

*See Supplement (1304)*

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INSTITUTE FOR FISHERIES RESEARCH  
DIVISION OF FISHERIES  
MICHIGAN DEPARTMENT OF CONSERVATION  
COOPERATING WITH THE  
UNIVERSITY OF MICHIGAN

ALBERT S. HAZZARD, PH.D.  
DIRECTOR

Report No. 1304

November 13, 1951

THE FISH FAUNA OF THE TWO HEARTED RIVER, LUCE COUNTY, 1951

By

Gerald P. Cooper

Abstract

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Brown trout were planted in the Two Hearted River, Luce County, in 1950. Of importance are the questions: will the species become established there, and, if so, how will the brown affect the rainbow and brook trouts which are now abundant? A series of fish collections were made in the fall of 1950 (results given in Institute Report No. 1269); and further collecting was done in October of 1951, the results of which are summarized herewith.

A few surviving browns were found in the stream in the fall of 1950, but no young or adult browns were found in 1951. The rainbow ("steelhead" runs from Lake Superior) is quite abundant in the lower half of the system, and the brook trout is the same in the upper half. For brook trout the usual adult size was 7 to 10 inches. The water is brown, the stream bottom is predominantly sand and silt, the gradient is low, there is very little bank erosion, pools and cover for trout are good, and minnows are rare.

All larval lampreys which were collected have been identified as the American brook lamprey. If the sea lamprey is reproducing there, the success must be low.

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Plantings of legal-sized brown trout from state hatchery stock were made in 1950 in the lower part of the Two Hearted River. There is an interest in determining whether or not the species will become permanently established as a result of this stocking. Thus a fish survey (series of fish collections) was made of the lower part of the river system in October of 1950, principally to determine the distribution of surviving browns; the results were summarized in Institute Report No. 1269, dated December 6, 1950.

A continuation of the fish survey of the Two Hearted System was made during October 8-13, 1951, by a series of shocker collections, mostly from the upper half of the system but in part overlapping the collection localities of the previous year. The present report on results of the 1951 study is thus a sequel to Report 1269. Of the twelve collection stations visited in 1950, five of them (Nos. 2, 3, 7, 9, and 10) were reworked in 1951, along with nine new stations (numbered 13 to 21, inclusive). Thus the number series for collection sites, which was started in 1950, was merely reused and continued for the collecting of 1951.

The field party in 1951 included District Fisheries Supervisors F. J. Warren, C. F. Long and L. R. Anderson; R. M. Bailey, Curator of Fishes, Museum of Zoology, University of Michigan; and Institute biologists D. S. Shetter, E. L. Cooper and the writer. The party camped in tents on the High Bridge Camp Ground, on the river north of Newberry.

The river between Antlers (Section 3 of T. 47 N., R. 11 W.) and a point (in Section 10 of T. 48 N., R. 11 W.) 1 mile above Ohio Camp was traversed by the entire party in 3 canoes and 2 shocker boats; and six collection sites were worked in this stretch of river. Two active beaver dams and a number of downed timbers across the stream were obstacles. About 5 hours of actual canoeing time were involved in this canoe trip.

#### Equipment

Collecting was done with two electric shockers: an A.C. unit, 110 volt, 550 watt, weight about 70 pounds, operated in a small square-end, plywood boat; and a D.C. unit, 230 volt, 2,500 watt, Model 24D, weight about 120 pounds, also operated in a small plywood boat. The A.C. unit was operated with the two electrodes usually about 4 to 6 feet apart. With the D.C. unit, the negative electrode was attached to the bottom of the boat, and the operators of the two positive electrodes roamed over the stream quite independently, and thereby "covered" a larger portion of wider streams than did the A.C. unit.

Water levels in the Two Hearted System were somewhat higher in 1951 than during the period worked in 1950. Hence, conditions for recovering fish in 1951 were not quite so favorable, although they were fairly satisfactory even where the river was wide and deep, and good in the headwaters and tributaries.

### Stream names

In terminology for branches of the Two Hearted River, the Department map is somewhat at variance with local usage. On one map, the river is divided into East and West branches at a point in the S.E. 1/4 of Section 1 of T. 49 N., R. 10 W.; and on the Ownership map, north and south branches are unnamed. According to L. R. Anderson, local District Fisheries Supervisor, the people at Newberry regard the stream as Two Hearted River starting at the Whorl Club in Section 4 of T. 47 N., R. 11 W., or else as the South Branch from this point to Hunters No. 4 camp in Section 9 of T. 48 N., R. 11 W., at a point where the West Branch enters from the west. In either event, it is Two Hearted River below Section 9 of T. 48 N., R. 11 W. The North Branch enters from the west in the N.W. 1/4 of Section 1 of T. 48 N., R. 11 W.

