EFFECT OF MESH SIZE ON TRAP CAPTURE OF LARGEMOUTH BASS

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ABSTRACT.—Evidence is presented that traps made of coarse mesh netting are better than traps made of fine mesh for capture of largemouth bass over 12 inches long. An attempt is made to explain the selective action of mesh size in terms of net visibility as it might affect fish entering traps, and also those trying to escape from traps following capture.

INTRODUCTION

In late May 1941, I set trap nets of three mesh sizes at Lake Springfield, Sangamon County, Illinois, and found that the larger sizes of largemouth bass, *Micropterus salmoides*, Lacepede, were caught more successfully in coarse mesh traps than in fine mesh traps. This tendency has been reported in the trap net fishing for carp and buffalo, but it has not been described in fishing for bass. The opposite tendency has been reported in a number of sportfish species.

METHODS AND MATERIALS

The traps used at Springfield were wing nets (also referred to as fykenets and hoopnets), and were of three mesh sizes: "fine"-1 x 1-inch (25 x 25mm), square mesh, "intermediate" -1½ x 1½-inch (38 x 38mm), and "coarse" -2½ x 2½-inch (63 x 63mm). Trap diameters (heights) varied from 2½ feet (0.77m) to 4½ feet (1.37m), but these moderate differences in diameter have been disregarded in presenting the catch data. A 1½ x 1½-inch square mesh, lead net, 60 feet (18.3m). long, 3½ feet (1.07m) deep was used with each trap, irrespective of the mesh of the trap. The traps were set in water deep enough to cover, or almost cover, the largest hoops comprising the net support.

The fish taken in the traps were measured in inches to the nearest 1/10 inch (2½mm), total length, then assigned to the nearest ½-inch size class.

Following measurement of the fish they were returned to the water near the nets in which they were caught. With the possible exception of a single bass specimen 12.0 inches long (305mm) all of the bass represented in the tables were large enough to have been caught by any of the traps used, i.e. they could not slip through the meshes of the coarsest nets fished when the nets were stretched tight. Only one bass less than 12.0 inches was caught during the two weeks of trapping -a 7.0 inch bass was caught in one of the fine mesh traps.

Sechii disc readings, measured in inches, showed that the water at the time of the trap collections was fairly turbid. At Bird Haven the reading was 6 inches (0.15m) on May 14, and 12 inches (0.3m) on May 20. At Toronto the reading was 8 inches (0.2m) on May 20, and at Woodside 6 inches (0.15m) on May 23.

RESULTS

The numbers of bass, 12 inches and larger, caught each day in individual traps of the three mesh sizes are shown in Table 1. Based on these data the average catch rates for the

two weeks of fishing came out as follows: 0.08 bass per trap in the fine mesh traps, 0.33 per trap in the intermediate mesh traps, and 0.64 per trap in the coarse mesh traps. These averages were obtained from 34, 6 and 28 lifts of the fine, intermediate, and coarse nets respectively. The better results with the coarse nets can be seen from day to day as well as for the entire two week period.

The bass caught at Springfield ran to large sizes. The 3 bass caught in the fine nets measured 12, 15.5 and 18 inches (305, 394, and 475-mm), total length; the two bass caught in the intermediate net measured 18.5 inches (470mm) each; the 18 bass caught in the coarse nets measured 17-19 inches (432-483-mm).

At each of the three fishing sites

TABLE 1. Number of largemouth bass, 12.0 inches (305 mm), and larger, caught in individual trap nets of three mesh sizes, fine (F), intermediate (I), and coarse (C) on successive lifts at various sites in shallow water, Lake Springfield, May 1941.

Fishing site	Trap identification number	Square mesh size 1	Dates of trap lifts — May 14	15	16	19‡	20	21	22*	23‡	26+
Bird Haven Bay	11	F			–	–	–				
	12	F			–	–	–				
	5	C	–	2	–	2	1				
	6	C	2	1	–	–	1				
Boy Scout Camp Bay	3	F	–	–	–	–					
	4	F	–	–	–	–					
First Bay East of Boy Scout Camp	1	F	–	1	–	1					
	2	C	–	–	4	1					
Near IC Railroad crossing, north side	8	F			–	–	–	–	–		–
	10	I			–	–	–	–	1		1
	7	C			–	1	–	2			
	9	C			–	–	–	1			
Lincoln Gardens	3	F					1	–			
	4	F					–	–			
Toronto	1	F					–		–		
	2	C					–		–		
Woodside	11	F								–	
	12	F								–	
	5	C								–	
	6	C								–	
Press Club	3	F									–
	4	F									–
	7	C									–
	9	C									–

