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The Channel Catfish was shown by Speaker (1948) in a sample of 1800 Iowa anglers to be the most important species of fish inhabitating the inland streams of Iowa. Therefore, any information concerning its life history and habits is important and of value in formulating a management policy for the species. To get information on the life history and habits of the channel catfish, tagging experiments were initiated in 1947. Tagging was carried on through 1949 and recoveries are continuing. The information sought by this investigation was: (1) to study the possibility of using marked fish for an inventory of stream populations of channel catfish, (2) to determine the extent of movements of catfish in Iowa's inland streams, and (3) to secure factual information relative to the rate of growth of catfish in what is presumed to be good catfish habitat.

The purpose of this paper is to record the information gathered to date and to discuss the value of the methods employed as instruments for studying the channel catfish.

Inasmuch as this study was to run for several years, it was decided that an internal tag would be most suitable. The tag used was fabricated from small metal operical fish tags by using only the portion bearing the serial number. This resulted in a bar type tag one thirty-second of an inch thick by three-sixteenths wide by one-half inch long. These were inserted in the catfish by a simple operation. A small slit was made in the fish's belly, a little ahead of the pelvic fin, with a sharp decurved scalpel. The tags were then inserted through the opening with the aid of a pair of fine forceps. In order to recognize the tagged fish, the adipose fin was clipped from all tagged individuals. Tagging and release was always accomplished immediately at the site of capture and careful notes concerning the date, location, length, weight, waterstage and tag number were recorded for each fish marked.

As is the case with any type of fish tag, the internal tag employed in this study demonstrated certain disadvantages. Of first significance, they were not easily found in the fish. Being small they were often embedded in the visceral fat or in a few other cases, walled-off by a peritoneal-like substance. This, of course, precluded any

more than just a few returns from anglers. Secondly, there was some tag-expulsion. It is possible this may have occurred shortly after marking. The mechanics at work that caused the internal tag to be shed are not clearly understood. No tags were found in approximately 10% of the fish recaptured.

The advantage of the internal tag of the type used in this study is that it does not offer any impediment or unusual stimulus to the fish's way of living. This may be very important in the study of fish movements.

The metric system of weights and measurements were employed for reason this system permits finer accuracy, particularly in the instances of weight. Small changes that occur on fish tagged for short periods are more readily discernible than would be the case if the English system were used.

To facilitate compilation of the data, each recovery was recorded on separate cards as shown in Figure I.

In the course of the study, 4,032 channel catfish were tagged at 28 stations distributed over approximately 500 miles of stream. Tagging was at a rate of 2,484 fish in 1947, 652 in 1948, and 895 in 1949. To date, 101 tags, or about 2% have been recovered. Of these, 12 were recovered in 1947, 25 in 1948, 52 in 1949, 6 in 1950, 2 in 1951, and 4 in 1952. Sixteen were returned by fishermen while the remaining 85 were taken in our regular netting activities or at fishway traps. Baskets or entrapping devices were affixed at the upstream throat of modified Denil-type fishways installed in certain of the dams in the river. The pertinent information concerning each of the tagged fish returned is given in Table II.

The 2,484 fish tagged in 1947 were captured and released at 28 stations that were quite evenly distributed over the Des Moines River drainage which includes the main stream to the Minnesota state

FISH TAG RETURNS

Biology Section
State Conservation Commission

Species	Tag Number	Date Tagged .....
Wt. Tagged.....	Wt. at Capture	Gain .....
Length Tagged	Length at Capture	Gain .....
"K" Tagged	"K" at Capture	Change .....
Place Tagged	Place Capture	Dist. moved .....
No. days Tagged	Water Stage Date Tagged	
Water Stage Capture		
Taken by	At	Date .....

Fig. 1. Card used for recovery information of tagged catfish, size 4 x 6.

line, the East Fork to Algona, the Boone to Goldfield, and the Raccoon upstream to Auburn. Those marked in 1948 and 1949 were mostly taken in the fishway traps at Fort Dodge and Humboldt.

Recoveries in 1947 and from 1950 on were at a low rate. This is explained by the fact that in 1947 our activities were spread out to the extent that there was very little opportunity to rework areas where fish had been tagged previously. Since the bulk of tagging was done prior to 1948, there has probably been a steady decline in the number of tagged fish in the river if from no other reason than by angling. Recoveries in 1948 and 1949 were at higher levels. During these years much of our work concerned a study of fishways, and fish that were tagged at these sites were recovered in larger numbers for at least two reasons. First, continued tagging on these areas resulted in a larger concentration of marked fish in the vicinity of the fishways, and secondly, the fishway traps were in constant operation throughout the open water season which, in effect, offered a much better chance to retake the marked fish. Of the 85 recaptured by us, 69 were secured in the fishway traps. Of these, 35 were taken at Fort Dodge and 32 at Humboldt, and one each at Des Moines and Rutland. This was expected since the larger number of fish were tagged at the first two mentioned stations.

