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INSTITUTE FOR FISHERIES RESEARCH
DIVISION OF FISHERIES
MICHIGAN DEPARTMENT OF CONSERVATION
COOPERATING WITH THE
UNIVERSITY OF MICHIGAN
November 16, 1950

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ANN ARBOR, MICHIGAN

Report No. 1268

REPORT ON THE INTENSIVE CREEL CENSUS OF THE EXPERIMENTAL WATERS
OF THE HUNT CREEK DRAINAGE, 1949 SEASON

By

David S. Shetter

ABSTRACT

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During the 1949 trout season intensive creel census data were obtained from the experimental waters of the Hunt Creek drainage under a permit system similar to that employed at the Pigeon River Trout Research Station and at the Rifle River Area. Excellent cooperation was received from the angling public.

A total of 876 permits were issued to 522 different individuals; ninety (10.3 percent) were granted to married women utilizing their husband's licenses, and 107 were written for minors under 17 years of age (12.2 percent).

On the experimental waters of Hunt Creek (7.02 acres) in 597 angling days a total of 1,437.00 hours of fishing (205 hours per acre) resulted in a catch of 713 brook trout larger than 7 inches. The weight of 703 fish creeled was 114.51 pounds. The average size of the brook trout creeled was 7.8 inches and 0.16 pounds. In addition the special regulation sections where 6.0 inches is the minimum legal size yielded 342 brook trout between 6.0 and 6.9 inches, and the total weight of these fish was 32.90 pounds (for 335 fish creeled). Also the removal of 27 illegal brook trout weighing 2.06 pounds was noted. The total weight of fish removed by angling amounted to

(W)

149.47 pounds or ^{21.29}~~21.63~~ pounds per acre for the ^{7.02}~~6.91~~ acres involved. Angling quality indices were: for adult fish, 0.50 fish per hour, 0.080 pounds of fish per hour; for 6- to 7-inch fish, 0.38 fish per hour, 0.036 pounds per hour.

On Fuller Creek and East Fish Lake Outlet, in 115 angling days 296 hours were expended in fishing, and this effort resulted in the catch of 50 brook trout larger than 7 inches (weight 7.59 pounds), and 131 brook trout between the sizes of 6.0 and 6.9 inches (weight 11.07 pounds). Angling quality indices for Fuller Creek-East Fish Lake Outlet were: for the adult brook trout, 0.17 fish per hour, 0.026 pounds per hour; for the 6-inch fish, 0.50 fish per hour, ^{0.042}0.42 pounds per hour. The average sizes were 7.6 inches and 0.15 pounds for the adult fish, 6.3 inches and 0.08 pounds for the "special" brook trout.

On East Fish Lake 1949 angling pressure was heavier than ever before. A total of 1,039.75 hours was expended in 287 angling days for a total of 93 brook trout which weighed 70.66 pounds. Angling quality indices were: 0.09 fish per hour, 0.068 pounds of fish per hour. The average size of the anglers' catch was 11.5 inches and 0.76 pounds. The largest brook trout during the 1949 season was a specimen measuring 18.4 inches which weighed 2 pounds, 9.5 ounces.

In Sections C and D of Hunt Creek and in Fuller Creek west of the rotary screen, where the minimum size limit is 6 inches, angling pressure continued to be heavier than in the experimental waters where 7 inches is the minimum size limit. Comparison of the 1939-1945 averages for these waters with the 1946-1949 averages (the years during which the 6-inch limit has been in force) suggests that an additional fraction of the brook trout population has been utilized by the anglers at some sacrifice in angling

quality but with an increase in the total production of the larger brook trout.

Individual records of all anglers using the experimental waters and their total catches for the season were tabulated. It was found that the more expert anglers on the streams (those taking from 11 to 75 brook trout) constituted 4.1 percent of the total individuals, and they made 12.2 percent of all the angling trips and took 48.6 percent of the total catch. On East Fish Lake, the ten most expert fishermen made up 4.8 percent of the total individuals and they made 10.5 percent of the total trips and caught 55.8 percent of the total catch.

Residence tabulation of the permit holders indicate that Wayne, Montmorency, Oakland, Genesee and Washtenaw County residents furnish over 50 percent of the angling pressure. Non-resident angling is conducted chiefly by Ohio residents.

Comparison of the anglers' catch in Sections Z, A, B and C, with pre- and post-season population estimates are presented. The data suggest that the pre-season population estimate in April, 1949 was inaccurate, probably as a result of low water temperature. On the basis of the known anglers' catch and the post-season population estimate in September, 1949, the anglers removed 65.5 percent of the total number of fish 7 inches and larger which were available during the 1949 trout season, leaving an escapement for spawning of 34.5 percent.

By means of fish traps in the blocking bulkheads at the lower end of Section Z and the upper end of Section C, the movements of brook trout in the main stream of Hunt Creek were observed. A total of 507 trout were handled. Recoveries of marked fish suggest a downstream migration of minor character and relatively short distance in the fall and winter months with a compensating return of many of the same fish during the following spring and early summer.

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OF THE HUNT CREEK DRAINAGE, 1949 SEASON

By

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The creel census activities of the Hunt Creek Fisheries Experimental Station comprise a major portion of the station's work schedule during the spring and summer. The 1949 angling records obtained from 2.43 miles of Hunt Creek (~~6.91~~^{7.02} acres) 1.8[✓] miles of Fuller Creek and East Fish Lake Outlet (3.57 acres[✓]) and from East Fish Lake a 16-acre brook trout lake, add to our knowledge of the sport fishery over populations of naturally-reared brook trout.

Records from the 1949 trout season constitute the 11th consecutive trout season for which records have been taken on all of these waters. A detailed map of the experimental waters is given in Figure 1.

Change in method of collecting creel census data

A major departure from previous creel census record collection methods was instituted with the start of the 1949 trout season. By order of the Conservation Commission, certain posted waters of the Hunt Creek drainage were

[✓] Determined from plane table maps drafted on a scale of 1 inch = 20 feet.

