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REPORT NO. 689

FISHERIES SURVEY OF BURKE, PARK, AND ROSE LAKES IN CLINTON COUNTY, AND LAKE LANSING IN INGHAM COUNTY

by

Eugene Roelofs

These four lakes lie in the same general vicinity between seven and ten miles northeast of Lansing. Burke and Rose Lakes are within the Rose Lake Wildlife Experimental Farm of the Game Division, Michigan Department of Conservation. The specific location of the four lakes is given in the following table.

Name of Lake	Township	Town	Range	Sections
Burke	Bath	5 N.	1 W.	23
Park	Bath	5 N.	1 W.	28, 29
Rose	Bath	5 N.	1 W.	26
Lansing	Meridian	4 N.	1 W.	2, 3, 10, 11

While these lakes are more or less isolated in that they have no inlets or outlets of appreciable size, they are definitely in the Grand River drainage system. They lie in a rather low area adjacent to the well-known Chandler's Marsh.

Maps were prepared and a biological survey was made of the four lakes by the Institute for Fisheries Research* during August of 1938. The maps show the outline of the lakes, the depths, bottom soils, and the distribution of weed beds. Additional fish collections were taken from Burke Lake by an Institute fish party,** on June 16-17, 1941.

No detailed history of possible industrial use of these lakes in the past is available.

Burke and Rose Lakes have never been known as outstanding fishing lakes. Park Lake and Lake Lansing, however, were formerly considered good fishing lakes. Park Lake was considered a good bass lake until a severe winter-kill occurred in 1936. The lake was then restocked and closed to fishing. Fishing was resumed in the spring of 1938 but has not reached its former level. Lake Lansing used to be considered a good bluegill lake but reports indicate a falling-off of the take of this species. Winter fishing seems to produce larger fish than does summer fishing. Due to the larger size of the latter two lakes (Park and Lake Lansing) and their proximity to the city of Lansing, they are much frequented.

While Burke and Rose Lakes have no resort development whatsoever, the other two are very popular. A summary of the cottages, boat liveries, etc. on the four lakes is given below:

Name of Lake	Cottages	Hotels	Resorts	Boat Liveries
Burke	0	0	0	0
Park	71	0	1	1
Rose	0	0	0	0
Lansing***	130	0	2	4

*The field party consisted of: Robert Ball, leader; Walter Crowe, Paul Eschmeyer, and Arthur Whiteley, assistants.

**The fish party: William Beckman, leader; L. Anderson, P. Galvin, and M. Pawlick, assistants.

***This information is compiled as of 1938, but it is understood that considerable building has occurred along the east shore since that time.

The quaking bogs which completely surround Burke and Rose Lakes prevents any resort or building possibilities which might otherwise occur. Park Lake and Lake Lansing are suitable for resort and cottage locations, and will likely continue to be used for such.

With regard to the shape of the basin, Lake Lansing, Rose and Park Lakes are very similar. They are all relatively shallow and thus have large shoal areas. The actual depths of the original basins are completely obscured by the tremendous deposition of organic materials. This results in "false bottoms," through which sounding leads and similar objects may pass for 15 or 20 feet with seemingly little resistance. The deposition in Park Lake is reported to be so rapid that it has filled in noticeably in the last 15 years. Natives recall times when most of the lake was 15 to 20 feet deep, where at present at least 85 per cent of the area is less than 10 feet deep. This is due almost entirely to organic matter accumulation. In all three of these lakes, the organic matter is produced within the lake itself, since there are no inlet streams which might be responsible. This condition will be discussed in more detail later.

In direct contrast to the shallow condition in the lakes mentioned above, Burke Lake is a deep lake in relation to its size. There is practically no shoal; the bottom drops off directly from the margin.

While the immediate shores of Burke and Rose Lakes are marshy and flat, the surrounding country is rather rolling. If managed properly, the land is suitable for farming. In the low land to the south of Rose Lake, mint and other muck crops are grown quite successfully.

