

Original: Fish Division
cc: Education-Game
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INSTITUTE FOR FISHERIES RESEARCH
DIVISION OF FISHERIES
MICHIGAN DEPARTMENT OF CONSERVATION
COOPERATING WITH THE
UNIVERSITY OF MICHIGAN

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ANN ARBOR, MICHIGAN

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January 5, 1945

REPORT NO. 984

EXPERIMENTAL USE OF GLASS MINNOW TRAPS
IN CERTAIN MICHIGAN TROUT STREAMS

by

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In the northern half of the Lower Peninsula there are many streams containing minnows. Some of these are open to the fishermen and bait dealers for securing bait, while in others (classified as trout waters) the taking of minnows is prohibited. Many of the former streams (those which have been open to the taking of minnows) are depleted or are rapidly becoming so, thus creating a critical bait shortage in one of Michigan's largest inland fishing areas.

In contrast, there are within the same area several trout streams containing abundant populations of desirable bait minnows which are not being utilized as up to the present no satisfactory method of harvest had been proposed or investigated. This same condition exists to some degree in southern Michigan trout streams and in the Upper Peninsula. At present the Conservation Department lacks authority to permit the commercial taking of minnows by any method in trout waters.

A suggested possibility for the selective harvest of minnows from certain trout streams has been proposed; this consists of the use of the glass minnow trap.

The minnow trap consists of a glass container, cylindrical in outline, having a funnel opening at one end, through which the fish must pass in order to be trapped (see Plate I, Figs. 1 and 2 for actual photographs of two types of traps). These traps are produced commercially by several sporting goods manufacturers in various sizes and design.

Results of a preliminary investigation conducted in 1943 by W. F. Carbine of the Institute staff (Report 916) on Paint and Stoney Creeks in Oakland County, indicated that glass minnow traps were quite selective in removing only minnows in streams containing moderate populations of trout. The success of this preliminary work led to a more intensive study during the summer of 1944.

The minnow trapping investigation during the summer of 1944 was conducted during June, July and August. In June, streams in Crawford, Montmorency, Otsego and Oscoda counties were investigated. In July, studies were conducted on streams in Antrim, Charlevoix, Crawford, Isabella, Kalkaska and Montmorency counties. The final study conducted in August covered streams in Benzie, Crawford, Grand Traverse, Manistee, Missaukee, Ogemaw and Otsego counties. The trip in June was more or less of a preliminary nature involving studies on methods and techniques of glass trapping, while the latter trips were chiefly in testing out the selectivity of fish capture by glass traps.

A total of 12 glass traps was used in these studies. These traps were purchased on the open market and were of standard design frequently used by fishermen and bait dealers. One type of trap used, cylindrical in outline, had an overall length of 13 inches and a circumference of 23 inches. The funnel opening was 1 1/8 inches in diameter, occupying a central position at one end of the trap (see Fig. 1, Plate I). The other end was enclosed with a perforated screw cap lid which could be removed

at any time. The other type of trap used (Fig. 2, Plate I) had an overall length of 13 inches and a diameter of 7 1/2 inches. This trap differed from the former in that it had a flat resting surface 7 inches square formed by moulded corners on the underside of the trap. The funnel opening of this type of trap measured 1 1/4 inches. Both traps were equipped with handles to aid in transportation. During these studies the twelve traps were transported from one stream to another in boxes partitioned in six separate compartments (see Fig. 3, Plate I) to prevent any breakage enroute. Each trap was equipped with an identification ^{float}~~net~~ marker attached by a seven-foot length of seine cord.

Each stream investigated was inspected first for the presence of minnows and their relative abundance. Conservation officers in the immediate areas were consulted and offered much assistance throughout the investigation.

Acknowledgments

I wish to acknowledge the cooperation and assistance of the District Fisheries Supervisors concerned and the District Supervisors and Conservation Officers of the Field Administration Division in Districts 8, 9, 10, 11 and 12.

Results of the Investigation in June

Beginning on June 5, 1944 and ending June 14, 1944 a total of four streams were checked with glass traps. These streams--North Branch of the Au Sable River in Crawford and Otsego counties, East Branch, Middle Branch and the Main Stream of Big Creek in Oscoda County, Upper Thunder Bay River in Montmorency County, and Crapo Creek in Otsego County--were all known to contain minnows and were also listed as trout streams. Some of the above streams were considered good trout waters, hence their selection for the initial investigation.

Methods: It was found during this investigation that in using glass traps baiting was necessary. A handful of ground soda crackers was sufficient to bait one trap; when this bait was gone, either eaten by the captive fish or washed out by current action, the trap failed to operate-- in fact, some of the captive fish would tend to escape unless immediate removal was practiced. It was also noted that traps set in certain locations were more effective in fish capture than others. Traps placed at the heads or sides of pools or obstructions in weak currents consistently took more fish than those placed in fast or quiet waters. Another factor to be considered in the operation of glass traps was to set the trap in a location free of aquatic plants as traps were inefficient in capture under these conditions.

The number of fish captured per trap varied considerably within a specific area. The number of minnows for each trap was usually correlated with the size of the specimens; the larger the fish, the fewer the numbers taken. Another point which might be discussed at this time is the differences in the number of fish captured per set for each stream. Generally a trap was baited and left in the stream for one-half hour, at which time it was lifted, the fish removed and counted. In this way the number of fish per hour per trap could be calculated. It was found that the number of fish per hour per trap captured varied considerably among the different streams. The most productive stream proved to be the Upper Thunder Bay River in Montmorency County (see Table 1). Listed in order according to catch per hour beginning with the most productive, the streams are as follows: Upper Thunder Bay River, Crapo Creek, Middle Branch Big Creek, North Branch Au Sable (Section 36), East Branch Big Creek, North Branch Au Sable (Section 19) and North Branch Au Sable (Section 12). From general observations, this method of evaluation of the minnow population in a stream appeared satisfactory. Streams exhibiting the greatest catch per

Table 1

Species and size range of fish taken in
glass traps during the June investigation

Name of stream and trapping location	Number of each species taken and size range in inches ()										Catch per hour per trap
	Common shiners	Creek chubs	Long-nosed dace	Horny-head chub	Blunt-nosed minnows	Northern redbellied dace	Common sucker	Fingerling trout	Yellow perch	Long-eared sunfish	
N. Br. Au Sable River, Crawford Co., T. 28 N., R. 2 W., Sec. 12		7 (2-5)	2 (3)				4 (6)	1 (2)			2
N. Br. Au Sable River, Crawford Co., T. 28 N., R. 2 W., Sec. 19		75 (2-5)	20 (2-3)								16
N. Br. Au Sable River, Otsego Co., T. 29 N., R. 2 W., Sec. 36	40 (2-4)	113 (2-5)	19 (2-3)			5 (2)		2 (2-3)			21
Upper Thunder Bay River, Montmorency Co., T. 30 N., R. 2 E., Sec. 21	97 (2-4)	23 (2-4)	6 (2-3)	30 (2-5)	21 (2-3)		2 (4)			1 (3)	45
Upper Thunder Bay River, Montmorency Co., T. 30 N., R. 2 E., Sec. 13	156 (2-4)	35 (2-5)		47 (2-4)	29 (2-3)		6 (3-4)		1 (4)		109
Crapo Creek, Otsego County, T. 29 N., R. 2 W., Sec. 36	66 (2-5)	76 (2-5)	114 (2-3)	26 (2-3)							34
E. Br. Big Creek, Oscoda Co., T. 28 N., R. 1 E., Sec. 34			119 (2-3)								17
Main Stream Big Creek, Crawford Co., T. 27 N., R. 1 W., Sec. 23											0
Middle Br. Big Creek, Oscoda Co., T. 28 N., R. 1 E., Secs. 5 and 7	92 (2-4)	118 (2-5)	62 (2-3)	58 (2-4)	4 (2-3)	20 (2)			1 (4)		45
Total	451	477	242	161	54	25	12	3	2	1	
Grand Total	1,428										

