

Rice Creek Assessment Project, Final Report

Research flows into action plans for stream restoration



Rice Creek (also known as Spring Brook) is a stream of state and regional significance. It is the only trout stream located in Rice County, Minnesota. Naturally reproducing brook trout, such as those found in Rice Creek, are comparatively rare due to the sensitivity of this fish to stream degradation.

Rice Creek is a special stream but its health is threatened. It is not meeting state standards for turbidity, nitrate nitrogen and *E. coli* bacteria. Turbidity negatively affects many aspects of trout life, including breathing, reproducing and feeding. Nitrates above certain levels can have toxic effects on aquatic organisms.

The quality of a stream reflects how land is used in its watershed. The watershed of Rice Creek is currently dominated by agriculture (84%) and lies mostly in Bridgewater Township. Land use is expected to change in coming years as portions of the watershed are in the annexation zones of Northfield and Dundas.

Bridgewater Township, Cannon River Watershed Partnership (CRWP), St. Olaf College and other partners sponsored a two-year project ending in June 2013 to study Rice Creek and recommend actions to improve and protect it. The diagnostic study was funded in part by the Minnesota

Pollution Control Agency (MPCA). This fact sheet summarizes the scientific findings and recommended actions.

Study Results

During 2011 and 2012, the study partners and volunteers collected information on the following subjects:

- Fish population, habits and diet
- Aquatic insects and other prey
- Stream and shoreline habitat
- Flow and water quality
- Water temperature
- Ground-water sources

The population of brook trout was estimated at 3,350 per mile, which is reasonably good for a stream of this size but could be increased with habitat improvements. The average size was 6-7 inches, a good breeding size, but better conditions could generate more fish over ten inches.



Researchers discovered that the trout in Rice Creek feed on both aquatic and terrestrial insects and other invertebrates, so both habitats (stream and shoreland) are important sources of food. Based on their work, the MPCA will recommend that a 1.9-mile portion of Rice Creek be listed as impaired for aquatic invertebrates.

The habitat of Rice Creek was assessed using a standard scoring

system. The average score was “fair” in both 2011 and 2012. Multiple areas had poor and very poor scores, while other areas were good to excellent. The habitat showed much room for improvement. Flooding events can improve some sites and worsen others by shifting sediment.



Nitrate concentrations are high during spring runoff and rain events as well as during base (low) flow conditions, which indicate subsurface inputs. Total suspended solids (TSS, related to turbidity) and total phosphorus (TP, related to algal blooms) are event-driven with concentrations far exceeding the proposed state water-quality standards. During base-flow conditions, TSS and TP are within desired ranges.

Water temperature was measured continuously at four locations. Temperatures periodically exceeded the maximum temperature preferred by trout (68 degrees F), especially downstream near Armstrong Road.

Ground-water inputs to the system appear to be local, shallow and “young”; the estimated age based on tritium samples was 5 – 10 years old. As a consequence, ground water is more sensitive to land-use changes.

Action Plan

Based on the study results, the partners recommended actions to improve the health of Rice Creek. The actions included a mix of targeted Best Management Practices (BMPs) as well as community outreach and watershed monitoring. As land use in the watershed is 84% agricultural, targeted BMPs included nutrient management, conservation tillage, cover crops, controlled drainage, buffers and wetland restoration.

While improvements across the watershed would be beneficial, much can be accomplished for the trout and coldwater community within the 60-foot corridor of the angler easement. Use of a “soft armor” approach of deep-rooted grasses with fewer trees and grading to a 1:4 slope would promote a narrower, deeper channel.



Water Quality & Habitat Goals

Following are goals for the short term (5-10 years) unless otherwise noted:

- Maintain and improve the riparian corridor, including buffers, so all habitat scores are fair or good.
- Reduce nitrate concentration in the stream by 30%.
 - Within 20 years, meet the state standard.
 - Over the long term, reduce levels further for additional benefits to aquatic life.
- Reduce peak flows and flooding by increasing water storage with

wetlands, infiltration and controlled drainage.

- Maintain or reduce stream temperatures so that peak values do not exceed 68 degrees F along the trout stream portion.
- Reduce suspended solids and phosphorus input during high flows by 25%.
 - Within 20 years, meet the proposed state standards.



While the stream is impaired for *E. coli* bacteria, it is not often used for recreation. Reducing bacteria levels is important, but it is not one of the primary goals for Rice Creek. Bacteria will be indirectly addressed by pursuing the goals above.

Priority Areas

Study results also helped prioritize areas for implementation activities:

- **Habitat:** Prioritize existing angler easement as well as any areas with habitat scores of fair or less.
- **Nitrates:** Focus on land that drains to County Ditch (CD) 22 during snow melt and spring runoff. Target the trout stream section and ditch at 100th Street East during low flows.
- **Peak flows:** Focus on land within the CD 22 drainage with potential for restorable wetlands as well as land throughout the watershed with potential for water storage and infiltration options.
- **Upland erosion:** Using the terrain analysis, prioritize areas for assessment of potential erosion controls to reduce sediment and phosphorus loss.

Next Steps

Steps are already being taken to improve Rice Creek. Minnesota Trout Unlimited (TU) received funding from Minnesota’s Outdoor Heritage Fund to restore and enhance coldwater stream habitats. Rice Creek was one of 13 streams targeted for projects. Work will apply to the angler easement: designing plans this year and starting restoration in 2014.

Study partners and volunteers remain committed. Bridgewater Township started work on a stream protection ordinance. The Freshwater Society and CRWP will continue the FarmWise program to engage landowners and operators in conservation practices. Faculty and students at St. Olaf College will research environmental, social and economic aspects.



Project Sponsors

Bridgewater Township
Cannon River Watershed Partnership
St. Olaf College Environmental Studies
MN Department of Natural Resources
Trout Unlimited
Rice County
Rice Creek Concerned Citizens Group
Freshwater Society
Other participating groups

For the full report and more, please visit www.crowp.net/rice-creek or contact Beth Kallestad at beth@crowp.net, (507) 786-3913, or Kathleen Doran-Norton at kdoran-norton@bridgewater.org, (507) 645-7663.