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INSTITUTE FOR FISHERIES RESEARCH  
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FURTHER EXAMINATIONS OF THOSE MICHIGAN INLAND LAKES IN WHICH PLANTINGS  
OF GREAT LAKE SHINERS (Notropis atherinoides) HAVE BEEN MADE

During the period of July 24 to 30, 1935, the writer examined nine of the eleven lakes in which the Michigan Department of Conservation planted Great Lakes Shiners during January, 1934. The object of this examination was to gain further evidence relative to the establishment of this species in these lakes. The name and location of each lake examined, the date and time of the examinations, and the amount of time spent and the approximate area of shore shallows covered by the examinations, are given in Table I (the examinations were made with 30-foot and 100-foot seines).

During these examinations (July 24 to 30, 1935), Great Lakes Shiners were seined from two of the nine lakes, namely: 3 specimens from Higgins Lake (July 28, 11 A.M.-1 P.M.); and 7 specimens from Houghton Lake (July 28, 3:15-5:15 P.M.). Detailed data on the Great Lakes Shiners are given in Table II. The two adult shiners taken from Higgins Lake represent specimens of the original plant (planted as young, January, 1934). The 2nd-summer specimen from Higgins Lake and all specimens from Houghton Lake were young of 1934 (Table II).

During the period of October 18 to 24, 1935, the writer, assisted by Edwin L. Cooper, again examined nine of the eleven lakes. Data pertaining to these examinations are given in Table III.

Table I

Lake	County	Point of examination	Date 1935	Time of day	Hours spent seining	Area of lake shallows covered by seining
Gull	Kalamazoo	S.E. shore	7/24	2:30-4 P.M.	1 1/2	800' x 200'
"	"	S.W. shore	"	4:30-6:30 P.M.	2	900' x 200'
"	"	N.W. shore	"	6:30-7:15 P.M.	3/4	300' x 50'
"	Barry	N.E. shore	"	7:15-8 P.M.	3/4	800' x 200'
Blanche	Newaygo	S.E. shore	7/25	10-11:15 A.M.	1 1/4	600' x 30'
Hess	"	S. shore	"	11:15-12 A.M.	3/4	300' x 100'
"	"	N.W. shore	"	12:15-2 P.M.	1 3/4	900' x 200'
Croton Dam	"	S. shore of north pond	"	2:30-5 P.M.	2 1/2	1500' x 200'
Freemont	"	N. shore	7/26	11 A.M.-1 P.M.	2	600' x 50'
Cadillac	Wexford	S. shore	7/27	3-5 P.M.	2	2000' x 250'
"	"	N.W. shore	7/27	5:15-6:15 P.M.	1	800' x 100'
*Higgins	Crawford	Extreme N.	7/28	11 A.M.-1 P.M.	2	1200' x 300'
"	Roscommon	" S.	"	1-3 P.M.	2	500' x 200'
"	Crawford	" N.	"	10:30-11:30 P.M.	1	600' x 200'
*Houghton	Roscommon	N.E. shore at Bachus Cr. mouth	"	3:15-5:15 P.M.	2	1200' x 100'
"	"	W. shore	"	5:45-7:30 P.M.	1 3/4	900' x 200'
"	"	W. shore	"	7:45-8:15 P.M.	1/2	300' x 100'
Hubbard	Alcona	W. shore of N.E. bay	7/30	7:30-10:45 A.M.	3 1/4	1500' x 200'

\* Great Lakes Shiners were obtained.

Table II. Standard and total lengths, sex, maturity and age, of the Great Lakes Shiners collected from Higgins & Houghton lakes.

Lake	S.L. in mm.	T.L. in in.	Sex	Stage of maturity	Age: summer of life
Higgins	52	2 1/2	female	immature	2nd
"	72	3 1/2	male	adult: testes large	3rd
"	76	3 3/4	"	"	"
Houghton	58	2 3/4	"	immature	2nd
"	62	3	"	"	"
"	59	2 7/8	female	"	"
"	62	3	"	"	"
"	62	3	"	"	"
"	63	3 1/8	"	"	"
"	63	3 1/8	"	"	"

↓ Determined by scale examinations.

