

Water Quality

The summer of 2002 saw a complete changeover in water quality staff. Corey Hanson replaced Ryan Odenbach as the Water Quality Coordinator and Stephanie Hanson replaced Zeb Lamp as the Water Quality Technician. Throughout the year, we have been busy working on multiple projects and have continued to be a hub of water quality information for other agencies.

TMDLs on the Clearwater River

The purpose of this project is to identify, document, and address, the causes of EPA water quality standard violations on Walker Brook and the trout stream portion of the Clearwater River. The TMDL standards define how much of a pollutant can be in a body of water while still allowing it to meet its designated uses, such as drinking water, fishing, and swimming. If more than 10% of the sampling events for a water quality parameter fail to meet the state standards, it is deemed impaired for the affected use.

The trout stream portion of the Clearwater River is listed for exceeding the standards for fecal coliform, with swimming being the affected use. Walker Brook, is listed because of its low dissolved oxygen levels, which affects aquatic life. Walker Brook is fed by ground water that is very old and oxygen depleted and flows through a bog with organic soil that further depletes the oxygen levels. Additionally, beaver dams are a frequent occurrence on Walker Brook, creating stagnant water and depleting dissolved oxygen levels even further. A delisting of Walker Brook has been proposed due to these natural causes. A natural source of fecal coliform in the trout stream portion is wildlife along the river, but there may also be anthropogenic sources.

There are also other reaches of streams and rivers within the Red Lake Watershed that are on the 1998 draft TMDL list as shown in the map below.



Clearwater Lake Management Plan Project

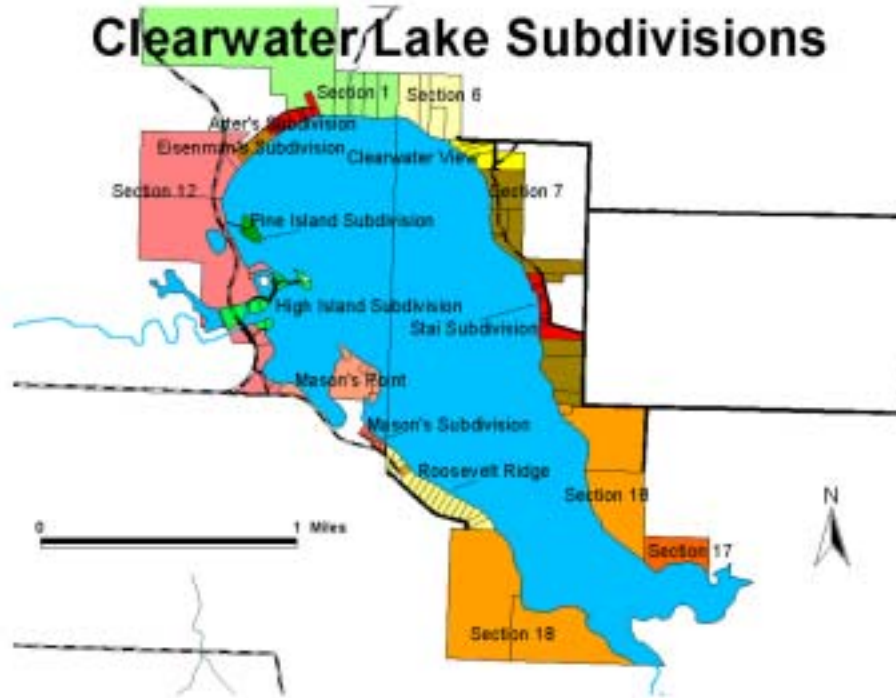
The Red Lake Watershed District received two Local Water Planning Challenge Grants, dealing with Clearwater Lake, through the Board of Water and Soil Resources in 2001. Much was accomplished for these projects in 2002.

The first project is the Clearwater Lake Management Plan. The Clearwater Lake Area Association (CLAA) applied for the challenge grant through the RLWD. The purpose of this project is to develop a lake management plan to improve lake water quality through active educational efforts with lakeshore owners and partnerships with local agencies. Elements of the management plan include:

- A property owners' survey to gather information about existing septic systems, aquatic vegetation, sedimentation, and lakeshore damage

- Lake watershed maps created by the Science Museum of Minnesota
- An extensive collection of historical lake information;
- A parcel-based database for both Excel and ArcView
- Results and recommendations from the Clearwater Lake Water Quality Project
- Development of a vision statement, mission statement, short and long-term goals, and an action plan with implementation goals.

