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Report 148

REPORT ON THE SURVEY OF THE THREE LAKES ON THE KINNE CREEK
CLUB PROPERTY, LAKE COUNTY

The three lakes, located in Lake Co., Webber Twp., were examined by the Institute for Fisheries Research in July, 1931. A general discussion, together with a discussion of the findings and with recommendations for improvement of the lakes, are here given. Mill Lake and Railroad Lake, essentially similar, are considered first. Spring Lake is taken up last.

Summary of findings for Mill Lake and Railroad Lake

The investigations revealed a number of interesting facts. These two lakes were found to be typical southern Michigan lakes in many ways, in spite of their northern location. The marl shoal, rich peat bottom below the dropoff and abundant vegetation on the slope and on the bottom below the slope are characteristic of many southern lakes. These two bodies of water are much more productive than the average northern lake. Unlike our southern lakes, which are located in more densely populated areas, the lakes here discussed are not in danger of pollution in any way and in all probability there will be no pollution in the near future. Furthermore, the predators which are generally so abundant in our southern waters are almost entirely absent in the lakes on the Kinne Creek Club property. Nature was unusually kind in giving these lakes the desirable characteristics of the more southern lakes and in eliminating some of the undesirable features in lower Michigan waters.

Unlike most lakes with organic bottoms, these lakes have an abundance of oxygen in the cold layer. Generally in such lakes, the decay uses up the oxygen in mid-summer

and little if any is found near the bottom. The abundant vegetation in Mill and Railroad lakes evidently supplies the oxygen faster than it is used up by decay. The fact that the oxygen does appear at all depths permits fish life to utilize the entire water and therefore renders the lake more productive than it would be otherwise.

Although bluegills are more or less abundant in both lakes, bass are present only in limited numbers. Net sets and seine hauls indicate that the lakes are none too well supplied with fish.

To assure good fishing in lakes where food is abundant the fish supply must be built up to a point where the fish will find some difficulty in securing enough food. It is evident that a hungry fish will seek something to eat. If too many fish are present for a given amount of food dwarfing will undoubtedly result. It is difficult to determine just when the proper balance between fish and food has been reached but in these two lakes the food present is greater in amount than the fish present require.

Although one cannot state definitely why fish are not more abundant it is fairly safe to assume that poor spawning conditions are partly responsible. The lakes are evidently not over-fished, predators are very few and pollution does not occur. The spawning conditions alone appear unfavorable.

Some spawning has taken place in the boxes placed along the shoal for this purpose. A majority of them appear not to have been used. These will undoubtedly be utilized if small-mouth bass are introduced. Other nest-building fishes apparently prefer not to use them. The marl shoals, in their present condition, are not satisfactory for bass spawning.

Summary of findings for Spring Lake

This little lake is unusual because of its extreme shallowness and its spring water. The bottom is quite soft. Although the surrounding country was not studied carefully and no definite information on the matter can be given, increased depth is desirable. Flooding of some adjoining land by placing a dam in the outlet would probably do no harm at all to fishing. It would kill the trees present in the flooded

area. Such flooding would place some sandy adjoining land under water and would make better spawning conditions possible. It should also provide increased food and protection. A study of the adjoining land is recommended and, if feasible, the damming of the outlet to increase depth is suggested.

Summary of Recommendations

The recommendations are made with the following points in view:

1. Stocking to build up the fish supply. This is necessary where spawning conditions are unsatisfactory.
2. Improvement of spawning conditions. A lake which is not fished heavily should, if conditions are satisfactory, have enough natural reproduction to render stocking unnecessary or at least to reduce stocking to a minimum.
3. Protection of young fish. This is one of the most important factors in a lake even though it has been greatly overlooked. It is certainly poor conservation to rear fishes at considerable expense and then to place them in areas where they are not sufficiently protected from the larger fish or from other predators. In order to build up good fishing the young fish must have a good chance of survival.
4. Improvement for minnow spawning. Even where aquatic insects are abundant a large supply of minnows is desirable. Adult bass and also fishes of some other species evidently prefer minnows to insects. The presence of an abundance of minnows gives young game fish a better chance of surviving.
5. Segregation of warm and cold water species. Where trout streams and warm water lakes are connected, screens of some type or other which prevent the stream fish from entering the lakes and visa versa are desirable.

