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WHITE BASS TAGGING STUDY
UPPER MISSISSIPPI RIVER
1964

by
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INTRODUCTION

In recent years the white bass (Roccus chrysops) has become an increasingly important sport fish in the upper Mississippi River. Movements of this species in the Mississippi River are not well known, other than that it is presumed to be rather mobile. The primary purpose of this tagging study was to learn more about white bass movements. Other data sought were the suitability and effects of two types of tag on this species, and the rate of angler harvest.

METHODS

From April 28 to May 7, 1964, a total of 1,149 white bass were tagged in the tailwaters of Lock and Dam No. 3 on the Mississippi River near Red Wing, Minnesota. During tagging operations, water temperatures ranged from 55 to 63 degrees Fahrenheit. The fish were concentrated in large schools within 300 yards of the dam and were easily collected with a three-phase, 230-volt, 7.5 amp. A.C. boomshocker. Two additional boats were used to pick up the stunned fish and transport them to a live cage.

Single dart tags (Floy No. 2) made of nylon and vinyl were used on 745 (65 percent) of the white bass. These were inserted with a stainless steel tagging needle between the interneurals of the second and third dorsal spines. Before insertion, the tag and needle were dipped in alcohol to help prevent infection. The tags were judged to be firmly anchored when slight pressure on the tag produced no slippage, indicating lodgement between the interneurals.

Monel metal jaw tags (National Tag and Band Company No. 3) were applied singly to 153 (13 percent) of the fish.

A combination of dart and jaw tags were used on 251 white bass (22 percent) to determine if there was any measurable difference in tag retention (Table 1).

Size of the white bass ranged from 11.0 to 17.4 inches total length, with 85 percent between 11.5 and 14.4 inches (Table 2).

Publicity about the tagging project was through news releases, posters, and personal contacts with boat livery operators. No reward was offered for tag returns.

RESULTS OF TAGGING PROJECT

As of December 31, 1965, a total of 57 tags (5.0 percent) were returned. All but one were recovered during the first six months following tagging.

Distribution of tag returns:

All except five of the tags were returned either from the tagging area or points downstream. The five fish caught upstream were taken in the St. Croix River at distances ranging from 15 to 31 miles from the tagging site (Table 3). The St. Croix River is a large tributary entering the Mississippi River 15 miles above Lock and Dam No. 3. The only recapture made during the second year after tagging came from the St. Croix River 13 months after release.

The recapture of these fish from points above Lock and Dam No. 3 indicates that these navigation structures are not barriers to upstream movement of white bass. Hubley (1959, 1963) reported similar findings for tagged channel catfish, walleye, and sauger in the upper Mississippi River.

The largest number of returns came from Lake Pepin, which produced 34 tags (59.6 percent of total returns). Lake Pepin is a natural widening of the Mississippi River, with its upper end located 11 miles downstream from the tagging site. The lake itself is 22 miles long and contains 24,000 acres.

Within Lake Pepin, most of the tagged fish were taken in the vicinities of Maiden Rock, Wisconsin and Lake City, Minnesota--17 and 24 miles from the tagging sites respectively. Lesser numbers were caught at Pepin, Wisconsin and Camp La Cupolis, Minnesota, both located at the lower end of the lake. A few others were scattered throughout the remainder of Lake Pepin.

The second largest group of tagged fish was taken at the tagging site in the tailwaters of Lock and Dam No. 3. Thirteen white bass (22.8 percent) were captured in this area, all in May, June, or July, 1964.

Two fish were recaptured below and one above Lock and Dam No. 4 at Alma, Wisconsin, located 44 miles downstream from the tagging area.

One fish was taken at Wabasha, Minnesota, a distance of 37 miles downstream.

One white bass, measuring 15.5 inches when tagged, was recaptured near Lansing, Iowa--a distance of 131 miles from Lock and Dam No. 3. This fish was at large for 131 days and made the longest journey recorded during this study.

