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THE TWENTY-FIRST ANNUAL REPORT ON THE RIFLE RIVER
RECREATION AREA, OGEMAW COUNTY, 1965¹

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The Rifle River Recreation Area, site of the Rifle River Research Station, is a 4,318-acre tract of wooded land in northeastern Ogemaw County. Six lakes, several ponds, and 9.5 miles of trout streams are within its fenced boundary. Free permits were given to visitors at the entrance which they returned upon leaving. Pertinent information on fish and game taken from the Area was recorded at the checking station.

Total attendance at this Area in 1965 amounted to a new annual high of 39,371 people. Exactly 34,300 permits were issued, of which 23,506 (68.5%) were for sightseeing, 6,640 (19.3%) for fishing, 4,081 (11.8%) for hunting, and 73 (0.4%) for trapping. At the campground on Devoe Lake, 1,690 camp nights were recorded. Campers who fished or hunted on the Area were required to conform to the Area rules for the daily reporting of fishing and hunting activities.

This is the final report in a series of annual reports dating back to 1945 when the Area was first opened to the public. Starting January 1, 1966 the daily registration requirement for visitors was dropped, and

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anglers and hunters no longer had to be questioned at the checking station. However, three lakes and a portion of Gamble Creek were closed to public fishing for a period of 5 years so that intensive studies of their fish populations could be continued. The three lakes are Grebe, Lodge, and Jewett.

As in previous annual reports, the major portion of this report concerns fisheries research. This section, which immediately follows, will provide Job Completion reports that are required annually for Federal Aid (Dingell-Johnson) projects, as well as furnish a continuing record of the work done at the station for the information of the Department of Conservation. A section at the end deals with hunting and trapping done on the Area in 1965.

All but one of these jobs (Job No. 11) was terminated on June 30, 1966. The annual creel census reports presented here serve as final reports for the first segments of both Job No. 3 and No. 4. Final reports are pending for all other jobs or segments of same.

Job No. 3. --Study of relationship between trout populations, exploitation rates and fishing pressure

This job is divided into two segments: (1) stream creel census and (2) trout population studies.

(1) Stream creel census

There are six trout streams in the Area with a combined length of 9.5 miles and a surface area of 33.9 acres. Altogether

2,981 anglers fished these waters for 7,027.5 hours (Table 1). Fishing pressure was at the rate of 277.8 hours per acre. Nearly 79% of the anglers were licensed males and 15% were unlicensed minor males.

Anglers harvested 1,059 fish that weighed 600.51 pounds. The catch was equivalent to 31.2 fish, or 17.7 pounds per acre. Trout comprised about 96% of the catch of which 95% were wild trout. Of the wild trout, 984 were brown, 19 brook, and 4 rainbow trout. These fish were caught at the rate of 29.7 fish per acre (15.7 pounds per acre).

About 13% of the 2,981 anglers were successful in catching at least one wild trout. Nearly 87% of the Area anglers fished the Rifle River and about 13% were successful. Among the streams, the percentage of success ranged between 11% on Oyster Creek and 44% on Vaughn Creek.

Angling quality for wild trout on the Area streams was 0.10 fish per hour per angler. Angling quality was best on Vaughn Creek (0.51) and poorest on Oyster Creek (0.11).

Rifle River. --Fishermen (2,593) spent 6,331.5 hours on the river, a slightly greater effort than in 1964. Angling pressure amounted to 277.8 hours per acre in 1965 compared to 254.2 hours in 1964. The catch of 801 wild trout (Table 2) was comprised of 795 brown, 3 brook, and 3 rainbow trout for a yield of 35.1 fish, or 20.0 pounds, per acre. The catch represents about a 23% reduction from the previous year. The road that provides access to the lower reaches of the Rifle River in the Area was in poor condition during the early weeks of the season.