From the data obtained in this work, it is immediately apparent that tagging fish has very little to offer in the way of making stream inventories of channel catfish. In the six years of study, approximately 45,000 catfish have been examined for tags by the writer alone. Inasmuch as only 87 or .002% of these had been tagged, it is obvious that the ratio of tagged to untagged fish is too small to be of any statistical significance. Even at the fishways, where the effort was many times more intensive than elsewhere, only 67 indi-

Table 1

A Comparison of Tagged Fish Recovered to Fish Examined for Tags from the Des Moines River Drainage for the Years 1947 Through 1952.

Year	Recaptured in Regular Survey	Number of Fish Examined	Percent Fish Bearing Tags
1947	9	3,432	.003
1948	20	2,121	.01
1949	47	17,621	.003
1950	5	13,154	.0004
1951	2	4,535	.0004
1952	4	4,365	.001
Total	87	45,202	.002

viduals out of 1,918 tagged there were retaken. This represents a return of about 3½%. This is, of course, a more significant return than mentioned above, but considering the time element required to arrive at the larger figure, it is even more evident that tagging is of very limited value in population studies involving even short reaches of streams the size of the Des Moines River. Table I compares by the years of study, the number of tags recovered in our regular surveys with the number of fish examined for tags over the same period in the Des Moines River Drainage.

The data acquired pertaining to movements, although not extensive, demonstrates quite clearly that catfish are not given to widespread travel in the Des Moines River. Of the 101 tags recovered, only 33 fish had moved from the port of tagging, and of these, 15 had traveled no more than one mile. See Table II. Only two fish had moved more than twenty miles. Thirty-two miles was maximum distance traveled. This was in a down stream direction, and was logged for a fish having been tagged 387 days. Twenty-eight miles was the greatest movement upstream and was recorded on a fish tagged 34 days. Twenty-four tags that had been out from one to more than five years were recovered from fish recaptured in the same areas in which they were marked.

Inasmuch as dams function to inhibit freedom of travel among fish, the remaining information concerning catfish movement will be treated in two parts. The first will deal with recoveries from fish that have had no association with dams. The second will concern fish having been tagged at or near dams.

Twenty-five recoveries were from fish having no association with dams. These are indicated in Table II by an asterick with the tag number. Of the 25, nine had not moved from the point of release even though six of these had been out from two to five years. Four others had moved no more than one mile while three had traveled less than five miles, seven less than ten and only three more than ten miles. Twelve fish had moved upstream, while four had journeyed down.

These findings show considerable variance with the catfish tagging experiments of the Upper Mississippi Conservation Committee (MS). That work, based upon data from the return of 382 tags, concluded tentatively that there was a great deal of general movement of channel catfish in the Mississippi River but no distinct upstream or downstream migration tendency was evident. This conclusion was based upon the fact that there were few returns from

Table 2

Pertinent Data Assembled from the Recovery of Tagged Channel Catfish in the Des Moines River in Central Iowa.

