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THE FIFTEENTH ANNUAL REPORT ON THE RIFLE RIVER AREA, OGEMAW COUNTY, 1959

by

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The Rifle River Area is a 4,318-acre wooded tract of land located in the northeast portion of Ogemaw County. Six lakes, a number of ponds, and approximately 9.5 miles of stream are within its fenced boundary (Fig. 1). Purchased by the Department of Conservation in 1944, it has been open to public recreational use since 1945. As visitors pass through the single entrance they are given free permits which they return to the checking station upon leaving. Here pertinent information is recorded on fish or game taken from the Area.

This fifteenth annual report on recreational use of the Area presents primarily the results of the fishing trips on the lakes and streams. Brief summaries of hunting and trapping activities also are included, and fisheries research projects in progress are briefly reviewed.

In 1959, 25,380 permits were issued to visitors, almost equaling the record total of 1958.[1] Of these permits, 17,150 (67.6 percent) were for sightseeing, 4,722 (18.6 percent) for fishing, 3,471 (13.7 percent) for hunting, and 37 (0.1 percent) for trapping.

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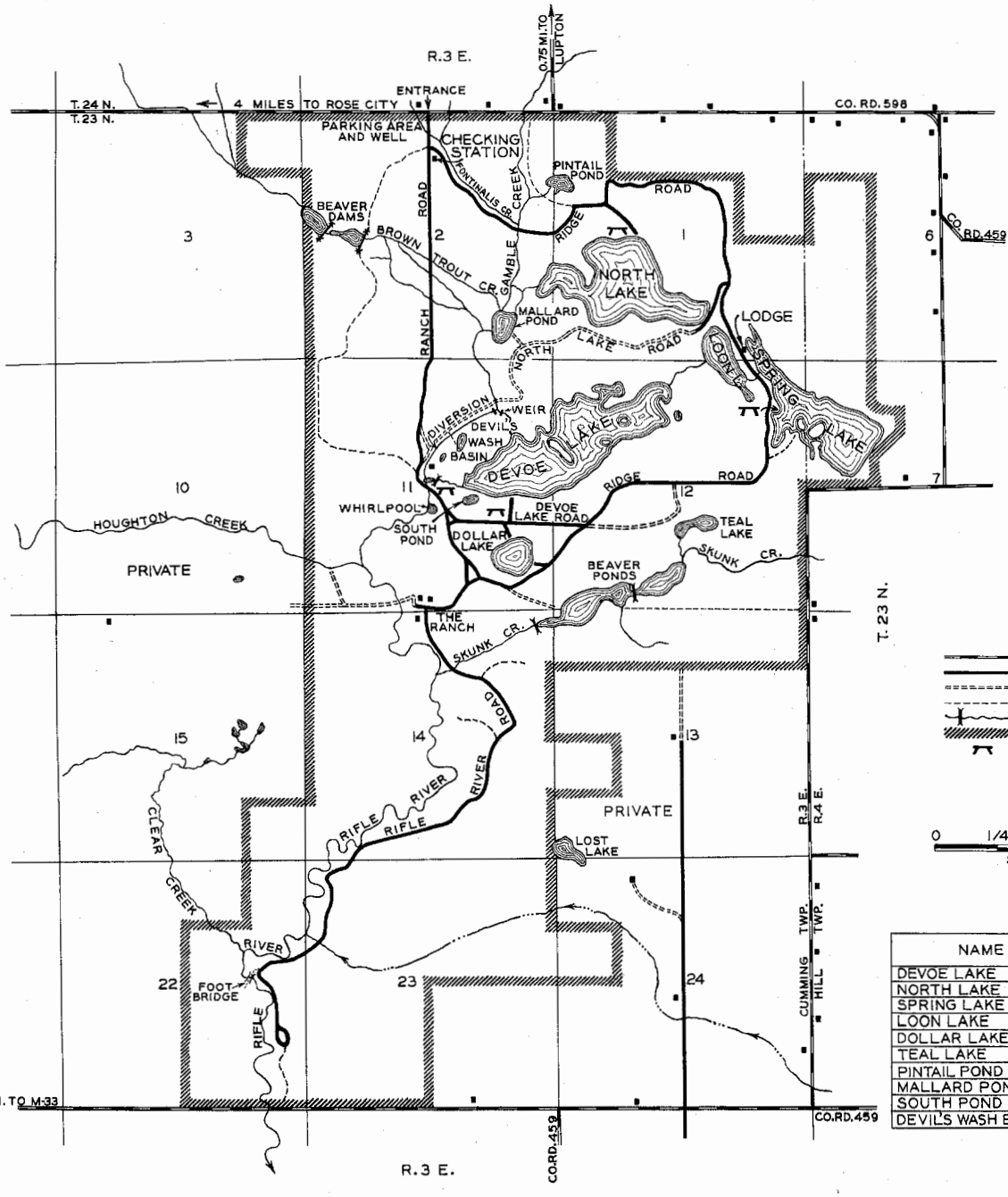
[1] A table on the back of Figure 1 presents a 14-year summary of public use of the Rifle River Area.

MICHIGAN DEPARTMENT OF CONSERVATION
FISH DIVISION

RIFLE RIVER AREA

OGEMAW COUNTY



LEGEND

- IMPROVED ROADS
- GOOD DIRT ROADS
- POOR DIRT ROADS
- TRAILS
- DAM
- AREA BOUNDARY
- PICNIC SITE

0 1/4 1/2 3/4 1
SCALE OF MILES

LAKE DATA

NAME	MAX. DEPTH (FEET)	AREA (ACRES)
DEVOE LAKE	53	130.0
NORTH LAKE	54	95.0
SPRING LAKE	18	72.5
LOON LAKE	20	17.2
DOLLAR LAKE	17	12.9
TEAL LAKE	15	5.8
PINTAIL POND	5	3.8
MALLARD POND	5	3.8
SOUTH POND	19	1.3
DEVIL'S WASH BASIN	15	1.3

Figure 1

RIFLE RIVER AREA

This 4,318-acre tract was purchased in 1945, with money from fishing and hunting licenses, to provide (1) additional public fishing and hunting grounds, and (2) a field laboratory for fish and game research. The former owner was H. M. Jewett, pioneer auto maker, who operated the Area as a private hunting and fishing preserve under the name of "Grousehaven."

Public use of the Rifle River Area is governed by the general rules for State-owned lands, except for special regulations which are announced on signs and posters. The Area is open daily, except Christmas; opening and closing hours are posted at the entrance. The Lodge is not open to the public; it is used by Department personnel for small meetings and to house people doing research work on the Area.

EVERYONE MUST REGISTER AT THE CHECKING STATION WHEN ENTERING AND AGAIN WHEN LEAVING THE AREA. Results of fishing, hunting and trapping must be reported to the clerk at the Checking Station. Fish should not be dressed until checked by the clerk. General seasons for fishing, hunting and trapping apply, except as posted. All other recreational activities are permitted except camping. If persons camped on the Area, it would complicate the daily checking out of fish and game which is essential to research on the Area. The clerk can suggest camping areas outside the Area. Permission to build cooking fires at designated sites must be obtained from the clerk on duty. It is unlawful to enter or leave the Area other than through the Checking Station, except by permission of the attendant on duty.

The Area is under the jurisdiction of the Fish Division of the Conservation Department. The other divisions of the Department are consulted on special problems and cooperate in management of the Area. The United States Weather Bureau and Geological Survey provide instruments for daily recording of data on weather, stream flow, and ground water levels.

