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MICHIGAN DEPARTMENT OF CONSERVATION
COOPERATING WITH THE
UNIVERSITY OF MICHIGAN

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June 23, 1959

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ANN ARBOR, MICHIGAN

Report No. 1575

THE FOURTEENTH ANNUAL REPORT ON THE RIFLE RIVER AREA,
OGEMAW COUNTY, 1958

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. It was purchased by the Department of Conservation in 1944 and first opened to public recreational use in 1945. Six lakes, a number of ponds, and approximately 9.5 miles of stream are within its fenced boundary (Fig. 1). 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.

In 1958, 25,983 permits were issued to visitors, the largest number issued in the 14 years of public use of the Area.¹ Of these permits, 17,135 (66.0 percent) were for sightseeing, 5,232 (20.1 percent) for fishing, 3,511 (13.5 percent) for hunting, and 105 (0.4 percent) for trapping. This fourteenth annual report on recreational use of the Area presents primarily the

¹The table on the back of Figure 1 presents a 14-year summary of public use of the Rifle River Area. Some of the statistics are at variance with those which have appeared in previous annual reports due to systematic errors, mostly because of different interpretations of data by different authors. For example, in 1946 210 permits were issued for picnickers but these were not tabulated as sightseeing permits (as they were subsequently). In some years froggers were included as fishermen and in other years as sightseers. The interpretation of data for anglers who received one fishing permit but fished in several bodies of water was another source of error; the total number of fishing trips exceeds the total number of fishing permits but for some years these values were interchanged erroneously. These and other discrepancies have been reviewed and the data in the table have been standardized and corrected.

MICHIGAN DEPARTMENT OF CONSERVATION
 FISH DIVISION
RIFLE RIVER AREA
 OGE MAW COUNTY

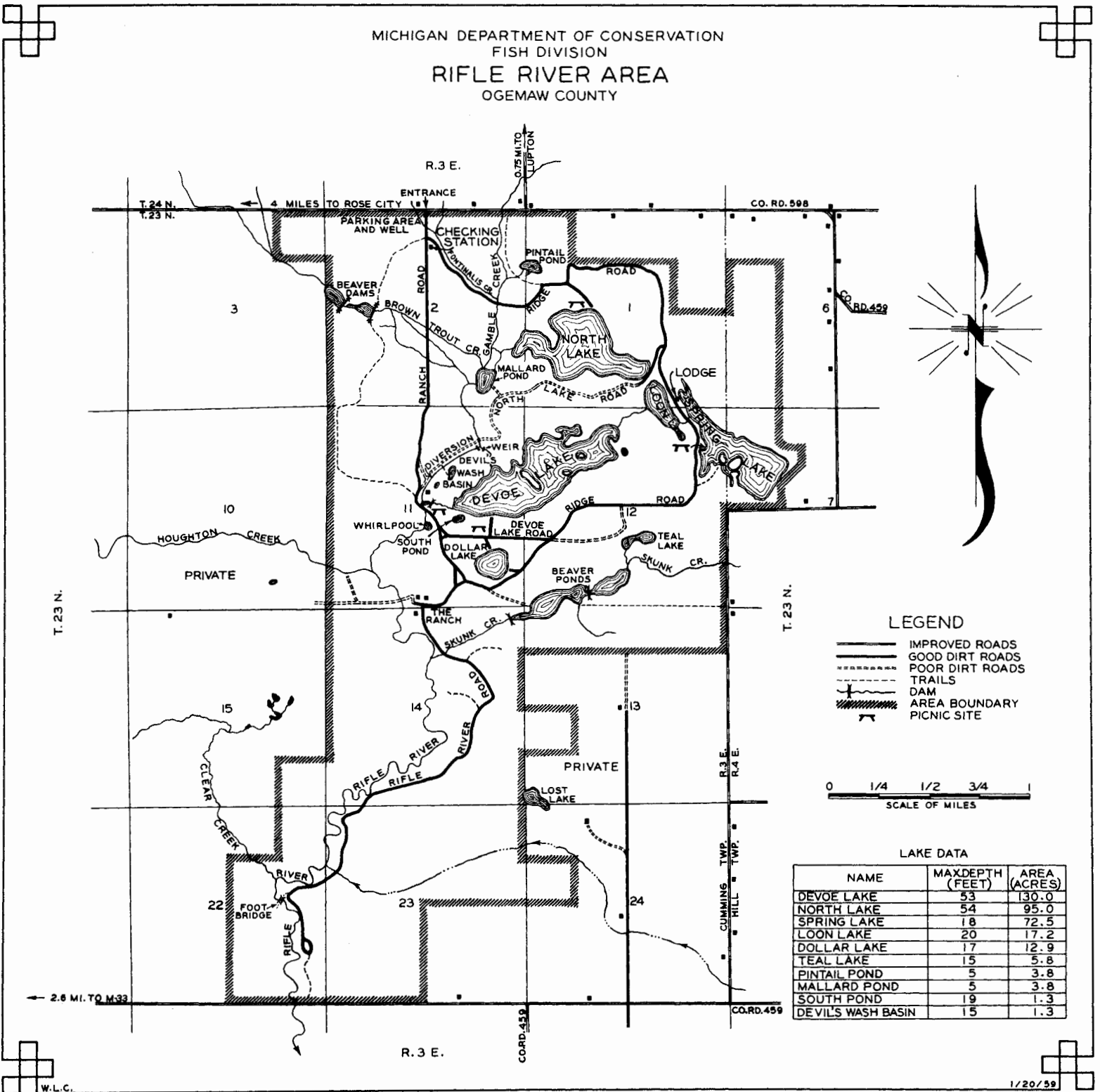


Figure 1

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				Total
	Sight-seeing	Fish-ing	Hunt-ing	Trap-ping	
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.