No.	Tag No.	No. Days Tag.	Wt. Gm. Day Tag.	Wt. Gm. Day Capt.	Gain	Tot. Lg. mm. Day Tag.	Tot. Lg. mm. Day Capt.	Gain	Dist. Moved In Mi.
1	8470*	1804	285	1800	1515	155	550	395	0
2	8433*	1803	147	1762	1615	272	517	245	dn.10
3*	9775*	1575	278	1575	1388	360	525	165	dn. 3
4	8249*	1287	103	307	204	251	359	108	up. 1
5*	7485*	1138	70	495	426	240	385	145	0
6	7841*	1078	194	481	287	240	406	160	0
7	8808	1061	173	539	366	289	419	130	0
8	6526*	1036	85	960	875	244	408	164	0
9	6797†	846	29	253	205	184	361	177	dn. 5
10	8929	793	109	539	430	269	368	99	0
11	9067	778	136	360	224	263	365	102	0
12	8450*	769	74	348	274	220	359	139	0
13	8177*	734	148	375	227	261	882	121	0
14	8814	729	88	389	201	224	371	147	0
15*	9671†	729	155			282	368	86	dn. 5
16	8821	716	76	325	249	215	356	141	0
17	8931	709	146	416	270	245	382	137	0
18	8988	694	119	322	103	242	360	118	0
19	8994	679	135	255	120	252	356	104	0
20*	9120	677	209			307	413	106	0
21	9189	672	152	418	266	260	383	123	0
22	9564	658	128	255	127	250	356	106	0
23	9389	651	205	567	362	305	438	133	0
24	9047	578	150	227	77	300	335	35	0
25	7596†	423	175	461	268	275	377	102	up. 5
26	8660	402	161	348	187	271	344	73	0
27	7718†	402	77	192	125	207	286	79	up.14
28	6734	398	85	284	199	207	300	93	0
29	6693	397	80	178	98	219	286	67	0
30	8685	394	430	582	152	344	393	19	0
31	7578†	393	60	227	167	208	286	78	dn.16
32	8136†	387	117	286	169	242	345	103	dn.32
33	8709	383	205	320	115	304	362	58	0
34	6800†	377	75	122	47	200	254	54	dn. 5
35	8242*	375	151	322	171	281	360	79	up. 1
36	6629	352	100	217	117	229	309	80	0
37	8718	347	65	173	108	200	292	92	0
38	8554	343	80	209	129	228	293	65	0
39	8757	337	128	244	116	243	311	68	0
40*	8429*	336	1644	1814	170	549	572	23	0
41	6836	336	132	900	668	265	381	116	0
42	8569	334	117	250	133	267	335	68	0
43*	8880	329	179	625	446	297	425	128	0
44	8549	327	92	177	85	220	293	73	0
45	8620	326	198	324	126	295	347	52	0
46*	6394†	325	92	178	86	231	280	49	up. 5
47	8795	325	90	215	125	223	304	81	0
48	6477†	321	301	524	223	343	379	36	dn.16
49	8628	318	235	301	66	305	340	35	0
50	6976	315	729	1220	491	470	489	19	0
51	6854	311	148	249	101	270	347	77	0
52	6808	305	192	328	136	286	366	80	0

No.	Tag No.	No. Days Tag.	Wt. Gm. Day Tag.	Wt. Gm. Day Capt.	Gain	Tot. Lg. mm. Day Tag.	Tot. Lg. mm. Day Capt.	Gain	Dist. Moved In Mi.
53	9292*	295	210	324	114	298	359	61	dn. 1
54*	9716†	283	242	454	211	362	394	32	dn. 5
55*	8103*	281	250	455	124	320	330	10	up. 6
56	6976	269	729	730	1	476	489	13	0
57*	9825*	241	822			476			0
58*	6075†	97	92	227	135	234	305	71	dn.20
59	8262	69	47	78	30	168	198	30	up. 4
60*	7906*	55	117	148	31	231	260	29	up. 6
61	8030*	50	912	988	76	464	467	3	up. 4
62*	6534*	49	69	260	181	226	305	79	up. 9
63	6027	45	208	229	21	298	316	18	0
64	6104	45	205	223	18	307	320	13	0
65	6134	45	122	146	24	234	259	25	0
66	6628†	43	99	138	39	225	254	29	up. 5
67*	6443*	43	122	152	30	228	254	26	up. 4
68	6744	41	325	357	32	350	361	11	0
69*	9761	40	784			459			up. 9
70	6470†	37	152	160	8	265	280	15	up. 5
71*	6402*	37	184	227	43	298	304	6	dn. 5
72	6913	35	2288	2235	7	210	212	2	0
73*	8511*	34	1446			532			up.28
74	8551	31	155	163	8	293	295	2	0
75	8635	28	111	115	4	273	280	7	0
76*	8685†	27	419			374			dn.11
77	6028	26	100	102	2	235	241	6	0
78	8771	26	144	136	—8	290	292	2	0
79	6339	25	110	115	5	224	230	6	0
80*	6027†	25	175			298			up.¼
81	6174	22	103	104	1	220	220	0	0
82	6823	21	240	249	9	302	310	8	0
83	6191	21	106	110	4	237	240	3	0
84	6849	21	105	110	5	242	249	7	0
85	6236	19	112	112	0	231	233	2	0
86	8018*	18	127	126	—1	244	245	1	up.14
87	6324	15	152	150	—2	271	270	—1	0
88	8214*	13	218	218	0	321	321	0	up. 9
89	8226*	13	101	101	0	258	258	0	up. 9
90	6224	10	207	205	—2	311	313	2	0
91	6312	9	49	50	1	195	195	0	0
92	7924	8	205	203	—2	296	295	—1	0
93	8407†	8	170	170	0	296	296	0	up.12
94	6612	7	116	115	—1	238	239	1	0
95	6251	5	157	155	—2	265	265	0	0
96	6233	5	92	90	—2	291	291	0	0
97	6069	4	205	205	0	291	290	—1	0
98	6323	4	369	368	—1	352	352	0	0
99	6671	4	300	300	0	345	345	0	0
100	6810	3	75	75	0	220	220	0	0
101*	6360	0	95	95	0	224	224	0	0

Up=up stream.
Dn=down stream.
*with number=return by fisherman: recapture data may not be accurate.
*with tag number=tag from fish tagged away from dam sites.
†with tag number=return from fish either having moved away from or up stream after work started.

fish having moved less than ten miles. Journeys above fifty miles were quite common and one fish had moved 180 miles.