Lake Lansing lies in a region of much lower relief. Park Lake combines the two extremes in that the land on the north and east sides of the lake is hilly, while the south and west sides are flat and marshy. It is through

this flat region that Park Lake connects with Chandler's Marsh and at one time is believed to have been connected with Lake Lansing (3 miles distant), the entire area being submerged.

Drainage waters entering these lakes is rather limited due to the small area which they service. Lake Lansing is the only one having an inlet, and this is very small and intermittent. Burke Lake has several springs about the margin. The others are fed by seepage and surface drainage.

All of the lakes maintain a fairly constant water level. Park Lake has no outlet. Burke Lake has a small outlet on the north end. Lake Lansing has a small intermittent outlet on the west side. A dam two feet high has been installed to maintain a higher water level. It seems quite effective in doing so. The dam probably has little effect on fish movements, since suckers and pike have been observed moving freely over the dam in the spring.

It is understood that, since the survey was made, a drainage ditch was dug from Rose Lake, taking water from the lake and transporting it eventually into Vermillion Creek. This has lowered the lake level somewhat, but has brought land along the south side into agricultural use. The relative values of the farm land and the maintenance of a higher water level will be discussed later.

Other physical characters of the four lakes are summarized in tabular form below.

Lake	Area (Acres)	Maximum Depth (Ft.)	% Shoal	Shore Development	Bottom Type		Color of Water	Secchi Disc (Ft.)
					Shoal	Depths		
Burke	1.8	39	10	1.36	Marl	Marl and fibrous peat	Blue-green	12 2/3
Park	185.	27	95	1.14	Fibrous and pulpy peat	Pulpy peat	Brown	4 2/3
Rose	26.7	9	100	1.92	Pulpy peat	...	Brown	6
Lansing	452	37	80	1.16	Fibrous peat and sand	Pulpy peat	Brown	6

There is a marked similarity between the three lakes -- other than Burke Lake. They all have a large percentage of soft organic bottom, an unusually large shoal area, and brown water, through which the Secchi disc (a black and white circular disc used to indicate depth of light penetration) can be seen for a relatively short distance.

Ordinarily a low shoreline development (the length of the shore as compared with the circumference of a circle of the same size) such as found in Park Lake and Lake Lansing is associated with low productivity because it indicates a lack of bays and coves which may provide food and shelter for fish. This condition is offset, however, by the shallow nature of the lakes since shallow waters are usually more productive of food and cover than are the deeper waters.

The turbidity of the water in these lakes undoubtedly has some effect on the distribution of plants, but again, the huge proportion of shallow water more than balances any decrease in vegetation which might be due to turbidity.

In addition to the physical characters in operation in a lake, the temperature and chemical nature of the water play an important part in determining the type, abundance, and distribution of plant and animal life, and these are summarized in the following table.

Lake and Date	Surface					Thermocline												Bottom					
						Top						Bottom											
	Temp. (F.)	O_2 (ppm.)	CO_2 (ppm.)	M.O. Alk. (ppm.)	pH	Depth (Ft.)	Temp. (F.)	O_2 (ppm.)	CO_2 (ppm.)	M.O. Alk. (ppm.)	pH	Depth (Ft.)	Temp. (F.)	O_2 (ppm.)	CO_2 (ppm.)	M.O. Alk. (ppm.)	pH	Depth (Ft.)	Temp. (F.)	O_2 (ppm.)	CO_2 (ppm.)	M.O. Alk. (ppm.)	pH
Burke (8/17/38)	78	9.9	0.0	175	8.5	15	72	17.7	0.0	200	8.2	27	47	2.4	8.0	221	7.6	39	44	0.0	26.0	241	6.8
Park (8/15/38)	79	7.8	0.0	115	8.5	12	76	6.0	0.0	124	8.4	18	66	0.0	10	135	7.2	18	66	0.0	10	135	7.2
Rose (8/18/38)	81	7.8	0.0	130	8.2	Thermocline from top to bottom												8	73	5.1	0.0	140	8.0
Lansing (8/11/38)	83	7.4	0.0	98	8.6	No thermocline												21	74	0.0	1.0	110	8.0

The only reports of pollution come from Park Lake, where it is said that chemical toilets are being emptied into the lake.

