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D. D. Douglas

NOV 21 1931  
FISH DIVISION

November 14, 1931

Report No. 104

REPORT ON LAKE AND STREAM SURVEY OF THE D. DWIGHT DOUGLAS ESTATE  
IN LAPEER COUNTY, WITH FISH MANAGEMENT PROPOSALS

FIRST INSTALLMENT

CONTENTS

	Page
Introduction.....	1
Misch Lake.....	1
Name.....	1
Origin.....	2
Inlets and Outlets.....	2
Pollution.....	3
Use of Water.....	3
Temperature.....	3
Chemical Conditions.....	4
Depth.....	4
Bottom.....	4
Vegetation.....	5
Natural Food.....	5
Spawning Grounds.....	5
Species of Fish Present.....	6
1. Perch.....	6

	Page
Species of Fish Present (con.)	
2. Large-mouth Bass.....	7
3. Pumpkinseed Sunfish.....	7
4. Green Sunfish.....	8
5. Coarse Fish.....	9
6. Obnoxious Fish.....	9
7. Forage Fish.....	9
Predators.....	12
Cover.....	13
Fertility.....	13
Ducks.....	13
Laws and Regulations.....	14
1. Private Lakes and Fishing Privileges.....	14
§(a)No Need to Post.....	14
§(c)Right to Fish.....	15
§(d)Right to Possess Fish.....	15
Discussion of Opinions.....	16
Remarks.....	16
Recommendations.....	17
1. Stocking.....	17
2. Replacement of Sunfish by Bluegills.....	17
3. Spawning Beds.....	18
4. Cover.....	19
5. Screen in Outlet.....	19

Recommendations (con.)	Page
6. Water Level.....	19
7. Predators.....	19
8. Items Not Needed.....	19
Half-Dollar Pond.....	20
Description.....	20
Recommendations.....	21
Hunter Creek.....	22
South Branch of Flint River.....	22
Misch Lake Inlet.....	23

## INTRODUCTION

The lakes and streams here considered are located in Lapeer County, several miles northeast of Metamora, specifically in Sec. 34 and 35 of Lapeer Township (T. 7 N., R. 10 E.). These lakes are included in a tract of 400 acres owned by Mr. D. Dwight Douglas of Detroit.

The survey was conducted for Mr. Douglas, with the idea of arriving at conclusions regarding ways and means for fishing conditions in the two lakes and in the streams located on the estate. The field work was conducted by a lake survey party from the Institute for Fisheries Research, on October 3rd and 4th, 1931, and the data have been analyzed and the following report prepared in the laboratory of the Institute.

### 1. MISCH LAKE

The larger body of water on the property is known as Misch Lake on the Name official lake and stream map of the Department of Conservation. We have no opinion on the desirability of retaining this name. If an official change is desired, application should be made to the "State Committee on Geographic Names", Room 641 State Office Building, Lansing, G. N. Fuller, Chairman". The regular form of action is to have the Board of Supervisors of the County pass a resolution proposing that the name be changed, giving reasons for the request. The State Committee then acts on the request, and the United States Geographic Board then acts, usually concurring.

There is of course nothing to prevent a private lake being called by any name the owner sees fit, but such action would not officially fix the name.

Origin

This is an artificial lake and has been in existence only six or seven years. In the present location of the lake there were formerly two small natural ponds, one about 600 feet by 300 feet, and the other about 450 feet by 300 feet. Both ponds were located in a marsh, somewhat smaller than the present lake. Two dams were constructed, one in the intermittent outlet of the pond to the west side and the other in a nearby draw. These dams caused the swamp to be flooded, and produced, in place of the two small ponds, this artificial lake with an area of 49.6 acres.

Inlets and  
Outlets

Misch Lake has only one inlet. This, herein provisionally called Misch Lake Inlet, is a clear, cold stream, which is spring fed. Its origin lies a short distance south of the estate. One short spring feeder joins it about 600 feet from its mouth, coming in from the west.

When the stream was examined, water level in lakes and streams generally was quite low but this creek maintained a fairly fast flow of cool water. Normally the stream is about 4 feet wide and 6 inches deep. When examined (October 3, 1931), it had an average width of about 2 feet and a depth of from 2 to 3 inches.

The creek is well shaded. The bottom is chiefly sand but gravel is also present in a number of places. With an air temperature of 84 degrees Fahrenheit, the temperature of the water was only 61 degrees.

No minnows or fish of any kind were seen here.

This inlet will be referred to again in this report. It can be stated here that the inlet provides some water continually for the lake but adds very little fertility. Since Misch Lake is already very rich in food, the matter of bringing in more food is relatively unimportant.

The lake has two small outlets. The flow of these can be regulated. One outlet passes directly to Hunter's Creek. The other passes through Half-Dollar Pond, and then into the first outlet. When the lake was examined, both outlets were practically dry. They are too small to support fish life.