Table III

Lake	County	Point of examination	Date 1935	Time of day	Hours spent seining	Area of lake shallows coveredd by seining
Gull	Kalamazoo	N.W. shore	10/18	2:30-3:30 P.M.	1	300' x 100'
"	"	N.E. shore	"	3:45-4:30 P.M.	3/4	600' x 100'
"	"	E. shore	"	4:45-5:30 P.M.	3/4	600' x 50'
"	"	E. shore	"	5:45-6:30 P.M.	3/4	300' x 50'
"	"	S.E. shore	"	6:45-8 P.M.	1 1/4	900' x 75'
Blanche	Newaygo	N. shore	10/20	9:30-11 A.M.	1 1/2	1200' x 200'
Hess	"	S.W. shore	10/20	11:15-12 A.M.	3/4	900' x 75'
"	"	S.W. shore	"	12:15-2:30 P.M.	2 1/4	900' x 100'
*Freemont	"	N. shore	"	3:30-5P.M.	1 1/2	600' x 200'
* "	"	N.W. shore	"	5:15-6:30 P.M.	1 1/4	600' x 250'
Crystal	Oceana	On 3 sides	10/21	8:30- 11 A.M.	2 1/2	1800' x 30-300'
Crystal	"	W. shore	"	1:30-3 P.M.	1 1/2	600' x 50'
Blue	Newaygo	N. shore	"	4:30-6 P.M.	1 1/2	600' x 150'
Cadillac	Wexford	N. shore	10/22	10:30-11:45 A.M.	1 1/4	900' x 200'
"	"	W. shore at canal	"	12 -1:30 P.M.	1 1/2	300' x 100' & lower 300 yds. of canal
"	"	S.W. shore	"	1:30-2:30 P.M.	1	600' x 150'
"	"	S. shore	"	4-5:30 P.M.	1 1/2	1200' x 150'
Houghton	Roscommon	S.W. shore	"	6:30-8 P.M.	1 1/2	900' x 300'
Higgins	Crawford	N. shore	"	8:45-11 P.M.	2 1/4	600' x 800'
Houghton	Roscommon	N.E. shore at Bachus Cr.	10/23	9-10 A.M.	1	600' x 200'+ lower 100 yds. of Cr.
"	"	N.E. shore	"	11 A.M.-12:30 P.M.	1 1/2	600' x 200'
"	"	S.W. shore	"	1:30-3:30 P.M.	2	900' x 200'
"	"	S.E. shore at Denton Cr.	"	4-5:30 P.M.	1 1/2	300' x 50' + lower 100 yds. of Cr.
Higgins	"	N.W. shore at Big Creek	10/24	9:45-11 A.M.	1 1/4	900' x 100' + lower 100' of Cr.
"	"	W. shore of lake	"	11:30 A.M.-12:30 P.M.	1	750' x 200'
*Higgins L. outlet	"	S. shore of lake	"	1:30-3P.M.	1 1/2	100 yds. of stream.

\* Great Lakes Shiners obtained.

During the examinations of October 18 to 24, 1935, Great Lakes Shiners were taken from Freemont Lake and from the outlet of Higgins Lake. Of the 184 shiners taken from Freemont Lake, 183 were found at the mouth of a small stream entering the lake on the north shore, and one shiner was taken at the mouth of a second small stream entering on this north shore. Most, if not all, of these shiners from Freemont Lake had lived through two summer, i.e. they represent young of 1934—this fact has been determined by:

1. An examination of the scales of a majority of these shiners.

2. A comparison of the average total length of the Freemont Lake shiners (2 1/4" to 3", average approximately 2 3/4") with the lengths of two-year-old shiners taken from Lake Michigan.

3. A comparison of the scales of these Freemont Lake Shiners (collected October 20, 1935) with the scales of Great Lake Shiners taken from Freemont Lake (April 5, 1935), which were 1 1/4" to 2" in total length and obviously young of 1934.

Forty-three Great Lakes Shiners were obtained from Higgins Lake outlet on October 24, 1935—of this number, 42 were young of 1935 (1 3/8" to 2 1/8" in total length) and one shiner was a very large adult female (one of the original plant; planted as a two-year-old; it was a four-year-old when taken from Higgins Lake outlet; and its ovaries contained developing eggs indicating that it probably would have spawned in 1936, thus living at least five years, and probably spawning during at least three years.)

A summary of the results obtained during the four examinations made thus far on those eleven inland lakes in which plantings of shiners were made during January, 1934.

Thus far the writer has examined the majority of these eleven lakes four times (a list of these lakes and the planting records are given in Institute Report 264). A summary of <sup>the recovery records of</sup> Great Lakes Shiners during these four check-ups are given as follows in Table IV.

Table IV

Lake	County	Date of examination	No. of Great Lakes Shiners obtained	Age of shiners
Blanche	Newaygo	4/5/35	1	*Young of 1934
Freemont	"	4/5/35	32	*Young of 1934
"	"	10/20/35	184	*Young of 1934 (probably all)
Houghton	Roscommon	7/28/35	7	*Young of 1934
Higgins	"	11/18/34	1	Young of 1934 (fish had deep gash on back—was possibly introduced by a bait fisherman)
"	Crawford	7/28/35	1	*Young of 1934
"	"	7/28/35	2	Young of 1935 (part of original plant)
Higgins L. outlet	Roscommon	10/24/35	42	*Young of 1935
"	"	"	1	Young of 1934 (part of original plant)

\* These fish represent in most, if not all, instances a natural reproduction in the lake.

