Uncommon lake aeration system aimed at preventing winter kill

By Ed DuBois

Shallow lakes in Wright County can be susceptible to a phenomenon known as winter kill. The oxygen in the lake gets depleted, and the lack of oxygen results in the death of fish in the lake.

Just before this happens, the DNR (Department of Natural Resources) often opens the lake to unlimited fishing. Anglers are allowed to take as many fish as they can catch before they die. This action doesn't necessarily prevent winter kill, but at least the fish are not wasted.

An alternative to unlimited fishing is to aerate the lake to increase its oxygen content just enough to keep the fish alive until spring weather can cause a natural restoration of the oxygen in the water. A unique aeration system is being used this winter at Mink and Somers Lakes just north of the City of Maple Lake.

The DNR and the Mink-Somers Lake Association are cooperating on what is called a pump and baffle aeration system. It began operating on Feb. 16 when the oxygen level in the lakes was down to around 3 ppm (parts per million).

The lakes with high wintertime oxygen levels are around 8-10 ppm, said Paul Diedrich, area fisheries manager at the DNR office near Montrose. Lakes that are opened for unlimited fishing are usually down around 2 ppm. Up around 5 ppm is good for sustaining fish, Diedrich said.

Following the start of operating the Mink-Somers aeration system, tests of the water at various places around the pair of lakes showed the oxygen levels were down to around 1.6 ppm. But at the point of discharge (where oxygenated water from the pump and baffle system was entering the lakes) the oxygen level was from 10-12 ppm. Tests in the vicinity of the aeration system showed 4 ppm. However, out in the middle of the bay where the aeration system is located, the oxygen level dropped from 2.5 to 1.6 ppm.

Diedrich could not explain the readings from the middle of the bay, but he is hopeful that the fish in the two lakes will seek out the oxygen plume from the aeration system and survive until natural causes restore the oxygen levels throughout the two lakes.

"We are creating a refuge of oxygen-suitable water," Diedrich said. "The rest of the lake is at 2 ppm or less. We don't know if the fish will find the oxygen rich water. Pan fish tend to stay put. Northern pike are best at getting around. We don't know if the walleye, perch and bass will go to the oxygen rich water."

Part of the reason the DNR and the lake association are trying so hard to save the fish is because a restocking project was recently conducted in the lakes.

"All the fish in Mink and Somers were killed in October, 1994. Then we stocked the lakes with game fish," said Diedrich.

He explained that rough fish had taken over in the lakes.

"The carp population was between 400 and 800 pounds per acre. There was not much room for anything else," he stated.

The capacity in most area lakes is from 500 to 1,000 pounds of fish per acre. When the rough fish population gets too high, the game fish die and the rough fish take over, Diedrich explained.

During recent mild winters, the threat of winter kill was not a great concern at Mink and Somers. However, they are relatively shallow lakes, and it is shallow lakes that get into trouble when winter conditions are harsh like they were this year. Shallow lakes do not have the volume needed to provide the fish enough oxygen to last throughout the winter when the snow-cover is especially heavy and prolonged.

Diedrich said a lake like Lake Pulaski in Buffalo has a larger volume, plus it has less organic material, such as dead algae which uses oxygen as it decays.

He was asked if natural underwater springs help some lakes maintain a higher oxygen level. He said that is generally not the case. Groundwater sometimes has little oxygen in it.

"We tested the well water at our office and found it was pretty well depleted of oxygen," Diedrich stated.

The oxygen from the Mink-Somers pump and baffle system is put in the water by pumping lake water to the top of a large chute on shore. The water cascades down the chute, picking up oxygen along the way back to the lake.

The system is unique in that it is close to shore and it creates relatively less open water than other systems, Diedrich said.

There are aeration projects involving what is called a "bubbler" system at Lake Fremont in Sherburne County and Becker Lake in Stearns County. This type of system needs to be used early in the winter when the ice initially forms. Diedrich explained that a bubbler system tends to circulate the water, and, if it were turned on suddenly late in the winter, it would circulate oxygen-poor water and possibly kill fish that might otherwise survive.

