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COOK AND PINE LAKES

by

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Cook and Pine Lakes are small lakes located in Wayne Township, Cass County (T. 5S., R. 16W., Sec. 30). They are near the town of Dowagiac and both drain into the Dowagiac River.

These lakes were the subjects of a partial biological survey* made on July 10, 1941. Since the main purpose of the survey was to determine the suitability of the lakes for trout, a complete temperature and chemical analyses were made. In addition some plankton and bottom samples were taken and an attempt was made to determine the type and relative abundance of plants in the lakes.

Neither lake has any resort development. However, their nearness to Dowagiac and the fact that they are tributary to Dowagiac River makes them of considerable potential importance as public fishing waters. Both are reported to provide fair fishing for bluegills and bass. Of the two,

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* Personnel of survey party - John Funk, leader, Eugene Roelofs and Stanley Lievense, assistants.

Pine is probably the better fishing lake at present. Cook Lake is easily accessible by a private road from M-40. It is privately owned but at present the owner allows the public to bring in boats, and fish with little or no restriction. Public access to this lake should be assured through purchase or easement if it is developed for trout.

Pine Lake is located in the outskirts of Dowagiac. Most of the margin is owned by one individual who does not allow fishermen to cross his property. Access can be obtained, however, across the property of another owner. If much future fishing is to be expected here, the state should purchase some frontage on this lake.

Both lakes are small (20 - 30 acres) with rather regular, bowl-shaped basins. Both are somewhat oval in outline. Their margins are marshy, this condition being somewhat more developed on Cook than on Pine Lake. The land rises to firm high banks a short distance back from the shore.

Both lakes are fed by cold streams flowing in from the surrounding marsh and in addition have springs in the bottom. Pine Lake's main inlet is a drainage ditch about 4 feet wide and 1 - 2 feet deep, with a moderate current. Cook Lake has two inlets. One in the east end is 10 feet wide and 6 - 8 inches deep. The one on the south east side is 2 - 3 feet wide and 1 - 3 feet deep. Both have a moderately slow current.

The outlets of both lakes are streams 10 - 15 feet wide, a few inches deep, with slow currents. Both flow into a tributary of the Dowagiac River.

The following table presents other physical factors not discussed above.

Lakes	Estimated Area in Acres	Maximum Depths	Estimated % of shoal	Bottom types		Color of Water	Secchi Disc.
				Shoal	Depths		
Cook	20 - 30	42.5 ft.	10%	Marl	F.peat and marl	Whitish	4 ft.
Pine	20 - 30	20 ft.	35%	F.peat-marl	Pulpy peat	Brownish	12 ft.

The above conditions indicate that Pine should be the more productive of the two lakes. The small amount of shoal (area potentially suitable for plant growth) in Cook Lake is due chiefly to the turbidity of the water which allows light to penetrate only a short distance (Secchi disc - 4 feet). The apparent white color is proof that the turbidity is due to marl in suspension. It has been reported that since the time of the survey, marl dredging has been resumed on the lake, resulting in even greater turbidity.

In general the physical factors seem to indicate that Pine Lake should be average or above in productivity, while that of Cook Lake should probably be rather low.

Temperature and chemical data are presented in the following table:

Lake				Pine					Cook				
Date	7/10/41			7/10/41		7/10/41			7/10/41			7/10/41	
	Deepest part of lake			Outlet		Inlet			Deepest part of lake			Main inlet	
	Depth in feet	Temp. °F	O_2 in p.p.m.	Temp. °F	O_2 in p.p.m.	Temp °F	O_2 in p.p.m.		Depth in feet	Temp. °F	O_2 in p.p.m.	Temp. °F	O_2 in p.p.m.
Surface	...	76	10.8	75	10.6	60	8.1		...	76	9.4	53	...
Bottom	20	60	3.3	...	...	...	...		43	44	0.3	...	...
Thermocline Top	..	...	...	...	...	...	...		15	66	15.2	...	...
Bottom	..	...	...	...	...	...	...		28	48	8.0	...	...
M.O. Alkalinity - Range	202.0 - 249.0			199.0		257.0			167.0 - 208.0			170.0	
pH - Range	7.4 - 8.3			8.4		7.8			7.3 - 8.2			7.9	

There was an abundance of oxygen in the surface water at all stations in both lakes. In Cook Lake a thermocline (zone of rapidly decreasing temperature) was present). All water below 12.5 feet was 70° or less. The oxygen was reduced at the bottom but the water in the thermocline had an abundance of oxygen. It seems unlikely that this would in the course of the season become reduced below the limit of tolerance for trout.