Public use of Rifle River Area since 1945

Year	Number of persons				
	Sight-seeing	Fish-ing	Hunt-ing	Trap-ping	Total
1945	9,784	4,339	2,207	40	16,370
1946	9,198	2,997	2,447	75	14,717
1947	10,532	3,893	2,342	51	16,818
1948	10,976	3,821	2,132	141	17,070
1949	13,320	4,021	1,968	134	19,443
1950	12,945	4,578	2,109	86	19,718
1951	13,391	4,216	2,018	144	19,769
1952	14,176	3,959	2,915	117	21,167
1953	13,478	5,132	5,994	88	24,692
1954	15,364	5,812	4,021	72	25,269
1955	14,825	5,651	3,236	45	23,757
1956	13,160	5,231	3,541	87	22,019
1957	13,321	4,486	3,266	66	21,139
1958	17,135	5,232	3,511	105	25,983

Research Activities

The many lakes and streams on the Area provide a good opportunity for research on methods to improve fishing. Management techniques developed here might be applied elsewhere in Michigan. Likewise, research on game management problems is carried on throughout the year.

A record of annual harvest of fish and game is obtained at the Checking Station. Studies on age and growth of fish and game species are made from weights and measurements taken at the Checking Station and from scale samples of fish, wings and tail feathers from grouse, and by examining the teeth of deer. Other studies may involve records of fin-clip marks or tags on fish, leg bands on grouse, and blood samples from certain birds or animals. Special research projects on the Area involve: (1) evaluation of stream and lake improvement, (2) fish population census in lakes and streams, (3) effects of fishing and hunting pressures on populations, (4) fish population manipulation, (5) stocking of different combinations of fish, (6) movements of stream fishes, (7) establishment of a flock of Canada geese to encourage local nesting, (8) grouse studies, (9) investigations on other game populations and their habitats, and (10) developing new techniques in fish and game research.

Anglers from 43 of Michigan's 83 counties fished in the Rifle River Area in 1959. Eighty-five percent of the fishermen were residents of either Ogemaw County or the eastern Michigan metropolitan areas in Bay, Genesee, Macomb, Oakland, Saginaw, and Wayne counties. Of 136 nonresident anglers, 65 percent were from Ohio.

A cloudburst (4.6 inches of rain in about 4 hours) on the night of May 19 resulted in extensive flooding of all streams in the upper Rifle River watershed. Lake levels in the Area reached their highest point in years. Because considerable damage was done to the roads and culverts, the Area was closed to public access on May 20-22. Houghton Creek flooded the field between the Rifle River and Boyer's gate (located at the west boundary of the Area). The Skunk Creek culvert was washed out and approaches to other bridges were damaged. A subsequent survey of stream improvement structures in the Area disclosed little or no damage. In the Rifle River, downstream from the Area, stream improvement devices installed before 1950 were reportedly destroyed, whereas those constructed more recently were unaffected. No damage was done to the weirs in Gamble Creek but half of the weir in the North Lake outlet collapsed. Waters from Gamble Creek poured into North Lake for several days and flooded the marshy area adjacent to the outlet, to a depth of at least a foot.

The downpour resulted in the inundation of the shorelines of Devoe and North lakes, and the white marl shoals of North Lake were discolored for most of the summer. At the Devoe Lake outlet, water overflowed the wooden wing walls of the dam, and water also skirted around the knoll on which 'Ned's' cabin formerly was located, and spilled over into the Diversion in a steady stream for about 4 days. South Pond was broadly connected with Devoe Lake for several days but there was no flooding of Devil's Wash Basin from Devoe Lake (or the Diversion). The inlet from Loon Lake was under a foot of water near Devoe Lake. The water

level in landlocked Dollar Lake rose 0.59 foot overnight and continued to rise for several days thereafter.

Large numbers of sunfishes and minnows moved from Loon Lake into Devoe Lake through the connecting channel during the high water (many were trapped in weirs set in this channel before the cloudburst). Undoubtedly the flood waters also resulted in fish movement among other connecting waters and streams within (and outside) the Area boundaries.

Stocking and recovery of hatchery-reared trout in area waters

Hatchery-reared trout contributed a large share of the total catch of trout in the Area during 1959. The combined catch of all hatchery-reared trout from all waters of the Area amounted to 1,085 fish (372.9 pounds) as compared to 658 native trout (385.2 pounds).

On April 28, 1,998 legal-size rainbow trout were planted in Devoe Lake. From this planting, lake fishermen caught 420 fish (21 percent) during the season. These trout comprised nearly 40 percent of the entire catch from the lake (1,060 fish).

In the past, rainbow trout of legal length planted in Devoe Lake frequently contributed substantially to the catch from the streams in the Area. Movement of planted trout out of the lake through the inlet (Gamble Creek) and the outlet is unrestricted. In the spring of 1959 an experiment was conducted to determine if there was any tendency for rainbow trout to leave the lake shortly after planting and, if so, whether scatter or spot plantings at different sites affected the magnitude of this movement. The 1,998 rainbow trout were divided into four groups of about 500 fish each and given a distinctive fin clip. A random sample of 50 fish from each group was measured to determine group parameters. These are indicated below:

Group	Length (inches) Mean	Range	Standard deviation
1	9.1	7.2-12.5	1.015
2	9.0	7.3-10.6	0.833
3	9.1	7.1-10.6	0.780
4	8.9	7.1-10.6	0.887

No significant difference between the mean lengths of fish in the four samples was found when the standard t test was applied to the data (values of p ranged from 0 to 76.9 percent).

The four groups of fish were planted as follows (the largest island in Devoe Lake [see Figure 1] was considered the dividing line between the upper [east] and lower [west] basins): Fish of Group 1 were spot-planted near the center of the lower basin; Group 2, scatter-planted along the drop-off in the upper half of the lower basin; Group 3, spot-planted near the center of the upper basin; and Group 4, scatter-planted around the periphery of the upper half of the upper basin.

Before the trout were planted the narrow outlet channel was blocked for 10 days with a trap net set about midway between the lake and the dam. A wing of the net was tied to each bank and the float lines were staked so as to provide a 'fence' extending 8-12 inches above the water. Between the trap net and the dam a fyke net also was installed, together with a lead set across the channel, to intercept any trout (captured in the trap net and released below the dam) which sought re-entry into the lake. The permanent weir in the Gamble Creek inlet of Devoe Lake trapped all fish attempting to leave the lake via the inlet. The trap-net catches are summarized below:

Group	Number of trout	Number of trout captured in outlet
1	500	57
2	499	39
3	500	38
4	499	44

During the 10 days of trap-net operation (April 28-May 8), 178 rainbow trout (8.9 percent of the total number planted) were trapped in the outlet and released downstream from the nets. Movement was most pronounced during the first two days and thereafter was slight and sporadic. Analysis of the recoveries by the Chi-square test indicated that there was no significant difference between the number of recoveries in Group 1 and any other group ($\underline{X}^2 = 4.57$, 3 d.f.; p = 78 percent). The location (upper or lower basin) and method (spot or scatter) of planting had no apparent effect upon the movement of trout out of the lake. No trout were caught in the fyke net which had been set in the outlet channel to intercept fish moving upstream.

There was comparatively little movement of these rainbow trout out of the lake through the inlet during this period. Altogether, 15 rainbow trout were captured in Gamble Creek traps as follows: three from Group 1, five from Group 2, two from Group 3, and five from Group 4. Thus, within a period of 10 days after the planting of 1,998 rainbow trout in Devoe Lake, at least 193 trout, or 9.6 percent, had moved out of the lake.