Table 1. --A summary of angling on the trout streams of the Rifle River Recreation Area in 1965

Stream	Area (acres)	Number of anglers	Hours of fishing	Fish caught							
				Hatchery- reared trout		Native fish				Total	
				Num- ber	Pounds	Wild trout		Others		Num- ber	Pounds
Rifle River	22.8	2,593	6,331.5	5	4.87	801	456.63	47	63.49	853	520.12
Gamble Creek	5.9	206	351.0	-	-	79	37.26	-	-	79	37.26
Houghton Creek	0.9	51	89.5	-	-	12	3.58	-	-	12	3.58
Vaughn Creek	0.9	71	164.5	-	-	106	27.98	-	-	106	27.98
Diversion	0.8	51	79.0	-	-	7	6.14	-	-	7	6.14
Oyster Creek	2.6	9	12.0	-	-	2	0.56	-	-	2	0.56
Totals	33.9	2,981	7,027.5	5	4.87	1,007	532.15	47	63.49	1,059	595.64

Table 2. --Number of fish of different species caught in six streams of the Rifle River
Recreation Area in 1965

Kind of fish	Stream						Total number of fish	Percentage of total catch
	Rifle River	Gamble Creek	Houghton Creek	Vaughn Creek	Diver- sion	Oyster Creek		
Brown trout								
Native	795	76	12	92	7	2	984	92.9
Hatchery	1	-	-	-	-	-	1	tr ^a
Rainbow trout								
Native	3	1	-	-	-	-	4	tr
Hatchery	4	-	-	-	-	-	4	tr
Brook trout								
Native	3	2	-	14	-	-	19	1.8
Northern pike	15	-	-	-	-	-	15	1.4
White sucker	12	-	-	-	-	-	12	1.1
Bluegill	11	-	-	-	-	-	11	1.0
Rock bass	4	-	-	-	-	-	4	tr
Black crappie	2	-	-	-	-	-	2	tr
Carp	2	-	-	-	-	-	2	tr
Largemouth bass	1	-	-	-	-	-	1	tr
Total	853	79	12	106	7	2	1,059	-
Percentage of total Area catch	80.5	7.4	1.1	10.0	0.6	tr	-	-

^a tr = less than 0.5%.

This apparently resulted in a shift in fishing pressure to the upper Rifle River (that portion of the stream from Devoe Lake dam to the mouth of Houghton Creek) which has yielded relatively few trout in past years.

About 12% of the anglers were successful in catching at least one wild trout whereas 15% were successful in 1964. Angling quality for wild trout was 0.08 fish per hour per angler, a significant reduction from 1964 (0.13) but identical to that for 1963.

The average length and weight of 795 wild brown trout caught in the river were 11.2 inches and 0.552 pound, respectively. The age composition of the catch differed somewhat from the previous year. Typically, as in 1964, 2-year-old brown trout make the largest contribution to the total catch with 3-year-old fish ranking second. In 1965, however, 2- and 3-year-old fish shared about equally in the catch (Table 3).

Hatchery trout were not stocked in the river (within the Area) in 1965 nor in the previous two years. For this reason, their contribution to the annual catch during these years was negligible; five were caught in 1965.

Seven species of fish, other than trout, were caught in the Rifle River. In this group were 47 fish of which northern pike, white sucker, and bluegill were the most common.

Gamble Creek. --Fishing pressure on this stream has remained relatively stable and light during the past three years; 59.5 hours per acre in 1965. The catch consisted of 76 wild brown,

Table 3. --Number (N) and percentage (P) of native brown trout of different age groups caught in streams of the Rifle River Recreation Area in 1965

Age group	Stream											
	Rifle River		Gamble Cr.		Houghton Cr.		Vaughn Cr.		Diversion		Oyster Cr.	
	N	P	N	P	N	P	N	P	N	P	N	P
I	24	3.1	1	1.4	1	9.1	-	-	-	-	-	-
II	346	45.2	17	24.3	6	54.5	28	33.3	2	33.3	-	-
III	352	46.0	34	48.6	4	36.4	49	58.3	2	33.3	2	100.0
IV	33	4.3	14	20.0	-	-	6	7.2	1	16.7	-	-
V	7	0.9	3	4.3	-	-	1	1.2	1	16.7	-	-
VI	3	0.4	1	1.4	-	-	-	-	-	-	-	-
VII	1	0.1	-	-	-	-	-	-	-	-	-	-
Totals	766		70		11		84		6		2	
Total catch ¹	795		76		12		92		7		2	

¹ Includes fish for which age was not determined.

