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THE REPOPULATION OF A SECTION OF THE FORD RIVER, DICKINSON COUNTY,
FOLLOWING ITS TREATMENT WITH ROTENONE¹

By

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On August 10 and 11, 1955, 30 1/4 gallons of emulsifiable rotenone were used to remove the fish population from a 32-mile section of the Ford River, between highway M-95, Dickinson County, and the village of Northland, Marquette County. Details of the fish-removal operation and of a prior fish survey of the Ford River system were reported by Cooper.³ An attempt to evaluate the effect of this treatment was made by collecting fish at five locations in the affected section of the river during 1956 and 1957. These collections were made by shocking for about one hour at each station with a 230-volt, 10.9-ampere, direct-current electric shocker. The five stations were checked once before and four times after the rotenone treatment.

Fish collecting for the general survey of the Ford River drainage system was done in August 1953, October 1954, and July 1955. The rotenone was applied on August 10 and 11, 1955. The first recheck with the electric shocker was made two months later, on October 3-4. Further collecting was done on July 15-16, 1956, October 18, 1956, and June 21-23, 1957. The post-treatment checks were made at stations 1, 2, 8, 28 and 27 of the earlier survey (see Fig. 1).

¹Part of the field work, analysis of data, and preparation of the report were undertaken with Federal Aid to Fish Restoration funds under Dingell-Johnson Project Number F-2-R.

²The field crews consisted of Conservation Department employees and the author.

³Cooper, Gerald P. 1956. Report on a fish survey of the Ford River system (near Escanaba), and preliminary results of an attempt at rough-fish removal in the upper half of the river. Institute for Fisheries Research Report No. 1466.

Figure 1.--Experimental section of the Ford River, Dickinson County, showing stations where fish collections were made before treatment of the stream with rotenone (0-17 and 26-29) and after treatment (1, 2, 8, 28, and 27).

