

Lake Aeration

A Management Tool to Prevent Fish Winterkill

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Fish Winterkill

- Shallow lakes (less than 15-20 feet) are most prone to fish kills during winter months.
- Once ice forms oxygen input from wind and wave action is eliminated.
- Once snow depth increases light can no longer penetrate and plants begin to die.
- Decomposition of plant material increases BOD which drives down the available oxygen reserves in the lake.
- The longer and more severe the winter and if the lake is low from drought will be two determining factors into the likelihood of a fish winterkill.

Fish Winterkill Continued

- Creates unbalanced fishery with poor quality.
- Need to restock lake frequently which is costly.
- Take many years for fishery to recover; fishing is poor for several years until fish grow to larger size.
- Potential decrease property values.
- Also.....not all lakes may be good lakes for fish.



Fish Tolerances to Low Dissolved Oxygen

2.0 ppm

Bass and Bluegill

1.5-1.0 ppm-

Yellow Perch and
Northern Pike

Less than 1.0-ppm-

Black Crappie and
Bullhead



Fish will die under ice in mid-winter.

Fish are seen dead on shore after ice out.

Scavengers will eat dead fish within a week or so.

Goal of Aeration

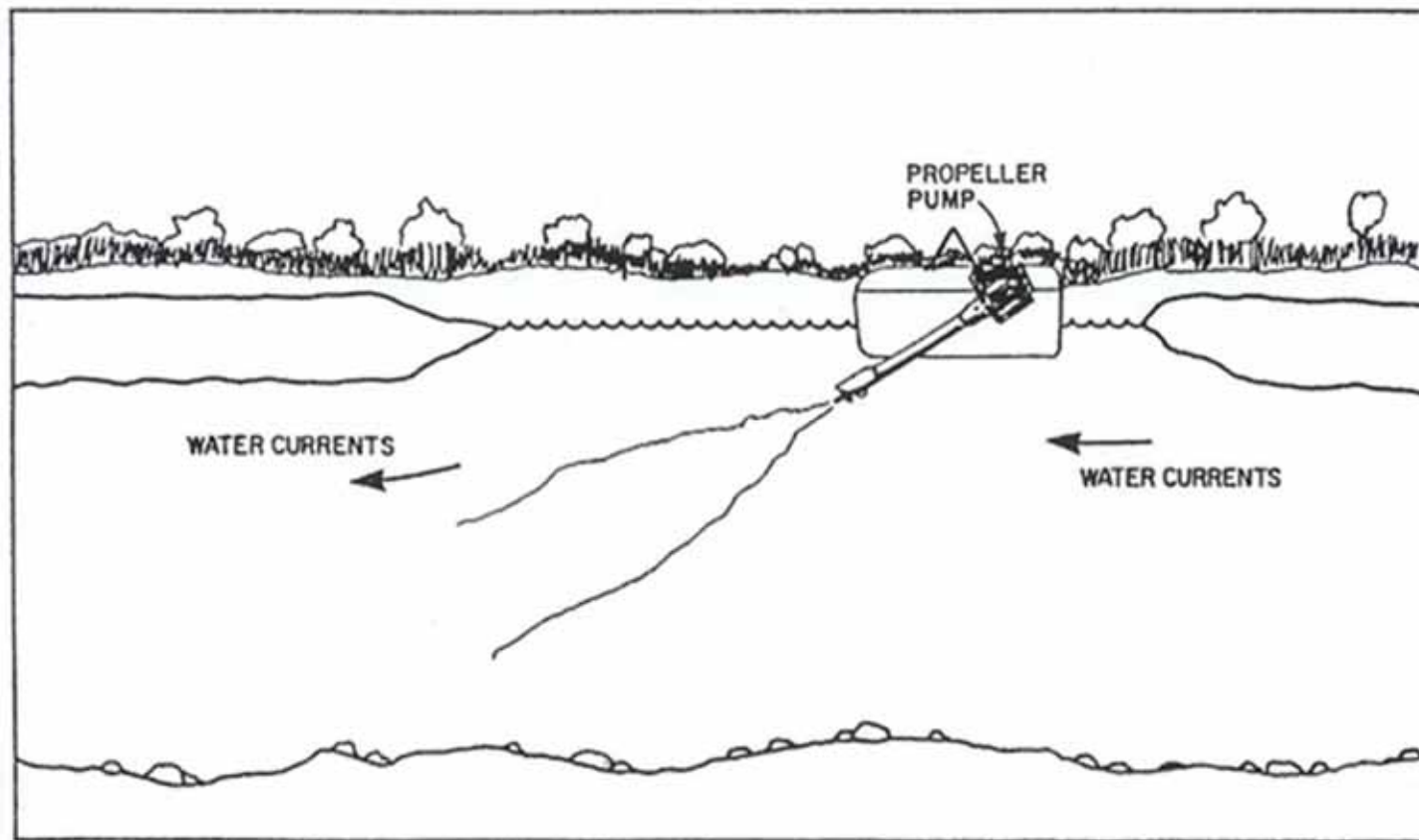
Is to avoid the frequency of fish winterkill and minimize fish winterkill when it occurs in an effort to provide a desirable sport fishery.