As shown below, 311 of the rainbow trout planted in Devoe Lake were caught in the stream (302 between April 28 and June 19):

Stream	Number of hatchery-reared rainbow trout caught
Lower Rifle River (between the mouth of Houghton Creek and the south boundary of the Area)	121
Upper Rifle River (between Devoe Lake Dam and the mouth of Houghton Creek)	126
Lower Gamble Creek (between Ridge Road bridge and the mouth)	23
Upper Gamble Creek (between Ridge Road bridge and the north boundary of the Area)	19
Houghton Creek	6
Diversion	16
Total	311

The hatchery-reared rainbow trout caught in Area streams averaged 9.2 inches in length at the time of capture, as compared to 11.0 inches for fish caught in Devoe Lake. This difference was due largely to the shorter time between planting and recapture in the stream than in the lake. About 97 percent of the 311 fish caught in the streams were taken by June 19, whereas only approximately 21 percent of the lake catch had been made by that date.

During the season, 900 hatchery brown trout of legal length were planted in the Rifle River. The results of this stocking are summarized below:

Number of trout caught in:	
Rifle River	320[2/]
Houghton Creek	18
Gamble Creek	2
Diversion	1
Fontinalis Creek	1
Total caught in Area streams	342[2/]
Percentage return on planting	38.0

On the basis of a postseason population study, an estimated 41 of the original planting were still present in the section of the Rifle River within the Area.

A relatively small carryover of trout planted in Area streams provided a third source of hatchery trout for stream fishermen. Survivors from 1958 plantings of 1,300 brown trout and 200 rainbow trout contributed 11 brown trout and one rainbow trout to the creel in 1959.

Hatchery trout, therefore, made a substantial contribution to the total catch of trout in the streams. The 311 rainbow trout caught in the Area streams coupled with the catch of 354 hatchery-reared trout from stream stockings yielded a total catch of 665 trout or 176.0 pounds. Since 612 native trout that weighed 330.2 pounds were caught in the streams, hatchery trout contributed 52.1 percent of the numerical catch and 34.8 percent of the total weight.

[2/] Included in the totals were one unmarked brown trout that was judged to have been of hatchery origin (1959 planting) and one marked hatchery brook trout which was apparently planted inadvertently with brown trout.

It should be recognized that returns from trout plantings reported here are not necessarily complete for no records are available of the number of trout that are caught in waters outside the Area. For example, of the 1,998 rainbow trout planted in Devoe Lake, 253 were caught in the streams below the lake and 58 were taken in the Diversion and above the lake. Since nearly half of the trout caught below the lake were taken in the "lower" Rifle River, it can be deduced that some rainbow trout moved downstream out of the Area and were exposed to exploitation by anglers in an area not censused.

Lake fishing

Fewer fish were caught in Area lakes in 1959 than in any year since the Rifle River Area was opened to public fishing in 1945. A total of only 2,416 fish were caught (Table 1), considerably less than the previous low of 3,852, in 1948. The 1959 catch weighed 790.1 pounds, or 35.6 pounds less than the record low weight of 1958. Similarly, fishing quality was the poorest ever recorded for the Area. Only 30 percent of the fishermen caught one or more fish and the average catch per hour per angler was 0.39. These low total catch data resulted almost entirely from the poor fishing in Dollar and Loon lakes. Only 1,058 fish were caught in these two lakes in 1959 whereas more than 3,500 were caught in 1958. Although fishing pressure on Loon and Dollar lakes decreased sharply from 1958, this was offset by an increase on other lakes. The total of 2,085 trips to all lakes was greater than in 1958 (2,042).

Sixteen kinds of fish were caught in the lakes and ponds (Table 2). Bluegills comprised one-third of the catch; yellow perch, 22.1 percent; and rainbow trout (from a spring planting in Devoe Lake), 17.4 percent. (No rainbow trout were caught in 1958.) Aside from rainbow trout, the only other species for which there was an increase in total catch over 1958 were brown trout, white suckers, smelt, and northern pike.

Table 1.--The fishing pressure, yield, and fishing quality on eight Rifle River Area lakes in 1959

Lake[1]	Fishing pressure				Yield				Fishing quality	
	Number of fishing trips	Trips per acre	Hours of fishing	Hours per acre	Number of fish	Fish per acre	Pounds of fish	Pounds per acre	Catch per hour per angler	Percentage of fishermen successful
Devoe	1,038	7.9	3,703	28.4	1,060	8.1	443.6	3.4	0.25	29
North	337	3.5	854	8.9	177	1.8	74.5	0.7	0.20	15
Dollar	508	39.4	1,156	89.6	966	74.8	220.2	17.1	0.78	42
Loon	71	4.1	207	12.0	92	5.3	16.3	0.9	0.39	30
South Pond	50	38.4	71	54.6	68	52.3	16.6	12.7	1.06	36
Teal	71	12.2	143	24.7	52	8.9	18.3	3.2	0.25	23
Devil's Wash Basin	3	2.3	11	8.4	1	0.8	0.6	0.4	0.07	33
Spring	7	0.1	5	0.1	.....	...	....	...	....	..
Totals	2,085	6.2	6,150	18.3	2,416	7.2	790.1	2.4	0.39	30

[1] Areas of the different lakes, in acres, are: Devoe, 130.0; North, 95.0; Dollar, 12.9; Loon, 17.2; South Pond, 1.3; Teal, 5.8; Devil's Wash Basin, 1.3; Spring, 72.5. Total acreage, 336.0.

Table 2.--The species composition, by number (N) and percentage (P), of the catch from seven lakes on the Rifle River Area, 1959[1]

Species	Lake												Total number of fish	Percentage of Area total
	Devoe		North		Dollar		Loon		South Pond		Teal			
	N	P	N	P	N	P	N	P	N	P	N	P		
Bluegill	61	5.8	7	4.0	650	67.2	25	27.2	59	86.8	9	17.3	811	33.6
Yellow perch	328	30.9	75	42.5	113	11.7	12	13.0	..	....	7	13.5	535	22.1
Pumpkinseed	5	Tr	12	6.8	47	4.9	47	51.0	1	1.5	..	....	112	4.6
Rock bass	89	8.4	29	16.3	6	0.6	..	....	..	....	1	1.9	125	5.3
Largemouth bass	4	Tr	7	4.0	44	4.6	..	....	3	4.4	13	25.0	71	2.9
Smallmouth bass	44	4.2	4	2.3	...	....	..	....	..	....	..	....	48	2.0
Black crappie	13	1.2	..	....	22	2.3	..	....	..	....	..	....	35	1.4
Hybrid sunfish[2]	...	...	2	1.1	56	5.8	4	4.4	4	5.8	14	26.9	80	3.3
Redear sunfish	...	...	..	....	17	1.8	..	....	..	....	..	....	18[4]	0.7
Bullheads[3]	...	...	3	1.7	11	1.1	4	4.4	1	1.5	8	15.4	27	1.1
Brown trout	46	4.3	..	....	...	....	..	....	..	....	..	....	46	1.9
Rainbow trout	420	39.6	..	....	...	....	..	....	..	....	..	....	420	17.4
Northern pike	...	....	9	5.0	...	....	..	....	..	....	..	....	9	Tr
Smelt	...	....	29	16.3	...	....	..	....	..	....	..	....	29	1.2
White sucker	50	4.7	..	....	...	....	..	....	..	....	..	....	50	2.1
Totals	1,060	....	177	....	966	....	92	....	68	....	52	....	2,416[4]	....

[1] No fish were caught in Spring Lake. In the body of the table, Tr = less than 0.5 percent.