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 addition to the fishing and hunting activities reported, a few visitors were interested in frogs and turtles. A total of 88.5 pounds of frogs were harvested (92 percent from Spring Lake) and one 10-pound snapping turtle was caught.

Anglers from 46 of Michigan's 83 counties fished in the Rifle River Area in 1958. Eighty-three 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. Fifty-five percent of the 160 out-of-state anglers were from Ohio.

A. W. DeClaire, C. J. Kohn, G. Smith, Jr., and K. R. Sammons assisted in the collection of data. K. G. Fukano handled the processing of stream data for IBM tabulation by the Department's Administrative Services. The junior author prepared the section on stream fishing; the rest of the report was prepared by the senior author. Portions of the hunting data were provided by W. L. Palmer and L. C. Ruch of the Game Division.

Stream fishing

During the 1958 trout season 3,535 resident anglers representing 41 Michigan counties and 98 nonresident anglers fished the streams of the Rifle River Area. The over-all catch statistics showed that the six trout streams in the Area, which comprise approximately 33.9 acres, were fished for 9,444 hours by 3,631 fishermen who spent an average of 2.6 hours fishing per trip (Table 1).² Angling pressure on individual streams varied from a low of 8 to a high of 367 hours per acre and, for all waters combined, angling effort amounted to 279 hours per acre.

²Skunk Creek was excluded from discussion in this report as it was classified as a non-trout stream and of negligible fishing value. As a matter of record, two anglers fished this small tributary of the Rifle River for 4 hours in 1958, and caught no fish.

Table 1.--A summary of angling on the trout streams of the Rifle River Area in 1958

Stream	Area (acres)	Number of anglers	Hours of fishing	Fish caught							
				Wild trout		Hatchery trout		Other species		Total wild fish	
				Number	Pounds	Number	Pounds	Number	Pounds	Number	Pounds
Rifle River	22.8	3,075	8,374.0	1,531	686.2	658	179.3	110	65.2	1,641	751.4
Gamble Creek	5.9	271	539.5	117	61.2	58	16.3	2	0.3	119	61.6
Houghton Creek	0.9	128	213.0	47	18.7	6	1.8	6	6.0	53	24.7
Fontinalis Creek	0.9	79	200.0	114	33.1	16	4.3	...	...	114	33.1
Diversion	0.8	58	96.0	14	4.6	1	0.2	...	...	14	4.6
Brown Trout Creek	2.6	20	21.5	1	0.3	...	...	...	...	1	0.3
Area totals	33.9	3,631	9,444.0	1,824	804.1	739	201.9	118	71.5	1,942	875.7

Fishermen caught 1,824 wild trout (1,799 brown and 25 brook trout) that weighed 804.1 pounds. This is equivalent to 53.8 trout or 23.7 pounds of trout per acre (Tables 2 and 3). Angling quality for wild trout on the various streams ranged from 0.10 to 0.41 fish per hour per angler. Over-all angling quality was 0.15 fish per hour per angler. About 20 percent of the anglers were successful in catching at least one wild trout (one out of every five angler-trips).

Nearly 68 percent of the fishermen used natural baits such as worms, minnows, insects, etc., while 21 percent used flies and other artificial lures. A relatively small percentage of anglers used both artificial and natural lures on the same fishing trip.

The kinds of fishing rods used by anglers (after June 6, when records on type of rod used were begun) were classified into 4 categories: fly rod; casting rod; spinning rod; and cane pole, or other types with no reel attached. Of the 1,784 fishermen censused, 67.8, 23.9, and 6.1 percent used fly rods, spinning rods, and casting rods, respectively; the remainder used either a cane pole or two kinds of fishing rods.

Rifle River.--Fishing on the Rifle River was far more extensive than on other Area streams; it accounted for 84.7 percent of the total fishing trips, 88.7 percent of the total hours, and 83.9 percent of the wild trout caught. Consequently, the over-all trends in the Area's stream fishing were influenced primarily by the results of fishing in the Rifle River. Angling pressure on the Rifle was equivalent to 367 hours per acre--the result of 3,075 angler-trips and 8,374 hours of fishing. Fishermen harvested 1,531 wild trout (1,517 brown and 14 brook). The average total length of wild brown trout (based on measurement of the entire catch) was 10.4 inches and the mean weight was 0.45 pound.

Table 2.--The species composition of the catch (by number and percentage of the total) from streams in the Rifle River Area in 1958

Kind of fish	Stream						Total number of fish	Percentage of total catch
	Rifle River	Gamble Creek	Houghton Creek	Fontinalis Creek	Diversion	Brown Trout Creek		
Brown trout								
Wild	1,517	112	47	109	13	1	1,799	67.2
Hatchery	501	57	6	16	1	...	581	21.8
Rainbow trout								
Hatchery	155	1	...	...	...	...	156	5.8
Brook trout								
Wild	14	5	...	5	1	...	25	0.9
Hatchery	2	...	...	...	...	...	2	0.1
White sucker	65	...	6	...	...	...	71	2.6
Yellow perch	24	1	...	...	...	...	25	0.9
Rock bass	15	1	...	...	...	...	16	0.5
Others ¹	6	...	...	...	...	...	6	0.2
Totals	2,299	177	59	130	15	1	2,681	...
Percentage of total catch	85.8	6.6	2.2	4.8	0.5	0.1	...	...

¹"Others" include 2 bluegills, 2 pumpkinseeds, 1 longear sunfish, and 1 black bullhead.