Pollution No pollution that would injure fish life was found. The water appears to be clean. Considerable decay takes place here, due to the abundance of vegetation, but sufficient oxygen remains for the fish. The rotting of the vegetation adds to the fertility of the water.

Use of Water Misch Lake is not fished extensively. It is private and is used only by members of the family and guests. A small amount of boating is carried on here. The chief purpose of the lake is to add to the attractiveness of the summer home and its environs. Very few lakes in the state could better serve that purpose!

As the fish population increases, more intensive fishing will doubtless be carried on here.

Temperature Temperature, even in the deepest part is relatively high (62°F at the surface and 58°F at 24 feet depth on October 4, 1931). The cool inlet tends to keep the lake water below the average temperature of lakes but the large amount of surface and extensive shallow area will at least compensate for this cooling effect. This is a matter of some importance as the increased temperature will add to the productivity of the lake.

No stratification appears in the lake. This renders it unfit or  
Chemical very poorly fitted for trout, but in no way interferes with the warm  
Condition water fishes.

Oxygen is moderately high and is present in some degree even at the maximum depth. As has been previously stated, considerable decay takes place here, because of the abundant vegetation, but the living plants, in turn, provide a large amount of oxygen. Although the oxygen is not especially high, it is quite sufficient for the fish life in the lake. The oxygen analyses were 6.7 parts per million at surface, 5.6 p.p.m. at 15 feet and 3.1 p.p.m. at 24 feet.

Carbon-dioxide is present only at the bottom of the deep West Hole. The water is moderately hard and moderately alkaline.

In general, the lake appears well suited (chemically) to fish life.

Depth Maximum depth in the West Hole is 29 feet, and in the East Hole is 15 feet. The average depth of the shallower parts of the lake is about 4 feet at present. Normally this should be about 6 feet. The depth is sufficient so that the lake will not freeze solid, and the large shallow area will make this a very productive lake, if it is otherwise properly managed.

Bottom Since this lake is largely artificial and since it has been in existence only six or seven years, one may expect the bottom to be more like the surrounding land than like a normal lake bottom. Much of the flooded area was swampy however, and the bottom is chiefly peat. The area near shore is varied, including some sand, clay, peat, and a small amount of gravel. The map indicates where each kind of bottom material occurs.

As has been stated, most of the lake is shallow. Weed beds are  
Vegetation very abundant over almost the whole bottom except in the West Hole.  
The East Hole has a very heavy bed of Najas covering the bottom.  
Vegetation in the lake is plentiful. Many coarse stems of dead  
vegetation, probably button bush, which existed here when most of the present bottom  
was still swamp, are found in the water. When the lake was being examined some  
of these were being removed. Since the living vegetation furnishes an abundance of  
protection, and since these dead stems tend to lower the oxygen and to injure the  
general appearance of the lake, the removal of these will not seriously affect the  
probable success of the efforts to build up the fish supply.

The lake contains a large amount of food; enough to take care of a  
Natural large fish population. Aquatic insects and bottom organisms are  
Food abundant. Some crayfish are present. Minnows, though not  
abundant in species, are quite abundant in number. Large schools of  
golden shiners were seen here, and this is a very desirable "forage fish".

This lake was examined quite late in the season, and the spawning  
Spawning beds were hard to locate. Some were found at various places along  
Grounds the shore. Most of these were evidently the nests of pumpkinseed  
sunfish. None of the beds found were on gravel. They were located  
either on sand, clay, or fibrous peat. The eggs were very probably deposited on  
exposed plant roots. These spawning grounds can be improved considerably. This  
will be discussed under "Recommendations".

Four species of game fish were found. Of these, two are present in fairly large numbers, one is common and one is scarce. A short discussion of each of these fish is here presented.

Species of  
Fish Present

1. Perch (Perca flavescens).

This fish is present in the lake in relatively large numbers, but do not appear to reach a large size. Judging from those seen at the lake, the average size is about seven to eight inches. Perch of this size can well be used as food but do not provide sport for those who prefer casting to stillfishing. Women and children generally enjoy fishing for both perch and bluegills.

Generally when perch are very abundant, they have a tendency to become dwarfed. Many lakes in Michigan and elsewhere contain a large population of this species, but these are relatively small fish.

Since perch are present in considerable numbers and since they seem to bite well, their presence in the lake is something of an asset. They do compete for food with other species, however, and their numbers should be held down. Two factors will tend to keep down the perch population: 1. An increased number of bass will eliminate many young perch. 2. Fishing for the perch will serve the same end. This should be encouraged, and those taken should not be returned to the lake.

Spawning conditions for perch are quite favorable. They do not build nests but they lay their eggs in shallow water. These eggs are embedded in long gelatinous strings and are spread over the brush and vegetation. Spawning takes place in the spring. The eggs hatch in about 20 to 30 days. In the smaller lakes perch often mature in about two years. The majority of the larger perch seen at the lake were very likely two or three years old.

Perch eat quite a variety of food. Generally insects, crustaceans, small fish

and minnows furnish most of their food supply. They can usually be caught on either small minnows or worms and sometimes take spinners.