[2] Bluegill x pumpkinseed in all lakes except that in Dollar Lake one hybrid may have been bluegill x redear.

[3] Black bullhead or brown bullhead.

[4] One redear sunfish caught in Devil's Wash Basin is included in this total.

One redear sunfish was caught in Devil's Wash Basin; no fish were caught in Spring Lake. These two bodies of water have been virtually out of fish production since 1955 because of winterkills.[3] After treatment of both waters with toxaphene, redear sunfish were stocked in Devil's Wash Basin in 1958, and adult crappies and northern pike fingerlings were planted in Spring Lake in 1959. Loon Lake also was treated with a light concentration of toxaphene (5 ppb.) in 1958 to reduce the large numbers of small sunfishes. Apparently the combined effects of this treatment and a light winterkill in the winter of 1958-1959 markedly reduced the anglers' catch during the 1959 season.

An attempt was made in Dollar Lake in May, 1959, to thin out the large population of small bluegills by seining. A total of 1,961 bluegills less than 6.0 inches long were removed from the lake. This reduction may have been partly responsible for the reduced catch of bluegills by fishermen. A total of 757 fish of several species were marked during this seining operation, and subsequent recaptures by anglers in 1959 provided a basis for estimating rates of exploitation.

For 87 percent (1,821) of the fishing trips, data were obtained (as in 1958) on the type of fishing rod used by lake fishermen. As indicated by results shown below, spinning rods were used oftener than any other kind of rod. The order of preference was identical to that in 1958:

Type of rod	Number of fishermen	Percentage
Spinning	768	44
Casting	530	28
Fly	259	14
Cane pole	129	7
Combination	135	7

[3] Although no fish were caught in Spring Lake, 21 persons took 194 frogs that weighed a total of 54.5 pounds.

A discussion of the fishing results for six of the lakes and ponds follows. Procedures for scale sampling and estimation of the age composition of the catches followed those of the past 3 years and are described in Report Nos. 1550 and 1575 of the Institute for Fisheries Research. Fishing records for the lakes and ponds were tabulated by seasons as follows: spring, open-water angling prior to the opening of the bass season (June 20, 1959); summer, June 20 to Labor Day, inclusive; fall, open-water fishing after Labor Day; and winter, fishing through the ice.

Devoe Lake.--After a 2-year decline, fishing pressure on Devoe Lake rebounded to the 1956 level. In 1,038 trips, anglers fished 3,703 hours and caught 1,060 fish (Table 1), the highest yield for any Area lake in 1959. The total catch of 443.6 pounds of fish amounted to 3.4 pounds per acre, which is about average for this lake. Yellow perch and rainbow trout contributed 70.5 percent of the catch; eight other species made up the balance (Table 2).

The presence of trout in Devoe Lake attracts more anglers to this lake in the spring than to any other lake on the Area. In 1959 the resident brown trout population was augmented by the aforementioned planting of 1,998 rainbow trout (mean length 9.0 inches) on April 28. Although 34 of 46 brown trout were caught in the spring, 270 of 420 rainbow trout were taken during the summer months. The rainbow trout caught in the lake represented 21 percent of the planting; their average length when caught was 11.0 inches. No trout were reported with lamprey scars in 1959. Three of the brown trout bore tags acquired when they were trapped at the weir in the Gamble Creek inlet, either in 1957 (2 fish) or 1955.

Perch comprised 30.9 percent of the total catch; their average length was 6.8 inches, an increase of 0.5 inch over 1958. Three-year-old fish again dominated the catch (Table 3), as they have for several years. Relatively few

Table 3.--The estimated age composition of the catch of three species of fish from Devoe Lake in 1959

[N = number; P = percentage]

Age group	Year class	Species					
		Yellow perch		Rock bass		Smallmouth bass	
		N	P	N	P	N	P
II	1957	79	24.7	...	....	12	27.3
III	1956	131	40.8	17	19.1	20	45.5
IV	1955	70	21.8	49	55.2	9	20.3
V	1954	24	7.5	10	11.2	3	6.9
VI	1953	13	4.0	10	11.2	..	....
VII	1952	2	0.1	1	0.1	..	....
VIII	1951	...	....	1	0.1	..	....
IX	1950	1	Tr	1	0.1	..	....
X	1949	1	Tr	..	....	..	....
Totals		321[1]	....	89	....	44	....

[1] Seven fish were neither measured nor scale-sampled.

older (and larger) perch have ever been caught in this lake and only two were caught in 1959.

Table 3 also presents the estimated age composition of the rock bass caught and the actual age distribution of the smallmouth bass catch. The 1955 year class of rock bass (age-group IV) dominated the catch for this species. This year class also made an important contribution to the 1958 catch of rock bass. Fewer smallmouth bass were caught in 1959 than during any of the past 3 years. As usual for this lake, bass 2 and 3 years old dominated the catch.

Thirty percent of the fishing trips involved still-fishing with worms; anglers who fished in this manner accounted for nearly all of the bass, perch, bluegills, suckers, and rock bass caught. Thirty-two percent of the fishermen trolled with a varied assortment of lures and caught most of the trout. The relatively few anglers who cast artificial lures had poor success (5 fish in 213 hours of casting).

North Lake.--Anglers on North Lake had better fishing in 1959 than in 1958, as 177 fish were caught in 854 hours of fishing (44 fish in 830 hours in 1958), but the total yield of 0.7 pound per acre again was very small (Table 1). Perch comprised 42.5 percent of the total catch (Table 2), with 3-year-old fish predominating. One-third of the perch were 9 to 13 inches long, which is somewhat unusual for this lake. Most of these larger perch were 5 to 7 years old. None of the bluegills and largemouth bass planted in 1954 were caught.

While most of the angling on this lake was done in the summer, there also was a moderate amount of winter fishing--more than on any other Area lake. Eighty fishing trips accounted for 56 fish (29 smelt, 24 perch, and 3 pike).

Most anglers on North Lake either still-fished or trolled in 1959 but the few (30) who cast with a worm and spinner combination caught all but one of the 11 bass taken.

Dollar Lake.--The fishing pressure of 89.6 hours per acre on Dollar Lake in 1959 (Table 1) approximated the 14-year average of 92.0 hours per acre for this lake. However, there are no other favorable comparisons of the 1959 fishing statistics with those of other years. Only 966 fish that weighed 220.2 pounds were caught in 508 trips (17.1 pounds per acre). Only 42 percent of the fishermen caught one or more fish, the first time in 15 years that less than half of the anglers were successful.

The pronounced drop in fishing success and yield in Dollar Lake was caused mostly by a reduction in catch of bluegills, which annually dominate the total catch. The 650 bluegills caught in 1959 represented two-thirds of the catch (Table 2), but this was a drop of 1,225 bluegills from the catch in 1958. This reduction may have resulted partly from the removal of 1,961 bluegills less than 6.0 inches long in May 1959 by seining.[4] Of these, an estimated 1,100 were 5.0-5.9 inches long and about 500 were 4.0-4.9 inches long. Judging by annual exploitation rates in 1957-1959 (the highest of which was 33 percent in 1958), it may be safely assumed that no more than 350 of these 5- to 5.9-inch bluegills and (since bluegill growth is very slow in this lake) few of the 4- to 4.9-inch fish would have been caught by anglers if the population had not been disturbed. Thus, if the catch was reduced in direct proportion to the number of fish removed by seining, the total harvest probably would not have exceeded about 1,000 bluegills (650 + 350), or about 875 fewer fish than were caught in 1958.

