

EVALUATION OF EFFECT OF TROTLINE USE ON THE POTOMAC RIVER FISHERY

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INTRODUCTION

This study was designed to bring about a better understanding of the potential of a newly proposed fishing gear for the Potomac River, trot or set lines. The study resulted from the concern expressed by anglers about the possible effects upon the fishery should this type gear be permitted. Bass fishermen were divided in opinion. There were those who felt that the removal of catfish would aid bass fishing. There were, on the other hand, those who were strongly opposed to the use of trot or set lines because they felt that the bass populations would be excessively exploited by trotlines. In particular it was expressed that the use of cut scaled bait or live baits, for example shiners or crayfish, would harmfully exploit the gamefish population. The depth of this concern has been clearly established. The use of similar gear (bushbobs or bank-poles) is prohibited in all but three of the 23 Maryland counties. The present regulations (1959) are as follows: "It shall be lawful in the waters of Potomac and Monocacy Rivers within Carroll, Washington and Frederick Counties for any resident of this State who has secured a resident angler's license to use bush-bobs or bank-poles (not exceeding a total of twenty-five (25) in all and not exceeding one (1) hook to a pole or bob)." "It shall be unlawful to use bush-bobs or bank-poles on any streams stocked with trout." "It shall be unlawful to use any bush-bob or bank-pole which has been baited with scale bait or live bait to catch suckers, catfish, carp, eels, gudgeons, and all species of sunfish, including bluegills, rock bass, commonly known as red-eye." "No person shall use a bush-bob or bank-pole except between the hours of sunset and sunrise."¹

DESCRIPTION OF TEST AREA

The area selected for testing trotlines and recording the catch was the vicinity of Edward's Ferry on the Potomac River in Montgomery County, Maryland.

Average depth in the experimental area was 3½ feet which is typical of the river for a distance of approximately 42 miles. Water levels are higher in spring and drop during late summer and early autumn.

River velocities range from less than 0.5 to more than 2.0 feet per second.

Turbidity, related to parts per million of silica, ranges from 30 to 150.

Bottom composition is approximately 75 percent gravel and rocks and 20 percent sand. Mud deposits amounting to 5 percent are found in the eddies along both banks.

Fish food organisms are abundant in the test area. Some of the more common ones are forage fishes, *notropis* spp.; crayfish, *Cambarus* sp.; mayflies, *Ephemera*; stoneflies, *Plecoptera*; and caddisflies, *Trichoptera*. The Potomac in this sector is richer in variety and abundance of aquatic life than many rivers in the East. (Patrick, 1957.)

The test area supports approximately 182 pounds of fish per acre. Table I shows the weight composition by species. (Sanderson, 1958.)

The harvest of channel catfish, smallmouth bass and panfishes in this sector of the river determined by tagging revealed a low rate of exploitation and revealed that catfishing effort and harvest could be increased. Table II is a summary of tagging results. (Sanderson, 1958.)

PROCEDURE

A schedule from May to October was established for this experiment. Three were two test periods each date the trotlines were fished. The first was for four hours preceding darkness, the second for four hours after sunset. Five lines or skates about 100 feet long, each rigged with 25 hooks, were employed. Hook sizes were selected to match the size and

¹ ARTICLE 66C Relating to Birds, Game and Inland Water Fish. State Wide Laws of Maryland, 1959. GIFC Annapolis, Md.

type of bait used and ranged in size from #4 to 3/0. Hooks were the "eagle claw" design with incurving hollow ground points and ringed eye. Dropper lines from the main line were about 24 inches in length and attached with a snap swivel. The use of swivels prevented the dropper line from twisting in currents and prevented loss of fish which could twist the line and pull free. Baits tested were worms and night crawlers; cut pieces of goldfish, *Carassius auratus*, with the scales remaining; live goldfish, live shiners, *Notropis* sp.; beef melts; commercially prepared catfish bait and live crayfish. The live baits and cut scaled bait were chosen particularly to test their effectiveness in taking smallmouth bass, *Micropterus dolomieu*, and species other than channel catfish, *Ictalurus punctatus*, which are common in the test area.

RESULTS

Many of the environmental variables which might affect trotline catches were observed and recorded. Approximately one half of the test hours were in daylight, the other half after sunset.

