Original: Research and Development
cc: Institute for Fish. Research
Education-Game
Region II - Fish
Hunt Creek Station
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Fish Section
Federal Aid (2)

MICHIGAN DEPARTMENT OF CONSERVATION
Research and Development Report No. 21*

December 16, 1964

THE TWENTY-FIFTH ANNUAL INTENSIVE CREEL CENSUS AT THE HUNT CREEK TROUT RESEARCH STATION, 1963[1]

By Gaylord R. Alexander, Otis H. Williams,
O. M. Corbett, and D. S. Shetter

*Institute for Fisheries Research Report No. 1702.

[1]Contribution from Dingell-Johnson Project F-27-R, Michigan.

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The Hunt Creek Trout Research Station and its experimental waters (Fig. 1) are located at the headwaters of Hunt Creek in south central Montmorency County.

Angling on the experimental stream sections and ponds was censused for the twenty-fifth consecutive year. Waters included in the census were Hunt Creek, Fuller Creek, Fuller Pond, East Fish Lake, West Fish Lake and Middle Fish Lake. Morphometry data and angling regulations that apply to the various units are given in Table 1.

Creel census methods

Each angler fishing in the Area is required, by Conservation Commission order, to obtain a free daily permit from the Station's office. Upon completion of angling, he must return to the checking station and allow inspection of his catch and furnish pertinent information.

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MICHIGAN DEPARTMENT OF CONSERVATION
FISH DIVISION

HUNT CREEK FISHERIES EXPERIMENTAL AREA

MONTMORENCY COUNTY

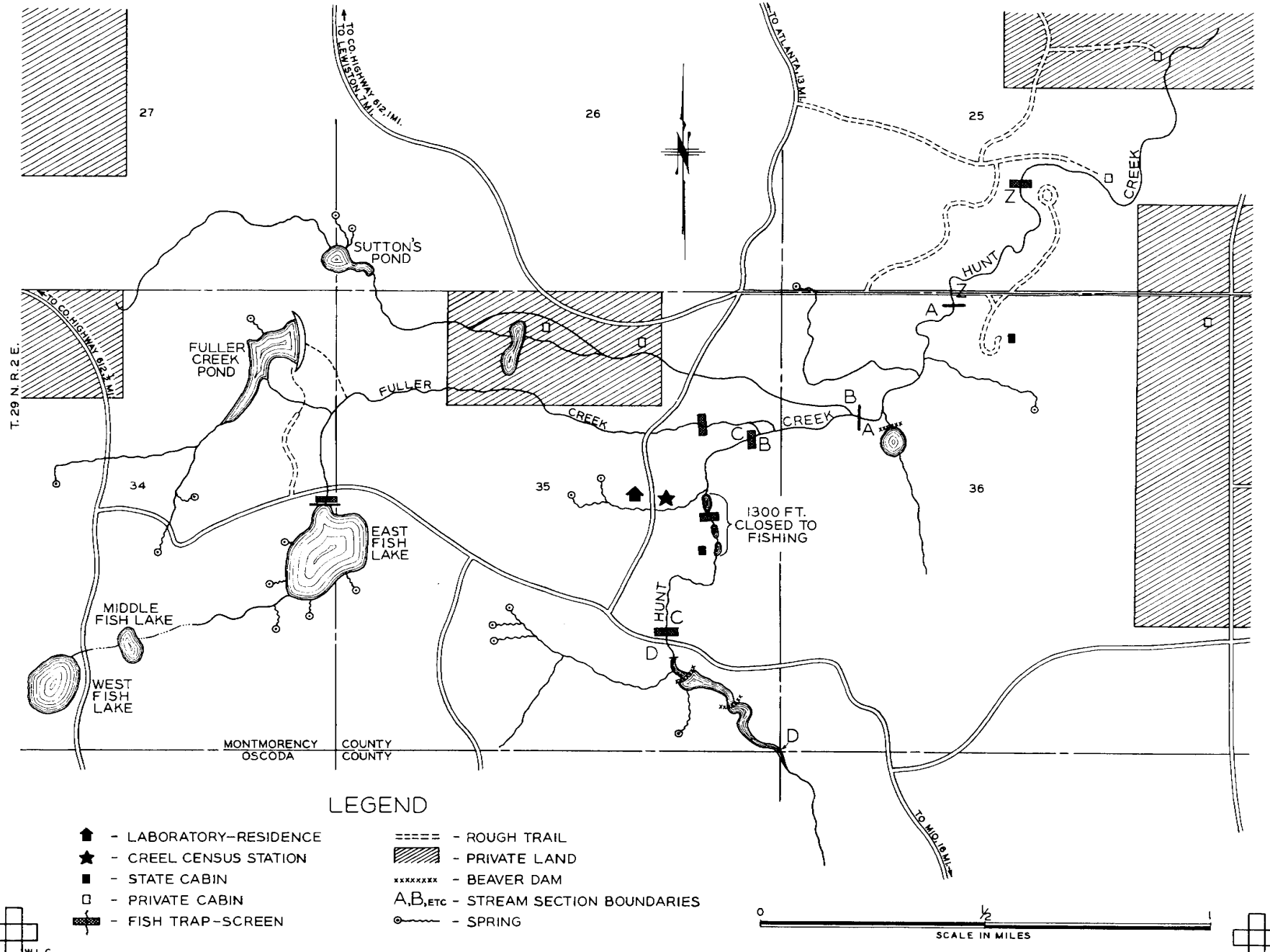

Figure 1

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	0.56	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

