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THE PINE RIVER CREEL CENSUS FOR THE 1938 TROUT SEASON -
INCLUDING RESULTS FROM LEGAL-SIZED PLANTINGS

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The end of the 1938 trout season marked the end of the second consecutive year in which an intensive creel census has been operated on the Pine River where it flows along the state-owned land between Walker Bridge and the western section line of Section 2 of T. 20 N., R. 12 W. This report will present the pertinent statistics concerning the fishing during 1938, the number of legal-sized hatchery trout released and recaptured and their apparent influence on the fishing.

In 1937 the census was conducted by enrollees of the Sable River CCC Camp until June 28, and after that camp was discontinued, by the Irons CCC Camp enrollees. During the 1938 trout season, the census was conducted over the same area as in 1937, but census clerks were hired by the Department of Conservation and their activities directed by a fisheries technician. One clerk was placed at each of the developed camp grounds where he was permanently stationed in a tent or house-trailer for the duration of the season. In addition to recording the catch, census clerks

took air and stream temperatures four times daily throughout the trout season, obtained stomach samples of trout caught by fishermen, and secured some 450 scale samples and weights and measurements of individual fish. Regular collections of both aerial and aquatic insects were made by two of the census clerks. The respective camp grounds were also policed by these men when fishing was light. Many favorable comments on the work of the census clerks, their appearance, and the manner in which they met the fishing public were heard during the past summer. The following men served as clerks during the 1938 trout season: Junior Blue, Harold Bowditch, Robert Fortney, Jr., Clifford Smith, Richard Love. Direction of the creel census was in charge of O. H. Clark from April 29 - June 8; Richard Bohland supervised the work from June 9 - September 7.

During the 1938 trout season, 4,109 fishermen fished a total of 16,849 hours in the state-owned waters of the Pine River. They averaged 4.1 hours per trip, and took 2.1 legal trout per fisherman. The average total catch per hour was 0.50 trout; the average catch per hour of rainbow trout was 0.36; the average catch per hour of brook trout was 0.14. The total number of legal trout caught was 8,480, made up of 1,421 "wild" brook trout, 927 hatchery-reared brook trout, 5,218 "wild" rainbow trout, and 908 hatchery-reared rainbow trout. Six brown trout were also included in the catch. The more important tabulations for the 1938 census, as well as available figures for previous censuses of the same area will be found in Table 1.

Marked hatchery trout, both fin-clipped and jaw-tagged, were released in the Pine River during the fall of 1937, and also before and during the 1938 trout season. The details of the various plantings and the percentage of marked trout recaptured from each planting are presented in Tables 2

and 3. The recovery percentages given for 1938 are based only on marked trout taken from the state-owned water. Total percentage of recapture from all data is slightly higher. It will be noted that, in general, the percentage of marked hatchery trout retaken was consistently higher in 1938. This may be attributed, at least in part, to the more efficient crew of census clerks.

Interpretation of data relating to the recovery of tagged trout planted during the summer and fall of 1937 has been confused by the fact that the July, August, and October 1937 plantings of tagged fish were inadvertently marked with tags of inferior quality many of which disintegrated and were lost from the fish. This was not discovered until the control experiment at the Grayling Hatchery was checked in the spring of 1938, when it was found that all the tags had disintegrated and fallen from the control fish, although mortality was negligible. The census clerks were instructed to check all fish for holes in the gular membrane or notches in the lower left jaw. Their persistent search turned up 29 rainbow trout and 9 brook trout which appeared to have lost their tags. Because of uncertainty as to the plantings from which these fish originated, they are not included in the recoveries as shown in the tables.

Very few marked trout which had been released during the summer of 1937 were recaptured during the season of 1938. A total of 9 fish were reported (3 tagged brook trout, 1 fin-clipped brook trout, and 5 tagged rainbow trout). One-half of all the marked trout planted in July and August, 1937, was fin-clipped, one-half was jaw-tagged. Although the true percentage of marked hatchery trout surviving from the summer of 1937 to the 1938 trout season was partly obscured by the loss of the tags, the fact that only one

fin-clipped fish entered the catch would definitely indicate a heavy loss of planted fish over the winter. A control experiment at the Harrietta Hatchery demonstrated a negligible mortality from fin-clipping and also showed that the fins did not regenerate to any appreciable extent.