Table 3.--A summary of angling quality for wild trout on streams of
the Rifle River Area in 1958

Stream	Trout caught per acre of stream		Catch per hour per angler	Percentage of fishermen successful
	Number	Pounds		
Rifle River	67.1	30.1	0.14	19.5
Gamble Creek	19.8	10.4	0.17	21.0
Houghton Creek	52.2	20.8	0.20	17.2
Fontinalis Creek	126.7	36.8	0.41	44.3
Diversion	17.5	5.8	0.13	12.1
Brown Trout Creek	0.4	0.1	0.10	5.0
Totals	53.8	23.7	0.15	19.8

A total of 658 hatchery trout entered the catch. Ninety-two percent of these trout were planted in the Rifle River in 1958, and 8 percent were from earlier plantings. One thousand legal-length brown trout were stocked in the River in lots of 250 fish each, at intervals of approximately one month during May, June, July, and August. Fishermen caught 465 of these fish (46.5 percent). Of 100 legal-length rainbow trout planted on May 19 and 100 on June 18, 70 percent (140 fish) were caught.

In addition to trout, six other species of fish entered the catch (Table 2). With the exception of white suckers, most of these fish were captured in the "upper" Rifle River (between Devoe Lake and the mouth of Houghton Creek).³

Angling pressure increased 55 percent on the Rifle River in 1958, as compared to 1957. The "lower" Rifle River (between the mouth of Houghton Creek and the south boundary of the Area) absorbed the increased fishing pressure while the "upper" Rifle River showed a decline of 98 angler-trips and 205 hours. In comparing the number of angler-trips to the lower Rifle River on a weekly basis in 1957 and 1958, the greatest disparity occurred during the first three weeks of the season. By the end of the first, second, and third weeks of the 1958 season, angling pressure (trips) was ahead of 1957 by 263, 169, and 141 percent, respectively. This marked difference is explained at least in part by the fact that the problem of access to the Area due to road construction curtailed early season fishing in 1957. Perhaps a more signal difference between 1957 and 1958 was the 93-percent increase in the catch of wild trout in the latter year (a rise from 34.7 to 67.1 fish per acre). As a result, angling quality improved significantly from 0.11 fish per hour per angler in 1957 to 0.14 in 1958 ($p = 0.05$).

³The fishing statistics for the "Whirlpool," a small, oxbow-like pond joining the upper Rifle River are not presented in the tables. In 51 fishing trips to this pond, anglers fished 85.5 hours and caught 14 fish (10 suckers and 4 northern pike) that weighed 23.8 pounds.

Unlike the previous years when stream levels tended to be high in spring and later declined to a base flow in late summer, stream levels in 1958 remained extremely low throughout the spring and summer. Under these conditions trout fishing is supposedly more difficult but the comparatively larger catch of trout did not bear this out.

In 3,075 angler-trips to the Rifle River 66 percent of the fishermen used worms for bait and caught 61 percent of the wild trout. Flies were employed on 20 percent of the fishing trips and accounted for 28 percent of the wild trout creeled.

A post-season population study on the Rifle River provided an estimate of 2,115 legal-length wild brown trout (92.8 per acre). Fishermen harvested 1,517 wild brown trout (66.5 fish per acre). The ratio of harvest to residual population was about 1:1.5. Thus for every two wild brown trout harvested by fishermen three trout were present at the close of the season. A similar ratio in 1957 was 1:3. In spite of an increased rate of exploitation in 1958, the residual population of both legal- and sublegal-length brown trout closely approximated that of 1957.

Gamble Creek.--Although Gamble Creek is the second-largest stream in the Area in both surface area and average width, it is (next to Brown Trout Creek) the most lightly fished stream. Angling pressure in 1958 was 91 hours per acre. The catch from "lower" Gamble Creek (between the mouth and Ridgeroad Bridge) consisted of 73 wild and 22 hatchery brown trout, 5 wild brook trout, 1 hatchery rainbow trout, 1 yellow perch, and 1 rock bass. Anglers caught 39 wild and 35 hatchery brown trout from "upper" Gamble Creek (between Ridgeroad Bridge and the north boundary of the Area).

The increased catch of hatchery brown trout in 1958 over that of 1957 was almost entirely attributable to the planting of 300 legal-length brown

trout (in three groups of 100 fish each, in May, July, and August) near Ridgeroad Bridge in 1958, of which 57 (19 percent) were harvested by anglers.

Although the harvest of wild trout per acre increased from 10.8 in 1957 to 19.8 in 1958, the greater angling effort in the latter year accounted for this gain and the quality of angling remained unchanged at 0.17 fish per hour per angler for both years.

After the close of the trout season, a population study on Gamble Creek between the Diversion and the north boundary of the Area showed a sharp difference in size structure of the population below and above Mallard Pond. Of the total estimated population of wild brown trout below Mallard Pond, about 72 percent were legal-length trout and 28 percent were sublegal fish; of the sublegal trout only about 5 percent were young-of-the-year fish (2-4 inches). There is little, if any, reproduction of brown trout in this portion of the stream. Above Mallard Pond young-of-the-year wild brown trout made up about 78 percent of the population and trout 7.0 inches long or longer comprised approximately 9 percent.

The average length of a fishing trip on Gamble Creek was 2 hours and the use of worms and flies was in the ratio of 3 to 1, respectively.

Houghton Creek.--Angling pressure on Houghton Creek increased nearly 78 percent, from 133 hours per acre in 1957 to 237 hours per acre in 1958. Likewise, there was an increase of 147 percent in the total yield of wild trout (19 in 1957; 47 in 1958). However the quality of angling remained unchanged for both years at 0.20 fish per hour per angler.

Fishermen showed a preference for worms over flies in the ratio of 5 to 1. Houghton Creek is somewhat more suitable for worm than for fly fishing.

Fontinalis Creek.--Fishermen spent 200 hours fishing on the 4,679 feet of the stream which lie within the Area. This is equal to about 222 hours per acre. The catch of wild trout was 109 brown and 5 brook trout (compared to 82 brown and 8 brook trout caught in 164 hours of angling in 1957). The average catch of wild trout per hour per angler declined from 0.48 in 1957 to 0.41 in 1958. In addition to wild trout, 16 hatchery brown trout were caught. These fish evidently moved out of Gamble Creek, where 300 were stocked, into Fontinalis Creek. (The combined yield from both streams amounted to 24.3 percent of the fish stocked.)

