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Movements of Channel Catfish and Flathead Catfish In Beaver Reservoir, Northwest Arkansas

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ABSTRACT

A total of 497 channel catfish, *Ictalurus punctatus*, and flathead catfish, *Pylodictis olivaris*, were tagged in Beaver Reservoir during two November-April tagging periods (1967-68 and 1968-69); total recaptures were 9.5 and 11.7% respectively. The longest time between tagging and recapture was 1622 days (4.4 years) for channel catfish and 494 days (1.4 years) for flathead catfish. The longest distances traveled were 43.1 km by a channel catfish and 44.3 km by a flathead catfish. Fisherman returns indicated that catfish were caught primarily from April through July. The many recaptures, even after long periods, within 1.6 km of the tagging point, suggested that fish moved little, or had homing tendencies. Captures of fish in trap nets indicated that rainfall and inflow possibly stimulated movements of channel catfish during the winter and early spring.

INTRODUCTION

Studies of the movements of channel catfish, *Ictalurus punctatus* (Rafinesque), and flathead catfish, *Pylodictis olivaris* (Rafinesque), in lakes and reservoirs have been limited. Hancock (1954) reported 2 returns from 97 channel catfish and no returns from 4 flathead catfish marked in Fort Gibson Reservoir, Oklahoma. At Utah Lake, Utah, 18 of 1,957 fin-clipped channel catfish were recaptured, but only 4 were recaptured outside the immediate area of tagging (Lawler, 1960). Hart and Summerfelt (1974) defined the home ranges and movements of flathead catfish at Lake Carl Blackwell, Oklahoma, by using sonic tags. Houser (1960) reported a high incidence of homing (about 37% of recaptures) by channel catfish in Lake Lawtonka, Oklahoma, during a study in which trap nets were used to capture fish and jaw tags to mark them. We describe movements and speculate about conditions that cause movement of tagged channel catfish and flathead catfish in Beaver Reservoir, Arkansas.

METHODS

Beaver Reservoir is in the upper White River basin in northwest Arkansas. At conservation pool elevation, the reservoir has a surface area of 11,445 ha and a storage capacity of 2,037,725 $m^3 \times 10^3$. Three major streams enter the reservoir: White River, War Eagle Creek and Richland Creek.

Nearly all fish were captured with Ederer submarine trap nets (nine channel catfish by electrofishing), during two periods of trap net fishing: November, 1967 through April, 1968 and November, 1968 through April, 1969. Four 2.7-m-deep trap nets were fished during the first period, and the same four nets plus two 1.8-m-deep trap nets during the second period. The trap nets were usually lifted every 3 to 4 days, except in late March when the nets were lifted once each week. The trap nets had leads 30.5 to 91.4 m long. The nets were fished at several locations, primarily in the upper half of the reservoir.

The collection of catfish by electrofishing was restricted to the upper White River and War Eagle Creek, 1 to 3 km above the reservoir pool, in late March and April, and was incidental to the collection of white bass, *Morone chrysops* (Rafinesque), for making studies (none of the nine catfish taken by electrofishing was recaptured). The Floy FD-67 internal anchor tag was used to mark most of the catfish captured, but a few dart-type internal anchor tags were used during the first tagging period. Tagging methods and equipment were described by Dell (1968) and Thorson (1967). In the present study, tags were placed on the left side of the fish below the adipose fin.

Tag recovery forms supplied to fishermen requested information on species, location and date of recapture, and the tag number. Reservoir maps were used to compute the shortest distances between locations of marking and recapture in the lake. All length measurements given are in total length. Recaptures in our trap nets were recorded and the fish released.

Data on rainfall and inflow were abstracted from Monthly Reservoir Operation data sheets prepared by the U. S. Army Corps of Engineers, Little Rock District, Little Rock, Arkansas.

RESULTS

Channel Catfish: A total of 497 channel catfish 220 to 710 mm TL (mean 398 mm TL) were tagged in the study. There were 47 recaptures (9.5%) during the four years following tagging (Table I). Anglers returned 38 tags (81%), and 9 tags (19%) were recovered in our trap nets. The longest time interval between tagging and recapture was 1622 days (4.4 years) with the mean interval of 195 days. An analysis of the movements of channel catfish by season, distance, days, and direction from tagging to recapture (Table II) showed that recaptures were made in every month except September, November, and December. The highest number (13) occurred in May.

The maximum distance traveled was 43.1 km (upstream from the tagging point), and the mean distance was 6.1 km. Of 47 recaptures, 11 were recovered upstream, 18 downstream, and 18 within 1.6 km of the tagging point; 36 (76%) were recaptured within 8.0 km of the point of tagging.

The numbers of channel catfish in the trap net catches increased after heavy rainfalls and associated high inflows during the period December through February (Fig. 1). Light rainfalls in late December, 1967 and early January, 1968 were followed by high catches of channel catfish. Heavier rainfall in late January, 1968 was followed by increased catches. Catches increased from late February to mid-March, 1968, during early spring rains. Heavy rain and high inflows on December 26 to 29, 1968, and January 28 to 30, 1969, were followed by the highest catches recorded. The high catches of February 24, 1969, appeared to indicate increased activity of channel catfish associated with spring warming trends.