MICHIGAN DEPARTMENT OF CONSERVATION
 FISH DIVISION
HUNT CREEK FISHERIES EXPERIMENTAL AREA
 MONTMORENCY COUNTY

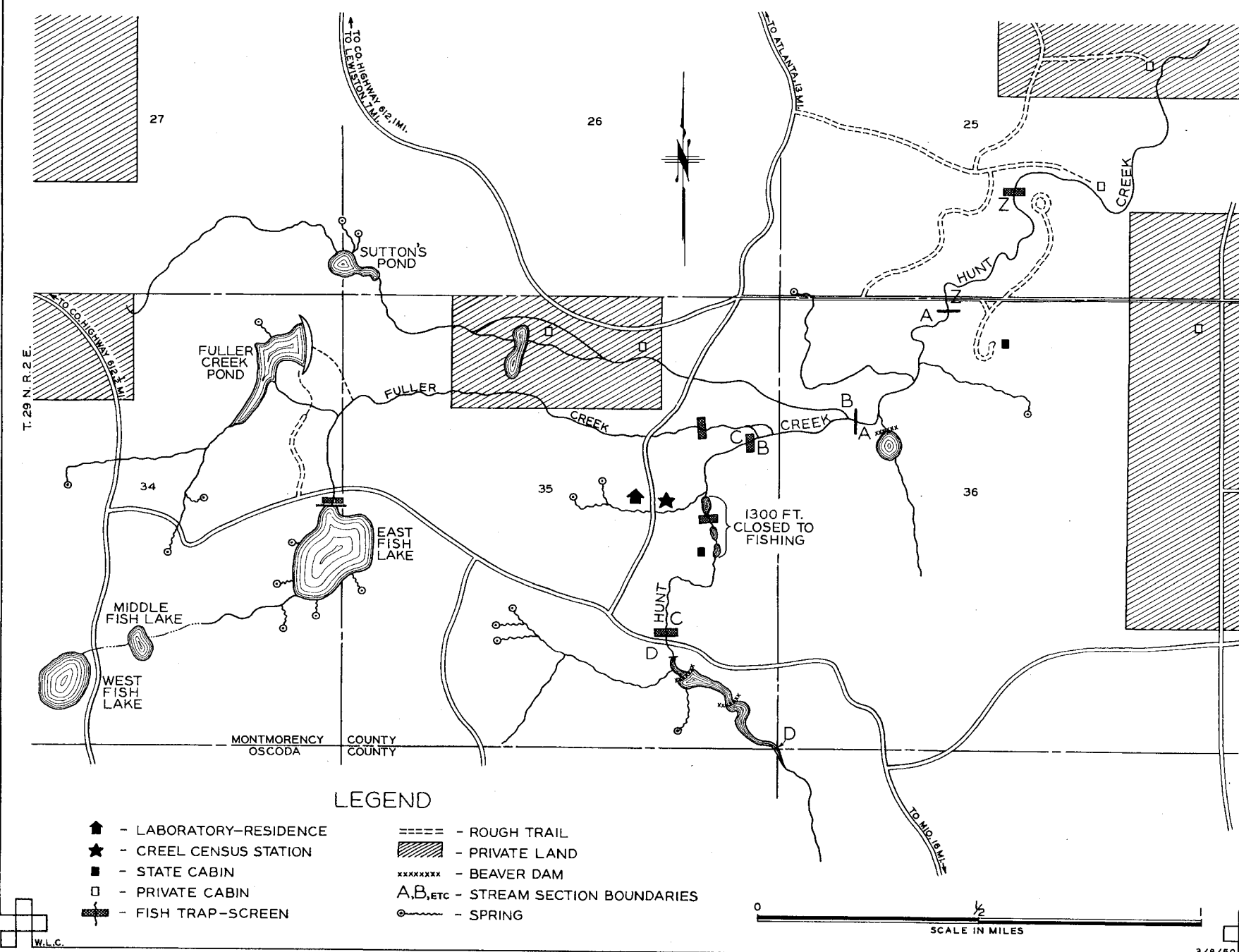


Figure 1

HUNT CREEK FISHERIES EXPERIMENTAL AREA

OBJECTIVE -- The Hunt Creek Fisheries Experiment Station was established in 1939 as a year-round testing ground and outdoor research laboratory where trained biologists might study brook trout and the effects of angling on a typical brook trout stream. The Hunt Creek drainage was chosen because of availability of state-owned stream frontage and also because of the variety of brook trout habitats present in the area.

State ownership has made possible various experimental restrictions and management procedures not otherwise feasible.

The purpose of the investigations is to find out by observation or by controlled experiments what methods of stream management will increase the quality of the brook trout angling and also preserve the species for the enjoyment of future anglers.

THE ANGLERS' PART IN OUR RESEARCH -- The best measure of an experimental procedure in trout stream management is how it affects the anglers' catch. Therefore, registration of anglers and collection of creel census records constitute an important part of the work each year. Such records provide a measure of the effects of changes in size and creel limits, and, in connection with marking experiments and year-round population estimates, reveal origin and movements of trout within the system. Creel census records compared with population estimates correspond to sales records compared with production schedules in industry.

RESEARCH HERE DURING THE LAST TEN YEARS -- has indicated that:

- (1) Natural reproduction is more than adequate in Hunt Creek;
- (2) Fall plantings of hatchery-reared brook trout fingerlings contribute less than 3% to the anglers' catches in subsequent years;
- (3) Stream improvement, properly carried out, can improve the quality of angling.
- (4) Tributary streams are not an important source of adult fish for main stream angling;
- (5) In the proper type of lake good brook trout fishing can be created by the elimination of rough fish populations.

Some of the other accomplishments of the station include detailed food studies of the brook trout by Dr. J. W. Leonard, who also identified new species of trout stream insects not previously described; an exhaustive study of the use of brook trout scales in age and growth studies of Michigan brook trout by Dr. E. L. Cooper; and the development by the past and present staff of the electric shocker as a substitute for seines in trout population investigations.

CURRENT INVESTIGATIONS -- include further study of brook trout movements in the main stream through the use of the recently-installed upper and lower screens, detailed year-round population studies on the brook trout population between these traps, trout lake and beaver pond population studies by means of netting, marking and recovery, and investigations of the effect of beaver dams on the fishing in dammed portions of trout streams.

REGULATIONS -- Except for about 1,300 feet of stream in Section C of Hunt Creek, all the waters on the map on the reverse of this sheet are open to angling. The posted waters, marked by Departmental signs, are open to angling under the following restrictions set by the Conservation Commission:

- (1) Each angler must first obtain at the checking station a daily free-use permit before fishing.
- (2) Each angler must report the results of his fishing at the checking station on conclusion of his angling.
- (3) Special regulations are to be observed in certain waters and such waters will be posted with appropriate signs. Otherwise the usual regulations for other waters of the state are in effect on the Hunt Creek Area.

SUMMARY, ANGLING STATISTICS, EXPERIMENTAL SECTIONS, HUNT CREEK, 1939-1949

	YEAR										
	1939	1940	1941	1942	1943	1944	1945	1946	1947	1948	1949
TOTAL ANGLER-DAYS.....	438	505	1,015	800	311	340	375	753	607	504	593
TOTAL HOURS FISHED.....	780	901	1,546	1,267	540	640	637	1,206	872	869	1,415
LEGAL BROOK TROUT TAKEN.	492	406	722	543	378	364	315	439	187	492	698
TOTAL POUNDS REMOVED....	67	60	116	83	59	53	52	68	26	78	115
CATCH PER HOUR.....	0.63	0.45	0.47	0.43	0.70	0.57	0.49	0.36	0.21	0.57	0.49
AVERAGE TOTAL LENGTH....	7.5	7.6	7.7	7.6	7.5	7.7	7.9	7.7	7.6	7.7	7.8

SUMMARY, ANGLING STATISTICS, EAST FISH LAKE, 1939-1949

	YEAR										
	1939	1940	1941	1942	1943	1944	1945	1946	1947	1948	1949
TOTAL ANGLER-DAYS.....	63	111	155	159	121	311	436	430	344	287	283
TOTAL HOURS FISHED.....	126	308	386	289	200	651	928	935	711	853	1,024
LEGAL BROOK TROUT TAKEN.	51	172	242	367	69	108	169	93	89	117	91
TOTAL POUNDS REMOVED....	--	28	47	97	26	79	131	69	54	55	70
CATCH PER HOUR.....	0.41	0.55	0.63	1.26	0.29	0.17	0.18	0.10	0.13	0.14	0.09
AVERAGE TOTAL LENGTH....	--	8.0	8.5	9.0	9.3	11.2	11.9	11.5	11.1	10.4	11.6

closed to all angling except by permit. The waters so posted were: Hunt Creek from the Oscoda County - Montmorency County line downstream to the lower bulk-head in Section 25, Fuller Creek and East Fish Lake Outlet, and East Fish Lake. All of these trout waters lie in T. 29 N., R. 2 E., of Montmorency County in Sections 25, 34, 35, and 36.

A small frame building was moved directly across the road from the Hunt Creek Fisheries Experimental Station and with some redecorating converted into a checking station where anglers applied for permits to fish and reported the results of their fishing. Free daily angling permits were issued to all anglers on presentation of a current license bearing trout stamps. The checking station was manned daily during the trout season from 6:00 a.m. until the last fisherman left in the evening. On week ends and holidays the checking station was opened at 4:00 a.m. to accommodate early anglers. Also a doorbell was installed at the laboratory for the convenience of fishermen desiring permits at hours outside of those when an attendant was on duty.

The experimental waters were posted with appropriate Departmental signs at all logical points of access, and the new system was given wide publicity in the local papers and at the local sportsmens' clubs. As on the Pigeon River Trout Research Area and on the Rifle River Area the angling public cooperated excellently. Of 876 angling permits issued in 1949, only two violations of the Commission order occurred. These anglers failed to return their permits and report their fishing results and were successfully prosecuted and fined accordingly.

It is felt that this general system of collecting the creel census records represents an advancement over the former system. Under the old method, it was the responsibility of the staff of the Station to search for the anglers on the experimental waters and wait for them to complete their angling. This

procedure involved from 600 to 1,000 miles per month in truck use for two trucks, as well as considerable overtime for the staff in checking the half-dozen points of access to the experimental waters. Under the permit system, average use on one truck has been under 450 miles per month, and the 1949 trout season ended with no overtime owed to the staff. These savings were accomplished with no loss of efficiency in the creel census or general station operations.

Angling results, 1949

Permits issued

A total of 876 permits were issued to 522 different individuals during the 1949 season. Of this number 90 were issued to married women fishing on their husband's licenses (10.3 percent), and 107 permits were made out for minors under 17 years of age (12.2 percent).

Angling results, experimental sections, Hunt Creek

With the completion of the concrete bulkheads at the lower end of the experimental water, plus inception of the Commission order, it was possible for the first time to get an accurate measure of the angling pressure and total catch on a measured area of stream below the "A" Bridge, now titled Section Z. From the "A" Bridge (which is the downstream boundary of Section A) to the lower bulkhead there are 2,397 feet of stream of an average width of 20.3 feet, or a total area of 1.12 acres. The length and area of Sections A, B, and C remained the same as in previous years. However, the beaver increased the water levels in Section D, and maps prepared by A. K. Adams, Fisheries Research Technican, indicate that the area of Section D was 3.11 acres as the result of increases in water levels. Section E, the section in the Bushman swamp has been eliminated inasmuch as it lies almost entirely in Oscoda County where the recent Commission order does not apply. Fishing records for this section were always few in number and the catch was negligible. The lengths, average widths, and areas of the various experimental sections of Hunt Creek are given in Table 1.

