Original: Fish Division
cc: Education-Game
Mr. C. F. Idema, Grand Rapids 4-8-42
Mr. Arnold Lenz, Grand Blanc 4-8-42

INSTITUTE FOR FISHERIES RESEARCH Dr. David S. Shetter
DIVISION OF FISHERIES
MICHIGAN DEPARTMENT OF CONSERVATION
COOPERATING WITH THE
UNIVERSITY OF MICHIGAN

ALBERT S. HAZZARD, PH.D.
DIRECTOR

ADDRESS
UNIVERSITY MUSEUMS ANNEX
ANN ARBOR, MICHIGAN

March 24, 1942

REPORT NO. 760

REPORT ON THE INTENSIVE CREEL CENSUS OF KINNE CREEK, WINGLETON CLUB, FOR THE 1941 TROUT SEASON, AND RESULTS FROM SEINING OPERATIONS.

by

David S. Shetter

This report summarizes the cooperative research efforts of the Wingleton Club members and several members of the staff of the Institute for Fisheries Research during 1941. As in previous years, the major research project was the conduct of the creel census in connection with the tagging of all trout planted in Kinne Creek. All club members continued to cooperate by recording their catches by stream section in the record books placed in the ice house. On May 20-21, 1941, Messrs. Shetter and Cooper seined all sections in an effort to determine the extent of natural reproduction.

Two introductions of tagged trout were made in Kinne Creek during 1941. The first was planted on May 20, and consisted of the following:

Into Section C ..... 50 brook trout; (Av. size 7.2 inches);

Into Sections A and B..103 brown trout; (Av. size 8.9 inches);

112 brook trout; (Av. size 7.3 inches);

104 rainbow trout (Av. size 9.3 inches).

On June 20, the previous planting was more or less duplicated by tagging and releasing the following:

Into Section C..... 50 brook trout (Av. size 7.2 inches);

Into Sections A and B... 98 brown trout (Av. size 9.3 inches);

99 rainbow trout (Av. size 9.1 inches);

90 brook trout (Av. size 7.3 inches).

Records of the catch, summarized in Table 1, were obtained from the record books kept in the ice house. For the sake of convenience, the catch records are assembled by two-week periods for each section and species and category (tagged or untagged).

The total catch for Kinne Creek during the 1941 trout season was 398 trout. The three species were taken in the following numbers: brook trout, 162; brown trout, 145; rainbow trout, 82; unidentified species, 9. As judged by the total catch for the various periods, the best fishing was in the four weeks June 21-July 4, and July 5-July 18. Over twice as many trout were captured during these periods as in any other period during the season (Table 1).

Brook Trout Catch

A total of 162 brook trout were caught from all sections of Kinne Creek, of which 52 were tagged fish, or 38.2 per cent. From Section C, the best piece of brook trout water, a total of 115 brook trout were caught, of which 92 were wild fish (80 per cent). From the two introductions into Section C of hatchery brook trout (totalling 100 fish), 23 tagged brook trout were taken, and these made up 20 per cent of the total catch of Section C.

From Sections A and B (which really now constitute a single section since the elimination of the revolving screen at the Cartier Pond), a total of 47 brook trout were reported. Of these 47 fish, 29 resulted from the 1941 plantings, or 61.7 per cent of the total brook trout catch of this part of the stream (Tables 1, 2).

No tagged brook trout planted in 1938 or in 1940 were captured during 1941.

Brown Trout Catch

Brown trout were caught only below the railroad grade. A total of 145 brown trout were caught, of which 56 were hatchery-reared fish planted in 1941, or 38.6 per cent of the total brown trout catch. These latter fish resulted from a total planting of 201 tagged brown trout.

One tagged brown trout was reported which carried over from the release of 1939 of 994 tagged fish. This fish was planted April 11, 1939, at a size of 7.2 inches and had grown to a size of 12.5 inches in two years and two months.