In 2002 the Clearwater Lake Area Association met several times to continue the planning process. In April of 2002, two CLAA members attended the MN Lakes and Rivers Conference in St. Cloud. A first draft of the management plan has been developed using the Sustainable Lake Planning Guide from the Minnesota Lake Association.



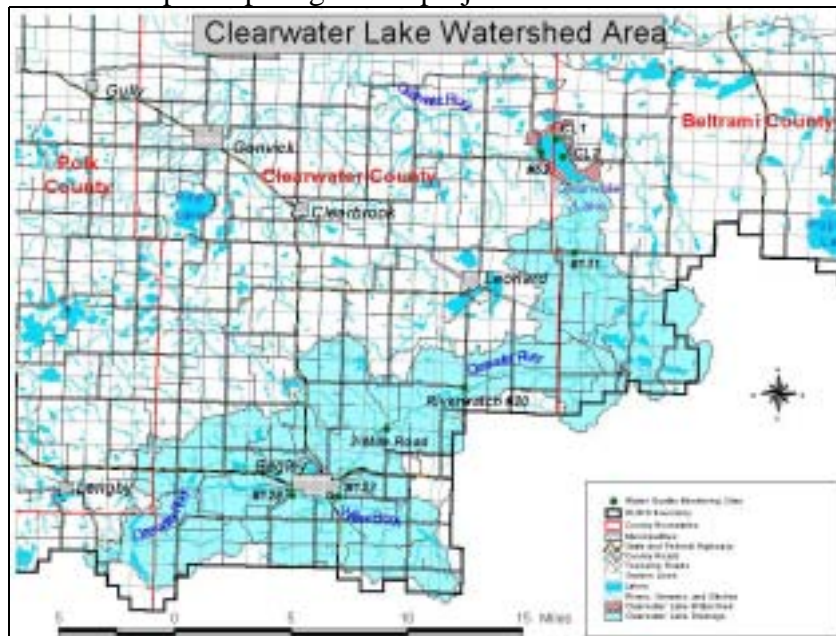
Clearwater Water Quality Model Project

The second project is the Clearwater Lake Water Quality Model. The purpose of this project is to assess the feasibility of various nutrient and sediment reductions and their effect on lake water quality. Final recommendations will be made after the following tasks have been accomplished

- Surveying and stream gauging of selected water quality monitoring sites
- Collection of water quality data from January 2002 to October 2002. The parameters sampled for included water temperature, pH, conductivity, dissolved oxygen, nitrates and nitrites, orthophosphorous, total phosphorous, fecal coliform, chemical oxygen demand, total Kjeldahl nitrogen, ammonia, total dissolved solids, and total suspended solids.
- Collection of evaporation pan and continuously recorded rain gauge data
- Data entry and statistical analysis (time series plots)
- Development of water quality and hydrologic budgets on an annual scale for Clearwater Lake
- Development of a water quality model for Clearwater Lake.

The recommendations will be published in a technical memorandum. The project also includes development of loads in the watershed above Clearwater Lake. This information will be used to determine contributions of nutrients and sediment from upper watershed sources. These results will be compared to those from the Clearwater Nonpoint Project that took place approximately ten years ago.

Local partners in this project include: Beltrami County, Clearwater County, the CLAA, the Clearbrook-Gonvick River Watch Program, and partial funding provided through the Red River Watershed Management Board. State Agencies such as the Minnesota DNR and the MPCA are also participating in this project.