2. Large-mouth Bass (Aplites<sup>?</sup>salmoides).

Large-mouth bass do not net easily and the several net sets in the lake may not have given a fair indication of the relative number present. The seining shows that some bass fingerlings are present but that they are not very abundant. Judging from the limited information obtained, one would decide that the bass are common but not abundant.

There are reasons to believe that the lake should support a rather large number of bass and that they should reach a fair size.

Spawning conditions for bass can be improved. Nests are generally built on old leaves and twigs, on root tips or on gravel and sand. The nests are not built close together as is usually the case with bluegills. Spawning usually takes place in late spring. The nest is guarded by the male or at times by both male and female.

Large-mouth bass prefer a relatively shallow and weedy environment. Misch Lake appears to be very well suited to this species.

The fish grow relatively fast when food is abundant. When food is scarce they often become cannibalistic and the adults eat the fry and fingerlings. Since food is plentiful in Misch Lake, and since shelter is good, the older fish will probably eat relatively few of the young ones. The food of the bass is chiefly crayfish, minnows, young fish, and insects.

Bass are often taken by still-fishing as well as by casting. Large specimens can show considerable "fight" and provide good sport for the angler.

3. Pumpkinseed Sunfish (Lepomis gibbosus).

This fish is present in fairly large numbers. Though very few adults were taken,

young fish were found to be plentiful. As high as 46 were taken in one small seine haul. These were all of last season. Although the fish reaches an establa size it is not nearly so important as a pan fish as is its relative, the bluegill. The fish competes with the bluegill in food, and in nesting places, where such areas are limited.

The habits of this fish are similar to those of the bluegill in many ways. The male builds a circular nest. This nest is built on sand, gravel, mats of plants roots, clay or sometimes on marl. Spawning takes place in late spring and is continued with decreasing intensity through the summer.

In some places this fish reaches a large size, sometimes nearly a foot in length (Adams and Hankinson, 1927). On the other hand Evermann and Clark (1920) found mature specimens 2 1/2 inches long. In many of the lakes of this state the pumpkinseed sunfish does not get much above legal size.

This fish eats chiefly insects and small snails.

#### 4. Green Sunfish (Apomotis cyanellus).

Only one specimen of this species was taken. This fish occurs in some of our Michigan lakes, but usually not in large numbers unless the lake is small and the species has little competition.

In habits this fish is quite similar to the pumpkinseed sunfish.

The green sunfish is still listed as a game fish in Michigan but very seldom reaches legal size here. It grows to be fairly large in some states farther south.

This species is not common in Misch Lake and will offer very little competition to fish of other species. Increased fishing, the destruction of all sunfish other than bluegills caught, and the planting of bluegills only will probably

suffice to hold down any tendency of this undesirable species to increase.

#### 5. Coarse fish.

Only one species of coarse fish, the yellow bullhead was taken in Misch Lake. None of these were large. This is present in moderate numbers but it is not abundant. It offers little competition to the other fish. It is chiefly nocturnal in habit and is more of a bottom feeder than are the fish described above.

The bullhead eats both plant and animal matter. It is regarded as a scavenger. Its food includes insects, snails, crayfish, minnows, and plants.

Relatively little is known of the spawning habits of this species. The fish appears to spawn in late Spring and early Summer. Its nest may be a hollow, a burrow, or a small excavation.

This fish can be taken at night on worms. Some consider it an amusing sport to fish for them with a hunk of meat, without a hook. The bullheads will often hold on long enough to be thrown into the boat.

#### 6. Obnoxious Fish.

No obnoxious fish were found in Misch Lake.

#### 7. Forage Fish.

Only three species of forage fish were taken here. Of these, one is fairly common, one is common, and one is abundant. A brief description of the three species follows.

##### Mud Minnow. (*Umbra limi*).

This minnow is fairly common in the lake, and the specimens taken were rather large adults measuring about 2 1/4 to 2 1/2 inches in length. It is not usually common in lakes, preferring isolated ponds and swamp creeks. Its commonness in Misch Lake can be accounted for by the mode of origin of the lake from the swamp ponds.

where it no doubt abounded. It will probably be decreased in numbers as the game fish supply is built up.

As the name indicates, this minnow is usually found in lakes and streams with muddy bottom. It prefers places where vegetation is abundant.

Although this minnow apparently has less value than other species as food for game fish it presumably does no harm to the lake. As bait it is extremely hardy but some anglers do not like it because of its dark colors. It is an interesting species to those who study the habits of fishes. The mud minnow can easily be recognized by its dark and rich colors and by the black vertical bar at the base of its tail fin.

The mud minnow lays its eggs in early spring, and when possible, runs up small swift streams to spawn. Possibly this minnow uses the inlet to discharge its family duties.

The following accounts of this interesting fish are taken from "The Ecology and Economics of Oneida Lake Fish" (Adams and Hankinson '27).