The recommendations made are not radical ones. They have been used successfully elsewhere. Expense in construction has not been over looked. It is difficult to state

what amount of improvement work should be done but the figures given below indicate the amount which, in our opinion, will be needed to sufficiently improve the conditions.

Plenty of brush is available. The size and shape of the individual heaps is relatively unimportant so long as the brush is loosely put together and placed at proper depths. The diagram presented in this report represents construction of a type of shelter which is deemed very satisfactory.

Slabs, boards, or flat objects of some sort are used for minnows. The blunt-nosed minnow, which was found in greater abundance than any other species, and which is a very desirable forage fish, spawns under such objects. An arrangement of slabs as illustrated in the enclosed diagram is especially desirable because, even after parts have been submerged in the bottom, other portions still are exposed. It may be necessary to raise the structure occasionally (every few years) to keep it from sinking in the bottom too far. Both slabs and brush shelters must be submerged with stones or sacks of sand until completely water-logged.

To improve spawning conditions for nest building fishes, gravel should be used, mixed with fine sticks, strewn over the bottom in a thin layer. (Large-mouth bass and bluegills will utilize chips of wood or very fine brush for nests.)

A brush screen which will prevent fish from passing through is desirable where stream fish and lake fish are to be kept separated.

Reports on the individual lakes follow.

Mill Lake

Size and location Mill Lake is much larger than either of the other two lakes located on the Kinne Creek Club property. It has an area of 55.2 acres and is located about midway between Railroad Lake and Spring Lake.

Inlets and Outlets. The lake has only one inlet of considerable size. This flows from Spring Lake. It enters the lake on the east side. A small spring feeder is also found at the northeast end of the lake.

The outlet, Kinne Creek, a trout stream, flows from the northwest corner.

Pollution. The lake lies in unsettled country. No sewage enters it. The water is clear, clean and unpolluted.

Use of water. Little use is made of the water except for boating and fishing and the first is carried on, generally, only in connection with the latter. Except for a boat house and dock at the end of the trail, no buildings are found around the lake.

Temperature. Surface temperature is high in summer. The water, however, is definitely stratified, and below 15 feet was found to be fairly cold in summer.

Oxygen. Oxygen is high at all depths. The abundance of vegetation on the bottom undoubtedly accounts for the presence of oxygen in fairly large amounts in the lower, non-circulating layer.

Other chemical conditions. No carbon-dioxide was found at any depth, indicating clean water. The water is decidedly alkaline and is relatively soft. The water is relatively clear. Chemically it is very satisfactory for fish life.

Depth. Shoal along part of the lake are narrow while in some portions, especially along the northern half of the east side, they are rather wide. These are well illustrated on the airplane photograph of the lakes. The slope is rather steep along most of the dropoff. Below the slope the bottom deepens gradually to a maximum depth of 39 feet. The southern half is somewhat deeper than the northern half.

Bottom The bottom on the shoal area is almost entirely marl. Two areas of sand, one near the southeast and one near the northeast end of the lake were found. A mixture of pulpy and fibrous peat covers the bottom of the small bay on the east side and some fibrous peat is found along the south shore. The bottom below the shelf is of pulpy peat.

Vegetation. Weeds are very abundant below the dropoff and on the slope. This is extremely fortunate since these plants provide both oxygen and food, making the entire volume of water suitable for fish life. Considerable vegetation is also found on the shoal area but the marl bottom on the shelf does not provide ideal conditions for abundant vegetation.

Natural food. Food is plentiful. Minnows are fairly numerous and aquatic insects are abundant. The food is ample to supply a rather large fish population.

Fertility. The shoal is of marl and is only fairly rich. The bottom below the slope is of pulpy peat and is productive.

Spawning grounds. Spawning beds were found along the shore line at various places, especially at the northeast and northwest corners. These were found on marl, the nests being made of plant roots or sticks and chips of wood. Quite a few spawning boxes have been placed in the lake at various places. These were filled with gravel. Some showed signs of having been used for nests. Others, apparently, had not been used.

Species of Game fish. Bluegills fairly abundant. Pike, rock bass, perch and large-
fish present mouth bass common. Pumpkinseed sunfish present. Fish are present in considerable number but the lake is rich enough to support a much larger number.

Obnoxious fish. None found.