In a previous report (No. 480) it was indicated from the 1937 creel census data that planting of large numbers (1,000-3,000) of legal fish apparently increased the catch per hour of the wild fish of the species planted. The releases of marked hatchery brook trout (never exceeding 1,000 individuals) before and during the 1938 trout season had an effect similar to that found in 1937, that is, an increase in the catch per hour of wild brook trout during the week of planting followed by a drop back to more or less normal catch per hour within two weeks (Figure 1). Marked rainbow trout released in 1938, however, did not produce any noticeable stimulation in the catch per hour of wild rainbow trout, except possibly during the twelfth week of the season, when 500 legal rainbow trout were planted (Figure 2). It might be argued also that this apparent rise in the catch per hour of wild rainbow trout was a normal condition, since the catch per hour of that species had been steadily increasing since the fifth week of the trout season. Figures 1 and 2 have been drawn from data included in Table 4.

Of the total catch of brook trout for the 1938 trout season on the Pine River, 39.5 per cent were hatchery-reared fish; hatchery-reared rainbow, however, made up only 14.8 per cent of the total catch of rainbow trout. Of all trout caught in the state-owned water, 21.7 per cent were the result of planting legal-sized fish.

The length of time that the various plantings of hatchery trout in 1938 exerted an influence on the fishing can be ascertained from Table 5. A

greater number and a larger percentage of hatchery-reared fish were recovered from the boat planting of May 25, 1938, than from the spot release of April 1, 1938. This difference in the percentage of retakes may have been due to the 29 day interval that elapsed before the anglers could lawfully fish for trout, whereas the boat planting was made during the open season and the fish were immediately available. As during the preceding open season (1937), hatchery brook trout were removed by fishermen in a relatively short time after release whether planted by boat or at one spot. The great majority of artificially-reared brook trout were taken in the first four weeks after planting (Table 4), and became a minor factor in the total catch after that time. Hatchery rainbow trout, however, contributed to the total catch at a more uniform rate. Despite this disparity in the rate of removal of the two species, the ultimate recovery percentages are quite similar (Table 4).

The number of fishermen benefiting from hatchery plantings during the open season should be a consideration in planning a stocking program. Data on the number of anglers taking marked trout from the Pine River in 1937 and 1938 demonstrated that only 11.4 and 20.6 per cent respectively of all the anglers benefited from the releases of marked fish. The average number of marked fish taken per angler in the group benefited was 3.96 in 1937, and 2.15 in 1938 (Table 6). About 1 per cent of the anglers taking marked fish catch many more than the average. These individuals usually live near the stream. As soon as they see the planting unit go by they start for the river with their tackle. Six local fishermen from a nearby town, in 24 fishing trips, caught 165 marked brook trout and 41 marked rainbow trout, an average of between 8 and 9 fish per trip. It was not unusual for limit catches of marked fish to be taken on the days when plantings were made.

Measurements from a pantographic enlargement of an aerial photograph of the Pine River show that 8 miles of stream were under complete census during 1938. The calculated production in terms of legal trout per mile of stream may be estimated as follows: Wild brook trout 177 per mile, wild rainbow 652 per mile, hatchery brook trout 116 per mile, hatchery rainbow 113 per mile, total yield of all trout 1,058 per mile.

Comparison of the census records from the 1937 and 1938 censuses (Table 1) indicates that during 1938 there were approximately twice the number of fishermen and twice the number of hours of fishing as there were in 1937. This apparent doubling of the fishing intensity increased the recorded total catch approximately 24 per cent over that of 1937. As the result of personal observation by the author and other members of the Institute staff on several trips to the Pine River in both 1937 and 1938, it is felt that the fishing intensity was approximately equal in 1937 and 1938. In the 1937 Pine River creel census it is definitely known that data for a number of fishermen were not taken if they had not caught fish. Lack of such data would cause the catch per hour for 1937 to appear higher than it actually was. Since some fishermen also fished when CCC enrollees were not on duty no accurate comparison of the fishing intensity of the two seasons can be made.

During the 1938 census, all clerks were on duty until the last fisherman left the stream. Care was exercised to record the catches properly. Census clerks reported 27 fishermen as "not contacted." The efficiency in recording the angling, assuming that no other fishermen escaped notice, was therefore 99.4 per cent. It is possible that the efficiency was slightly less because it is very probable that a small number of anglers may have entered the

stream between the census stations and were not observed by the clerks. However, for the reasons just discussed, it is felt that the 1938 census presents a truer picture of the fishing intensity and the total catch than does that of the 1937.