	TSS	TDS	COD	TKN	AMMONIA	OP	TP	Fecal Coliform	DO	Nitrates and Nitrites
Minimally Impacted	6.4				0.2		0.052	20		0.09
EPA Standards	25	500						200	5	
Site #128, County Road 25										
Total annual flow vol.	1176	1176	1176	1176	1176	1176	1176	1176	1176	1176
Total annual loads	40172.1	2692377	272573.7	7408.4	1440.5	110.5	412.1	15980280	110135.9	279.4
Mean Conc	3.42	228.94	23.18	0.63	0.12	0.01	0.04	1358.87	9.37	0.02
Site # 133 Walker Brook										
Total annual flow vol.	923	923	923	923	923	923	923	923	923	923
Total annual loads	16139.2	2578798	217663.3	5804.6	791.4	308	648.1	6630693	58332.8	191.7
Mean Conc	1.75	279.39	23.58	0.63	0.09	0.03	0.07	718.38	6.32	0.02
3 Mile Road										
Total annual flow vol.	6016	6016	6016	6016	6016	6016	6016	6016	6016	6016
Total annual loads	384945.4	17641390	1335359	32781.4	4998.6	2080.3	3568.6	11552730	460224.2	1562.7
Mean Conc	6.40	293.24	22.20	0.54	0.08	0.03	0.06	192.03	7.65	0.03
Buzzle Lake Outlet										
Total annual flow vol.	576.4	576.4	576.4	576.4	576.4	576.4	576.4	576.4	576.4	576.4
Total annual loads	9798.2	1249287	72336	1680.4	444.2	35.7	66.9	594236.2	57404.7	116.4
Mean Conc	1.70	216.74	12.55	0.29	0.08	0.01	0.01	103.09	9.96	0.02
Site #131 Clearwater Lake Inlet										
Total annual flow vol.	4698	4698	4698	4698	4698	4698	4698	4698	4698	4698
Total annual loads	397504.3	13098240	857840	20124.3	4563.6	652.1	2855.2	10760790	488119.4	3177.9
Mean Conc	8.46	278.80	18.26	0.43	0.10	0.01	0.06	229.05	10.39	0.07
Site #52 Clearwater Lake Dam										
Total annual flow vol.	9510	9510	9510	9510	9510	9510	9510	9510	9510	9510
Total annual loads	165462	25048290	1637912	38271.1	11156.3	672	2740.3	1166463	995237.3	3488.1
Mean Conc	1.74	263.39	17.22	0.40	0.12	0.01	0.03	12.27	10.47	0.04

Clearwater Lake Water Quality Model Project Flux Modeling Results

Red River Watershed Assessment Protocol Project

In 2002, the Red Lake Watershed District worked on the “Red River Watershed Assessment Protocol Project”. This is a multi-faceted project aimed at examining water quality data collected on a long-term basis at the RLWD and establishing protocols for the future long-term water quality program. One part of this project is the establishment of a RLWD website. The website was completed in December 2002 and will have one more round of edits and improvement in March 2003. The website has many features, including the following

- www.redlakewatershed.com
- The website features an interactive GIS map of the watershed and can be used in searching for water quality sites.
- Online water quality database that can be updated, downloaded, or statistically analyzed online.
- Water quality report card that gives each monitoring site a grade for water quality based on dissolved oxygen, total phosphorous, total suspended solids, and fecal coliform concentrations. The report card is designed to give the public a qualitative sense of the state of water quality throughout the Red Lake Watershed
- Site description, including pictures
- A table of all existing water quality data for the site
- Analyze and Download page. Water quality data can be statistically analyzed online and time series plots. One can download water data in multiple formats, a data dictionary for the database, and quality assurance information.

Other accomplishments for this project include:

- Existing water quality data for the district was entered into the EPA’s STORET database for the first time since 1994.
- A method was created for censoring data that is below the minimum detection limit.
- Time series graphs by parameter and correlation matrixes were created for each site.
- The present monitoring goals and network are being reviewed. The monitoring network and schedule are being revised in order to coordinate better with the monitoring activities of other agencies.
- A final draft of a Standard Operating Procedures (SOP) manual was created.
- A Quality Assurance Project Plan (QAPP) and Sampling and Analysis Plans (SAP) were drafted.
- Computing annual loads at gauging stations
- Demonstrated statistical analysis techniques applied to RLWD and other organizations’ water quality data
- A water quality report format for use in the RLWD