What contributed to the greater movement of Mississippi River fish compared to those of the Des Moines River can only be conjecture. Of significance is the difference between the two rivers. The Mississippi, with its greater size and nine foot channel, offers deep water passage for long distances. The Des Moines River, on the other hand, is characterized by a series of alternating deep and shallow water areas. As will be pointed out below, these shallow water areas may act as barriers to the movement of stream fishes. A second factor contributing to the difference may be associated with the point of release of tagged fish with that of their original capture. Most of the Des Moines River fish were returned to the exact spot in which they were secured and in no case were they released more than 100 yards from the point of capture.

Seventy-six returns from the Des Moines River were from fish taken at fishways. Of the 76 fish, 59 had been marked and recovered at the same dam in which case no movement was logged. In that these fish were all taken in traps affixed to fishways, it might be argued that they were attempting an upstream migration, but were blocked by the dam. In connection with this, however, it is pointed out that even though over 1,234 of the tagged fish were returned to the water below the dam, there was very little movement attempted after tagging. Thirty-three returns were from fish that did not try to ascend the dams a second time for over 200 days. Sixteen others did not try a second assault for over 20 days while the remaining 11 made their second attempt between 3 and 20 days. Had the fish caught at the fishways been undertaking a movement upstream, there should have been many more recoveries and these should have occurred within a much shorter length of time. In addition to this, of several hundred fish tagged at dams and released above, not one was caught at the next dam even though one of these was only 5¼ miles further upstream.

Catfish are attracted by current in which instance the increased current at the foot of the fishway is probably the only inducement for fish to move up. Had those catfish been permitted to negotiate the ladders, it is unlikely they would have traveled anymore than a short distance after entering the quiet water pools above the dam. This belief is based mostly on the data cited above.

Another incident lending partical support to this thinking has come from a study of a local population of catfish. This particular population has been under almost constant surveilance for five years. It is contained between two dams on the Des Moines River which are a little over five miles apart. There are two deep water pools in the area. The downstream pool is about three miles long and is separated from the second pool by a relatively shallow reach of river of approximately one mile in length. Something in the order of 10,000 fish were finclipped in the lower pool. These were clipped by different fins on three stations separated by three-quarters of a mile each. Subsequent netting in the entire area has shown catfish to move quite freely from one end to the other in the pool in which they were clipped as opposed to practically no exchange between the two pools. Bangham and Bennington (1938), found native stream fish in Ohio streams to be more or less acclimated to their habitat and not inclined to move over great distances. The present work seems to varify those findings. Returning now to the high incidence of recapture at dams, it is postulated that the deep water at the foot of the dam is in itself an attraction to catfish, and fish caught and tagged and then recaptured there, points up further the narrow latitude of movement of catfish rather than exhibiting the dam as a barrier to the upstream migration of the species.

Seventeen of the recoveries (marked with a dot by the tag number in Table II) were from fish that had moved away from or up to dams after being tagged. Of these, six had moved downstream while the remaining eleven had traveled up to the dams from downstream tagging stations.

The information secured on the growth of catfish in the Des Moines River is presented in Table II. Because the sample is small and because of the methods used to obtain the data, the principles of growth studies do not apply. The data is of value only insofar as it shows the changes in length and weight as they occurred between the time of tagging and recapture. From this several generalizations relating to the growth of catfish in the Des Moines River are indicated. These follow: (1) Increases in length is usually most rapid in fish less than 12 inches in total length. (2) Increases in length for younger fish may be rather uniform in natural waters. (3) Annual gains under stream conditions may

run 3-4 inches for fish less than 12 inches long. (4) For fish over 12 inches in total length, annual gains are at a much reduced rate as compared to the smaller specimens and increases of one inch per year is about average.

Literature Cited

Bangham, R. V. and Bennington, N. L. 1938. Movement of fishes in streams. Am. Fish. Soc., Vol. 67. pp. 256-262.

Speaker, E. B. 1948. Mr. and Mrs. Iowa Go Fishing. Iowa Conservationist. Vol. 7.

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