Conclusions

1. The planting of trout of legal size in the spring before the opening of the season resulted in a relatively smaller percentage of these fish being recaptured. The month of freedom which they enjoyed apparently did not make them any wilder or smarter, for when fishing began they were removed at approximately the same rate as the fish planted during the open season. Thirty-five per cent of the brook trout planted before the season's opening were recaptured, and 38 per cent of the rainbow trout.

2. Legal-sized trout planted during the season were immediately subjected to angling and a higher percentage of them were retaken by the fishermen; 52 per cent of the brook trout planted in May 25, 1938, were reported back, and 44 per cent of the rainbow trout. Fifty-six and one-half per cent of the rainbow trout planted in July were recovered.

3. Only about one fisherman in five of the total anglers fishing the Pine caught tagged or fin-clipped hatchery fish in 1938. In 1937 only about one fisherman in nine caught marked hatchery trout.

4. The release of mature rainbow trout in the Pine River appears to be unnecessary in view of the large numbers of "wild" rainbow trout (resulting from fingerling stocking or natural spawning) taken during this and preceding years. The number of brook trout taken did not approach the catch of rainbow

TABLE 1. COMPARISON OF THREE SEASONS OF TROUT FISHING ON THE
STATE-OWNED PORTION OF THE PINE RIVER, LAKE COUNTY

Item	¹ 1936	1937	1938
Number of resident fishermen	319	² 1,850	² 3,912
Number of non-resident fishermen	23	108	171
Total number of fishermen	342	2,010	³ 4,109
Percentage of fishermen taking no fish	53	31	45
Total number of hours fished	894	8,459	16,849
Average number of legal trout taken	1.4	3.2	2.1
Total wild brook trout taken	119	1,683	1,421
" hatchery " " "	...	1,488	927
" wild rainbow " "	347	2,647	5,218
" hatchery " " "	...	686	908
" wild brown " "	9	uncertain	6
Average size of - wild brook trout	8.5	9.2	8.2
- hatchery brook trout	...	8.8	8.1
- wild rainbow trout	12.1	9.6	8.2
- hatchery rainbow	...	10.1	8.5
- wild brown trout	8.9	...	9.2
Total undersized brook trout	28	913	3,018
" " rainbow trout	32	629	2,963
Catch per hour - all legal brook trout	0.13	0.38	0.14
Catch per hour - all legal rainbow trout	0.37	0.39	0.36
Average catch per hour - all legal trout	0.50	0.77	0.50

¹Creel census conducted 8/15/36 to 9/7/36 only, entire seasons of 1937 and 1938.

²Residence unknown; 1937 - 52; 1938 - 26.

³Total exclusive of 27 anglers who would not or could not be interviewed.

trout, and in 1938 the ratio was approximately 1:4, although almost equal numbers of fingerling brook and rainbow trout have been planted in the censused portion of the Pine River in the period 1933-1937 (Table 7).

5. It is obvious that, both during the 1937 and 1938 creel censuses, hatchery brook trout stocked before or during the open season did not contribute to the catch to any degree for more than three weeks after release (Table 5). Just why rainbow trout reared and planted under the same conditions should furnish angling over a longer period of time cannot be stated definitely at this time. One possible explanation is that rainbow trout possess a higher degree of intelligence in the matter of choice of food than does the brook trout.

It also might be that artificially reared brook trout tend to "school" in the stream much as they did in hatchery pools, whereas the rainbow may scatter more. This would lead to a greater degree of food and space competition among the brook trout and to early removal by the fishermen.

6. Because of the failure of the tags to remain attached to the trout planted in October, 1937, no fair comparison can be made between the percentage of fish accruing to the angler from this planting and from releases of hatchery fish during the spring of 1938. Even if all trout recorded as having lost tags were included with tags from the October, 1937 planting (these fish which lost tags might have been from July or August, 1937 releases), recovery percentages would have been 6.2 per cent for brook trout and 7.0 per cent for rainbow trout. These percentages of recapture were much lower than those obtained from the release made in April, 1938, and which was subjected to the same fishing, and possibly indicate heavy mortality

between fall planting and succeeding summer fishing. Judgement of the merits of fall versus spring planting should be reserved for another year until creel census results are available which include fall and spring plantings with tags of known quality.