hour (Upper Thunder Bay River) per trap also contained the largest observed populations. The two most common species of minnow encountered in this area were the common shiner and the creek chub. Creek chubs were collected at seven of the nine locations worked and common shiners were collected at five stations. The hornyhead chub, next in abundance, was found at seven stations. The first four species listed in Table 1 accounted for 92 per cent of the total catch, which amounted to 1,428 fish. Out of this total number, only 3 trout were taken. Many traps were set in ideal trout habitat and should have taken this species if adaptable to their capture. Therefore it can be assumed that the proportions of trout to minnows captured in these traps would be representative of normal conditions. Another point to mention is the relative size of the captured fish. There were many fish observed in the streams which were over 6 inches in length, yet out of the total number of fish taken, there was not a single specimen that attained this size as most would range in lengths of two to five inches.

Results of the Investigation Conducted in July

Beginning on July 7, 1944 and ending on July 11, 1944 a total of 12 streams investigated are presented below: Coldwater Creek, Isabella County, Portage Creek, Kalkaska County, Au Sable River and East Branch of Au Sable, Crawford County, Upper Thunder Bay River, North Branch Thunder Bay River and Tomahawk Creek, Montmorency County, McGeach and Inwood Creeks, Charlevoix County, Guyer, Mitchell and Paradine Creeks in Antrim County. All of the above streams are known to contain trout as well as minnows. Trapping methods developed in June were practiced during the July trip. Results similar to those obtained during the June work were obtained. There was a marked difference in the relative minnow population for each stream; also, as formerly found, minnows appeared to be more

abundant in certain localities within a specific stream. With the exception of Coldwater Creek, the Upper Thunder Bay River again was the highest minnow producing water visited. Streams located in the north central counties, having a Lake Huron drainage, produced more fish per hour generally than those located in the western counties having a Lake Michigan drainage. There was also a marked difference in the species present in the two areas, the former producing a preponderance of common shiners while in the latter area this species was entirely lacking. Also, this area produced a great number of fine-scale dace, which was not present in the north central streams to any extent.

A total of 1,922 fish were collected from these 12 streams composed of 17 species (see Table 2). Again, as in June, the common shiner headed the list as the most abundant, representing 47 per cent of the total catch. Shiners, hornyhead chubs and creek chubs accounted for 87 per cent of the total catch. There were only 10 fish other than minnows taken (see Table 2) and of these, only one was a trout, which was of fingerling size. Many of the sets were in good trout waters and could have been expected to take trout if the traps were effective for these species.

Results of the Investigation Conducted in August

Beginning on August 4, 1944 and ending on August 10, 1944 a total of ten streams were investigated, namely: Clam River in Missaukee County, Fletcher Creek, Wexford County, Betsie River in Manistee and Benzie counties, Tobeco Creek in Grand Traverse County, Au Sable River in Crawford County, North Branch of Au Sable River and Crapo Creek in Otsego County, Honeywell and Lost Creeks in Oscoda County, and Rifle River in Ogemaw County. All of the above streams with the exception of one (Tobeco Creek) are classified as trout streams, some of which are considered good trout waters. Minnow sampling methods similar to those practiced in June and July were used.

Table 2
Species of fish collected in glass traps during July, 1944

Name of stream and trapping location	Kind and number of each species taken													Catch per hour per trap				
	Common shiners	Hornhead chubs	Creek chubs	Northern redbellied dace	Long-nosed dace	Blunt-nosed minnow	Northern pearl dace	River chub	Common sucker	Stickleback	Robk bass	Long-eared sunfish	Pumpkinseed sunfish		Largemouth bass	Yellow perch	Northern finescale dace	Trout
Coldwater Creek, Isabella Co., T. 16 N. R. 5 W., Sec. 30,31	192	14	41		5									1				62
Coldwater Creek, Isabella Co., T. 16 N. R. 5 W., Sec. 29	94	10	8		3	2					1	1						20.4
Portage Creek, Kalkaska Co., T. 26 N., R. 5W., Secs. 12, 13	28	12	28		14				1						1			20.4
Au Sable River, Crawford Co., T. 26 N., R. 3 W., Sec. 9	45	9	46		27													21.0
E. Br. Au Sable River, Crawford Co., T. 28N., R. 2W., Sec. 30	85	84	6			11												25.4
Upper Thunder Bay River, Montmorency Co. T. 30N., R. 2E., Sec. 15	166	237	16								1	1						31.0
Upper Thunder Bay River, Montmorency Co. T. 30N., R. 3E., Sec. 21	47	25	15		17	8			1									46.7
North Br. Thunder Bay River, Montmorency Co., T. 30N., R. 3E., Sec. 19	200	9	3	9							1							22.6
N. Br. Thunder Bay River, Montmorency Co. T. 32N., R. 3E., Sec. 21	18	24	14						4									44.4
Tomahawk Creek, Montmorency Co., T. 32N., R. 2E., Sec. 2	34		4		12											11		15.2
McGeach Creek, Charlevoix Co., T. 33N., R. 8 W., Sec. 5			48	20	1				1							1		7.1
Inwood Creek, Charlevoix Co., T. 33 N., R. 8 W., Sec. 7			11	12	5													7.0
Guyer Creek, Antrim Co., T. 32 N., R. 9 W., Sec. 25			7	42	7		4			3						21	1	21.2
Mitchell Creek, Antrim Co., T. 30 N., R. 9 W., Sec. 23			27	4			3				1	1			12			8.0
Paradine Creek, Antrim Co., T. 30 N., R. 9 W., Sec. 35			11	21											16			16.0
Total	909	424	281	108	91	21	7	4	3	3	3	2	2	1	1	61	1	
Total Fish ...	1,922																	

The results were found to be consistent. Certain sections of a stream were found to contain more minnows than others; as an example, at one location in Tobeco Creek the catch per hour per trap was 9.0 fish, while one mile upstream the catch per hour had risen to 56 (see Table 3).

A total of 2,092 fish were collected during this period from the above streams. Only six fish from this lot represented game fish, 4 yellow perch and 2 fingerling trout (see Table 3). The creek chubs headed the list in the greatest number captured, followed by hornyhead chubs and common shiners. These three species accounted for 82 per cent of the total numbers collected.