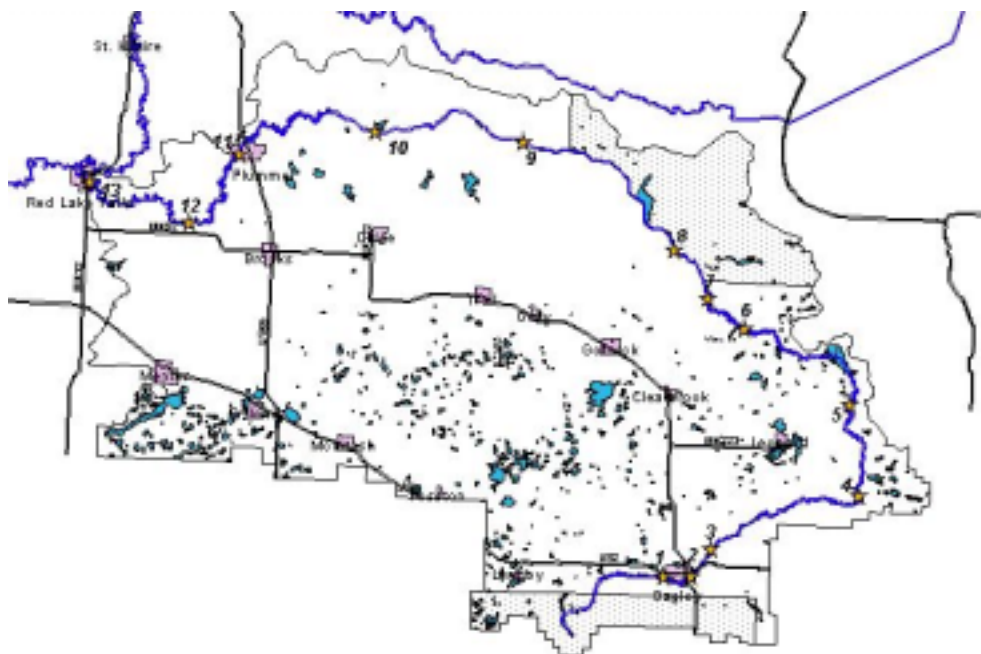
The project was funded through a Local Water Planning Challenge Grant through the Board of Water and Soil Resources in 2001. The Red River Basin Team is acting as the local advisory committee for the team.



The RLWD Website Mapviewer

Clearwater River Habitat/Bioassessment Project Workplan

The purpose of the Clearwater River Habitat/Bioassessment is to perform an index of biological integrity (IBI) along the entire Clearwater River. This will help quantify aquatic habitat and detect aquatic life impairments. The project will involve sampling of fish and macroinvertebrates at 13 sites along the Clearwater River. Clearwater Lake will also be surveyed and sampled for fish, plants, macroinvertebrates, and phytoplankton. The sampling will be performed in cooperation with staff from the Red Lake DNR and the Beltrami SWCD. A sampling and analysis plan has been created for the project and the sampling permits have been acquired. Sampling will occur in August of 2003.