Three other factors undoubtedly influenced the lower bluegill catch in 1959--(1) 328 fewer hours of fishing than in 1958, (2) the cumulative mortality of fish of the strong 1952 year class, and (3) relative weakness of succeeding year classes.

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[4] This experiment in population manipulation was attempted in order to improve the poor growth rate of bluegills (about 1.0 inch per year) by thinning out the population--particularly the abundant 2.0- to 4.0-inch size group. We anticipated removing at least 75 percent (by weight) of the population of small bluegills less than 6.0 inches long, with a 1,600-foot seine. We removed 52.6 percent of the total estimated weight of the population 4.0-6.0 inches long but only a few bluegills under 4.0 inches were caught.

Anglers caught 2,550 bluegills of the 1952 year class in 1956-1958, or twice as many as from the next most abundant year class (1953). This 1952 hatch provided 80 and 78 percent of the catch in 1956 and 1957, and ranked second to the 1953 year class in 1958 (38 percent of the catch as compared to 51 percent for the latter). Furthermore, relatively few bluegills older than 6 years have been caught in this lake, which indicates a rather high mortality rate beyond the sixth year of life. Therefore, unless another strong year class had appeared in the population, a drop in the total bluegill catch was inevitable in 1959. As shown in Table 4, this 1952 year class still provided 9.2 percent (59 fish) of the total catch as 7-year-old fish, the best record for this age group in at least the past 4 years. The 1953 and 1955 year classes each supplied slightly more than one-third of the 1959 catch but neither was as strong as the 1952 group.

Table 4 also presents the estimated age composition of the catch of four other kinds of fish numerically important in the catch in Dollar Lake. A moderate increase in the perch catch over that of 1958 is ascribed to the 1957 year class, which constituted two-thirds of the catch. The 1956 year class dominated the catches of pumpkinseeds and hybrid sunfish, both of which showed increases over 1958. The catch of largemouth bass (44) dropped 24 percent from 1958, but exceeded the catch in 1956 (37) and 1957 (24). The 1954 year class dominated the catches in 1958 and 1959 (more than 50 percent each year).

Redear sunfish fingerlings planted in 1954 and 1956 have contributed little to the total catches in recent years. Seventeen were caught in 1959, most of which were 4-year-old fish (progeny of the 1954 planting).

Bluegill and largemouth bass fingerlings (2,000 each), marked by removal of the right pectoral fin, also were planted in Dollar Lake in 1954. (One bass and one bluegill were caught in 1958.) Nine bluegills and two bass with this

Table 4.--The estimated age composition of the catch of five species of fish from Dollar Lake in 1959

[N = number; P = percentage]

Age group	Year class	Species									
		Bluegill		Largemouth bass		Yellow perch		Pumpkinseed		Hybrid sunfish	
		N	P	N	P	N	P	N	P	N	P
I	1958	4	0.1	..	....	...	....	..	....	..	....
II	1957	...	....	1	2.3	77	68.1	4	8.5	2	3.6
III	1956	57	8.8	4	9.1	11	9.7	31	66.0	47	83.9
IV	1955	241	37.3	7	15.9	11	9.7	6	12.8	6	10.7
V	1954	65	10.0	26	59.1	14	12.5	1	2.1	1	1.8
VI	1953	224	34.6	3	6.8	...	....	3	6.3	..	....
VII	1952	59	9.2	..	....	...	....	2	4.3	..	....
VIII	1951	...	....	..	....	...	....	..	....	..	....
IX	1950	...	....	..	....	...	....	..	....	..	....
X	1949	...	....	3	6.8	...	....	..	....	..	....
Totals		650	....	44	....	113	....	47	....	56	....

mark were caught in 1959. Unfortunately, two 10.0-inch bass were inadvertently given the same mark during a fish population study in 1957. Since bass grow slowly in this lake the marked bass caught in 1959 could have come from either source.

Rates of exploitation of Dollar Lake fish by anglers, based on the percentage of marked fish caught, have been computed each year since 1957. The 1959 rates are shown in Table 5. Perch consistently have been captured at a higher rate than any other species (over 40 percent each year) while crappies have been equally consistent as the least-exploited species (maximum, 6.4 percent in 1958). Pumpkinseeds have been captured at rates ranging between 20.0 and 31.2 percent. In 1959, the rate of exploitation for bluegills was only 7.3 percent--much lower than in previous years (24.4 percent in 1957; 33.2 percent in 1958). (The minimum length of fish marked at the start of the 1959 study of rate of exploitation was 6.0 inches, compared to 5.0 in 1957 and 1958. The effect, if any, of this change in the size of fish marked probably would have been to raise, rather than lower, the observed rate of exploitation, because relatively few of the large numbers of 5.0- to 5.9-inch bluegills marked in 1957 and 1958 were caught.)

Eighty-six percent of the fishing pressure on Dollar Lake occurred in the summer. The great majority of anglers still-fished from a boat and used worms for bait; they captured 70 percent of the fish taken during the year. Anglers who cast artificial lures caught half of the bass, but no other fishing method, bait, or lure was particularly effective or selective in catching fish.

Loon Lake.--Fishing in Loon Lake in 1959 was the poorest recorded in its history as a public lake. Seventy-one angling trips produced 92 fish that weighed 16.3 pounds (Table 1). The 47 pumpkinseeds caught comprised 51 percent of the catch. No bass or crappies, and only a small number of bluegills, perch, and bullheads, were caught. Possibly the combined effects of a light treatment of

Table 5.--Exploitation rates of fish by angling in Dollar Lake, May 30-December 31, 1959

Species	Minimum length of fish marked (inches)	Number of marked fish on May 30	Number of marked fish caught	Percentage exploitation
Bluegill	6.0	400	29	7.3
Pumpkinseed	5.0	18	4	22.2
Black crappie	6.0	88	1	1.1
Largemouth bass	10.0	92	7	7.6
Yellow perch	5.0	83	35	42.1
Hybrid sunfish	5.0	12	6	50.0
Redear sunfish	5.0	64	6	9.4
Totals		757	88	11.6

toxaphene in the summer of 1958 (to thin out large numbers of small sunfishes) and a light winterkill in 1958-1959 combined to effectively reduce the stocks of larger fish.[5] Net catches late in October, 1959, however, revealed the presence of all species usually found in the lake, plus a large population of bluegills and pumpkinseeds of intermediate size (4.0-5.5 inches).

In January and December, 1959, experimental ice fishing by Area personnel in connection with experiments on artificial circulation of the lake with compressed air yielded 110 fish (bluegills, perch, and pumpkinseeds) that weighed 7.1 pounds. Only 33 of these fish were 5.0 inches long or longer, however. If the fish caught by experimental angling are included, a total of 202 were caught (weight, 23.4 pounds) in Loon Lake in 1959.

South Pond.--Seventy-one hours of fishing in this pond produced 68 fish, 59 of which were bluegills (Tables 1 and 2). Since the 1953 year class of bluegills dominated the catches in South Pond in 1956 and 1957, and the 1954 brood predominated in 1958, one might perhaps expect the 1955 year class to supply the bulk of the 1959 catch. No fish of this group were caught, however. The catch was equally divided between the 1954 and 1956 year classes (age-groups III and V). Apparently there was little or no survival of fish from the 1955 year class.

Teal Lake.--No fish were caught out of this lake in 1958 in 48 hours of fishing. In 1959, however, 52 fish were caught in 143 hours of angling (Table 1). Furthermore, 13 largemouth bass were caught (Table 2), a species that hadn't been taken in this lake since 1949. These bass ranged in age from 2 to 5 years, despite the fact that wintertime oxygen levels had been low (less than 1.0 ppm.) in both 1958 and 1959. These bass may have moved into the lake from George Lake (outside the Area) via Skunk Creek during the May flood.