Table 1

Dimensions of the various experimental waters on the Hunt Creek drainage, with the angling regulations in force, 1949 trout season. (Mileage is given in parentheses).

Experimental water	Dimensions		Area, 1949 (acres)	1949 angling regulations
	Length (feet)	Average width (feet)		
Section Z	2,397 (0.45)	20.3	1.12	7 inches minimum size, 15 per day
Section A	2,577 (0.49)	24.3	1.44	7 inches minimum size, 15 per day
Section B	1,605 (0.30)	17.5	0.64	7 inches minimum size, 15 per day
Section C	3,970 (0.75+)	11.8	0.71 ^{1/2}	6 inches minimum size, 15 per day
Section D	2,896 (0.55)	50.0	3.11	6 inches minimum size, 15 per day
<hr/>				
Totals, experimental sections, Hunt Creek	13,445 (2.55)	...	7.02	.....
<hr/>				
Lower Fuller Creek	1,140 (0.22)	25.4	0.66	7 inches minimum size, 15 per day
<hr/>				
Upper Fuller Creek and East Fish Lake Outlet	8,735 (1.65)	14.5	2.91	6 inches minimum size, 15 per day
<hr/>				
Fuller Creek from Hunt Creek to East Fish Lake and Fuller Creek Pond	9,875 (1.87)	...	3.57	.....
<hr/>				
East Fish Lake	...	...	16.00	7 inches minimum size, 5 per day use of live minnows as bait prohibited

^{1/2} Approximately 1,300 feet of Section C around the experimental diversions is closed to fishing. The figure given for acreage was determined from plane table maps.

In the section previously known as Below A, now called Section Z, in 165 angling days, a total of 374.75 hours of angling were recorded in which time 186 adult brook trout were creeled whose total weight was 28.09 pounds (Table 2). For the entire season the average size of the brook trout taken was 7.6 inches, and the average weight was 0.15 pounds. The catch per hour for the season was 0.50 fish, and the pounds per hour rate of removal was 0.075 pounds. On a per-acre basis, anglers removed 167 adult trout and 25.06 pounds of adult brook trout per acre. Of the 165 angling days listed 103, or 62.4 percent caught no legal trout. The angling pressure on this lowermost stream section was at the average rate of 335 hours per acre.

Section A was lightly fished during 1949 in comparison with previous years (Table 3). Records from 64 days of angling involving 120.25 hours were listed, and the total catch amounted to 76 adult brook trout (3 of which were returned to the water) whose total weight amounted to 10.69 pounds. The average size of these brook trout was 7.5 inches and their average weight was 0.15 pounds. Quality indices for this stream section in 1949 were 0.63 fish per angling hour, or 0.089 pounds of fish per hour of fishing. On a per acre basis, the yield to the anglers from 1.44 acres may be calculated to be 53 adult fish or 7.42 pounds per acre. Unsuccessful angling days on Section A amounted to 57.8 percent of the total (37/64). The angling pressure in Section A during 1949 was at the average rate of 84 hours per acre.

Section B (Table 4) angling in 1949 was, as in many years, relatively light in comparison with other sections. A total of 23 angling days involving 30.25 hours were noted. The total catch was 30 adult brook trout, 4 of which were returned to the water. The total weight of the 26 fish creeled was 3.73 pounds. The average size of the brook trout taken was 7.4 inches and 0.14 pounds. Angling quality indices were good--0.99 adult brook trout per hour, or 0.123 pounds of

Table 2

Angling statistics, Section Z, Hunt Creek 1949 trout season

Figures in parentheses give the number of angling days on which no legal brook trout were taken.

Date	Total angling days	Total hours of angling	Brook trout catch		Angling quality		Total inches of legal brook trout	Average length (inches)
			Number	Total pounds	Catch per hour	Pounds per hour		
April 30-May 13	32 (24)	71.50	29	4.13	0.41	0.058	221.2	7.6
May 14-27	17 (11)	40.50	14	2.30	0.35	0.057	110.0	7.9
May 28-June 10	12 (6)	24.75	29	3.99	1.17	0.161	217.0	7.5
June 11-24	15 (10)	36.75	16	2.30	0.44	0.063	120.1	7.5
June 25-July 8	12 (7)	28.00	13	2.03	0.46	0.072	97.6	7.5
July 9-22	26 (15)	64.75	27	4.69	0.42	0.072	213.4	7.9
July 23-August 5	7 (5)	14.25	4	0.60	0.28	0.042	30.5	7.6
August 6-19	19 (11)	47.75	21	2.87	0.44	0.060	156.7	7.5
August 20-September 2	12 (6)	19.75	20	2.85	1.01	0.144	149.2	7.5
September 3-11	13 (8)	26.75	13	2.33	0.49	0.087	100.9	7.8
Totals, averages	165 (103)	374.75	186	28.09	0.50	0.075	1,416.6	7.6

Table 3

Angling statistics, Section A, Hunt Creek 1949 trout season.

Figures in parentheses give the number of days on which no legal trout were taken.

Date	Total angling days	Total hours of angling	Brook trout catch		Angling quality		Total inches of legal brook trout	Average length (inches)
			Number	Total pounds	Catch per hour	Pounds per hour		
April 30-May 13	3 (3)	2.50	...	...	...	...	...	...
May 14-27	14 (10)	24.50	9	1.34	0.37	0.055	67.6	7.5
May 28-June 10	0 (0)	...	...	...	...	...	...	...
June 11-24	8 (4)	17.25	11 ³ / _✓	1.32	0.64	0.077	61.5	7.7
June 25-July 8	11 (4)	21.50	23	3.17	1.07	0.147	169.7	7.4
July 9-22	6 (1)	9.25	19	2.61	2.05	0.282	142.5	7.5
July 23-August 5	8 (6)	15.50	6	0.80	0.39	0.052	44.7	7.4
August 6-19	7 (6)	19.00	1	0.22	0.05	0.012	8.2	8.2
August 20-September 2	4 (2)	3.75	2	0.41	0.53	0.109	16.3	8.1
September 3-11	3 (1)	7.00	5	0.82	0.71	0.117	38.1	7.6
Totals, averages	64 (37)	120.25	76 ³ / _✓	10.69	0.63	0.089	548.6	7.5

NOTE: Number in carets indicates number of trout caught and returned to the stream.

Table 4

Angling statistics, Section B, Hunt Creek 1949 trout season

Figures in parentheses give the number of days on which no legal trout were taken.

Date	Total angling days	Total hours of angling	Brook trout catch		Angling quality		Total inches of legal brook trout	Average length (inches)
			Number	Total pounds	Catch per hour	Pounds per hour		
April 30-May 13	2 (2)	4.00	...	...	...	...	...	...
May 14-27	1 (0)	0.50	1	0.17	2.00	0.340	7.7	7.7
May 28-June 10	0 (0)	...	...	...	...	...	...	...
June 11-24	5 (0)	7.00	16 ³ ✓	1.88	2.29	0.269	96.4	7.4
June 25-July 8	4 (3)	8.00	3	0.37	0.37	0.046	21.9	7.3
July 9-22	2 (1)	2.00	4	0.57	2.00	0.285	29.8	7.4
July 23-August 5	2 (1)	2.50	2	0.34	0.80	0.136	15.9	7.9
August 6-19	0 (0)	...	...	...	...	...	...	...
August 20-September 2	6 (4)	5.25	3 ¹ ✓	0.27	0.57	0.051	14.4	7.2
September 3-11	1 (0)	1.00	1	0.13	1.00	0.130	7.5	7.5
Totals, averages	23 (11)	30.25	30 ⁴ ✓	3.73	0.99	0.123	193.6	7.4

NOTE: Number in carets indicates number of trout caught and returned to the stream.

brook trout per hour. Section B is 0.64 acres in area, thus the per acre yield to the fishermen may be calculated to be 47 legal trout and 5.83 pounds per acre. Eleven of 23 angling days were unsuccessful or 47.8 percent. Angling pressure for 1949 in this short section may be computed to be 48 hours per acre.

