



WINTERKILL

By Ron Wilson

The North Dakota Game and Fish Department does not operate winter aeration systems, such as this one at Strawberry Lake in McLean County.



GREG GULLICKSON

For decades, winter aeration systems were used on North Dakota waters to reduce the possibility of winter fish kills triggered by the lack of adequate oxygen and sometimes a buildup of toxic gases.

Yet, this longtime fisheries management tool, designed to keep water from freezing during the state's leanest months, has been shelved as the risk to human safety outweighs uncertain benefits to fish.

"Fish management in the 1960s and into the mid-1970s centered around trying to keep lakes alive, especially in the Turtle Mountains, using various aeration systems," said Greg Power, North Dakota Game and Fish Department fisheries chief. "The conclusion that we always came up with concerning the success of these systems was that they were inconclusive."

This is the second winter of a fisheries division policy that says the Game and Fish Department will no longer design or operate aeration systems during winter because of the inherent risk to human safety. There are some aeration systems in place today in North Dakota, but those are operated by the U.S. Fish and Wildlife Service and organizations such as wildlife clubs and cabin associations.

"We could never prove that we put oxygen in the water, not with the equipment we were using," said Gene Van Eeckhout, southeast district fisheries supervisor, Jamestown.

The aeration systems, Van Eeckhout said, were designed to help keep fish alive that fisheries crews worked so hard to get to catchable size for anglers. Even so: "I laid awake many nights thinking about the dangers of that open water," he said.

To alert anglers and other winter recreationists to dangers the aeration systems created, fisheries crews used signs, reflective tape and fences around the open water. Still, people drove vehicles too close to the open water, and it wasn't uncommon to find that ice anglers drilled holes and fished just outside the fence, thinking that the aeration systems attracted fish.

Winterkill is the reality of fisheries management on the Northern Plains. Fish die every winter, the only consolation being that some winters aren't as bad as others.

A fishery is threatened with winterkill when the oxygen supply is not adequate to sustain fish, and winterkill affects each lake differently. Dying and decaying vegetation consumes large amounts of oxygen in winter, but given the right

conditions, plants can produce adequate oxygen to sustain both fish and the process of decay.

Plants quit producing oxygen when deprived of light needed for photosynthesis. Cloudy ice and heavy snow cover can reduce the amount of light available to plants, increasing the likelihood of winterkill. Some fish species are less tolerant of low oxygen conditions than others.

Winterkill may be total, meaning all species in the water body succumb to the lack of oxygen. In other cases, partial winterkills may occur as oxygen levels, although very low, may not reach zero. Because rough fish species, such as bullheads, are more tolerant of low oxygen conditions, most partial winterkills result in total mortality of desirable species, leaving only undesirable fish behind.

Winter aeration was once a common fish management tool, something budding fisheries biologists were taught in college. "It's kind of gone away," Power said. "We went from maybe 30 systems in the '60s and '70s,



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Installing a winter aeration system during winter was a lot of work for Game and Fish Department personnel. (Below) Despite warnings, some ice anglers are attracted to winter aeration systems because they figure the fish are attracted to them, too.

down to maybe 10 by the late '80s and early '90s. You just never knew what you were getting for your dollar.”

Scott Gangl, Department fisheries management section leader, said research has been done in North Dakota over the years to document the benefits of aeration, but the results have been variable and inconclusive. In 1977, systems on four lakes in the Turtle Mountains were evaluated, during which a fish kill occurred at Lake Upsilon while an aeration system was in operation. The fish kill was attributed to heavy snowfall and a long ice-cover period. Meanwhile, it was noted, Dion Lake, which was prone to frequent fish kills, didn't have a kill from 1968-76 when it was being aerated.

“Dissolved oxygen monitoring during the study period didn't show any remarkable difference between aerated and nonaerated lakes,” Gangl said.

From 1990-93, Van Eeckhout compared the effects of aeration at Lake Hoskins to nonaerated Green Lake, both located in McIntosh County. “They didn't document any significant oxygen exchange at Lake Hoskins that could be attributed to the aeration system, with similar trends in oxygen levels occurring at each lake during each winter of the study,” Gangl said.

Winter 1992-93 was the harshest during the study, and dissolved oxygen levels dropped considerably for an extended period at Green and Hoskins. A total fish kill was recorded at Green Lake, while no substantial fish kill occurred at Lake Hoskins.

In the most recent study, Van Eeckhout inserted radio transmitters into walleye and northern pike in Hoskins and Green during winters 1999-00 and 2000-01 to monitor fish movements in relation to aeration systems at both fisheries.

The study revealed that neither species showed an affinity to the aeration site in Green Lake either before or after the aeration program began. In Lake Hoskins, walleye and pike seemed to collect in the deepest portion of the lake, near where the aerator was in operation, during the period of the lowest dissolved oxygen. It appeared the fish were selecting water that had higher than average dissolved oxygen conditions, although it wasn't determined whether higher dissolved oxygen was the result of the aeration system or some other factor, such as water depth.

Basically, research and evidence indicates that winter aeration may have a positive effect on some lakes during some winters, but during harsh winters, these systems may not help save a fishery. “Whether they work or not, our fisheries biologists feel the risk of human life isn't worth the tradeoff for a few fish,” Gangl said.

As a result of research showing little or no measurable benefit from aeration, the number of aeration systems operated by the Department declined to four by 2007, Gangl said. “Over the last 20 years, we have significantly reduced the number of aeration

systems we operate, and we haven't seen a major increase in winterkill in that time," he said.

Some aeration work has been done, and continues, in North Dakota in summer months, thus reducing the threat to human safety, while improving water quality and likely reducing the threat of winterkill. Brandon Kratz, Department fisheries biologist, Jamestown, heads the most recent work, started in 2006 at Heinrich-Martin Dam in LaMoure County.

Most of the lakes and reservoirs in North Dakota thermally stratify in summer, meaning there is a division between the warmer water on top and cooler water on the bottom. Gangl said this stratification prevents the mixing of oxygenated surface water with bottom water, where oxygen consumption often exceeds production. Summer aeration, he added,

can prevent stratification and promotes mixing of oxygenated water throughout the water body.

"Preliminary results indicate that summer aeration can keep a small reservoir from stratifying," he said. "In theory, aeration over several summers may promote oxidation of bottom sediments, reducing biological oxygen demand, thus reducing the likelihood of winter fish kills."

The book on aeration systems in North Dakota is not closed. "The research that Brandon is doing could determine if running the systems during summer correctly can maintain water quality benefits into and through the following winter," Power said.

RON WILSON is editor of North Dakota OUTDOORS.



RON WILSON

Game and Fish Department fisheries personnel check dissolved oxygen levels on a North Dakota fishery last winter.



CRIAG BHIRLE

Radio transmitters were once inserted into walleye and northern pike in two McIntosh County lakes to monitor their movements in relation to winter aeration systems.