Air temperature varied from 40° to 92°F. Water temperature ranged from 51°F to 87°F.

On two scheduled test days high water with the river out of banks prevented setting and fishing the lines. Trotlines were fished under clear skies, cloudy skies, during rain and during thunderstorms.

Table III shows the fishing effort by hook hours and date for the baits tested. A total of 17,400 hook hours were recorded, one half in daylight, one half at night.

Trotlines caught almost exclusively channel catfish. Table IV shows the number, percent of catch, average length, and average weight for species taken. More than 95 percent of the fish taken were channel catfish. The six other species taken formed less than 5 percent of the total. Smallmouth bass, a popular game species, formed only 1.1 percent of the catch.

The average channel catfish taken by trotlining was 15.3 inches long and weighed 15 ounces (Table IV). There was no significant difference between the size of day caught or night caught catfish. The average length of catfish taken by rod anglers measured almost the same (15.1 inches). Both trotlining and rod angling selected samples from the same age class of the population.

Length and weight of catfish taken by the seven baits tested revealed no statistically significant difference for one bait to take larger fish than another.

Table V records the catch of channel catfish per thousand hook hours for each bait tested. For all seven baits combined, daylight fishing was more productive than night fishing, but not markedly so. For daylight fishing the most effective bait was live goldfish with a catch rate of 80 per thousand hook hours, while live shiners were second with 65. Pieces of uncolored goldfish were third with 26 and worms and nightcrawlers, considered as one bait, were fourth with 22. Live crayfish were fifth with 15 and commercial catfish bait sixth with 6. Beef melts, which ranked seventh and last, caught no fish during the daylight trials.

For night trotlining, live goldfish were again first with a catch rate of 58 per thousand hook hours; however, pieces of uncolored goldfish were second with 45, not third as in daylight tests. Live shiners were a close third with 44 and live crayfish fourth with 22. Worms and night-crawlers were fifth with 15, commercial catfish bait sixth with 8, and beef melts were again last with a catch rate of only 5 per thousand hook hours.

Periods of above average catches of channel catfish were associated with rising water levels and increases in velocity and turbidity. Toward the end of the survey period in October when water temperature decreased markedly the catch rate dropped.

All fish caught by trotlining were marked by clipping the left pectoral fin and returned to the water alive. The abundance of channel catfish in the area was confirmed by the few recaptures on the trotlines. Only six of the 648 catfish caught during the trial were recaptures. The population fished by the trotlines is large and fast growing as indicated by electrofishing, tagging and growth analyses.

DISCUSSION

A prediction of the trotliner's average catch of channel catfish using a 25 hook trotline fished at hour intervals was calculated from the experimental catch statistics and is shown in Table VI. The catch would vary depending upon the bait used and would rank in the same order as in Table V for day and night sets.

Day catches would vary from a high of 8 using live goldfish to a low of none using beef melts for an average four hour set.

Night catches would vary from a high of about 6 using live goldfish to a low of one for the poorest bait, beef melts.

Creel census of rod anglers made in the same area of the river as a part of the Federal Aid program revealed an average catch rate of 1.68 fish per hour (including "throwbacks") in the summer of 1957 (June 1 to September 1). The creel rate was 1.19 fish per hour. For a four

TABLE I.
POTOMAC RIVER FISH POPULATION *
Montgomery County, 1957

<i>Species</i> **	<i>Estimated Population</i> (pounds per acre) ¹
Bluegill	7
Brown Bullhead	2
Channel Catfish	41
Carp	12
Crappie ²	2
Eel	7
Fallfish	3
Hog Sucker	17
Largemouth Bass	2
Pumpkinseed	1
Rock Bass	3
Redhorse Sucker	51
Smallmouth Bass	16
Redbreasted Sunfish	14
Yellow Bullhead	2
Creek Chub	1
Miscellaneous species	1
Total	182

* See page 257, Transactions Twenty-third North American Wildlife Conference, 1958.

** Common names are those listed in Special Publication No. 2, American Fish Society, 1960.

¹ Smallmouth 9.0-inches-plus, all other species 5.0-inches-plus.

