

Cross Lake and Turtle Lake Water Quality Study

In June, 2000, the Red Lake Watershed District completed a study report on the water quality of the Cross Lake and Turtle Lake systems. One reason for the study was concern over excessive algae and nutrients, particularly on Cross Lake. To address this concern, data collection focused on establishing baseline water quality characteristics at six (6) in-pool locations. This collection included measurements of total phosphorus, chlorophyll-a, secchi disk readings and dissolved oxygen/water temperature profiles.

Another reason for conducting the study was concern about the effects of constructed dams (located on Cross Lake, Turtle Lake, and South Connection Lake) on hydrology of the lake systems. To determine the hydrology of the lake systems, depth recorders were set up at six (6) locations. The information from the recorders was used to determine lake system inflows and discharges (i.e. a hydrologic budget) and to display flow direction in the lake systems.

Results of the study indicated that Cross Lake was eutrophic with an average Carlson's Trophic Status Index (TSI) value of 62. Cross Lake also displayed stratification during the summer of 1998. Dissolved oxygen measurements of less than 3 parts per million (ppm) occurred twice during this period at depths below 2.5 meters. Turtle Lake was also considered eutrophic with an average TSI value of 65. The depths of Turtle Lake and the rest of the monitoring sites were not sufficient for identification of

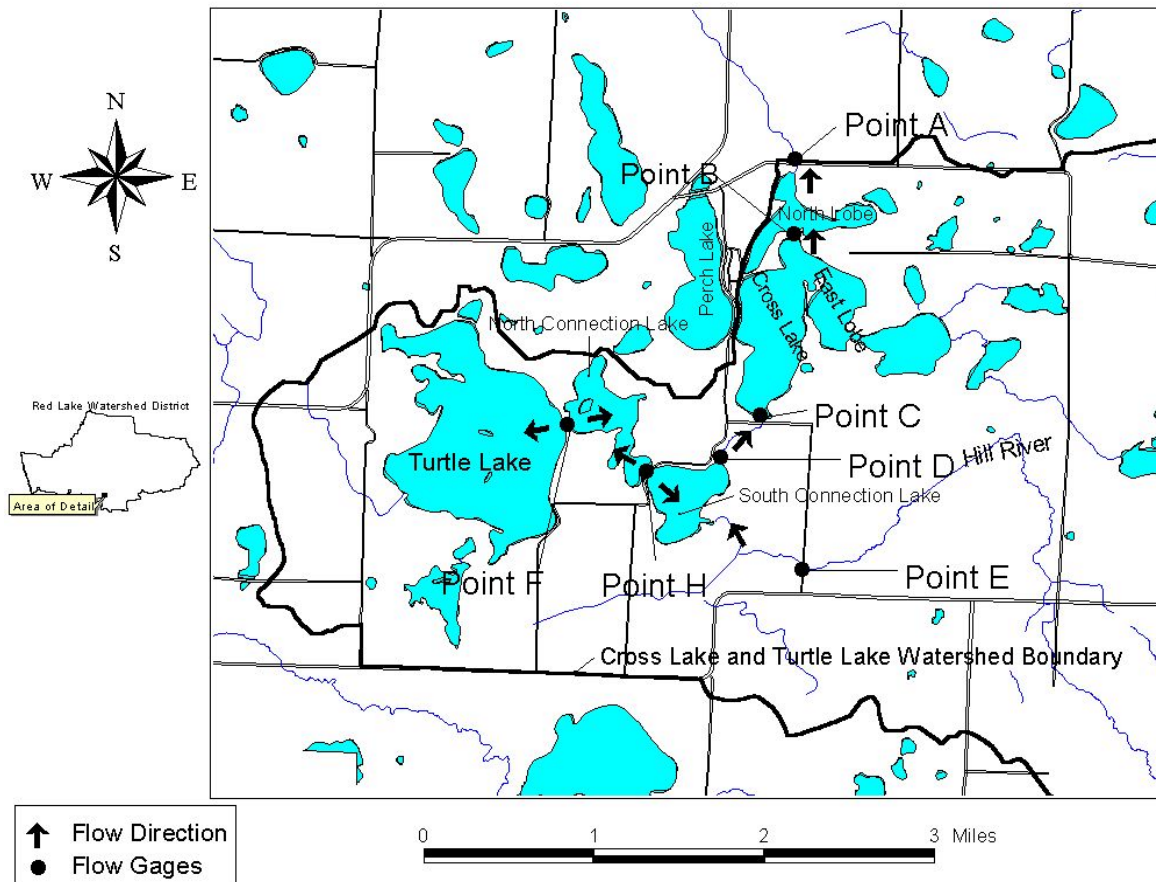
stratification or changes in the dissolved oxygen profile.

Sites in the Turtle Lake system had higher mean levels of total phosphorus. Turtle Lake averaged 0.079 ppm and South Connection Lake averaged 0.077 ppm. In comparison, Cross Lake had a total phosphorus mean level of 0.054 ppm.

Determining hydrologic budgets and flow direction on the Cross Lake and Turtle Lake systems was difficult due to instrument problems and errors. Rough determinations of the flow direction revealed that during higher runoff events, water actually flows from South Connection Lake into Turtle Lake. As inflow into the Turtle Lake system decreases, flow then switches direction and flows from Turtle Lake to South Connection Lake.

