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FISH DIVISION

INSTITUTE FOR FISHERIES RESEARCH

Report 124

General Summary of the Reports on the Lakes of Antrim County

Appended hereto are the following reports:

Report 112---Torch Lake

Report 114---Elk Lake

Report 97 ---Setting of commercial nets in Elk Lake

Report 117---Lake Bellaire

Report 118---Clam Lake

Report 119---Round Lake

Report 121---Central Lake

Report 123---Six minor lakes in Antrim County surveyed in 1931.

Note.---Further details on the depth, bottom, temperature, chemical composition, weed beds, fish population, fishing conditions of past and present, etc., are given in the survey cards and on the lake maps.

General Summary of Reports on The Lakes of Antrim Co.

Introduction

Those who have followed the development of our state through its brief history realize that we have certain important problems which must be dealt with. The development of Michigan has not followed the course taken by most states of the middle west. In Ohio, Indiana, Illinois, Iowa and elsewhere, the clearing of land, where clearing was needed, was accompanied and followed by farming. Rich agricultural communities arose. The cleared land rose rapidly in value. Problems of taxation never became of vital importance.

In southern Michigan, development was similar to that in the states just south of us.

Northern Michigan, during the last half of the 19th century and for some years after that, passed thru the prosperous lumbering days. As was true elsewhere, and was to be expected here, farming followed the lumbering. At this point, however, the northern half of our state, except in certain areas, failed to follow in the footsteps of our southern counties and of states south of us. Today hundreds of abandoned farms bear witness to hopes that did not materialize. The rich agricultural communities failed to make their appearance. The towns which came into existence during lumbering days became smaller. Some of them ceased to exist entirely. The census figures for the last 30 years show a decline in population. Figures available on land ownership show that the land is fast reverting to the state.

Except in certain regions, such as parts of Chippewa and Menominee counties in the upper peninsula, the northern part of our state can never hope to become a prosperous farming area. Soil experts are not at all amazed at the present trend.

The region is too far removed from the larger centers of population to become a manufacturing center. Mining is carried on in certain locations but is not scattered over

a large enough area to give the northern half of our state a prosperous aspect. Hopes of establishing rich oil fields here have died away.

The picture is not so utterly lacking in color as it appears to be to a large element of our population. Far sighted citizens and organizations see, in this region, vast resources which have never been fully developed. This portion of the state should become, with proper guidance, cooperation and insight, one of America's leading playgrounds. Agricultural failures, and even the present general depression, have opened our eyes more than ever, to the resources which await development.

Northern Michigan with its excellent scenery, its acres of woodland and its hundreds of lakes and streams, has all the physical characteristics needed to make it a paradise for tourists and resorters. The tourist and resort industry now ranks first in the upper part of the state. With proper cooperation of all persons interested in the area the industry should still develop immensely.

Good fishing is highly essential in such an area. The ever increasing army of fishermen has tried to take from our lakes and streams a little more than they are able to give. If this organization can find ways of improving fishing conditions in our lakes and streams it will have justified its existence. It is making every effort to so change the environment that our waters may become more productive. In order to succeed it must have the cooperation of our sportsmen and of the citizens living in the region.

Environmental control is no longer a dream. Definite steps have been taken to place in our waters, those essentials which nature, in her haphazard way, has failed to provide, and to remove those things which interfere with the end generally desired--better fishing.

In recommending lake improvements we have not neglected a consideration of the appearances of the lakes. When a lake has been improved, it is still, so far as one can see, just as it was previously but, below the surface, small fish are finding greater protection, adults are rearing larger broods because of better spawning conditions, food is more plentiful and enemies are fewer.

Kalkaska County has made a beginning. It is hoped that those who are interested in

the lakes here discussed, with more resources available, will make every effort to improve these lakes.

The report here presented gives in as clear and unprejudiced a way as possible the facts found in our survey of the lakes and gives our suggestions for improving them. It is not full of impossible promises, nor is it written to sell our ideas to others. It contains none of the ~~following~~ oratory so commonly used in salesmanship. It is a simple statement of conditions as we have found them and of the methods of improvement which we consider most promising. Should any organization see fit to carry out the plans here presented we can assure them that we will cooperate to the fullest possible extent and, although no promises are made, we feel that the adventure will be well worthwhile.