Flathead Catfish: One hundred seventy-one flathead catfish were tagged during the two tagging periods (Table I). The total length ranged from 400 to 1020 mm, with a mean total length of 714 mm. There were 20 recaptures (11.7%), 15 (75%) by anglers and five

Table 1. Summary of channel and flathead catfish tagging and recaptures by tagging period, percent, and year of recapture in Beaver Reservoir, Arkansas.

Species and tagging period	Number tagged	Years of recapture											
		1967-68		1968-69		1970		1971		1972		1973	
		No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Channel Catfish													
1967-68	197	11	5.6	0	-	0	-	0	-	0	-	0	-
1968-69	300	-	-	30	10.0	1	0.3	3	1.0	1	0.3	1	0.3
Totals	497	11	2.2	30	6.0	1	0.2	3	0.6	1	0.2	1	0.2
Flathead Catfish													
1967-68	94	9	9.6	1	1.1	0	-	0	-	0	-	0	-
1968-69	77	-	-	8	10.4	2	2.6	0	-	0	-	0	-
Totals	171	9	5.3	9	5.3	2	1.2	0	-	0	-	0	-

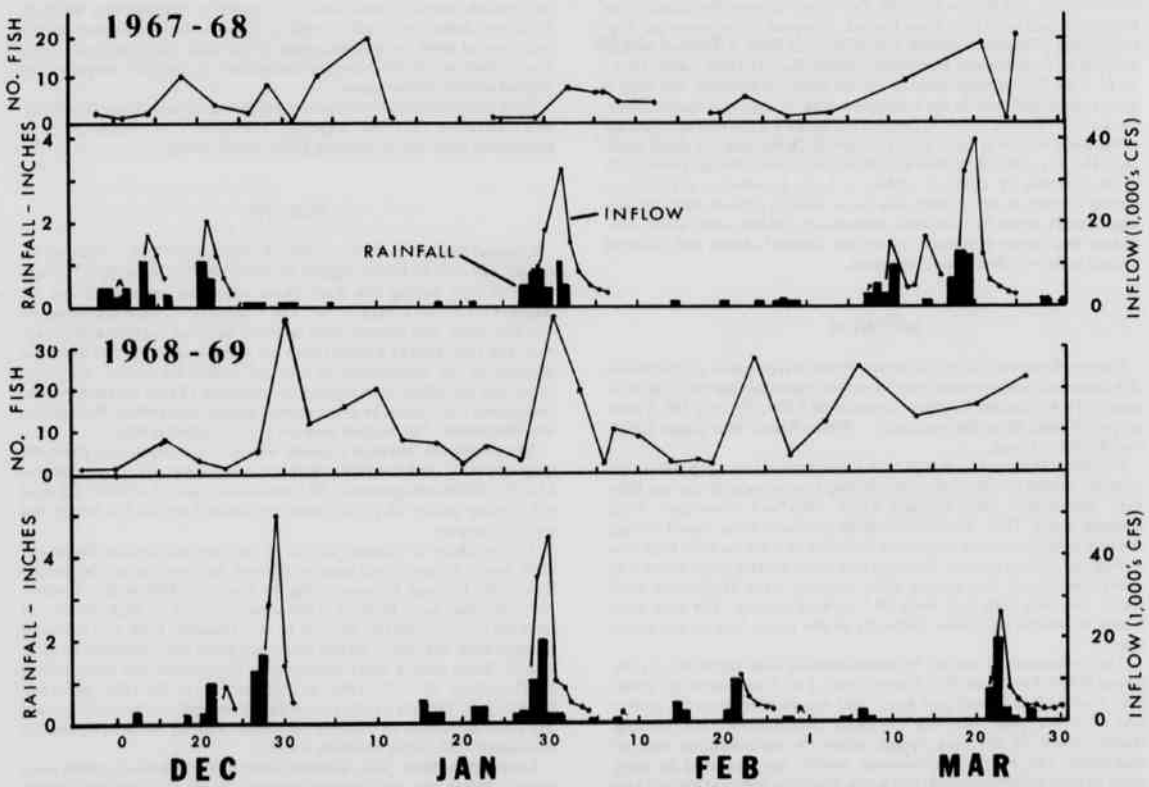


Figure 1. Beaver Reservoir trap net catches of channel catfish, rainfall, and inflow for two tagging periods from December, 1967 to March, 1968 and December, 1968 to March, 1969. The rainfall and inflow data are taken from U. S. Army Corps of Engineers reports which are reported in the English units used here.