Provides a zone of refuge.

May have some partial winterkill.

In real bad winters more severe winterkill may still occur (2013-2014).

Surface Aspirating System



Aspirating Systems

- Work best in shallow/larger lakes that have high BOD demand.
- Will add oxygen to the system.
- More expensive to purchase and run but generally does a better job of minimizing fish winterkill.
- More labor intensive, need to install and remove annually.



Haul on Ice
With
Equipment.



**Chainsaw
Hole in
Ice**



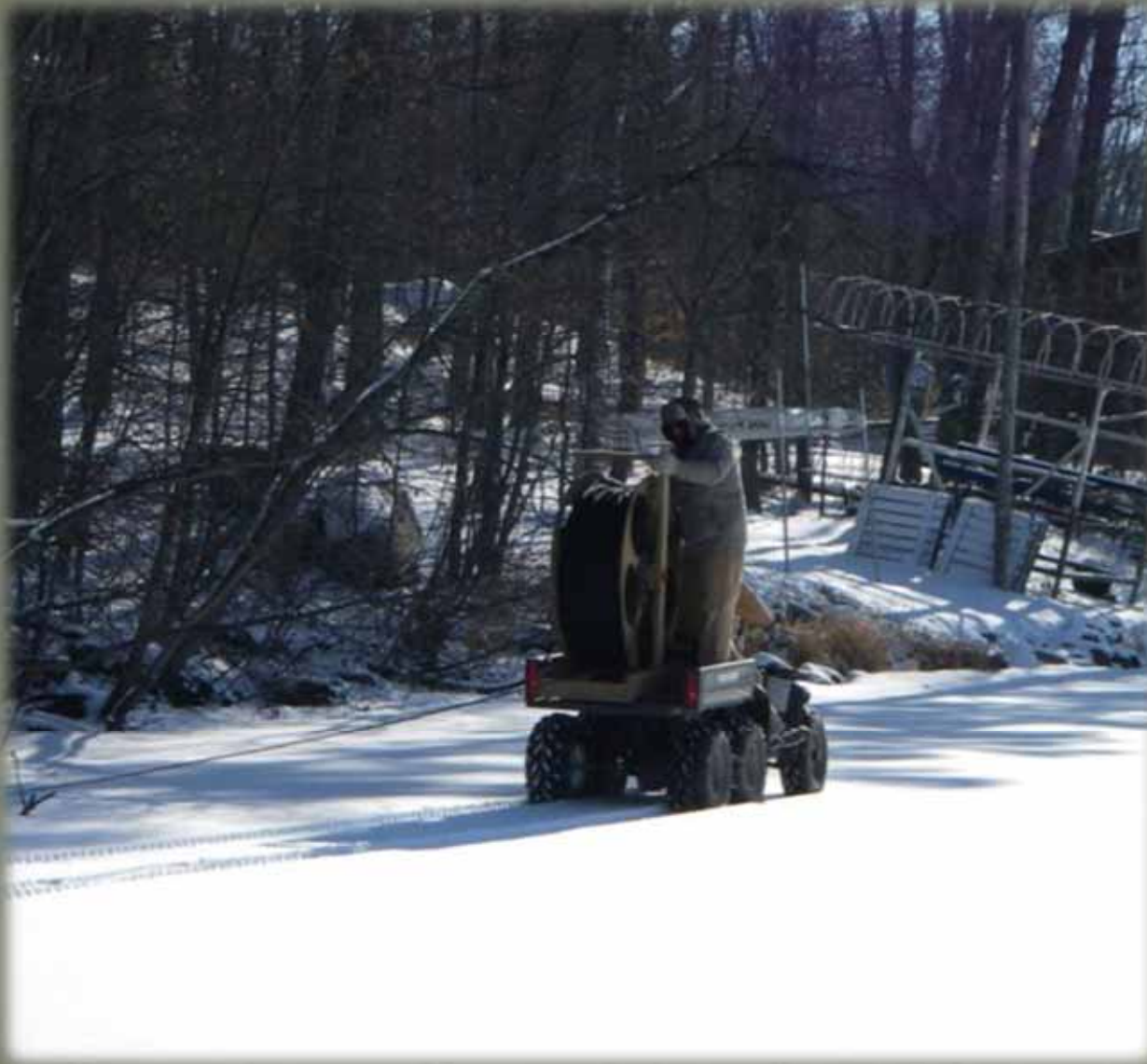
Push Cut-
Out Ice
Chunk.