Very rarely can one find a chain of lakes as beautiful and as ideal for resort development as the group here discussed.

The Survey

The survey of the Antrim County lakes was carried out by the Institute for Fisheries Research, an institution created in 1930 at the University of Michigan primarily to conduct for the State Department of Conservation investigations concerned with the conservation and the increase of the fish life in our inland lakes and in our streams.

This and other lake surveys ^{were} made possible partly through funds provided the Institute by the State Conservation Department, but chiefly as a project sponsored and financed by the Michigan Division of the Izaak Walton League of America, through its president, Harry M. Harper, of Lansing.

The investigations were carried out by a party of six men, most of whom had previous training in survey work. The work was carried on in the summer of 1931, from July 22 to September 17. An ideal camp site was provided, without cost, by Mr. Richards, banker of Bellaire. This camp was located on Torch Lake a mile above Clam River. Many local

citizens and resorters cooperated with the party in many ways, to make the work a success.

MAJOR LAKES: SIX LOWER LAKES OF INTERMEDIATE CHAIN

The six lower lakes of the Intermediate Chain, Central, Bellaire, Clam, Torch, Round and Elk, were studied in greatest detail, because of their size and importance. Time was not available to complete a survey of all of the lakes of the county, but six other lakes in the same vicinity were worked. These are Mud, High, Bass and Birch lakes west of Torch and Elk lakes, and also Thayer Lake and Lake of the Woods, which lie to the east of Torch Lake.

The six major lakes, with a total area of 32,306 acres, show considerable variety. They range in size from 427 acres to 18,286 acres, and in depth from about 29 feet to about 300 feet. Three of these lakes are well suited to cold water species, 3 are not. Two may be regarded as almost entirely shoal water. All but one have the bottom of chiefly clay below the dropoff. Three have marl dominant on the shoal area. In many other ways these lakes are dissimilar.

The six lakes can be separated into two general groups, Round, Clam and Central Lakes having fairly heavy vegetation and rather large shoal areas, and Torch, Elk, and Bellaire Lakes with less vegetation and with relatively large cold water areas. Each lake of one type has a lake of the other type just below it in the connected chain.

A considerable amount of data has been compiled into a table which is here given.

Table 1. General summary of characteristics of the six lower lakes of the
Intermediate Chain, Antrim County

	Elk	Round	Torch	Clam	Bellaire	Central
Area in acres	7,732	2,561	18,286	427	1,785	1,515
Mid-channel length in miles	9	3.9	19	3.5	4.5	6.25
Width in miles	1.3 av.	1.4 max.	1.65 av.	.2 av.	1.3 max.	.38 av.
Max. depth found in feet	198	29	297	2.9	99	79
Chief inlet	Round Lake	Torch River	Clam River	Grass River	Intermediate River	Intermediate River
Outlet	Elk River	Elk Lake	Torch River	Clam River	Grass River	Intermediate River
Dominant type of bottom on shoal	sand	peat and sand	sand	marl	marl	marl
Below dropoff	clay	clay	clay	clay	clay	peat and clay
Resort development	extensive	little	extensive	moderate	fairly extensive	moderate
Designation 1931	pike lake	no special designation	pike lake	pike lake	no special designation	pike lake
Vegetation	relatively little	abundant	little	abundant	moderate	abundant

Table 1 (Continued)

	Elk	Round	Torch	Clam	Bellaire	Central
Food	fair	good	poor	good	fairly good	good
Cover	fairly poor	good	poor	good	fair	good
Oxygen	high at all depths	high at all depths	high at all depths	fairly high at all depths	high at all depths	Fairly high in upper third. None near bottom.
Surface temperature found (Aug. 26- Sept. 17)	74	72	68	72	70	72
Bottom temp. found (same time)	45	70	41	70	43	52
Air temperature when water temperatures were taken	88	88	85	76	70	70
Suitable for cold water species?	yes	no	yes	no	yes	very poorly suited.