The majority of the tagged brown trout were recovered in Section B, but Section A provided approximately 45 per cent of the catch of wild brown trout (Tables 1, 2)

Rainbow Trout Catch

As during the previous seasons, the stock of wild rainbow trout was almost negligible, as only four untagged rainbow trout were recorded from Sections A and B. The 77 tagged rainbow trout captured from the 203 tagged fish introduced constituted 93.9 per cent of the total catch of that species (Tables 1, 2)

One tagged rainbow trout from the planting of 1940 was caught during 1941. This particular fish was 8.6 inches long when planted April 16, 1940, and grew to a size of 12.5 inches in 445 days.

All rainbow trout were taken from Sections A and B.

As no tagged fish planted in Kinne Creek in 1941 were reported as recovered from the Pere Marquette River, it may be assumed with a fair degree of assurance that the extra blocking screen near the creek mouth was successful in stopping any downstream migration out of Kinne Creek.

Growth of the Tagged Fish

Data on the increase in size was available for the majority of tagged fish recorded. These data have been assembled by two-week periods in the same manner as the catch records in order that fish which had been free for approximately similar periods of time would be grouped together in obtaining the average growths. The recoveries were separated as to whether they were planted in May or June.

Comparison of the growth of the fish planted in 1941 with the growth made by hatchery fish planted in previous seasons is somewhat difficult because in previous years the plantings were made before the opening day, and thus were in the stream longer before removal. Also in previous years the fish, with the exception of the brook trout, were of a smaller average size.

The best growth noted for the planted brook trout were as follows: for the May planting, two fish grew an average of 0.6 inches (14 mm.) in 70 days; for the June planting, 3 fish grew an average of 0.8 inches (22.7 mm.) in 62 days (Table 3).

For the planted brown trout, the best growths were as follows: from the May planting, 5 fish grew an average of 0.5 inches (13 mm.) in 51 days; from the June planting, one fish grew 0.5 inches (13 mm.) in 64 days (Table 4).

Among the planted rainbow trout the best growth exhibited by fish from the May planting was from 3 fish which grew an average of 11.3 mm. (0.4 inches) in 73 days. The best growth from the June planting was found from four fish which grew an average of 0.3 inches (7.8 mm.) in 47 days (Table 5).

Average Size of Wild Fish Taken

The data on average total length of the wild trout, as reported by the club anglers, arepresented in Table 6. The average size of the

wild brook trout captured was 8.3 inches; of wild brown trout, 9.9 inches; of wild rainbow trout, 9.8 inches. Comparison with the average sizes of the wild fish taken in 1939 and 1940 indicate that fish of a larger average size were taken in 1941 than in 1939, but that the average length of the brook and brown trout was slightly smaller than during 1940. In the case of the brook trout, this may be attributed partly to the lowering of the size limit on brook trout during 1941 from 8 to 7 inches.

Although the average size of the hatchery trout released in Kinne Creek has been increased during the past two years, the average size of the wild fish taken has usually exceeded the size of the hatchery fish captured, despite a known increase in size of the planted fish after release in the creek. The comparison is as follows for the 1941 season:

Species	Average size of Wild fish	Hatchery fish
Brook trout	8.3 inches	7.7 inches
Brown trout	9.9 inches	9.3 inches
Rainbow trout	9.8 inches	9.4 inches

Generalized Results of Plantings of Legal-sized Hatchery Trout to Date.

In Table 7 are presented the recovery percentages obtained in the several plantings made to date in Kinne Creek, and also the percentage of the total catch made up by tagged fish of the various species in the respective years.

Considering the money invested in the various plantings, the best returns have been obtained from the smaller releases of brook, brown, and rainbow trout made in 1940 and 1941.

Percentages of recovery have varied from 9.6 on 994 tagged brown trout of legal size released on April 11, 1939, to 27.8 on 201 brown trout released during May and June, 1941; on tagged brook trout, recovery

percentages have varied from a low of 12.0 on 1,500 fish released in April, 1938, to 17.2 on 302 fish planted in May and June. From the 250 tagged rainbow trout planted in 1940, and the 203 tagged rainbow trout planted in 1941, recovery percentages of 34.0 and 37.8 were effected.

Results of Seining Operations, 1941

On May 20-21, 1941, the author and Edwin L. Cooper seined in Sections A, B, and C to obtain evidence concerning natural reproduction in Kinne Creek. The results of the seining efforts are presented in Table 8. The seine used was 10 feet x 6 feet x 1/4-inch mesh.