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[5] There is no good supporting evidence for this assumption, however. Only 22 fish of catchable size were found after the selective toxaphene treatment; 37 were found immediately after the ice disappeared.

Stream fishing

The six trout streams in the Area were fished 7,169.5 hours by 3,022 fishermen during the trout season (April 25-September 13).[6] Angling pressure varied markedly among the different streams, from 28 angling trips in Brown Trout Creek to 2,562 in the Rifle River (range in angling effort, 13.1 to 280.4 hours per acre, respectively). For the 33.9 acres of trout streams in the Area, angling pressure amounted to 211.5 hours per acre. For all streams, the average length of time spent fishing was 2.4 hours per trip.

Altogether, 594 wild brown trout and 18 brook trout (total weight, 330.2 pounds) were caught in Area streams. The rate of harvest was 18.1 native trout, or 9.7 pounds, per acre. The contribution of hatchery trout to the total harvest consisted of 352 brown, 312 rainbow, and 1 brook trout, which were taken at the rate of 19.6 trout or 5.2 pounds per acre.[7]

Only 9.8 percent of the fishermen were successful in catching at least one wild trout. The catch of wild trout per hour per angler ranged between 0.00 (Brown Trout Creek) and 0.30 (Fontinalis Creek) and averaged 0.06 for all streams combined. If hatchery trout are included, the overall average catch was 0.13 trout per hour per angler.

Records were obtained on the kinds of lures employed by all stream fishermen. The greatest variety of lures was used on the Rifle River (largest stream) and the least variety (primarily worms) on the smaller streams. As summarized below, the two lures used most frequently were worms and flies (85.8 percent) with a preference for worms over flies of about 5 to 1:

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[6] As nontrout water, Skunk Creek was excluded from these totals. Nine fishermen fished this creek for 20 hours and caught no fish.

[7] Seven trout were reported caught in the Rifle River which were not seen by the creel census clerk. These trout were not included elsewhere in this Report.

Lure	Number of fishermen	Percentage
Worms	2,159	71.4
Flies	434	14.4
Artificial lures other than flies	56	1.8
Worms and spinners	39	1.3
Insects (Natural)	17	0.6
Minnows	16	0.5
Natural lures other than worms, minnows, or insects	7	0.3
Combination of two or more of above	294	9.7

In addition to lures, stream fishermen also were asked about the type of fishing rod used. Fly rods were used oftener than any other kind of rod, and spinning rods ranked second, as shown in the following tabulation:

Type of rod	Number of fishermen	Percentage
Fly	1,724	57.0
Spinning	964	31.9
Casting	186	6.2
Cane pole	39	1.3
Combination	100	3.3
Unknown	9	0.3

Rifle River.--By far the most heavily used stream in the Area, the Rifle River, was fished by 2,562 fishermen for 6,393 hours, or 280.4 hours per acre (Table 6). The average length of a fishing trip was 2.5 hours. A total of 516 wild brown trout were caught (Table 7), which averaged 10.9 inches in total length and 0.57 pound in weight. In addition, four wild brook trout were creeled.

Fishermen caught 579 hatchery trout--330 brown, 248 rainbow, and 1 brook (Table 7). Of 900 legal-length brown trout (three lots of 300 each) planted in the Rifle River during the season, 320 (35.6 percent) were caught. The origin of two trout in the returns was not conclusively known but they were believed to have come from this planting. One fish, an unmarked brown trout,

Table 6.--A summary of angling on the trout streams of the Rifle River Area in 1959

Stream	Area (acres)	Number of anglers	Hours of fishing	Fish caught							
				Hatchery-reared trout		Native fish					
						Trout		Others		Total	
				Number	Pounds	Number	Pounds	Number	Pounds	Number	Pounds
Rifle River	22.8	2,562	6,393.0	579	151.8	520	293.6	119	88.0	639	381.6
Gamble Creek	5.9	198	338.5	44	13.2	35	17.3	...	....	35	17.3
Houghton Creek	0.9	131	245.5	24	6.7	24	11.2	16	20.2	40	31.4
Fontinalis Creek	0.9	55	74.5	1	0.2	32	7.9	...	....	32	7.9
Diversion	0.8	48	84.0	17	4.1	1	0.2	...	....	1	0.2
Brown Trout Creek	2.6	28	34.0	...	....	...	....	...	....	...	....
Totals	33.9	3,022	7,169.5	665	176.0	612	330.2	135	108.2	747	438.4

Table 7.--Number of fish of different species caught in five streams of the Rifle River Area in 1959[1]

Kind of fish	Stream					Total number of fish	Percentage of total catch
	Rifle River	Gamble Creek	Houghton Creek	Fontinalis Creek	Diversion		
Brown trout							
Native	516	29	24	24	1	594	42.1
Hatchery	330	2	18	1	1	352	25.0
Rainbow trout							
Hatchery	248	42	6	..	16	312	22.1
Brook trout							
Native	4	6	..	8	..	18	1.3
Hatchery	1	..	..	..	..	1	Tr
White sucker	64	..	14	..	..	78	5.5
Carp	..	..	2	..	..	2	Tr
Bluegill	27	..	..	..	..	27	1.9
Rock bass	7	..	..	..	..	7	Tr
Pumpkinseed	10	..	..	..	..	10	0.7
Others[2]	11	..	..	..	..	11	0.8
Totals	1,218	79	64	33	18	1,412	....
Percentage of total area catch	86.3	5.6	4.5	2.3	1.3	...	...

[1] No fish were caught in Brown Trout Creek. In the body of table "Tr" = less than 0.5 percent.

[2] "Others" include 4 largemouth bass, 3 brown bullheads, 2 yellow perch, 1 northern pike and 1 longear sunfish.

was judged on the basis of pigmentation to be of hatchery origin. The other was a marked brook trout which apparently was planted with brown trout. Eleven of the brown trout caught in 1959 were survivors from plantings made during 1958. All but one of the 248 hatchery rainbow trout had been planted in Devoe Lake; the other was a survivor from a 1958 stream planting. Only one of the rainbow trout planted in Devoe Lake in 1959 was captured in the Rifle River during the postseason trout population study.

Angling pressure on the Rifle River in 1959 decreased approximately 24 percent below that of 1958. This represented a decrease of 513 angler-trips and 1,981 hours of fishing. The total yield of wild trout dropped from 1,531 to 520 fish in 1958 and 1959, respectively--a decrease of 66 percent.

The marked disparity between 1958 and 1959 in the catch of wild trout appeared to be influenced primarily by factors other than the flood discussed earlier in this report. Annually, fishing pressure on the Rifle River is heaviest during the first half of the season. Except for a slight increase during the fifth week (week of Decoration Day), angling pressure tends to diminish after the first week until about the first week in July, after which it levels off. A major portion of the total harvest generally is caught during the first half of the season. For the "lower" Rifle River, the most intensively fished water in the Area, angling effort and yield during the early part of the 1959 season was substantially less than in 1958, as shown below:

Week of fishing season	Number of fishing trips		Percentage decrease in 1959	Number of wild trout caught		Percentage decrease in 1959
	1959	1958		1959	1958	
1st	356	494	27.9	73	217	66.4
2nd	510	700	27.1	100	382	73.8
3rd	650	875	25.7	197	457	56.9
4th	759	1,043	27.2	237	551	57.0

In 1959, angling quality was poorer than in 1958 throughout the season, including the early spring. During the first four weeks of the season the catch per hour per angler was 0.08 as compared to 0.13 for 1958. Fishing activity was curtailed during the latter part of the fourth week (which did not include weekend fishing--the above text table is based on successive 7-day periods after the opening day of the trout season, rather than on calendar weeks) and most of the fifth week due to the flood. From the sixth week to the close of the 1959 trout season (post-flood period), 1,260 angler-trips produced 257 wild trout. For a comparable period in 1958, 812 trout were caught in 1,456 angler-trips. The comparatively greater increase in angling pressure and reduction in catch depressed the catch per hour per angler slightly further in the post-flood period in 1959 (0.06), as compared to a similar period in 1958. With the overall reduction in angling pressure (24.1 percent) and catch (66.8 percent) for the "lower" Rifle River in 1959, the angling quality index dropped from 0.16 wild trout per hour per angler in 1958 to 0.07 in 1959.