Table II. Channel catfish and flathead catfish recaptures upstream, downstream, and within 1.6 km of the tagging point in Beaver Reservoir, Arkansas, from 1967-68 and 1968-69 tagging period (data combined). (CC = channel catfish; FH = flathead catfish)

Months of recapture, distance from tagging site, and days at large[a/]	Upstream		Downstream		Within 1.6 km		Total	
	CC	FH	CC	FH	CC	FH	CC	FH
Months								
January	-	-	-	-	2	1	2	1
February	-	-	-	-	1	1	1	1
March	-	1	-	1	5	1	5	3
April	3	-	1	2	3	-	7	2
May	4	5	5	1	4	1	13	7
June	3	3	2	-	2	1	7	4
July	-	1	7	-	-	-	7	1
August	-	-	2	1	1	-	3	1
October	1	-	1	-	-	-	2	-
Kilometers								
0-1.6	-	-	-	-	18	5	18	5
1.7-8.0	5	2	13	3	-	-	18	5
8.1-16.1	3	4	4	1	-	-	7	5
16.2-24.1	2	1	1	1	-	-	3	2
24.2-32.2	-	1	-	-	-	-	-	1
>40.3	1	2	-	-	-	-	1	2
Days at large								
1-10	-	-	-	1	3	3	3	4
11-20	-	-	-	1	1	-	1	1
21-50	2	2	-	-	5	1	7	3
51-100	3	-	5	2	5	-	13	2
101-150	4	2	7	-	2	-	13	2
151-200	-	3	1	-	1	-	2	3
201-250	2	2	-	-	-	-	2	2
351-400	-	1	-	-	-	-	-	1
451-500	-	-	-	1	-	1	-	2
501-1000	-	-	3	-	1	-	4	-
1001-1650	-	-	2	-	-	-	2	-
Total recaptures	11	10	18	5	18	5	47	20

[a]No recaptures in September, November, or December; no recaptures of fish that moved 32.3-40.2 km; and no recaptures of fish that were at large for 251-350 or 401-450 days.

(25%) in our trap nets. Flathead catfish recaptures and movements by season, time, and direction from tagging to recapture are given in Table II. There were seven recaptures (35%) in May, four (20%) in June, three in March, two in April, and one in January, February, July and August.

The longest interval between tagging and recapture was 494 days (1.4 years); mean interval was 86.9 days. The longest distance traveled was 44.3 km, shared by two fish.

DISCUSSION

The trap nets intercepted catfish during migration or movement within their home ranges. Because there were no multiple recaptures, it is difficult to distinguish migration from movement within the home range. Houser (1960), reported that about 37% of 96 total recaptures from 1002 marked channel catfish were in the trap where the fish were caught and tagged. His fish were released at distances of 1,450 to 6,180 feet from the trap captured, and the highest recapture numbers in the traps of original capture came from the longest distances, indicating strong homing trends. In the present study, two channel catfish were at large 2.7 and 2.6 years after tagging and recaptured 2.4 and 1.6 km, respectively, from the tagging point, also suggesting strong home range orientation. Of the downstream recaptures, seven (39%) were recaptured in July, and two in August. These data suggest that channel catfish migrate back to a home range area after having completed a spring upstream migration. Flathead catfish displaced and tracked with sonic gear at Lake Carl Blackwell tended to return to their original home range area (Hart and Summerfelt, 1974). In the present study one flathead catfish was recaptured about 0.4 km from the tagging point 481 days (1.3 years) after tagging. Other flathead catfish were recaptured within 1.6 km of the tagging point of to 24 days after tagging, suggesting that we had intercepted their movements within a home range. Hart and Summerfelt (1974) were able to show catfish movement capabilities for a short period of time, such as 2,216 m in 39.5 h, or 58.6 m/h. In our study the time required to move a measured distance was predicated on recaptures and did not allow the measurement of lateral movement, velocities for short periods, or depth distribution patterns.

Four of our tagged fish moved considerable minimum measured distances upstream between tagging and recapture. A channel catfish was recaptured 16.6 km 31 days after tagging and three flathead catfish were recaptured 28.9 km in 35 days, 44.3 km in 170 days and 44.3 km in 202 days after tagging, all suggesting a spring migration and temporary departure from the home range.

Movements of channel catfish during the winter have not been documented. There was evidence that winter movement or activity was stimulated by rainfall, reservoir inflows, or a combination of both conditions. Catches of channel catfish in trap nets during the winter were higher after a period of inflow greater than 282 m^3/sec. (10,000 cfs) or a rainfall of 2.5 cm (1 in.) or more (Fig. 1) with two exceptions: (1) late December, 1967, and (2) mid to late February, 1969. During those periods, catches exceeded ten fish and rainfall was less than 10 cm (0.5 in.), or inflow was less than 142 m^3/sec. Alabaster (1970) found that the movements of salmonids in rivers were influenced by conditions associated with naturally occurring freshets, rather than with a high flow. Although no temperature data are available for the years of our study, Beaver Reservoir minimum temperatures (below 10°C) from 1964 to 1967 were reached by late February (Mullen et al., 1970). From the data it is believed that rainfall and inflow increase the movements of catfishes.

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