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DIVISION OF FISHERIES

MICHIGAN DEPARTMENT OF CONSERVATION

COOPERATING WITH THE

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REPORT NO. 518

INVESTIGATION CONCERNING THE DESIRABILITY OF CONTROLLING VEGETATION
IN MICHIGAN CENTER LAKE AND BIG WOLF LAKE IN JACKSON CO. MICHIGAN

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The Michigan Center-Wolf Lake chain drains west into a tributary of the Grand River. A 10-12 ft. dam constructed at the town of Michigan Center about 100 years ago, was responsible for the creation of the lower end of this chain of lakes including the Michigan Center pond (recently given the status of a lake by the U. S. Geological Survey). The water is shallow in the lower end of Michigan Center Lake having a maximum depth of about 12 feet (in channel) and an average depth of about 4 feet. There is little or no fluctuation in water level since the water is controlled at the dam.

It seems that during the past few years, the vegetation, in the bays and coves at the lower end of Michigan Center Lake, has greatly increased, thus cutting down the circulation of water through these areas and creating a stagnant and strongly odorous condition. This may be due to gradual filling but is more likely the result of slight but regular accumulations of domestic sewage coming into the bays from the dense cottage colony around the west end of the lake.

There was no evidence of harmful or excessive pollution which would be a direct menace but the indirect effect on the fertilization of the lake soils

has undoubtedly been a contributing cause to the increased vegetation described.

Michigan Center Lake in its present state is about at its peak of productivity for fish and other aquatic life. Any effort to "clean out" the lake by dredging would undoubtedly decrease the lake's present productiveness. However, according to the reports of Mr. Edwin Shannon and other fishermen in the area, fish taken from the lower lake are seldom palatable because of their strong muddy taste and "grubby" condition. Only the lower end of the chain of lakes and principally Michigan Center Lake were reported as problem waters in this respect. Residents at Wolf Lake seemed to be satisfied with conditions there.

Water analyses taken at several points through these lakes show no startling or unusual conditions. A summary is given on page 3.

These analyses are indicative of the productiveness of the water and bottom soils in Michigan Center Lake. Almost none of the lake is too deep to support vegetation and all of the bottom soils and water conditions are ideal for its production. In Wolf Lake the vegetation areas are restricted and are not of a serious nature.

The problem of correcting the conditions in Michigan Center Lake is controversial. Many of the residents there feel that it should be dredged out or sucked out so as to open a channel. As is obvious, each of the bays would have to be greatly deepened to discourage vegetation. The idea that opening a channel would correct the vegetation conditions in the many bays and coves is illogical. Nor would this be likely to greatly affect the quality of fish in these areas. A certain amount of dredging in the lower

Location **	Maximum Depth	Bottom Condition	pH	Carbon Dioxide ppm.	Oxygen ppm.	Methyl Orange Alkalinity ppm.	Remarks
Lower end of Michigan Center Lake. 300 ft. from South shore.	6 ft.	Muck, peat and marl	7.6	0.7	8.7	215	Heavy concentration of cottages.
Michigan Center Lake $\frac{1}{2}$ mi. from outlet 200 ft. off shore.	4 ft.	Muck, root fibers, dead vegetation and small quantity of marl.	7.6	1.0	...	200	Heavy concentration of cottages.
Dureas Point Cove 200 ft. off shore.	3 ft.	Muck, abundant dead and living vegetation	7.8	0.6	10.0	125	Very heavy cottage concentration.
Head of Center Lake 500 ft. off shore in or near channel.	6 ft.	Muck	7.7	0.8	11.2	198	Very few cottages. Very little pollution.
Channel about $\frac{1}{2}$ way between Michigan Center and Wolf Lakes.	3 ft.	Marl with small quantity of organic muck. Chara abundant.	7.8	0.6	12.0	178	No cottages.
* Big Wolf Lake North side toward east end.	9 ft.	Marl with small quantity of organic muck. Chara abundant.	7.2	0.7	11.5	121	Few cottages.
Big Wolf Lake 300 ft. from inlet.	3 ft.	Pulpy peat	7.2	0.7	...	148	No cottages.

** Sample depths approximately $1\frac{1}{2}$ feet from bottom.

* Big Wolf Lake has a maximum depth of about 40 feet.

end of the lake would certainly do no damage and might solve the problem, but to extend this up through the chain of lakes to Big Wolf Lake would be no asset to the fisheries interests of the area. Furthermore, the residents of the upper lakes in this chain do not want to have such a project carried out since it might lower the level of Big Wolf Lake which at present seems quite satisfactory.

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SUPPLEMENT TO REPORT NO. 518

FURTHER INVESTIGATIONS CONCERNING THE CONTROL OF
AQUATIC VEGETATION IN MICHIGAN CENTER LAKE, JACKSON COUNTY, MICHIGAN

C.J.D. Brown

The first investigation on Michigan Center Lake was made on February 11, 1939, when the lake was covered with ice. The present study was made on August 11, 1939, under more or less typical summer conditions. As near as we were able to determine from local residents, conditions at the time of this summer investigation were fairly representative of the last two or three years. Certain cottage owners complained about the high water level maintained during July. Apparently the city engineer is responsible for fluctuations due to the manipulation of the gates at the dam. This dam can maintain a head of about 6 1/2 feet when all splash boards are in place. At the present time the dam is holding about a five foot head.