Coarse fish. None found.

Forage fish. Blunt-nosed minnows fairly abundant. Black-chinned shiner, least darters and menona killifish common. Golden shiners and log perch present.

Predators. Evidently very few fish predators are found in or around the lake. No fish-eating birds were seen here, but, very likely, some kingfishers are present along

the shores of the lakes and streams. Very few snapping turtles were seen here. Predatory fishes, other than pike and other desirable species, were not seen. The lake is relatively free from undesirable predators.

Cover. Vegetation in the deeper water provides excellent cover. Weed-beds and fallen branches also provide a limited amount of shelter on the shoal but cover is not as abundant as it should be on portions of the shoal.

Water level. From all indications the water level is quite constant. The region is covered with timber and run-off water is very limited.

RECOMMENDATIONS

Set 1: for trout and bluegills

This lake is obviously capable of supporting a fairly large fish population. We found conditions in the lake which make us believe that there is a very good chance that brook trout will live there and grow to a large size. If so, they could be caught early in the season on fly, and after about July 1 on bait. We do not know whether the Club members would desire trout fishing in the lake. But if they do, we would suggest that a three year trial be undertaken to determine whether trout will become established, according to the following recommendations. If the trial should fail, recourse could then be had in the second set of recommendations, leading to bass and bluegills. Or if trout in the lake are not desired, Set 2 should be followed from the beginning.

1. Stocking.

1000 to 5000 brook trout, 6" to 8" in length per year. Smaller fish would be unsatisfactory, because too subject to destruction by the predaceous fishes present in the lake.

5000 to 10000 bluegill fingerlings per year.

2. Shelter increase.

The construction of 15 brush shelters is recommended.

3. Slabs for minnow spawning.

Not recommended unless (or until) a bass project is started.

4. Screen in outlet.

Not recommended unless (or until) a bass project is started.

5. Spawning bed improvement.

50 cubic yards of gravel and same quantity of small water-logged sticks, shavings, chips or very fine brush, to be strewn over bottom in depths of 18 inches to 6 feet.

6. Other improvements are not considered essential.

Set 2: for bass and bluegills.

These recommendations are suggested to be followed at once, if trout are not desired for the lake. If trout succeed, bass should not be planted. If trout fail, these recommendations are suggested to be then followed:

1. Stocking:

2000 to 5000 small-mouth bass fingerlings per year. These should use spawning boxes already provided, and might well yield enough natural reproduction to allow the annual plant to be decreased. Large-mouth bass should increase as the result of improving the spawning beds. Unless small-mouth bass do not become well established within reasonable time, plantings of the large-mouth, inferior as a game fish, are not recommended. 5000 bluegill fingerlings per year.

2. Shelter increase.

Some increased shelter for young fish is desirable on the shoal area in places where weed beds are least abundant. The construction of 25 shelters is recommended.

3. Slabs for minnow spawning.

One hundred slabs, placed along the shoal on firm bottom are recommended.

4. Screen in outlet.

We would recommend filling in the outlet at its source with a loose brush and stone dam to prevent intermixing of lake and stream fish and to prevent loss of bluegills fingerlings in fall. This dam would need repair each spring

and occasional replacement.

5. Spawning bed improvement:

50 cubic yards of gravel and same quantity of small water-logged sticks, shavings, chips or very fine brush, to be strewn over bottom in depths of 18 inches to 6 feet. The spawning boxes should be kept in repair, and about doubled in number, two years after the first planting.

6. Other improvements are not considered essential.

Railroad Lake

This lake is similar to Mill Lake in many respects.

Location The lake is located near the railroad which passes through the estate.

and Size. It is really two lakes having a shallow connection. It has an area of almost 24 acres.

Inlets and outlets. This lake, unlike the other two is completely landlocked, having neither inlet or outlet.

Pollution. The lake is removed from all sources of artificial pollution. From all indications the water is quite clean and uncontaminated.

Use of water. No structures, except a boat house, are found here. The lake is surrounded by second growth timber. It is used only for boating and fishing.

Temperature. Temperature is fairly high during the summer in the upper 12-15 feet. Near the bottom the water is fairly cold. When examined (air temperature 84°) the surface was 78° and the bottom 54°.