Summary

During the June, July and August investigation, a total of 24 streams located in 13 counties (see Plate II) were investigated with glass minnow traps. Three of these streams, North Branch of the Au Sable River, Crapo Creek and the Au Sable River were checked twice. A grand total of 5,442 fish were collected of which 5,420 were minnows. The remainder, 22 in number, were composed of 6 fingerling trout, 7 yellow perch, 1 large-mouth bass, 2 pumpkinseeds, 3 longeared sunfish and 3 rock bass. Presented in Table 4 is the total number of each species taken. The most common species of minnow taken ~~were~~ ^{were} the common shiner, creek chub and the hornyhead chubs, whose combined total accounted for 81 per cent of the total catch. The ratio of game fish to minnows was calculated as one to every 247, a very low figure. In the Au Sable River system, consisting of the Main Au Sable River, North Branch and the East Branch, considered as good trout waters, a total of 5 trout were taken in a harvest of 1,810 minnows, a ratio of one trout to 362 minnows.

Table 3
Species of fish collected in glass traps in August

Name of stream and trapping location	Creek chubs	Kind and numbers of each species taken										Catch per hour per trap		
		Horny-head chubs	Common shiner	Long-nosed dace	Northern red-bellied dace	Common sucker	Northern fine-scale dace	Blunt-nosed minnow	Northern pearl dace	Yellow perch	Brook stickle-back		Trout	
Clam River, Missaukee Co., T. 22N., R. 8 W., Sec. 20	68		72	3								1		36
Fletcher Creek, Wexford Co., T. 24 N., R. 2 W., Sec. 27	22			3		2								13.5
Betsie River, Manistee Co., T. 24 N., R. 14 W., Sec. 2	6	2	21			2								9.3
Betsie River, Benzie Co., T. 25N., R.13W., Sec. 19	5	1	18	1		2								6.7
Tobeco Creek, Grand Traverse Co., T. 28 N., R. 9 W., Sec. 5	93			3	42		31		16		2			9.0
Tobeco Creek, Grand Traverse Co., T. 28 N., R. 9 W., Sec. 8	4		31		49									56
Au Sable R., Crawford Co., T. 26 N., R. 3 W., Sec. 10	194	296	61	99				22				1		26.9
N. Br. Au Sable R., Otsego County	232	158	61	28		26		5				1		19
Crapo Cr., Crawford Co., T.29N.,R.2W., Sec. 22	44	16	49	11										11.4
Honeywell Cr., Oscoda Co. T.26N.,R.2E., Sec. 35	16													12
Lost Creek, Oscoda Co., T.26N.,R.2E., Sec. 17	31													20.6
Rifle R., Ogemaw Co., T.22N.,R.3E.,Sec. 28	6	30	9	4						2				63.7
Rifle R., Ogemaw Co., T.21N.,R.3 E., Sec. 28	20	59	101	9						1				21.1
Total	741	562	423	161	91	32	31	27	16	4	2	2		
Total fish 2,092														

Table 4

Kinds and number of fish taken in glass traps
during June, July, and August, 1944

Name of fish	Number of fish taken per month			Total
	June	July	August	
Common shiner	451	909	423	1,783
Creek chub	477	281	741	1,499
Hornyhead chub	161	424	562	1,147
Longnosed dace	242	91	161	494
Northern redbellied dace	25	108	91	224
Bluntnosed minnow	54	21	27	102
Northern finescale dace		61	31	92
Common sucker	12	3	32	47
Northern pearl dace		7	16	23
Yellow perch	2	1	4	7
Trout	3	1	2	6
Brook stickleback		3	2	5
River chub		4		4
Rock bass		3		3
Longeared sunfish	1	2		3
Pumpkinseed		2		2
Largemouth bass		1		1
Total	1,428	1,922	2,092	5,442

Assuming that the above figures are more or less representative of trout-minnow capture relationship, one could expect approximately 550 fingerling trout to be captured in a harvest of 200,000 minnows from a stream like the Au Sable River. However, these trout collected in glass traps would not be injured in any manner and could easily be released. Further, the detrimental effect on these trout in captivity would be much less than if they were taken by hook and line fishing. Food studies on trout and minnows indicate that they are direct competitors for many articles of their diet. It could also be expected that there would be a certain amount of predation of trout fry by larger minnows, thus the presence of great numbers of minnows in a trout stream may be more detrimental than good. Future research along these lines is needed and anticipated.

Recommendations

1. That certain trout streams or portions of trout streams be opened for the taking of minnows by glass traps only for personal use and for commercial purposes.
2. The streams, or portion of streams, to be opened will be recommended by the local conservation officer, who will when possible consult a fisheries biologist for assistance in determining the desirability of opening that particular water for the taking of minnows.
3. The open season shall be between June 15 and Labor Day, inclusive. The reason for this restricted season is to give the minnows a chance to spawn and to prevent too much interference between minnow trappers and trout fishermen, as the largest number of trout fishermen can be expected on these streams before June 15.

4. Each glass trap when in use must be identified by a white float marker (minimum size 2 inches by 6 inches) bearing the owner's name and address.

5. The funnel opening of a glass minnow trap shall be not greater than a diameter of one and one-fourth inches.

6. No other types of minnow traps will be permissible. The common screen minnow trap is at present widely used by many fishermen and easy to obtain, but no research data are available as to its use and the results of the same.

7. In baiting a glass minnow trap the bait shall be restricted to a cereal type of food only, such as crackers and bread. No meat or animal flesh of any type shall be used.

8. Glass minnow traps used in trout streams shall be under the immediate supervision of the owner of the traps or his representatives.

9. Studies on the harvest of minnows in trout streams by the use of wire screen traps is recommended.

10. It is recommended that when the personnel is available, an intensive study on the minnow-trout relationship be conducted.