7. Although conclusions regarding the fate of the legal trout stocked during the summer of 1937 are subject to the same limiting factor of poor tags, half of the marked fish planted in July and August were fin-clipped, so that recovery of only one fin-clipped trout during the fishing season of 1938 must be taken to indicate a considerable mortality of fish from one summer to the next.

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TABLE 2. DETAILS OF PLANTINGS OF HATCHERY FISH AND
PERCENTAGE OF RECOVERY FROM PLANTINGS

Date of Planting			Species and how planted				Percentage of recovery of hatchery fish	
			Brook trout		Rainbow trout			
Year	Month	and Day	Spot	Boat	Spot	Boat	Brook trout	Rainbow trout
1937	May	18-19	3,000	...	...	...	40.2	...
1937	June	15	...	959	2,007	...	6.0	22.3
1937	July	13	...	2,004	...	1,000	4.9	10.2
1937	August	10	...	1,550	...	1,000	8.1	13.6
1937	October	28-29	1,000	...	500	...	5.3	1.2
1938	April	1	1,000	...	500	...	34.9	38.4
1938	May	25	...	1,000	...	1,000	51.6	44.1
1938	July	15	...	...	500	...	...	¹ 56.5
² 1938	November	5	798					
Total planted to date			5,798	5,513	3,507	3,000	...	...

¹Based on recoveries from 400 fish planted within the limits of the census area.

²Not fished for as yet.

TABLE 3. DATE OF RELEASE, METHOD OF MARKING AND AVERAGE SIZE
 (IN INCHES) OF TROUT PLANTED IN THE PINE RIVER
 (Figures in parentheses represent average total length.)

Date of Planting			Species and how marked				Total planted	
Year	Month	Day	Brook trout		Rainbow trout		Brook trout	Rainbow trout
			Tag	Fin-clip	Tag	Fin-clip		
1937	May	18-19	1,000	.....	.....	.....	3,000 (9.0)	.....
1937	June	15	959	.....	1,007	.....	959 (8.8)	2,007 (10.1)
1937	¹ July	13	504	500	250	250	2,004 (8.8)	1,000 (9.8)
1937	¹ August	10	500	500	250	250	1,550 (8.6)	1,000 (10.6)
1937	October	28-29	1,000	.....	500	.....	1,000 (7.4)	500 (10.9)
1938	April	1	1,000	.....	500	.....	1,000 (7.6)	500 (7.5)
1938	² May	25	500	500	500	500	1,000 (8.6)	1,000 (7.9)
1938	July	15	.....	.....	500	.....	.....	500 (8.2)
1938	³ November	5	499	299	.....	.....	800 (11.4)	.....
Total planted to date			5,062	1,799	3,507	1,000	11,311	6,507

¹Dorsal and adipose fins removed on fin-clipped fish.

²Adipose and left ventral fins removed on fin clipped fish.

³Adipose and right pectoral fins removed on fin-clipped fish.
 November 1938 planting not subjected to angling as yet.