Burke Lake shows a wide range of conditions with respect to temperature, oxygen, methyl orange alkalinity, and pH. The water is suitable for trout in that it is cold and has an adequate oxygen supply except near the bottom in late summer. The wide range in pH (6.8-8.5) is well within the toleration limits of fish.

Lake Lansing, Park Lake, and Rose Lake are warm throughout. On the date of the survey, Rose Lake had sufficient oxygen for fish life at all depths, while the lower regions of the other two were oxygenless. The lack of oxygen renders water unsuitable for fish life, but this zone is confined to the deeper waters and does not include much of the lake. Rose Lake maintains a reasonable oxygen supply at the bottom. It is somewhat unusual to find a definite thermocline in a shallow lake such as this. The presence of a thermocline in Rose Lake can probably be accounted for by an inflow of cold oxygen-laden water which either enters the bottom of the lake or enters near the surface and settles to the bottom. Additional evidence that this condition exists is found in the fact that the lake maintains a fish population from year to year, which it would probably not be able to do in such shallow water without its being spring fed.

The kind*, abundance**, and distribution of vegetation with regard to depth in the four lakes is summarized in the following table.

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*Plants were identified by Miss Betty Robertson, Botany Department, University of Michigan.

**A = abundant, C = common, F = few, R = rare.

Common Name	Scientific Name	Burke Lake		Park Lake		Rose Lake		Lake Lansing	
		Abund.	Depth (Ft.)	Abund.	Depth (Ft.)	Abund.	Depth (Ft.)	Abund.	Depth (Ft.)
Waterweed	Anacharis canadensis	...	...	...	...	...	...	R	½ - 1
Swamp milkweed	Asclepias incarnata	...	...	R	½ - 1	...	...	...	...
Water shield	Brasenia Schreberi	...	...	R	2- 4	...	...	F	2 - 4
Sedge	Carex sp.	F	½	...	...	...	...	...	...
Coontail	Ceratophyllum demersum	C	1 - 8	R	½ - 1	F	½ - 2	A	1 - 16
Musk grass	Chara sp.	A	1 -21	F	½ - 5	A	1 - 9	A	1 - 8
Loosestrife	Decodon verticillatus	...	...	R	0 - 1	...	...	...	...
Square-stem spike rush	Eleocharis quadrangulata	...	...	...	...	...	...	R	1 - 2
Spike rush	Eleocharis sp.	F	0 - ½	C	½ - 3	...	...	R	0 - ½
Horsetail	Equisetum fluviatile	...	...	R	½ - 1	...	...	...	...
Spike rush	Eleocharis acicularis f. inundata	...	...	F	1 - 3	...	...	...	...
Mud plantain	Heteranthera dubia	...	...	...	...	...	...	R	1 - 3
Blue flag	Iris versicolor	...	...	...	...	...	...	R	o - ½
Quillwort	Isoetes sp.	...	...	...	...	...	...	R	2 - 4
Rush	Juncus sp.	...	...	...	...	R	1 - 3	...	...
Duckweed	Lemna minor	...	...	...	...	F	0	R	0
Water milfoil	Myriophyllum	R	1 - 7	R	5 - 6	R	2 - 5	C	2 - 8
Bushy pondweed	Najas flexilis	A	1 -10	F	1 - 4	...	...	A	1 - 7
Bushy pondweed	Najas olivacaea	...	...	F	3 - 6	...	...	...	...
White water lily	Nymphaea odorata	...	...	R	1 - 3	C	1 - 3	C	1 - 4
Yellow water lily	Nuphar variegatum	F	1 - 8	R	1 - 4	C	1 - 4	C	½ - 4
Pickerel weed	Pontederia cordata	...	...	F	1 - 3	....	...	C	1 - 3
Water smartweed	Polygonum natans f. genuinum	...	...	...	...	...	...	R	0 - 1½
Pondweed	Potamogeton americanus	...	...	...	...	C	1 - 4	F	1 - 3
Large-leaf pondweed	Potamogeton amplifolius	...	...	F	5 - 6	...	...	A	2 - 4
Large-leaf pondweed	Potamogeton angustifolius	C	1 -12	C	1 - 6	A	1 - 5	C	1 - 5
Large-leaf pondweed	P. foliosus v. marcellus	R	1 - 6	...	...	...	...	...	...
Large-leaf pondweed	P. gramineus	...	...	C	1 - 3	R	1 - 2	...	...
Large-leaf pondweed	P. g. var. graminifolius f. terrestris	F	0 - ½	...	...	...	...	...	...
Large-leaf pondweed	P. illinoiensis	...	...	A	½ - 6	...	...	R	2 - 4
Large-leaf pondweed	P. g. var. graminifolius f. myriophyllus		...	F	1 - 3	...	...	R	2 - 4
Floating-leaf pondweed	Potamogeton natans	...	...	F	1 - 4	F	2 - 5	F	2 - 4
Floating-leaf pondweed	P. panormitanus	...	...	R	½ - 1½	...	...	...	...
Sago pondweed	P. pectinatus	...	...	F	2 - 4	C	1 - 3	F	1 - 7
Sago pondweed	P. pusillus	...	...	...	...	...	...	F	1 - 2
White-stem pondweed	P. praelongus	...	...	C	5 - 6	...	...	F	3 - 9