"Abbot ('09) and Gill ('04) show how much these fish depend on mud for their existence, disappearing into it, tail first, when danger approaches. To catch them one must, therefore, stir up the mud while one is using the net. They hibernate in this soft bottom mud, going down 4 to 9 inches, and may be found dormant in it, lying with the head upward in either a vertical or a nearly horizontal position, making it appear that they burrowed tail first. When the water is receding in their habitats they are capable of jumping from one pool to another, and eventually protect themselves by burrowing as in hibernation. Mud minnows may be seen resting on the bottom or moving slowly over it, making peculiar tracks. They can pass thru soft mud with remarkable ease. Bean ('92) says: 'It has been stated that this fish has been plowed up in ponds and swamps which have dried out.'"

"Abbot ('90) says: 'The mud minnow is carnivorous. When kept in aquaria they will devour any reasonable number of flies offered them, and undertake, without hesitation to swallow earthworms as large as themselves. Once they take hold of a worm they never let go, but at least secure the portion of that animal between their jaws.....Unlike any other of our fishes the mud minnow will leap twice or thrice its length out of the water to seize a fly

or beetle that rests upon some overhanging blade of grass or twig."

"Mud minnows are superior to all of our other small fishes for bait only in their tenacity of life. Evermann ('01) describes this quality as follows: 'So persistently do they cling to life that it is really difficult to kill them. In a live box (for which any old barrel answers admirably), minnow-bucket, or on the hook, it will live indefinitely; indeed, unless seriously bitten or swallowed outright by some game fish, a single mud minnow can be fished with for several days if not for the entire season! Its unexcelled tenacity of life is, however, about the only thing it has to recommend it as a bait minnow. Its somber, unattractive color prevents its being readily seen by game-fishes, and its tenacity to pull down or get to the bottom almost militates against it. But bass and pickerel and pike do sometimes take it, and, in spite of its deficiencies, the mud minnow is a good thing to have in one's minnow pail.'

Its ability to live under many conditions makes it easy to transfer from a natural habitat to an aquarium, where it is attractive in appearance and has some interesting features of behavior, as when it suspends itself almost motionless above the bottom and assumes various peculiar attitudes of body. It takes food readily, including small scraps of meat as well as natural food, and it will leap above the water and take tempting morsals from the hand."

"Pettit ('02) noted mosquito larvae scarce in pools where mud minnows were found, in comparison with those where they were absent."

#### Iowa Darter (*Poeciliichthys exilis*).

This darter is common in Misch Lake. The species is found in weedy lakes and streams where it breeds in late spring and early summer.

Little can be said regarding the value of this minute species as a forage fish. It is a bottom fish, usually inhabiting weedy places.

#### Golden Shiner (*Notemigonus crysoleucas*).

This excellent forage fish is present in large numbers. It prefers to live where vegetation is abundant. Misch Lake is well suited for this species. The minnow often grows to a size of over six inches and is very prolific. In locations where this fish reaches a large size it is occasionally eaten by humans and is said to be quite palatable.

No nest is built. The eggs are laid on plants in late spring and through the summer.

This minnow is regarded as good food for black bass, and it is being propagated at state fish hatcheries for feeding the bass. It is a very fortunate circumstance, auguring well for the future, that this species abounds in Misch Lake.

The golden shiner is objected to by some as a bait minnow, because it is rather delicate; others prefer it - as usual there is a difference of opinion among anglers. An examination of the stomachs of bass taken from the lake would probably show this minnow to constitute an important item in their diet. The shiner itself eats considerable vegetation, as well as insects and other forms of animal life.

The following two lines from "The Ecology and Economics of Oneida Lake Fishes" (Adams and Hankinson '27) are worth repeating: "In stagnant waters the golden shiner is a valuable mosquito destroyer. Smith ('04) says that wherever it occurs mosquito larvae are absent."

Predators            Predators were found to be relatively few. Of the fish eating birds, several specimens of one species, the great blue heron, were seen. This bird eats a considerable amount of young fish. In the past it has probably done little harm to Misch Lake, since most of the young fishes near the shore were pumpkinseed sunfish. With bluegills planted in the lake and with an increased number of bass fry, the bird may probably do some slight harm. But since the pumpkinseeds tend to inhabit shallower water than the bluegills, they will be preyed upon in larger proportion.

Turtles are present in moderate numbers. All those observed when the lake was examined by our party were painted turtles.

Muskrats are quite common here. They are known to eat clams and will, at times, eat the flesh of painted turtles, but their destructiveness to the fishes is little if any.

In general, predators are few here compared to predators in other lakes of the state.

Cover           The weed beds and flooded brush provide extensive shelter for fingerling fishes.

Fertility       This lake appears fairly rich and productive.

Ducks           We pretend to know very little about ducks. It is recommended that the owner of the lake take the cover map of the estate, together with the map produced by the Institute for Fisheries Research (which indicates the vegetation and bottom conditions in the lake), to Dr. Miles D. Pirnie, in charge of the Kellogg Bird Sanctuary, Augusta, Mich., and there discuss the matter with him. Dr. Pirnie is undoubtedly the leading duck expert in the state, and his work on ducks and their food has been outstanding.