The average movement of the 57 white bass recaptured was 21.2 miles, ranging from 0 to 131 miles.

Rate of movement:

At least four white bass are known to have moved at a rate of one or more miles per day--the fastest being a fish caught in the St. Croix River which traveled 15 miles in ten days (Table 4). The average daily movement of five fish caught downstream from Lake Pepin ranged from 0.78 to 1.02 miles per day over distances of 37 to 131 miles.

The interval of freedom varied from 9 to 387 days, with an average of 88 days at large.

Size distribution of recaptures:

There was a definite relationship between the length of fish tagged and the size range of tagged fish returned. In general, the smaller the fish when tagged, the fewer the tag returns. Fish less than 13 inches accounted for 47 percent of the tags at large, but only 25 percent of the tags returned. At the other extreme, fish between 13 and 14.5 inches accounted for 39 percent of the tags and 56 percent of the returns (Table 2).

These data suggest that the smaller fish are probably more vulnerable to post-tagging mortality or tag loss than the larger specimens.

Suitability of tags:

The relatively small number of recaptures precludes a definite comparison of the suitability of the tags used. However, as shown in Table 1, it appears that the various tags and combinations were returned in numbers approximately proportional to the numbers at large. There were slightly less dart tags than would be expected, and slightly more jaw tags and double tags. Of the 16 double tagged fish returned, all carried both tags except one fish which was lacking a jaw tag.

Several fishermen reported that their fish exhibited rather severe local infection and necrosis at the point of dart tag attachment. Therefore, it must be assumed that an unknown but probably substantial number of other bass were similarly infected, with attendant tag loss and/or mortality.

DISCUSSION OF RESULTS

The 56 tagged white bass caught during the year following release represents a 4.9 percent annual return. This compares to a 4.2 percent return found by Wickliff (1933), a 5.5 percent return by Duck (1948), and a 10.2 percent return by Bishop (1959). Bonn (1961) had returns ranging from 7.8 to 11.9 percent over a five year period. These studies were conducted in lakes and reservoirs in Ohio, Oklahoma, and Texas. In at least two of the studies, commercial fishermen provided tag returns in addition to sport fishermen. In these respects the tagging studies were not comparable.

Several factors had a depressing effect on tag returns. The presence of post-tagging infection among dart-tagged fish undoubtedly accounted for some tag loss or mortality. The life span of white bass is rather short, so natural mortality of the larger fish tagged also reduced the number of tags at large after the first year.

In addition, 1965 (the year following tagging) saw the greatest Mississippi River flood in recorded history. This occurred during the spring spawning period of the white bass and disrupted their normal pattern of movement. It also reduced fishing pressure during this and later periods to virtually nothing. These factors may partially account for the almost complete lack of tag returns during the second year of the study.

Nevertheless, it is evident that the white bass in the upper Mississippi River are lightly harvested, especially in Lake Pepin where fishing pressure is intense and where most of the white bass apparently congregate after spring migrations. Protective regulations appear to be unnecessary.

SUMMARY

A total of 1,149 white bass were tagged in the tailwaters of Lock and Dam No. 3 during April and May, 1964. A 4.9 percent return was made during the first six months after tagging, with one tag returned after that period for a total return of 5.0 percent over a 13 month period.

Average movement of tagged fish was 21.1 miles. The average interval of freedom was 88 days, ranging from 9 to 387 days at large.

Distribution of tag returns indicate that the white bass in the upper Mississippi River are rather mobile and are capable of undertaking extended journeys. After the spring migration into the tailwaters of Lock and Dam No. 3, the white bass range widely. A small portion of the population continues upstream and enters certain tributaries such as the St. Croix River. The majority move downstream and remain in Lake Pepin, while others make long downstream movements of up to 131 miles. Several white bass traveled substantial distances at average speeds exceeding one mile per day.