Common Name	Scientific Name	Burke Lake Abund.	Burke Lake Depth (Ft.)	Park Lake Abund.	Park Lake Depth (Ft.)	Rose Lake Abund.	Rose Lake Depth (Ft.)	Lake Lansing Abund.	Lake Lansing Depth (Ft.)
Pondweed	P. Robbinsii	...	...	C	1 - 6	...	...	C	2 - 9
Pondweed	P. Richardsonii	...	...	...	...	...	...	F	1 - 4
White-stem pondweed	P. strictifolius	...	...	R	1 - 3	...	...	F	2 - 4
Flat-stem Pondweed	P. zosteriformis	...	...	F	1 - 5	...	...	C	2 - 9
Duck potato	Sagittaria latifolia	...	...	C	½ - 1	...	...	R	0 - ½
Duck potato	Sagittaria sp.	...	...	...	...	...	...	F	0 - 2½
Hardstem bulrush	Scirpus acutus	...	...	F	½ -2½	A	0 - 1	...	...
Three-square bulrush	S. americanus	...	...	C	1 - 3	...	...	F	0 - 3
Soft-stem bulrush	S. validus	Pres	?	...	...	...	...	R	1 - 2
Bur reed	Sparganium chlorocarpum	...	...	R	½ - 1	...	...	...	...
Bur reed	Sparganium sp.	...	...	R	1	...	...	...	...
Duckweed	Spirodela polyrhiza	R	0	...	...	...	...	...	...
Cattail	Typha angustifolia	...	...	...	...	A	0 - 1	F	0 - 1
Cattail	Typha latifolia	R	0 - ½	F	0 - 1	...	...	C	0 - 1
Bladderwort	Utricularia vulgaris var. americana	R	1 -12	F	1 -2½	F	½ - 3	F	1 - 3
Wild celery	Vallisneria americana	...	...	...	...	...	...	F	2 - 6

All of these lakes have abundant vegetation. Within certain limits, the amount of vegetation is closely correlated with productivity. In general, more weeds mean more fish food, more protection for fry and fingerling fish, and thus better growth of the fish present. However, weeds may at times become too plentiful and actually crowd the fish or at least prevent their free movement so that the food within the weed beds is unavailable. Large, dense weed beds also interfere with angling. In Rose and Park Lakes, it is believed that there is too much vegetation. Dense weed beds cover a large portion of the bottom. These beds are not of a character which prevent fish movements, but their deposition on the bottom is resulting in a rapid filling up of the lake. Decomposition of the dead vegetation under the ice requires considerable oxygen and during extended periods of snow cover, a large part of the oxygen in the lake may be utilized, resulting in winter kill. This has occurred in Park Lake and may become a more frequent occurrence as the lake becomes shallower.