In Section C (Table 5), more or less normal angling pressure prevailed during 1949. The legal minimum size limit in Section C is 6 inches and has been at this special limit since 1947. A total of 101 angling days were expended on the 0.71 acres of stream within the Section C boundaries, and 42.6 percent of the angling days were unsuccessful in catches of either adult or 6- to 7-inch brook trout. In 248.00 hours of fishing 79 adult brook trout (3 of which were released) weighing 12.27 pounds and 117 6- to 7-inch brook trout weighing 11.67 pounds were removed by angling. Angling quality indices were as follows, adult brook trout, 0.32 fish per hour, 0.049 pounds of fish per hour; 6- to 7-inch brook trout, 0.48 fish per hour, 0.047 pounds of fish per hour. The average size of the anglers' catch was: Adult fish, 7.7 inches, 0.16 pounds; 6- to 7-inch brook trout, 6.4 inches, 0.09 pounds.

Based on a water acreage of 0.71 acres, Section C yielded 111 adult fish per acre and 17.28 pounds of adult brook trout per acre during 1949. The 6- to 7-inch fish added 165, 6- to 7-inch brook trout and 16.44 pounds per acre. Angling pressure for the 1949 trout season in Section C averaged 349 hours per acre.

Of the experimental stream sections on Hunt Creek, Section D, with its three beaver ponds continued to attract the greatest number of anglers as it had done during 1948 (Table 6). In 1949, 244 angling days were listed for Section D, during which 663.75 hours of fishing yielded 342 adult brook trout weighing 60.64 pounds and 222, 6- to 7-inch brook trout whose weight was 21.23 pounds. The average size of the adult fish creeled was 7.9 inches and 0.18 pounds, while the 6- to 7-inch fish taken averaged 6.4 inches in total length and 0.10 pound in weight.

The 1949 angling quality indices for Section D were as follows: adult fish, 0.52 fish per hour, 0.091 pounds per hour; 6- to 7-inch fish, 0.33 fish per hour,

Table 5

Angling statistics, Section C, Hunt Creek 1949 trout season.

Figures in parentheses are as follows: Under "Total angling days" the number of angling days on which no legal or 6- to 7-inch trout were taken. The other data in parentheses gives the statistics on the angling for 6- to 7-inch brook trout.

Date	Total angling days	Total hours of angling	Brook trout catch		Angling quality		Total inches of legal brook trout	Average length (inches)
			Number	Total pounds	Catch per hour	Pounds per hour		
April 30-May 13	22 (15)	47.50	13 ³ / _✓ (13 ³ / _✓)	1.76 (1.60)	0.27 (0.27)	0.037 (0.034)	97.7 (63.3)	7.5 (6.3)
May 14-27	4 (0)	6.75	6 (11)	0.91 (1.08)	0.89 (1.63)	0.135 (0.160)	44.9 (72.0)	7.5 (6.5)
May 28-June 10	22 (6)	76.00	16 (31)	2.25 (2.89)	0.21 (0.41)	0.030 (0.038)	119.8 (198.3)	7.5 (6.4)
June 11-24	10 (2)	22.75	11 ³ / _✓ (22)	1.23 (2.20)	0.48 (0.97)	0.054 (0.097)	64.1 (142.9)	8.0 (6.5)
June 25-July 8	7 (2)	14.00	3 (8)	0.36 (0.77)	0.21 (0.57)	0.026 (0.055)	22.1 (51.4)	7.4 (6.4)
July 9-22	12 (5)	26.75	11 (10)	1.81 (0.86)	0.41 (0.37)	0.068 (0.032)	86.2 (62.9)	7.8 (6.3)
July 23-August 5	14 (10)	29.75	10 (16)	2.34 (1.52)	0.34 (0.54)	0.070 (0.051)	80.8 (103.6)	8.1 (6.5)
August 6-19	2 (2)	6.00	... ...	... ...	0.00 (0.00)	0.000 (0.000)	... ...	... ...
August 20-September 2	6 (1)	14.50	9 (6)	1.61 (0.49)	0.62 (0.41)	0.111 (0.034)	71.7 (38.3)	8.0 (6.4)
September 3-11	2 (0)	4.00	... (3)	... (0.26)	0.00 (0.75)	0.000 (0.065)	... (19.4)	... (6.5)
Totals, averages	101 (43)	248.00	79 ³ / _✓ (120 ³ / _✓)	12.27 (11.67)	0.32 (0.48)	0.049 (0.047)	587.3 (752.1)	7.7 (6.4)

NOTE: Number in carets indicates number of trout caught and returned to the stream.

Table 6

Angling statistics, Section D, Hunt Creek 1949 trout seasons.

Figures in parentheses are as follows: Under "Total angling days" the number of angling days on which no legal or 6- to 7-inch trout were taken. The other data in parentheses gives the statistics on the angling for 6- to 7-inch brook trout.

Date	Total angling days	Total hours of angling	Brook trout catch Number	Total pounds	Angling quality Catch per hour	Angling quality Pounds per hour	Total inches of legal brook trout	Average length (inches)
April 30-May 3	77 (40)	204.50	89 (67)	13.55 (7.49)	0.44 (0.33)	0.066 (0.037)	699.0 (421.0)	7.9 (6.3)
May 14-27	41 (25)	104.00	41 (25)	5.92 (2.02)	0.39 (0.24)	0.057 (0.019)	308.1 (160.7)	7.5 (6.4)
May 28-June 10	20 (11)	57.25	11 (9)	1.77 (0.83)	0.19 (0.16)	0.031 (0.014)	84.1 (20.3)	7.6 (6.6)
June 11-24	15 (8)	29.25	14 (18)	2.70 (1.48)	0.48 (0.62)	0.092 (0.051)	115.2 (117.2)	8.2 (6.5)
June 25-July 8	24 (16)	49.00	30 (21)	5.59 (2.15)	0.61 (0.43)	0.114 (0.044)	236.5 (138.1)	7.9 (6.6)
July 9-22	28 (12)	98.00	42 (46)	8.88 (4.36)	0.43 (0.47)	0.091 (0.044)	329.3 (290.8)	7.8 (6.3)
July 23-August 5	12 (5)	29.25	19 (7 ^h)	4.38 (0.30)	0.65 (0.24)	0.150 (0.010)	151.5 (20.3)	8.0 (6.8)
August 6-19	7 (4)	19.75	9 (1)	1.67 (0.09)	0.46 (0.05)	0.085 (0.005)	71.4 (6.1)	7.9 (6.1)
August 20-September 2	5 (1)	11.00	22 (2)	4.85 (0.21)	2.00 (0.18)	0.441 (0.019)	193.3 (13.5)	8.8 (6.7)
September 3-11	15 (4)	61.75	65 (26)	11.33 (2.30)	1.05 (0.42)	0.183 (0.037)	522.8 (168.5)	8.0 (6.5)
Totals, averages	244 (126)	663.75	342 (222 ^h)	60.64 (21.23)	0.52 (0.33)	0.091 (0.032)	2,711.2 (1,395.3)	7.9 (6.4)

NOTE: Number in carets indicates number of trout caught and returned to the stream.

0.032 pounds per hour. Yields per acre to the 1949 anglers may be computed as follows, (based on an area of 3.11 acres for Section D): adult fish, 110 fish and 19.50 pounds; 6- to 7-inch fish, 71 fish and 6.83 pounds.

Of the 244 days of angling registered for this stream section, 126 or 51.6 percent, were unsuccessful in catching any fish larger than 6 inches. Angling pressure on Section D amounted to an average of 213 hours per acre for the 1949 season.

Angling records from all experimental sections on Hunt Creek have been combined in Table 7 by two-week periods. They reveal that a total of 597 angling days were expended on the 7.02 acres within the boundaries of the experimental portion of Hunt Creek. During these days 1,437.00 hours of fishing yielded 713 adult brook trout weighing 114.51 pounds (weight of 703 fish kept) and 342, 6- to 7-inch brook trout whose weight was 32.90 pounds (weight of 335). The average size of the adult trout taken was 7.8 inches and 0.16 pounds; average size of the "special" brook trout was 6.4 inches and 0.10 pounds.

In addition to the total legal creel mentioned above, 19 brook trout of lengths less than 6.0 inches were removed from the 6-inch waters whose total weight was 1.30 pounds (average length 5.8 inches). From the 7-inch waters there were 8 brook trout which were less than 7 inches long in anglers' creels whose total weight was 0.76 pounds (average length 6.8 inches). Thus the total number of fish, legal and illegal, which were caught and removed amounted to 703 adult brook trout, 335 "special" (6- to 6.9-inch brook trout), and 27 illegal brook trout whose total weight was 149.47 pounds, or $\frac{21.29}{21.63}$ pounds per acre of all fish from the $\frac{7.02}{6.91}$ acres under observation.