Dr. Pirnie will be found to be quite congenial and to be more than willing to give good sound advice and co-operation in the matter. He states that a personal visit will have much better results than correspondence. It is our opinion that a few hours spent with him will be both pleasant and helpful to any one interested in ducks or in other game birds.

Prof. Earl C. O'Roke, School of Forestry and Conservation, University of Michigan, has made a more or less extensive study of the diseases of ducks and other game birds and animals. He, too, will be found quite willing to cooperate and advise at any time,

especially should there be any question about the health of the birds.

Laws and  
Regulations

Laws regarding public and private lakes and streams have never been quite clear, even in the minds of many legislators and courts. Recently the Conservation Department has asked the Attorney General's Department to give its interpretation of the several laws dealing with this matter. Several questions and interpretations which may concern Misch Lake and other waters on the estate are here copied:

"1.-Classify for the purpose of regulation:

(c) A private lake of less than 250 acres with either inlet or outlet not planted with public fish.

The right of the public to fish on this lake depends on whether the inlet or outlet and the lake is navigable in fact and in law..... "If a stream is of sufficient capacity for the floatage of rafts and logs in the condition in which it generally appears by nature, it will be regarded as public, notwithstanding there may be times when it becomes too dry and shallow for that purpose. "-Cooley's Constitutional Limitations (7th Ed.) p. 861.

If the inlet or outlet and the lake mentioned, comes within the terms of the above definitions of navigability, then the public has a right to fish therein. On the contrary if it is not navigable, the public has no right to fish therein.

(d) A private lake of less than 250 acres, with either inlet or outlet, but planted with public fish.

.....If it is not navigable and the riparian owners have not given written consent to the planting of fish therein, the public may be excluded therefrom. If not navigable and the owners have given written consent to the planting of such fish in this lake and still exclude the public therefrom, then under Section 6442 Compiled Laws of 1929 the riparian owners cannot take fish therefrom themselves."

"8.-Consider a lake which from physical features may be classed as a private lake:

(a) Is it necessary for the owner or owners of a private lake to post same, file a declaration, or publish or record this fact and that the fishing regulations provided by law are not applicable to such waters?

"There is no law requiring the owner or owners of a private lake to post the same, file a declaration, publish or record the fact that it is a private lake, nor is there any law requiring him or them to give any notice that fishing regulations are not applicable to such lake.

(c) What authority or control of the fishing in such lake may be exercised by the state, even though the riparian owner or owners have not signified their intentions or desire of treating the lake as a private lake? In other words, can the state arrest and prosecute persons fishing in such lakes contrary to the provisions of law, when such persons have not secured either the consent or refusal of riparian owners?

"The right of a riparian owner to take fish from a private lake without restraint from Legislative enactment as held in *People v. Lewis*, 227 Mich. 343, does not extend to strangers fishing in said lake without the owner's permission. It only applies to the owner, his lessees or licensees. All others can be arrested by state officers and prosecuted therefor.

(d) Is the possession or size of fish contrary to provisions of law, taken from such lake which may or may not have been treated as a private lake, a violation of the statute which prohibits the possession of certain species during certain seasons or of less than a certain size?

"The laws of this State make the mere possession of certain fish or certain numbers, or sizes thereof, an offense under certain circumstances. Such a law applies to fish shipped in from other states.

*People v. O'Neal*, 110 Mich. 324  
*People v. Lassen*, 142 Mich. 597.

"It therefore applies to fish caught in a private lake within this State. The taking is not unlawful, but the possession is unlawful. The case of *Territory of Hawaii v. Hoy Chong*, Annotated Cases, 1915 A. v. 1159, holds in this regard as follows:

'It is to be noted that while the statutes forbidding the taking of fish or game are not applicable to private waters or grounds, those which forbid the having of fish or game in possession out of season are not so limited and the right of the State to prohibit unqualifiedly the having in possession of game or fish is ordinarily upheld.'

(e) Would this be applicable if the fish were removed from the premises?

"The possession would be unlawful wherever the fish were in this State."

(Signed by)

"Paul W. Voorhies  
(Attorney General)

By:- Emerson R. Boyles  
(Deputy)"

"I agree with you that the holding that the taking of the fish by the riparian

owner is lawful in a private lake but that the possession is unlawful is anomalous situation. However, the Supreme Court has decided in at least two cases, that the possession of fish out of season is a violation of the possession law even though the fish were shipped in from some other state, in which case the purchasing of same would be legal but the possession illegal. The only adjudicated case covering the exact situation is the one cited in the opinion, and that case holds flat-footedly that even though the taking was legal from a private lake that the possession was illegal.