2 brook, and 1 rainbow trout. Only eight of these fish were caught in Upper Gamble Creek, that portion of the stream from the north boundary of the Area downstream to Mallard Pond. The 1965 catch was nearly identical to that for 1964 (80 wild trout). Wild trout were caught at the rate of 13.4 fish, or 20 pounds per acre. About 18% of the fishermen were successful in catching at least one wild trout. Angling quality was 0.19 compared to 0.21 fish per hour per angler in 1964.

The 76 wild brown trout in the catch averaged 10.8 inches and 0.482 pound. Three-year-old brown trout were predominant in the catch.

Houghton Creek. --Only 51 anglers fished this one-quarter mile of stream in the Area, the fewest number since 1949. In 89.5 hours of fishing 12 wild brown trout were caught. In 1964, 90 anglers spent 165.5 hours on the stream and caught 12 wild brown trout and one brook trout. Angling quality was 0.13 in 1965 compared to 0.07 fish per hour per angler in 1964.

Vaughn Creek. --Nearly the same number of anglers fished the stream in 1965 (71) as in 1964 (73). However, angling effort (hours) in 1965 was 35% less than in the previous year. As a result, angling pressure was about 183 hours per acre in 1965 compared to 282 in 1964. The catch of wild trout consisted of 92 brown and 14 brook trout or about 118 fish per acre. This represents a decrease of about 29% from the previous year when 132 wild brown and 18 brook

trout were caught. About 44% of the angler trips on the stream were successful and angling quality was 0.51 fish per hour per angler.

Of the 92 brown trout caught, the average length and weight was 9.0 inches and 0.278 pound; for the 14 brook trout it was 8.4 inches and 0.222 pound. Two- and 3-year-old fish comprised about 92% of the catch of wild brown trout.

Diversion. --Fifty-one anglers fished this water for 79 hours and caught seven wild brown trout. In the previous year, 43 anglers expended 57.5 hours and caught nine wild brown trout.

Oyster Creek. --In the complex of trout water in the Area this small stream usually receives scant attention by the angler. Only 12 anglers fished the stream (12 hours) and caught two wild brown trout.

All Streams. --Since 1963 there has been a small annual increase in fishing pressure on the Area streams. In this period the number of fishermen increased 5.9% and the hours fished by 6.7%. In 1965 fishing pressure was 207.3 hours per acre.

Fishermen harvested 1,007 wild trout (532.15 pounds) in 1965, a reduction of about 22% from 1964 (1,293) which was one of the best years on record. The yield in 1965 amounted to 29.7 fish per acre.

About 10% of the wild brown trout that entered the catch was comprised of yearlings and 4-year-old fish and older (Table 3). Relatively fewer 2-year-old fish were caught in 1965 than in 1964, the principal difference between the two years. About 13% of the Area anglers were successful in catching at least one wild trout. Angling quality dropped to 0.10 fish per hour per angler from the 1964 index of 0.15 (Table 4).

Table 4. --A summary of angling quality for native trout on the trout streams of the Rifle River Recreation Area in 1965 ¹

Stream	Trout caught per acre of stream		Catch per hour per angler	Percentage fishermen successful
	Number	Pounds		
Rifle River	35.1	20.0	0.08	11.4
Gamble Creek	13.4	6.3	0.19	17.5
Houghton Creek	13.3	4.0	0.13	11.8
Vaughn Creek	117.7	31.1	0.51	43.7
Diversion	8.8	7.7	0.13	9.8
Oyster Creek	0.7	0.2	0.11	11.1
Average	29.7		0.10	12.5

¹ Not shown is the angling results for Skunk Creek. Ten anglers fished 13.5 hours but caught no fish.

This was the third consecutive year that trout were not stocked in Area streams. As a result, their contribution to the annual trout catch has steadily declined from 4% in 1963 to 0.4% in 1965.

