Original: Fish Division
cc: Education-Game
Institute for
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Pigeon River Station
N. G. Benson
D. S. Shetter

February 24, 1953

Report No. 1360

MOVEMENT OF HATCHERY TROUT FOLLOWING EARLY SPRING PLANTING

By

Norman G. Benson

Abstract

The purpose of this investigation was to determine the influence of early spring planting (when water temperatures were low) on the movement of legal-sized hatchery trout. Two thousand jaw-tagged trout were released at certain points on each of three different streams in Michigan, and the extent of movement was determined from voluntary reports by anglers on where the fish were caught. Brook trout were planted in the East Branch of the Fox River in Schoolcraft County; rainbow trout were planted in the East Branch of the Au Sable in Crawford County; and brown trout were planted in Baldwin Creek in Lake County.

The results were based on 960 returns, or 16 percent of the total number planted. The majority (81%) of the returns were downstream at distances less than two miles from the points of release, and very few fish went more than 5 miles.

Trout went somewhat farther downstream in the East Branch of the Au Sable and Baldwin Creek where temperatures were lower (38 and 35 degrees F., respectively) than they did in the East Branch of the Fox River where the temperature was highest (51 degrees F.).

The present experiments showed less promise (than similar tests made in 1950 and 1951) that early spring planting would be a useful tool in effecting a wide dispersal of legal-sized hatchery fish, because most fish did not move more than two miles.

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It was reported for the Pigeon River Trout Research Area in 1950 and 1951 that legal-sized hatchery trout, planted in early spring, move downstream if water temperatures are low at the time of planting (Cooper, 1951; and, in press). The present investigation was instituted to test further this tendency for downstream movement on other streams in Michigan.

Methods

The study was performed by releasing 2000 jaw-tagged trout during April, 1952, in each of three Michigan streams. Exact records of points of release were kept, by tag numbers. The following plantings were made: brook trout were released in the East Branch of the Fox River in Schoolcraft County on April 21; rainbow trout were released in the East Branch of the Au Sable River in Crawford County on April 9; and brown trout were released in Baldwin Creek in Lake County on April 11. Total lengths in inches were determined for a random sample of 100 trout from each 1000 trout planted. (Data on the plantings are given in Table 1.)

Table 1. Species, number of fish, and location, of plantings in East Branch of the Fox River, East Branch of the Au Sable River, and Baldwin Creek. Included are lengths of a sample of 100 fish from each planting.

Location of planting	Species	Date of planting (1952)	Number of fish planted	Mean length (inches)	Standard error of mean (inches)	Range in lengths (inches)
Baldwin Creek						
Baldwin Rearing Station, T 17 N, R 13 W, Sec. 3	Brown	April 11	1000	7.6	0.06	6.5-9.4
Bridge at M37 near Baldwin, T 17 N, R 13 W, Sec. 3	Brown	April 11	1000	7.6	0.07	6.4-9.7
East Branch Au Sable River						
Grayling Hatchery, T 26 N, R 3 W, Sec. 8	Rainbow	April 9	1000	7.8	0.05	6.7-9.2
First road below hatchery, T 26 N, R 3 W, Sec. 8	Rainbow	April 9	1000	7.8	0.05	6.5-9.4
East Branch Fox River						
Fox River Rearing Station, T 47 N, R 13 N, Sec. 16	Brook	April 21	1000	8.4	0.09	6.7-10.4
Mouth of Clear Creek, T 47 N, R 13 W, Sec. 21	Brook	April 21	1000	8.4	0.09	6.8-10.5

Voluntary returns of tags from fishermen were used as the measure of movement. Signs were placed at various access points on each stream to notify the fishermen of the presence of tagged trout, and local departmental personnel were encouraged to collect returns. The distance in miles of movement of each fish, between the known point of release and the point where the fish was caught (as described by the fisherman), was determined in either of two ways: For the main stream of the Au Sable a map was obtained from the Grayling Guide Service, which contained data on stream mileage (the stream is used extensively for boating and canoe racing), and the distances were read directly from this map. For Baldwin Creek and the East Branch of the Fox River, each distance was computed on Conservation Department maps; the stream course was overlaid with a piece of string, and the length of the string was then measured.