INSTITUTE FOR FISHERIES RESEARCH

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PLATE I



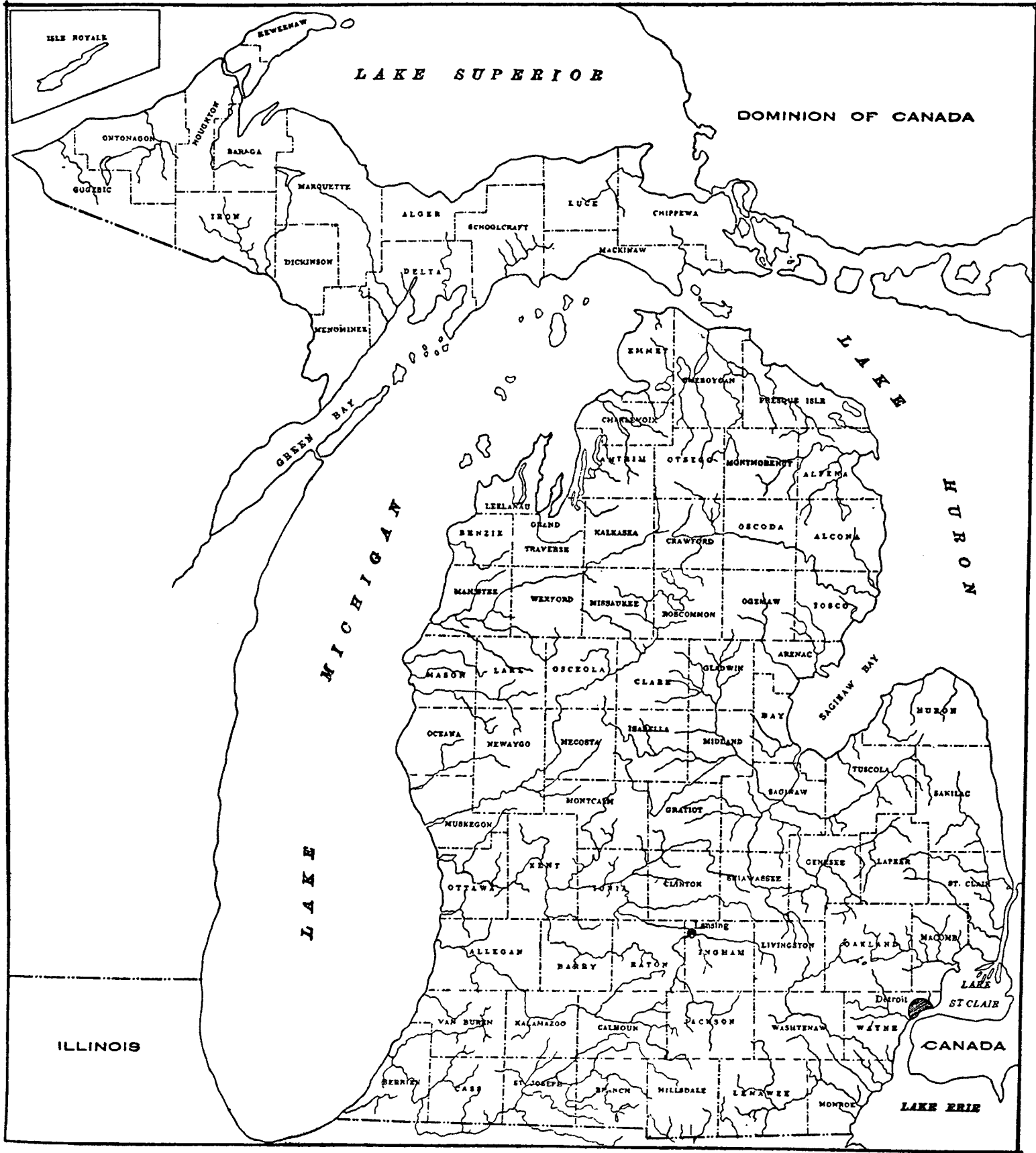
Fig. 1
Round glass minnow trap



Fig. 2
Flat rest type glass minnow trap



Fig. 3
Glass minnow trap carrying case



Shaded areas indicate counties in which glass minnow trapping was undertaken

APPENDIX TO REPORT NO. 984

Presented below are the specific field data obtained during the glass minnow trapping investigation.

June 5, 1944. Location: North Branch of the Au Sable River, Crawford County, T. 28 N., R. 1 W., Sec. 19. Time 6:15 p.m. to 7:45 p.m. Four traps were used at this location. They were set at intervals of 100 feet in running water with a moderate current. The water temperature was 68°F. and the air 84°F. The sky was partly cloudy and a strong southwest wind was present. Presented below is the catch record per trap.

Trap No. 12. Set in 16 inches of water on a gravel bottom.
Fourteen creek chubs, two to four inches in length.

Trap No. 13. Set in 24 inches of water on a gravel bottom.
Twenty-four creek chubs, average length 3 inches,
and 2 long-nosed dace.

Trap No. 14. Set in 18 inches of water on a sand bottom.
Eight creek chubs, 2 to 4 inches in length,
and 7 long-nosed dace, 2 to 3 inches in length.

Trap No. 15. Set in 12 inches of water on sand and gravel
bottom.
Twenty-nine creek chubs, 2 to 5 inches long,
11 long-nosed dace, 2 to 3 inches long.

June 6, 1944. Location: North Branch of the Au Sable River in Crawford County, T. 28 N., R. 2 W., Sec. 12. Time 1:00 p.m. to 3:00 p.m. The water temperature was 56°F. and the air was 49°F. The sky was overcast and the weather was rainy. Wind in the northwest. Four traps were used, set at intervals of 75 feet in running water ranging from one to two feet deep.

Trap No. 13. Set on a gravel bottom--no fish.

Trap No. 14. Set on a shifting sand bottom.

Three creek chubs, 2 to 4 inches long, and
3 suckers, 6 inches long.

Trap No. 15. Set on shifting sand bottom took one brook
trout fingerling 2 inches long.

Trap No. 16. Set on sand and gravel bottom--took 4 creek
chubs, 2 to 5 inches long, 1 common sucker,
6 inches long, and 2 long-nosed dace, 3 inches
long.

June 7, 1944. Location: Middle Branch of Big Creek, Oscoda County,
T. 28 N., R. 1 E., Sec. 5. Time: 3:05 p.m. to 4:05 p.m. The water tem-
perature was 64°F. and the air was 74°F. The sky was partly cloudy and
the wind in the northwest. Four traps were used at this location, which
was immediately below a beaver dam. The water depth varied from 1 to 1 1/2
feet at the set locations. The stream was sluggish in movement and the
bottom partly covered with a mucky silt. Presented below is the capture
record.

Trap No. 13. Nineteen creek chubs, 2 to 4 inches,
7 long-nosed dace, 2 1/2 inches,
4 common shiners, 3 inches,
1 hornyhead chub, 4 inches long, and
2 northern redbellied dace, 2 inches long.

Trap No. 14. Twelve creek chubs, 2 to 5 inches long,
11 long-nosed dace, 2 to 3 inches long,
5 hornyhead chubs, 4 1/2 inches in length,
6 northern redbellied dace, 2 to 3 inches in length,
1 common shiner, 4 inches long.

Trap No. 15. Twenty-eight creek chubs, 2 to 4 inches in length,
5 long-nosed dace, 2 to 3 inches long,
5 common shiners, 3 inches long, and
4 northern redbellied dace, 2 1/2 inches long.

Trap No. 16. Twenty-one creek chubs, average length 4 inches,
2 long-nosed dace, length 3 inches,
5 northern redbellied dace, 2 to 2 1/2 inches in length,
1 hornyhead chub, 4 inches long.

The above hornyhead chubs and some of the common shiners were still spawning as both ripe males and females of each species were collected.

June 7, 1944. Location: Middle Branch of Big Creek, Oscoda County,
T. 28 N., R. 1 E., Sec. 5. Time: 4:55 p.m. to 6:15 p.m. The water temperature was 61°F. and the air 69°F. The sky was overcast and a moderate wind was blowing from the northwest. Four traps were used, set at intervals of 50 feet in slow running water ranging in depth of 10 to 20 inches. The bottom was of sand and gravel.

Trap No. 13. Took 9 creek chubs, 3 to 5 inches in length,
16 common shiners, average length 3 inches,
13 hornyhead chubs, 3 to 4 inches in length,
8 long-nosed dace, 3 to 4 inches long,
1 northern redbellied dace, 2 1/2 inches long,
1 bluntnosed minnow, 2 1/2 inches long.