Over the experimental waters as a whole the angling quality indices were 0.50 adult fish per hour and 0.080 pounds of adult brook trout per hour; 6- to 7-inch brook trout were removed at the rate of 0.37 fish per hour and 0.036 pounds per hour.

The per acre removal by anglers during 1949 was as follows: adult fish, 102 fish and 16.31 pounds per acre; 6- to 7-inch fish, 91 fish and 8.87 pounds

Table 7

Angling statistics, all experimental sections combined, Hunt Creek 1949
trout season.

Figures in parentheses are as follows: Under "Total angling days" the number of angling days on which no legal or 6- to 7-inch trout were taken. The other data in parentheses gives the statistics on the angling for 6- to 7-inch brook trout in Sections C and D

Date	Total angling days	Total hours of angling	Brook trout catch		Angling quality	
			Number	Total pounds	Catch per hour	Pounds per hour
April 30-May 13	136 (84)	330.00 (252.00)	131 ³ (80 ³)	19.45 (9.09)	0.40 (0.32)	0.059 (0.036)
May 14-27	77 (46)	176.25 (110.75)	71 (36)	10.69 (3.10)	0.40 (0.33)	0.061 (0.028)
May 28-June 10	54 (23)	158.00 (133.25)	56 (40)	7.99 (3.72)	0.35 (0.30)	0.051 (0.028)
June 11-24	53 (24)	113.00 (52.00)	68 ⁹ (40)	9.31 (3.68)	0.60 (0.77)	0.082 (0.071)
June 25-July 8	58 (32)	120.50 (63.00)	72 (29)	11.52 (2.92)	0.60 (0.46)	0.096 (0.046)
July 9-22	74 (34)	200.75 (124.75)	103 (56)	18.68 (5.22)	0.51 (0.45)	0.093 (0.042)
July 23-August 5	43 (27)	91.25 (59.00)	41 ¹ (23 ¹)	8.53 (1.82)	0.45 (0.39)	0.093 (0.031)
August 6-19	35 (23)	92.50 (25.75)	31 (1)	3.65 (0.09)	0.34 (0.04)	0.039 (0.003)
August 20-September 2	33 (14)	54.25 (25.50)	56 ¹ (8)	9.99 (0.70)	1.03 (0.31)	0.184 (0.027)
September 3-11	34 (13)	100.50 (65.75)	84 (29)	14.70 (2.56)	0.84 (0.44)	0.146 (0.039)
Totals, averages	597 (320)	1,437.00 (911.75)	713 ¹⁰ (342 ¹)	114.51 (32.90)	0.50 (0.38)	0.080 (0.036)

NOTE: Number in carets indicates number of trout caught and returned to the stream.

in the 3.71 acres where the latter group were legally available. When the illegal catch is included, the per acre removal of all fish was 21.63 pounds and 154 brook trout.

Of the 597 angling days on the experimental waters, 320, or 53.6 percent, caught no adult or "special" brook trout. The angling pressure for the 1949 season amounted to an average of 205 hours per acre.

Angling results, Fuller Creek and East Fish Lake Outlet (Table 8)

A short portion of Fuller Creek, the main tributary to Hunt Creek, has a minimum legal size limit of 7 inches. This stream area lies between the rotary screen and the confluence with Hunt Creek and is 0.22 miles long and 0.66 acres in extent. A total of 17 hours of fishing on 14 angling days yielded 10 brook trout weighing 1.74 pounds for a catch per hour of 0.59 fish and 0.017 pounds of fish per hour. The average size of the fish captured was 8.2 inches and their average weight was 0.17 pounds. Ten of the 14 angling days, or 71.4 percent, reported no angling success as far as brook trout larger than 7 inches were concerned.

On Upper Fuller Creek (upstream from the rotary screen) the minimum legal size limit was 6 inches. A total of 99 angling days were spent on this water during which time 263.00 hours of angling yielded 35 adult brook trout (catch per hour, 0.13 fish) whose weight was 4.33 pounds (pounds per hour, 0.016 pounds) and 131, 6- to 7-inch brook trout (catch per hour, 0.50 fish) which weighed 11.07 pounds (pounds per hour, 0.042 pounds). The average size of both the adult and the "special" brook trout was lower here than in the other experimental waters. The adult brook trout creeled were of an average size of 7.3 inches and 0.12 pounds, while the "special" brook trout averaged 6.3 inches in length and 0.08 pounds in weight. Based on a water area of 2.91 acres, Upper Fuller Creek yielded 12 adult brook trout and 45, 6- to 7-inch brook trout per acre, and 1.49 pounds of adult brook trout and 3.80 pounds of 6- to 7-inch brook trout per acre.

Angling statistics, Fuller Creek and East Fish Lake Outlet, 1949 trout season.

Figures in parentheses are as follows: Under "Total angling days" the number of angling days on which no legal or 6- to 7-inch trout were taken. The other data in parentheses gives the statistics on the angling for 6- to 7-inch brook trout.

Date	Total angling days	Total hours of angling	Brook trout catch		Angling quality		Total inches of legal brook trout	Average length (inches)
			Number	Total pounds	Catch per hour	Pounds per hour		
April 30-May 13	25 (9)	84.75	12 (50)	1.44 (3.82)	0.14 (0.59)	0.017 (0.045)	87.0 (313.1)	7.2 (6.3)
May 14-27	13 (5)	26.75	3 (27)	0.39 (1.97)	0.11 (1.01)	0.014 (0.074)	22.2 (170.4)	7.4 (6.3)
May 28-June 10	18 (11)	55.25	7 (5)	0.93 (1.12)	0.13 (0.09)	0.017 (0.020)	51.1 (32.6)	7.3 (6.5)
June 11-24	9 (3)	15.75	3 (15)	0.30 (1.34)	0.19 (0.95)	0.019 (0.085)	21.2 (95.7)	7.1 (6.4)
June 25-July 8	6 (3)	16.00	3 (6)	0.36 (0.57)	0.19 (0.38)	0.023 (0.036)	21.4 (39.3)	7.1 (6.5)
July 9-22	3 (3)	3.75	... (0)	... ...	0.00 (0.00)	0.000 (0.000)	... ...	... ...
July 23-August 5	3 (3)	7.00	... (0)	... ...	0.00 (0.00)	0.000 (0.000)	... ...	... ...
August 6-19	7 (6)	22.00	1 (3)	0.12 (0.27)	0.04 (0.14)	0.005 (0.012)	7.1 (19.3)	7.1 (6.4)
August 20-September 2	7 (2)	12.50	... (12)	... (0.94)	0.00 (0.96)	0.000 (0.075)	... (75.6)	... (6.3)
September 3-11	8 (3)	19.25	6 (13)	0.79 (1.04)	0.31 (0.68)	0.041 (0.054)	43.9 (83.7)	7.3 (6.4)
Totals, averages Upper Fuller	99 (48)	263.00	35 (131)	4.33 (11.07)	0.13 (0.50)	0.016 (0.042)	253.9 (829.7)	7.3 (6.3)
Totals, averages Lower Fuller 1949	14 (10)	17.00	10	1.74	0.59	0.017	81.6	8.2
Totals, averages Fuller Creek Pond 1949	2 (0)	16.00	5	1.52	0.31	0.095	45.5	9.1
Grand totals Fuller Creek and East Fish Lake Outlet, 1949	115 (58)	296.00 (263.00)	50 (131)	7.59 (11.07)	0.17 (0.50)	0.026 (0.042)	381.0 (829.7)	7.6 (6.3)

Of the 99 angling days listed, 48, or 48.4 percent had caught no legal trout of any classification.

The earth filled embankment replacing the old Fuller Creek Beaver Dam was completed in May, 1949. This impounded approximately the same amount of water (as yet unmapped) as did the original beaver dam. During the last week in August, two anglers (both successful) fished 16 hours on the impoundment and caught 5 adult brook trout weighing 1.52 pounds. The average size of these fish was 9.1 inches and 0.30 pounds. Angling quality indices were 0.31 fish per hour, 0.095 pounds of fish per hour.

Angling results, East Fish Lake (Table 9)

This 16-acre brook trout lake, where the daily limit is 5 fish of 7 inches or larger, was fished harder in 1949 than any year in the previous decade. In 287 angling days a total of 1,039.75 hours of fishing was recorded. The anglers removed 93 legal brook trout weighing 70.66 pounds. The average size of the fish taken was 11.5 inches and 0.76 pounds. For the entire season the angling quality indices were 0.09 fish per hour, 0.068 pounds of fish per hour. The pounds per acre removal by angling amounted to 4.42 pounds under an angling pressure of 65 hours per acre for the season.