In Pine Lake no marked thermocline was present. The surface was quite warm, while the bottom waters were cold enough for trout. The oxygen supply on the bottom was rather low. Whether as the season advances the bottom water warms and the oxygen supply is further depleted, is not known but it is probable that this would occur. If so, conditions may become unsuitable for trout. In opposition to this, however, is the fact that the inlet stream was cold and that cold springs enter the bottom of the lake. To reconcile these opposing sets of factors, it seems probable that at least parts of the lake would be able to support trout the year round.

The two lakes differ markedly in both type and abundance of vegetation. In Pine Lake plants were abundant and 18 species were observed. In Cook there were only ten species and none were abundant. A list of the species of plants and their relative abundance in the two lakes is given in the following table.

Species*	Pine	Cook
Waterweed (Anacharis canadensis)	abundant	...
Coontail (Ceratophyllum demersum)	common	...
Muskgrass (Chara sp.)	common	common
Swamp Loostrife (Decodon verticellatus)	abundant	few
Duckweed (Lemna minor)	rare	...
Yellow Water Lily (Nuphar advena)	common	few
White Water Lily (Nymphea odorata)	few	few
Bushy Pondweed (Najas flexilis)	few	...
Arrow Arum (Peltandra virginica)	common	...
Pondweed (Potamogeton filiformius)	...	few
Variable Pondweed (Potamogeton gramineus var. graminifolius)	common	few
Floating-leaf Pondweed (Potamogeton natans)	...	rare
Sago Pondweed (Potamogeton pectinatus)	few	...
White-stemmed Pondweed (Potamogeton praelongus)	abundant	...
Flat-stemmed Pondweed (Potamogeton zosteriformis)	few	...
Pondweed (Potamogeton sp.)	...	rare
Big Bulrush (Scirpus acutus)	common	common
Three-square Bulrush (Scirpus americanus)	common	common
Cattail (Typha latifolia)	common	...
Bladderwort (Utricularia sp.)	rare	...
Water Milfoil (Myriophyllum sp.)	few	...

* Plant determinations by Eugene W. Roelofs.

An abundance of plants is within certain limits generally considered to be favorable to productivity in a lake. They harbor large numbers of food organisms, their photosynthetic activity adds oxygen to the water, and they furnish shelter for fish. In this respect Pine is by far the more productive of the two lakes.

In both lakes plankton was abundant at the time of the survey. In Cook, bottom food organisms were not abundant, no doubt, because of the scarcity of plants. Amphipods were fairly common, however, in the shallow water. In the depths aquatic earthworms were abundant and Coethra larvae were common. Pine Lake showed a much greater abundance and variety of bottom food. On the vegetation in shallow water snails, scuds, mites, and various insect larvae were abundant. The deep water yielded an abundance of aquatic worms and Corethra larvae. In general, food conditions would seem to be much better here.

No fish were collected in either lake. Spawning beds, probably those of bluegills, were observed in Pine Lake, and in the inlet of this lake a large brown trout was observed.

As previously stated the results of this survey indicate Pine Lake as being above average in productivity and Cook Lake as being rather low. From the standpoint of their suitability for trout, however, the temperature and chemical conditions in Cook are more favorable than in Pine.

Management Suggestions

Both lakes are now in the "all other lakes" classification. It is suggested that for the present they be allowed to remain in this category. If the following experimental program is carried out, it may be considered advisable to change the designation later.

It is suggested that 200 marked adult rainbow trout be planted in each lake after September 1 in order to give the fish an opportunity to spawn in the lakes. Before this is done the inlet streams should be improved by the introduction of gravel to provide spawning facilities.

Everything possible in the way of cleaning spring drains, etc., should be done in order to introduce more cold water into the lakes. The marl dredging operations on Cook Lake should be stopped if at all possible. It is possible the commercial value of the marl obtained is greater than the value of the lake as fishing water. If so, all attempts to improve fishing conditions should be dropped as the dredging has already almost ruined the lake for fish at least temporarily.

It is suggested that the above program be carried on for three years. Periodically careful checks should be made by members of the Institute staff to determine whether the trout are becoming established and are capable of maintaining themselves. The results of these checks would determine whether the designations of the lakes should be changed to that of trout lakes or whether the project should be dropped as having failed.

During the time that this program is in operation, it is suggested that the limit for trout on these lakes be reduced to five. Since the purpose of the plantings is to introduce breeder fish into the lakes, a careful check should be kept on the number of trout caught. It is suggested that the periodic checks mentioned above be made twice a year, near the beginning and end of each fishing season. Besides checking the extent to which the trout have become established, a good idea of the total trout population in the lakes could be obtained at this time.

The limit might have to be further reduced if it is found that too many of the planted fish are being caught.

It is hoped that by following this experimental program a small population of trout capable of maintaining itself may be established.

INSTITUTE FOR FISHERIES RESEARCH

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