From the figures obtained, it would appear that there is considerable natural reproduction by the brook trout in that stream area lying above the railroad grade (Section C). Here we obtained almost one brook trout per seine haul. Eighteen fingerlings (av. $3\frac{1}{2}$ inches, spawned in the fall of 1940), two sub-legal brook trout (6 1/8-6 3/4 inches), and one 8-inch brook trout were captured in 23 seine hauls. Other fish captured were one largemouth bass (4 5/8 inches), several common suckers, creek chubs, black-nosed dace, and one chub-sucker.

In Section B (railroad grade to Cartier Pond), a total of 39 seine hauls yielded only one fingerling brook trout and three fingerling brown trout (both spawned in the fall of 1940), and 11 muddlers. In Section A, the total number of fish captured in 14 seine hauls consisted of one fingerling brown trout and 2 muddlers.

From the seining data, natural reproduction appears to be most successful in Section C, where the only species of trout present is the brook trout.

The question which puzzles the author is "Why is there only a small amount of evidence of reproduction by the brown trout and brook trout in the sections below the railroad grade?" On November 9, 1938, in Sections

A and B, there were a total of 18 brown trout nests and 29 brook trout nests, by actual count. If a similar number spawned each fall, it is conceivable that we should obtain more than from 0.07 to 0.10 fingerling trout per seine haul.

Possible reasons for the apparent lack of success in obtaining more naturally spawned fingerling trout below the railroad grade are:

(1) Inefficiency of the seine in the fast, turbulent waters of Sections A and B, plus the numerous submerged snags.

(2) Non-presence of young-of-the-year trout because of

  (a) Mortality in the egg or sac-fry stage caused by silting (Hobbs, 1940),

  (b) Mortality in the egg stage caused by superimposition of redds. (Hobbs, 1940),

  (c) Predation on newly-emerged fry and on young trout by the adult brook and brown trout.

If, for the sake of argument, we assume that Sections A and B are three times as difficult to seine as Section C, we should credit Sections A and B with three times as many fish. Even if this were done, Section C still yields approximately twice as many fish per seine haul as the lower sections.

Concerning the other suppositions, the following arguments may be advanced: Unless spawning territory is very limited, there will be little or no superimposition of spawning beds. From observations to date, there appears to be ample spawning grounds in Sections A and B for both brook and brown trout.

The question of predation by the adult brown and brook on the young-of-the-year of both species is relatively unexplored. Examination of

several hundred legal-sized brook trout from Hunt Creek by J. W. Leonard has failed to reveal any significant predation by these larger trout on the fingerling brook trout (which are considerably more abundant in Hunt Creek than in Kinne Creek). The role of the brown trout in this relationship is, at present, unknown.

Silting of trout eggs and sac-fry not yet emerged from the gravel conceivably could occur in the lower sections of Kinne Creek (below the railroad grade) if the electric turbine is shut off for any periods longer than one hour between October 15-March 15. When the flow from Section C is completely blocked for even this short period, it creates quite a head of water just above the railroad grade. Unless this head of water is released carefully and slowly, it will carry down into Sections A and B much of the silt deposited at present just above the railroad tracks. Also, any loose materials and detritus in the stream bottoms in the upstream end of Section B are churned up and re-deposited further downstream. The author has seen the stream under such conditions when the color of the water was like chocolate well down into the middle of Section A because of the presence of so much suspended material in the water.

Conclusions and Recommendations

1. Both club register and ice house register indicate that the 1941 trout season was better on Kinne Creek than was the 1940 trout season. There was a discrepancy of 51 fish between the two records, which should be avoided in the future. According to the ice house records, 398 trout were captured in Kinne Creek, whereas the register in the clubhouse listed 449. As nearly as could be determined, between 87 and 100 anglers used the stream in 1941.

2. Comparatively small plantings of legal trout again yielded a higher percentage of recovery to the club anglers. From the records it appears that the angling pressure was very light until after the second release of hatchery fish, since the majority of tagged fish were taken after June 20.