### Stations

Locations and notes on collection stations in 1951, with a continuation of the numbering system started in Report No. 1269, are as follows:

Station 2.--Two Hearted River, just (100 yards) below mouth of the East Branch. Section 6 of T. 49 N., R. 9 W., near the west line of Section 6. One hundred and fifty yards of stream generally from bank to bank, D.C. shocker, 3:30 - 4:30 p.m., October 8, 1951.

Station 3.--Two Hearted River, at Reed and Green Bridge. Center of Section 11 of T. 49 N., R. 10 W. A.C. shocker, 300 yards by 2 yards of stream, 2:45 - 4:00 p.m., October 8, 1951.

Station 7.--Two Hearted River, at the high bank and public fishing site in center of Section 10 of T. 48 N., R. 11 W. D.C. shocker, 150 yards of stream, 2:00 - 3:00 p.m., October 9, 1951.

Station 9.--East Branch Two Hearted River, at logging-road bridge in the N.E. 1/4 of Section 30, T. 49 N., R. 9 W. D. C. shocker, 125 yards of stream, 12:00 to 1:00 p.m., October 13, 1951.

Station 10.--East Branch Two Hearted River, in N.E. 1/4 of Section 5 of T. 48 N., R. 9 W. A.C. shocker, 200 yards by 5 feet of stream, 12:00 - 1:00 p.m., October 13, 1951.

Station 13.--Whiskey Creek, tributary of Dawson Creek, in west-central part of Section 8 of T. 48 N., R. 10 W. Collection by application of 15 pounds of cresol (U.S.P.-XIII, Mol. Wt. 108.13). Treatment affected lower 500 yards of stream, to its mouth in Dawson Creek, 5:00 - 5:30 p.m., October 12, 1951.

Station 14.--North Branch Two Hearted River, 100 feet above its mouth, in the N.W. 1/4 of Section 1 of T. 48 N., R. 11 W. A.C. shocker, 250 yards by 6 feet of stream, 2:00 - 3:00 p.m., October 9, 1951.

Station 15.--Two Hearted River, in center of Section 16 of T. 48 N., R. 11 W. D.C. shocker, 100 yards of stream, 3:30 - 4:00 p.m., October 11, 1951.

Station 16.--Two Hearted River, in the north-central part of Section 21 of T. 48 N., R. 11 W. A.C. shocker, 125 yards by 4 feet of stream, 2:00 - 2:45 p.m., October 11, 1951.

Station 17.--Two Hearted River, at Hemlock Dam, in S.E. 1/4 of Section 21 of T. 48 N., R. 11 W. D.C. shocker, 100 yards of stream, 3:00 - 4:00 p.m., October 10, 1951.

Station 18.--Two Hearted River, at mouth of Camp One Creek, including lower 150 feet of Camp One Creek, in N.E. 1/4 of Section 33 of T. 48 N., R. 11 W. A.C. shocker, 150 yards by 4 feet of stream, 3:00 - 3:30 p.m., October 10, 1951.

Station 19.--Two Hearted River, 1/2 mile below Antlers, above a beaver dam, in the south-central part of Section 33 of T. 48 N., R. 11 W. D.C. shocker, 100 yards of stream, 12:30 - 1:00 p.m., October 10, 1951.

Station 20.--Two Hearted River, at Antlers, in N.W. 1/4 of Section 3 of T. 47 N., R. 11 W. D.C. shocker, 150 yards of stream, 11:30 a.m. - 12:30 p.m., October 12, 1951.

Station 21.--Two Hearted River, just downstream from Whorl Club gate, in S.E. 1/4 of Section 4 of T. 47 N., R. 11 W. A.C. shocker, 125 yards by 6 feet of stream, 11:00 a.m. - 12:30 p.m., October 12, 1951.

#### Fish

Many of the larger trout taken in the collecting were measured and scale sampled in the field, then liberated. A few of the larger trout and all of the smaller fishes collected were preserved. The preserved collections were subsequently examined in the laboratory, and all identifications were verified by Dr. Bailey. All fish taken by the collecting are enumerated in Table 1. A few of the significant conclusions follow.