Fish foods are plentiful in all of the lakes. There is, as pointed out above, abundant vegetation, which results in a heavy production of fish food organisms. Plankton (microscopic and semi-microscopic plants and animals) is abundant in these lakes. Burke and Rose Lakes support chiefly zooplankton (animals) while Park Lake and Lake Lansing produce an abundance of phytoplankton (plants). Plankton is used as food by the larger fish food organisms (insects, etc.), by smaller fish, and, to a certain extent, by adult game fish themselves.

The kinds and relative abundance of fish in the four lakes are summarized in the following table, as well as the stocking records for 1936-40 inclusive. This summary is based upon collections and information secured by the survey parties, and it must be admitted that the collections, except for Burke Lake, are not entirely adequate. It is often difficult to secure

(Note: -p.19 comes next-)

good fish samples at certain seasons of the year. The following table may not in all instances represent the relative abundance of each species but is based on the best information available.

	Burke Lake	Park Lake		Rose Lake	Lake Lansing	
Fish	Abundance	Abundance	Number stocked 1936-40	Abundance	Abundance	Number stocked 1936-40
GAME FISH						
Northern pike	Reported	Rare - 1 taken	...	Few - 4 taken	Few	...
Mud pickerel	...	...	...	...	Rare - 1 taken	...
Walleye		Reported			Reported	
Yellow perch	...	Common	4,000	Few - 5 taken	Common	23,300
Smallmouth bass	...	...	...	...	...	2,250
Largemouth bass	Few	Young collected	4,158	...	Common	11,200
Rock Bass		Reported				
Warmouth bass	Rare - 1 taken	...	...	Rare - 1 taken	Few	...
Green sunfish	Common	...	...	...	...	...
Bluegill	Common	Common	14,640	Rare - 1 taken	Common	162,000
Long-eared sunfish	Few	...	...	...	...	...
Pumpkinseed	Common	Few	...	Rare - 2 taken	Common	...
Black crappie	...	...	...	Rare - 1 escaped	Few	...
Bluegill x pumpkinseed	Common	...	...	...	...	...
Bluegill x green sunfish	Rare - 1 taken	...	...	...	...	...
COARSE FISH						
Common sucker	...	...	...	Rare - 1 taken	...	...
Lake chub sucker	...	Few	...	...	Rare	...
Brown bullhead	...	Common	...	Rare - 1 taken	Few	...
Yellow bullhead	Rare - 1 taken	Rare - 1 taken	...	...	Few	...
OBNOXIOUS FISH						
Dogfish	...	...	...	Rare - 1 taken	Reported	...
Carp	...	...	...	...	Reported	...
FORAGE FISH						
Black-nosed shiner	...	...	...	...	Few	...
Black-chin shiner	...	Common	...	...	Few	...
Straw-colored shiner	...	...	...	...	Common	...
Common shiner	Rare	...	...	...	...	...
Golden shiner	...	Common	...	...	Few	...
Blunt-nosed minnow	...	Common	...	...	Few	...
Menona killifish	...	...	...	...	Few	...
Silversides	...	...	...	...	Abundant	...

The lack of forage fish in the samples from Burke and Rose Lakes is due, no doubt, to the fact that it was almost impossible to seine in these lakes.

A growth study was made on the small number of game fish taken; the results are presented in the following table.