Table 1.--Morphometry of experimental waters of Hunt Creek drainage, with angling regulations on trout for 1963

Experimental water	Dimensions			1963 regulations		
	Length (miles)	Average width (feet)	Area (acres)	Lure	Minimum length (inches)	Daily creel limit
Section of Hunt Creek						
Z	0.45	20.3	1.12	Any	7	10
A	0.49	24.3	1.44	Any	7	10
B	0.30	17.5	0.64	Any	7	10
C[1]	0.51	11.8	0.71	Any	7	10
D	0.55	11.0	0.73	Any	7	10
Total, Hunt Creek	2.30	16.7	4.64			
Fuller Creek	1.87	15.7	3.57	Any	7	10
Fuller Pond	...	...	14.6	No live fish	10	5
East Fish Lake	...	...	16.0	No minnows	10	5
West Fish Lake	...	...	10.2	Any	7	5
Middle Fish Lake	...	...	2.5	Any	7	5

[1] Excluded are 1,270 feet of Section C given over to experimental diversions that are closed to fishing.

During the 1963 season, 1,406 permits were issued to anglers who made 1,820 fishing trips. A trip resulted whenever a person fished one of the designated stream sections or lakes on the Area; one angler was listed as making more than one trip on any date when he fished more than one stream section, lake, or pond. The 1963 fishing represents the highest angler use of the Area in its 25-year history.

Male licensees made 75.2% of the trips; female licensees, 0.4%; wives, 5.7%; minor males, 16.5%; and minor females, 2.2%.

Acknowledgments

O. H. Williams, T. H. Turppa and O. M. Corbett assisted in the collection of the creel census records. K. G. Fukano handled the data for IBM tabulation. The Accounting Section of the Conservation Department did the card punching, verifying, and tabulating on IBM equipment. O. H. Williams compiled most of the summary tables, and O. M. Corbett determined the ages of all the trout that were caught.

Recovery of planted trout

Table 2 summarizes the results from plantings made in recent years in East Fish Lake, West Fish Lake, Middle Fish Lake, Fuller Pond, and Section D of Hunt Creek.

Since 1958, matched plantings of rainbow and brook trout have been made in East Fish Lake in mid-October. Three hundred fish of each species, that averaged 8.9 inches long, have been planted annually. The planting rate is about 38 trout per acre.

Returns from rainbow trout plantings of 1958 through 1962 are as follows: number--233, 248, 276, 255, and 236; poundage--271, 222, 266, 209, and 228.

Recovery of rainbow trout by anglers from 1958 through 1962 amounted to 83% of the number planted and a 326% return in weight. These figures are minimal because additional fish will be recovered from the last two plantings; some trout of sublegal size have been creeled, and undoubtedly some fish were poached.

The angler recoveries of the October brook trout plantings in East Fish Lake from 1958 to 1963 are as follows: number--88, 68, 158, 139, and 112; poundage--50, 34, 74, 64, and 53.

The recovery of brook trout by anglers from 1958 through 1963 amounted to 38% of those planted and 70% of the poundage. Few additional recoveries are expected from these plantings. Some sublegal brook trout were also creeled.

In December 1962, 150 hatchery brook trout (from the same lot as the October planting) were released after ice formed on East Fish Lake. Anglers creeled 61 legal and 10 sublegal fish from this planting for a total recovery of 47%. Planting brook trout after ice formation did not improve the recovery rate in 1963. A duplicate test is being run in 1964.

A comparative planting of 400 each of wild brook, hatchery brook, and hatchery rainbow trout was made in Fuller Pond in April 1962. The hatchery fish averaged 5.5 inches long and ranged from 4.5 to 6.5 inches. The wild trout were transferred from Hunt Creek and had the same average

size as the hatchery trout but ranged from 3.0 to 6.9 inches. The wild fish were divided into two size groups and marked differently; 260 fish under 5.4 inches were marked by clipping the left pelvic fin, and 140 fish, 5.5 to 6.9 inches, were marked by clipping the right pelvic fin.

None of these trout were harvested during the 1962 season because of the 10-inch minimum size limit on Fuller Pond. Recovery in 1963 consisted of 9 transferred wild brook trout (all of the small-size group), 48 hatchery brook trout, and 82 hatchery rainbow trout. The weights of these fish as expressed in percentages of the total weights of the plantings were 19, 100 and 285, respectively. An unknown amount of hooking mortality occurred but it is believed to have been low because little fishing was done in the pond during 1962 after the first one-third of the season. Returns would probably have been much greater with a lower size limit. Obviously, rainbow trout gave much better returns than either wild or hatchery brook trout. The recovery of hatchery brooks was considerably better than that of wild brooks. The wild trout, although of the same average size as the hatchery brook trout, averaged about one year older. It was noted that the wild fish attempted to move out of the pond during the fall spawning period but were trapped by the outlet trap and returned to the pond. It is believed that the wild fish were more mature than hatchery fish, and this is, in some way, related to their survival and ultimately to the difference in angler recovery. Possibly mature fish are more vulnerable to predators.

West Fish Lake was censused for the first time in 1963 after it was stocked with trout in April. This is a 10-acre seepage lake with a maximum depth of 10 feet. As water temperatures reach 80 F at the surface and 68 F at the bottom during mid summer, the habitat is no better than marginal for trout at this season. Suckers, sticklebacks, mudminnows, Iowa darters, golden shiners, red-belly dace and fathead minnows comprise the natural fish population.

