



Clearwater River Watershed Lakes Move from TMDL Study to Implementation

The area encompassed by the Clearwater River Watershed District (CRWD) is rich in soil and water resources, fueling the growth of two economic mainstays in this Central Minnesota territory - farming and tourism. Around these basics have grown the communities that support their needs. As population and industry grow, those priceless resources, which we often take for granted, may deteriorate.

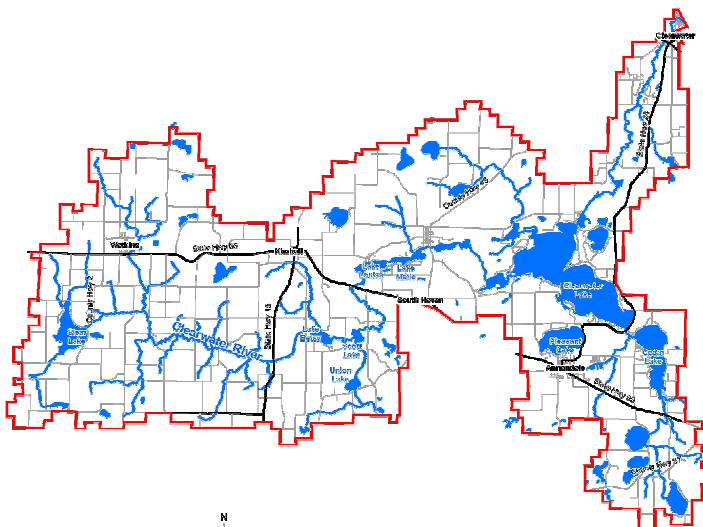
A number of years ago, those who fished and enjoyed the waters of the Clearwater Chain of Lakes began to notice a decrease in the clarity of those waters, an increase in the number of rough fish (bullheads and carp), and an increase in the growth of algae on the surface of the water.

Studies showed that the lakes were nutrient-rich—they were polluted with phosphorus in amounts many times higher than the norm.

Runoff from cities, farmland, private septic systems, and industry contributes an excessive amount of sediment and phosphorus to the lakes and rivers in the watershed.

The CRWD recognized early on that clean water was essential to maintaining the economic health of the towns within its borders like Annandale, Kimball, Watkins, and Clearwater. Starting in 2002, the CRWD began meeting with landowners and government representatives to talk about impaired waters in the CRWD.

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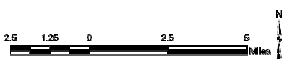
The Clearwater River Watershed District is located in Stearns, Meeker, and Wright Counties. Highway 55 bisects the District.

What is a TMDL?

- The Total Maximum Daily Load: the maximum amount of a pollutant that a water body can receive and still meet water quality standards
- A scientific study to identify and quantify the sources of pollution to a water resources.
- The allocation of that amount to the pollutant's sources.

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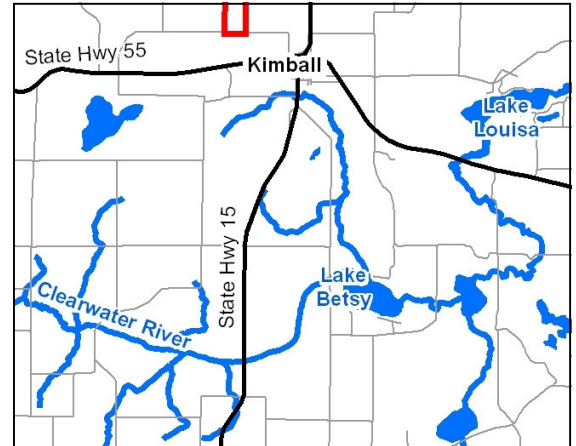
Lake Betsy Hypolimnetic Withdrawal and Irrigation Pilot Study

Lake Betsy is a 148 acre lake in Meeker County south of the city of Kimball. As an upstream lake in a series of lakes along the Clearwater River, Lake Betsy traps nutrients and sediment from the watershed and protects the water quality of downstream lakes. But this nutrient trapping comes at a cost—Lake Betsy suffers from very severe algae blooms.

The project would pump nutrient-rich water from

the lake bottom—the “hypolimnion”—and use it to irrigate a nearby farm field. Instead of feeding algae in the lake, the phosphorus in the withdrawn lake water would be recycled to nourish crops, reducing the need to fertilize the farm field.

If successful, the Lake Betsy Pilot Project could be replicated elsewhere, improving lake water quality while sustaining agriculture.



Lake Betsy is located about 5 miles southeast of Kimball



Project Benefits

- ✓ Remove about 300 pounds phosphorus annually
- ✓ Reduce need to apply fertilizer to nearby farm fields
- ✓ Reduce water consumption for irrigation

Project Costs

Construction	\$280,000
Engineering, Permitting, etc.	<u>\$20,000</u>
Total Cost	\$300,000
Annual Operating Cost	\$10,000

Q: Why withdraw water from the lake bottom?

A: In the summertime, many lakes “stratify,” or develop temperature layers. The bottom layer, or “hypolimnion,” is cooler than the rest of the lake, and stays on the bottom. Over the summer the oxygen in that water is depleted. When it gets too low, a chemical reaction occurs and phosphorus can be released from the sediments, causing algae growth. Removing this phosphorus-rich water will reduce algae.

Q: Where does the phosphorus in the sediments come from?

