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Sources of Algal Nutrients to Fremont

John G. Robinson, Aquatic Biologist*
Water Resources Commission
Michigan Department of Natural Resources

Eutrophication - Algae

The Water Resources Commission has recommended that the wastewater be diverted from Fremont Lake. Even treated sewage contains large amounts of fertilizing materials such as nitrogen and phosphorus which cause algae to grow abundantly and cause some of the problems experienced in Fremont Lake.

Even if the city were to remove 80% of the phosphorus they would still be discharging over a ton of phosphorus to the lake. A ton of fertilizer spread over a period of an entire year might not cause severe problems if Fremont discharged their wastewater to a large river instead of a lake.

To give you some idea of the significance of the phosphorus load contributions from Fremont to the lake we must first appreciate that a very small amount of phosphorus will fertilize a large volume of water. One pound will fertilize 37 acres of water if the water were only 1 foot deep. An acre of water 1 foot deep is referred to as an acre foot.

Fremont Lake contains approximately 40,000 acre feet of water. If one pound will fertilize 37 acre feet then 1000 will fertilize 37,000 acre feet or approximately the entire lake. Even if Fremont were to remove 80% of the phosphorus from their wastewater treatment plant they would still discharge over 2000 lbs/yr of phosphorus -- more than twice as much as is needed to keep the algae growing. In addition, other algal nutrients such as nitrogen would still reach the lake.

The question which then arises is, will complete removal of all Fremont's wastewater from the lake bring Fremont Lake back to a crystal clear condition?

* Presented at a Fremont City Commission meeting on October 28, 1969.

Or, is there enough fertility in the water and the bottom muds to permit the algae to continue to grow even without Fremont's wastewater? To answer this we have to consider several factors which control fertility in lakes.

1. Depth - Shallow lakes. Lakes 20-30 feet deep are usually naturally more fertile than deep lakes like Fremont Lake which is 30-80 feet deep. This is due partly to the fact that deep lakes stratify and tend to seal off the nutrient supply in the deepest water. When algae die they settle to the bottom taking with them nutrients they have taken from the water. Shallow lakes however can recycle nutrients from muds.

2. Shoreline type and vegetation. Lakes with considerable shallow areas containing rooted aquatic plants are fertile and tend to recycle the nutrients in the upper waters where algae can take it up. The sandy soil in the shallows of Fremont Lake do not support a large crop of rooted aquatic weeds.

3. The flow-through or detention time of a lake is also an important factor in fertility. If a large stream of clean water enters the lake and replaces the lake water every year than artificially added nutrients will pass downstream. As I understand it Fremont Lake does not have much flow-through so we cannot expect to flush the lake out very fast.

4. The watershed size and type is also a factor. Some lakes receive the land runoff from several hundred square miles of land. This runoff usually carries some nutrients with it. However, Fremont Lake has a relatively small watershed and the soils are porous and not conducive to soil erosion which would result in nutrients entering the lake.

In Summary, Fremont Lakes is fertile only because of man's activities, therefore, discontinuance of nutrient inputs will result in alleviation of the algae problems.

Experience in other lakes has shown that the changes in lake conditions do not occur overnight, but that they do occur.

An encouraging sign was found this summer when a fish survey found that Fremont Lake is an excellent perch lake -- of 325 perch caught in gill nets the average length was 9.1" -- bass, smallmouth, large, walleye, and northern pike were also found. So it looks like the lake has a fairly good fish population at present