Trout were first introduced into West Fish Lake in the fall of 1960 for the purpose of studying the utilization of minnows by brook, brown, and rainbow trout. Trout planted prior to April 1963 were recovered by the Station's staff with various types of sampling gear.

In April 1963, West Fish Lake was planted with 100 legal and 150 sublegal fish each of brook, brown, and rainbow trout. During 1963, recovery by anglers from the legal-length planting amounted to 48%, 23%, and 49% for the respective species (Table 2). The returns from the sublegal planting were 0.0%, 14%, and 5%, respectively.

Angler returns during 1963 of trout planted in West Fish Lake before 1963 were: 9 brook trout (2.7 pounds, average length, 9.5 inches), 27 brown trout (14.7 pounds, average length, 11.8 inches), and 33 rainbow trout (10.7 pounds, average length, 10.0 inches).

Middle Fish Lake is a 2.5-acre seepage basin with a maximum depth of 5 feet. Water temperatures and dissolved oxygen are adequate for trout during two periods of the year: from ice breakup to about July 1 and from October 15 to about mid-January. Lakes of this type

Table 2.--Angler catch of trout released in the experimental waters of the Hunt Creek area, 1958-1963

Area and date of planting	Species[1]	Trout planted[2]			Legal trout creeled		Total legal trout creeled to date			
		Number	Pounds	Average length (inches)	1959-1962	1963	Number		Pounds	
							Total	Percentage	Total	Percentage
East Fish Lake										
Oct. 1958	S	300	75	8.9	88	...	88	29.3	49.7	66.3
Oct. 1959	S	300	78	8.9	68	...	68	22.7	33.7	43.2
Oct. 1960	S	300	84	8.9	158	...	158	52.7	73.8	87.9
Oct. 1961	S	300	79	8.9	139	...	139	46.3	63.9	80.9
Oct. 1962	S	300	78	8.9	...	112	112	37.3	52.9	67.8
Dec. 1962	S	150	45	9.5	...	61	61	40.7	26.9	59.8
East Fish Lake										
Oct. 1958	R	300	69	8.9	233	...	233	77.7	271.4	393.3
Oct. 1959	R	300	75	8.9	248	...	248	82.7	222.0	296.0
Oct. 1960	R	300	76	8.9	274	2	276	92.0	265.7	349.6
Oct. 1961	R	300	74	8.9	243	12	255	85.0	208.5	281.8
Oct. 1962	R	300	74	8.9	...	236	236	78.7	228.1	308.2
Fuller Pond										
April 1962	S	400*	28	5.5	...	9	9	2.3	5.3	18.9
April 1962	S	400	26	5.5	...	48	48	12.0	26.0	100.0
April 1962	R	400	26	5.5	...	82	82	20.5	74.1	285.0

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Table 2. --concluded

Area and date of planting	Species[1]	Trout planted[2]			Legal trout creeled		Total legal trout creeled to date			
		Number	Pounds	Average length (inches)	1959-1962	1963	Number		Pounds	
							Total	Percentage	Total	Percentage
West Fish Lake										
April 1963	S	100	21	8.2	...	48	48	48.0	9.8	46.7
	B	100	21	8.2	...	23	23	23.0	5.8	27.6
	R	100	21	8.2	...	49	49	49.0	10.1	48.1
	S	150	12	5.5	...	0	0	0.0	0.0	0.0
	B	150	12	5.5	...	21	21	14.0	4.0	33.3
	R	150	12	5.5	...	7	7	4.7	1.0	8.3
Middle Fish Lake										
April 1963	S	20	8	10.5	...	14	14	70.0	6.1	76.3
	B	40	16	10.5	...	17	17	42.5	7.3	45.6
	R	30	12	10.5	...	19	19	63.3	6.7	55.8
	S	20	4	8.2	...	10	10	50.0	2.4	60.0
	B	40	8	8.2	...	20	20	50.0	5.1	63.8
	R	30	6	8.2	...	15	15	50.0	2.9	48.3
Section D										
Oct. 1962	S	285*	57	8.1	...	94	94	33.0	17.1	30.0

[1] S = brook trout, R = rainbow trout, B = brown trout

[2] All planted trout were from hatcheries, except for two lots (marked by asterisk) which were wild trout transferred from other waters.

can provide put-and-take trout fishing if needed in future years. Trout were planted in Middle Fish Lake in April 1963 to determine the extent that they will utilize minnows. The plantings consisted of two size groups (average lengths 8.2 and 10.5 inches) of each species: brook, brown, and rainbow trout. Angler recovery of the larger trout of the respective species was: 70%, 43%, and 63%; recovery of the smaller size fish was 50% for each of the three species.

In October 1962, Section D of Hunt Creek was planted with 285 wild brook trout (7.0 inches or larger) that were transferred from Sections A and Z. Anglers recovered 33% of these fish during the 1963 season.

Angling results

A summary of statistics for the various waters of the Area is given in Table 3. Residual populations of trout at the close of the fishing season, as estimated from collections taken by electrofishing, are shown in Table 5. Physical characteristics of the experimental waters were described in earlier reports.

Hunt Creek

The general trout fishing regulations applied to all stream water in 1963. Table 4 summarizes the angling statistics since 1939 for Hunt Creek.