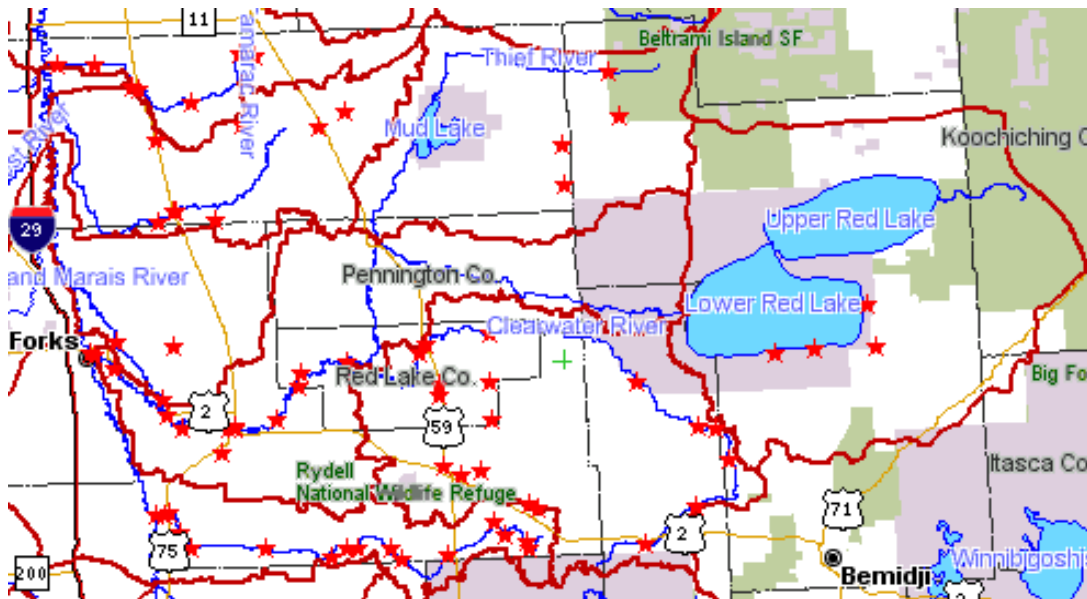
River Watch Program Update

The River Watch Program has been continuing at several area 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.

In 2002, the RLWD continued funding for the program in eight area schools for a period of ten years. This was accomplished through the signing of a mutual agreement between the schools and the RLWD. The RLWD is providing for reagents and supplies as well as substitute teacher and monitoring transportation costs. The schools involved in the program include Oklee, Plummer, Red Lake Falls, Clearbrook-Gonvick, Crookston, East Grand Forks, East Grand Forks Sacred Heart, and Fisher.

Wayne Goeken and Danni Halvorson are employed by the Red River Watershed Management Board to provide technical support to each River Watch Program in the Red River Basin and coordinate the program with watershed district and local SWCD personnel. Their duties will be changing, with more responsibility for the technical support being transferred to watershed districts and SWCDs.

Future plans for the River Watch Program in the RLWD include maintaining annual River Watch data display forums and extending funding for the program to other schools including Grygla, Win-E-Mac, and Fosston. The data collected will be entered into the RLWD database to be utilized by resource managers.



Riverwatch Monitoring Site

Silver Creek Buffer Strip Implementation

In phase I of the Clearwater River Nonpoint Study, the Silver Creek watershed was identified as a priority watershed for the reduction of nutrient loads. The study also found that land within 100 meters of waterways has the greatest impact on water quality. In order to help reduce sediment and nutrient runoff, the RLWD has allocated funds for the installation of additional riparian buffer strips along Silver Creek (there were some installed in 1998 using 319 Grant and RLWD funds to pay for the easements).

Conservation Reserve Program (CRP) money will be used to pay for the installation and easements for the additional buffer strips. The Clearwater County SWCD and NRCS has been using funds provided by the RLWD to collect and process applications from landowners. They will then determine which areas are eligible for CRP, and then proceed to the installation. So far, there have been 20 buffer strip contracts signed for the Silver Creek watershed. RLWD staff have been collecting water quality samples at the Silver Creek water quality monitoring site. Pre and post buffer strip data will be used to determine the success of the buffer strip program in improving water quality.

Riparian buffer strips are strips of permanent vegetation next to a river or stream. They can consist of native grasses, trees, and shrubs planted next to a waterway. They help reduce nutrient runoff from agricultural, lawn, or urban landscapes. They also provide habitat for wildlife, increase species diversity, and moderate water temperature (to benefit fish and other aquatic life). The wider the buffer is, the greater the benefits it provides. Buffer strips are also a benefit to landowners that install them on their property. Farmers that put some of their land into CRP for buffer strips or other conservation practices receive monetary incentives for doing so. They then get the benefit of improved water quality, less soil loss from erosion, increased recreational value, and an aesthetic improvement to their land. Conservation buffer strips also have other applications in addition to riparian areas of streams and rivers, such as filter strips, field borders, grassed waterways, field windbreaks, shelterbelts, and contour grass strips.

