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THE USE OF HOBBLED GILL NETS IN A COMMERCIAL FISHERY OF LAKE CARL BLACKWELL, OKLAHOMA

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ABSTRACT

A modified gill net known as a hobbled gill net was utilized in a commercial fishery in 3,300-acre Lake Carl Blackwell in Central Oklahoma from September, 1957 through December, 1958. A total of 3,200 fish weighing 20,252 pounds was taken in 1,085 net days, a net day being 300 feet of net fished 24 hours.

Non-game fishes represented 97 percent by weight of the total catch. Hobbled gill nets proved particularly effective in taking flathead catfish, which comprised 63.4 percent by weight of the total catch. The average catch of flathead catfish increased from 4.9 to 13.0 and 14.6 pounds per net day for 3.0-, 3.5- and 4.0-inch bar mesh nets respectively. In general, the catch of all other species decreased as the mesh size increased from 3 to 4 inches. Hobbled gill nets may be an efficient modification over standard commercial gill nets and a more selective gear for large flathead catfish than other entanglement gears.

INTRODUCTION

A commercial fishery was conducted in 3,300-acre Lake Carl Blackwell, Payne County, Oklahoma, from September, 1957, through December, 1958, utilizing a modified gill net known as a hobbled gill net. This net is being used by many Oklahoma commercial fishermen and it is believed that the net represents an efficient modification of regular gill nets. It is not known who first designed the hobbled gill net, although it is reported to have been originally used in Oklahoma by fishermen in Grand Lake in 1955-56. A description of the hobbled gill net, a discussion of its efficiency and the commercial harvest from Lake Carl Blackwell are herein reported.

Descriptions, use and efficiency of much of the freshwater commercial fishing equipment used in the Mississippi River have been discussed by Starrett and Barnickol (1955). Houser (1957) described the gear used in Lake Texoma during 1952-53. White (1955, 1959) discussed the commercial fishing gears used on T. V. A. lakes in Alabama. Two of the most widely used entanglement

* Data collected as a graduate student at Oklahoma State University.

devices for freshwater commercial fishing are gill and trammel nets. Where trammel and gill nets are fished in comparable situations, trammel nets usually are more efficient. The ability of trammel nets to "pocket fish" without entangling adjacent webbing is one chief advantage of this net. Vertical looseness contained in the inner wall of webbing in trammel nets provides the slackness from which the pocket is formed.

Looseness or fullness in a net is a relationship between the mesh size, the linear amount of webbing used and the resulting length or depth of net obtained. Three-inch webbing (mesh sizes in this report are bar or square mesh measure) hung so each mesh is three inches square, is hung on a full, or one (1:1) basis. This equals four 3-inch meshes per linear foot of net. The same webbing hung on a one-half basis would require twice (eight meshes per foot) the linear amount of webbing as the same total length of net hung on a full basis. Houser (1957) pointed out that looseness in net webbing tends to improve the efficiency of gill nets. A trammel net with an inner wall of three-inch webbing 36 meshes deep would hang about nine feet in depth on a full vertical basis. However, if the two outside walls of webbing restricted the net depth to seven feet, the inner webbing would be hung vertically on about a three-fourths basis. This vertical looseness is contained collectively in the webbing mass and not in the individual meshes as in horizontal looseness. The vertical looseness can be seen in trammel nets as a loose pile of inner webbing at the bottom of the net.

METHODS AND MATERIALS

The hobbled gill nets used in this study had only one wall of webbing, yet utilized a principle of entangling fish similar to trammel nets. Two modifications in the design of "standard" gill nets made this possible. Vertical hobble lines running through the webbing were tied to the float and lead lines to prevent the webbing from hanging its full vertical depth. The hobble lines were tied on six foot intervals at each float (Figure 1). The nets used were 3.0-3.5- and 4.0-inch mesh and were hobbled to fish approximately 6.5 feet in depth. Without hobbling these nets would have hung between 8.0 and 8.5 feet in depth.

Figure 1. Hobbled gill net with hobble line passing through webbing between float and lead lines preventing webbing from hanging its full vertical depth.