Because the stream has an average width of only 8.7 feet and flows through an area of heavy ground cover, most of the fishing was done from the bank and worms were used almost exclusively for bait. The average time spent fishing was 2.5 hours per trip.

Diversion.--The Diversion and Brown Trout Creek, were the only streams in the Area that showed a reduction in fishing pressure from 1957. Fishing (primarily with worms) in the Diversion involved 58 angler-trips for a total of 96 hours or about 120 hours per acre. Fishermen caught 13 wild brown and 1 brook trout (17.5 fish per acre). (In 1957, a pressure of 151 hours per acre in the Diversion yielded 13 wild brown trout.) The catch per hour declined from 0.13 in 1957 to 0.10 in 1958.

On October 15-16, a population study showed an estimated 166 sublegal and 115 legal-length wild brown trout in the Diversion. The population level, particularly of mature trout, at this time of the year, however, may not be representative of that found during the spring and summer months of the fishing season because there is some movement of fish in the fall through the Diversion from the Rifle River.

Brown Trout Creek.--Comparatively little fishing was done in this small creek. In 20 trips (21.5 hours of fishing) only 1 wild brown trout

was caught. In 1957, 7 wild brown trout were creeled in 31 angler-trips (61 hours).

All streams.--In general, trout stream fishing in the Area in 1958 showed an increase of about 34 percent in number of anglers and 51 percent in fishing hours over 1957. Fishing intensity in 1958 was approximately 279 hours per acre compared to 185 hours per acre in 1957. With the greater fishing effort in 1958, the yield of wild trout rose from 984 in 1957 to 1,824 in 1958 (or from 29.0 to 53.8 trout per acre). The over-all quality of angling improved significantly from 0.13 to 0.15 trout per hour per angler ($p = 0.05$).

Lake fishing

In many respects the pattern of fishing activity on eight of the Rifle River Area lakes and ponds in 1958 was remarkably similar to that of 1957. The total number of fishing trips (2,038) and hours of fishing (5,528), as shown in Table 4, differ by only 2 trips and 22 hours from the 1957 totals. Likewise, the number of fishing hours per acre on Devil's Wash Basin, Devoe, Loon, Spring, and North lakes closely approximated the values for 1957. The percentage of anglers who caught at least one fish (37) was identical to that of 1957. However, the total catch of 4,323 fish (825.7 pounds) in 1958 was smaller than the 1957 catch of 4,906 (1,006.0 pounds). Dollar Lake had the greatest fishing pressure (115 hours per acre) and produced the largest yield of fish (28.1 pounds per acre).

The species composition of the total catch from the various lakes (Table 5) bears a close resemblance to the catches of 1957 and earlier years. Bluegills again comprised over half of the total catch (52.5 percent), followed by perch (17.2 percent), and pumpkinseeds (12.3 percent). Thirteen

Table 4.--The fishing pressure, yield, and fishing quality on eight Rifle River Area lakes in 1958

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	722	5.6	2,219	17.1	702	5.4	205.0	1.6	0.27	24
North	305	3.2	830	8.7	44	0.5	35.4	0.4	0.04	8
Dollar	580	44.9	1,484	115.0	2,164	167.8	361.9	28.1	1.49	58
Loon	318	18.5	845	49.1	1,346	78.2	208.2	12.1	1.64	62
South Pond	65	50.0	82	3.1	64	49.2	13.8	10.6	0.78	25
Devil's Wash Basin	9	6.9	8	6.2	3	2.3	1.4	1.1	0.22	22
Spring	11	0.2	12	0.2	0	...	...	...	....	..
Teal	28	4.8	48	8.3	0	...	...	...	....	..
Totals	2,038	6.1	5,528	16.5	4,323	12.9	825.7	2.5	0.81	37

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

Table 5.--The species composition by number (N) and percentage (P) of the catch from six lakes on the Rifle River Area in 1958¹

Species	Lake										Total number of fish	Percentage of Area total
	Devoe		North		Dollar		Loon		South Pond			
	N	P	N	P	N	P	N	P	N	P		
Bluegill	32	4.6	7	15.9	1,875	86.6	308	22.9	46	71.9	2,268	52.5
Yellow perch	437	62.2	7	15.9	92	4.3	205	15.2	1	1.5	742	17.2
Pumpkinseed	5	1.0	...	...	27	1.2	497	36.9	1	1.5	530	12.3
Bullheads ²	1	tr	...	...	35	1.6	188	14.0	...	...	224	5.2
Rock bass	67	9.5	2	4.5	17	0.8	45	3.3	5	7.8	136	3.1
Largemouth bass	13	1.9	2	4.5	58	2.7	9	0.1	7	11.0	89	2.0
Hybrid sunfish ³	...	...	...	...	23	1.1	62	4.6	...	...	85	2.0
Black crappie	37	5.2	2	4.5	15	0.7	31	2.3	...	...	85	2.0
Smallmouth bass	57	8.1	2	4.5	...	...	...	...	...	...	59	1.4
Brown trout	34	4.8	...	...	...	...	...	...	...	...	34	0.8
Redear sunfish	...	...	...	...	22	1.0	...	...	...	...	25 ⁴	0.5
White sucker	17	2.4	...	...	...	...	1	tr	...	...	18	tr
Smelt	...	...	15	34.3	...	...	...	...	...	...	15	tr
Northern pike	...	...	7	15.9	...	...	...	...	...	...	7	tr
Longear sunfish	2	tr	...	...	...	...	...	...	4	6.3	6	tr
Totals	702	...	44	...	2,164	...	1,346	...	64	...	4,323 ⁴	...

¹No fish were caught in Spring and Teal lakes. In the body of the table, tr = less than 0.5 percent.

²Black bullhead and brown bullhead.

³Bluegill x pumpkinseed.