Trap No. 14. Took 29 common shiners, 2 to 4 inches long,
15 creek chubs, 2 to 4 inches long,
17 hornyhead chubs, 2 to 4 inches,
12 long-nosed dace, 2 to 3 inches long, and
1 northern redbellied dace, 2 inches long.

Trap No. 15. Took 20 common shiners, 2 to 4 inches long,
5 creek chubs, 3 inches long,
1 bluntnosed minnow, 3 inches in length,
9 hornyhead chubs, 3 to 5 inches long,
14 long-nosed dace, 2 to 3 inches, and
1 northern redbellied dace, 2 inches long.

Trap No. 16. Took 17 common shiners, 2 to 3 1/2 inches long,
4 creek chubs, 3 inches in length,
12 hornyhead chubs, 2 to 4 inches long,
3 long-nosed dace, 3 inches in length,
1 blunt-nosed minnow, 2 1/2 inches long, and
1 perch, 4 inches long.

June 8, 1944. Location: East Branch of Big Creek, Oscoda County,
T. 28 N., R. 1 E., Sec. 34. Time: 4:20 p.m. to 6:10 p.m. The water
temperature was 58°F. and the air 65°F. The sky was clear and only a
slight wind. Four sets were made at this location in running water at
depths averaging one foot. The bottom soil was chiefly sand and gravel.
Presented below are the recorded trapping data.

Trap No. 13. Thirty-eight long-nosed dace, 2 to 3 1/2 inches long.

Trap No. 14. Twenty-one long-nosed dace, 2 to 3 inches long.

Trap No. 15. Twenty-seven long-nosed dace, 2 to 3 inches in
length.

Trap No. 16. Thirty-three long-nosed dace, 2 to 3 inches long.

The population of minnows in this stream seemed to consist of chiefly
one species, only moderate in abundance.

June 8, 1944. Location: Big Creek, Crawford County, T. 27 N.,
R. 1 W., Sec. 23. Sets were made at a point just below the junction of
the East and Middle Branches of Big Creek. The water temperature was

59° F. and the air 61°. The time was 6:45 p.m. to 7:45 p.m. Four traps were used at this location and no minnows were collected.

June 10, 1944. Location: Crapo Creek, Otsego County, T. 29 N., R. 2 W., Sec. 36. Time: 2:30 p.m. to 3:50 p.m. Water temperature 56° F.; air 73° F. Weather clear and sunny. Four traps were set in running water ranging in depth of one to 1 1/2 feet. The bottom was composed of sand and gravel. Presented below is the catch record per trap.

Trap No. 13. Twenty-six creek chubs, ranging in length of 2 to 5 inches, 3 long-nosed dace, average length of 2 1/2 inches, 15 common shiners, ranging in length of 2 to 5 inches, 7 hornyhead chubs, 2 to 4 inches in length.

Trap No. 14. Twenty-one creek chubs, ranging in length of 2 to 5 inches, 2 long-nosed dace, 3 inches long, 16 common shiners, 2 to 4 inches long, and 3 hornyhead chubs, 2 to 4 inches long.

Trap No. 15. Eighteen creek chubs, 2 to 5 inches long, 5 long-nosed dace, 2 to 3 inches long, 22 common shiners, 2 to 4 inches long, and 9 hornyhead chubs, 2 to 4 inches in length.

Trap No. 16. Eleven creek chubs, 2 to 5 inches long, 4 long-nosed dace, 2 to 3 inches long, 13 common shiners, 2 to 4 inches long, and 7 hornyhead chubs, 2 to 4 inches in length.

June 10, 1944. Location: North Branch of the Au Sable River, Otsego County, T. 29 N., R. 2 W., Sec. 36. Time: 5:00 p.m. to 7:30 p.m. Water temperature 67° F.; air 72°. The sky was clear. Five traps were set in running water of depths varying from one to one and one-half feet. The bottom type was chiefly gravel and sand. Presented below are the data secured from the five sets.

- Trap No. 12. Twenty-one creek chubs, 2 to 3 1/2 inches long,
16 common shiners, 2 to 4 inches long,
1 brook trout, 2 1/2 inches long, and
3 long-nosed dace, 2 1/2 inches long.
- Trap No. 13. Thirty-seven creek chubs, 2 to 4 1/2 inches long,
5 common shiners, 2 to 3 inches long, and
5 long-nosed dace, 2 to 3 inches in length.
- Trap No. 14. Eighteen creek chubs, 2 to 5 inches long, and
16 common shiners, 2 to 4 inches in length.
- Trap No. 15. Twenty creek chubs, 2 to 4 inches long,
5 northern redbellied dace, 2 inches long,
3 common shiners, 2 to 3 inches long, and
3 long-nosed dace, 2 to 3 inches long.
- Trap No. 16. Twenty-two creek chubs, 2 to 4 inches in length,
1 brook trout, 2 inches long, and
5 long-nosed dace, 2 to 3 1/2 inches in length.
- Trap No. 17. Twenty-five creek chubs, 2 to 5 inches long, and
3 long-nosed dace, 2 to 3 inches in length.

June 14, 1944. Location: Upper Thunder Bay River, Montmorency
County, T. 30 N., R. 2 E., Sec. 21. Time: 3:30 p.m. to 4:30 p.m. Water
temperature 70°F.; air 82°F. Sky mostly clear with a light west wind.
Presented below is the catch record for the glass traps.

- Trap No. 13. Seven hornyhead chubs, 2 to 4 1/2 inches long,
35 common shiners, 2 1/2 to 3 1/2 inches in length,
11 creek chubs, 2 to 3 inches long,
3 bluntnosed minnows, 2 to 2 1/2 inches long,
3 long-nosed dace, 2 to 3 inches long, and
2 common suckers, average length 4 1/2 inches.

Trap No. 14. Thirty-two common shiners, 2 to $\frac{1}{4}$ inches in length,
2 creek chubs, 3 to $\frac{1}{4}$ inches long,
8 hornyhead chubs, 2 to $\frac{1}{4}$ $\frac{1}{2}$ inches long,
5 bluntnosed minnows, 2 to 3 inches long, and
1 long-nosed dace, 2 $\frac{1}{2}$ inches in length.

Trap No. 15. Twenty-two common shiners, 2 to $\frac{1}{4}$ inches long,
5 hornyhead chubs, 2 to 3 $\frac{1}{2}$ inches long, and
1 bluntnosed minnow, 2 $\frac{1}{2}$ inches long.

Trap No. 16. Thirty common shiners, 2 to $\frac{1}{4}$ inches long,
10 creek chubs, 2 to 3 $\frac{1}{2}$ inches long,
12 bluntnosed minnows, 2 to 3 $\frac{1}{2}$ inches long,
10 hornyhead chubs, average length $\frac{1}{4}$ inches,
1 long-eared sunfish, 3 inches long and
2 long-nosed dace, 3 inches.

June 14, 1944. Location: Upper Thunder Bay River, Montmorency
County, T. 30 N., R. 2 E., Sec. 15. Water temperature 71°F.; air 81°.
Time: 6:45 p.m. to 7:45 p.m. The sky was clear. Four traps were set at
this location, spaced about 50 feet apart in running water ranging from
one to two feet deep. Presented below are the capture records.