No brown trout, either young or adult, were found, even though two of the collecting sites were where the browns had been planted (see Report No. 1269 for planting records) and at least five of the sites (Station numbers 2, 3, 7, 9 and 10) were places which surviving browns might have been expected to select for spawning. This means that there is, as yet, no evidence that the brown trout will become established in the Two Hearted River from the plantings in 1950.

Young and fingerling rainbows, presumably resulting from runs of "steelheads" from Lake Superior, are abundant in the main river about

Table 1.--Numbers of fish collected at 14 stations on the Two Hearted River System, Luce County, October 8-13, 1951.

Species	Stations														Total
	2	3	7	9	10	13	14	15	16	17	18	19	20	21	
	Two Hearted River Just below East Branch	Two Hearted River T49N, R10W, Sec. 11	Two Hearted River T48N, R11W, Sec. 10	East Branch T49N, R9W, Sec. 30	East Branch T48N, R9W, Sec. 5	Whiskey Creek T48N, R10W, Sec. 8	North Branch T48N, R11W, Sec. 1	Two Hearted River T48N, R11W, Sec. 16	Two Hearted River T48N, R11W, Sec. 21 (N. 1/2)	Two Hearted River T48N, R11W, Sec. 21 (S.E. 1/4)	Two Hearted River T48N, R11W, Sec. 33 (N.E. 1/4)	Two Hearted River T48N, R11W, Sec. 33 (S. 1/2)	Two Hearted River T47N, R11W, Sec. 3	Two Hearted River T47N, R11W, Sec. 4	All stations
Rainbow trout, 7 inches and over		1													1
Rainbow trout, under 7 inches	1	1		24	24	12	1								63
Brook trout, 7 inches and over						2		1		1		28	32	9	73
Brook trout, under 7 inches				3		28		1		3	1	8	87	34	165
White sucker										6					6
Pearl dace			7					4	8	6					25
Blacknose dace								2							2
Longnose dace								1							1
Redbelly dace				1											1
Muddler ( <u>C. bairdi</u> )	12	16	2	1		2	2	1							36
Muddler ( <u>C. cognatus</u> )		1	1	22	29	14		10	13	6	16		13	16	141
Brook stickleback	3		8					1	6	4	5	1			28
American brook lamprey (ammocoetes)				7				1	2	1					11

up to the North Branch and especially abundant in the East Branch and in Dawson Creek (1951 records supplemented by records of 1950 from Report 1269).

Minnows of all kinds and suckers are generally rare in the entire system, both in numbers and kinds. Muddlers (2 species) are generally quite abundant and the brook stickleback is common.

The brook trout is abundant in the headwaters of the Two Hearted River, especially in the vicinity of the Whorl Club and below Antlers for aways. Everywhere, the brook trout was found to be moderately infested with the gill louse (Salmincola). Most adult-size brooks were in the 7- to 10-inch size range.

The two species of muddlers have complementary distributions, similar to the relationship between rainbow and brook trouts. The northern muddler (C. bairdi) occupies the downstream half of the drainage, along with the rainbow, while the slimy muddler (C. cognatus) occupies the upper half of the drainage along with the brook trout; there is, however, a wide area of overlap. The great similarity in ecological requirements of the slimy muddler and brook trout has long been recognized by fish biologists, to the extent that the slimy muddler is a reliable index of good brook trout water. Perhaps we are at the stage where a survey of brook trout waters could be based largely on the presence of C. cognatus.

Lamprey ammocoetes (a total of 11 specimens) were collected at four stations. All were identified as the American brook lamprey (Entosphenus lamottei), based on Vladykov's recent paper on larval lampreys. So that there is no evidence from the two seasons of fish collecting that the sea lamprey is reproducing successfully in this stream system.



The field party had one opportunity to observe the operation of the 230-volt, 2,500-watt, D.C. shocker under unusual circumstances. About 1/2 mile below Antlers a 4-foot, active beaver dam has created a long (about 250 yards) stillwater which was 4 to 6 feet deep, of silt and sand bottom, and with sluggish current; the stream was barely confined to the channel. Brook trout were concentrated in this dead-water, probably for spawning. In traversing the length of this stillwater, we observed schools of brook trout, first running ahead of the canoe for aways and then doubling back alongside--altogether about a dozen schools of 50 to several hundred per school. Mr. Warren, who has had much experience in counts of trout in hatchery raceways, estimated the number conservatively at 1,500 to 2,000. The common length range was 7 to 10 inches.