⁴Three redear sunfish caught in Devil's Wash Basin are included in this total.

other kinds of fish made up the remaining 18 percent of the total catch.⁴ No fish were caught in Spring or Teal lakes. (Spring Lake was treated with toxaphene in July to remove the remnant population of bullheads and minnows which had survived a winterkill in 1956.) The presence of redear sunfish in Devil's Wash Basin resulted from a transfer of 25 adults from Dollar Lake in the spring of 1958, of which 3 were caught by anglers.

A discussion of the fishing results for five of the eight lakes follows. The scale-sampling procedure in 1958 was similar to that followed in 1956 and 1957. Scale samples were taken from 582 fish caught by anglers and, except for two pumpkinseeds, all fish not scale-sampled were measured. The measured fish were grouped into length-frequency intervals of one-half inch. Ages were assigned according to the percentage of the different age groups in similar size groups of scale-sampled fish, enabling estimates to be made of the total contribution of each year class to the catches of several species. (Scale samples collected while netting Dollar and Loon lakes in the spring also were used as a basis for assigning ages to fish caught in the first half of the summer.)

As in 1957, an intensive netting program was carried out in Dollar and Loon lakes before the opening of the bass season. Many fish were fin-clipped in an effort to estimate the size of the respective fish populations. Large numbers of fish in Dollar Lake also were marked that had been captured in two seine hauls with a 1,600-foot seine by the Lake and Stream Improvement Section in April. In Loon Lake, fish captured by electrofishing were marked in addition to those that were netted. Exploitation rates for these two lakes are presented.

⁴Not shown in the tables is the catch of four anglers who fished East Pond, a small pond adjacent to Devoe Lake. Seventeen perch weighing 2.9 pounds were caught in four hours of fishing in September.

For 75 percent (1,532) of the fishing trips, data were obtained on the type of fishing rod used by lake fishermen. As indicated by the results shown below, spinning rods were used oftener than any other kind of rod:

<u>Type of rod</u>	<u>Number of fishermen</u>	<u>Per- cent- age</u>
Spinning	603	39.4
Casting	455	29.7
Fly	258	16.8
Cane pole	109	7.1
Combination	107	7.0

For the purpose of this report, fishing records for lakes and ponds are divided by seasons as follows: spring, open-water angling prior to the opening of the bass season (June 21, 1958); summer, June 21 to Labor Day, inclusive; fall, open-water fishing after Labor Day; and winter, fishing through the ice.

Devoe Lake.--The 722 anglers who fished this lake for 2,219 hours in 1958 caught 702 fish that weighed 205 pounds (Table 4). On a per-acre basis, the fishing pressure and yield were small (17.1 hours and 1.6 pounds, respectively)--typical of the past history of this 130-acre lake. Most (459) of the fishing trips were during the summer months.

This lake gets more attention from anglers in the spring than any other lake on the Area, presumably because of the presence of trout. Thirty-two of the 34 brown trout caught in 1958 were captured in the spring before the opening of the bass season. Three of the trout bore lamprey scars. Rainbow trout were absent from Devoe Lake catches for the first time since 1946, probably because none have been planted in this lake since 1955. Rainbow trout plantings are scheduled to be resumed in 1959.

Perch comprised 62.2 percent of the total catch; their average length was 6.3 inches. As shown in Table 6, most perch caught (86 percent) were under 4 years of age and more than half were from the 1955 hatch. The 1953 and 1954 year classes upheld the fishery in 1956 and 1957 but only 54 perch caught in 1958 were from these hatches (age-groups IV and V).

Table 6 also presents the estimated age composition of the catches of smallmouth bass, rock bass, and black crappies. Fifty-seven smallmouth bass were caught in 1958 (same as in 1957), 33 of which were 3 years old. The distribution of age groups in the smallmouth bass catch followed a pattern similar to that observed in catches for the past 14 years. Few bass older than 4 years have been caught in Devoe Lake (only three in 1958). Age-groups III and V dominated the catches of rock bass whereas about half of the crappies caught were 4 years old. (This 1954 year class of crappies also constituted 50 percent of the 1957 catch.)

Forty-one percent of the fishing trips involved still-fishing with worms only, and perch dominated the catches. Fifty-one of the 57 smallmouth bass caught were taken on worms or worms used in combination with other lures. The relatively few anglers who fished only with artificial lures had poor success (9 fish in 174 hours of fishing). Trollers accounted for 32 of the 34 trout caught.

In addition to 2,219 hours of public fishing, Area personnel still-fished for 200 hours as part of an experiment to evaluate the effect of the presence of Hoad shelters on fishing success. Of 606 fish caught, 603 weighing 58.2 pounds were removed from the lake. Thus the total harvest in 1958 from Devoe Lake was 1,305 fish which weighed 263.2 pounds.⁵ The

⁵Three smallmouth bass weighing 1.6 pounds also were caught but were marked and returned to the lake.

Table 6.--The estimated age composition of the catch of four species of fish from Devoe Lake in 1958

(N = number; P = percentage)

Age group	Year class	Species							
		Yellow perch		Rock bass		Black crappie		Smallmouth bass	
		N	P	N	P	N	P	N	P
I	1957	2	0.5	...	...	1	2.7	...	...
II	1956	132	30.2	...	...	1	2.7	10	17.5
III	1955	242	55.4	22	32.8	9	24.3	33	57.9
IV	1954	48	11.0	17	25.4	18	48.7	11	19.3
V	1953	6	1.3	22	32.8	5	13.5	1	1.8
VI	1952	7	1.6	2	3.0	1	2.7	...	...
VII	1951	...	...	...	...	1	2.7	...	...
VIII	1950	...	...	1	1.5	1	2.7	2	3.5
IX	1949	...	...	3	4.5	...	...	...	...
Totals	...	437	...	67	...	37	...	57	...

numbers of fish removed from the lake during this experiment included 546 perch, 20 smallmouth bass, 16 rock bass, 12 bluegills, 6 pumpkinseeds, 2 black crappies, and 1 northern pike.