Dam at outlet of Michigan Center Lake

The extent and density of weed beds were roughly determined from a boat while rowing back and forth across each bay and the main lake. Plant samples were hauled up at intervals by means of a plant hook.

The weed beds were medium to dense in the entire west bay, which has a maximum depth of about 10 feet. Eel grass (Valisneria), Coontail (Ceratophyllum), and common pondweed (Potamogeton) made up the major part of these beds. It was possible to row a boat without difficulty through the most dense patches. The use of outboard motors was limited, however, to the main channel and a few narrow strips kept open by constant use.



East view of the west bay. The calm areas of water are due to the emergent seed pods of Valisneria.

The weed beds were more limited in this Dureas Point cove due to the presence of a pocket about 20 feet deep. The weeds extended from shore out to about the 12 foot contour. The extreme west portion of this bay was completely choked with plant beds. This cove and the West Bay described above support practically all of the cottage development on the lake.

The central and eastern parts of the lake have moderate growths of weeds with Chara predominating on the north and east sides.

Since no contour map has been prepared for this lake, the exact extent of shallow water is not definitely known, but our rough estimate indicates that at least 90% of the bottom is capable of supporting weed beds. Probably more than half of the lake is less than 4 feet in depth. All shallow lakes of this type which have or develop suitable bottom conditions, invariably become choked with vegetation.

A rough comparison of the density of aquatic vegetation in this lake with that found in other southern Michigan lakes shows it to represent about average conditions. Several shallow lakes, such as Lansing Lake, Park Lake, etc., have much more vegetation than Michigan Center Lake.

Chemical water analyses were made in Dureas Point Cove for the purpose of comparing the summer and winter conditions. One sample was taken at the surface and another at 20 feet. The results are as follows.

<u>Depth</u>	<u>pH</u>	<u>Carbon dioxide ppm.</u>	<u>Oxygen ppm.</u>	<u>Methyl orange alkalinity ppm.</u>
Surface	8.6	0.0	8.0	117
Bottom (20 ft.)	7.6	9.0	4.8	139

A fish sample was taken at the west end of the lake near the outlet. This included 15 bluegills, 1 largemouth bass, and 1 rock bass. A study of the scales of these indicates comparatively slow growth. A summary follows:

Bluegills

<u>Total Length</u>	<u>Age</u>
3½ - 4 inches	3rd year
4 - 5 "	4th year
5 - 6 "	5th year
8 inches	7th year

Largemouth bass

7 inches	2nd year
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Under favorable conditions bluegills reach legal length in their 3rd to 4th year.

Suggestions For the Control of Vegetation

While the vegetation in Michigan Center Lake is not unusual in quality and quantity for a shallow lake of southern Michigan, some control could be exercised without doing serious damage to the fish population.

There are two possibilities which appear to us. The one has to do with the control of the water level as suggested by Mr. Westerman. If all of the splash boards were removed from the dam late in autumn (November 1-15), more than 60% of the bottom in the lower lake would be high and dry. A general clean up would then be possible the following spring, at least in the zone near cottages. The gates could then be replaced in time to fill the lake for summer.

The effect of this procedure on the fish population is not known, but we suspect that most of the fish would be able to winter over in the few small pockets left filled with water. Even if part of the fish population is lost, the advantage of reducing the vegetation might make the experiment worth while.

It might be possible to have a contour map made of this lake previous to the time of draining it so that the extent of its effect could be determined in advance. It would then be possible to more accurately predict the effect of lowering the water level on the fish population.

In the event of reducing the water area in this manner, it would probably be necessary to restrict winter fishing as the fish would be concentrated in comparatively shallow water. Due to the fact that this may furnish some valuable information for future projects of its kind, the Institute for Fisheries Research would like to supervise and obtain accurate data on the process and effect if such draining procedure is contemplated by the people of Michigan Center.

The other possibility of weed control is by some mechanical means, as with an underwater mowing machine. Rough calculations indicate about 60-75 acres of weed beds in the vicinity of the cottages on Michigan Center Lake. Very few of the troublesome areas are over 4 feet in depth and could be mowed without difficulty. Also, the density of the beds are not outside the limits of these cutting devices. Recent inquiry into the adaptability and effectiveness of the better underwater devices indicate that 8-10 acres of ordinary weed beds similar to those found in Michigan Center Lake could be mowed in one day and that two cuttings a year would eliminate the menace for the season. The cost of operation is very reasonable. It seems entirely possible that this method of control would be practical. At any rate, it should be investigated.

We think that the cost of dredging or the use of a sucking device would be exceedingly high and would only temporarily reduce the plant population. Unless the water could be greatly deepened, there would probably be very little effect on the plant population.

We are assuming that the cost of whatever method used must be borne by the cottage owners themselves or through some project sponsored by them, and doubt that the removal of vegetation will benefit the fisheries there.

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