TABLE 4. NUMBER OF TROUT CAUGHT AND CATCH PER HOUR

PINE RIVER CREEL CENSUS, 1938

Hours fished in week	Brook trout				Rainbow trout				Total	Catch per hour
	Hatchery	Catch per hour	Wild	Catch per hour	Hatchery	Catch per hour	Wild	Catch per hour		
1 - 2588.50	291	0.11	379	0.15	82	0.03	273	0.11	1,025	0.40
2 - 1039.75	59	0.06	78	0.07	27	0.02	90	0.09	254	0.24
3 - 779.00	20	0.03	45	0.06	17	0.02	88	0.11	170	0.22
4 - 494.00	200	0.40	87	0.18	63	0.13	63	0.13	413	0.84
5 - 1753.50	288	0.16	145	0.08	156	0.09	205	0.12	794	0.45
6 - 609.50	18	0.03	51	0.08	63	0.10	164	0.27	296	0.48
7 - 860.50	25	0.03	75	0.09	67	0.08	281	0.32	448	0.52
8 - 727.50	6	0.01	68	0.09	31	0.05	324	0.44	429	0.59
9 - 594.50	3	0.01	68	0.11	29	0.05	311	0.52	411	0.69
10 - 960.00	4	0.00	97	0.10	67	0.07	520	0.54	688	0.72
11 - 578.50	2	0.00	29	0.05	11	0.02	336	0.58	378	0.66
12 - 936.25	7	0.01	68	0.07	78	0.08	632	0.68	785	0.84
13 - 853.50	1	0.00	48	0.06	59	0.06	343	0.40	451	0.52
14 - 615.00	-	0.00	32	0.05	26	0.04	293	0.48	351	0.57
15 - 843.50	1	0.00	33	0.04	50	0.06	345	0.41	429	0.51
16 - 545.50	1	0.00	26	0.05	27	0.05	288	0.53	342	0.63
17 - 649.00	1	0.00	39	0.06	27	0.04	253	0.39	320	0.49
18 - 1420.75	-	0.00	53	0.04	28	0.02	409	0.29	490	0.35
16,848.75	927	0.06	1,421	0.08	908	0.05	5,218	0.31	8,474	0.50

TABLE 5. ACTUAL RATE OF REMOVAL FROM THE HATCHERY RELEASES OF
FALL, 1937 AND SPRING AND SUMMER, 1938

Week of recovery in 1938 trout season	Method and date of planting marked trout							
	Spot - 10/28/37		Spot - 4/1/38		Boat - 5/25/38		Spot - 7/15/38	
	Brook trout	Rainbow trout	Brook trout	Rainbow trout	Brook trout	Rainbow trout	Rainbow trout	
Apr. 30-May 6	1	42	5	245	70	...	...	...
May 7-13	2	5	1	50	24	...	...	...
May 14-20	3	2	...	18	13	...	...	...
May 21-27	4	1	...	14	9	185	52	...
May 28-June 3	5	3	...	14	21	271	132	...
June 4-10	6	...	...	...	14	18	48	...
June 11-17	7	...	...	2	6	23	55	...
June 18-24	8	...	...	...	3	6	28	...
June 25-July 1	9	...	...	1	6	1	23	...
July 2-8	10	...	...	2	9	2	57	...
July 9-15	11	...	...	...	2	2	9	...
July 16-22	12	...	...	1	2	6	13	63
July 23-29	13	...	...	1	6	...	6	46
July 30-Aug. 5	14	...	...	...	2	...	4	18
Aug. 6-12	15	...	...	...	...	1	5	40
Aug. 13-19	16	...	...	1	2	...	5	24
Aug. 19-27	17	...	...	...	...	1	...	25
Aug. 28-Sept. 7	18	...	...	...	3	...	4	20
Total	53	6	349	192	516	441	236	
Per cent recovery	5.3	1.2	34.9	38.4	51.6	44.1	156.5	

¹This percentage based on the recovery from 400 tagged rainbow trout planted inside the censused portion of the stream.

TABLE 6. DISTRIBUTION OF THE CATCH OF MARKED TROUT AMONG ANGLERS
ON THE PINE RIVER IN 1937 AND 1938

Item	Year	
	¹ 1937	1938
Total number of anglers ²	2,010	4,109
Number of anglers taking marked fish	229	847
Percentage of total anglers taking marked fish	11.4	20.6
Number of marked brook trout taken	563	927
Number of marked rainbow trout taken	343	908
Total number of marked fish taken	906	1,825
Average number of marked fish taken by anglers catching marked fish	3.96	2.15
Range in numbers of marked fish taken	1 to 16	1 to 15

¹Only one-half of all hatchery fish marked in 1937, all in 1938.

²Figures are actually for "fishermen-days" and not for individual fishermen. For example, if a man fished for two days he was considered as two anglers etc.