Fish	Age Group*	Burke Lake		Park Lake		Rose Lake		Lake Lansing	
		Number of Specimens	Average Length (In.)	Number of Specimens	Average Length (In.)	Number of Specimens	Average Length (In.)	Number of Specimens	Average Length (In.)
Bluegill	II	29	4.2	...	...	1	5.4	...	...
	III	17	6.0	...	...	...	...	6	4.4
	IV	2	6.2	...	...	...	...	10	5.3
	V	1	6.4	...	...	...	...	9	6.5
	VII	1	8.1	...	...	...	...	2	7.5
Largemouth bass	I	1	3.8	...	...	...	...	...	...
	II	8	7.6	...	...	...	...	...	...
Perch	II	...	...	...	...	4	4.9	...	...
	III	...	...	1 (♀)	10.9	1	6.0	...	...
	IV	...	...	1 (♂)	6.4	...	...	...	...
	V	...	...	1 (♀)	11.2	...	...	...	...
Pumpkinseed	I	...	...	1	3.6	...	...	...	...
	II	33	4.1	1	6.3	2	4.4	...	...
	III	3	5.2	...	...	...	...	...	...
Northern pike	I	...	...	1	21.0	1	16.2	...	...
	II	...	...	...	...	1	18.6	2	19.2
	III	...	...	...	...	1	23.0	...	...
	VI	...	...	...	...	...	...	1	24.5
Warmouth bass	II	...	...	...	...	1	5.1	...	...
	III	...	...	...	...	...	...	1	3.9
	IV	...	...	...	...	...	...	1	5.4
	VI	1	6.6	...	...	...	...	1	6.0
	VII	...	...	...	...	...	...	1	6.2
Green sunfish	II	5	3.6	...	...	...	...	...	...
	III	3	4.2	...	...	...	...	...	...
	IV	3	5.4	...	...	...	...	...	...
	V	1	5.1	...	...	...	...	...	...
Long-eared sunfish	II	5	3.2	...	...	...	...	...	...
	III	3	4.3	...	...	...	...	...	...
Bluegill x pumpkinseed	II	14	4.2	...	...	...	...	...	...
	III	2	6.3	...	...	...	...	...	...

*All age determinations made by W. C. Beckman.

There is a noticeable difference in the growth rate of bluegills in Burke Lake and those in Lake Lansing; the Burke Lake bluegills reached maturity during their fourth season of growth. Pumpkinseeds and green sunfish in Burke Lake are not making as rapid growth as are the bluegills. Lake Lansing pike are growing slowly.

The perch and northern pike in Rose Lake do not seem to be growing very fast. The small sample taken, however, may not represent the actual condition in the lake.

The data on growth rate of fish in these four lakes do not warrant any very definite conclusions.

Creel census records for a number of years (summers) are available for Park Lake and Lake Lansing. They are summarized in the following table.

Species	Park Lake								Lake Lansing					
	1928	1930	1931	1932	1933	1934	1935	1939	1930	1932	1933	1936	1938	1940
Smallmouth bass	...	12	3	...	...	14	...	...	...	1	...	3	...	13
Largemouth bass	...	5	...	13	1	6	11	...	1	15	27	5	3	262
Bluegill	9	64	78	160	26	236	45	3	154	115	404	68	171	171
Pumpkinseed	4	23	...	17	8	108	38	...	11	12	22	...	10	36
Rock bass	...	...	40	...	...	10	...	...	...	...	...	...	...	...
Calico bass	...	15	11	57	...	34	5	...	10	...	32	...	5	32
Perch	...	12	5	77	...	19	17	...	13	61	2	4	11	39
Walleye	...	5	...	...	...	...	...	...	...	1	...	...	...	...
Northern pike	...	7	5	...	1	15	...	...	3	25	10	...	...	38
Bullhead	1	3	2	11	...	27	...	...	9	...	9	...	3	1
Dogfish	...	...	...	1	...	...	...	...	...	...	...	...	...	1
Warmouth bass	...	...	...	...	...	...	...	...	1	...	1	...	...	5
Total	14	146	144	336	36	469	116	3	202	230	507	80	203	598
Fish caught per hour	1.4	1.0	1.6	2.0	1.3	2.0	1.7	0.3	2.7	4.8	2.1	2.7	2.7	0.7

These records do not represent a complete census but probably show the relative annual take of each species. They show that the bluegill is the predominant fish in the catch of both lakes. In 1940 in Lake Lansing, the largemouth bass was taken much more frequently than the bluegill; 262 bass averaging 14.4 inches were recorded.