1 For actual mesh sizes, see text.
* The two traps lifted at I.C. crossing had been fished 24 hours; those at Toronto for 48 hours.
\+ All traps fished 48 hours.
‡ All traps fished 72 hours.

where bass were taken in numbers, (at Bird Haven, at the Bay east of the Boy Scout Camp, and at the I. C. Bridge, the best results were achieved with the coarse nets. This obviously suggests that the difference in catch rate was due more to mesh size than to trap placement. Evidence of selectivity of mesh is also shown in the consistency with which the large bass were caught in the traps of different mesh. Bass 12 inches or longer were taken in 12 of the 28 lifts of the coarse mesh traps (43 percent), in 2 of 6 lifts of the intermediate mesh traps (33 percent), but in only 3 of 34 lifts of the fine mesh traps (9 percent).

DISCUSSION

It appears from the data presented that largemouth measuring 12 inches and larger belong with the large sizes of certain commercial species which Starrett and Barnickol (1955) listed as fish that were caught better in coarse mesh nets, namely 15 inch and larger sizes of carp, bigmouth buffalo, and smallmouth buffalo. While Starrett and Barnickol concluded that coarse nets were inferior to fine nets for capture of sportfishes of desirable sizes (sizes generally acceptable to sport fishermen), some of the fish given the "desirable" rating were almost certainly small enough to have escaped through the meshes of the coarse mesh nets, for example 8.0 inch white crappies and black crappies, and 15.0-inch channel catfish. Thus, the degree of selectivity of their nets for capture of crappies and channel catfish remains uncertain.

It is suspected -and this is a commonly held belief of net fishermen- that nets of finer mesh are more easily seen by fish approaching them, and therefore that fine mesh nets are easiest for fish to avoid. It should also be noted that captured largemouth bass and certain other species are capable of escaping from traps through the funnels (Hansen, 1944, Patriarche, 1968). Fine mesh nets should be easiest to escape from because of the greater contrast between the opening at the apex of the funnel (the escape route) and the net material of which the funnels are made. Differences in mesh sizes might have little effect on captures and escapes in clear water but have a decided effect on both in turbid waters, (the situation at Lake Springfield). At Lake Glendale the best catch rates of bass in wingnets were made in early spring (March) when the water was turbid, Hansen (1953), though in that study it was not certain that low water temperature, or some other seasonal factor had not affected the catch as much as high turbidity. Mesh size probably would not affect the capture of fish at night, but in turbid water could affect the number of escapes with the coming of daylight.

Fine mesh traps nearly always catch more species and more individual fish than coarse mesh traps because they can retain fish of a wider size range. The buildup of trapped fish in fine mesh traps is a possible factor affecting the desire of large sized fish to enter traps or avoid entrance, and also may be a factor in the desire of large fish to escape or remain in the traps after capture.

Large as well as small bass were captured in quantity in fine mesh traps at Lake Glendale when the lake was between 2 and 5 years old, Hansen (1966), and this has been observed when fine mesh nets were fished in a number of other new Illinois lakes. Lake Springfield was approximately 6 years old at the time of the 1941 trapping. Bass of all sizes are generally trapped with difficulty with fine mesh nets in old lakes. It is in older lakes that the

use of coarse mesh nets might prove especially useful in population sampling or in obtaining large bass to meet special needs.

LITERATURE CITED

HANSEN, DONALD F. 1944. Rate of escape of fishes from hoopnets. Trans. Ill. Acad. Sci. 37:115-122.

HANSEN, D. F. 1953. Seasonal variation in hoopnet catches at Lake Glendale. Trans. Ill. Acad. Sci. 46:216-226.

HANSEN, D. F. 1966. Stocking and sportfishing at Lake Glendale (Illinois). Ill. Nat. Hist. Surv. Bull. 29(2):105-158.

PATRIARCHE, MERCER H. 1968. Rate of escape of fish from trap nets. Trans. Am. Fish. Soc. 97(1):59-61.

STARRETT, WILLIAM C. and PAUL G. BARNICKOL. 1955. Efficiency and selectivity of commercial fishing devices used on the Mississippi River. Ill. Nat. Hist. Surv. Bull. 26(4):325-366.

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