North Lake.--Only 44 fish were caught in North Lake in 830 hours of fishing in 1958; the total harvest amounted to 0.4 pound per acre (Table 4). Eight species of fish were caught (Table 5). Fifteen smelt (a species first caught in this lake in 1957) were taken through the ice in 1958. Only two smallmouth bass were caught. In 1956 there was reason to believe that the 1953 year class of smallmouth bass might be relatively strong because 31 of 37 bass caught by anglers were from this hatch; however only three were caught in 1957 and none in 1958. More than half of the fishing trips to this lake were during the summer months. The fishing method used most frequently was trolling with minnows (272 hours), and trollers caught six of the seven pike and one of the two largemouth bass caught in 1958.

Of 15,000 fin-clipped 1.5-inch bluegills and 8,000 3-inch largemouth bass planted in North Lake in 1954 none have been caught to date, with the possible exception of one bass in 1957 (a fish with a malformed fin).

Dollar Lake.--Fishing pressure on this 12.9-acre lake, annually one of the most heavily fished lakes on the Area, amounted to 115 hours per acre (Table 4), an increase of 34 percent over last year. In 580 fishing trips, 1,484 anglers caught 2,164 fish weighing 361.9 pounds, which is equivalent to 28.1 pounds of fish per acre. Fifty-eight percent of the trips were successful. Bluegills (1,875 caught) dominated the catch of nine kinds of fish, and comprised 86.6 percent of the total (Table 5). The next most abundant species in the catch were perch (92) and largemouth bass (58). The numbers of perch, crappies, and rock bass caught in 1958 were similar to those of 1957. Pronounced increases were noted for bass, redear sunfish, brown bullheads, and bluegills in 1958, but fewer pumpkinseeds and hybrid sunfish were caught.

The estimated age composition of the catches of four species is shown in Table 7. During 1956 and 1957 bluegills from the 1952 year class contributed about 80 percent of the fish to the bluegill catch, and this hatch again made a sizeable contribution to the creel in 1958 as 6-year-olds (713 fish); however, the 1953 year class (age-group V) predominated in the catch in 1958 (about 51 percent of the total). Bluegills from 3 to 7 years of age were caught and the mean length was 6.2 inches (6.3 inches in 1957). Four-year-old fish were most numerous in the catches of bass and pumpkinseeds, whereas age groups II and IV dominated the perch catch.

As usual, most fishing on this lake was done in the summer months (425 trips) and still-fishermen who fished with worms dominated the fishing. The 68 anglers who cast artificial lures caught 19 bass but most bass were caught by still-fishermen. Of the 22 redears, a relative "newcomer" to the lake, 21 were taken on worms--the other on a fly. Most of the bluegills, as usual, were caught on worms.

The exploitation rates of fish in Dollar Lake by angling between May 1-December 31 are shown in Table 8, expressed as the percentage of fin-clipped fish caught by anglers. Nearly twice as many fish were marked in 1958 (2,441) than in 1957 (1,348) because of the use of a large seine and other nets. On the basis of returns of clipped fish, perch were more heavily exploited (48.5 percent) than any other species (this percentage was 44.3 in 1957). About one-third of the available bluegills, rock bass, brown bullheads, and largemouth bass were caught (range 33.2-35.5 percent). As in 1957, crappies were least exploited (6.4 percent). For most species the percentages were higher this year than last year, reflecting the greater fishing pressure and yield in 1958.

Table 7.--The estimated age composition of the catch of four species of fish
from Dollar Lake in 1958

(N = number; P = percentage)

Age group	Year class	Species							
		Bluegill		Largemouth bass		Yellow perch		Pumpkinseed	
		N	P	N	P	N	P	N	P
II	1956	...	...	...	...	55	59.8	...	...
III	1955	61	3.3	6	10.3	8	8.7	3	11.1
IV	1954	122	6.5	33	56.9	23	25.0	18	66.7
V	1953	954	50.9	16	27.7	6	6.5	4	14.8
VI	1952	713	38.0	...	...	...	...	2	7.4
VII	1951	25	1.3	1	1.7	...	...	...	...
IX	1949	...	...	1	1.7	...	...	...	...
XI	1947	...	...	1	1.7	...	...	...	...
Totals	.....	1,875	...	58	...	92	...	27	...

Table 8.--Exploitation rates of fish by angling in Dollar and Loon lakes in 1958¹

Species	Minimum length of fish marked (inches)	Dollar Lake			Loon Lake		
		Number of fish marked	Number of marked fish caught	Percentage exploitation	Number of fish marked	Number of marked fish caught	Percentage exploitation
Bluegill	5.0	2,441	810	33.2	193	38	19.7
Pumpkinseed	5.0	45	9	20.0	770	96	12.5
Black crappie	7.0	140	9	6.4	45	2	4.4
Largemouth bass	10.0	121	43	35.5	16	2	12.5
Rock bass	5.0	23	8	34.8	53	8	15.1
Yellow perch	7.0	68	33	48.5	52	9	17.3
Hybrid sunfish	5.0	22	5	22.7	65	8	12.3
Brown bullhead	7.0	43	15	34.9	92	1	1.1
Black bullhead	8.0	...	...	....	14	5	35.7
Totals	...	2,903	932	32.1	1,300	169	13.0

¹These rates were computed for the periods May 1-Dec. 31 for Dollar Lake and June 3-Dec. 31 for Loon Lake.

Three species of fish were planted in Dollar Lake in 1954 as fingerlings-- 1,000 redears, 2,000 bluegills, and 2,000 largemouth bass. Two of the redears and five of their progeny were caught in 1957. All 22 redears caught in 1958 were progeny of the 1954 stock (3-year-old fish). A second planting of 1,000 redear fingerlings was made in 1956 but none have been caught to date by anglers. Of the bass and bluegills planted, one of each was caught in 1958.