"The situation that results is somewhat similar to a person possessing intoxicating liquors in his home. Under his constitutional rights, unless he made a sale of same or manufactured same, it would be impossible to get a search warrant and convict the person of illegal possession. In the case of his taking fish from his own lake and having them in his possession on his own property, the situation would be similar. The Conservation Officers would have no right to search his premises for the fish without a proper search warrant.

"In view of the decisions covering this situation, I think it would be well for the Legislature at some future time to enact that the possession of fish out of season when legally taken from a private lake is an exception to the general law.

"Very truly yours,

HUGH E. LILLIE (Signed)

Ass't Attorney General"

Remarks Neither inlet or outlet of Misch Lake, or of Half-Dollar Pond would in our opinion be adjudged to be navigable.

Particular attention is called to section 1 (d). If fish from state or federal hatcheries are planted with the written consent of the owner of the lake (or the riparian owner) the public cannot be excluded unless the owner himself refrains from fishing in the lake. If these fish are planted without the written consent of the owner (by someone else) the public may be excluded and the owner may fish the lake.

We cannot state to what extent these laws, as they stand and as they are now interpreted by the Attorney General's Department, will be enforced by the Conservation Department.

Lakes of the state are now designated as bass, pike, or trout lakes, depending on which kind of fish is dominant. Misch Lake could logically only be designated as a bass lake. All lakes are interpreted as bass lakes unless specifically designated otherwise.

#### RECOMMENDATIONS

1. Stocking. As has been stated, Misch Lake is relatively rich in food, contains an extensive shoal area and should support a large fish population. 2000 bluegill fingerlings and 1000 bass fingerlings should be planted every year. Observations on the increase in the fish population and on the rate of growth from year to year would be important, in determining whether the number should be changed.

Generally large-mouth bass do best in a shallow and weedy place while small-mouth bass prefer open and deeper water and cleaner shores. Our various investigations, however, have indicated that there are exceptions to this rule and that small-mouth bass do well in some shallow and weedy lakes. If the lake were a public lake we would recommend only the large-mouth species, because its success would appear more probable. However, if for a private lake the other species is much preferred, despite the better adaptability of the lake to the large mouth species, it may be planted with anticipation of moderate success. On account of the nature of the lake, the large-mouth bass will probably persist even though only the small-mouth species is planted. One reason why the small-mouth is less/<sup>well</sup> adapted to such lakes is its greater preference for clean gravel spawning beds. This deficiency can be corrected (see item 3 below).

2. Replacement of sunfish with bluegills.-As stated under "species of fish present" Misch Lake now abounds in the pumpkinseed sunfish. This species is generally considered

to be less desirable than the bluegill as a game and pan fish. With some discouragement of the native fish and encouragement of the bluegill, we predict on the basis of experience elsewhere that the bluegill will succeed and eventually outnumber the other species. The placing of gravel in the lake for spawning beds would favor the bluegill, which is less of a weed-bed spawner than the pumpkinseed. Yearly plants of 2000 bluegill fingerlings would do likewise.

The discouragement of the sunfish could be accomplished by killing all as caught. This would be, we suppose, within the rights of the private lake owner, even granting the validity and enforceability of the interpretations which have recently been put in the law, provided fish under 6 inches and no more than 25 pan fish be in the possession of the angler at any one time. The dead sunfish too small to keep should be thrown into the lake where they will furnish food for crayfish and other fish food, and on decomposition increase the fertility of the lake to a slight degree. The distinction of the pumpkinseed is easy. It has a bright red spot on the "ear", which spot is absent in the bluegill, and it lacks the large blackish blotch on the dorsal fin which is characteristic of the bluegill.

The introduced bluegills will hybridize to a greater or less degree, probably in considerable numbers, with the pumpkinseeds. This will result in an infertile hybrid ("mule"), but in a fish which tends to exceed either species in size and activity. Occasional very fine sunfish ought to be caught as a result of this hybridization.

3. Spawning Beds. Considerable gravel should be placed on portions of the shoal area to improve spawning conditions. This should be placed where the bottom is firm, preferably on sandy areas. Some sand mixed with the gravel will do no harm. Fine gravel (1/4" to 1") is best, but "bank run" is satisfactory. A thin layer of gravel

is most desirable. About 100 cubic yards should be used to advantage. If this is completely utilized by the fish more gravel can be added later. The gravel should be put in water from one to five feet in depth. Favorable locations for the gravel will be indicated on a chart accompanying the map.

4. Cover. Because of the cannibalistic tendencies of the bass good cover is needed. Experiments prove that brush heaps provide wonderful protection for young fish. However, since vegetation is so plentiful, and since food is also present in large quantities, increased cover seems unnecessary in Misch Lake at present. Should the adult bass population be greatly increased, a few well-placed brush heaps will prove desirable.

5. Screen in Outlets. The screen in the outlets should be of fine enough mesh to prevent fry and fingerlings from passing out of the lake. We recommend 1/2" screening. When the water is high, these will require some attention, for cleaning, especially in the fall.

6. Water Level. The water should be kept at a permanent level if possible. Fluctuations may interfere with spawning beds and food production.