**Set
Aerator in
Hole On
Float
System.**



**Anchors
and
Floats
Attached.**



**Install
Barrier
Rope
Around
Aeration
Hole**



**Drill in
Posts
Attach
Barrier
Fence
Around
Ice Hole**



Aeration System in Operation



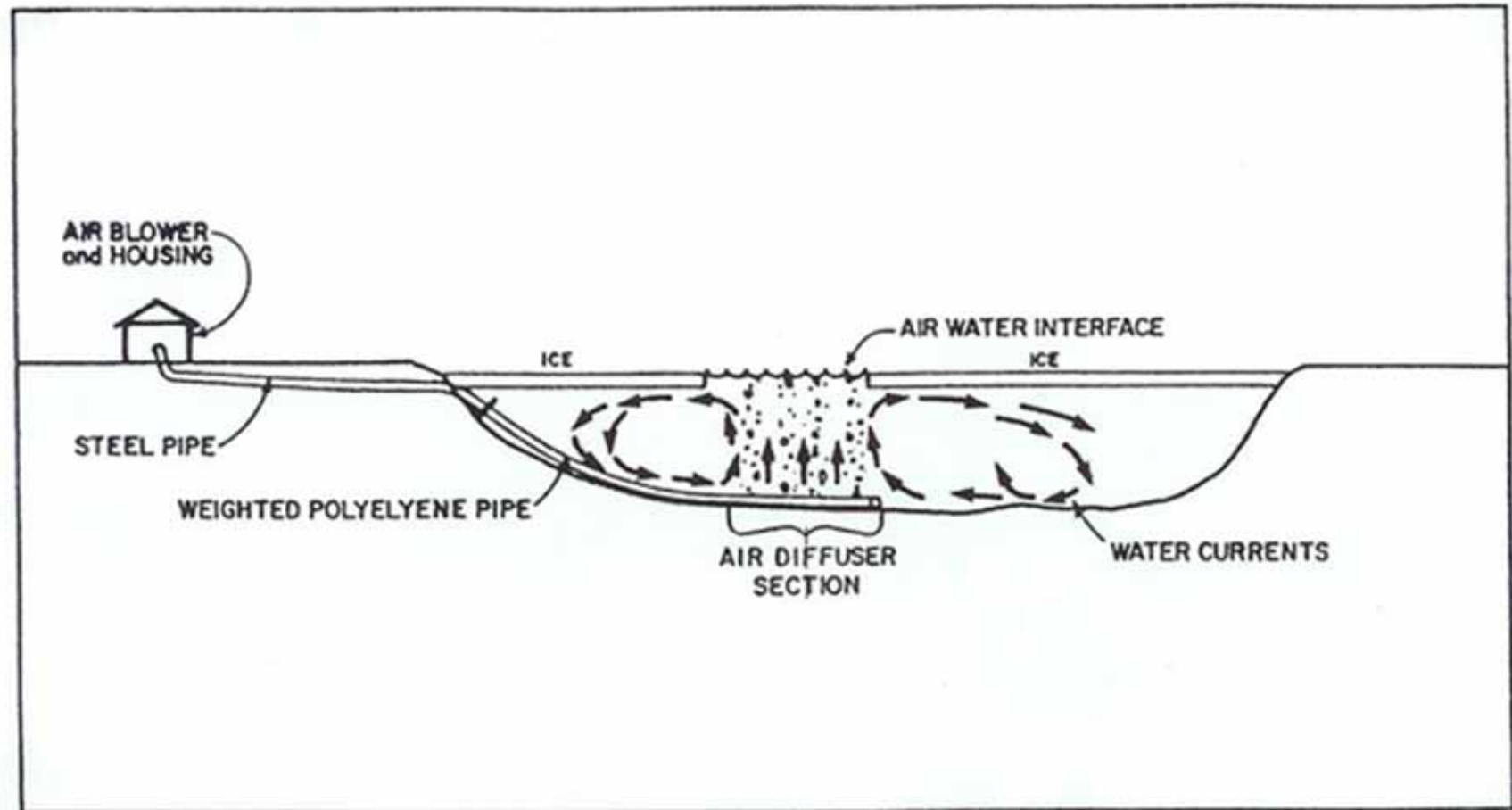
Cost

Initial cost;
\$2500/unit.

Annual
operating cost
about \$250/
month

or
\$1000/year/unit.

Compressed Aeration System



Compressed Aeration Systems

- Work better on smaller lakes with area of deeper water 15-20 feet.
- Slow the rate of oxygen depletion rather than add oxygen.
- Cheaper to purchase and run but not as effective.
- Requires initial install only. Permanent fixture. Install and remove fence only each year.
- One $\frac{3}{4}$ hp unit/30-50 acres of lake area.
- Install fence when ice is 6-8 inches (support 4 wheeler).

Small Aeration House On Shore



Aeration Units Mounted on Bench.



Drill holes near end of Aeration Lines to
relieve pressure when aeration system
turned on.



Turn on, fence and that's about it.





Cost

Initial Cost;

\$1300/unit

Annual operating
cost about

\$125/month/unit

or \$500/unit/year.

in property as to prevent accidents.

(2) Any person who violates this section shall be fined not less than \$25 nor more than \$100 or imprisoned for not less than 30 days nor more than 6 months. Each day during which a violation of this section continues shall be considered a separate offense.

History: 1997 a 254

167.22 Cigars not to be manufactured in basements. No shop or place whereon cigars are manufactured shall be located below the ground floor.