Not enough data was obtained to determine the suitability of the different tags used, although slightly fewer dart tags were recovered than would be expected. Several returned white bass exhibited severe localized infection at the site of dart tag attachment, which may partially account for the fewer dart tags recovered.

There was a definite relationship between size of fish when tagged and size distribution of recoveries. In general, the smaller fish showed the poorest tag returns.

It is evident from this study that white bass are lightly harvested by sport fishermen in the upper Mississippi River, and restrictive fishing regulations are unnecessary.

ACKNOWLEDGEMENTS

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LITERATURE CITED

- Bishop, Harry, 1959. Notes on the return of tagged white bass. Proc. Okla. Acad. Sci., 39:195-197.
- Bonn, Edward W., 1961. Lake Texoma white bass tagging study. Texas Game and Fish., IF Report Series (4):27 pp.
- Buck, Homer D., 1948. Lake Texoma fish rodeo. Texas Game and Fish, 6 (8):14-17.
- Hubley, Raymond C., Jr. and Glenn D. Jergens, 1959. Walleye and sauger tagging investigation on the upper Mississippi River. Invest. Memo. No. 1 (Mimeo)., Wis. Cons. Dept.
- Hubley, Raymond C., Jr., 1963. Second year of walleye and sauger tagging on the upper Mississippi River. Invest. Memo. No. 16 (Mimeo)., Wis. Cons. Dept.
- Hubley, Raymond C., Jr., 1963. Movement of tagged channel catfish in the upper Mississippi River. Trans. Am. Fish. Soc., 92: 165-168.
- Wickliff, E.L., 1933. Returns from fish tagged in Ohio. Trans. Am. Fish Soc., 63:326-331.

Fig. 1. Map of the Upper Mississippi River with sites of tagging and recovery identified.

