and influencing downstream water quality. To help prevent the rough fish from traveling from Fountain Lake to Pickerel and Mud lakes, the SRRWD installed an electric fish barrier at the outlet of Mud Lake.

Electric fish barriers work by creating an electrical field that sends a minor shock through the fish and discourages them from passing through. In the fall of 2009, the Minnesota DNR plans to perform a fish kill on Pickerel and Mud lakes to reduce the carp population.

Water Quality Monitoring Results
Looking to the Future

The SRRWD’s monitoring program has been focused on collecting baseline data for the major water features to help assess long-term water quality trends within the district, select achievable water quality management goals, and track the district’s progress towards management goals. In addition to these program objectives, the SRRWD has adapted their monitoring program in recent years to incorporate a volunteer monitoring program and to support TMDL development.

Volunteer Water Quality Monitoring Program

The citizens within the SRRWD have long been actively involved in efforts to protect and restore their local waterbodies. To capitalize on the interest of watershed residents and encourage public participation, the SRRWD implemented a volunteer monitoring program in 2007. The volunteer program, which is currently primarily funded by a Surface Water Assessment Grant from the Minnesota Pollution Control Agency (MPCA), focuses on the SRRWD lakes with limited historic water quality data (White, Upper Twin and Lower Twin). The SRRWD also plans to expand their volunteer program to include citizen precipitation recorders. The SRRWD is thankful for the participation of its citizen volunteers and looks forward to a successful 2009 volunteer monitoring program. If you are interested in becoming a part of the volunteer monitoring program, please contact SRRWD staff.

Supporting TMDL Development

In 2008, the MPCA began development of a TMDL (see sidebar on Page 6) for the Cedar River and its tributaries, including the Shell Rock River and upstream Pickerel, Fountain, and Albert Lea Lakes. In 2008, the SRRWD expanded their stream monitoring program in support of the ongoing TMDL. Six new stream gauging stations, funded by a Surface Water Assessment Grant, were added in the far upstream tributaries to Fountain Lake and two stream gauging stations were added downstream of Albert Lea Lake to help characterize the amount and quality watershed runoff. In addition, two stormwater discharge monitoring sites within the City of Albert Lea were added to help quantify the pollutant loading to local waterbodies from the urban areas.

The comprehensive water quality monitoring program will continue during 2009-2010 in support of TMDL development, with a significant portion of the program being funded by the MPCA’s TMDL program. The SRRWD will then re-evaluate their monitoring program based on the outcome of the TMDL and the SRRWD’s water quality management priorities.