

RICE CREEK WATERSHED DISTRICT



‘The potential application is huge’

The Rice Creek Watershed District is testing a new way to remove carp in Minnesota. Designed to improve Long Lake’s water quality, it could work wherever carp migrate to spawn.



Left: Kukulski was on site for a week to test the electrical guidance system. **Right:** Przemek Bajer of the Minnesota Aquatic Invasive Species Research Center is the lead project researcher.

NEW BRIGHTON — An experimental carp removal system being tested this month on Rice Creek could change the way Minnesota deals with the invasive fish that degrade lakes’ water quality and habitat.

If it works, the system could be used where invasive common carp migrate to spawn.

“The potential application is huge, because carp show these spawning migrations in



many, many different lake systems,” said lead project researcher Przemek Bajer of the Minnesota Aquatic Invasive Species Research Center. “If you could create a device that removes them from the stream without a lot of physical labor — that would basically revolutionize carp management. You could remove 50 to 80 percent of the population with one or two people with very little effort.”

Top: Post-doctoral researcher Peter Hundt and Emil Kukulski, director of Poland-based ProCom System’s hydro-ecological department, work April 30 to reposition a chute through which carp will migrate up Rice Creek from Long Lake to spawn in the Lino Chain of Lakes.

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The Rice Creek Watershed District is testing a low-voltage electrical guidance system that directs migrating carp into a gate that leads to a fish ladder. Paired with a Whooshh System (AKA carp cannon), not yet attached, it is designed to remove about 75 percent of migrating carp. Carp removal is one part of RCWD's \$7.3 million plan to improve water quality in Long Lake.

The system combines technology used in Poland to keep fish out of hydroelectric plants with technology developed in the U.S. to pick fruit.

Carp removal is just one element of Rice Creek Watershed District's four-part, \$7.3 million Long Lake Targeted Watershed Demonstration Project, a plan to improve water quality in nutrient-impaired Long Lake. A \$3 million Targeted Watershed Demonstration Program grant from the Minnesota Board of Water and Soil Resources is in play.

"Algae blooms are frequent; they can be intense," said Matt Kocian, RCWD lake and stream specialist. "Common carp exacerbate that problem big time. We know in Long Lake and in some of our other lakes we're not going to meet water-quality standards without addressing carp."

Carp stir up the lake bottom in search of food, which increases turbidity and frees nutrients that feed algae growth.



Four-part Long Lake plan

Rice Creek Watershed District's Long Lake Targeted Watershed Demonstration Project addresses phosphorus- and nutrient-loading from the 100,000 acres that flow into Long Lake. The project has four elements:

- ◆ Hansen Park stormwater retrofits in New Brighton, where a \$4 million iron-enhanced filter is slated to

go online this summer;

- ◆ Mirror Lake stormwater retrofits in Saint Anthony Village;

- ◆ Middle Rice Creek restoration, where a re-meandering added a half-mile in creek length and will help to reduce erosion and sediment-loading;

- ◆ Invasive common carp management.

To make a noticeable difference in Long Lake, the RCWD estimates the carp population must drop

from 800 kilograms per hectare to 100 kg/ha. A single female can produce 1 million eggs a year.

Each spring, approximately 20,000 carp that over-winter in New Brighton's Long Lake swim up Rice Creek to spawn in the shallow Lino Chain of Lakes.

The experimental system would remove about 75 percent of adult carp leaving Long Lake; a second installation would deter about 75 percent of juvenile carp leaving the Lino Chain of Lakes.

On Day 5 of a seven-day site visit to test the electrical guidance system, Emil Kukulski stood waist-deep in Rice Creek. The hydro-ecological department director of Poland-based Procom System, Kukulski was reconfiguring the chute through which the carp will pass.

The system is designed like this: Lines of positive and negative electrodes produce a low-voltage current that carp will not pass. The electrodes are attached to buoys anchored to a track on the creek bottom. Angled across the creek, the electric guidance system funnels carp to a gate. The only upstream



From left: Post-doctoral researcher Peter Hundt and University of Minnesota technician Kao Vang work with Kukulski in Rice Creek to reposition a chute.

route, it leads to a fish ladder — “steps” built on a floating wood platform. When carp reach the metal chute at the top, they’ll drop into the so-called carp cannon.

The Whooshh System, which was developed to pick fruit, and then modified to safely move salmon over dams, will pneumatically propel carp through a plastic tube and into a holding bin on shore.