The number of fish caught per hour is consistantly higher in Lake Lansing than in Park Lake. A noticeable decrease is noted in 1940, however. This may have been due to the increase in bass fishing, which is not as productive on an hourly basis.

Management Suggestions

The four lakes discussed in this report are listed in the "all other" group of lakes and with the exception of Burke Lake, this designation should be retained.

Burke Lake contains water very suitable for trout and could easily be, and should be, converted into a trout lake. The present population of bluegills and sunfish should be poisoned out and the lake stocked with brook trout. There is an abundant oxygen supply in the cold water of the thermocline. The warmer waters above should promote rapid growth. When the surface becomes too warm, trout will find refuge in the colder, deeper waters.

One thousand fingerling brook trout should be planted in the fall. Observations should be made the following year to determine whether or not any adults spawn. Spawning facilities are rather limited, but a few fish should be able to spawn successfully. To encourage spawning, the outlet should be cleaned and deepened and gravel should be spread throughout the prepared beds. If no spawning occurs, fingerlings should be planted as it becomes necessary.

Since the lake is very small, fishing must necessarily be controlled if the lake is to maintain a trout population. Recommendations for this control are as follows: (1) limit a day's catch to two fish per person; (2) allow only artificial baits to be used; (3) use creel census blanks for permits to fish, and require that they be properly filled out before leaving; (4) no boats are to be allowed on the lake, since at least two-thirds of the lake can be reached by casting from shore.

The object of these rules is to provide trout fishing for a larger group of fishermen than the lake could service if restrictions were not enforced. In doing this, the catches will be small, but for those to whom trout fishing appeals, there will be an opportunity to enjoy this type of fishing in a section of the state where at present it is unavailable. In addition, by checking the number of fish removed, the rules can be modified as it becomes necessary.

The regulation or control of fishing to the extent as outlined above is not recommended except under special circumstances. Burke Lake lies on the Rose Lake Wildlife Experiment Station of the Game Division. The Game Division has offered to cooperate in carrying out such a plan. Since the lake is small and access to it can be easily controlled, the regulations can be enforced with a minimum of effort and expense.

Park Lake has been adequately stocked since the winter-kill of 1935-36. Natural propagation should again be adequate to maintain a suitable fish population; no further stocking is recommended.

As mentioned in the text, this lake is very shallow and contains a tremendous quantity of vegetation. Winter-kills can be expected to occur more frequently as the lake becomes shallower due to the rank plant growths. Control of the vegetation seems impractical, if not impossible, on a large scale. Food and cover are adequate. Plantings of adult largemouth bass

and bluegills are recommended to follow future winter-kills.

Predators and parasites are not numerous and require no regulation.

The water level is not subject to fluctuation and requires no control.

Rose Lake is in a situation similar to Park Lake. It is shallow and contains too much vegetation. However, winter-kills have not occurred and stocking has been unnecessary.

The water level has been lowered by means of a drainage ditch, bringing into agricultural use some lowlands previously usable only as pasture. This condition should remain, since the agricultural value of the land is greater than the small difference in the area of the lake. The entire lake is surrounded by a floating bog and there is no firm shoal, so there is nothing to be gained by raising the water level. Food and cover are adequate and the depth or the spring water supply previously discussed has proven sufficient to bring the fish through the winter.

The lake is definitely "on the way out" with the rank plant growths contributing to its filling up and the encroaching bog mat decreasing the surface area.

Lake Lansing provides adequate spawning facilities for all the species of game fish present, and stocking is unnecessary. Judging by the number of fry and fingerling fish in the lake, natural propagation is adequate to maintain the population at a level which the lake can support. To ensure the continuation of natural propagation, the water level should be maintained by use of the dam in the outlet. Lowering of the water level would destroy the major part of the suitable spawning area for bass and bluegills.

Food and cover are abundant enough to support the present fish population. Parasites and predators are not serious and require no control.

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