Trap No. 13. Forty-one common shiners, 2 to $\frac{1}{4}$ inches long,
11 creek chubs, 2 to 5 inches long,
13 hornyhead chubs, 2 to $\frac{1}{4}$ inches long, and
7 bluntnosed minnows, 2 to 3 inches long.

Trap No. 14. Eighteen common shiners, 2 to 3 inches long,
6 creek chubs, 2 to $\frac{1}{4}$ inches long,
5 hornyhead chubs, 2 to 3 $\frac{1}{2}$ inches long,
7 bluntnosed minnows, average length 2 $\frac{1}{2}$ inches,
2 common suckers, 5 inches long.

Trap No. 15. Twenty-nine common shiners, 2 to 3 inches long,
8 creek chubs, 2 to 3 inches long,
14 hornyhead chubs, 2 to 4 inches long,
5 bluntnosed minnows, 2 to 3 inches long, and
1 four-inch perch.

Trap No. 16. Thirty-nine common shiners, 2 to 4 inches long,
5 creek chubs, 2 to 3 inches long,
8 hornyhead chubs, 2 to 4 inches long,
7 bluntnosed minnows, 2 1/2 inches long, and
3 common suckers, 4 1/2 inches long.

June 14, 1944. Location: Upper Thunder Bay River, Montmorency County,
T. 30 N., R. 2 E., Sec. 13. Time: 8:30 p.m. to 8:50 p.m. Water tempera-
ture 72°F.; air 76°F. Sky clear. One trap was set immediately below the
spill at the dam located in Atlanta. At the set location the water was
about two feet deep and sluggish in movement. Results are presented be-
low.

Trap No. 16. Fifty-eight common shiners, 2 to 4 inches long,
3 bluntnosed minnows, 2 1/2 inches average length,
7 hornyhead chubs, 2 to 3 inches long,
5 creek chubs, average length 2 1/2 inches, and
1 common sucker, 4 inches long.

July 7, 1944. Location: Coldwater Creek, Isabella County, T. 16 N.,
R. 5 W., Secs. 30 and 31. Water temperature 67°F.; air 81°F. Weather
fair. Results of six sets made at 9:15 a.m. and lifted at 9:55 a.m. are
presented below.

- Trap No. 9. Set 20 minutes.
Thirty-seven common shiners, 2 1/2 to 4 1/2 inches,
3 creek chubs, 2 to 3 inches long, and
1 hornyhead chub, 3 inches long.
- Trap No. 7. Set 25 minutes.
Forty-six common shiners, 2 to 4 1/2 inches long,
11 creek chubs, 2 to 3 inches long,
2 long-nosed dace, 3 inches long,
1 hornyhead chub, 5 inches long, and
1 two and one-half inch bluntnosed minnow.
- Trap No. 10. Set 35 minutes at a depth of one foot took:
23 common shiners, 2 to 4 inches long,
21 creek chubs, 3 to 6 inches long,
3 hornyhead chubs, 2 to 3 inches long, and
1 longnosed dace, 3 inches long.
- Trap No. 9. Reset for 20 minutes took:
36 common shiners, 2 to 5 inches long,
6 creek chubs, 2 to 6 inches long,
5 hornyhead chubs, 2 to 3 1/2 inches long, and
2 three-inch long-nosed dace.
- Trap No. 8. Set for 30 minutes took:
38 common shiners, 4 to 6 inches long, and
1 four-inch hornyhead chub.
- Trap No. 12. Set for 33 minutes took:
12 common shiners, 2 to 4 inches long, and
4 hornyhead chubs, 2 to 4 inches long.

July 7, 1944. Location: Coldwater Creek, Isabella County, T. 16 N., R. 5 W., Sec. 29. Water temperature 78°F.; air 86°F. Time: 10:40 a.m. to 11:50 a.m. There were several cold feeder streams, average water temperatures of 60°F., entering the main stream at this point. The main stream consisted of pools and rapids, and the bottom was chiefly sand and gravel. Presented below are the results from five traps.

Trap No. 9. Twenty-one common shiners, 2 to 3 inches long,
4 creek chubs, 3 to 4 inches long,
1 hornyhead chub, 4 inches long, and
1 long-eared sunfish, 3 inches long.

Trap No. 8. Nine common shiners, 2 to 4 inches long,
2 four-inch creek chubs,
2 four-inch hornyhead chubs, and
1 long-nosed dace, 3 inches long.

Trap No. 7. Twenty-six common shiners, 2 to 4 inches in length,
1 three-inch creek chub,
3 hornyhead chubs, 3 to 4 inches long,
2 long-nosed dace, 2 to 3 inches long,
1 bluntnosed minnow, 2 1/2 inches long, and
1 three-inch pumpkinseed.

Trap No. 10. No fish were taken in this set.

Trap No. 12. Thirty-eight common shiners, 2 to 4 inches long,
1 three-inch creek chub,
4 hornyhead chubs, 2 to 4 inches long, and
1 two-inch bluntnosed minnow.

July 8, 1944. Location: Portage Creek, Kalkaska County, T. 26 N., R. 5 W., Secs. 12 and 13. Time: 11:00 a.m. to 12:00 noon. Water temperature 71°F.; air 83°F. Sky was clear, wind gentle. The stream at the

trapping location was full of debris, composed of old beaver cuttings and windfalls. The bottom of the stream was mostly sand and muck. The stream itself was characterized by pools and sluggish water movements. The stream appeared to have a large population of minnows present. Presented below are the results of glass trapping in this creek.

Trap No. 7. Five common shiners of average length of 5 inches, and 1 long-nosed dace, 3 inches long.

Trap No. 10. Eleven common shiners, 2 to 5 inches long, 16 creek chubs, 2 to 6 inches long, 6 hornyhead chubs, 2 to 4 inches long, 5 long-nosed dace, 2 to 3 inches long, and 1 two and one-half inch sucker.

Trap No. 8. Three common shiners, average length 3 inches, 12 creek chubs, 3 to 6 inches long, 3 hornyhead chubs, 2 to 4 inches long, 1 two and one-half inch long-nosed dace, and 1 five-inch yellow perch.

Trap No. 13. Nine common shiners, 2 to 4 inches long, 7 long-nosed dace, average length 2 1/2 inches, and 3 hornyhead chubs, average length 3 inches.

July 8, 1944. Location: Au Sable River, Crawford County, T. 26 N., R. 3 W., Sec. 9. Time: 2:00 p.m. to 3:00 p.m. Water temperature 68°F.; air 87°F. The stream at this location was wide and shallow with some debris present. The bottom was chiefly sand and gravel interspersed with an occasional weed bed. Presented below are the results from five sets.

Trap No. 7. Eleven common shiners, 2 to 4 inches long, 15 long-nosed dace, 2 1/2 inches long, 6 creek chubs, 2 to 4 inches long.

Trap No. 8. Twenty-one common shiners, 2 1/2 to 4 inches long,
2 long-nosed dace, 2 1/2 inches long, and
3 creek chubs, 3 inches long.

Trap No. 10. Five common shiners, 2 to 4 inches long,
2 long-nosed dace, 2 1/2 inches long,
6 hornyhead chubs, 3 to 5 inches long, and
10 creek chubs, 2 to 4 inches long.