3. The hatchery fish appeared to grow somewhat less than in preceding years, probably because they were in the stream for a shorter period than in preceding years. Despite their larger average size at the time of planting, the hatchery fish caught were of a smaller average size than were the wild fish of all species entering the catch.

4. As no reports of tagged fish released in Kinne Creek in 1941 were received from the Pere Marquette River, it may be assumed that there was no loss through migration downstream, and that the extra blocking screen was functioning efficiently. The use of this screen or a similar one should be continued.

5. No planting of hatchery brook trout should be made in Section C. Despite the addition of 100 hatchery fish in 1941, only 20 per cent of the total catch was made up by the 23 fish recaptured. Seining data also demonstrated that there is considerable natural reproduction here.

Below the railroad grade, it is suggested that 250 rainbow trout, 200 brown trout, and 50 brook trout be planted about June 1st. Again it is to be emphasized that as many of these fish should be removed before the end of the season as possible. (Originally it was the idea of the author and Dr. Hazzard that only 250 trout (100 brown, 100 rainbow, 50 brook) be stocked in 1942 inasmuch as the fishing pressure on Kinne Creek is rather light, and 350 fish stocked in mid-June in 1941 would probably have made just as good angling as did the two plantings. This

suggestion represents a compromise between the ideas of the Chairman of the Creek Committee and the Institute, and it is the author's feeling that it is an adequate number of legal fish to provide good angling. Rainbow trout have been given preference because of the fine angling they have produced, and also because they do not appear to spawn in Kinne Creek. A small number of brook trout is included to vary the sport to a certain degree, although from the records obtained in recent years, it is apparent that Sections A and B are becoming less and less favorable for brook trout to survive in any numbers unless natural reproduction of that species can be increased in the lower sections).

6. Since the results to be expected from legal-sized plantings in Kinne Creek are now fairly well established, further tagging of plantings can be omitted unless a radical change in the program is made. However, fishermen should continue to record their catches in the Club register and should also record there the length and tag number of any tagged fish which may be taken from earlier plantings.

7. The blocking screen at the upper end of Section C should be periodically inspected, and, if possible, made fish-tight against bass and other centrarchids. When any centrarchids or rough fish are caught by anglers in Section C, these fish should be killed.

8. The caretaker should be instructed to exercise great care in releasing a head of water from the ponds above the railroad tracks, particularly during and after the fall spawning periods (October 15-March 15), as it would be quite possible for this operation to silt in eggs laid down by mature trout. This would take more of his time, but might yield more trout in subsequent years.

9. Pool improvement should continue using structures which will create long, deep, open pools. A plan for this work will be given the

caretaker early in the summer so that work can be done during the open season and early fall. Sufficient help should be made available to the caretaker so that he can have this work done without interfering with his other duties.

Literature Cited

Hobbs, Derisley F. 1940. Natural reproduction of trout in New Zealand and its relation to density of populations. Fisheries Bulletin No. 8, New Zealand. Marine Dept., p. 69.

INSTITUTE FOR FISHERIES RESEARCH

By David S. Shetter

Report approved by: A. S. Hazzard

Report typed by: R. Bauch

Table 1

Anglers' Catch in the Various Sections of Kinne Creek, Wingleton Club, by Two-week Periods, 1941.