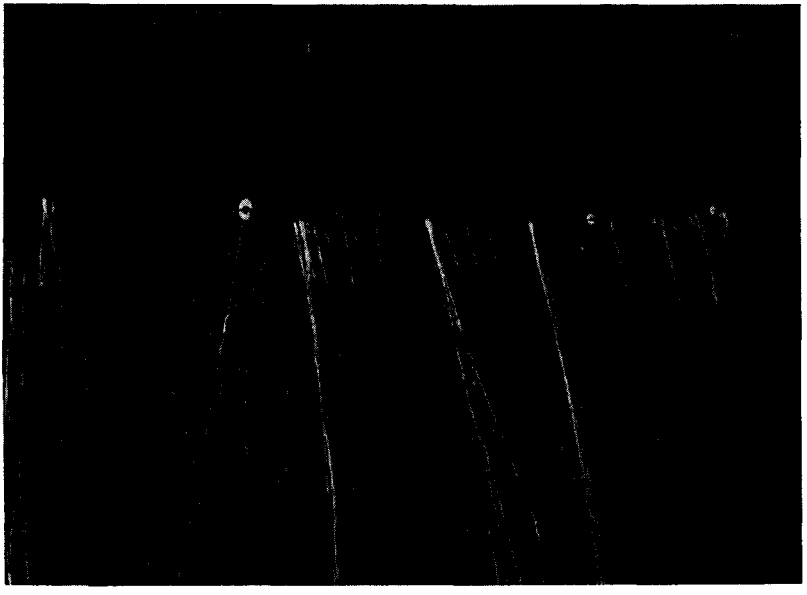

Figure 2. Horizontal construction of hobbled gill net showing 24-inch hanging drops allowing loose webbing mass to slide along two-foot section of net.

Horizontally, the webbing was hung on a one-half basis. Horizontal looseness in the webbing mass, similar to that obtained in the vertical design of the net, was accomplished by constructing the nets with 24-inch hanging drops (attachment of webbing to float and lead lines). This allowed loose webbing to slide horizontally a distance of two feet on each hanging drop (Figure 2). All of the nets were constructed with 139 bonded nylon webbing and with 120 braided nylon float and lead lines with tight fitting plastic floats and lead weights. As noted by Chance and Hassebauer (1958), braided nylon for float and lead lines greatly aided setting and handling of the nets.

The vertical slackness caused by the hobble lines produced a loose pile of webbing along the bottom of the net. This made the bottom portion of the net particularly effective for entangling fish in a pocket-like manner similar to trammel nets. The horizontal looseness in the webbing obtained from the 24-inch hanging drops, aided the catching efficiency of the net and allowed most fish to become caught without entangling more than a two-foot linear section of net.

Each of the nets was 300 feet in length and 6.5 feet in depth. All sets were fixed on the lake bottom normally in a straight line in water ranging from 15 to 35 feet deep and at least 300 feet from shore. Most sets were made perpendicular to the shoreline across inundated creek channels and ravines.

RESULTS

The total number, weight, percentage by number and percentage by weight of each species are presented in Table I. A total of 3,200 fish weighing 20,252 pounds was taken during a total of 1,085 net days. A net day equals 300 linear feet of net fished 24 hours. Hobbled gill nets were particularly effective in taking flathead catfish. Of the total catch, 1,270 were flathead catfish weighing 13,033 pounds. This was 64.4 percent by weight of the total harvest. River carpsuckers and carp comprised 22.1 and 7.2 percent by weight respectively of the total catch. Rough fish, as defined by Oklahoma law, composed 97 percent by weight of the total catch. Game fish caught were channel catfish, large-

mouth bass and white crappie which composed 2.2, 0.4 and 0.4 percent by weight respectively of the total harvest. A comparison of the total catches made with 3.0-, 3.5- and 4.0-inch-mesh nets is shown in Table II.

