

Lake Martha Summer Aeration to Help Control Algae Blooms

Summary:

Lake Martha often suffers from late summer algae blooms. In particular, the last two summers have seen an increase in the density and duration of "summer dog days".

The lake association has attempted to control algae using the following methods:

1. Use of iron oxide to increase the oxygen levels in the lake's sedimentary layers
2. Use of copper sulfate to kill algae either sparingly during blooms or more aggressively. Note: the prolonged use of copper sulfate is known to have long term negative effects. SIDE EFFECTS OF 58 YEARS OF COPPER SULFATE TREATMENT OF THE FAIRMONT LAKES, MINNESOTA, Mark J. Hanson Heinz G. Stefan, December 1984 <https://doi.org/10.1111/j.1752-1688.1984.tb04797.x> Cited by: 41

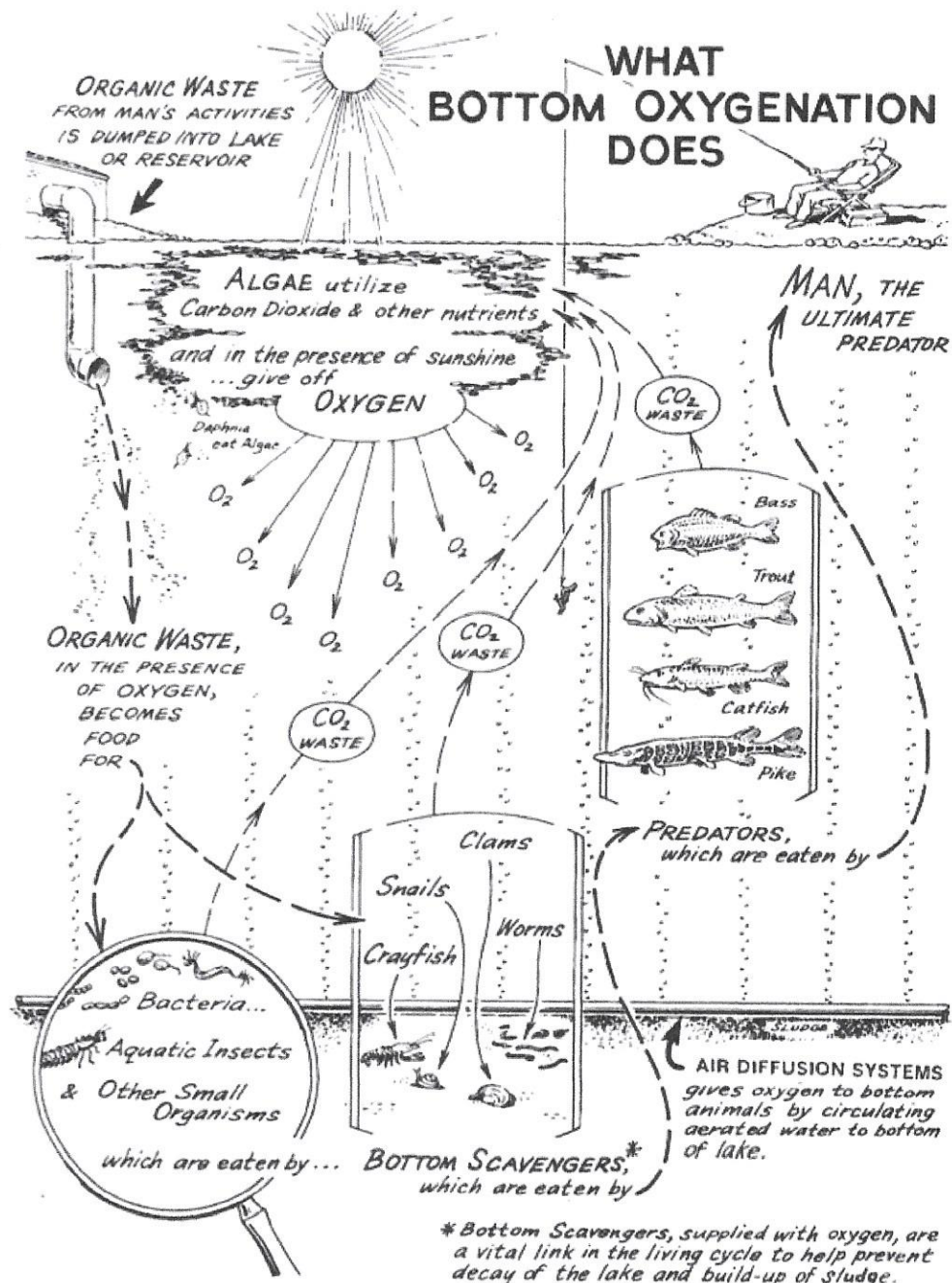
Key Water Quality Concepts (From Biologist Amanda Yourd, Minnesota DNR):

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- Lakes are very complex ecosystem and no two lake are the same, so any type of treatment will have different effects on different lakes
- Poor water quality is usually the result of excess dissolved **phosphorus** and **nitrogen** in the water (aka excess nutrients)
- Phosphorus is usually the main nutrient that causes algal blooms like the one you are describing
- Most metro lakes have two sources of phosphorus: **internal** and **external**
 - **External** phosphorus comes from landscape runoff and stormwater discharge (phosphorus gets carried off the land into the lake by heavy rains and storm sewers)
 - **Internal** phosphorus is already present in the sediment at the bottom of the lake. When the lake has enough oxygen in it, the internal phosphorus is bound up by sediment. When oxygen decreases, the phosphorus will get released into the water column, potentially fueling the growth of algal blooms. Oxygen will often get lower in late summer, which is when internal phosphorus will get released and algal blooms can develop.