Two-week periods, 1941	Brook trout						Brown trout						Rainbow trout						Totals						Total [1] trout captured
	Tagged			Untagged			Tagged			Untagged			Tagged			Untagged			Tagged			Untagged			
	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C	
Apr. 26-May 9	...	...	...	...	2	20	...	...	...	5	1	...	...	...	...	1	...	...	...	...	...	6	3	20	29
May 10-23	...	...	...	...	3	10	...	1	...	14	10	...	...	2	...	...	...	...	...	3	...	14	13	10	40
May 24-June 6	...	1	3	1	5	2	...	2	...	...	...	...	...	...	...	...	...	...	...	3	3	1	5	2	14
June 7-20	...	...	...	...	1	...	2[a]	...	...	4	5	...	8	1	...	...	...	...	10	1	...	4	6	...	21
June 21-July 4	...	8	4	...	1	14	3	16	...	11	9	...	11	10	...	...	1	...	14	34	4	11	11	14	88
July 5-18	...	9	7	...	3	31	1	10	...	2	10	...	3	13[b]	...	...	2	...	4	32	7	2	15	31	91
July 19-Aug. 1	...	7	1	1	...	7	1	10	...	...	1	...	...	14	...	...	...	...	1	31	1	1	1	7	42
Aug. 2-15	...	1	7	...	...	8	1	6	...	6	4	...	7	1	...	...	...	...	8	8	7	6	4	8	41
Aug. 16-Sept. 1	...	3	1	...	1	...	...	4	...	...	5	...	2	2	...	...	...	...	2	9	1	...	7	...	19
Totals by sections	...	29	23	2	16	92	8	49	...	42	46	...	31	43	...	1	3	...	39	121	23	45	65	92	385
Totals by type		52			110			57			88			74			4			183			202		385
Totals by species			162						145						78						385				385

[1] Nine untagged trout unidentified as to species)
Four tagged rainbow trout numbers not recorded) Sec. A and B. These fish have not been included in the above tabulation. Therefore the total catch was 398 trout (162 brook trout, 145 brown trout, 82 rainbow trout, 9 trout species?).

[a] Includes one tagged brown trout planted in 1939.

[b] Includes one tagged rainbow trout planted in 1940.

Table 2

Summary of results obtained from the 1941 releases of tagged brook trout, brown trout, and rainbow trout in the sections of Kinne Creek.

Item	Sec. C	Sec. A and B			Totals
	Brook trout	Brook trout	Brown trout	Rainbow trout	
Number planted May 20	50	112	103	104	369
Number recovered, 1941	13	13	36	31	93
Percentage of recovery	26.0	11.6	34.9	29.9	25.2
Number planted June 20	50	90	98	99	337
Number recovered, 1941	10	16	20	42	88
Percentage recovered	20.0	17.8	20.4	42.4	26.1
Total catch, 1941	115	47	145	[1] 82	[2] 398
Percentage of total catch originating from May planting	11.3	27.7	24.8	37.8	23.4
Percentage of total catch originating from June planting	8.7	34.0	13.8	51.2	22.1
Percentage of total catch originating from both plantings	20.0	61.7	38.6	[1] 93.9	[2] 46.5

[1] These figures were arrived at by using the additional 4 tagged rainbow trout whose numbers were not recorded. These four fish are also included above in the total catch.

[2] The total catch includes 389 brook, brown and rainbow trout, and 9 trout unidentified as to species, and untagged.

Table 3

Growth data on tagged brook trout planted in Kinne Creek in 1941.

Time period	May 20 planting					June 20 planting				
	Number of recoveries with growth data	Average days free	Average size at tagging (mm.)	Average increase in size (mm.)	Average increase per day of freedom	Number of recoveries with growth data	Average days free	Average size at tagging (mm.)	Average increase in size (mm.)	Average increase per day of freedom
Apr. 26-May 9	...	...	...	...	...	...	...	...	...	...
May 10-23	...	...	...	...	...	...	...	...	...	...
May 24-June 6	4	5	193	9.8	1.96	...	...	...	...	...
June 7-20	...	...	...	...	...	...	...	...	...	...
June 21-July 4	7	39	191	3.4	0.08	3	12	195	4.3	0.36
July 5-18	8	52	189	9.0	0.17	8	24	182	5.3	0.22
July 19-Aug. 1	2	70	189	14.0	0.20	6	34	187	9.2	0.27
Aug. 2-15	4	76	180	11.3	0.15	6	46	182	2.3	0.05
Aug. 16-29	1	94	180	11.0	0.12	3	62	197	22.7	0.37
Aug. 30-Sept. 1	...	...	...	...	...	...	...	...	...	...

Table 4

Growth data on tagged brown trout planted in Kinne Creek in 1941.

