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FERTILIZATION OF LAKES - GOOD OR BAD?

by

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Recently there have appeared published reports, both popular and scientific, telling of the increase in growth of fish in ponds as a result of the addition of fertilizer. Most of these reports have come from southern states where the fisheries workers have been utilizing small farm ponds for their experimentation.

In the regions where the majority of the work has been reported the winters are mild and the ice and snow cover on the lakes and ponds seldom occurs and is of short duration. Conditions in Michigan, where the lakes are covered with snow and ice for long periods, are very different and because of these differences the effects of the application of fertilizer to lakes and ponds are being studied under a cooperative program between the Institute for Fisheries Research and Michigan State College.

With approximately 11,000 natural lakes within the borders of our state it does not seem that the need for fertilization of the waters will ever approximate that of states having few natural bodies of water and, even if completely successful, such a management practice could be economically justified on more than a few specially chosen lakes. The

experimental fertilization of lakes and ponds in Michigan has been in progress for three years and during that period has indicated certain favorable results that can be obtained by the use of fertilizer in fishing waters and also has pointed out the potential dangers involved in the adding of nutrients to the waters.

Increase in fish food:

From our experiments it has been shown that the addition of commercial fertilizer to small ponds results in an important increase in the small organisms which the young fish feed upon. The effects of the fertilizer in producing more fish food work in somewhat this way: The nutrients in the fertilizer dissolve in the water and are taken up by the minute plants, called algae, causing them to grow and multiply rapidly. These in turn are eaten by the very small water fleas and insect larvae. These latter organisms are eaten by most young fish and many of the adult game fish.

It has been demonstrated in Michigan waters that in some instances the volume of food organisms can be doubled by the addition of fertilizer.

Increase in growth rate of the fish:

An increased rate of growth of the fish present results, in most instances, from the greater volume of fish-food organisms in the fertilized ponds. This can, and often does, mean larger game fish. However, it can instead mean an increase in the number of young fish that survive to share the existing food supply, which would result in a body of water with more small fish but no additional growth of the fish in the size range of chief interest to the angler. This latter condition of too many small fish is a serious one in many of our lakes at present and there is no proof that the addition of fertilizer will correct a condition resulting from an unbalanced fish population in a lake.

Fertilization has shown considerable promise in increasing the production of minnows and additional work is in progress to determine more exactly the role of fertilizer in the raising of bait minnows.

Fertilization of natural lakes:

In the spring of 1946 four lakes in the northern part of the Lower Peninsula of Michigan were chosen to study the effects of applications of inorganic fertilizer to natural lakes. Two of these lakes received applications of fertilizer at three week intervals during the summer period and the other two were untreated, thus serving as a check. One pair of lakes were warm-water lakes and the other pair were trout lakes.

Warm-water lakes:

Two lakes, North Twin and South Twin, east of Indian River in Cheboygan County, were chosen as representative of the bass-bluegill type of lake. Both are shallow lakes with no inlet, only South Twin having an outlet, and there is no surface water connection between the two lakes. North Twin Lake, having a surface area of 27.5 acres and a maximum depth of 14 feet, was fertilized and South Twin left untreated for a control. The bottom deposits of the lake are of a pulpy peat nature and cover much of the lake basin. Sparse aquatic plant beds occur in the lake. The bass and bluegill fishing has been considered poor for several years in this lake.

Trout lakes:

Two small trout lakes, in Otsego County, set deep in the pine and sand plains of the Pigeon River Forest, were selected as the representatives of an entirely different type of lake. These two lakes, also named North Twin and South Twin, are very similar to each other in all respects. Of this pair of lakes, South Twin was fertilized and North Twin left untreated

for a comparison. The fertilized lake has a surface area of 4.3 acres and a maximum depth of 38 feet.

Effects of fertilizer on natural waters:

The two of the four lakes described above were fertilized during two summers and a close check made on the biological effects of the fertilizer. Several changes were noted in the lakes during the two summers, among which was a heavy growth of algae in the warm-water lakes. During the second summer of the experiment there developed on North Twin Lake a growth of filamentous algae that choked the shoal areas of the entire lake during the early part of the summer. This production of algae also occurred in several of the experimental ponds located at one of the southern Michigan fish hatcheries and is one of the undesirable results that often accompanies fertilization. In the accompanying photographs are shown a fertilized pond with an objectionable coating of floating filamentous algae, and a nearby untreated pond showing the clear surface and clean shores.

Another feature of fertilization was a change in the trout lake which indicated that addition of nutrients was creating a condition that would so modify the lake as to make it suitable for only warm-water species of fish and not for trout. This effect is a most undesirable one since the number of lakes in the Lower Peninsula of Michigan suitable for trout is limited and any modification of the existing trout lakes making them non-trout waters should be avoided.

A study of the scales from fish in the four experimental lakes showed there had been a definite increase in the growth of the fish in the fertilized lakes over those of the untreated lakes.

Winterkill--a possible result of fertilization:

The most serious threat to our lakes from fertilization is that of winterkill. As we add nutrients to the waters the minute plants develop in tremendous numbers. As long as ample sunshine penetrates the water surface and the surface of the lake is exposed to the air plenty of oxygen will be present for the fish. However, when ice and snow cover the lakes shutting off the air and most of the light these plants die and then decay, using up the oxygen of the water. As a result of this action the oxygen may get so low that the fish die.

This was the condition found when the four lakes were checked in late February of this year. As a result of the oxygen depletion the two fertilized lakes had a very severe winterkill and only a few fish, none of them game fish, had survived. No winterkill occurred in the two untreated lakes.

From the results obtained so far in the use of fertilizer on Michigan's waters we can see many possibilities for its use and can offer certain cautions that should be observed in its use.

We do know that its use will increase the growth rate of the game fish population and its use can be economically justified in the production of minnows. On the other side of the ledger are several items that should be considered carefully before its use is attempted. At present we cannot predict whether or not filamentous algae in such amounts as to be most objectionable to fishermen, resort owners, and swimmers will result from the fertilization. Certainly no one wants a good swimming or boating lake turned into an unsightly body of water such as can result from fertilization under certain conditions.

Any benefit that the fisherman might get from increased growth of fish could be wiped out by a winterkill which can be a secondary result of fertilization.

Until such a time as it is more possible to predict and control the results of the addition of fertilizer to our waters it will be well to avoid the general use of fertilizer in lakes.

INSTITUTE FOR FISHERIES RESEARCH

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