In 1963, anglers fishing Section Z creeled 155 wild brook trout, 1 wild brown trout, and 2 wild rainbow trout. Trout averaged 7.7

Table 3. --Summary of angling data, experimental waters of Hunt Creek drainage, 1963

(W = wild; H = hatchery; T = wild transferred trout)

Experimental water	Total fishing			Trout caught					
	Trips	Percent trips successful	Hours	Species	Origin	Number	Pounds	Average length (inches)	Trout per hour[1]
Section of Hunt Creek									
Z	153	48	395	Brook	W	155	24.99	7.7	0.39
				Brown	W	1	0.70	12.2	tr
				Rainbow	W	2	0.45	9.0	0.01
A	89	44	184	Brook	W	128	20.81	7.7	0.70
				Brook	T	2	0.48	8.9	0.01
				Rainbow	W	1	0.41	10.1	tr
B	83	46	156	Brook	W	76	11.70	7.7	0.49
				Brook	T	1	0.16	8.2	tr
C	227	25	398	Brook	W	82	12.79	7.8	0.21
				Brook	T	14	2.54	8.2	0.04
				Rainbow	W	3	1.07	9.6	0.01
D	160	33	290	Brook	W	79	13.83	8.1	0.27
				Brook	T	77	13.90	8.3	0.27
Total Hunt Creek	712	36	1,423	Brook	W	520	84.12	7.8	0.37
				Brook	T	94	17.08	8.3	0.07
				Brown	W	1	0.70	12.2	tr
				Rainbow	W	6	1.93	9.5	tr
				All		621	103.83	7.9	0.44
Fuller Creek	216	21	501	Brook	W	106	15.61	7.7	0.21

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Table 3. --concluded

Experimental water	Total fishing			Trout caught					
	Trips	Percent trips successful	Hours	Species	Origin	Number	Pounds	Average length (inches)	Trout per hour[1]
Fuller Pond	158	42	540	Brook	W	8	4.24	11.1	0.01
				Brook	T	9	5.27	11.4	0.02
				Brook	H	48	26.01	11.0	0.09
				Rainbow	H	82	74.11	13.0	0.15
				All		147	109.63	12.1	0.27
East Fish Lake	525	39	2,074	Brook	W	3	2.42	12.8	tr
				Brook	H	173	79.80	10.7	0.08
				Rainbow	W	1	0.69	11.7	tr
				Rainbow	H	251	275.80	13.5	0.12
				All		428	358.71	12.4	0.21
West Fish Lake	154	47	459	Brook	H	57	12.49	8.8	0.12
				Brown	H	71	24.48	10.0	0.15
				Rainbow	H	89	21.78	9.1	0.19
				All		217	58.75	9.3	0.47
Middle Fish Lake	55	65	131	Brook	H	24	8.49	9.9	0.18
				Brown	H	37	12.33	9.8	0.28
				Rainbow	H	34	9.62	9.7	0.26
				All		95	30.44	9.8	0.72
All waters	1,820	38	5,128	Brook	W	637	190.51	7.8	0.12
				Brook	T	103	22.35	8.6	0.02
				Brook	H	302	126.79	10.3	0.06
				Brown	W	1	0.70	12.2	tr
				Brown	H	108	36.81	9.9	0.02
				Rainbow	W	7	2.62	9.8	tr
				Rainbow	H	456	381.31	12.3	0.09
				All		1,614	676.97	9.7	0.31

[1] tr = less than 0.005

Table 4.--Legal wild brook trout caught in Hunt Creek, 1939-1963

Section and year	Total fishing		Total catch		Catch per hour		Average size	
	Trips	Hours	Number	Pounds	Number	Pound	Length (inches)	Weight (pound)
A, B, C and D								
1939	438	780	461	67	0.59	0.09	7.5	0.15
1940	505	901	406	60	0.45	0.07	7.6	0.15
1941	1,015	1,546	706	113	0.46	0.07	7.7	0.16
1942	808	1,267	532	83	0.42	0.07	7.6	0.16
1943	311	540	372	59	0.69	0.11	7.5	0.16
1944	340	640	337	53	0.53	0.08	7.7	0.16
1945	375	637	312	52	0.49	0.08	7.9	0.17
1946	753	1,206	434	68	0.36	0.06	7.6	0.16
1947	607	872	184	26	0.21	0.03	7.6	0.14
1948	504	869	476	78	0.55	0.09	7.7	0.16
1949	432	1,063	517	87	0.49	0.08	7.8	0.17
1950	369	915	415	75	0.45	0.08	8.0	0.18
1951	552	1,066	431	76	0.40	0.07	8.0	0.18
1952	488	1,195	556	103	0.47	0.09	8.0	0.19
1953	656	1,587	572	118	0.36	0.07	8.4	0.21
1954	748	1,649	483	88	0.29	0.05	8.0	0.19
1955	702	1,522	508	94	0.33	0.06	8.0	0.19
1956	704	1,245	585	104	0.47	0.08	7.8	0.19
1957	668	1,307	630	123	0.48	0.09	8.1	0.20
1958	701	1,257	583	121	0.46	0.10	8.2	0.21
1959	590	1,060	433	81	0.41	0.08	7.9	0.19
1960	641	1,179	674	122	0.57	0.10	8.0	0.18
1961	601	1,084	500	78	0.46	0.07	7.7	0.16
1962	541	959	752	131	0.78	0.14	7.9	0.17
1963	559	1,028	365	59	0.36	0.06	7.8	0.16