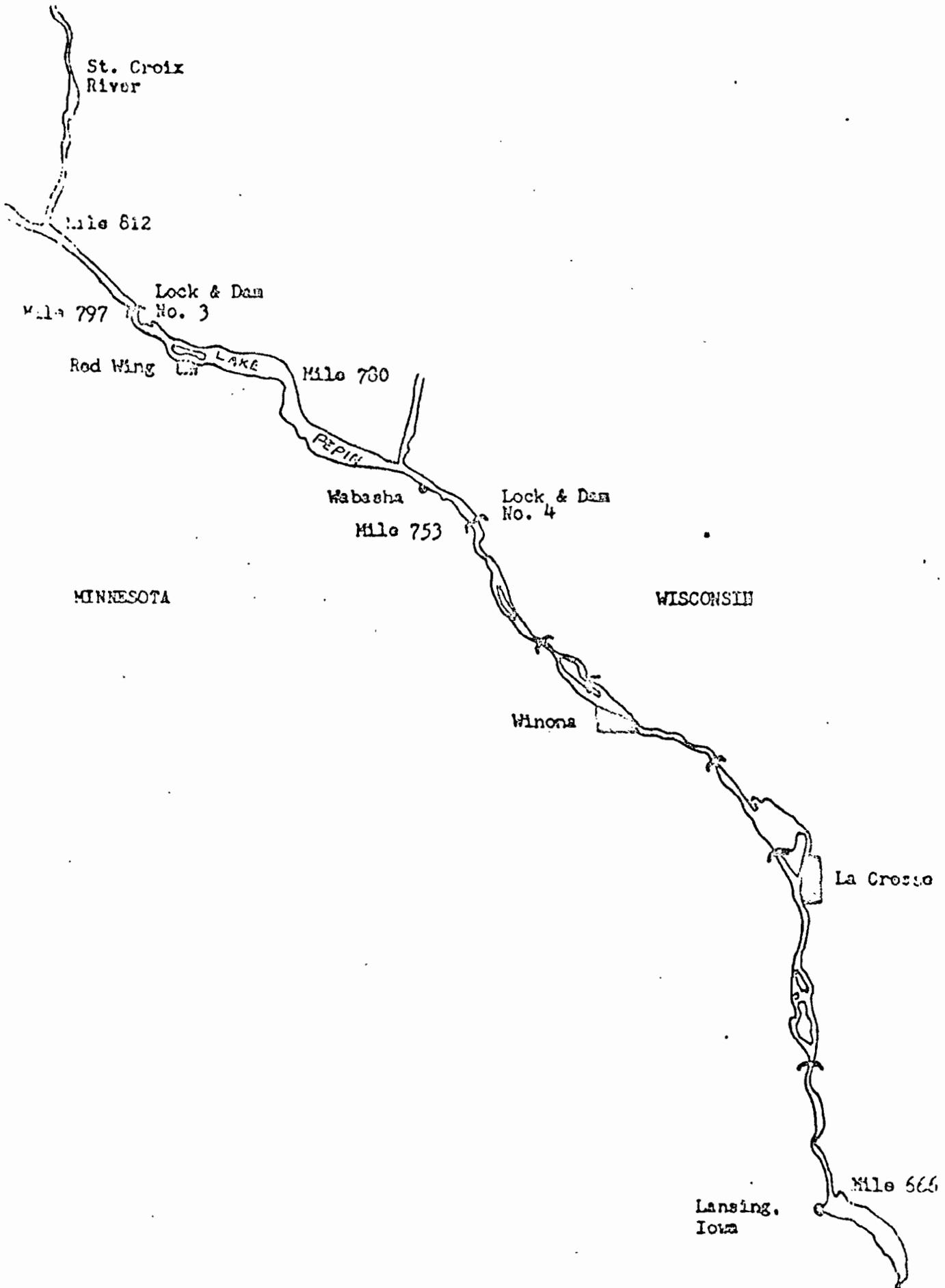


Table 1. Number and percent of white bass tagged with dart, jaw, and combination tags and number of tags returned.

	<u>Dart Tag</u>	<u>Jaw Tag</u>	<u>Combination</u>	<u>Total</u>
Number Used	745	153	251	1,149
Number Returned	33	8	16	57
Percent of Tags Used	64.8	13.3	21.9	-
Percent of Tags Returned	57.9	14.0	28.1	5.0

Table 2. Length frequency of white bass tagged and returned.

<u>Total Length (inches)</u>	<u>Number Tagged</u>	<u>Number Returned</u>
11.0 - 11.4	14	-
11.5 - 11.9	111	4
12.0 - 12.4	227	5
12.5 - 12.9	191	5
13.0 - 13.4	180	12
13.5 - 13.9	163	12
14.0 - 14.4	109	8
14.5 - 14.9	71	4
15.0 - 15.4	51	4
15.5 - 15.9	23	3
16.0 - 16.4	7	-
16.5 - 16.9	1	-
17.0 - 17.4	1	-
Total	1,149	57

Comparison of Length Frequency-Tagged and Returned (Percent)