Oxygen. Oxygen was found to be high at all depths. It was highest near the bottom. This lake, as well as Mill Lake, can be used at all depths by the fish.

Other chemical conditions. Carbon-dioxide was not found. The water is relatively soft. It is quite alkaline. The water here was not as clear as the water in Mill Lake when the examinations were made. Chemically the lake is well suited to fish life.

Depth. The lake has two separate basins. The upper part of the lake reaches a maximum depth of 30 feet while in the larger part a maximum depth of 35 feet was found. The shoals are fairly wide, having an average width of about 100 feet. The dropoff is fairly abrupt and has a relatively steep slope.

Bottom. The bottom is similar to that in Mill Lake. The shoal is almost entirely of marl while the bottom below the dropoff is of pulpy peat.

Vegetation. Vegetation is present on most of the bottom. Some was found even in the deeper parts. The shoal area, being of marl, contains vegetation in limited amounts.

Natural food. The food in this lake compares with the food in Mill Lake. Aquatic insects are abundant. Minnows are common.

Fertility. The marl shelf is fairly fertile while the peat bottom below the drop-off is quite productive. The lake is much richer than the average northern lake.

Spawning grounds. Spawning beds were found at various places along the shore. Quite a few nests were seen. These were almost entirely bluegill beds. They were located on the marl, the nests being made chiefly on root plants.

Species of fish present. Game Fish. Bluegills were found to be quite abundant. Large-mouth bass and green sunfish are common. It is possible that a few other species are present in limited numbers. Only the three kinds of game fish were taken in the nets and seines.

Coarse fish. None.

Obnoxious fish. Blunt-nosed minnows are fairly abundant. Common shiners, Iowa darters, least darters and river chubs are also present.

Predators. Predators are very few. No undesirable predatory fish were found. A few snapping turtles are present and, undoubtedly, an occasional kingfisher is found here.

Cover. Cover is fair. The vegetation on the shoal provides some protection. Some snags are also present. More cover is desirable.

Water level. Water level appears to be quite uniform. Even though fluctuations should be fairly large nothing could be done to prevent it in a land-locked lake such as this.

RECOMMENDATIONS

This lake so nearly resembles Mill Lake that the recommendations made for both are, with very few exceptions, similar.

Set 1: for trout and bluegills.

What has been said of trout in connection with Mill Lake applies also to Railroad Lake.

1. Stocking.

1000 to 3000 brook trout 6" to 8" in length. Smaller fish would be unsatisfactory because too subject to destruction by other fish. 2000 to 4000 bluegill fingerlings.

2. Shelter increase.

The construction of ten brush shelters is recommended.

3. Slabs for minnow spawning.

Not recommended unless or until bass project is started.

4. Spawning bed improvement.

25 cu. yds. of gravel and same quantity of small water-logged shavings, chips or very fine brush to be strewn over bottom in depths of 18 inches to 6 feet.

Set 2: for bass and bluegills.

To be followed at once if trout are not desired in lake. If trout fail, these recommendations are suggested to be then followed.

1. Stocking.

1000 to 3000 small-mouth bass. These should use spawning boxes already provided. And might well yield enough natural reproduction to allow the annual plant to be decreased. Large-mouth bass should increase as the result of improving the spawning beds. Unless small-mouth bass do not become well established within reasonable time, plantings of the large-mouth, inferior as a game fish, are not recommended. 2000 bluegills fingerlings per year.

2. Shelter increase.

The construction of 15 brush shelters recommended.

3. Slabs for minnow spawning.

50 slabs placed along the shoal on firm bottom recommended.

4. Spawning bed improvement.

25 yds (cubic) of gravel and same quantity of small water-logged sticks, shavings, chips or very fine brush, to be strewn over bottom in depths of 18 inches to 6 feet. The spawning boxes should be kept in repair, and about doubled in number, two years after the first planting.

Spring Lake

This small lake is well named. It is quite unlike most lakes in a number of respects.

Location and Area. The lake is located a little more than a fourth mile east of Mill Lake. It has an area of 7.5 acres.

Inlets and Outlets A small inlet enters the lake at the northeast end. A fairly large outlet, is found at the south end. The outlet flows into Mill Lake. Numerous springs are found in the bottom. Inlet and outlet were not examined. The inlet is too small to contain fish of any great size, while the outlet (Kinne Creek) is quite short.