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Table 4. --Concluded

Section and year	Total fishing		Total catch		Catch per hour		Average size	
	Trips	Hours	Number	Pounds	Number	Pound	Length (inches)	Weight (pound)
Z								
1949	165	375	186	28	0.50	0.07	7.6	0.15
1950	165	473	160	21	0.34	0.04	7.4	0.13
1951	129	322	124	18	0.39	0.06	7.5	0.14
1952	188	570	222	34	0.39	0.06	7.7	0.15
1953	225	566	183	27	0.32	0.05	7.6	0.15
1954	363	838	143	22	0.17	0.03	7.7	0.16
1955	139	293	198	29	0.68	0.10	7.6	0.15
1956	176	354	197	32	0.56	0.09	7.6	0.16
1957	113	218	127	22	0.58	0.10	7.9	0.17
1958	84	175	101	15	0.58	0.09	7.6	0.15
1959	97	197	118	17	0.60	0.09	7.5	0.14
1960	227	541	509	91	0.94	0.17	8.0	0.18
1961	172	390	151	22	0.39	0.06	7.6	0.15
1962	161	386	297	48	0.77	0.12	7.7	0.16
1963	153	395	155	25	0.39	0.06	7.7	0.16

Table 5. --The fall populations of legal (7.0+ inches) and sublegal (1.5-6.9 inches) wild brook trout in Section Z, A, B, and C, Hunt Creek, 1949-1963

Year	Section Z		Section A		Section B		Section C	
	Sub-legal	Legal	Sub-legal	Legal	Sub-legal	Legal	Sub-legal	Legal
1949	1,413	95	2,156	41	1,040	15	1,437	19
1950	1,989	89	1,687	70	1,231	29	1,351	41
1951	1,210	71	1,940	41	896	23	2,159	34
1952	1,130	75	2,472	44	1,109	28	2,126	21
1953	1,641	42	2,957	35	1,157	19	1,305	16
1954	1,545	40	3,203	47	1,407	9	2,328	27
1955	1,276	88	2,563	105	1,147	30	1,638	44
1956	904	109	2,403	158	1,003	29	2,212	30
1957	1,527	67	3,015	68	1,257	35	2,632	31
1958	1,455	54	2,459	72	1,288	44	2,555	35
1959	1,190	263	2,331	280	1,349	99	1,682	32
1960	1,481	105	2,689	157	1,444	66	1,884	34
1961	1,285	109	1,548	102	1,085	42	1,088	26
1962	1,065	115	2,518	174	1,268	71	1,902	42
1963	1,030	72	2,201	87	1,093	30	2,170	37

inches in length. Anglers fished 395 hours and caught at least one trout on 48% of their trips. They reported catching and releasing 978 trout, and creeled 12 (1.07 pounds) sublegal fish. A population estimate made in October 1963 showed that 72 legal and 1,030 sublegal trout remained in Section Z after the fishing season. The residual population was down compared to previous years (Table 5).

Section A anglers creeled 128 wild brook trout, that weighed 21 pounds, in 184 hours of fishing. They also took 1 wild rainbow and 2 wild brook trout that had been transferred to Section D. Forty-four percent of the trips were successful. Anglers caught and released 727 sublegal fish. About 87 legal and 2,201 sublegal wild brook trout remained in Section A after the season; these estimates were, respectively, about 50% and 87% as large as those of the previous fall.

Angling in Section B produced 76 wild brook trout and 1 wild brook trout that had been transferred. Anglers fished 156 hours during their 83 trips, and 46% of them were successful. They caught and released 636 sublegal trout and creeled 1. Post-season population estimates indicated that 30 legal and 1,093 sublegal trout remained in Section B. Similar to the situation in Section A, legal-length fish were 50% and the sublegal fish 14% less numerous than in the previous fall.

In Section C, anglers creeled 82 wild brook trout, 14 transferred wild brook trout, and 3 wild rainbow trout in 398 hours of fishing. Twenty-five percent of their 227 trips were successful. Trout averaged 7.8 inches

long. Anglers caught and released 1,145 sublegal-length trout and creeled 2. The fall population estimate showed that 37 legal and 2,170 sublegal trout remained after the season; there were a few less legal fish but more sublegal fish than the year before.

Section D, the uppermost section of Hunt Creek, was mostly stream habitat during the 1963 season. Fishermen made 160 trips, fished 290 hours, and creeled 79 wild brook trout and 77 transferred wild brook trout. Thirty-three percent of the anglers were successful. Trout averaged 8.2 inches long and were caught at the rate of 0.54 fish per hour.

The total harvest from Hunt Creek in 1963 amounted to 520 wild brook trout, 94 transferred wild brook trout, 6 wild rainbow trout, and 1 wild brown trout. About 50% fewer wild brook were caught in 1963 than in 1962, when an unusually large number were taken. Anglers spent 1,423 hours on 712 fishing trips to Hunt Creek. The rate of catch was 0.44 fish per hour, and 36% of the anglers caught one or more trout. The trout averaged 7.9 inches long.

Fuller Creek

Table 6 summarizes the angling statistics for Fuller Creek since 1940. On 216 trips in 1963, anglers creeled 106 wild brook trout (15.6 pounds). The fishermen spent 501 hours in pursuit of trout and were successful on 21% of their trips. The trout averaged 7.7 inches long. The fishing pressure was the highest ever recorded for Fuller Creek, and the catch ranked third highest.