167.26 Refrigerators and iceboxes. (1) Any person who discards or abandons any refrigerator, icebox or deep freeze locker, having a capacity of 1 1/2 cubic feet or more, which is no longer in use, and which has not had the door removed, or such portion of the latch mechanism removed to prevent latching or locking of the door, is guilty of a misdemeanor. Any owner, lessee or manager who knowingly permits such a refrigerator, icebox or deep freeze locker to remain on premises under his or her control without having the door removed or such portion of the latch mechanism removed to prevent latching or locking of the door is guilty of a misdemeanor. Any person violating this section shall be fined not more than \$50 or imprisoned not more than 30 days or both.

(2) Guilt of a violation of this section shall not, in itself, render one guilty of manslaughter, battery or other crime against a person who may suffer death or injury from entrapment in such refrigerator, icebox or deep freeze locker.

History: 1997 a 682

167.26 Leaving unguarded ice holes. (1) Except as provided in sub. (1m), any person who removes ice or causes its removal from any stream, pond or lake shall place around the margin of the opening made by such removal a fence, by setting posts of not less than 2 by 4 in size with any of the following fixings:

(a) A fence board attached not less than 3 1/2 feet above the surface of the ice on the stream, pond or lake.

(b) Colored plastic construction roll fencing attached to the posts.

(1m) Instead of the requirements under sub. (1), any person who removes ice or causes its removal from Lake Rotte des Monts, Lake Poygon, Lake Winnebago or Lake Winnebocome for the opening of a stream may mark the opening made by the removal without using fencing if the person uses at least 2 strips of wood that protrude at least 3 feet above the surface of the ice. The strips of wood may not exceed approximately 1.5 inches in width and approximately 0.25 inch in thickness.