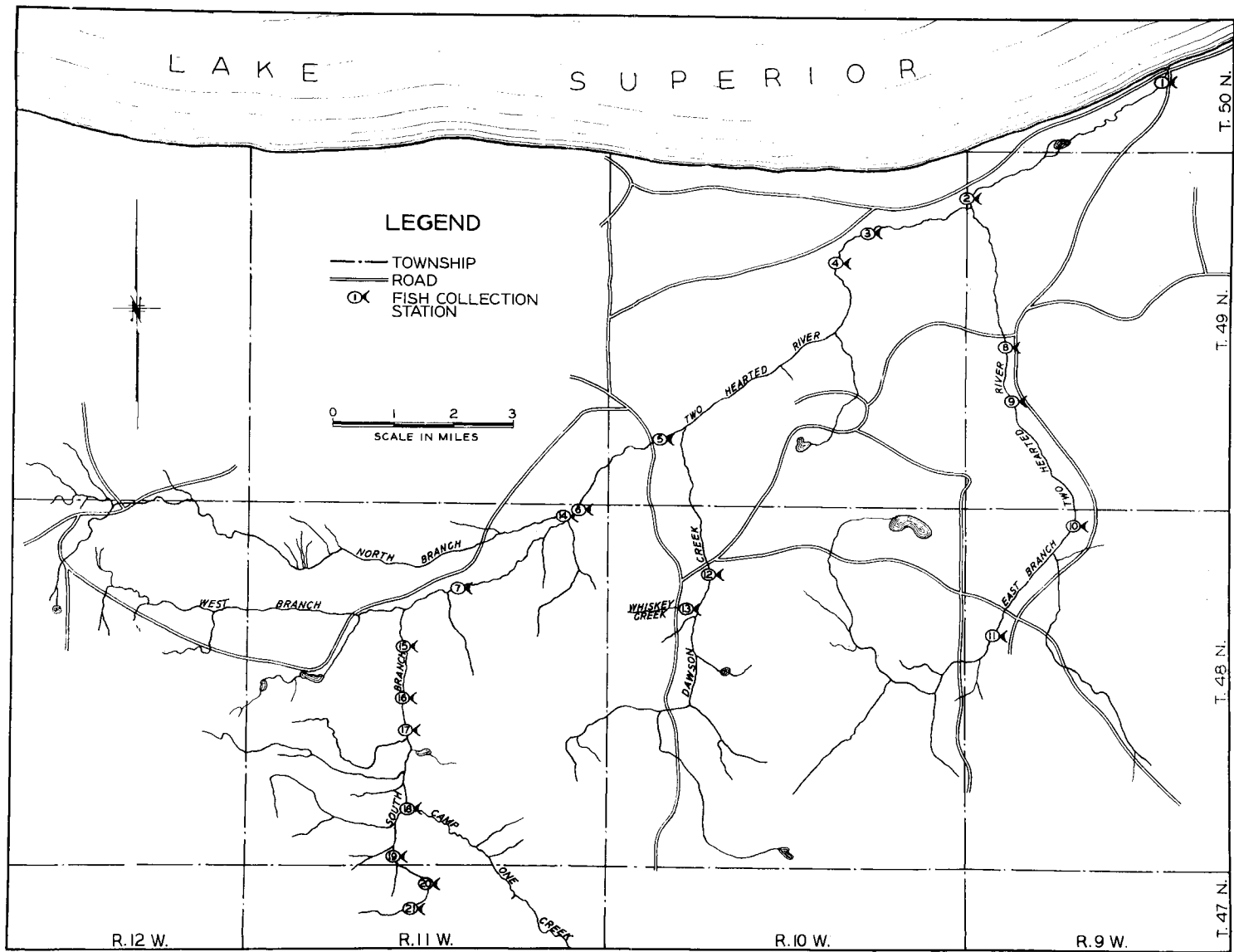
A plywood boat containing a D.C. shocker was harnessed between two canoes, and positive electrodes were operated from bows of the canoes. Thus, we could move along behind a school of trout and watch carefully their reaction to the electrodes. When electrodes were simply left in the water in pursuit of a school, the trout merely moved along ahead of the field, or dashed away when affected by the current; catching fish by this procedure would have been exceedingly slow. The effective method was to raise the electrode out of the water and suddenly thrust it into the center of a school. Our impression was that the electrode had to come within about two feet of the fish to effect capture, otherwise the fish were repelled. Within two feet of the electrode, about half of the fish could be induced to follow the electrode to the surface, while the other half were incapacitated and lay on the bottom.