Species of Fish Present

Table No. 2 shows the species of fish taken in each lake by our party. Netting and seineing were carried on only intensely enough to give an idea of the species present and of their relative abundance. Every effort was made to reduce net sets to a minimum. The total number of fish taken by our party was small and had no affect on the fish population in general. Extensive netting and seineing would probably show that a few species are present in some of the lakes, other than those listed here. It is believed, however, that all species which are well represented were taken and only those which are fairly few in number could have escaped our attention.

The table shows that only six species were found in all six lakes.

Table 2. Species of fish found in the six lower lakes of the Intermediate Chain, Antrim County.

GAME FISH	Ellie	Round	Touch	Clam	De'llaire	Central
Brown trout			+			
Lake trout	+		+		+	
Brook trout			+			
Northern pike	+	+		+	+	+
Muskegon	+		reported	reported		
Perch	+	+	+	+	+	+
Yellow perch					+	+
Small-mouth bass	+	+	+	+	+	+
Large-mouth bass	+	+		+	+	+
Bluegill				+	+	+
Long-eared sunfish				+		
Pumpkinseed sunfish				+		+
Rock bass	+	+	+	+	+	+
Osage	+		+		+	+
Whitefish	+		reported		reported	
COARSE FISH						
Common sucker	+	+	+	+	+	+
Brown bullhead	+			+		
Catfish	+					
OBNOXIOUS FISH						
Lawyer	reported		+			
Long-nosed gar	reported	+		+	+	+
FORAGE FISH						
Black-nosed shiner	+			+	+	

Table 2 (Continued)

	Elk	Round	Torch	Clam	Bellaire	Central
Straw-colored shiner	+	*	+	+	+	
Common shiner	*	+	+	+	+	
Blunt-nosed minnow	+	+	+	+	+	+
Mud minnow	+	+				
Menona killifish	+			+		
Log perch	+	+	+	+		+
Johnny darter	+	+	+	+	+	+
Iowa darter	+			+		+
Muddler			+	+	+	+
Rosy-fronted minnow	+	+	+		+	
Lake shiner			+			
Long-nosed dace	+		+			
Horned dace			+			
Black-nosed dace			+			
Total number species in each lake	25	14	22	21	19	16

Stocking

It is evident that these lakes are in need of fairly heavy stocking. Considering the size of the lakes, the number of fish here recommended is not large.

We can neither make nor find a suitable hard and fast rule regarding the number of fish to be planted in a lake. All data available is carefully studied. Full consideration is given to the amount of food, amount of protection, amount of shoal area, abundance of predators, condition of spawning grounds, relative abundance of both young and adult fish now present and to any other factors which we know to affect the fish population. After these factors have been given due consideration an estimate of the number and kind of fish which we feel should be planted is given.

Table No. 3. gives the number and kind of fish recommended for each lake.

Table 3. Budget for six lower lakes of Intermediate Chain.

Fish	Elk	Round	Torch	Clam	Bellaire	Central	Total
Lake trout	25,000		50,000		5,000		80,000
White fish					10,000 fry		10,000 fry
Large-mouth bass #	5,000	25,000		5,000	5,000	5,000	45,000
Small-mouth bass	25,000	25,000	85,000		10,000	5,000	150,000
Bluegills	5,000	15,000		5,000	5,000	5,000	35,000
- Perch	25,000	15,000	85,000	5,000	5,000	5,000	140,000
- Walleyes					10,000 fry	10,000 fry	20,000 fry
Total	85,000	80,000	220,000	15,000	50,000	30,000	480,000
Average per acre of water	11	32	12	35	28	20	15

All fingerlings unless otherwise stated.

If fry are planted where fingerlings are recommended the number should be multiplied by 10.

Improvement Recommendations

In making out the recommendations we have not been unmindful of the costs involved in improvement. Only those items most critically needed have been recommended and every effort has been made to suggest methods which will be least expensive.

The improvements.

A person investing his money in an improvement project is naturally anxious to find out, before investing, what benefits may be expected from the work. We make no promises that lakes such as Torch can be changed from a biological desert into a lake such as Houghton. We can assure people, however, that the improvements we recommend are not radical or fanciful ones. They have been put to the test for many years in some country or other and have been found beneficial. Although environmental control is a relatively new thing, as applied to public lakes and streams, in this state and in this country, it has long been carried out in places where fish are of immense importance as items of food.