The fate of the marked bass and bluegill plantings may have been associated with the presence at the time of planting of large numbers of native fish. The large 1952 and 1953 year classes of bluegills were in the lake in 1954 and their presence probably minimized the chances of a successful survival of the hatchery fish. In 1954, too, there was a relatively large population of largemouth bass present (the largest catches of bass by anglers since 1945 occurred in 1954 and 1955) and it is quite possible that the hatchery bass served as food for the native fish. The stocking of additional fish in 1954 undoubtedly intensified the competition for food and space.

Loon Lake.--The catch per hour per angler for Loon Lake (1.64) was best among the Area lakes, but the total catch did not approach that of 1957, when more than 2,100 fish were caught. In 1958, anglers caught only 1,346 fish that weighed 208.2 pounds, in 318 fishing trips (Table 4). More than a third (497) of the fish caught were pumpkinseeds with a mean length of 5.4 inches. Other species numerically important in the catch were bluegills, perch, and bullheads (Table 5). A total of 10 kinds of fish were caught. Fewer bluegills, perch, crappies, and hybrids were caught in 1958 than in 1957, accounting for most of the difference between total annual catches.

The 65-hour drop in fishing pressure in 1958 was partly responsible for the smaller harvest. However, the data in Table 9, which show the age

Table 9.--The estimated age composition of the catch of five species of fish from Loon Lake in 1958¹

(N = number; P = percentage)

Age group	Year class	Species									
		Bluegill		Pumpkinseed		Yellow perch		Black crappie		Hybrid sunfish ²	
		N	P	N	P	N	P	N	P	N	P
I	1957	...	....	...	...	22	10.7	...	...	...	...
II	1956	21	6.8	16	3.2	80	39.0	1	3.2	2	3.2
III	1955	113	36.7	121	24.5	8	3.9	...	...	31	50.0
IV	1954	114	37.0	256	51.8	35	17.1	...	...	24	38.7
V	1953	53	17.2	61	12.3	35	17.1	6	19.4	5	8.1
VI	1952	7	2.3	22	4.4	24	11.7	19	61.3	...	...
VII	1951	...	...	19	3.8	1	0.5	5	16.1	...	...
Totals	....	308	...	495	...	205	...	31	...	62	...

¹Two pumpkinseeds which were not measured are not included in the tables.

²Bluegill x pumpkinseed.

composition of the catch of five species, largely explain the reasons for this decline. In 1956 and 1957 the strong 1952 year class of bluegills contributed heavily to the catch as 4- and 5-year-old fish, but in 1958 only seven bluegills from this hatch were caught. A similar situation prevailed for perch: the 1952 year class contributed only 24 fish to the catch in 1958 whereas in 1957 this number was 148. About half of the perch caught in 1958 were either 1- or 2-year-old fish. Similarly, older crappies (age-groups V and VI) sustained the fishery in 1957 but by 1958 natural mortality and angling probably had reduced the population to the point that fishermen were able to catch only 24 of the fish from these year classes (173 in 1957). Crappies of the 1954, 1955, and 1956 year classes were conspicuously absent from the 1958 creels. Judging from the age composition of the anglers' catches, spawning success and/or survival of crappies has been poor in this lake since 1952. A strong 1954 year class of pumpkinseeds supported the fishery in 1957 and 1958--contributing an estimated 51 percent of the catches of this species in each year. The catches of hybrid sunfish were composed of the same age groups in both 1958 and 1957. The largemouth bass catch was small again in 1958, a situation that has prevailed since the winterkill of 1956.

The exploitation rates of fish in Loon Lake by angling between June 3 and December 31 are shown in Table 8. Of 1,300 fish fin-clipped in May and June, 169 were caught by fishermen. Nearly identical rates of exploitation for pumpkinseeds and rock bass for 1957 and 1958 reflect the similarity in the total catches of these species in the two years. Smaller exploitation rates for bluegills, perch, and hybrid sunfish in 1958 reflect their decline in the total catch. Respective rates of exploitation in 1957 and 1958 for bluegills were 27.9 and 19.7; perch, 34.9 and 17.3; hybrids, 14.6 and 12.3. The percentage of marked crappies and bullheads caught was low during both years.

Most fishing was done in the summer on Loon Lake but there also was a fair amount of ice fishing--more on this lake than any other lake in the Area. Sixty-six hours of fishing through the ice with grubs produced a catch of 189 fish, most of which (78.8 percent) were pumpkinseeds and bluegills. Thirteen of the 31 crappies caught in 1958 were taken through the ice. Most of the summer fishing was by still-fishermen who used worms.

The fate of a 1954 planting of 3,000 each of marked fingerling bluegills and largemouth bass could conceivably have been similar to that postulated for hatchery fish planted in Dollar Lake, except that many could have succumbed during the winterkill of 1956. Loon Lake, too, contained a large population of bluegills spawned in 1952. The best catches of largemouth bass made by anglers in Loon Lake occurred in 1955, indicating the presence of a large native population. No fish from this planting have been caught by anglers to date.

South Pond.--Sixty-five anglers fished this pond for a total of 82 hours and caught 64 fish, 72 percent of which were bluegills. In 1956 and 1957, the 1953 year class dominated the catches but in 1958 nearly all bluegills caught were 4-year-old fish of the 1954 year class. The mean length of bluegills taken was 6.6 inches. Five other species also were caught in this pond (Table 5).