As in past years, only a comparatively small fraction of the total angling effort and catch for the Rifle River occurred in the "upper" Rifle River (19.6 percent of the angler-trips and 4.6 percent of the total catch in 1959).[8] This section of the Rifle River also reflected the drop in angling quality demonstrated above for the lower portion of the river. Although the number of angler trips increased by 142 (39.4 percent), the catch of wild trout was reduced by 13 (35.1 percent). For this section of the stream the average catch was only 0.02 trout per hour per angler.

For both sections combined (upper and lower Rifle River) in 1959, wild trout were caught at the rate of 0.05 trout per hour per angler, a statistically

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[8] The fishing statistics for the "Whirlpool," a small oxbow-like pond adjoining the upper Rifle River are not presented in the tables. In 61 fishing trips, anglers fished 95.5 hours and caught 7 fish (4 northern pike, 2 suckers, and 1 black crappie) that weighed 14.2 pounds.

significant decrease ($p = 0.05$) from the corresponding figure of 0.14 in 1958 (Table 8). Further evidence of the poor quality of angling in 1959 was shown by the fact that only 9.7 percent of the anglers were "successful" (caught one or more wild trout) in the Rifle River.

The age of 491 of the 516 wild brown trout caught was determined. The largest percentage of trout were 2 years old (in their third year of life) and III-group fish were next in importance; about 11 percent of the trout caught were yearlings (Table 9). Trout of age-groups V and VI contributed only 9 fish to the total catch.

In addition to trout, several other species of fish were caught in the Rifle River. In the lower Rifle River, these were mostly white suckers (51 of a total of 53) while the catch from the upper Rifle River (66) included a greater number of species, among which bluegills, white suckers, and pumpkinseeds were the most common (Table 7). Unusual catches in the upper Rifle River were four largemouth bass. Most of the centrarchids were caught near the dam, where fishermen frequently still-fish from the bank or from the dam.

Observations during the 1959 postseason trout population study in the Rifle River indicated that the distribution and abundance of certain species of fish was different than observed in similar studies in previous years. Northern pike commonly are present in the "Whirlpool," but have been rare in the river; in the fall of 1959, however, several were observed throughout the river. Carp were found in the lower reaches of the Rifle River near the south boundary of the Area, whereas usually a small number of carp are present only in the upper section of the stream. Largemouth bass, which are occasionally found in the river, were observed in greater abundance than in the past. Similarly, bluegills and hybrids (bluegill x pumpkinseed) appeared to be more numerous than in previous years. These changes were probably caused by the spring flood which allowed movement of fish from upstream areas such as Devoe Lake, "Whirlpool," and Mallard Pond.

Table 8.--A summary of angling quality for wild trout on the trout streams of the Rifle River Area in 1959

Stream	Trout caught per acre of stream		Catch per hour per angler	Percentage of fishermen successful
	Number	Pounds		
Rifle River	22.8	12.9	0.05	9.7
Gamble Creek	5.9	2.9	0.10	12.6
Houghton Creek	26.7	12.4	0.06	10.1
Fontinalis Creek	35.6	8.8	0.30	16.4
Diversion	1.2	0.2	0.04	2.1
Average[1]	18.1	9.7	0.06	9.8

[1] Although no fish were caught in Brown Trout Creek, average values cited include this stream.

Table 9.--Number (N) and percentage (P) of wild brown trout of different age groups caught in streams of the Rifle River Area in 1959

Age group	Stream									
	Rifle River		Gamble Creek		Houghton Creek		Fontinalis Creek		Diversion	
	N	P	N	P	N	P	N	P	N	P
I	52	10.6	..	....	4	16.7	1	4.5	..	....
II	239	48.7	12	44.4	11	45.8	16	72.7	1	100.0
III	154	31.4	9	33.3	8	33.3	5	22.7	..	....
IV	37	7.5	6	22.2	1	4.2	..	....	..	....
V	6	1.2	..	....	..	....	..	....	..	....
VI	3	0.6	..	....	..	....	..	....	..	....
Totals	491	....	27	....	24	....	22	....	1	....
Total catch[1]	516	....	29	....	24	....	24	....	1	....

[1] Includes fish for which age was not determined.

Rifle River fishermen showed a preference for worms over flies for bait by a ratio of nearly 5 to 1. Worms were used on 72 percent of the 2,562 angler-trips and flies on 15 percent. Fishermen caught 344 wild trout on worms and 140 on flies.

Gamble Creek.--Angling pressure on Gamble Creek decreased from 91.4 hours per acre in 1958 to 57.4 hours in 1959, a reduction of 37.2 percent. The harvest of wild trout dropped sharply from 117 (19.8 per acre) in 1958 to 35 (5.9 per acre) in 1959. The catch per hour per angler decreased from 0.17 in 1958 to 0.10 in 1959. Of the 35 wild trout creeled, 29 were brown trout and 6 were brook trout. The brown trout caught were 2 to 4 years old (Table 9). Forty-two of the hatchery-reared rainbow trout planted in Devoe Lake were caught in Gamble Creek.

Houghton Creek.--Fishing pressure in 1959 increased 15.2 percent over 1958, but the catch of wild trout decreased by about one half and the index of angling quality fell from 0.20 trout per hour per angler in 1958 to 0.06 in 1959. The age composition of the catch of wild brown trout was similar, percentagewise, to that of the Rifle River (Table 9).

Six of the hatchery-reared rainbow trout planted in Devoe Lake were caught in Houghton Creek.

Fontinalis Creek.--Angling effort on Fontinalis Creek amounted to 82.8 hours per acre, a reduction of 62.7 percent from 1958. The yield dropped from 126.7 trout per acre in 1958 to 35.6 in 1959. The catch of trout per hour per angler dropped from 0.41 in 1958 to 0.30 in 1959. The total catch in 1959 consisted of 24 wild brown and 8 brook trout.

Diversion.--A total of 84 hours of fishing on the Diversion in 1959 yielded one wild brown trout (and 16 hatchery-reared rainbow trout from the spring planting in Devoe Lake). In 1958, 96 hours of fishing resulted in a catch of 14 wild trout. The index of angling quality was 0.13 and 0.04 fish per hour per angler in 1958 and 1959, respectively.

Brown Trout Creek.--Twenty-eight anglers fished this stream for 34.0 hours in 1959 and failed to catch a trout. (In 1958 only one trout was caught after 21.5 hours of fishing by 20 fishermen.)

