Clean Water Report for 2014

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

March 2015

What’s Inside:

- Goose Lake Fish Barrier and reconstructed Albert Lea Lake Outlet taking shape
- June rainfall overwhelms area streams
- Reaches #1 & #5 of the Wedge Creek Stream Habitat Restoration Project completed
- Good things to come in 2015

Photo credit: Dan Borland
Precipitation

Watershed Wide Variability
The Shell Rock River Watershed District saw high variability between local rainfall gauges in 2014. Gauges stationed at Clark’s Grove and Glenville recorded four to eight more inches of rain than gauges at Hayward and Twin Lakes throughout the month of June. In contrast, Hayward and Twin Lakes gauges experienced high rainfall in August, while the other two gauges lagged. Such large disparities in data indicate flashy rainfall, as rain was falling heavily in some areas and not at all in others.

Precipitation Trends - How Do 2013 and 2014 Compare?
Rainfall totals for April through September exceeded long-term averages in both 2013 (32.75 inches) and 2014 (27.70 inches). More than ten inches above average fell April through June of 2013. Periods of persistent rainfall can be especially problematic because local soils are already saturated, resulting in greater runoff during subsequent storms. In 2014, April, June, and August were above average for precipitation, while May, July and September were well below. Occasional dry periods result in greater infiltration and less runoff during rain events.
Goose Creek and Albert Lea Lake Fish Barriers Near Completion

An overabundance of common carp can hinder lake restoration efforts. Bottom-feeding activities reduce rooted plant establishment and re-suspend phosphorus-rich sediment into the water which contributes to unwanted algal blooms. To mitigate this issue, the SRRWD has successfully installed fish barriers at Wedge Creek, White Lake and Mud Lake. The installation of the barriers coupled with rough fish eradication has produced noticeable improvements in upstream water clarity and habitat. To build upon this effort, two additional fish barriers were planned for Goose Creek and Albert Lea Lake.

Goose Creek - Construction of the Goose Creek fish barrier began in October 2014 and is expected to be complete in the spring of 2015. The barrier will prevent carp and other rough fish from returning to Goose Lake to spawn and repopulate in upstream water bodies. After the barrier is completed, the District will work with the DNR to re-build the fish populations in Goose Lake, first by eliminating all fish species, then reintroducing desired game fish. Measurable improvements in water quality are expected. The District will be closely tracking progress at its seasonal monitoring station in Goose Creek where phosphorus concentrations are expected to decrease.

Albert Lea Lake - The Albert Lea Lake fish barrier currently under construction is part of a larger improvement project at the lake’s outlet. This project will be completed in 2015. The unique renovation has three main components that will collectively reduce unwanted fish and plant populations and improve overall lake quality and habitat:

- **Rock-arch water-level control** – This replaced the former fixed crest dam and provides a more natural outlet to the lake.

- **Lake level management structure** – This structure will give the District the capability to adjust lake elevations, as necessary, to improve lake health. The desired outcome is an improvement in aquatic plant health.

- **Electric fish barrier** – An electric fish barrier will stop travel of common carp populations in Albert Lea Lake. Additionally, the barrier is a preventative measure for the potential threat of destructive Asian Carp which are moving up the Cedar River toward the Shell Rock River.
Stream Monitoring

Overview
Stream monitoring is essential to understanding which sub-watersheds within the SRRWD are producing the most runoff and transporting the most pollutants. The variability in these totals across the watershed has a lot to do with differences in land use and the runoff patterns associated with those uses. In 2014, the SRRWD monitored 13 stream locations throughout the District. By monitoring these sites long-term, the District can observe which areas should be targeted for additional improvements and how successful past projects have been.

Stream Response To Excessive Rain In June
An astonishing 5.71 inches of rain was documented at the Albert Lea Airport from June 14 through June 19, just six days. Back to back rain events can result in excessive runoff because already saturated soils cannot absorb any additional rainfall. The heavy-hitting rain not only caused severe flooding issues in the area, but also resulted in excessive sediment loading across the watershed. Elevated levels and flow rates in streams were observed through the middle of July. To put it in perspective, the volume of runoff generated in the Wedge Creek subwatershed during that timeframe was over 50% of the total flow observed all season.

![Wedge Creek Stream Flow and Precipitation](image)

Peak discharge topped over 600 cfs following intense June rainfall.

![Wedge Creek Stream Flow and Total Suspended Solid Concentrations](image)

Elevated Total Suspended Solids concentrations during peak flow.
Wedge Creek Is Taking Shape

Reaches #1 (2,500 linear feet) and #5 (2,500 linear feet) of the Wedge Creek Stream Restoration Project were completed in 2014. Since 2011, five of the six stream sections have been completed leaving one final section, reach #6, for 2015. The project targeted 1.95 miles of stream bank and 36 total acres. Rehabilitation efforts focused on stabilizing erosive stream banks and providing areas that will attenuate floodwater and sediments. Stream bank stabilization will provide improved habitat for amphibians and water fowl and most importantly, reduce sediment and phosphorus loading to Wedge Creek and downstream water bodies.