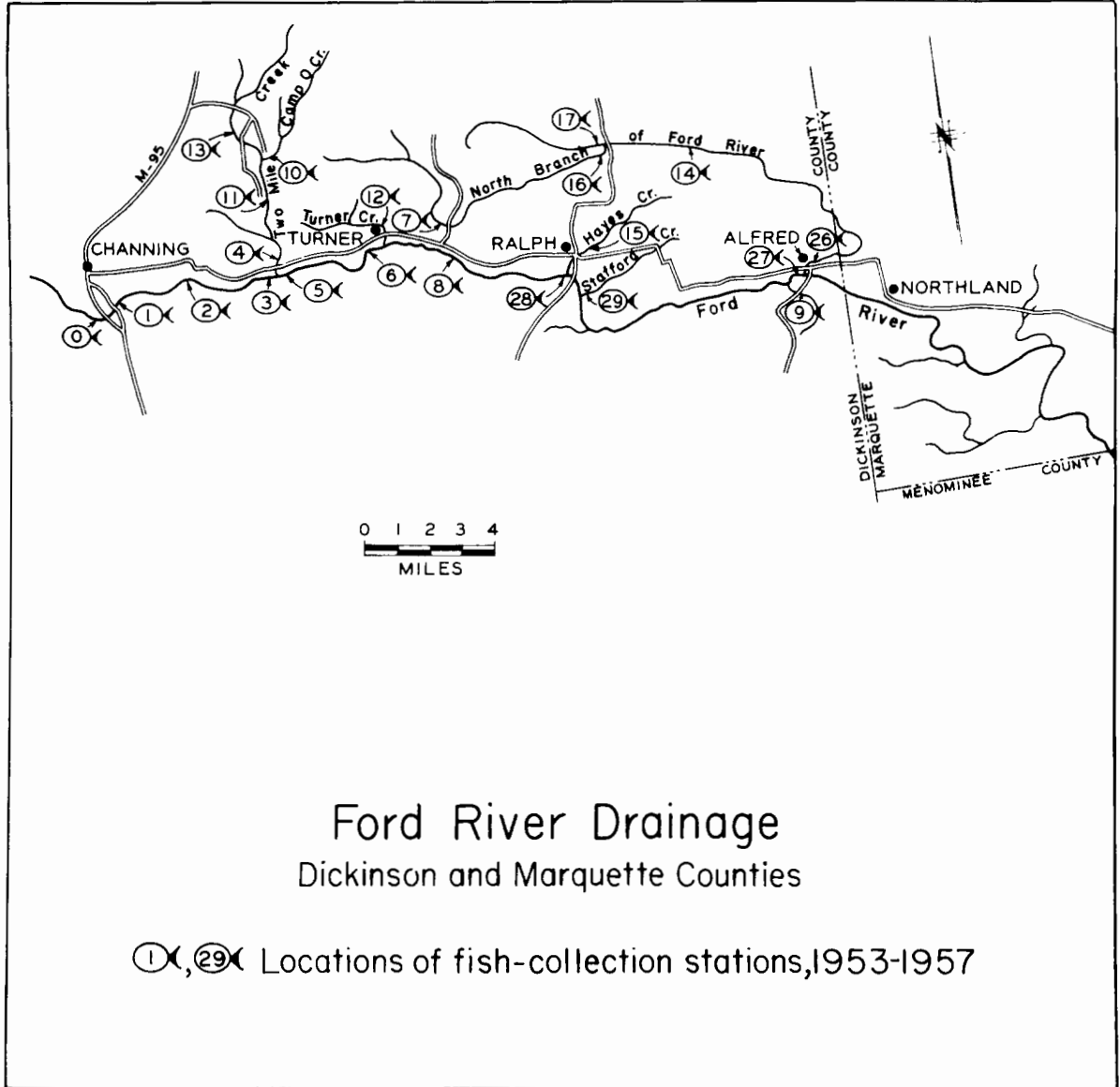


Figure 1

The collections made in October 1955 indicated that the kill of the fish had been complete, or nearly so, at stations 1, 2, and 8 which represent about 12 miles of the treated section. Apparently many fish survived at stations 28 and 27, although observations there during the poisoning indicated a fairly heavy kill.

The shocker collections during July 1956 yielded few fish at any of the five stations (1, 2, 8, 28, and 27). This was largely due to difficult conditions for shocking caused by heavy rains before and during the collecting period.

The collections made in October 1956 and June 1957 showed that repopulation of the river with fish had progressed to the point of former abundance within a year after poisoning. There even was an increase in the numbers of some species, but most of these fish were of smaller size.

The recruitment at stations 1 and 2 probably came downstream from the Ford River above highway M-95. Fairly rapid repopulation had occurred at Station 1 only two months after the kill. A year was required for the fish population at Station 2, located about two miles downstream from Station 1, to recover fully.

Repopulation of the stream at Station 8 also took about a year. This part of the river probably received most of its fish from Two-Mile Creek which was not poisoned. (The fish collected in Two Mile Creek in 1953 and 1954 are listed in Table 6.) Another possible source of fish for this station and for other stations further downstream was Turner Creek, although its contribution doubtless was small (see Collection F-12 in Table 6).

The fairly rapid recovery of the population at stations 28 and 27 was to be expected in view of the incomplete kill and the sources of recruitment from tributary streams. Collecting in the river was terminated when it became apparent that the fish population had fully recovered.

The species and number of fish collected at each station during the experimental period are given in tables 1-5. The totals of the fish collections from the five stations, based on three arbitrary groups (trout, coarse fish [including sea lampreys], and forage fish), are compared graphically in Figure 2. These collections indicated that the effects of the poisoning were of short duration (somewhat less than one year). Figure 2 shows that the total number of fish in 1956 surpassed the pre-treatment level of abundance. At the end of 22 months the total number of fish was about the same as before the treatment. Although the total population of fish 14 months after the poisoning was greater than before the treatment, the fish were smaller and of a somewhat different species composition. After recovery, the collections contained more brook trout, white suckers, burbot, creek chubs and common shiners, but fewer Johnny darters, black-side darters, mottled sculpins and American brook lampreys. Notably the "weak swimmers" were the slowest to repopulate the stream. Blacknose dace, sea lampreys and northern brook lampreys appeared in the collections in about the same numbers as they occurred before the poisoning. Fish of other species were too few to permit any conclusion.