Establishment of the baseline water quality and hydrologic characteristics of the Cross Lake and Turtle Lake systems is part one of a two-part process. With known eutrophication problems, the next recommended steps include developing a detailed nutrient balance, further hydrologic investigation (including groundwater investigations) and an inventory and mapping of current land use.

The study was funded through a cooperative effort between the Red River Watershed Management Board and the RLWD, each contributing 50% of the funding.



Map of the Cross Lake and Turtle Lake systems with flow direction and flow monitoring sites. The lake systems are located approximately 3 miles northeast of Fosston, MN.

Other Water Quality Program Information

During 2000, the RLWD applied for a Section 319 grant for statistical development of the district's long-term water quality data and a water quality report format. The project was not funded, but the format will be used in applying through other grant programs. The RLWD has continued working with the Red River Basin Water Quality Team, guided by Molly MacGregor from the Minnesota Pollution Control Agency, for grant project development.

Goals for the water quality program in 2001 include:

- Working on a Clearwater Lake water quality project;
- Providing assistance to the Clearwater Lake Area Association in developing a lake management plan;
- Working on a habitat/bioassessment of the Clearwater River;
- Continue work on the Clearwater River Water Quality Project, including the River Watch Program;
- Continue work on statistical development of long-term data and a water quality report format.

Beaver Pond Water Quality Study

In May, 2000, the Red Lake Watershed District completed a study report of water quality associated with beaver ponds. Water quality impacts from “man-made” impoundments has been debated for some time. The purpose of this study was to determine the effect of naturally constructed impoundments.

The RLWD identified two beaver ponds on which to conduct the study. The first was located on the Moose River in Beltrami County, Township 157 North and Range 57 West. The second was located on the Clearwater River in Sinclair Township, Clearwater County, downstream of Clearwater Lake. Monitoring focused on taking samples upstream, downstream and in the pool of the beaver ponds. Data collection was performed in 1995 and 1996. A comparison of the upstream and downstream water quality parameter concentrations was made using a statistical test.

Results from the Moose River beaver pond indicated greater total phosphorus, nitrates and alkalinity concentrations downstream compared to upstream of the beaver pond. The results also indicated that the beaver pond contributed the additional concentration of each parameter. Statistical differences were not found between concentrations of other water quality parameters.

Approximately 9 to 15 measurements of each water quality parameter were taken on the Moose River beaver pond, which were enough to perform a statistical test. Approximately 5 or less measurements were recorded on the Clearwater River beaver pond site. More data was needed at this site for statistical analysis.

The study was sponsored jointly by the Red Lake Watershed District and the Red River Watershed Management Board.



Picture of the Moose River Beaver Dam, Section 7 and 8, T157N R57W, Beltrami County

River Watch Program

The River Watch Program has been established at several schools in the RLWD. The goal of the River Watch Program is to educate students in natural resources fields while collecting meaningful water quality, quantity and other natural resource data. Students are provided “hands-on” experience in subjects ranging from chemistry and biology to hydrology and geology. The program was established through the Clearwater River Water Quality Implementation Project at four area schools including Oklee, Plummer, Clearbrook-Gonvick and Red Lake Falls.

On May 3, 2000, a Clearwater River River Watch Forum was held in Red Lake Falls, MN. The forum gave students a chance to display results of past years’ data collection and acquire

responses from natural resource personnel. The forum was put on in cooperation from RLWD personnel and Wayne Goeken, Red River Basin River Watch Coordinator. In the afternoon students were introduced to biological monitoring in a session conducted by Chuck Fritz (RLWD administrator). Fritz displayed different techniques in the collection of macroinvertebrates using the Clearwater River at Riverside Park as the demonstration site.

The RLWD plans to extend funding for the program in eight area schools for a period of ten years. The goal of this funding is to provide a stable River Watch Program in each school. Personnel from the RLWD and local Soil and Water Conservation Districts will interact with teachers and students providing a framework for the program.



Area River Watch students perform analysis of water quality samples in school laboratory.

Clearwater River Stream Bank Stabilization and Revitalization Project

In 2000 the RLWD continued work on the Clearwater River Stream Bank Stabilization and Revitalization Project. The project is being performed through a Section 319 grant from EPA, grants which are dedicated to making nonpoint source water pollution improvements. The work performed during 2000 was focused on bank stabilization, grade stabilization and floodplain improvements on the Clearwater River in Section 27, Greenwood Township, Clearwater County.

To accomplish this project, a committee was formed made up of landowners, SWCD and other county representatives, permitting agents and RLWD representatives. The committee assisted in assigning an engineer for project design, adding insight into project development and help in acquiring the necessary permits for project construction. In October 2000 a contractor was assigned to perform construction, most of which will occur in 2001.

The project includes stabilizing stream bank erosion sites through bank reshaping, rock riprap and bioengineering techniques. Other facets include installing rock riffles across the channel of the Clearwater River for grade stabilization and re-establishing the function of the floodplain using clay fill and rock riprap. Another aspect of the Greenwood 27 project is applying for wetland banking acres due to restoration of the floodplain. The RLWD owns approximately 25 acres in the project area, some of which may qualify for the wetland banking program.

The Section 319 grant project will also involve stabilization of two other sites: one in Section 6, Gully Township, Polk County on the Lost River and the other in Section 31, North Equality Township, Red Lake County on the Clearwater River. Design and construction work on these projects will be performed in 2001 and 2002.



Stream bank erosion site on the Clearwater River, Section 27, Greenwood Township, Clearwater County.