Unsuccessful angling days on East Fish Lake constituted 81.2 percent of the total fisherman days listed (233/287). As usual a number of excellent brook trout were taken; of the total catch of 93 fish, 26 were larger than 1 pound, and 4 were larger than two pounds. The largest specimen was 18.4 inches in length and 2 pounds 9 1/2 ounces in weight. As in several seasons in the previous decade, almost one-third of the season's catch exceeded one pound in weight.

Progress of the angling in Sections C and D of Hunt
Creek and Fuller Creek west of the rotary screen where the legal
size limit is 6 inches (Table 10)

The 1949 trout season was the fourth consecutive season in which a six-inch size limit operated on the waters specified above. To give some idea of the trend

Table 9

Angling statistics, East Fish Lake, 1949 trout season

Figures in parentheses give the number of days on which no legal trout were taken.

Date	Total angling days	Total hours of angling	Brook trout catch		Angling quality		Total inches of legal brook trout	Average length length (inches)
			Number	Total pounds	Catch per hour	Pounds per hour		
April 30-May 13	115 (99)	435.00	26	24.12	0.06	0.055	335.8	12.9
May 14-27	19 (15)	62.25	6	9.80	0.10	0.157	89.4	14.9
May 28-June 10	47 (38)	155.00	11	6.53	0.07	0.042	119.7	10.9
June 11-24	13 (12)	30.25	1	0.28	0.03	0.009	8.8	8.8
June 25-July 8	9 (8)	35.50	2	0.39	0.06	0.011	15.5	7.8
July 9-22	9 (9)	50.50	...	...	0.00	0.000	...	...
July 23-August 5	21 (11)	52.75	21	13.14	0.40	0.249	220.4	10.5
August 6-19	24 (18)	92.50	11	7.46	0.12	0.081	118.9	10.8
August 20-September 2	17 (13)	80.00	9	7.32	0.11	0.092	108.8	12.1
September 3-11	13 (10)	46.00	6	1.62	0.13	0.035	52.0	8.7
Totals, averages	287 (233)	1,039.75	93	70.66	0.09	0.068	1,069.3	11.5

Table 10

Comparison of the average annual angling statistics for Sections C, D, and E of Hunt Creek and of Fuller Creek under a 7-inch size limit (1939 - 1945) and under a 6-inch size limit (1946 - 1949).

A - brook trout larger than 7 inches.
S - brook trout between 6.0 to 6.9 inches.

Item	Total angling days	Percentage unsuccessful angling days	Total hours of angling	Brook trout caught		Catch per hour		Pounds of trout removed		Pounds per hour	
				A	S	A	S	A	S	A	S
				1939 - 1945 averages C, D, E and Fuller Creek size limit, 7 inches	423	61	679.4	311	...	0.46	...
1946 - 1949 averages C, D, E and Fuller Creek size limit, 6 inches	627	59	1,047.9	332	436.2	0.32	0.42	54.30	37.50	0.052	0.036
Percentage change in averages	+48.2	-3.3	+54.2	+6.8	(+147.0) ¹	-30.4	(+60.9) ¹	+12.50	(+90.2) ¹	-26.8	(+23.9) ¹

¹ Figures in parentheses give percentage changes obtained by adding all trout larger than 6 inches together.

of the results, the average annual angling pressure and yield for the period 1939-1945 inclusive, and the same data for the period 1946-1949 inclusive are compared. The earlier period was one during which the minimum size limit was 7 inches; the latter span of years was the one during which the 6-inch minimum legal size was in force.

It should be recorded here that stream conditions on Section C and D of Hunt Creek have changed or been changed noticeably in the period 1946-1949. Section C had several low dams installed and numerous digger logs in an attempt to improve this water. In Section D a beaver colony built three dams during 1947 that have been maintained at full level. The effect on the fishing for trout larger than 7 inches has been recorded elsewhere. Fuller Creek, on the other hand, has not been changed to any degree as a trout habitat throughout the course of this phase of the investigation. A part of the increase in angling in Section D and a part of the increase in catch of brook trout larger than 7 inches results from the habitat changes mentioned, and these factors will have to be weighed in the final analysis of the problem.

All angling data from the two periods in question for the waters to which the 6-inch size limit apply are combined to obtain the averages given in the table. The percentage change in the annual averages have been determined using the 1939-1945 averages as a base figure.

As in the earlier reports, the data continued to indicate that there has been a noticeable increase in angling pressure (48.2 percent more trips, 54.2 percent more hours) on the stream sections in question during the last four years when fished under a 6-inch size limit. There was only a slight drop in unsuccessful angling days, as 3.3 percent fewer trips were recorded as complete failures (no legal trout of 6 inches or larger captured).

The average yearly catch of brook trout larger than 7 inches has been 6.8 percent larger in number and 12.50 percent larger in weight since the inception of the 6-inch size limit. In addition, the 6-inch fishing has yielded an additional

436.2 brook trout per year between the size of 6.0 and 6.9 inches with an average yearly weight of 37.50 pounds.

Angling quality for the adult (7 inches and larger) brook trout in the waters in question was poorer (catch per hour 30.4 percent lower, pounds per hour 26.8 percent lower) after the initiation of the 6-inch minimum size. It would appear that this decrease in angling quality for adult fish is due primarily to the marked increase in angling pressure, since the average number of adult brook trout removed per year has not decreased.

If the total catch (all brook trout above 6 inches) is considered, there have been increases as follows in the yearly averages since the initiation of the 6-inch size limit:

Total catch	147 percent
Poundage removed	90.2 percent
Catch per hour	60.9 percent
Pounds per hour	23.9 percent

Thus far it does not appear that the removal of brook trout between the sizes of 6.0 and 6.9 inches has affected the angling for brook trout of larger sizes, and it has made available an additional fraction of the trout population for the angling public which formerly was wasted.

The commission order concerning the special 6-inch size limit expires January 1, 1951. At the end of the 1950 trout season the pertinent records will be examined in detail and a report submitted on the subject.

Number of individual anglers catching various
numbers of adult brook trout during the 1949
season.

In past years these data were summarized by angling days, totalling up the results from the various stream sections. The previous method gave accurate results insofar as individual sections were concerned, but when the stream totals

were added the fact that a percentage of the anglers were successful in one portion of the stream and not in another tended to throw the calculations off. It seemed that a more valuable set of data might be obtained by tabulating season totals by individual anglers, and sorting them by the number of brook trout they captured during the entire season. This was done for stream angling and trout lake angling. To facilitate the compilation of these figures an alphabetical card file was established on which each individual's name and residence appeared, and the dates of fishing and the numbers of fish captured were recorded.

The results of the tabulation of stream angling on the experimental portions of Hunt Creek and Fuller Creek are given in Table 11, and only brook trout 7 or more inches in length are considered. It should be emphasized that the numbers of trout are season totals for individuals.

It will be observed that season totals for various individuals ranged from 0 to 75 adult brook trout.

On Hunt and Fuller creeks there was a total of 367 individual fishermen who expended a total of 712 angling days (or trips) and their total catch amounted to 763 brook trout over 7 inches long. The dispersion of the angling effort and the total catch may be summarized as follows: 226 individuals (61.6 percent) caught no adult brook trout (0.00 percent) in 1949 in 281 trips (39.5 percent); 106 individuals (28.9 percent) who caught from one to five brook trout removed 239 adult fish (31.3 percent) in 264 angling trips (37.1 percent); 20 individuals (5.4 percent) who caught from six to ten adult brook trout during the entire season removed 153 fish (20.1 percent) in 80 trips (11.2 percent); and 15 individuals (4.1 percent) who caught from 11 to 75 adult brook trout removed 371 fish (48.6 percent) in 87 angling days (12.2 percent).

Note that with the increase in success the average number of trips during the season per individual increased.

Table 11

Number of adult brook trout caught and number of angling trips made by individual anglers. 1949 trout season Hunt and Fuller Creeks

Number of adult brook trout caught	Number of individuals catching them	Number of angling trips made	Total trout caught	Percent of total individuals	Percent of total angling trips	Percent of total catch
0	226	281	0	61.6	39.5	0.00
1	46	101	46			
2	27	64	54			
3	8	20	24			
4	10	32	40			
5	15	47	75			
6	4	21	24			
7	6	24	42	28.9	37.1	31.3
8	6	25	48			
9	1	4	9			
10	3	6	30			
11	1	9	11			
12	2	8	24			
13	1	3	13			
14	2	5	28	5.4	11.2	20.1
15	2	7	30			
19	1	3	19			
22	1	6	22			
23	1	9	23			
29	2	9	58			
68	1	11	68			
75	1	17	75	4.1	12.2	48.6
Totals	367	712	763			

This distribution of the season's total catch among individual anglers of the experimental waters on the Hunt Creek Fisheries Area is remarkably similar to that noted for the 1949 season observed in the experimental waters of the Pigeon river (see I.F.R. Report 1250, page 33) which indicated that the 10.3 percent of the individuals on the Pigeon River who caught from 6 to 91 fish during the 1949 season removed 61.6 percent of the total 1949 catch. On Hunt Creek and Fuller Creek 9.3 percent of the individuals who caught from 6 to 75 fish removed 68.6 percent of the total catch for 1949.