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Report approved by G. P. Cooper

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Table 1.--Number and species of fish collected by direct-current shocker at Station 1 in the Ford River, before and after poisoning

Species of fish ²	Date, ¹ and minutes of shocking				
	August 1953 60	October 1955 50	July 1956 62	October 1956 60	June 1957 75
<u>Game fish</u>					
Brook trout	13	8	1	51	30
<u>Coarse fish</u>					
White sucker	12	2	...	132	38
Burbot	15	1	...	22	29
<u>Obnoxious fish</u>					
Sea lamprey	2	1	...	...	...
<u>Forage fish</u>					
Creek chub	7	39	...	177	73
Pearl dace	...	3	1	17	36
Blacknose dace	44	11	8	87	194
Longnose dace	14	1	...	2	8
Redbelly dace	...	...	7	25	20
Finescale dace	...	...	...	...	31
Common shiner	...	...	1	2	5
Fathead minnow	...	...	...	3	2
Brassy minnow	...	...	...	...	3
Mudminnow	2	...	1	1	1
Blackside darter	5	...	...	3	3
Johnny darter	12	...	...	3	...
Mottled sculpin	12	...	...	27	...
Brook stickleback	3	...	...	26	...
Amer. brook lamprey	50	...	3	8	6
<hr/>					
Total fish	191	66	22	586	479
Number of species	13	8	7	16	15

¹The August 1953 collection was made before treatment of the stream with rotenone; all other collections were made after the treatment.

²Names follow those given by R. M. Bailey in Names of Michigan Fishes, Fish Division Pamphlet No. 22, September, 1958.

Table 2.--Number and species of fish collected by direct-current shocker at Station 2 in the Ford River, before and after poisoning

Species of fish ²	Date, ¹ and minutes of shocking				
	August 1953 60	October 1955 85	July 1956 68	October 1956 60	June 1957 64
<u>Game fish</u>					
Brook trout	4	9	...	14	18
Rainbow trout	2	...	...	...	...
<u>Coarse fish</u>					
White sucker	1	...	...	109	3
Burbot	11	...	1	6	80
<u>Forage fish</u>					
Creek chub	48	...	...	132	23
Pearl dace	...	...	...	...	1
Blacknose dace	53	1	1	91	39
Longnose dace	8	...	...	...	8
Redbelly dace	...	...	1	1	1
Common shiner	2	...	1	38	1
Mudminnow	2	...	...	...	10
Blackside darter	12	...	...	4	5
Johnny darter	26	...	...	...	...
Mottled sculpin	13	...	...	...	1
Brook stickleback	5	...	...	13	1
Amer. brook lamprey	15	...	...	1	1
Total fish	202	10	4	409	192
Number of species	14	2	4	10	14

¹The August 1953 collection was made before treatment of the stream with rotenone; all other collections were made after the treatment.

²Names follow those given by R. M. Bailey in Names of Michigan Fishes, Fish Division Pamphlet No. 22, September, 1958.

Table 3.--Number and species of fish collected by direct-current shocker at Station 8 in the Ford River, before and after poisoning

Species of fish ²	Date, ¹ and minutes of shocking				
	August 1953	October 1955	July 1956	October 1956	June 1957
	90	55	62	70	67
<u>Game fish</u>					
Brook trout	...	1	...	...	...
<u>Coarse fish</u>					
White sucker	35	2	3	34	...
Burbot	2	...	1	12	12
<u>Obnoxious fish</u>					
Sea lamprey	6	3	11	7	...
<u>Forage fish</u>					
Creek chub	35	6	...	58	9
Pearl dace	...	...	...	1	...
Hornyhead chub	...	...	...	...	1
Blacknose dace	13	...	...	20	14
Longnose dace	13	...	...	6	5
Redbelly dace	12	...	...	...	...
Finescale dace	2	...	...	...	...
Common shiner	...	...	...	28	...
Mudminnow	...	1	...	...	...
Blackside darter	24	...	...	10	3
Johnny darter	6	...	...	19	5
Fantail darter	1	...	...	...	...
Mottled sculpin	9	...	...	2	2
Brook stickleback	2	...	...	...	1
Amer. brook lamprey	9	...	4	6	...
N. brook lamprey	37	16	12	34	9
Total fish	206	29	31	237	61
Number of species	15	6	5	13	10

¹The August 1953 collection was made before treatment of the stream with rotenone; all other collections were made after the treatment.

²Names follow those given by R. M. Bailey in Names of Michigan Fishes, Fish Division Pamphlet No. 22, September, 1958.