Table 6.--Legal wild brook trout caught in Fuller Creek, 1940-1963

Year	Total fishing		Total catch		Catch per hour		Average size	
	Trips	Hours	Number	Pounds	Number	Pound	Length (inches)	Weight (pound)
1940	20	36	16	3	0.44	0.08	...	0.19
1941	59	97	21	3	0.22	0.03	...	0.15
1942	31	39	11	2	0.28	0.05	8.3	0.18
1943	19	25	19	3	0.76	0.12	7.6	0.14
1944	96	145	61	8	0.42	0.06	7.6	0.15
1945	102	159	64	9	0.40	0.06	7.5	0.14
1946	223	278	56	8	0.20	0.03	7.4	0.14
1947	212	219	27	4	0.12	0.02	7.5	0.14
1948	190	196	31	5	0.16	0.03	7.7	0.16
1949	115	295	43	6	0.15	0.02	7.4	0.13
1950	107	185	12	2	0.06	0.01	7.6	0.16
1951	110	246	59	9	0.24	0.04	7.6	0.16
1952	85	221	64	10	0.29	0.05	7.6	0.15
1953	86	212	84	14	0.40	0.07	7.8	0.16
1954	99	201	68	11	0.34	0.05	7.7	0.16
1955	110	214	68	10	0.32	0.05	7.6	0.14
1956	230	476	192	35	0.40	0.07	8.0	0.18
1957	179	377	76	12	0.20	0.03	7.6	0.15
1958	159	332	71	11	0.21	0.03	7.7	0.16
1959	126	234	70	11	0.30	0.05	7.8	0.16
1960	134	222	98	15	0.44	0.07	7.6	0.15
1961	135	246	99	14	0.40	0.06	7.6	0.14
1962	152	299	161	25	0.54	0.08	7.7	0.16
1963	216	501	106	16	0.21	0.03	7.7	0.15

Fuller Pond

An earthen dam on the site of an old beaver dam maintains this 15-acre impoundment. In April 1962, Fuller Pond was stocked with 400 hatchery rainbow trout, 400 hatchery brook trout, and 400 wild brook trout transferred from Hunt Creek. The fish of each group averaged 5.5 inches at planting; none were creeled during the 1962 season. During 1963, anglers recovered 82 hatchery rainbow, 48 hatchery brook, and 9 transferred wild brook trout from the introduction. In addition, 8 native brook trout were harvested. Anglers spent 540 hours on 158 trips, and 42% were successful in catching one or more trout per trip. Trout averaged 12.1 inches long, and were caught at the rate of 0.27 fish per hour. The total catch of 147 trout that weighed 110 pounds represents the best fishing ever recorded for Fuller Pond. This improvement was influenced by good growth and survival rates that probably resulted from directing the flow of cool creek water through the entire length of the pond, which improved conditions for trout.

East Fish Lake

During 1963, anglers spent 2,074 hours on East Fish Lake, another new record. They caught 428 trout that weighed 359 pounds (Table 3). The bulk of the catch (77% by weight) was composed of rainbow trout. This portion of the catch was divided as follows: fish planted in the fall of 1962--93.6%; 1-year carry-overs--5.2%; 2-year carry-overs--0.8%; and one wild rainbow trout--0.4%. The fish of

these respective groups averaged 13.3, 17.2, 21.7, and 11.7 inches in total length.

Anglers creeled 173 hatchery brook trout that averaged 10.7 inches. No carry-over brooks were taken. Three wild brook trout, that averaged 12.8 inches, were harvested.

Rainbow trout continue to contribute more to angling than brook trout because of better survival and growth. Angler use has increased since the inception of rainbow planting because more and larger fish are available and the period of productive fishing has been extended. Brook trout are exploited mostly during the first two weeks of the season, whereas the rainbow trout catch is distributed over the entire season.

West Fish Lake

Anglers made 154 trips to this lake, fished 459 hours, and creeled 217 trout that weighed 59 pounds and averaged 9.3 inches in total length. Forty-seven percent of the anglers caught one or more fish per trip. Data on recovery of stocked trout are shown in Table 2. Other information on this lake appears in a preceding section of the report.

Middle Fish Lake

Anglers made 55 trips to Middle Fish Lake and fished 131 hours. They creeled 95 trout that averaged 9.8 inches. Sixty-five percent of the anglers were successful. Recoveries of planted fish are tabulated in Table 2. Other comments on this lake were made earlier.

All waters

From the experimental waters as a whole, anglers creeled 1, 614 trout (677 pounds) on 1, 820 trips that involved 5, 128 hours of fishing (Table 3). Numerically, the catch was down 9% from that of 1962, but its weight established a new record for the Area; this weight exceeded that of the record numerical catch of 1962 by 15%. The average size of trout creeled was 9.7 inches, and the rate of catch was one legal trout per 3 hours of fishing.

Summary of lures used

The 1963 catch is summarized in Table 7 according to the lures used. On streams, worms or worm and spinners were used on 84% of the fishing trips, and these lures accounted for 84% of the catch. Fishermen who used other live bait or a combination of lures made 9% of the trips and caught approximately 7% of the trout. Anglers employed artificial lures, either flies or hardware, on 7% of the trips to account for 9% of the fish.

On pond waters, anglers used worms or worm and spinners on 62% of their trips and took 68% of the catch. Those who fished with other live bait or combinations made 24% of the trips and accounted for 16% of the trout. Artificial lure and fly fishermen made 14% of the trips and caught 15% of the fish.