² *Pomoxis annularis* and *P. nigro maculatus*.

TABLE II.
SUMMARY OF TAGGING OPERATIONS IN THE POTOMAC RIVER BASIN.

<i>Species</i>	<i>No of Fish Tagged</i>	<i>No. Reported Recovered by Anglers</i>	<i>Per Cent Re- ported Re- covered by Anglers</i>
Bluegill	269	2	0.7
Brown Bullhead	145	1	0.7
Channel Catfish	1406	41	2.9
Crappie	375	17	4.5
Largemouth Black Bass	170	5	3.0
Pumpkinseed	28	1	3.6
Rock Bass	195	7	3.6
Smallmouth Black Bass	745	56	7.5
Yellow Bullhead	120	2	1.7
Yellowbelly Sunfish	2228	32	1.4
Total all species	5681	164	2.8

² *Pomoxis annularis* and *Pomoxis nigro-maculatus*

TABLE III.
FOR BAITs TESTED BY TROT LINES, POTOMAC RIVER, MONTGOMERY COUNTY, MD.*

Date 1959	Worms & Night Crawlers		Pieces of Uncolored Goldfish		Live Goldfish		Crayfish		Beef Melts		Commercial Catfish Bait (Notropis Sp.)		Shiners		Total Hook Hours		
	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	
**May 5	400	400	400	400												400	400
May 12	250	250	250	250	250	250										500	500
May 20			500	500	500	500										500	500
May 28			500	500	500	500										500	500
June 8	100	100			100	100	200	200			100	100	100	100	100	500	500
June 10	100	100	400	400												500	500
June 16	100	100			400	400										500	500
June 23	100	100	100	100							100	100	200	200	200	500	500
July 2			200	200			300	300								500	500
July 9	100	100	100	100			100	100	100	100	100	100	100	100	100	500	500
July 22	100	100	100	100			100	100	100	100						500	500
**July 29	100	100									100	100	100	100	100	300	300
Aug. 7	100	100									300	300	100	100	100	500	500
Aug. 13	100	100	100	100	100	100					100	100	100	100	100	500	500
Aug. 19	100	100	100	100							100	100	200	200	200	500	500
Aug. 26	100	100	100	100	100	100	100	100			100	100	100	100	100	500	500
Sept. 1			100	100			100	100			200	200	100	100	100	500	500
Oct. 15													500	500	500	500	500
Total Hook Hrs.	1100	1100	1950	1950	1750	1750	400	400	700	700	1100	1100	1700	1700	1700	8700	8700
Grand Tot.																	17400

* 5 trotlines, 25 hooks each, except where indicated by **.

hour trip approximately 4.8 fish were creeled. Four hours is the approximate length of a daily trip. These catches were made by anglers using live baits, cut baits and artificial lures of their selection who were fishing in daylight.

The average of baits tested on trotlines would produce a catch of approximately 3.0 fish per four hour daylight set and 2.8 fish for a night set.

Although the composition of trotline catches was one percent small-mouth bass, rod anglers' catches were 27 percent smallmouth and about 31 percent catfish.

RECOMMENDATIONS

It is recommended that use of a single trotline rigged as described in this report be considered for use in the Potomac River for the following reasons:

- A. There is an abundance of channel catfish which will exhibit better growth and offer less competition to smallmouth bass if harvested in greater numbers.
- B. The trotline, as described, is selective for channel catfish with over 95 percent of the catch formed by this species.
- C. About one (1) percent of the catch can be expected to be small-mouth in good bass habitat. This compares to 27 percent for rod anglers in the same waters.
- D. The catch of fish for the trotline herein described is slightly less than that for comparable effort by angling.

Season, Size and Creel: It was suggested that trotline regulations for channel catfish conform with the regulations for angling; that is, no closed season, no minimum size, no creel limit. Creel of other species should be in conformity with angling regulations.

TABLE IV.
TROTLINE CATCH AT EDWARD'S FERRY POTOMAC RIVER, 1959.