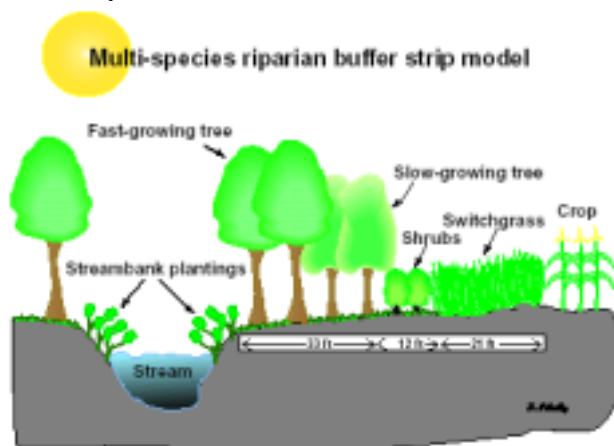


Figure 1. The natural benefits of a riparian (river) zone can be recreated by planting strips of trees, shrubs, and grasses, and stabilizing streambanks, shown above, as well as constructing small wetlands to capture tile flow from nearby fields. Source: Iowa State University, 1995.

An example of an area in which buffer strips would be beneficial

Clearwater River Stream Bank Stabilization and Revitalization Project

The stream bank stabilization completed in 2001 has withstood a round of spring runoff and the June 2002 flooding. The vegetation on the banks is starting to establish itself and remained intact through high water. The floodplain sites that block off the eroding channels that were forming in the floodplain also remained intact through the periods of high water. They also held water in the channels throughout the summer, helping to restore the wetland environment of the floodplain.

The restored floodplain area is in the process of being certified for wetland banking credits. This process should be completed by the spring of 2003.

The rock riffle structures have also remained intact, but there is too much of a drop after the furthest downstream riffle structure, so additional structures will be put into place to step the water down in order to prevent scour holes. The funds for this additional work on the Greenwood 27 project will come from the funds that were originally allocated for the Equality 31 stream bank stabilization project. It was determined that at the Equality 31 site, the stream channel was in a state of natural evolution and an attempt at stream bank stabilization would be unsuccessful.

Final design plans are being drafted for another erosion site in Section 6, Gully Township, Polk County on the Lost River. This project is aimed at addressing erosion near a county bridge.

It will also serve as a demonstration project for stream bank stabilization techniques that have not been used in this part of the state.

These projects have been made possible through a Section 319 grant from the EPA, which is administered by the MPCA. Cooperating partners in the project have included Clearwater County and local landowners. Special cost share funds and in-kind work were provided through the Clearwater County SWCD. Local landowners provided some of the construction as well as right-of-way for construction.

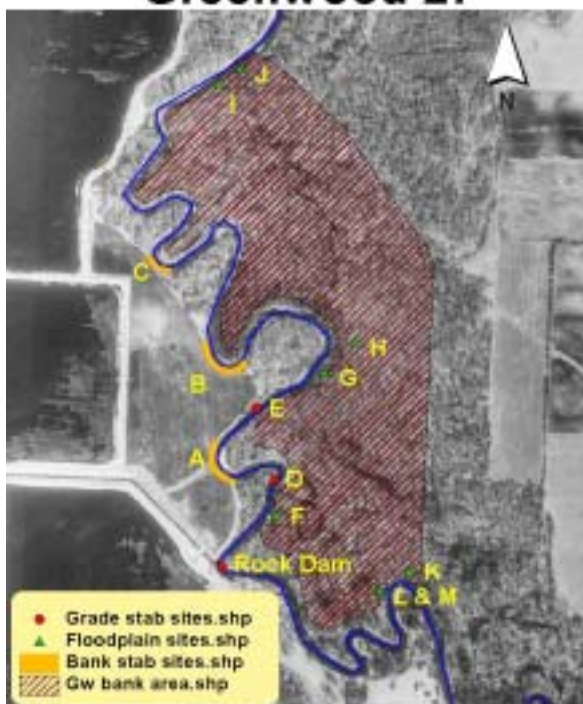


Site A Before



Site A Fall 2002

Greenwood 27



Floodplain site G



Riffle Structure Example

Future Water Quality Program Information

In 2003, goals for the water quality program include:

- Continue progress on the Clearwater Lake Projects;
- Continue progress on the Red River Watershed Assessment Protocol Project;
- Continue progress on establishing buffer strips in the Silver Creek Subwatershed in Clearwater County;
- Finish construction on the grade stabilization efforts through the Clearwater River Stream Bank Stabilization and Revitalization Project.

For more information or questions on water quality projects, water quality data, mapping or GIS data contact Corey Hanson at the Red Lake Watershed District Office or e-mail at coreyh@wikel.com.