The extent that a particular lure was used was generally proportional to the degree of its success.

Table 7.--A comparison of different fishing lures showing frequency of use, numbers of trout caught, and catch per hour, in streams (Hunt Creek and Fuller Creek) and ponds (Fuller Pond, East, Middle and West Fish lakes) at the Hunt Creek Station, 1963

Waters and lures	Number of angler trips	Percentage of total trips	Number of trout caught	Percentage of total catch	Number of hours fished	Average catch per hour
Streams						
Worm	668	72.0	488	67.1	1,414	0.35
Worm and spinner	112	12.1	124	17.0	219	0.57
Flies	58	6.3	63	8.7	122	0.52
Minnow	26	2.8	16	2.2	38	0.42
Insect	17	1.8	5	0.7	29	0.17
Artificial lure	6	0.6	0	0.0	5	0.00
Natural	1	0.1	0	0.0	1	0.00
Combination	40	4.3	31	4.3	96	0.32
Totals	928	100.0	727	100.0	1,924	0.38
Ponds						
Worm	434	48.7	486	54.8	1,720	0.28
Worm and spinner	119	13.3	120	13.5	441	0.27
Flies	24	2.7	38	4.3	50	0.75
Minnow	3	0.3	4	0.5	7	0.57
Artificial lure	101	11.3	98	11.0	282	0.35
Natural	8	0.9	2	0.2	28	0.07
Combination	203	22.8	139	15.7	676	0.21
Totals	892	100.0	887	100.0	3,204	0.28

Number of trout caught per trip

(Table 8)

Where the daily creel limit was 10 trout of a minimum size of 7 inches, anglers creeled 6 or more trout on 2.6% of the trips; these trips accounted for 26% of the season's catch from Hunt and Fuller creeks. Sixty-seven percent of the anglers failed to catch a trout.

From waters under a daily limit of 5 trout and a minimum size limit of 7 inches, anglers made limit catches on 13% of their trips. These trips accounted for 43% of the catch. Forty-eight percent of the fishermen on these waters were unsuccessful.

On waters where the creel and size limits were 5 trout and 10 inches, anglers made limit catches on 3.4% of the trips. Limit catches comprised 20% of the total catch from these waters. No trout were caught on 60% of the trips.

Seasonal distribution of the catch and

angler effort (Table 9)

The 1963 trout season was divided into 10 two-week periods to assess differences in fishing pressure and catch according to time. In general, the heaviest fishing pressure occurs during the first two weeks of the season. Thereafter the effort and catch, especially on streams, are quite uniformly distributed. On the streams of the Area in 1963, 20% of the angling was done and 27% of the season's catch was taken during the first two weeks. The stream populations, composed almost

Table 8. --Number and percentage of fishing trips on which different numbers of trout were caught, Hunt Creek Trout Research Station, 1963

Number of trout caught per trip	Daily creel limit[1] 10 trout, 7 inches		Daily creel limit[2] 5 trout, 7 inches		Daily creel limit[3] 5 trout, 10 inches	
	Number of trips	Percentage of trips	Number of trips	Percentage of trips	Number of trips	Percentage of trips
0	626	67.5	100	47.8	411	60.2
1	130	14.0	33	15.8	119	17.4
2	81	8.8	19	9.1	74	10.8
3	36	3.9	14	6.7	31	4.5
4	20	2.2	16	7.7	25	3.7
5	11	1.2	27	12.9	23	3.4
6	6	0.6	...	...	...	...
7	4	0.4	...	...	...	...
8	5	0.5	...	...	...	...
9	3	0.3	...	...	...	...
10	6	0.6	...	...	...	....
	928	100.0	209	100.0	683	100.0

[1] Experimental sections of Hunt Creek and Fuller Creek.

[2] Middle Fish and West Fish lakes.

[3] East Fish Lake and Fuller Pond.

Table 9.--Angling effort and catch of brook, brown and rainbow trout by two-week periods, 1963 trout season, from different waters of the Hunt Creek area

Two-week period	Hunt Creek		Fuller Creek		East Fish Lake		
	Angling hours	Brook trout catch	Angling hours	Brook trout catch	Angling hours	Catch	
						Brook	Rainbow
1	312	171	72	22	982	142	78
2	70	16	23	13	112	6	21
3	167	115	38	13	66	3	5
4	114	71	14	6	124	9	50
5	113	39	28	11	154	9	24
6	107	26	56	13	177	4	9
7	140	64	90	6	71	1	12
8	183	51	83	2	181	2	26
9	123	39	51	6	126	0	13
10	94	29	46	14	81	0	14
Totals	1,423	621	501	106	2,074	176	252

Two-week period	Fuller Pond			West Fish Lake			
	Angling hours	Catch		Angling hours	Catch		
		Brook	Rainbow		Brook	Brown	Rainbow
1	82	26	6	158	48	21	37
2	20	8	1	106	5	7	33
3	4	3	4	40	4	3	9
4	32	1	8	22	0	1	2
5	24	0	7	10	0	0	6
6	42	9	7	0	0	0	0
7	53	2	9	12	0	0	0
8	159	10	34	20	0	1	0
9	102	5	5	56	0	18	2
10	22	1	1	35	0	20	0
Totals	540	65	82	459	57	71	89

entirely of wild brook trout, carry numerous sublegal fish that attain legal size during the season, thus providing a continuous supply of harvestable stock.