Trap No. 12. Three common shiners, 3 inches long,
3 hornyhead chubs, 4 inches long, and
17 creek chubs, 2 to 4 inches long.

Trap No. 13. Five common shiners, 3 to 4 inches long,
8 long-nosed dace, 2 1/2 inches long,
10 creek chubs, 3 to 5 inches long.

July 8, 1944. Location: East Branch of Au Sable River, Crawford
County, T. 28 N., R. 2 W., Sec. 30. Time: 3:40 p.m. to 4:40 p.m. Water
temperature 76°F.; air 87°F. The stream at this location was sluggish and
the bottom was mostly shifting sand. A few trout were observed in the
larger pools. Six traps were set at this location. Presented below are
the results of these sets.

Trap No. 7. Sixteen common shiners, 2 to 4 inches long,
1 creek chub, 3 inches long,
3 hornyhead chubs, 3 inches long, and
1 long-nosed dace, 2 1/2 inches long.

Trap No. 8. Twelve common shiners, 2 to 3 inches long,
1 five-inch creek chub,
14 hornyhead chubs, 3 to 4 inches long, and
3 long-nosed dace, 2 to 3 inches long.

Trap No. 9. Fourteen common shiners, 2 to 4 inches long,
2 three-inch creek chubs,
18 hornyhead chubs, 3 to 5 inches long, and
21 bluntnosed minnows, 2 1/2 inches long.

Trap No. 10. Seven common shiners, 3 inches long,
4 hornyhead chubs, 2 to 3 inches long,
1 long-nosed dace, 2 1/2 inches long, and
3 blunt-nosed minnows, 2 to 3 inches long.

Trap No. 12. Ten common shiners, 3 to 4 inches long,
2 creek chubs, 4 inches long,
30 hornyhead chubs, 3 to 5 inches long, and
one long-nosed dace, 2 1/2 inches long.

Trap No. 13. Twenty-six common shiners, 2 1/2 to 4 inches long,
15 hornyhead chubs, 3 to 4 inches long, and
1 two and one-half inch bluntnosed minnow.

July 9, 1944. Location: Upper Thunder Bay River, Montmorency County,
T. 30 N., R. 2 E., Sec. 15. Time: 11:00 a.m. to 12:00 noon. The sky was
clear. Water temperature 74°F.; air 78°F. There was little cover in the
stream, also there were very few pools present. The bottom type was most-
ly sand and gravel. The minnows were abundant in the stream. There were
nine traps placed in this stream, each set at 50 foot intervals. Each
trap was lifted every 15 minutes and the fish counted. Presented below
are the collective data for the nine traps: 166 common shiners, 3 to 5
inches long; 237 hornyhead chubs, 3 to 5 inches long; 16 creek chubs, 3
to 4 inches long; 1 long-eared sunfish, 2 inches long; and 1 rock bass,
2 inches long.

July 9, 1944. Location: Upper Thunder Bay River, Montmorency County,
T. 30 N., R. 2 E., Sec. 29. Time: 1:00 p.m. to 2:00 p.m. Water tempera-
ture 73°F.; air 80°F. Sky clear. The stream bottom was composed of sand,
gravel and marl. The stream was comprised of pools and rapids. Minnows
were abundant in the stream. Presented below are the collective data for
five traps: 47 common shiners, 3 to 4 inches long; 15 creek chubs, 3 to
4 inches long; 25 hornyhead chubs, 2 to 4 inches long; 17 long-nosed dace,
2 1/2 to 3 inches long; 8 blunt-nosed minnows, 2 1/2 inches average length,
and one five-inch sucker.

July 9, 1944. Location: North Branch of the Thunder Bay River,
Montmorency County, T. 32 N., R. 3 E., Sec. 21. Time: 2:45 to 3:45 p.m.
Water temperature 82°; air 85°F. The stream at this location was about
20 feet wide and one to two feet deep. The bottom was chiefly shifting
sand. Five traps were set here. The results were as follows:

200 common shiners, 2 to 4 inches long,
3 creek chubs, 3 inches long,
9 hornyhead chubs, 2 to 4 inches long,
9 northern redbellied dace 2 to 3 inches long, and
1 two-inch rock bass

Four additional sets were made on this stream on the George Millard
property of Section 19. The stream at this point was estimated to have a
flow of 15 c.f.s. The bottom was mostly shifting sand, partially covered
with an algae and Nitella. Presented below are the results from these
operations:

18 common shiners, ranging in lengths of 2 to 5 inches,
14 creek chubs, 3 to 5 inches long,
24 hornyhead chubs, 3 to 5 inches in length, and
4 river chubs, 4 to 5 inches in length.

July 9, 1944. Location: Tomahawk Creek, Montmorency County, T. 32 N., R. 2 E., Sec. 2. Time: 5:15 p.m. to 6:15 p.m. Water temperature 74° F; air 83° F. The stream was small at this location and the bottom was composed of sand and a mucky silt. Presented below are the collective data from four traps in this stream.

There were 34 common shiners, 2 to 4 inches long; 12 long-nosed dace, 2 to 3 inches long; 4 creek chubs, 2 to 4 inches long; and 11 northern redbellied dace having an average length of about 2 1/2 inches.

July 10, 1944. Location: McGeach Creek, Charlevoix County, T. 33 N., R. 8 W., Sec. 5. Time: 10:00 a.m. to 12:30 p.m. The stream at this point was small, estimated at 2 c.f.s. The bottom was chiefly gravel and rubble. The stream itself was characterized by pools and rapids. Many minnows were observed. Water temperature 76° F.; air 78° F. Four traps were set at this location and the results of these sets are presented below:

There were 48 creek chubs, ranging in lengths of 2 to 4 inches; 20 northern redbellied dace, average length of 2 1/2 inches; one four-inch common sucker; one two and one-half inch long-nosed dace; and one two-inch northern fine scale dace.

July 10, 1944. Location: Inwood Creek, Charlevoix County, T. 33 N., R. 8 W., Sec. 7. Time: 2:00 p.m. to 3:00 p.m. This stream was very small, estimate one c.f.s. The stream was characterized by pools and rapids and the bottom was chiefly sand and gravel. The minnow population was moderate. Glass traps were quite ineffective in securing a sample, as indicated below in the results of four sets.

There were 11 creek chubs, 2 to 3 inches long; 12 northern redbellied dace, of an average length of 2 1/2 inches; and 5 long-nosed dace, 2 to 3 inches long.

July 11, 1944. Location: Guyer Creek, Antrim County, T. 32 N., R. 9 W., Sec. 25. This stream is small, estimated at 1 1/2 c.f.s. The stream bottom was composed of sand, gravel and muck. Four sets were made at this location between the hours of 10:00 a.m. and 11:00 a.m. The fish taken in these traps were as follows: 21 northern finescale dace, 1 1/2 to 2 inches long; 42 northern redbellied dace, average length of 2 inches; 7 creek chubs, 2 to 4 inches long; 7 long-nosed dace, 2 to 3 inches long, 4 northern pearl dace, 2 to 4 inches long; 3 brook sticklebacks, 1 1/2 inches in length; and one brook trout, 3 inches long.