Hunting

A summary of the 1958 hunting pressure and success is presented in Table 10. During the small-game seasons, 733 permits were issued to hunters and the hunting pressure amounted to 2,191 hours, which was 219 hours less than in 1957. The ruffed grouse kill in 1958 (101) nearly doubled that of 1957 (58) and 1956 (56)--encouraging evidence that these birds may be on

Table 10.--Summary of hunting and trapping activities on the
Rifle River Area in 1958

Season and game species	Number of permits	Hours or trap nights	Animals harvested ^{1/}
HUNTING			
<u>Small game</u>	733	2,191	...
Ruffed grouse	...	.....	101
Woodcock	...	.....	34
Ducks	...	.....	37
Coots	...	.....	2
Cottontails	...	.....	12
Snowshoe hares	...	.....	3
Squirrels	...	.....	7
Raccoons	...	.....	1
Wilson's snipe	...	.....	2
<u>Deer</u>			
Gun	2,265	10,354	58
Archery	513	2,172	3
TRAPPING			
	105	1,963	...
Muskrat	...	.....	91
Mink	...	.....	15
Raccoon	...	.....	2
Beaver	...	.....	6

^{1/}In addition, 11 deer which had been killed illegally during the gun season were located on the Area.

the upswing of their cycle. There was no pronounced difference in the 1958 bag of woodcock (34) from that of 1957 (30). Other small game shot on the Area in 1958 included 37 ducks, 15 rabbits, 7 squirrels, 2 coots, 2 Wilson's snipe, and 1 raccoon.

Sixty-one legal deer kills were recorded for the Rifle River Area in 1958, of which three were bagged by archers. In addition, 11 deer which had been killed illegally during the gun season were located on the Area. In 1958, hunters on the Area who possessed the required permit could shoot does during the regular 15-day buck season and 16 were shot. A total of 10,354 gun hours of deer hunting was done during the season (8,403 in 1957) and archers hunted for 2,172 hours (2,520 hours in 1957).

Trapping

Table 10 also presents a summary of trapping activities on the Area in 1958. The total of 105 trapping permits issued were used by 11 individuals, eight in the spring and three in the fall. The largest of the six beaver taken weighed 48.5 pounds. Fewer muskrats were caught in 1958 (91) than in 1957 (137) but the 15 mink trapped represented a 50 percent increase over 1957.

Miscellaneous Area activities

The field work on the lakes and streams of the Rifle River Area in 1958 is summarized as follows: (1) Fish population estimates were made for Dollar, Loon, and Teal lakes by netting for marked fish; for the Rifle River, Gamble Creek, Diversion, and three sections of Houghton Creek (outside the Area) by electrofishing. (2) Fish sampling stations on the Rifle River and its tributaries outside the Area, that have been sampled in previous years, were sampled in the fall. (3) Ten Hoad shelters were put in Devoe Lake under the direction of R. D. Sims, and a fishing

experiment designed to test their effectiveness for improving fishing quality was carried out during the open-water season. (4) An aeration experiment was conducted on Spring Lake in February and March to observe the effects of introducing compressed air into the lake beneath ice cover. (5) Toxaphene was applied to Spring Lake twice by K. G. Fukano in preparation for stocking a different fish combination in 1959. The first application of 12 p.p.b. was inadequate and the treatment was successfully repeated using 24 p.p.b. (6) Fukano also treated Loon Lake with 5 p.p.b. toxaphene to eliminate small centrarchids. (7) A 1,600-foot seine was used by a Lake and Stream Improvement crew in Dollar Lake to capture fish for marking as part of an experiment to test methods of population estimation using nets and/or anglers' catches of marked fish. (8) Small traps were installed in the outlets of Loon and Spring lakes in the spring to observe fish movement through these outlets. (9) A boom-type, A.C. shocking device mounted on a boat was used to a limited extent in Loon Lake to obtain fish for fin clipping. (10) The shorelines of Devoe and North lakes were seined in September to check on small-fish populations.

The operation of the weirs in Gamble Creek and North Lake outlet was suspended in 1958 pending the completion of a summary report on past data by H. Gowing. The review and analysis of 12 years of creel-census data on the Area lakes was completed, a report written, and a paper given at the annual meeting of the Michigan Academy of Science, Arts, and Letters, at Detroit. The 1957-1958 biennial report was prepared as well as a report on the results of fishing over Hoad shelters in Devoe Lake. Bernard Clausen, a graduate student at the University of Michigan, interviewed land owners residing in the watershed of the upper Rifle River, as part of a doctoral study on the economic effects of the Rifle River Watershed Improvement Project. The Ranch House was used for his headquarters.

Activities by Game Division personnel are summarized as follows:

- (1) Ruffed grouse were trapped and banded in the spring by W. L. Palmer.
- (2) Palmer also made a botanical census in the vicinity of drumming logs late in the fall.
- (3) Grouse census lines were run for population estimates by parties under Palmer's direction.
- (4) Foxes were tracked by field parties in the winter months under the direction of R. D. Schofield to locate previously marked carcasses of illegally killed deer.
- (5) Three islands in Devoe Lake were partially cleared by R. G. Strong to encourage nesting by Canada geese.
- (6) Twenty-four pinioned Canada geese were brought to the Area from the Mason Game Farm and released on Spring Lake by Strong.
- (7) L. C. Ruch and W. C. Ryder supervised the collection of hunting data during the deer season in November.
- (8) Two local men were hired by the Game Division to man the checking station during the grouse season.

Physical improvements on the Area, in addition to the installation of Hoop shelters in Devoe Lake, included (1) construction of a foot bridge over the Rifle River near the south end of the Area by prison inmates under the direction of R. G. Strong; (2) replacement of one of the bridges over Brown Trout Creek with a large culvert; (3) completion of the restoration of the boundary fence line by inmate labor, and realignment of a small segment of same at the southwest corner at the request of the Ogemaw County Highway Commission in November; (4) installation of identification signs at South Pond; and (5) establishment of a recording rain gage near the south end of the Area by personnel of the U. S. Geological Survey.

A canoe race on the Rifle River which was sponsored by the Midwest International Canoe Racing Association took place on July 4, starting in the Area near the Ranch bridge and ending at the U. S. 23 highway bridge at Omer.

INSTITUTE FOR FISHERIES RESEARCH

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