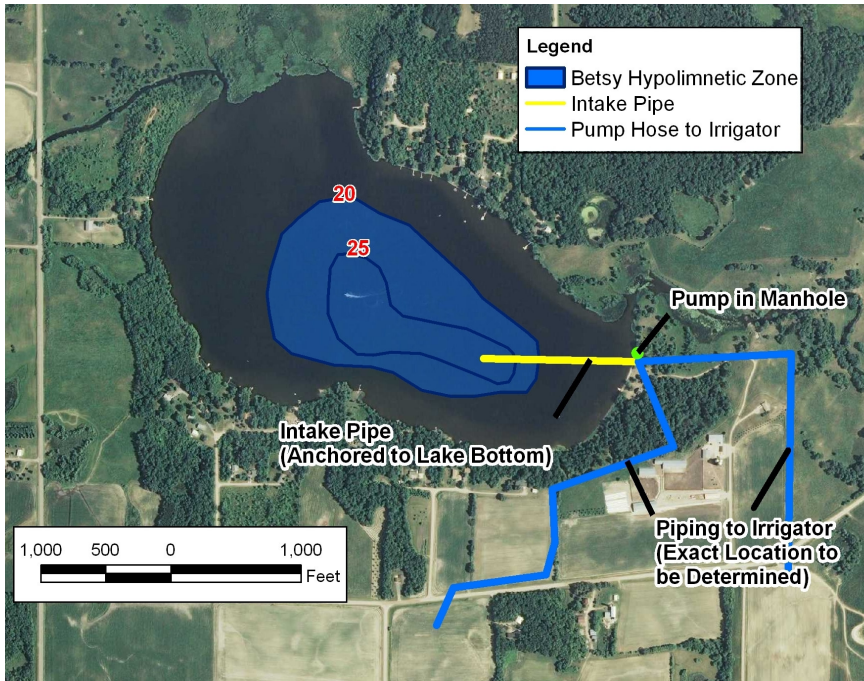
A: The Clearwater River flows through Lake Betsy. The lake receives water not only from area around it but also from a large upstream watershed. The phosphorus and sediment delivered to the lake build up in the lake sediments.

Q: Why not just reduce phosphorus coming into the lake?

A: We need to do both. The District is working with landowners upstream to reduce phosphorus and sediment to the Clearwater River.



How Would the Project Work?



Above: A hose reel sized to store 6 - 660' hoses
 Below: A PTO pump.

(Images courtesy Hydro Engineering, Inc.)



The proposed system would consist of a pump powered by a tractor power take off (PTO). The pump would be located in a manhole along the shoreline of the lake with an intake pipe anchored to the bottom running from the manhole approximately 1,200 feet to the deep portion of the lake. This system would pump water out of the lake bottom from the intake pipe, through a plastic pipe to a hose reel and travelling irrigation gun that would apply the water to agricultural areas surrounding the lake.

A 55 hp pump would be needed to pump the water from the edge of the lake

to the irrigation gun, a horizontal distance of up to 4,000 feet and a vertical height of about 80 feet, with enough pressure (100 psi) to operate the irrigation gun.

It is estimated that pumping would occur about half the time from June to September, or about 60 days of pumping at a pumping rate of 400 gpm. At that rate an estimated 300 pounds of phosphorus would be removed from the lake annually. The Lake Betsy TMDL requires that the total phosphorus load be reduced by 87%. Achieving that daunting goal will require a wide variety of activities both large and small.

Other Activities

- ✓ Carp control in lakes
- ✓ Grants to farmers help manage pastures and grazing
- ✓ Replace drainage tile intakes with filters
- ✓ Plant buffers around tile intakes
- ✓ Plant buffers along the stream banks of the River and its tributaries



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*Cleaning up the lakes
and the Clearwater River
will cost an estimated
\$8.3 million.*

Q: Which lakes do not meet state standards?

- Clear
- Betsy
- Scott
- Union
- Louisa
- Marie
- Caroline
- Augusta
- Swartout
- Albion
- Henshaw

Q: Why did the District undertake this TMDL study?

A: The impairments to the lakes and River are inter-related. The sources of pollution to the lakes are also polluting the River. Studying all the lakes and the River at once and making improvements in this way is most cost-effective and ensures that taxpayers and property owners get the biggest benefit for their buck.

Q: What is the District going to do to clean up the lakes and the River?

- A: The CRWD has identified a suite of projects and activities, and will work with multiple partners:
- ✦ Work with agriculture to manage their operations in ways that don't pollute lakes and the River.
 - ✦ Help restore buffers, upgrade septic systems and remove carp from lakes.
 - ✦ Work with cities to enhance street sweeping.
 - ✦ Help property owners undertake practices such as rain gardens on their own properties.

TMDLs Move to Implementation

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The CRWD worked with the Minnesota Pollution Control Agency to undertake a special study called a Total Maximum Daily Load (TMDL) to better understand the sources of pollutants to the lakes and the River, and to develop a plan to clean them up.

Eleven lakes in the CRWD do not meet State of Minnesota water quality standards, and have been designated as "Impaired Waters." Nutrient

concentrations in the lakes are high enough to impair the use of the lakes for swimming and fishing.

In addition, in some areas the Clearwater River contains too little dissolved oxygen to support fish and other aquatic life, and it is contaminated by high levels of bacteria.

The TMDL identified the sources of pollutants to the lakes and River, and calcu-

lated the "load reduction" needed to meet State water quality standards.

An Implementation Plan was developed through extensive work with lake associations, cities, townships, counties, citizens, and groups such as Ducks Unlimited. This Plan includes construction projects, management programs, and other activities to help clean up the lakes and River.