<i>Species</i>	<i>Number</i>	<i>Per Cent of Catch by Number</i>	<i>Average Length* (Inches)</i>	<i>Average Weight (Ounces)</i>
Brown Bullhead <i>Ameiurus nebulosus</i>	8	1.2	9.3	7
Channel Catfish <i>Ictalurus punctatus</i>	642	95.5	15.3	15
Creek Chub <i>Semotilus atromaculatus</i>	1	**	7.0	
Eel <i>Anguilla bostoniensis</i>	5	.7	21.6	24
Smallmouth B. Bass <i>Micropterus dolomieu</i>	7	1.1	8.9	7
Yellowbelly Sunfish <i>Lepomis auritus</i>	2	**	8.5	5
Yellow Bullhead <i>Ameiurus natalis</i>	7	1.1	8.7	6

* Total length

** Less than .5 percent

TABLE V.
CATCH OF CHANNEL CATFISH PER 1000 HOOK HOURS FOR BAITS TESTED IN THE POTOMAC RIVER, 1959.

<i>Bait</i>	<i>Day</i>	<i>Night</i>	<i>Average</i>
Live Goldfish	80	56	69
Live Shiners	64	44	54
Pieces of Uncolored Goldfish	26	45	35
Worms & Night Crawlers	22	15	18
Live Crayfish	15	22	18
Commercial Catfish Bait	6	8	7
Beef Melts	0	5	2
Average of above baits	30.4	28.1	29.0

TABLE VI.
PREDICTED FISHERMAN'S AVERAGE CATCH OF CHANNEL CATFISH
USING 25 HOOK TROTLINE FISHED AT 4 HOUR INTERVALS.*

<i>Bait</i>	<i>Day (4 hours)</i>	<i>Night (4 hours)</i>
	<i>Number of Fish</i>	<i>Number of Fish</i>
Live Goldfish	8.0	5.8
Live Shiners	6.4	4.4
Pieces of Uncolored Goldfish	2.6	4.5
Worms & Night Crawlers	2.2	1.5
Crayfish	1.5	2.2
Commercial Catfish Bait	0.6	0.8
Beef Melts	0.0	0.5
Average of above baits	3.0	2.8

* Regulations Article 66C (1960) pertaining to bait fish include in part the following: "No person, firm or corporation shall take or have in possession more than thirty-five (35) bait fish in any one day taken from non-tidal waters of this State." (see exceptions)

EFFICIENCY AND SELECTIVITY OF FLAG GILL NETS FISHED IN LAKE BISTINEAU, LOUISIANA

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ABSTRACT

In order to determine the efficiency and selectivity of flag gill nets in catching game fish, experimental flag gill nets were fished in Lake Bistineau during the period March through August, 1956. Flag gill nets contain no lead line and are hung on a top line which contains no floats. The experimental nets used consisted of the following mesh sizes: 1.0, 1.5, 2.0, 2.5, 3.0, 3.5 and 4.5 inch square mesh. For summary purposes the various species of fish were grouped into 3 types: (1) commercial fish (2) game fish and (3) other fish. The more valuable commercial fishes were caught at higher rates in the larger mesh sizes. Game fish were caught at higher rates in the smaller mesh sizes. Data are presented on the frequency distributions of the catches per net day which should give a somewhat better idea of the potential of the various mesh sizes of flag gill nets when fished under commercial conditions than the mean catches. The size of fish available to be caught had in many instances a definite effect on the mean length of the fish caught by the various mesh sizes of flag gill nets. The catch of fish by the flag gill nets for the period March through May was compared with the catch for the period June through August and the catch for shallow sets was compared with the catch for deep sets. In order to determine the selectivity of flag gill nets, the relative composition of the flag gill net catches was compared to estimates of the relative composition of the fish population made by rotenone poisoning. Commercial fish and other fish were much more relatively abundant in the flag gill net samples while game fish were considerably more relatively abundant in the samples taken by rotenone poisoning. Attempts have been made to close Lake Bistineau to all commercial fishing. I doubt that either restricting or allowing commercial fishing on Lake Bistineau will have much effect on the fish population. Nevertheless commercial fishing should be allowed since it utilizes a resource that would otherwise be wasted. I would recommend a minimum legal size of 3.0 inch square mesh for gill nets fished in Lake Bistineau based on 2 considerations: (1) the catch of game fish in the various mesh sizes and (2) characteristics of the commercial fishery.