Results

The results of this study depended entirely on voluntary returns of tagged fish. There was no accurate means of determining what percentage of creeled fish were reported, but it was assumed that the percentage was relatively constant in various parts of each stream. The total number of tags returned was 960 or 16 percent of the total number of trout planted. The brown trout planted in Baldwin Creek gave the highest return (18.9%); and the rainbow trout in the East Branch of the Au Sable, the lowest (10.5%).

East Branch of the Fox River. Most of the brook trout in this test stream were recovered during the first two weeks of the angling season, and within two miles downstream of the planting site (Table 2). A small percentage (17.2%) were recovered at a

Table 2. Returns from 2000 brook trout planted in East Branch of Fox River, on April 21, 1952

Date (1952)	Movement from point of planting, in miles										Total number of returns	Total returns in percent, by date
	Downstream									Upstream		
	Less than 1	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	½-2		
Apr. 26-May 9	240	...	5	1	3	8	..	3	..	2	262	70.4
May 10-May 23	23	30	..	2	..	..	..	1	..	..	56	15.0
May 24-June 6	1	2	1	..	..	4	7	..	1	..	16	4.3
June 7-June 20	10	2	..	..	13	4	1	3	..	..	33	8.9
June 21-July 4	..	..	1	..	..	1	1	..	..	..	3	0.8
July 5-July 18	..	..	..	..	..	..	..	..	..	..	..	..
July 19-Aug. 1	..	..	..	..	..	..	..	..	..	..	..	..
Aug. 2-Aug. 15	..	..	..	..	..	..	..	..	..	..	..	..
Aug. 16-Aug. 29	..	..	..	..	..	..	..	..	1	..	1	0.3
Aug. 30-Sept. 14	..	..	..	..	1	..	..	..	..	..	1	0.3
Total returns												
Number	274	34	7	3	17	17	9	7	2	2	372	..
Percentage	73.7	9.1	1.9	0.8	4.6	4.6	2.4	1.9	0.5	0.5	..	100

greater distance downstream. About six miles downstream from the point of release, this stream divides up into many small tributaries which local fishermen call the "spreads." It is difficult to fish this section of stream and only a few recoveries were made here, but it is possible that more recoveries would have been made in the "spreads" and below if the stream remained as one channel. The temperature of the water at the time of planting was 51 degrees F., which was appreciably warmer than the temperature of the Pigeon River (43 degrees F.) where the planted brook trout moved downstream in large numbers for considerable distances. Higher temperatures at the time of planting could account for the high percentage of recoveries near the point of release in the East Branch of the Fox.

East Branch of the Au Sable River. Rainbows planted in the East Branch of the Au Sable River moved downstream to a greater extent than did either brooks in the Fox River or browns in Baldwin Creek (Table 3). The temperature of the water at the time of planting was 38 degrees F. The majority (58.1%) of the recaptured rainbows were less than two miles from the points of release; 34.9 percent of the recoveries were made at distances greater than three miles from the points of release; and one trout was recovered approximately 125 miles downstream. The recoveries were spread over longer distances and over a longer period in the angling season than the recoveries in the other test streams.

Baldwin Creek. Brown trout moved downstream a short distance --90.4 percent of the recoveries were made within two miles of the point of release--and a larger proportion of returns came in the first two weeks of the season than in subsequent periods (Table 4). The temperature of the water at the time of planting was 35 degrees F.