Few returns can be expected the first year or two from any work of this kind. We do, however, feel optimistic about future fishing in these lakes if the recommended improvements and stocking have been carried out.

Rearing ponds.

The number of fish desired to properly stock these lakes is rather large and may not always be available in the quantities called for. In view of this, we feel that the construction of rearing ponds somewhere in the vicinity of these lakes would be materially helpful in their improvement, along the lines we suggest.

Vegetation Increase.

Two of the lakes, Torch and Elk, would profit greatly by an increase in vegetation and Lake Bellaire would profit to a considerable extent. Increased weed beds not only provide more cover but also are responsible for an increase in insect life and tend to increase the fertility of the lake. Planting weeds over the entire shoal is out of

the question but a method of starting weed beds locally is discussed in the Torch Lake report. This method should ~~prove~~ to be an economical one.

Predator Control.

In any of the lakes where the gar-pike are at all abundant they may advantageously be kept in check by spearing or by surface netting. Either method of control must, of course, be under the direct supervision of the Conservation Department--(except for spearing in January and February). Round and Bellaire lakes are now most in need of predator control. Lawyers are few and do not seem to be a very serious menace. Fish-eating birds apparently create no serious ~~pb~~problem here. No dogfish or carp were found here. The gar-pike seems to be the only predator which is abundant, ~~a~~ now.

Slabs for Minnow Spawning

These have been recommended for Torch Lake since this lake is most seriously in need of food increase and since slabs are available here. It would also be well to place slabs or other flat objects on the shoals in the other lakes, especially Elk, Bellaire, and Central but this is not so urgent here as in Torch Lake.

Fertility Increase.

within reason

No attempt can be made ~~to~~ to enrich these lakes chemically because of their large size and their large outlets. It is possible, however, to enrich certain local areas. Methods of doing this are given in the Torch Lake report. Such local fertilizing should be carried on especially in Torch, Elk, and Bellaire lakes.

Cover.

No doubt an increase in cover is one of the most necessary improvements which can be made in several of these lakes. The use of brush heaps has been found very satisfactory both for food increase and cover. One type of shelter is described in the Torch Lake report. A number of other types can also be used. The number to be placed in the lakes depends on the size of the heaps. The figures given are merely an estimate of the

of shelters which we feel should be used. More could be used to advantage. Any individual might improve his favorite fishing ground by providing the grounds with a shelter or two.

Table No. 4 gives the minimum improvements suggested.

The detailed methods of installing the improvements are not given here since they have been in part discussed in the Torch Lake section, and since it is hoped that a member of the Institute for Fisheries Research staff may be on hand to offer suggestions as the work progresses.

Table 4. Improvements recommended for six lower lakes of
Intermediate Chain, Antrim County.

	Elk	Round	Torch	Olam	Bellaire	Central
Brush shelters (20' x 50')	150	none	450	none	75	*
Hearing ponds in vicinity	+	+	+	+	+	+
Bar control	0	+	0	*	+	*
Slabs for minnow spawning	*	0	1000	0	*	*
Vegetation increase (locally)	+	0	+	0	+	none
Fertility increase (locally)	+	0	+	0	+	none

* = desirable but not regarded as necessary as are items marked + or items where figures are given.

The 6 Minor Lakes

Of these lakes three are relatively unimportant. Mud Lake is too shallow. High Lake is quite acid and the perch are highly parasitized. Bass Lake is very shallow, is low in oxygen and is very silty. No recommendations for stocking or improvement are made for these three lakes.

Lake of the Woods and Thayer Lake, similar in many respects, are excellent lakes. We cannot suggest ways of improving these waters but stocking with certain species is desirable.

Birch Lake appears to have all the requirements needed for a good fish lake, except that more cover is desirable. Stocking is also recommended.

The recommendations are given in the following table (Table No. 5).

Table 5. Improvement and stocking recommendations for Thayer Lake, Birch Lake, and Lake of the Woods.

Improvements	Thayer L.	L. of the Woods	Birch L.
Brush shelters	none	none	20
Stocking			
Large-mouth bass fingerlings	2,000	2,000	2,000
Small-mouth bass fingerlings	2,000		2,000
Wall eye fry	2,000		
Bluegill fingerlings		2,000	2,000
Perch fingerlings			2,000