INSTITUTE FOR FISHERIES RESEARCH

Gerald P. Cooper

Report approved by A. S. Hazzard

Report typed by B. A. Lowell



Two Hearted River System, Luce County, showing fish collection stations, 1950 and 1951.

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Supplement to Report No. 1304

June 2, 1952

GROWTH RATE OF TROUT IN TWO HEARTED RIVER, LUCE COUNTY

By

Edwin L. Cooper

As a part of the field data taken on portions of the Two Hearted River, Luce County, during October, 1951, scale samples were secured from all trout in the collections. Collecting was accomplished by electrofishing with the exception of Whiskey Creek where cresol was used. The average total length in inches of the different year classes of trout have been summarized in Table 2.

Two of the collecting sites were principally ponded conditions caused by beaver (at Antlers, T. 47 N., R. 11 W., Sections 3 and 4; and above Beaver Dam, T. 48 N., R. 11 W., Sec. 33). These two locations exhibited the fastest growth rate and also probably the greatest population density. Outside of the other collection at Whorl Club Gate (T. 47 N., R. 11 W., Section 4) and Dawson Creek (1950 data), brook trout and rainbow trout are scarce in this river system, judging by the numbers of trout encountered in the three streams studied extensively in the Lower Peninsula (I.F.R. Report No. 1330). Data from Report No. 1330 are also given in Table 2 as a comparison with the Two Hearted River data.

INSTITUTE FOR FISHERIES RESEARCH

Edwin L. Cooper

Report approved by A. S. Hazzard

Report typed by N. L. Greenman

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Table 2.--Growth of trout in Two Hearted River system compared with three Lower Peninsula streams.

Locality	Species	Date	Average length and range					
			1951 Year Class Length (Number)	Range	1950 Year Class Length (Number)	Range	1949 Year Class Length (Number)	Range
Two Hearted River at Whorl Club Gate, T47N, R11W, Sec. 4	Brook Trout	Oct. 12, 1951	3.00 (15)	2.2-4.2	6.03 (22)	3.8-8.6	7.70 (6)	6.6-9.3
Two Hearted River at Antlers, T47N, R11W, Sec. 3 & 4	Brook Trout	Oct. 12, 1951	3.17 (50)	2.3-4.3	6.38 (60)	3.7-9.8	7.96 (7)	4.9-10.6
Two Hearted River above Beaver Dam, T48N, R11W, Sec. 33	Brook Trout	Oct. 10, 1951	-----	-----	7.83 (33)	5.7-10.3	9.17 (3)	6.7-10.7
Two Hearted River at Hemlock Dam, T48N, R11W, Sec. 21	Brook Trout	Oct. 10, 1951	-----	-----	6.10 (4)	4.9-7.5	-----	-----
Two Hearted River above Hodges, T48N, R11W, Sec. 16	Brook Trout	Oct. 11, 1951	-----	-----	6.60 (1)	6.6	9.50 (1)	9.5
Two Hearted River at Reed & Green Br., T49N, R10W, Sec. 11	Rainbow Trout	Oct. 8, 1951	2.50 (1)	2.5	-----	-----	8.70 (1)	8.7
Whiskey Creek (Tributary to Dawson Creek, Tributary to Two Hearted River) at Pine Stump Junction, T48N, R10W, Sec. 8	Brook	Oct. 12, 1951	3.41 (23)	3.0-4.2	5.62 (6)	4.6-7.3	8.20 (1)	8.2
	Rainbow Trout	Oct. 12, 1951	2.26 (11)	1.6-2.8	5.50 (1)	5.5	-----	-----
East Branch Two Hearted River, at Shamrock, T48N, R9W, Sec. 5	Rainbow Trout	Oct. 13, 1951	2.13 (15)	1.4-2.6	4.72 (9)	3.8-6.0	-----	-----
East Branch Two Hearted River, T49N, R9W, Sec. 30	Rainbow	Oct. 13, 1951	2.13 (22)	1.4-3.3	5.36 (5)	4.4-6.6	-----	-----
Hunt Creek, Montmorency County	Brook Trout	Sept. 26, 1951	3.30 (68)	2.3-4.4	5.48 (37)	4.5-7.2		
Pigeon River, Otsego County	Brook Trout	Sept. 27, 1951	3.67 (53)	2.8-4.5	6.13 (48)	4.7-7.8		
North Branch Au Sable River, Crawford Co.	Brook Trout	Sept. 26, 1951	3.75 (50)	2.3-5.5	7.77 (29)	6.1-8.9		