Another type of aeration method, a hypolimnetic system, has been used at Lake Marie in the Clearwater River chain. This system takes water from the oxygen-poor deeper layer of lake water, mixes it with air and then releases it back to the lower depths. The hypolimnetic system creates relatively little open water.

One other type of aeration method involves agitators. This type is not being used in Wright County. In fact, the only aeration system being operated this winter in Wright County is the Mink-Somers pump and baffle project, according to Diedrich's records.

He said much planning goes into establishing an aeration system. It is not possible to aerate a lake on a moment's notice. Public notifications must be issued, approvals must be obtained, and arrangements must be made.

"You need to plan ahead," Diedrich said.

At Mink and Somers, the DNR and the lake association had been working closely together for years on rehabilitating the lakes. The agreement for the aeration system provides that the association pays for the electric power to run the system and pays for insurance coverage. The DNR paid for the equipment and monitors the project. The equipment cost about $25,000.

Aeration

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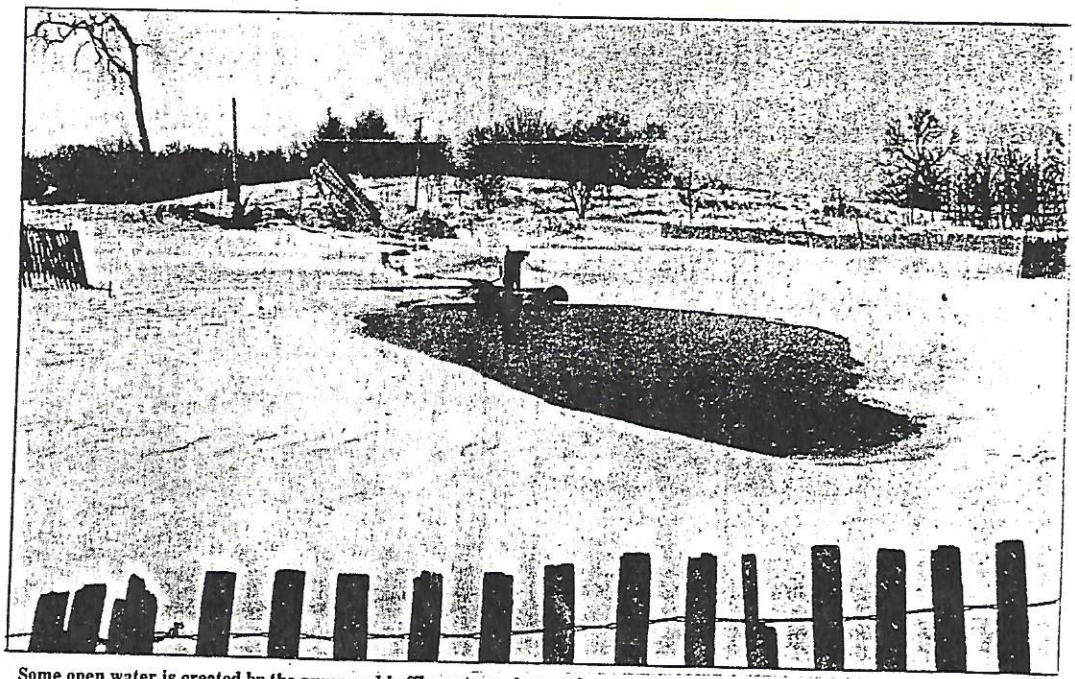
A pump for the system is mounted on floats. It sends water through a large pipe to a chute on the shore.

Water froze at the bottom of the chute, but under the ice you could hear the water flowing.



Some open water is created by the pump and baffle system. A snow fence and "thin ice" warning signs were put up around the system for safety. Here, you can see the pump in the water, with the chute on shore in the background.

A unique aeration system has been operating at Mink and Somers Lakes in Corinna Township (just north of the City of Maple Lake) since about the middle of February. Here, DNR (Department of Natural Resources) fisheries technician Brad Maas stands next to a chute through which water from the lake is pumped. The water cascades down the inside of the chute, picking up oxygen along the way back to the lake. (Photos by Ed DuBois.)