Table 4.--Number and species of fish collected by direct-current shocker at Station 28 in the Ford River, before and after poisoning

Species of fish ²	Date, ¹ and minutes of shocking				
	October 1954 60	October 1955 60	July 1956 69	October 1956 60	June 1957 64
<u>Game fish</u>					
Brook trout	4	2	...	...	4
Brown trout	...	1	...	...	...
<u>Coarse fish</u>					
White sucker	2	19	2	27	2
Burbot	1	...	...	4	9
<u>Obnoxious fish</u>					
Sea lamprey	2	7	4	12	1
<u>Forage fish</u>					
Creek chub	17	18	2	32	6
Pearl dace	1	...	...	...	1
Hornyhead chub	3	2	...	4	...
Blacknose dace	10	4	3	22	6
Longnose dace	5	...	...	1	2
Redbelly dace	...	1	...	...	...
Finescale dace	...	...	...	2	1
Common shiner	5	5	...	27	3
Bluntnose minnow	...	...	...	...	5
Mudminnow	...	...	2	...	...
Blackside darter	16	...	...	3	1
Johnny darter	36	...	...	3	5
Fantail darter	...	...	...	2	...
Mottled sculpin	8	1	...	5	2
Brook stickleback	...	...	...	...	1
Amer. brook lamprey	2	10	...	1	8
N. brook lamprey	12	34	7	32	16
Total fish	124	105 ³	20	177	73
Number of species	15	13	6	15	17

¹The October 1954 collection was made before treatment of the stream with rotenone; all other collections were made after the treatment.

²Names follow those given by R. M. Bailey in Names of Michigan Fishes, Fish Division Pamphlet No. 22, September, 1958.

³Includes one pumpkinseed.

Table 5.--Numbers and species of fish collected by direct-current shocker at Station 27 in the Ford River, before and after poisoning

Species of fish ²	Date, ¹ and minutes of shocking				
	October 1954	October 1955	July 1956	October 1956	June 1957
	50	80	61	60	61
<u>Coarse fish</u>					
White sucker	3	25	1	10	...
Hog sucker	...	5	...	...	...
Burbot	16	3	...	10	7
<u>Obnoxious fish</u>					
Sea lamprey	1	6	2	31	...
<u>Forage fish</u>					
Creek chub	...	8	...	...	...
Blacknose dace	2	3	...	1	2
Longnose dace	2	3	...	1	37
Redbelly dace	3	...	...	...	...
Common shiner	...	...	...	10	4
Blackside darter	10	1	...	21	19
Johnny darter	9	2	...	8	14
Fantail darter	17	1	...	8	12
Mottled sculpin	1	...	...	...	...
Amer. brook lamprey	1	3	...	3	...
N. brook lamprey	9	49	5	56	20
Total fish	74	109	8	159	115
Number of species	12	12	3	11	8

¹The October 1954 collection was made before treatment of the stream with rotenone; all other collections were made after the treatment.

²Names follow those given by R. M. Bailey in Names of Michigan Fishes, Fish Division Pamphlet No. 22, September, 1958.

Table 6.--Number and species of fish collected in streams tributary to the
experimentally poisoned section of the Ford River

Item	Stream							
	Ford	Two mile	Turner	Hayes	Stafford	Marsh L.	N. Br. Ford	
Station number	0	4, 11, 13, 10	12	15	29	9	26, 14, 16, 7, 17	
Date shocked	Oct. 1956	Aug. 1953	Oct. 1954	Oct. 1954	Oct. 1954	Oct. 1954	Oct. 1954	Oct. 1954
Minutes of shocking	50	235	45	25	30	45	305	
<u>Game fish</u>								
Brook trout	11	43	11	2	...	5	7	
Brown trout	...	1	...	...	...	...	...
<u>Coarse fish</u>								
White sucker	55	12	6	13	43	...	76	
Burbot	17	18	...	...	...	3	25	
<u>Forage fish</u>								
Creek chub	21	22	2	17	109	2	15	
Pearl dace	2	11	...	...	7	...	20	
Blacknose dace	23	62	2	13	8	...	141	
Longnose dace	...	69	...	...	...	...	78	
Redbelly dace	...	7	...	...	10	...	3	
Finescale dace	...	2	...	...	...	...	1	
Common shiner	1	2	...	8	42	...	15	
Fathead minnow	...	...	...	...	...	...	3	
Brassy minnow	2	10	...	...	...	...	1	
Mudminnow	3	6	...	...	...	...	22	
Blackside darter	...	...	...	2	...	...	12	
Johnny darter	27	6	...	2	12	...	35	
Fantail darter	...	...	...	...	...	...	2	
Mottled sculpin	6	72	...	1	2	8	43	
Brook stickleback	...	...	...	...	1	...	5	
Amer. brook lamprey	55	91	1	1	...	12	8	
N. brook lamprey	...	1	...	...	4	...	25	
Total fish	223	435	22	59	238	30	538 ¹	
Number of species	12	17	4	9	10	5	21	

¹Includes one rosyface shiner.