Time period	May 20 planting					June 20 planting				
	Number of recoveries with growth data	Average days free	Average size at tagging (mm.)	Average increase in size (mm.)	Average increase per day of freedom	Number of recoveries with growth data	Average days free	Average size at tagging (mm.)	Average increase in size (mm.)	Average increase per day of freedom
Apr. 26-May 9	...	...	...	...	...	...	...	...	...	...
May 10-23	1	2	249	0.0	0.00	...	...	...	...	...
May 24-June 6	2	14	270	4.0	0.29	...	...	...	...	...
June 7-20	1	28	249	0.0	0.00	...	...	...	...	...
June 21-July 4	15	38	230	6.0	0.16	4	11	239	4.0	0.36
July 5-18	5	51	226	13.0	0.25	4	22	231	8.5	0.39
July 19-Aug. 1	7	66	229	9.2	0.14	4	34	235	3.8	0.11
Aug. 2-15	2	77	218	7.0	0.09	5	48	220	0.6	0.01
Aug. 16-Aug. 29	...	...	...	...	...	1	64	241	13.0	0.20
Aug. 30-Sept. 1	1	112	236	5.0	0.04	2	71	218	4.5	0.06

Table 5

Growth data on tagged rainbow trout planted in Kinne Creek in 1941.

Time period	May 20 planting					June 20 planting				
	Number of recoveries with growth data	Average days free	Average size at tagging (mm.)	Average increase in size (mm.)	Average increase per day of freedom	Number of recoveries with growth data	Average days free	Average size at tagging (mm.)	Average increase in size (mm.)	Average increase per day of freedom
Apr. 26-May 9	...	...	...	...	...	...	...	...	...	...
May 10-23	2	2	222	4.0	2.00	...	...	...	...	...
May 24-June 6	...	...	...	...	...	...	...	...	...	...
June 7-20	9	25	232	3.9	0.15	...	...	...	...	...
June 21-July 4	8	36	237	7.4	0.21	12	11	224	6.8	0.62
July 5-18	7	46	242	4.4	0.10	8	20	243	0.9	0.04
July 19-Aug. 1	1	66	241	1.0	0.02	13	34	234	3.2	0.09
Aug. 2-15	3	73	232	11.3	0.15	4	47	233	7.8	0.17
Aug. 16-29	...	...	...	...	...	4	64	237	4.5	0.07
Aug. 30-Sept. 1	...	...	...	...	...	...	...	...	...	...

Table 6

Average size of wild trout taken by Kinne Creek anglers, 1939-1941 inclusive.
(Figures in parentheses indicate size ranges, measurements given in inches)

	Average size of wild trout					
	Brook trout		Brown trout		Rainbow trout	
Year	Number	Size	Number	Size	Number	Size
1941	110	8.3 (7-12)	88	9.9 (8-16)	4	9.8 (8 3/4-11 1/2)
1940	71	8.6 (8-12)	86	10.4 (8-15 1/2)	3	8.7 (7-9 1/4)
1939	92	7.9 (7-11 1/4)	181	9.1 (7-16)	2	8.5 (8-9 1/8)

Table 7

Summary of hatchery trout planted, number and percentage of recoveries made, and percentage of hatchery trout in the total catches of those species, Kinne Creek, 1938-1941 inclusive.

Year	Species planted	Number planted	Number recovered	Percentage recovery	Total catch of species	Percentage hatchery fish in total catch
1938	Brook trout	1,500	180	12.0	343	52.5
1939	Brown trout	994	98	9.6	279	35.1
1940	Brook trout	167	21	12.5	92	22.8
	Rainbow trout	250	85	34.0	88	96.5
1941	Brook trout	302	52	17.2	162	32.1
	Brown trout	201	56	27.8	145	38.6
	Rainbow trout	203	77	37.8	82	93.9

Table 8

Tabular summary of the results of seining in Kinne Creek, May 20-21, 1941

Item	Section A	Section B	Section C ↓
Number of seine hauls	14	39	23
Brook trout captured			
7 inches or larger	...	...	1
4 - 7 inches	...	...	2
Less than 4 inches	...	1	18
Brown trout captured			
Less than 4 inches	1	3	...
Muddlers captured	2	11	...

↓ Other fish captured in Section C include: one largemouth bass, 4 5/8 inches; also common suckers, creek chubs, black-nosed dace, and a chub-sucker.