The evidence thus far obtained, indicating a natural reproduction of the Great Lakes Shiner in these inland lakes, is the recovery, from four of the eleven lakes, of young shiners. The recovery, during the initial examination of these lakes (Nov. 16 to 21, 1934), of a single young shiner having a deep hook-gash or injury on the back was believed to be of little significance. However, these subsequent recoveries of young shiners present an entirely different picture. It seems to be a logical conclusion that there has been some natural reproduction of the Great Lakes Shiner in some of these inland lakes in which they were planted. Incidental introduction by bait fishermen would hardly account for the numbers which were obtained from these lakes. The extent of this reproduction, the ability of this species to maintain itself in these lakes, and the effect, if any, beneficial or otherwise, which these plantings will have on the production of game fish, are problems which should warrant future study. A period of several years will probably be required to satisfactorily determine whether or not Great Lakes Shiners will become sufficiently abundant in these lakes (in which they have been planted) to be an important forage minnow. If they do become abundant in some of these lakes, studies should be made of food of the game fishes to determine the role of this shiner in the game fish diet. There is also the danger, in introducing a foreign species, that some disease or parasite may also be introduced which would result in damage of greater importance than the value of the planting. It is therefore not recommended that plantings of this minnow be made in a wholesale manner throughout the state, until we know better the effects of these experimental plantings.

Records of further plantings of Great Lakes Shiners made by the Department

For the sake of completeness of this report and of the Institute files, records of plantings of Great Lakes Shiners made by the Department during 1935 are included, see Table V.

Table V

Date 1935	Planted by	Lake	County	Towship	No. of shiners planted
1/10	Alvin Moore Unit #24	Lake Cadillac	Wexford	Clam Lake	500,000*
1/11	"	Lake Mitchell	"	Cherry Grove & Selma	500,000*
1/12	"	Bar Lake	Manistee	Manistee,	500,000*
1/14	"	Bear Lake	"	Bear Lake & Pleasanton	500,000*
1/15	"	Lakes Eleanor & Dickson	"	Dickson	500,000*
1/16	"	Pleasant Lake	Wexford	Selma	500,000*
1/18	"	Lake Missaukee	Missaukee	Lake	500,000*
1/19	"	Fife Lake	Gd. Traverse	Fife Lake	500,000*
1/21	"	Green & Duck L.	"	Green Lake	500,000*
4/10	"	Long Lake	Wexford	Harring	500,000*
June	R. Johnston	Grass Lake	Missaukee	Norwick	? (one load)

\* These shiners were obtained from the Channell at Manistee between Lake Michigan and East lake, Conservation Office Ray Walters and men from the F.E.R.A. assisted in securing these fish from the Channell and to help load them.

Shiners for Long Lake, Wexford County were held in ponds at Hatchery until roads opened in spring to allow trucks to get into it.

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*Gerald P. Cooper*

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Year	Planted by	Label	Quantity	Value	No. of plants
1910	Living Moore	Label 101110	10000	10000	10000
1911	"	Label 101111	"	10000	10000
1912	"	Label 101112	"	10000	10000
1913	"	Label 101113	"	10000	10000
1914	"	Label 101114	"	10000	10000
1915	"	Label 101115	"	10000	10000
1916	"	Label 101116	"	10000	10000
1917	"	Label 101117	"	10000	10000
1918	"	Label 101118	"	10000	10000
1919	"	Label 101119	"	10000	10000
1920	"	Label 101120	"	10000	10000
1921	"	Label 101121	"	10000	10000
1922	"	Label 101122	"	10000	10000
1923	"	Label 101123	"	10000	10000
1924	"	Label 101124	"	10000	10000
1925	"	Label 101125	"	10000	10000
1926	"	Label 101126	"	10000	10000
1927	"	Label 101127	"	10000	10000
1928	"	Label 101128	"	10000	10000
1929	"	Label 101129	"	10000	10000
1930	"	Label 101130	"	10000	10000
1931	"	Label 101131	"	10000	10000
1932	"	Label 101132	"	10000	10000
1933	"	Label 101133	"	10000	10000
1934	"	Label 101134	"	10000	10000
1935	"	Label 101135	"	10000	10000
1936	"	Label 101136	"	10000	10000
1937	"	Label 101137	"	10000	10000
1938	"	Label 101138	"	10000	10000
1939	"	Label 101139	"	10000	10000
1940	"	Label 101140	"	10000	10000
1941	"	Label 101141	"	10000	10000
1942	"	Label 101142	"	10000	10000
1943	"	Label 101143	"	10000	10000
1944	"	Label 101144	"	10000	10000
1945	"	Label 101145	"	10000	10000
1946	"	Label 101146	"	10000	10000
1947	"	Label 101147	"	10000	10000
1948	"	Label 101148	"	10000	10000
1949	"	Label 101149	"	10000	10000
1950	"	Label 101150	"	10000	10000

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\* These plants were obtained from the National Bureau of Investigation and the Bureau of Plant Industry, Department of the Interior, and the Bureau of Entomology and Plant Quarantine, Department of Agriculture. The plants were obtained from the Bureau of Entomology and Plant Quarantine, Department of Agriculture, and the Bureau of Plant Industry, Department of the Interior, and the Bureau of Entomology and Plant Quarantine, Department of Agriculture.

LIST OF PLANTS  
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