On April 30 the carp were migrating. The electric barrier was working. But the fish refused to enter the gate.

A similar project worked on invasive sea lampreys in Michigan. The electrical guidance system keeps native fish out of hydroelectric plants’ water intakes at 20 sites in Poland, Switzerland and Brazil.

This is the first time it’s being tried in Minnesota.

Kukulski — along with post-doctoral student Peter Hundt and University of Minnesota technicians Kao Vang and Cameron Swanson — pounded black PVC pipes into a collar that will hold the repositioned chute in place.



Matt Kocian, Rice Creek Watershed District’s lake and stream specialist, left, and Bajer discuss progress of the carp removal system being installed April 30 on Rice Creek in New Brighton. A second system would stop juvenile carp from migrating downstream from the Lino Chain of Lakes.

MAISRC adapted the electric barrier and pneumatic removal technologies with funds from RCWD, the Clean Water Fund and the Environment and Natural Resources Trust Fund.

RCWD will lease and test the ProCom equipment for two years (at a cost of \$120,000) before deciding whether to purchase for an additional \$30,000. RCWD will pay \$80,000, part of the cost to lease the Whooshh System for two years; the University of Minnesota will pay the balance.

If the fish don’t cooperate soon, Bajer said experiments would resume in the summer when carp migrate in lesser numbers. The average spring migration runs 10 to 14 days.

“There are fish trying to cross the barrier every day. They have been really trying aggressively to cross it,” Bajer said two days after the reconfiguration. “However, they do not want to swim through our fish ladder. So we keep adjusting, changing one thing at a time trying to figure out what they don’t like about our design.”

Other methods considered

SEINING: In the past, the Rice Creek Watershed District hired a commercial fisherman to net the carp under the ice. Ice conditions and fish movements made for inconsistent harvests, and market demand for carp has been low.

FISH BARRIERS: A permanent structure would stop carp from migrating upstream, but it also would require frequent maintenance.

HIGH-VOLTAGE BARRIER: A fixed, high-voltage barrier would prevent access to spawning habitat. The most expensive (and more dangerous) option, it also would block native fish, and would not control carp upstream.

AERATION: Aeration could keep native fish alive and therefore reduce the carp population. But the Lino Chain of Lakes vast acreage makes the option ineffective.



Common carp swim under a railroad bridge when they migrate up Rice Creek from Long Lake. They'll migrate in lesser numbers during the summer, when researchers can fine-tune the removal system.

The crew tried enlarging the entrance, positioning the fish ladder deeper in the water, adding branches to naturalize the approach, increasing water flow with a second pump. Next, Bajer planned to disconnect everything but the entrance.

Once the carp do move, they'll be tracked.

Employees of Bajer's company, Carp Solutions, tagged about 1,000 carp last year. They installed five antennae — near the approach, at the gate, at the start and exit of the fish ladder, and about a mile upstream. Data will help determine the best management strategy.

"We're learning how sensitive they are to structures that we're putting in the stream," Bajer said. "They seem to be

“**Long Lake can get some pretty severe algae blooms in July, August when the temperatures heat up. I don't know that I'd say long Lake is the worst in our watershed in terms of phosphorus concentrations or algae bloom severity, but it's pretty bad. The fact that there's so much recreational use, that's why we're focusing on it.**”

— Matt Kocian, Rice Creek Watershed District

very cautious. The fish ladder is a good example. Even though they could easily cross it, they just don't want to.”

Watershed districts throughout the state are paying attention. Two Minnehaha Creek Watershed District employees were on

site recently to see the testing.

While the combination electrical guidance system and Wooshh system is the preferred outcome, Kocian said another positive result would be to use the guidance system alone to direct carp into a traditional trap. Each

technology could work elsewhere with site-specific adaptations.

"If it works, it's a big deal. It could be a game-changer for how we manage carp," Kocian said. "What we're testing here absolutely could be modified and implemented in other locations."



The Minnesota Board of Water and Soil Resources' mission is to improve and protect Minnesota's water and soil resources by working in partnership with local organizations and private landowners. Website: www.bwsr.state.mn.us.



Left: Corn was used to bait the carp, which were being successfully stopped by the electrical guidance system but refused to enter the gate leading to the fish ladder on April 30. **Middle:** Five antennae will monitor the movements of about 1,000 carp tagged last year to help determine the best management strategy. **Right:** Tools rested on the bank of Rice Creek. Carp migrate up Rice Creek each spring to spawn.