Figure 2.--Total number of fish collected at five stations (1, 2, 8, 28, 27) in the experimental section of the Ford River before and after poisoning. Total collecting time each year was approximately five hours. The species of fish in the three groups are given in Tables 1-5.

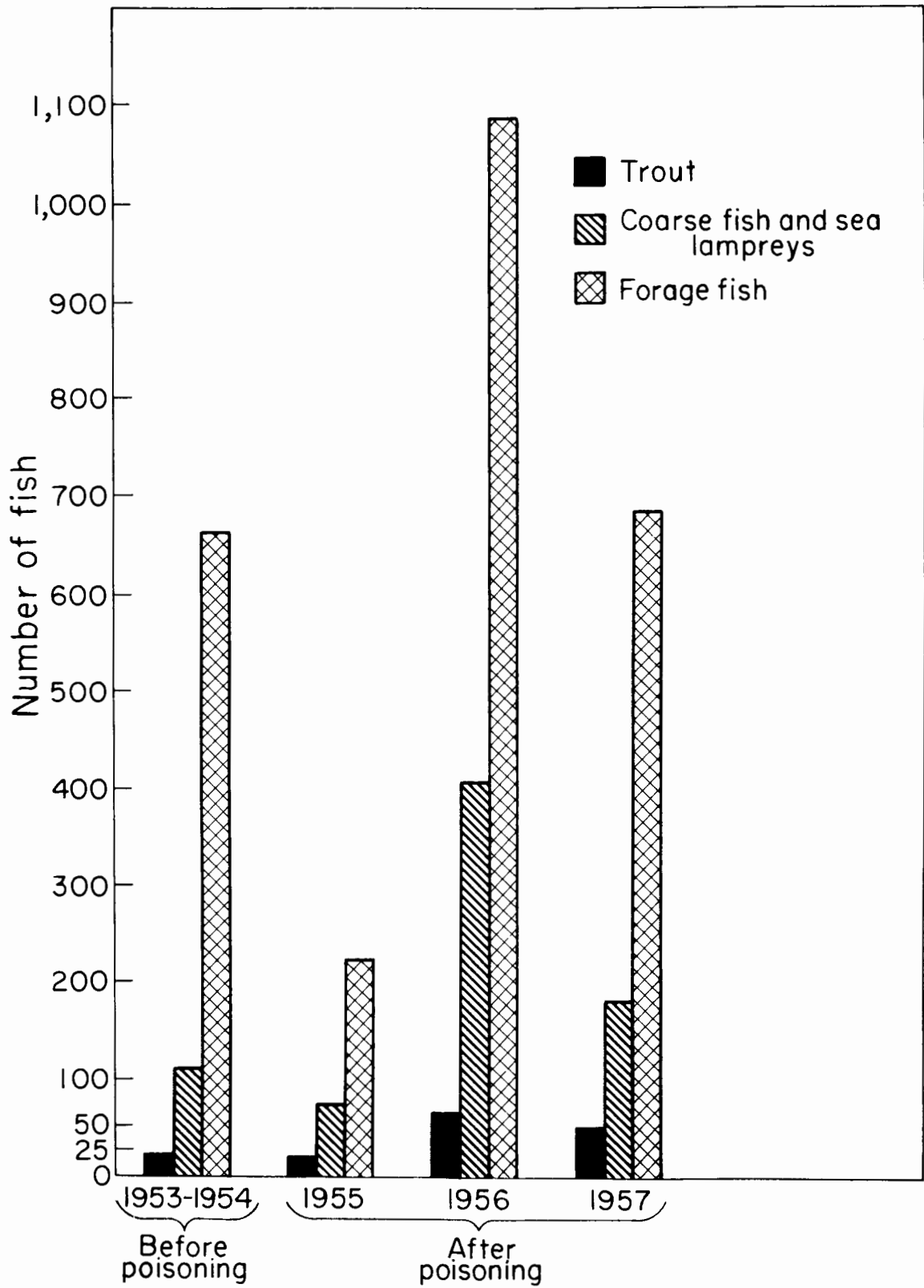


Figure 2