TABLE I

NUMBER, WEIGHT, PERCENTAGE BY NUMBER AND BY WEIGHT OF EACH SPECIES TAKEN WITH HOBBLED GILL NETS IN LAKE CARL BLACKWELL, OKLAHOMA, FROM SEPTEMBER, 1957 THROGH DECEMBER, 1958

Common Name	*Scientific Name*	*No.*	*Wt. (Lbs.)*	*% by No.*	*% by Wt.*
Commercial Species:					
Flathead Catfish	*Pylodictis olivaris*	1,270	13,033	36.69	64.35
River Carpsucker	*Carpiodes carpio*	1,100	4,478	34.38	22.11
Carp	*Cyprinus carpio*	452	1,465	14.14	7.23
Freshwater Drum	*Aplodinotus grunniens*	123	415	3.85	2.14
White Bass	*Roccus chrysops*	67	230	2.09	1.13
SUBTOTAL		3,012	19,621	94.15	96.96
Game Species:					
Channel Catfish	*Ictalurus punctatus*	79	452	2.47	2.23
Largemouth Bass	*Micropterus salmoides*	17	94	0.50	0.40
White Crappie	*Pomoxis annularis*	92	85	2.88	0.41
SUBTOTAL		188	631	5.85	3.04
TOTAL		3,200	20,252	100.00	100.00

The average total catch per net day for 3.0-, 3.5- and 4.0-inch-mesh hobbled gill nets was 27.1, 17.6 and 15.4 pounds respectively. Flathead catfish comprised only 17.9 percent of the total catch in 3.0-inch nets, but comprised 73.7 and 95.0 percent respectively of the total catch in 3.5- and 4.0-inch nets (Table II). The average catch of flathead catfish per net day in 3.0-, 3.5- and 4.0-inch-mesh nets increased from 4.9 pounds to 13.0 and 14.6 pounds respectively (Table

TABLE II

COMPOSITION OF CATCHES MADE WITH 3.0-, 3.5- AND 4.0-INCH BAR MESH HOBBLED NETS IN LAKE CARL BLACKWELL, OKLAHOMA, FROM SEPTEMBER, 1957 THROUGH DECEMBER, 1958

	*3.0-Inch Bar Mesh 206 Net Days**			*3.5-Inch Bar Mesh 506 Net Days*			*4.0-Inch Bar Mesh 373 Net Days*		
	No.	*Lbs.*	*E†*	*No.*	*Lbs.*	*E*	*No.*	*Lbs.*	*E*
Commercial Fish:									
Flathead Catfish	155	1,001.0	17.9	696	6,573.0	73.7	419	5,459.0	95.0
River Carpsucker	776	3,111.3	55.7	307	1,267.3	14.2	17	99.5	1.7
Carp	365	1,123.9	20.1	74	310.7	3.5	13	30.4	0.5
Freshwater Drum	24	39.4	0.7	90	350.2	3.9	9	25.4	0.4
White Bass	56	197.1	3.5	11	32.9	0.4	..	. . .	. .
SUBTOTAL	1,376	5,472.7	97.9	1,178	8,534.0	95.7	458	5,614.3	97.6
Game Fish:									
Channel Catfish	7	22.4	0.4	50	295.4	3.3	22	134.2	2.4
Largemouth Bass	11	54.5	1.0	6	39.5	0.4	..	. . . .	. .
White Crappie	61	36.4	0.7	31	48.6	0.6	..	. . . .	. .
SUBTOTAL	79	113.3	2.1	87	383.5	4.3	22	134.2	2.4
TOTAL	1,455	5,586.0	100.0	1,265	8,917.5	100.0	480	5,748.5	100.0

* A net day equals 300 feet of net fished 24 hours.

† Percentage of total weight.

III). The average size flathead catfish taken in 3.0-, 3.5- and 4.0-inch-mesh hobbled gill nets was 6.5, 9.4 and 13.0 pounds respectively. A general decrease in the catch, other than flathead catfish was concomitant with each increase in mesh size. Approximately 75 percent of the total weight of carp and 70 percent of the total weight of carpsuckers was taken in 3.0-inch nets although this mesh size was used for only 19 percent of the total fishing effort.