The Wedge Creek station SWC01 will continue to be monitored in the subsequent years to track improvements in water quality. The 2014 monitoring results showed that runoff totals over the Wedge Creek drainage area were above the 6-year average, but noticeably below 2013 totals (see stream fact sheet). An extended dry period in July and August allowed for heavy, late-season rains to mostly absorb into soils. As expected, Total Suspended Solids (TSS) concentrations were the highest during large flow events. The maximum TSS concentration was observed during peak flow rates, and was over 130 times greater than TSS in average flow conditions. Now that restoration activities are nearing completion, the District hopes to see a decrease in TSS concentrations associated with these high flow events.

Tough Winter Leads to Fish Kill

The winter of 2013-2014 was one of the coldest and snowiest on record, leading to district-wide fish kills. Though many Minnesota lakes freeze over in the winter months, it takes especially cold temperatures for the lakes to freeze to depths seen over the 2013-2014 season. When ice depths approach the bottom of lakes, oxygen concentrations deplete in the remaining water, causing a winterkill of fish. The District observed fish kills in all lakes except Fountain Lake.
Fountain Lake (Including Bancroft Bay)

Holding steady. Water clarity was right at the state standard, while phosphorus was over twice the standard.

White Lake

Exceeding expectations. Both phosphorous and water clarity were at their lowest levels since monitoring began in 2005. Water clarity met state standards for the first time as a result of the fish barrier installed at the outlet.

Pickerel Lake

Another great year. Though phosphorous inched slightly above state standards, 2014 levels were again much lower than average. In a repeat of 2013, the lake’s water clarity passed states standards.

Albert Lea Lake

Seeing improvement. Phosphorous concentration was slightly better than average, though still far above state standards. Water clarity met state standards for the first time since 2010.

Across the Watershed: 2014 Lake Water Quality

- Lake Monitoring Locations
- Stream Monitoring Locations
- Municipal Boundaries

Across the Watershed:
2014 Lake Water Quality

Phosphorus
- MPCA standard (<90ug/L)

Clarity
- MPCA standard (>2.3 ft)
Improvements Observed, but Phosphorus Problems Persist

In 2014, all eight lakes were unable to attain the state standard for phosphorus concentrations, similar to 2013. However, improvements were observed in Albert Lea, White, Hall and School Section Lake, with White Lake recording its best season since 2005. Fountain Lake phosphorus concentrations reverted back to long-term average levels in 2014 after having a much improved 2013 season.

The water clarity standard was attained by four lakes including Fountain, White, Pickerel, and Albert Lea Lake. Upper Twin, Lower Twin, Hall’s, and School Section Lakes did not meet the state standard (>2.3 feet) for water clarity in 2014, however none of these lakes had an average lake depth greater than 2.45 feet throughout the season.

Upper Twin Lake

Surprising results. Phosphorus concentrations exceeded the long-term average and the MPCA standard in 2014. Water clarity improved from the long-term average by 0.7 feet, although the average lake depth was 2.42 feet in 2014 and the lake bottom was visible on 5 of 11 sampling visits.

Lower Twin Lake

Murky spring. Phosphorus concentration exceeded the long-term average and MPCA standard in 2014. Water clarity in Upper Twin Lake was greater than average, although the lake depth was only 2.27 feet on average and the lake bottom was visible during 4 of 11 sampling visits.

Hall’s Lake

Approaching state goals. Phosphorus concentrations were less than average in 2014 and almost met the state standard. Water clarity was nearly equal to the average. The average lake depth in 2014 was 2.45 feet and the bottom was visible on 5 of 11 sampling visits.

School Section Lake

Nutrient overload. Although both phosphorus and clarity improved upon the long-term average in 2014, neither met the state standard. The average lake depth was only 2.22 feet during the 2014 season and the bottom of the lake was visible for 3 of 7 sampling visits.
Construction Season

The 2015 construction season will include completing projects started in the fall of 2014. This includes the Goose Creek Electric Fish Barrier (pages 1-2) and Albert Lea Lake Dam replacement and fish barrier. The Goose Creek Electric Barrier is a new, open-channel structure located at Green Lea Golf Course. The Albert Lea Dam project required the removal of an existing structure and replacement with a rock riffle structure (2014). The new structure will facilitate water level management and an electric fish barrier (2015 pages 1-2).

Wedge Creek stream restoration efforts will continue in 2015 with the completion of reach 6 (2,500 linear feet), the final phase of the overall 1.95 mile project. This project provides habitat for fish and wildlife while improving water quality in Wedge Creek and Fountain Lake.

In addition, Fountain Lake Restoration project support funding of 7.5 million dollars has been secured as a result of the 2014 bonding bill. District staff members have been involved in preliminary and final dredge design. Permitting efforts have begun which will require interagency collaboration with stakeholders and permit regulators in 2015.

Monitoring Efforts During the Winter

The Watershed District continues to monitor dissolved oxygen levels in Albert Lea Lake, Fountain Lake and Pickerel Lake throughout the winter to ensure sustainability of fish populations. Dissolved oxygen levels were high in late 2014 and in early 2015. This is a result of normal lake water levels which allow for normal flow between lakes and over the Fountain Lake Dam. In addition, the 2014-2015 snow accumulation and thin ice cover were considerably lower than accumulations in late 2013-2014. Ultimately, this should result in lower levels of fish population winter kill.

About Shell Rock River Watershed District

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

For more information: www.shellrock.org