Table 3. Returns from 2000 rainbow trout planted in the East Branch of the Au Sable River on April 9, 1952

Date (1952)	Movement from point of planting, in miles										Total number of returns	Total returns in percent, by date*
	Downstream								Upstream	Location unknown		
	Less than 1	1-2	3-7	8-13	17-20	25-35	40-80	over 80	½-2			
Apr. 26-May 9	26	6	7	7	6	5	1	..	..	7	65	36.5
May 10-May 23	8	17	3	8	3	..	1	..	..	..	40	22.5
May 24-June 6	18	14	3	..	6	2	1	..	2	..	46	25.8
June 7-June 20	3	2	..	1	..	3	..	..	..	1	10	5.6
June 21-July 4	3	..	..	..	1	..	...	..	2	..	6	3.4
July 5-July 18	7	..	..	..	..	1	..	..	..	..	8	4.5
July 19-Aug. 1	..	..	..	..	..	..	..	..	..	..	..	..
Aug. 2-Aug. 15	1	..	..	..	..	..	..	1	..	..	2	1.1
Aug. 16-Aug. 29	..	..	..	..	..	..	..	..	..	1	1	0.6
Aug. 30-Sept. 14	..	..	..	..	..	..	..	..	..	..	..	..
Undated returns	3	..	..	12	1	..	1	..	..	14	31	..
Total Returns												
Number	69	39	13	28	17	11	4	1	4	23	209	..
Percentage**	37.1	21.0	7.0	15.0	9.1	5.9	2.2	0.5	2.2	..	..	100

* Not including returns for which dates are unknown.

** Not including returns for which locations are unknown.

Table 4. Returns from 2000 brown trout planted in Baldwin Creek on April 11, 1952

Date (1952)	Movement from point of planting, in miles										Total number of returns	Total returns in percent by date
	Downstream								Upstream	Location unknown		
	Less than 1	1-2	2-3	3-4	4-5	5-6	6-7	7-8	½-2			
Apr. 26-May 9	133	23	1	1	1	..	..	..	1	..	160	42.2
May 10-May 23	49	2	1	..	..	1	..	1	..	..	54	14.3
May 24-June 6	11	4	..	..	..	..	..	..	7	..	22	5.8
June 7-June 20	14	74	1	..	1	..	..	..	..	..	90	23.7
June 21-July 4	11	1	..	4	..	..	..	..	7	1	24	6.3
July 5-July 18	1	..	..	..	5	..	..	..	2	..	8	2.1
July 19-Aug. 1	9	4	..	..	1	..	..	..	..	..	14	3.7
Aug. 2-Aug. 15	2	2	..	..	1	..	..	..	..	..	5	1.3
Aug. 16-Aug. 29	1	..	..	..	..	..	..	..	..	..	1	0.3
Aug. 30-Sept. 14	..	1	..	..	..	..	..	..	..	...	1	0.3
Total returns												
Number	231	111	3	5	9	1	..	1	17	1	379	..
Percentage※	61.1	29.3	0.8	1.3	2.4	0.3	..	0.3	4.5	..	..	100

※ Not including return for which location is unknown.

Discussion

From the evidence on tag returns, the majority (81%) of the trout moved downstream at distances up to two miles from the point of release. Only 2.5 percent of the recoveries were upstream. There was, therefore, a definite tendency for downstream movement of a few miles. There was no evidence, however, of a mass movement for distances greater than 2 miles downstream, in any of the test plantings.

The recoveries were distributed downstream to a greater extent on the East Branch of the Au Sable River and Baldwin Creek than on the Fox River. The temperatures were lower (38 and 35 degrees F.) on the Au Sable and the Baldwin respectively, and this might explain the difference in migration. The differences of movement among species cannot be evaluated from the present data. In an earlier study, Cooper (1951) found approximately equal movement among brook and rainbow trout in the Pigeon River, and in a personal communication he has expressed the belief that planting trout when temperatures are low might be a simple means to disperse legal-sized hatchery trout over a large section of a stream. Most of the fish in this study, however, were recovered within two miles from the points of release, whereas only a few were widely scattered at distances of more than two miles downstream.

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