July 11, 1944. Location: Mitchell Creek, Antrim County, T. 30 N., R. 9 W., Sec. 23. Time: 12:30 p.m. to 1:30 p.m. This is also a small stream, estimated to have a flow of 2 c.f.s. The stream was characterized by pools and rapids. Six traps were placed in this stream and the collective results were found to be as follows: 27 creek chubs, 2 to 5 inches long; 41 northern redbellied dace, having an average length of 2 inches; 12 finescale dace, average length 2 1/2 inches; 7 long-nosed dace, 2 to 3 inches long; 3 northern pearl dace, average length of 3 1/2 inches; one two-inch rock bass; and one two-inch pumpkinseed.

July 11, 1944. Location: Paradine Creek, Antrim County, T. 30 N., R. 9 W., Sec. 35. Time: 2:00 p.m. to 2:45 p.m. This stream was very small, estimated flow 1 c.f.s. The bottom of the stream was chiefly sand and gravel. The water temperature was 78°F. Presented below are the results from four sets. There were 21 two-inch northern redbellied dace; 11 creek chubs, 2 to 3 inches long; and 16 northern finescale dace of an average length of 2 inches.

August 4, 1944. Location: Clam River, Missaukee County, T. 22 N., R. 8 W., Sec. 20. Time: 5:15 p.m. to 6:20 p.m. Water temperature 76°F. and the air was 92°F. The sky was partly overcast. The population of

minnows in this stream were only moderate, being isolated in certain sections. Four traps placed in this stream took 114 minnows and one four-inch perch. The minnows ranged from 2 to 4 inches in length and were composed of the following species according to abundance: creek chubs, shiners, long-nosed dace, and northern fine-scale dace.

August 5, 1944. Fletcher Creek, Wexford County, T. 24 N., R. 2 W., Sec. 27. Time: 2:00 p.m. to 2:30 p.m. The population of minnows in this stream were only moderate. Several trout were observed in the pools. The stream had a flow estimated at 4 c.f.s. The bottom was chiefly sand and gravel. Four sets made in this stream produced only 27 minnows, composed of creek chubs, long-nosed dace, and suckers.

August 5, 1944. Location: Betsie River, Manistee County, T. 24 N., R. 14 W., Sec. 2. The stream at this location was quite large and only a few minnows were observed. Four traps set between the hours of 3:30 p.m. and 4:20 p.m. produced only 31 fish, composed of mostly shiners with a few creek chubs and long-nosed dace.

August 5, 1944. Betsie River, Benzie County, T. 25 N., R. 13 W., Sec. 19. Time: 4:50 p.m. to 5:50 p.m. The stream at this location was observed to possess only a few minnows. Four traps set at this location took only 27 minnows, composed mostly of shiners. At this location the stream was quite swift and it was hard to anchor the traps in a correct fishing position.

August 6, 1944. Location: Tobeco Creek, Grand Traverse County, T. 28 N., R. 9 W., Sec. 5. Time: 12:30 p.m. to 3:30 p.m. The stream flow was considered as very low, probably due to the prolonged dry season. The stream bottom was composed of sand, gravel and rubble. The population of minnows appeared to be abundant. Seven sets were made at this location and they took a total of 187 minnows, composed of creek chubs, northern redbellied dace, northern pearl dace, long-nosed dace and sticklebacks.

These minnows ranged from 2 to 4 inches in length.

One mile upstream from the above location another series of sets was made. The stream at this point was very sluggish and the bottom was chiefly sand and silt. Minnows appeared to be very abundant. Three traps set for 30 ~~minutes~~^{minutes} took 8 1/4 minnows composed of northern redbellied dace, shiners and creek chubs.

August 7, 1944. Location: Au Sable River, Crawford County, T. 26 N., R. 3 W., Sec. 10. Time: 11:30 a.m. to 1:00 p.m. and 3:30 p.m. to 4:35 p.m. Water temperature 67°F.; air 79°F. The sky was mostly clear and the wind was in the northwest. A total of 10 traps was set, placed at intervals of every 50 feet. These traps took a total of 673 fish, composed of horny-head chubs, creek chubs, shiners, long-nosed dace and one three-inch trout. These fish are listed in order of abundance. The stream at this location appeared to have an abundant supply of minnows.

August 8, 1944. Location: North Branch of the Au Sable River, Otsego County, T. 29 N., R. 2 W., Sec. 22. Time: 1:15 p.m. to 4:20 p.m. The stream at this location was quite swift and several fingerling trout were seen. The water temperature was 67°F. and the air was 80°F. A total of 9 traps was set at this location and they produced 511 minnows and one three and one-half inch brook trout. The species list according to abundance was as follows: mostly creek chubs, a few hornyhead chubs, and about 2 1/4 common suckers.

August 8, 1944. Location: Crapo Creek, Otsego County, T. 29 N., R. 2 W., Sec. 36. Time: 5:30 p.m. to 7:00 p.m. Water temperature 61°F.; air 79°F. A total of 7 traps were set which took a combined catch of 120 minnows. These minnows were 2 to 4 inches in length and composed of 4 1/4 creek chubs, 16 hornyhead chubs, 49 common shiners, and 11 long-nosed dace.

August 10, 1944. Location: Rifle River, Ogemaw County, T. 22 N., R. 3 E., Sec. 28. Water temperature 71^oF. The river at this location was composed of pools and rapids. The bottom was composed of sand, gravel and rubble. There were not many minnows observed in the stream. A total of 8 traps were set in the stream and they took 49 minnows and 2 perch. The minnows were as follows: 30 hornyhead chubs, 9 common shiners, 6 creek chubs, and 4 long-nosed dace.

August 10, 1944. Location: Rifle River, Ogemaw County, T. 21 N., R. 3 E., Sec. 28. The stream at this location was somewhat turbid and the bottom was chiefly shifting sand. Six traps were set in this area in water depths ranging from one to two feet. At this location more minnows were observed than before and the population increase was also evident by the trap returns which were as follows. A total of 190 minnows were taken in one and one-half hours of fishing. This total was composed of 101 common shiners, 59 hornyhead chubs, 20 creek chubs, 9 long-nosed dace, and one yellow perch. The minnows ranged from 2 to 5 inches long.

August 10, 1944. Location: Honeywell Creek, Oscoda County, T. 26 N., R. 2 E., Sec. 35. Water temperature 72^oF. Three traps were set at this location. The stream was very small, in part due to the prolonged dry season. Under normal conditions this stream would undoubtedly have had a flow of about three c.f.s., while at the time of the above trapping the flow was estimated at one c.f.s. The water in the stream was quite shallow, estimated at 6 inches deep. The three traps were set for one-half hour and took 16 creek chubs. The minnow population in the stream did not seem to be plentiful.

August 10, 1944. Location: Lost Creek, Oscoda County, T. 26 N., R. 2 E., Sec. 17. This stream was also very small, estimated at one c.f.s. Ideal locations for glass trap sets were not to be found--in all instances

part of the trap when in a fishing position remained above the water. Three traps set in this stream for one-half hour took 31 creek chubs, 2 to 3 inches long. Minnows in this stream did not seem to be too plentiful.

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