TABLE 7. NUMBER OF TROUT FINGERLINGS PLANTED IN PINE RIVER, 1933-1937
 INCLUSIVE, IN STATE-OWNED WATER UNDER CREEL CENSUS
 (T. 20 N., R. 12 W., Sec. 2, 11, 12, 13, 24)

Year planted	Brook trout	Rainbow trout
1933	24,000	24,000
1934	35,800	38,000
1935	14,000	14,000
1936	3,000	...
1937	16,000	20,000
Total	92,800	96,000

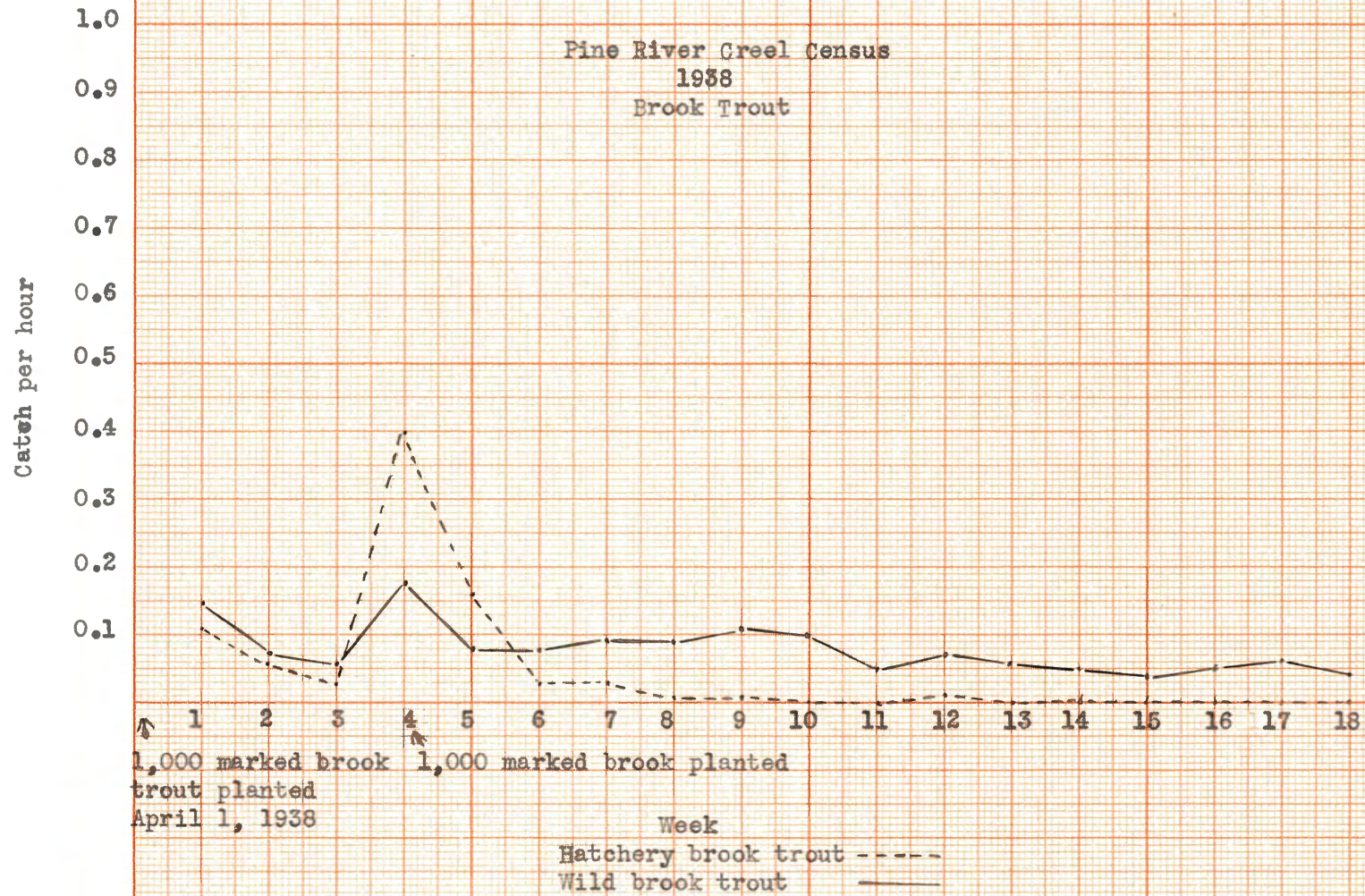


Figure 1

Catch per hour
KEUFFEL & ESSER CO.
NEW YORK

Pine River Creel Census
1938
Rainbow Trout

↑ 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18
500 marked rainbow planted Apr. 1, 1938 1,000 marked rainbow planted 500 marked rainbow planted

Week
Hatchery rainbow trout -----
Wild rainbow trout ———

Figure 2