(2) Any person causing ice holes by recession of water may, in lieu of the requirements of sub. (1), erect and maintain a barricade around such holes consisting of uprights spaced every 25 feet or less, connected by a continuous rope, cord or similar material placed 3 1/2 feet off the surface of the ice. The connecting rope, cord or similar material shall have reflectorized ribben or tape or other reflectorized devices attached to it, so as to be highly visible, and shall be of sufficient strength to permit retrieval of the barricade following melting of the ice. Any person errecting such barricade shall remove the barricade and all parts thereof from the ice

167.27 Capping and filling wells or similar structures.

(1) This section applies only to counties of a population of 500,000 or more.

(2) The owner of any real estate shall securely protect any well, seepage pit, cistern, cesspool, septic tank, or other similar structures in active use with a cover of concrete, metal or wood covered with sheet metal, securely fastened and of sufficient weight so it cannot be entered by small children and so as to make it free from danger to persons going upon such real estate.

(3) Whenever any shallow dug well, seepage pit, cistern, cesspool or septic tank is abandoned or its use discontinued, the owner of the real estate upon which it is located shall promptly fill the same to grade.

(4) Whenever any drilled, bored or deep dug well, except test wells of 10 inches or less in diameter, is abandoned or its use discontinued, the owner of the real estate upon which it is located shall promptly fill the same, either with alternate layers of sand or clay and concrete, and seal with a concrete cover at least 5 inches thick, or in accordance with recommendations of the department of health and family services.

(5) Whenever any mine shaft, exploration shaft or test well is abandoned or its use discontinued, the operator or owner shall promptly fill same to grade or enclose the same with a fence of strong woven wire not less than 46 inches wide with one bar across above or cap same with a reinforced concrete slab at least 8 inches thick or with a native boulder at least 3 times the diameter of the top of the shaft or test well bore. The strands of the woven wire shall not be smaller than No. 12 wire and the cross wires and meshes shall not be smaller than No. 16 wire; the strands shall not be more than 12 inches apart, and the meshes shall not exceed 8 inches square. All wires must be tightly stretched and securely fastened to sufficient posts firmly set not more than 8 feet apart. In case any person shall neglect to repair or rebuild such fence which the person is so required to build and maintain, any person may complain to the department of commerce or to the local governing body, which shall give notice in writing to the person who is required to build and maintain such fence. The department of commerce or the local governing body shall then proceed to examine the fence, and if it shall determine that such fence is insufficient, it shall notify the person responsible for its erection and maintenance and direct the person to repair or rebuild the fence within such time as it shall deem reasonable. Any person refusing to comply with such order shall be subject to the penalties provided.

(6) Existing abandoned mine shafts, exploration shafts or test wells shall be securely protected by owner of the real estate upon which it is located.

(7) Any person violating this section shall be fined not less than \$10 nor more than \$200 or imprisoned not exceeding 6 months, or both.

(8) Any violation of this section causing or the alteration of the department of commerce or municipal authorities shall be reported to the attorney general or district attorney for prosecution.

History: 1997 a 682; 1995 a 27 ss. 4471, 4472, 4936 (S) and 5126 (10).

Barriers

WI State Statute:
167.26; Marking
Unguarded Ice
Holes.

If you meet the
statue requirements
(fencing and or
notification option)
and someone gets
injured or hurt you
are not liable.

When to install

- Install as soon as ice is thick enough to drive on with a four wheeler or snowmobile and associated gear. 6+ inches. If using trucks you will need more ice. 12+.
- Installation usually occurs around mid-late December or early Jan in warm winters.
- The sooner you get the system installed the better. In many circumstances you are slowing the decline of oxygen depletion and if you wait too long to turn on the system it may be too late. Biggest thing is make sure its safe to go out.

Need to retrieve barrier material as soon as ice is out.

- Material will float in lake and boats could get entangled in the rope.
- Launch boat and remove.
- Takes a crew of 3-4 about $\frac{1}{2}$ day to remove.

Other Aeration Options

- Wind and Solar.
- Least preferred.
- When the wind does not blow the aerator does not work. Will not usually do well in a lake may work in a small pond.
- Solar may be an option in a small lake where no power exists but has its down falls. Broken panels, if its cloudy does not work as well etc.

Other Factors

- Willing landowner to allow aeration system to be placed on their property. Likely enter into an agreement with multiple parties.
- Need state Chapter 30 permit to place structure on bed of lake.
- May need county zoning approval for aeration shed.
- Local group/s willing to help pay for and install aeration system.
- Talk to local fish biologist about the lakes potential and management options improving the fishery.

Questions