7. Predators. Predators are few and relatively unimportant in this lake. Our idea would be that the herons, kingfishers and other bird predators will add more than enough to the attractiveness of the estate than is necessary to compensate for any destruction they will cause. As explained above, the herons will tend to select the pumpkinseeds, which ought to be removed anyway.

8. Items not needed. Vegetation increase and fertility increase are not regarded as urgently called for at the present time.

### Half-Dollar Pond

Name This small, round pond of 0.9 of an acre area, in common with many such ponds in the state, has been dubbed "Dollar Pond". But inasmuch as there are already two "Dollar Ponds" in Lapeer County, one of which is in the same township, we recommend that another name be used. On account of the very small size, perhaps "Half-Dollar Pond" will seem appropriate.

Description Inlets and Outlets.--A small intermittent inlet connects this with Misch Lake. Fish cannot pass upstream. A screen in the outlet of Misch Lake prevents their coming into Dollar Pond.

A small intermittent outlet connects Dollar Pond with Hunter Creek.

Pollution. No pollution was observed.

Use of Water and Adjoining Land.--No use is made of the water. The lake immediately adjoining the pond is not cultivated. A Cassandra bog surrounds three sides of the water while a wooded area of mixed conifers and hardwoods lies to the west side.

Temperature and Chemical Condition.--The pond appears chemically suited to warm water fishes. Temperatures are relatively high from top to bottom rendering the water unfit for trout.

Depth.--Average depth is 7 to 9 feet. Maximum depth is 11 feet.

Bottom.--The bottom is of soft peat. No sand or gravel is present.

Vegetation.-- Some vegetation is present. Musk-grass (Chara) is common. Weeds are present in sufficient amounts.

Natural Food.--No estimate of the natural food could be obtained. The soft bottom rendered seining impossible. Some minnows were seen and aquatic insects are undoubtedly fairly abundant.

Spawning Grounds.--No satisfactory bottom conditions exist for nest building fishes. This condition cannot be remedied by adding gravel, as this would sink in the soft bottom.

Species of Fish Present.--Since seining was impossible, an estimate of the kinds and abundance of small fish could not be obtained. Some minnows are present, and some small members of the sunfish group (probably pumpkinseeds) were seen. The net yielded three species: 1 yellow bullhead, 1 chub sucker, and 4 rather large common suckers.

Predators.--No predators were seen but the herons from Misch Lake probably make "side trips" to this pond. A few turtles may also be present.

Cover.--Little cover is found. The vegetation is not abundant enough to furnish good protection. The fish now found in the pond are chiefly bottom feeders and little cover for them is needed.

Fertility.--Dollar Pond must be quite fertile.

Three courses can be taken in connection with improving this

Recommendations pond:

1. It may be completely neglected because of its small size.
2. Bass and bluegill fingerlings might be planted. About 100 of each might be put in the pond for a few years as an experiment. In this case the outlet should be screened to prevent these fish from passing down stream in time of high water.
3. Dynamite could be used to remove all fish now present. Then the outlet could be screened and the fingerlings, together with some golden shiners seined from Misch Lake could be planted.

Of these the second suggestion appears most satisfactory. The pond is large

enough to support a limited number of fish. Those now present are chiefly bottom feeders and should interfere little with the bass and bluegills. On the other hand the young of these species might be used to some extent as food. In this way the suckers might be eradicated in a number <sup>of</sup> years. If or when food should become scarce, golden shiners could be seined in numbers in Misch Lake for introduction into the pond.

The bass would very likely not spawn here but could be planted from year to year. A number of spawning boxes as used in the hatcheries might well be used by the bass. A few brush heaps for shelter should also be provided. These should be wired together and weighted down so as not to project above the surface. If the pond is to be used at all, the outlet should be screened. This could best be done by making a rather loose brush-and-stone dam in the outlet.

#### Hunter Creek

This small stream was not examined by our party. It is undoubtedly too small to support large fish.

#### South Branch of

#### Flint River

This river passes through the northwest tip of the estate. Here it is fairly wide, has good cover and gravel bottom and contains an abundance of forage fish as well as common suckers and pumpkinseed sunfish. A large portion of the river would have to be examined before a statement regarding its fitness for trout could be made. However, it is extremely improbable that an investigation would indicate fitness for trout. Shiners and chubs for lake fishing can be obtained here.

Misch Lake Inlet

This stream has been briefly discussed under Misch Lake (Inlets and Outlets). It will be given more complete consideration in a supplementary report in connection with prospective trout and rearing ponds.

INSTITUTE FOR FISHERIES RESEARCH

E. W. Eschmeyer

INSTITUTE FOR FISHERIES RESEARCH

January 12, 1932

RECEIVED

Report No. 104

JAN 16 1932

FISH DIVISION

REPORT ON LAKE AND STREAM SURVEY OF THE D. DWIGHT  
DOUGLAS ESTATE IN LAPEER COUNTY, WITH FISH MANAGEMENT PROPOSALS

Second Installment

(Discussion on proposed fish ponds)

The accompanying diagram illustrates what, in our opinion, would be the most feasible arrangement and location for fish ponds on the estate, and the only location possible if trout are desired. A dam in the stream below the confluence of the two spring feeders would create a pond of almost two acres but this would evidently be too warm for trout and unsuited for bass. The arrangement as here proposed provides for two trout ponds and one bass rearing pond.