TABLE III

AVERAGE POUNDS OF FISH TAKEN PER NET DAY IN VARIOUS MESH SIZES OF HOBBLED GILL NETS IN LAKE CARL BLACKWELL, OKLAHOMA, FROM SEPTEMBER 1957 THROUGH DECEMBER, 1958

	Bar Mesh in Inches		
	3.0	*3.5*	*4.0*
Commercial Fish:			
Flathead Catfish	4.86	12.99	14.64
River Carpsucker	15.10	2.50	0.27
Carp	5.46	0.61	0.08
Freshwater Drum	0.19	0.69	0.07
White Bass	0.96	0.06	...
SUBTOTAL	26.57	16.85	15.06
Game Fish:			
Channel Catfish	0.11	0.58	0.36
Largemouth Bass	0.26	0.08	...
White Crappie	0.18	0.09	...
SUBTOTAL	0.55	0.75	0.36
TOTAL	27.12	17.60	15.42

DISCUSSION

A decrease or increase in the catch per unit effort with corresponding changes in mesh sizes is usually reflective of the composition of the population. Most freshwater commercial fish populations contain greater poundages of fish within the catchable size range of 3.0-inch nets than 4.0-inch nets, therefore, an increase from 3- to 4-inch nets tends to decrease the potential catch. White (1959) reported a general decrease in the poundage of all fishes taken with each increase in mesh sizes of whip-set trammel, fixed trammel, riprap and gill nets in Alabama's T. V. A. lakes.

Moyle (1949) pointed out the following as the primary factors influencing the catch of gill nets: (1) movement of fish; (2) shapes and structure of fish; and (3) grouping patterns of fish. In addition to these factors it is suggested that the specific design and construction of the net, including looseness of webbing and diameter of the webbing twine can greatly influence gill-net catches. In the present study the catch of flathead catfish increased with each increase in mesh size. A larger mesh normally means a larger average size fish. The relative effectiveness of different mesh sizes of hobbled gill nets may increase beyond the simple mechanics of larger fish with each increase in mesh size. It seems possible that the specific behavior of flathead catfish in relation to the design of this net could cause larger mesh sizes to be more effective than smaller meshes. However, the true efficiency of any gear can not be based on the catch alone but the catch in relation to what is available. Lake Carl Blackwell was first impounded in 1936-37 and has no record of commercial harvest prior to this study. The lake may have developed a "mature population" of flathead catfish with the greatest percentage of the total poundage comprised of individuals larger than the average size flathead catfish taken in 3.5-inch nets. This would provide a greater poundage of flathead catfish to be caught in 4.0-inch mesh nets than in 3.0- or 3.5-inch nets, resulting in an increase in the catch per net day with each increase in mesh size.

It is unfortunate that no comparative tests were made with other nets during this study. The catch per unit effort data herein reported for hobbled gill nets are among the highest listed for taking catfish in entanglement types of commercial gear. White (1959) reported catches of 13.3, 6.2 and 3.4 pounds of catfish (three species) per net day in 3.0-, 3.5- and 4.0-inch mesh whip set trammel nets respectively, while the same respective mesh sizes of regular trammel nets caught only 2.0, 2.0, and 1.9 pounds of catfish per net day. Starrett and Barnickol (1955) using 1.5-, 2.0- and 3.0-inch-mesh trammel nets on the Mississippi River stated "trammel net seems to be a very inefficient method for taking catfish." Houser (1957) listed a six-month commercial catch from Lake Texoma taken in flag or "shirt tail" type gill nets and regular gill nets (primarily 4.0-inch-mesh nets) which included over 23,500 pounds of catfish but did not list the catch per unit effort.

Care should be exercised in making comparisons between commercial fishing gears from different areas. Variations in fish populations and differences in personal techniques of the users can cause erroneous comparisons in different gears or the same type of gear. Although no comparative tests were made with other nets, it is believed that the hobbled gill net is an efficient modification over standard gill nets for certain purposes and may be more selective for large flathead catfish than other entanglement types of commercial gear.

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SOME EFFECTS OF LIME APPLICATIONS TO WARM-WATER HATCHERY PONDS

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ABSTRACT

The results of applying ground limestone ($CaCO_3$) and quicklime (CaO) to hatchery ponds used for the culture of bluegills (*Lepomis macrochirus*, Raf.) are described. Effects appeared to be beneficial in the sample of ponds treated. Quicklime was difficult to apply because of caustic effects to skin of personnel handling it.

Laboratory experiments indicated that hydrated lime ($Ca[OH]_2$) could be used to produce a pH as alkaline as that obtained from quicklime provided that an equivalent amount of calcium was used in the hydrated form.