Aeration may help keep oxygen levels up and keep the internal phosphorus under control (it's not guaranteed to do this, though). However, aeration cannot keep external phosphorus from flowing in, so the external sources will also have to be addressed.

The Positive Effects of Increasing Dissolved Oxygen:



Lake Aeration Summary and Cost:

A lake aeration system is similar to an aquarium bubbler.

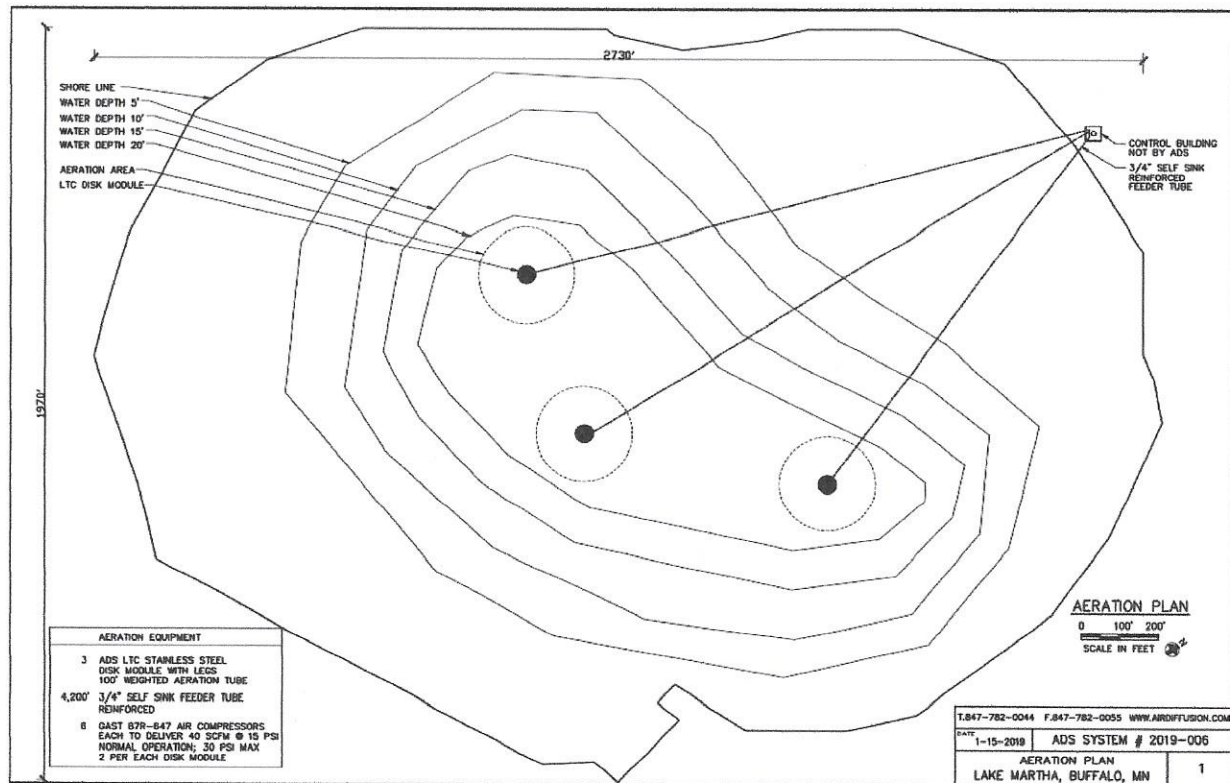
- Surface air compressors
- Submerged tubing
- Underwater diffusers

The system serves as a “water pump” where the rising bubbles induce water movement. The system needs to provide enough water movement from the deepest parts of the lake to the surface. Oxygen levels increase by exposing water to the surface (not from the bubbles).

We have received quotation from two commercial aeration companies. ADS has provided the most competitive design and bid.

ADS Bid for a three-diffuser system:

\$18,616 + freight



Lake Martha three-diffuser DIY System:

ITEM	QUANTITY	UoM	PRICE	SUB-TOTAL	
3/4 IRRIGATION HOSE	1900 FT		\$ 0.26	\$ 494.00	Menards
3/8 (7X7) GALVANIZED WIRE ROPE	5000 FT		\$ 0.55	\$ 2,748.56	e-rigging
1.5" STAINLESS STEEL BAND CLAMPS (EVERY 5 FEET)	380 EACH		\$ 0.45	\$ 171.00	e-bay
Gast 87R 1/3 HP Air Pump	6 EACH		\$ 659.55	\$ 3,957.30	e-bay
Electric kWh Meter	1 EACH		\$ 112.32	\$ 112.32	e-bay
Enclosure for pumps	1 EACH		\$ 1,000.00	\$ 1,000.00	Allowance
BIO-WEAVE DIFFUSER RING	3 EACH		\$ 94.99	\$ 284.97	Bubblemac Industries
Fittings and Gages	1 EACH		\$ 500.00	\$ 500.00	Allowance
Electrical	1		\$ 300.00	\$ 300.00	Allowance
Sales Tax				\$ 648.77	
GRAND TOTAL				\$ 10,216.92	