Purpose of ponds. The owner has expressed his desire to have trout fishing on the estate if conditions permit. None of the waters are now suited to trout.

There is always a certain amount of difficulty and expense connected with obtaining a supply of fish for a private lake. One of these ponds (Middle Pond) should supply the bass needed for Misch (Douglas) Lake. Only enough water should be put through this pond to hold the level constant and to temper the water in very hot weather. This pond should be well fertilized to increase the production of natural food.

These ponds should not only provide the fish but should be an added attraction to the already attractive estate and should give the owner considerable interesting

information on pond culture methods. A small surplus of fingerling bass and blue-gills might be available for sale. If it should be desired to expand the installation to increase the sales, additional ponds could later be built between the ones now proposed and the lake.

Size of ponds. The West Pond would have a length of over 450 feet, while the East Pond would be slightly over 300 feet long. Both of these trout ponds would be about 30 feet wide. The Middle (Bass) Pond would have a length of between 500 and 600 feet and an average width of 80-90 feet.

Water supply. The two spring feeders are not large but should supply the necessary amount of cold water to hold the temperature of the ponds down to a tolerable point for brook trout, at least in the East Pond. We would recommend rainbow trout for the West Pond. Both are fairly cold and maintain a fairly even flow of water.

Description. The proposed ponds would all be held back by an earth dam constructed at the base of the three ponds, at the point where the two knolls approach most closely. This dam would be provided with a spillway for each pond so that the levels could be independently raised or lowered, or any one pond drained when so desired.

A diversion dam would be needed at the head of the West and Middle Ponds as shown, to feed into each. The East Pond would need only a screen at its upper end.

The dikes would also be of soil scraped out of the proposed ponds.

The ponds would have a depth of nearly five feet at the lower end, grading to almost nothing at the upper end.

Construction. As to the method of building the ponds, we would recommend the use of a horse and scraper to throw up the main dam and the three dikes shown in the sketch. A low dike might also be needed along the south half of the east shore of East Pond. The dirt should be removed from the ponds themselves, but none of these

should be dug lower than the outlets, because every fish pond should be completely drainable to facilitate removal of fish when desired and to assist in controlling any disease that may develop. The floor of the ponds should be given an even gradient down to the outlet.

The present brush along the creeks will mostly have to be cut to permit the scraping, but any that can be left along the outer (up hill) side of each pond could be retained to advantage. We would recommend that the Middle Pond be scraped out first, so the water from each creek could be diverted through it while the two trout ponds were being built.

As to details of construction of the diversion and outlet units, we would recommend that the Department of Conservation be consulted, and that the man who would construct the ponds visit a plant where such constructions are regarded as successful by the Department.

Shelter. As soon as the dikes are completed, willow trees should be planted along both shores of the two trout ponds to provide shade, and food, and to help hold down the temperature and retard losses due to bird predators.

A large floating shelter should be constructed in the lower part of the Middle Pond, and several other shelters and covers of floating material and of brush, should be added to each of the three ponds, to provide shelter and food.

Feeding Of fish. Some feeding of the fish will be necessary if any large numbers are maintained. Supplies of small golden shiners reined from the main lake would provide excellent food for the trout and for the bass in the latter part of the summer. Adult blunt-nosed minnows could be introduced into the large ponds with slabs of wood for spawning, to produce crops of young minnows for the small bass through the summer. The fertilizing of the Middle Pond would produce food for the bluegills or bass. Feeding with prepared fish foods could probably be largely avoided. This would be

especially important in the trout ponds, as naturally fed fish are gamier.

Stocking of ponds. For the trout ponds we would recommend that 6" to 8" brook and rainbow trout be purchased, and that fish caught smaller than 7 1/2" or 8" be returned to grow larger. Such ponds properly handled ought to carry about 600 rainbows and about 300 brooks. Probably 400 and 200 respectively could be caught each year, of trout 7 1/2 to 12 inches long. We would recommend as an initial plant 1000 rainbow trout and 500 brook trout 6" to 8" long, and the addition of only enough new stock of similar size each year to hold the population around the 600 and 300 mark for the West and East Ponds, respectively.

For the Middle Pond we would recommend that bluegills and small mouth bass be handled on alternate years; that 15000 bluegill and 10000 bass fry or small fingerlings be added in late spring, and the product in late fall fingerlings be planted in the lake or sold. A yield of 20 to 60% might be looked forward to.

INSTITUTE FOR FISHERIES RESEARCH

R. W. Schmeyer

*1 cc. to H. F. Harper  
Original and 1 cc. to W. H. Douglas*