All streams.--The quality of stream fishing in the Area was comparatively poor in 1959. Except for Houghton and Brown Trout creeks, all streams were subjected to less fishing pressure than in 1958, and every stream yielded fewer wild trout than in 1958. The quality of fishing for wild fish dropped significantly ($p = 0.05$) from 0.15 fish per hour per angler in 1958 to 0.06 in 1959. The contrast between 1958 and 1959 was intensified by the comparatively large harvest of trout from the streams during 1958.

Hunting

A summary of the 1959 hunting pressure and success is presented in Table 10. The decline in hunting pressure during the small-game season, which started in 1958, continued in 1959. Only 623 permits were issued for 1,736 hours of hunting (455 fewer hours than in 1958). Eighty-three grouse were shot, which represents a drop of 18 birds from last year's total kill--commensurate, perhaps, with the drop in hunting pressure. Other small game shot on the Area included 36 woodcock, 17 squirrels, 16 ducks, 5 cottontails, 3 porcupines, 2 raccoons, 1 red fox, and 1 snowshoe hare.

Hunting pressaure during the deer seasons was similar to that of 1958 but the kill was much higher. The total legal kill of deer was 94, of which 4 were bagged during the archery season. This was the second-highest total kill in 15 years of public hunting on the Area. In addition, 14 unclaimed deer were found on the Area, making a total of 108 deer known to have been shot in 1959. During the gun season the harvest of bucks was at the rate of six per square mile. Including the kill by 211 special-permit holders, deer were taken at the rate of 15 per square mile. Forty-six percent of the total buck kill was in the 1 1/2-year age

Table 10.--Summary of hunting and trapping activities on the Rifle River Area in 1959

Season and game species	Number of permits	Hunting hours, or trap nights	Animals harvested
HUNTING			
Small game	623	1,736	..
Ruffed grouse	...	.....	83
Woodcock	...	.....	36
Ducks	...	.....	16
Cottontails	...	.....	5
Snowshoe hare	...	.....	1
Squirrels	...	.....	17
Raccoons	...	.....	2
Red fox	...	.....	1
Porcupines	...	.....	3
Deer[1]			
Gun	2,209	10,658	90
Archery	638	2,838	4
TRAPPING	37	1,073	..
Muskrat	...	.....	40
Mink	...	.....	14
Otter	...	.....	2
Beaver	...	.....	4
Raccoon	...	.....	1

[1] In addition to the legal kill shown, 14 unclaimed deer were found on the Area.

group; the oldest buck was 4 1/2 years old. Average deer weights were lighter this year than in 1958. Adult bucks averaged 5 pounds less and adult does 2 pounds less than in 1958. Weights ranged from a 33-pound doe fawn to a 145-pound buck.

Trapping

Table 10 also gives a summary of trapping activities on the Area in 1959. Five trappers used the 37 daily permits issued and trapped for 1,073 trap-nights. Less than half as many muskrats were taken in 1959 (40) as in 1958 (91) but the numbers of other animals taken were about the same both years, with the exception of the two otter. These were the first otter trapped on the Area since 1952.

Miscellaneous Area activities in 1959

Research work on the lakes and streams of the Rifle River Area in 1959 is summarized as follows:

(1) Experiments with wintertime circulation of a lake by means of compressed air were continued in 1959. Following some exploratory work on Spring Lake in 1958, the air conductor was laid on the bottom of Loon Lake and operated from December 31, 1958 to April 1, 1959. Data were collected on water temperatures, oxygen, carbon dioxide, total hardness, bottom fauna, and fish movements. The failure to maintain an adequate oxygen level with this set-up prompted a modification of our technique for the following winter (1959-1960). On December 8, the air conductor was re-laid in Loon Lake but floated at a depth of 5 feet and the effects noted.

(2) Observations on oxygen content were made frequently on Area lakes and ponds during the winter months. Some fish mortality was observed in Loon and Teal lakes, and East Pond. Oxygen depletion also was evident in many parts of Spring Lake.

(3) A 1,600-foot seine was used in Dollar Lake by a crew from the Lake and Stream Improvement Section in an attempt to remove three-fourths of the small bluegills. The object of this work was to improve the rate of growth of bluegills and increase the survival of young largemouth bass. All fish returned to the lake were marked so that estimates of population size and exploitation rates could be made.

(4) Experimental fish plantings were made in Devoe Lake (rainbow trout), Gamble Creek (fall plant of fingerling brown trout), and Spring Lake (fingerling pike, adult crappies, and redbelly dace) in addition to the regular trout plantings in the Rifle River.

(5) Periodic seine hauls were made in Devoe and North lakes throughout the summer and fall to ascertain the variability associated with catches of bass fingerlings by this gear, and determine the success of bass spawning.

(6) Small traps were operated in the outlets of Loon and Spring lakes in the spring to observe fish movements.

(7) Frequent spawning observations were made on redear sunfish in Devil's Wash Basin and collections of fingerlings were made for stomach analyses.

(8) Seasonal bottom fauna collections were made in Houghton Creek near Rose City as a follow-up to previous studies on this stream.

(9) Estimates of the fall population of brown trout were made for the Rifle River and Gamble Creek within the Area, and three sections of Houghton Creek outside the Area, by electrofishing.

(10) Population sampling stations on the Rifle River and its tributaries outside the Area (north of M-55), that have been sampled in previous years, were sampled in the fall.

(11) The ammocoete population in Gamble Creek was sampled in August in search of sea lamprey ammocoetes.

(12) A paper on the results of our experiments with the wintertime use of compressed air in Spring and Loon lakes was written and presented at the Midwest Wildlife Conference in December at Minneapolis (presentation by F. F. Hooper).

Activities by Game Division personnel are summarized as follows:

(1) Foxes were tracked in January by field parties under the direction of R. D. Schofield, to locate previously marked carcasses of unclaimed deer.

(2) W. L. Palmer continued his analysis of vegetation in the vicinity of drumming logs used by ruffed grouse.

(3) Grouse census lines were run in December for population estimates by the staff at the Houghton Lake Wildlife Experiment Station.

(4) L. C. Ruch supervised the collection of hunting data during the deer season in November, assisted for a few days by W. C. Ryder.

(5) One local man (Dow Mason) was hired by the Game Division to help collect hunting information in October.

(6) A share-cropping agreement was concluded with a neighboring landowner by the District Game Biologist whereby one new food patch near Spring Lake and the former sites near Teal Lake and the 'Ranch' bridge over the Rifle River were cultivated.

Activities related to the management of the Area included the following:

(1) A 12 x 14-foot addition was built onto the Checking Station to increase office space in the winter months.

(2) The bridge over Skunk Creek was replaced with a large culvert.

(3) The damaging flood in May resulted in considerable work to rebuild the road beds through the swamps. Area personnel were assisted by additional Fish Division personnel and equipment.

(4) The footbridge over the Rifle River was relocated following the flood, by a crew of prison inmates, under the supervision of R. G. Strong.

(5) Location markers for the Hoad shelters in Devoe Lake were reinstalled in the spring for the benefit of anglers.

(6) An abandoned road leading to an exit on the east side of the Area was rebuilt and a new gate installed with the aid of prison inmates.

(7) The cabin located near the outlet of Devoe Lake (Ned's Cabin) was partly dismantled and burned in March, at the request of the Lansing office.

(8) Proposals for changing the names of several of the Area lakes and streams were prepared and presented to the Ogemaw County Board of Supervisors in June. After a favorable vote, they were forwarded to the State Board on Geographic Names for consideration. Eventually they will also have to be approved by Federal officials before taking effect.

(9) The second annual Rifle River canoe race, sponsored by the Midwest International Canoe Racing Association and business men in the two counties bordering the river, took place on July 5. The event started in the Area near the ranch house.

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