On East Fish Lake the 1949 records show that 212 individuals spent 287 angling days in catching 93 brook trout larger than 7 inches (Table 12). When sorted by numbers of fish removed by the various individual anglers we find that the total season's catch by individuals ranged from 0 to 11 fish. Of the 212 individuals, 169 fishermen (79.7 percent) made 199 trips (69.3 percent) which were unsuccessful (0.00 percent of the total catch); 41 anglers (19.3 percent) who caught from one to five fish removed 72 brook trout (77.4 percent of the total) in 77 trips (26.8 percent); while two anglers (1.0 percent) who took 10 and 11 fish during the season removed 21 fish (22.6 percent) in 11 fishing days (3.9 percent). The 10 most successful anglers (4.8 percent of the total) who caught 3, 4, 5, 10 and 11 fish in 30 trips (10.5 percent of the total trips) removed 52 brook trout, or 55.8 percent of the total catch. As on the streams, the expert angler fished oftener and was able to catch more fish by reason of greater skill and for more numerous opportunities to angle.

Residence of anglers, 1949

The residence tabulation of fishermen using the streams and East Fish Lake is given in Table 13. The permits and angling records have been sorted on an individual basis as well as on an angling day basis as was done in previous years.

Table 12

Number of adult brook trout caught and number of angling trips made by individual anglers, 1949 trout season, East Fish Lake.

Number of adult brook trout caught	Number of individual anglers catching them	Number of angling trips made	Total adult trout caught	Percent of total individuals	Percent of total angling trips	Percent of total catch
0	169	199	0	79.7	69.3	0.00
1	25	41	25	11.7	14.3	26.9
2	8	17	16	3.8	5.9	17.2
3	4	9	12	1.9	3.1	12.9
4	1	4	4	0.5	1.4	4.3
5	3	6	15	1.4	2.1	16.1
10	1	5	10	0.5	1.8	10.8
11	1	6	11	0.5	2.1	11.8
Totals	212	287	93	100.0	100.0	100.0

Table 13

Residence of individual anglers, also residence of anglers
as tabulated by angling days, 1949 trout season
Hunt Creek Fisheries Experimental Area

County or State of residence	Number of individuals from county or state	Residence tabulation by angling days			Totals
		East Fish Lake	Fuller Creek	Hunt Creek (exp. secs.)	
Alcona	1	...	...	1	1
Alpena	5	...	...	12	12
Arenac	4	2	...	2	4
Bay	7	...	3	8	11
Berrien	3	3	...	3	6
Branch	1	1	...	...	1
Clinton	1	...	...	4	4
Calhoun	8	12	...	12	24
Crawford	5	6	...	...	6
Genesee	(4) 38	22	28	37	(3) 87
Gratiot	2	2	...	...	2
Hillsdale	4	1	...	4	5
Ingham	18	8	1	15	24
Ionia	2	1	...	1	2
Iosco	2	1	...	2	3
Isabella	6	5	...	4	9
Jackson	20	19	4	7	30
Kalamazoo	1	...	...	1	1
Kent	9	7	...	10	17
Lapeer	1	...	...	2	2
Lenawee	3	...	...	4	4
Livingston	2	...	2	2	4
Macomb	13	12	2	17	31
Menominee	1	...	...	1	1
Midland	7	1	...	3	4
Monroe	1	...	...	1	1
Montmorency	(2) 75	71	22	131	(1) 224
Newaygo	2	...	...	6	6
Oakland	(3) 15	18	6	39	(4) 63
Oscoda	18	3	1	22	26
Presque Isle	1	...	...	2	2
Saginaw	13	7	...	7	14
Sanilac	5	...	4	2	6
Shiawassee	5	2	2	6	10
St. Clair	12	7	...	14	21
Tuscola	11	7	3	11	21
Washtenaw	(5) 27	10	6	30	(5) 46
Wayne	(1) 104	41	28	114	(2) 183
Total residents	483	269	112	537	918
Florida	1	2	...	...	2
Illinois	6	4	...	6	10
Indiana	7	4	...	7	11
Kansas	1	...	...	2	2
Ohio	23	7	3	45	55
Oregon	1	1	...	...	1
Total nonresidents	39	18	3	60	81
Grand totals	522	287	115	597	999

The sorting by individuals probably gives a truer picture of the origin of the fishing pressure. Four hundred and eighty-three individual anglers who were Michigan residents came from 37 counties in the Lower Peninsula and Menominee County in the Upper Peninsula. The 5 counties furnishing the most individual anglers to the Hunt Creek area were: Wayne (104), Montmorency (75), Oakland (45), Genesee (38) and Washtenaw (27). However, reference to the tabulation by fishing days indicates from a standpoint of total angling pressure anglers from Montmorency County, Wayne County, Genesee County, Oakland County and Washtenaw County were most numerous in the order given.

Thirty-nine individual non-resident fishermen came from Florida (1), Illinois (6), Indiana (7), Kansas (1), Ohio (23), and Oregon (1).

Comparison of 1949 anglers' catch with the estimated adult population
of brook trout.

In April, 1949, the self-cleaning rotary screens were placed in the concrete bulkheads at the upper end of Section C and the lower end of Section Z (formerly known as "Below A."). Fish-traps in the bulkheads made it possible to observe migration into and out of the area between the two devices and to observe additional mortalities. Thus a reasonably accurate check on the fish population of Sections Z, A, B and C could be maintained at all times. The rotary screens were maintained in a fish-tight condition from April 7 to December 12, 1949. A snow, followed by a heavy rain on that date over-topped them on the latter date. However, the resident population was controlled by the screens during the period involving the population studies and the 1949 creel census.

During the period April 10-15, 1949, and again during the period September 23-29, 1949 a population study of the enclosed stream area (2.0 miles, 3.91 acres) was made by the marking and recovery method, utilizing the electric shocker. In Table 14 the numbers of brook trout of various sizes that were marked and the estimated

Table 14

Population estimates and catch data for 3.91 acres of the experimental waters confined between the upper and lower bulkhead traps (Sections Z, A, B, C) Hunt Creek, 1949.

Item	7 inches +		6 - 6.9 inches		2 - 5.9 inches	
	Number marked	Estimated total population	Number marked	Estimated total population	Number marked	Estimated total population
Population study, Spring, 1949	62	129	128	342	536	2,998
Observed mortality	1	9	...	10	...	13
Migrated out	1	6	3	7	6	75
Population estimate less known losses	60	114	125	325	530	2,910
Immigration in	20	...	20	...	...	71
Theoretically available to anglers during 1949 season	80	114	145	325	530	2,981
Caught by 1949 anglers as 7 inches or larger	30	...	39(9) ¹	...	13(11) ²	...
Population study, Fall, 1949	82	188	188	500	1,664	5,814

- ✓ 1 - Figure in parenthesis is number of 6.0 - 6.9 inch trout which were removed as 7 inch + fish during season.
- ✓ 2 - Figure in parenthesis is number of 2.0 - 5.9 inch trout which were removed as 6.0 - 6.9 inch fish during season.

population of each size group is given. Along with this is listed the observed mortalities and emigrations from the blocked-off portion of the stream. Also shown are the theoretical numbers of brook trout available to the 1949 anglers, both marked and unmarked, based on the preseason population study in the spring.

The next line gives the observed catch of marked fish which entered the anglers' catch of brook trout larger than 7 inches during 1949. It was possible to separate those fish which grew from 6.0-6.9 inches to some size above 7 inches because they were clipped by removing the top 1/3 of the caudal fin, while those which were less than 6.0 inches had the lower 1/3 of the caudal fin removed.

Between the blocking bulkheads, anglers caught 361 brook trout larger than 7 inches during 1949, of which 30 were jaw-tagged 39 had the upper tail clipped and 13 had the lower tail clipped, and 279 were unmarked trout.