Pollution. Chemical analysis indicated an abundance of oxygen and a lack of carbon-dioxide. The water is unusually clear and clean. It is evident that no pollution occurs here.

Use of water. This lake has been fished relatively little in the past. It is unsuited for bathing because of its shallowness and its soft marl bottom. Boating is carried on only in connection with fishing.

Temperature. Since the lake is very shallow and is exposed to the sun, its mid-summer temperature is high--too high to be well suited for trout during the warm season. Temperature taken in the spring holes was found to be 76°. The surface temperature was 78° when the air was 82°.

Oxygen and other chemical conditions Oxygen was found to be high. The water is fairly soft and is rather highly alkaline. No carbon-dioxide was found. The water is quite clear.

Chemically, the lake is well suited for fish life.

Depth. The entire lake is unusually shallow. Average depth was found to be less than 3 feet. Much of the lake is less than 2 feet deep. A number of spring holes occur where the water is from 5 to 10 feet deep. These holes, however, compose a relatively small amount of the bottom area.

Bottom. Except for the fibrous peat margin the entire lake bottom is of soft marl. This is not firm enough to permit natural spawning beds for members of the bass family.

Vegetation. Weeds are present on most of the lake bottom, but on most of the area they are only fairly abundant. At the inlet weeds are extremely plentiful. The vegetation is chiefly muskgrass. This is to be expected in a marl bottomed lake.

Natural food. A marl bottom is generally only moderately productive. Minnows are present in limited numbers. Aquatic insects are fairly abundant. Although it cannot be regarded as plentiful, a considerable amount of food is available for the fish.

Fertility. The peat margin is quite productive but the lake as a whole does not compare in richness with Mill Lake and Railroad Lake.

Spawning grounds. Conditions are good for perch spawning. This species lays its eggs on vegetation or on roots. The soft bottom renders conditions unfavorable for bass and bluegills or trout. The bass can, perhaps, spawn on the roots of muskgrass but the success of such spawning beds is questionable.

Species of fish present. Game fish. Perch, large-mouth bass and rock bass were found here. The perch reach a good size and appear to be fairly abundant. A

considerable number of bass are present. The fine clear water should produce good "clean" fish.

Coarse fish. None found. The lake is not suited for bullheads.

No suckers were taken here.

Obnoxious fish. None found.

Forage fish. Only golden shiners were taken. The soft bottom makes seining impossible and it is probable that forage fish of several other species are present in limited numbers.

Predators. No predators were seen. Very likely kingfishers visit the lake at times. The shallowness of the water should make matters easy for them in taking young fish.

Cover. The vegetation provides considerable cover. Some logs and branches have also fallen into the lake around the shore. No protection is present for small fishes in the deeper holes. Cover is fair but is somewhat inadequate.

Water level. Since the area is wooded, and since the lake is largely spring-fed, floods after spring rains are not expected. From all indications the water-level is more or less constant. Despite the fact that the level in most lakes was quite low when the examination of Spring Lake was made, the water here appeared to be at the normal level.

RECOMMENDATIONS

1. Stocking.

Since game fish are already present and since the water becomes quite warm in the summer stocking with trout is not recommended.

An annual plant of 500 large-mouth bass fingerlings and 500 perch fingerlings should be made for several years.

2. Shelter increase.

More protection for young fish is desirable. A number of brush shelters should be constructed, the number depending on the size of the shelters. Preferably,

10 to 20 small, loosely bundled, brush heaps (about 8' x 8') should be submerged. These would not only provide shelter for the young fish but would tend to increase the food supply.

3. Spawning conditions.

Spawning conditions for bass could not be improved very easily because of the soft bottoms. Annual planting will probably be necessary to secure good fishing.

4. Food increase.

Increase of food is desirable. The introduction of more forage fishes is not recommended. The brush shelters, in providing proper conditions for aquatic insects and for algae, should have a definite effect on the food supply.

5. Increased depth.

A greater depth of water is highly desirable. If a dam in the outlet would increase the depth several feet without flooding too much adjoining country and thus killing timber, such a dam would undoubtedly greatly benefit the lake. A careful study of the amount of land which would be flooded in case a two or three foot dam were constructed should be made. Increased depth, together with increased shelter and annual stocking should provide excellent conditions for fish life.

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