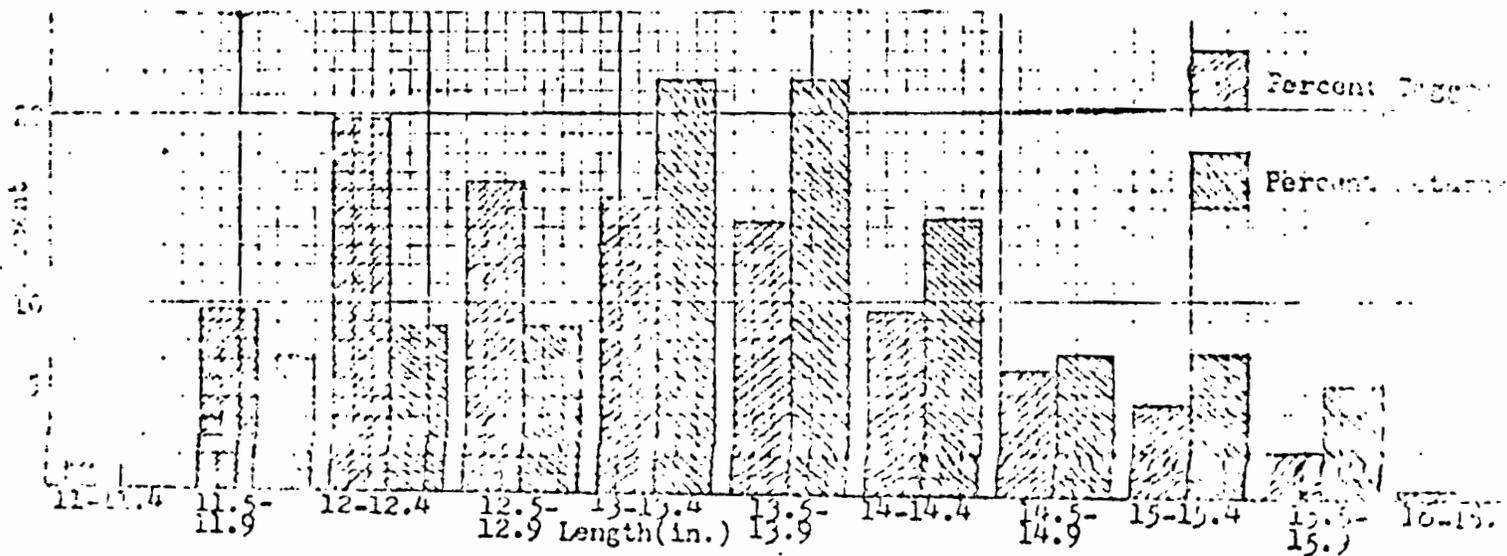


Table 3. Geographical and monthly distribution of white bass tag returns.

	<u>St. Croix R.</u> <u>(15-31 miles)</u>	<u>Lock & Dam 3</u> <u>(0-$\frac{1}{2}$ miles)</u>	<u>Lake Pepin</u> <u>(11-33 miles)</u>	<u>Mabasha</u> <u>(37 miles)</u>	<u>Lock & Dam 4</u> <u>(44-48 miles)</u>	<u>Lansing</u> <u>(131 miles)</u>	<u>Monthly</u> <u>Number</u>	<u>Total</u> <u>Percent</u>
<u>1964</u>								
May	2	4	1	-	-	-	7	12.3
June	2	6	2	1	2	-	13	22.8
July	-	3	5	-	1	-	9	15.8
August	-	-	15	-	-	-	15	26.3
September	-	-	8	-	-	1	9	15.8
October	-	-	3	-	-	-	3	5.3
<u>1965</u>								
May	1	-	-	-	-	-	1	1.7
Total	5	13	34	1	3	1	57	5.0

Table 4. Distance traveled by tagged white bass recovered above Lock and Dam No. 3 below Lake Pepin.

<u>Date Tagged</u>	<u>Date Recaptured</u>	<u>Number Days at Large</u>	<u>Total Length When Tagged</u>	<u>Location of Recapture</u>	<u>Miles Upstream</u>	<u>Miles Downstream</u>	<u>Miles Per Day</u>
4-29-64	5-21-64	22	13.7	St. Croix R.	21	-	0.95
5-6-64	6-13-64	38	14.0	St. Croix R.	24	-	0.63
5-6-64	6-6-64	31	14.5	St. Croix R.	17	-	0.54
5-7-64	5-17-64	10	12.4	St. Croix R.	15	-	1.50
4-30-64	5-22-65	387	13.8	St. Croix R.	31	-	-
5-1-64	6-17-64	47	13.4	Wabasha	-	37	0.78
4-30-64	6-12-64	43	13.7	Alma	-	44	1.02
5-7-64	6-20-64	44	15.5	Alma	-	44	1.00
4-29-64	7-6-64	68	13.7	Alma	-	48	0.71
5-7-64	9-15-64	131	15.5	Lansing, Iowa	-	131	1.00