Calculations based on the known numbers of marked fish available at the start of the 1949 season and the estimated numbers of the various size groups, can account for only a portion of the 1949 catch. Since it was known that 80 tagged fish larger than 7 inches were available during the season and 30 were captured, in theory $30/80$ of the 34 unmarked available trout larger than 7 inches at the season's opening should have been taken during the season or 14 fish. By similar reasoning, $39/136$ of the 180 unmarked 6.0- to 6.9-inch fish grew to a size of 7+ inches during the season, or 52 fish. The estimated numbers of brook trout which were less than 6.0 inches at the season's opening and which grew into the 7-inch + class would be $13/519$ of 2,451, or 61 fish.

If we now add the known numbers of marked fish to the estimated totals of unmarked fish of comparable sizes, we have $30 + 39 + 13$ (all marked) + $14 + 52 + 61$ (unmarked) or a total of 209 brook trout larger than 7 inches, leaving the origin of 152 fish unexplained. Through the presence of known numbers of marked fish of various sizes it is possible to obtain a measure of the growth of sub-legal fish into the legal size class, also it appears that the weirs and bulkheads at the upper and

lower ends of the experimental water were fish-tight, so the possible factor of migration into and out of the area is taken into account. The most logical explanation of the discrepancy between the known total anglers' catch and the total catch as calculated by size groups is that the 1949 spring population study was inaccurate in that it failed to account for a portion of the trout population present at that time.

This is demonstrable in another way. In theory, if the population study method was sampling the entire population the percentage of marked fish in the anglers' catch should have been very close to the percentage of marked fish in the estimated total population. In 1949 a comparison of these two sets of percentages were:

for marked fish 7+ inches in population study--approximately 48 percent (62/129);

for marked fish 7+ inches in creel census--approximately 23 percent (82/361);

for marked fish 6.0 to 6.9 inches in population study--approximately 37 percent (128/342)

✓ for marked fish 6.0 to 6.9 inches in creel census--approximately 17 percent (20/117);

This suggests that the electric shocker was reaching only about 1/2 of the actual population of legal fish in mid-April when the water temperatures were for the most part lower than 50° F. during the mornings and early afternoon.

In the last line of Table 14 will be found the population estimate of the blocked-off portion of the stream after the close of the trout season. At that time stream temperatures were more favorable ranging from 48° to 58°. It will be noted that many more fish of all size groups were marked and the estimates were correspondingly higher. Of the two 1949 population estimates, the estimate of 188 brook trout larger than 7 inches is probably the more accurate.

Based on the latter estimate, there was a total of 361 + 188 legal brook trout available to the 1949 anglers, or 549 adult fish. Of this number 361, or 65.5 percent were taken, leaving 34.5 percent as escapement for spawning. Comparing this

✓ Data for Section C utilized only as this was the only area where 6.0 inches was legal size.

data with similar studies on the Pigeon River Trout Research Area in 1949 we find that on the Pigeon River the anglers there removed approximately 73 percent of the available brook trout stock, leaving an approximate 27 percent escapement. Comparative figures on the estimated fall populations, the total angler-take and the percentage of escapement are given in Table 15. It can be demonstrated that the angling pressure per acre was approximately 30 percent heavier on the Pigeon River experimental waters than on the waters of Hunt Creek. Perhaps this pressure difference accounts for the difference noted in the percentage of escapement for the two areas.

These results suggest that in the future trout stream population studies should not be attempted until the water temperature remains above 50° F. if accurate estimates are desired.

Movement of brook trout through the blocking weirs on
the main stream of Hunt Creek in 1949.

The concrete bulkheads at the "D" bridge and at the lower end of the Section Z (see Map) were completed in the fall of 1948, and self-cleaning rotary screens and horizontal screens and fish-traps were installed and operating by April 7, 1949. Insofar as we could determine the various devices utilized were fish-tight except possibly for brook trout smaller than three inches. At no time during the trout season was there high enough water to overflow the rotary screens or the horizontal or vertical screen traps. The horizontal screen traps in the lower bulkhead were overtopped for the first time on December 12, 1949, as the result of snow followed by a cold rain. The records of movement, presented in table 16, represent accurately the extent of the movement in and out of the area between the bulkheads. All fish above 4 inches, total length, were marked by jaw-tagging.

The recoveries of tagged fish at the two bulkheads yields some information on their movements. Of particular interest are the recoveries made in the spring

Table 15

Comparative data on estimates of legal brook trout populations, anglers take, angling pressure and percentage of escapement 1949 trout season, Hunt Creek and Pigeon River research areas. (Figures in parentheses are per acre figures.)

Item	Pigeon ¹ River (24.1 acres)	Hunt Creek (3.91 acres)
Estimated population, Fall, 1949	290 (12)	188 (48)
Removed by angling, 1949 season	793 (33)	361 (92)
Total legal stock available, 1949	1,083 (45)	549 (140)
Angling pressure per acre, 1949, (hours)	283	198
Percentage of escapement, 1949	26.8	34.5

¹ Data taken from Table 30, page 51, I. F. R. Report No. 1250

Table 16

Numbers of brook trout handled in the blocking
bulkhead traps, Hunt Creek, 1949, by monthly periods.

Trap	Month	7 inches+		6 - 6.9 inches		3 - 5.9 inches		0 - 2.9 inches	
		up	down	up	down	up	down	up	down
Lower trap	April	2	...	5	...	11	...	...	...
	May	3	...	3	...	21	...	1	...
	June	8	1	7	1	26	...	5	1
	July	8	...	5	...	4	...	5	...
	August	...	...	...	...	1	...	1	...
	September	...	...	...	...	...	...	...	...
	October	7	...	3	...	2	1	...	...
	November	1	8	...	9	...	20	...	...
	December	...	11	...	17	...	57	...	5
	Totals	29	20	23	27	65	78	12	6
Upper trap	April	7	...	6	...	17	...	...	...
	May	...	...	2	...	19	1	...	...
	June	...	...	1	...	37	...	...	3
	July	...	...	...	...	...	...	5	...
	August	...	...	...	1	1	...	2	1
	September	...	...	...	...	...	...	...	...
	October	...	8	...	3	3	6	...	2
	November	...	10	...	2	...	6	...	6
	December	...	40	...	9	...	38	...	12
	Totals	7	58	9	14	77	51	7	24
Grand totals		36	78	32	41	142	129	19	30

Gain or loss to blocked off
area

+ 60

+ 1

= 39

+ 23

of 1949 (mainly during April and May) at the upper (D) bulkhead. During the fall of 1948 220 brook trout were jaw-tagged in the Section D beaver ponds. The blocking screens were placed in the bulkheads and operating on April 7, 1949. All of the seven tag recoveries made in the spring which were moving upstream were fish which were originally tagged in the Section D beaver ponds, and which had moved downstream into Section C between October, 1948 and April, 1949, and which were moving up into Section D again. All of the upstream migration of these recoveries had occurred by May 7.

There were 10 recoveries of tagged fish moving downstream through the Section D bulkhead traps in the months of October, November, and December, 1949. Seven of these fish were marked as they had moved upstream through the D bulkhead traps earlier in the summer and spring, while two recoveries originally were marked in the Section D beaver ponds in October, 1948. One recovery was made on one of the Section D beaver pond fish which had been trapped moving upstream in the spring. This latter fish had moved down out of the beaver ponds in the winter of 1948-1949, back upstream into Section D in the spring of 1949, and then back down into Section C in the fall of 1949.

At the lower trap there were no recoveries of tagged fish moving upstream during 1949, probably because so few marked fish were available to move back upstream. On the fall downstream migration in October, November and December, there was a total of 18 recoveries of tagged fish. Fourteen of these had been marked as they moved upstream past the lower bulkhead earlier in 1949, while four were recoveries which were marked during the fall of 1949 as they moved downstream through the upper bulkhead. These latter fish moved through the entire blocked-off stream area into waters further downstream.

It appears that there is some downstream movement of the fish in Section D to Section C mainly during the fall and winter months, and a reverse movement in the spring of the year. A similar movement trend can be demonstrated at the

lower bulkhead, where there was a movement upstream mainly in June and July. The bulk of the reverse movement occurred in the fall and early winter, mainly in December. Combination of the data from both traps indicates that the blocked-off portion of the experimental waters gained 45 fish in the period April-December, 1949; 60 in the legal-size-class, 1 fish in the 6- to 6.9-inch class and 23 fish in the 0 to 2.9-inch class, but ^{lost} 39 fish in the 3- to 5.9-inch class. At the upper end of the blocked-off areas, emigration took place mainly in April, May and June, and most immigration during October, November and December. At the lower trap, the situation was just the reverse.

It is of some interest to note that of all the migrants tagged moving into the blocked-off area between April and September only four migrants entered the anglers' catch of 1949 in the blocked-off sections, (Sections Z, A, B, and C).

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