On lakes, 40% of the fishing effort was expended during the first two weeks of the season, which accounted for 45% of the total catch.

On East Fish Lake, 81% of the brook trout catch was made during the first two weeks, when only 31% of the rainbow trout were caught. The slower exploitation of rainbow trout not only extends the interest of anglers in this lake, but also allows better utilization of the food supply.

West Fish Lake contained brook, brown, and rainbow trout during the 1963 fishing season. Anglers creeled 84% of the brook trout catch in the first two-week period, 42% of the rainbow trout, and 30% of the brown trout. Here, too, rainbow trout gave better seasonal distribution of catch than brook trout, but not as good as brown trout.

From Fuller Pond, fishermen creeled 40% of the total brook trout catch in the first two-week period. Only 7% of the rainbow trout were taken then. The catch of both brook and rainbow trout was fairly well distributed among the other nine periods of the season.

In summary, where early season fishing pressure is not excessive and sublegal fish are recruited into the legal size classes throughout the season, the catch distribution of brook trout can be satisfactory. This condition exists in Hunt and Fuller creeks.

However, in lakes that are supplied by between-season stocking of hatchery-reared fish, brook trout do not provide desirable fishing quality throughout the season. Rainbow trout, being harder to catch, do provide fishing during the entire season at present angling intensities. In heavily fished lakes or small lakes, brown trout may give a more uniform return.

Age distribution of wild trout in the catch (Table 10)

The age distribution of the wild brook trout from the Area waters is summarized in Table 10. The age composition (percentage of catch in various age groups) from Sections Z and A was: I's--8.1, II's--86.3, and III's--5.6. From Section B, C, D, and Fuller Creek, age-group percentages were: I's--6.6, II's--60.3, III's--31.7, and IV's--1.4. About three-fourths of the stream trout were II's (third summer fish). The age distribution (percentage) of wild brook trout caught from East Fish Lake and Fuller Pond was: II's--27.3, III's--63.6, and IV's--9.1.

Residence of anglers

The residence of the anglers making the 1,820 trips to the waters of the experimental area is summarized in Table 11. Thirty-nine counties of the Lower Peninsula, one Upper Peninsula county, and four states were represented. About 20% of the anglers were from

Table 10.--The age distribution of wild brook trout caught by anglers in experimental waters, 1963

Water	Age group	Number of fish	Average length (inches)	Percentage of total catch
Sections Z + A, Hunt Creek	I	23	7.3	8.1
	II	246	7.7	86.3
	III	16	8.9	5.6
	IV	...	...	...
	Total	285	...	100.0
B, C, D and Fuller Creek	I	29	7.5	6.6
	II	263	7.6	60.3
	III	138	8.5	31.7
	IV	6	9.1	1.4
	Total	436	...	100.0
East Fish Lake and Fuller Pond	I	...	...	...
	II	3	10.4	27.3
	III	7	11.6	63.6
	IV	1	14.4	9.1
	Total	11	...	100.0
All waters	I	52	7.4	7.1
	II	512	7.7	69.9
	III	161	8.6	22.0
	IV	7	9.9	1.0
	Total	732	...	100.0

Table 11. --Residence of anglers fishing experimental waters of Hunt Creek Trout Research Station, 1963

Residence (County)	Number of trips	Residence (County or state)	Number of trips
Montmorency	313	Gladwin	7
Wayne	306	Ionia	7
Bay	238	Kent	6
Oakland	152	Lapeer	6
Genesee	106	Eaton	5
Ingham	103	Sanilac	4
Macomb	57	Newaygo	3
Midland	53	Tuscola	3
Oscoda	49	Branch	2
Saginaw	49	Grand Traverse	2
Washtenaw	47	Iosco	2
Hillsdale	37	St. Joseph	2
Isabella	32	Alpena	1
Jackson	28	Crawford	1
Monroe	26	Marquette	1
St. Clair	20	Ogemaw	1
Livingston	18	Total	1,762
Lenawee	14	Ohio	49
Arenac	12	Indiana	4
Huron	12	Minnesota	4
Presque Isle	12	Wisconsin	1
Shiawassee	10		
Kalamazoo	8	Total	58
Calhoun	7	Grand total	1,820

Montmorency County and adjacent counties. One-third of the fishermen lived in the metropolitan area of southeastern Michigan. People from the Saginaw-Bay City-Midland triangle area made about 25% of the trips. Less than 3% of the anglers were from the western counties of the state, and 39% were non-residents, mainly from Ohio.

Types of fishing gear used

The types of fishing gear used in the Area during 1963 are listed in Table 12. The categories are based primarily on the kind of reel used in conjunction with various rods. For example, a fly rod used with a spinning reel was classed as spinning gear; a spinning rod with a single-action fly reel was listed as fly-fishing gear. Most anglers fished the streams with fly-fishing tackle, whereas spinning gear was used mostly on pond waters.

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Table 12. --Type of fishing gear used in the experimental waters of Hunt Creek area, 1963

Experimental water	Trips using type of gear						Total trips
	Fly	Spin-ning	Cast-ing	Cane pole	Combina-tion	Unknown	
Streams							
(Sections A, B, C, D, and Z of Hunt Creek + Fuller Creek)	417	436	60	8	1	6	928
Ponds							
(East, West, and Middle Fish lakes and Fuller Pond)	74	704	62	3	44	5	892