Whirlpool Pond. --A few hundred feet below Devoe Dam is a shallow, 0.6-acre pond broadly connected to the Rifle River. Carp and northern pike inhabit the pond along with other species of fish, and provide some fishing interest. In 226 hours of angling here in 1965, 127 fishermen caught 10 pike and 1 carp.

(2) Trout population studies

The Petersen mark-and-recapture method was used to estimate populations of native brown trout in portions of certain streams in the Area. Estimates were obtained before, during, and after the fishing season in 1965 for Section D of Gamble Creek (Mallard Pond to north boundary of Area) and Section B of the Rifle River (Devoe Lake bridge to mouth of Houghton Creek). Pre-season estimates for Sections A and J of the Rifle River and Houghton Creek could not be obtained because of high water levels in the spring of 1965.

Exploitation of brown trout in Section D of Gamble Creek during 1965 was negligible. There was an estimated population of 198 legal-size brown trout prior to the fishing season. Anglers caught 3.0% of these fish (age II-V) compared to 8.2% in 1964 and 10.2% in 1963.

The age distribution of legal-size brown trout in the population and catch is shown below:

	Age-group			
	II	III	IV	V
1965 spring estimate	45	99	53	1
1965 anglers' catch	2	4	0	0
1965 fall estimate	244	111	22	5
Exploitation (%)	4.4	4.0	0.0	0.0

Between spring and fall of 1965 the mortality rate and/or migration out of Section D of age-I trout was 24.3% and 58.5% for age-IV fish. There was recruitment of age-II fish into the stream section during this period as this 1963 year class showed a 44.8% increase but age-III fish remained stable.

Estimates were obtained in July and September of a marked population (of known size) present in Gamble Creek in April. Between spring and summer this population was reduced nearly 60%; between summer and fall, about 15%.

The over-winter loss between September, 1965 and April, 1966 for each year class was: 1965--45.4%; 1963--10.7%; 1962--59.4%; 1961--95.4%; 1960--100.0%. The 1964 year class did not show a reduction in this period. However, the 1962 year class, which exhibited little change during 1965, had a relatively large over-winter loss.

The 1965 pre-season estimate of brown trout in Section B of the Rifle River is somewhat tenuous due to the poor recovery of marked

trout. However, our best estimate was 15.2 legal-size brown trout per acre. Anglers harvested 4.5 fish per acre. The 1965 post-season estimate was 21.8 trout per acre.

In 1964, only 0.8% of the fall estimate of brown trout in Section J in the Rifle River were sublegal; 9.0% in 1965. Significant recruitment into Section J begins with age-I fish. In 1964, age-II fish dominated the population and there was a substantial carry-over of these fish into 1965. As a result, three-year-old fish made an unusually large contribution to the total catch of trout in 1965, as shown below:

	Legal-size trout						Totals
	Age-group						
	I	II	III	IV	V	VI	
1964 catch	1	307	127	25	-	1	461
1964 fall estimate	215	346	39	5	-	-	605
1965 catch	12	174	157	13	4	1	361
1965 fall estimate	254	247	86	9	1	-	597

Job No. 4. --Fish production and its utilization in small warm-water lakes

There are two segments to Job No. 4: (1) creel census statistics and (2) calculations of production and maximum sustained yield.

(1) Creel census statistics

A virtually complete record of fishing activity on the individual lakes and ponds was kept for the last time in 1965. In 11,130 hours of

fishing, anglers caught 4,439 fish (1,358.5 pounds) from seven of the Area lakes (Table 5). On the average, 25% of the anglers caught and kept at least one fish, and the average catch per hour was 0.40.

Yellow perch comprised 55.1% of the catch, bluegills 19.5%, bullheads 6.7%, and black crappies 6.0%. None of the other 10 kinds of fish comprised as much as 4.0% of the catch.

Devoe Lake. --In 2,170 trips, anglers fished 6,830 hours and caught 2,379 fish (749.0 pounds). This harvest amounted to only 5.8 pounds per acre, despite the fact it was the largest catch from any Area lake (Table 5). Yellow perch (mean length, 7.3 inches) comprised two-thirds of the total catch that included 14 kinds of fish (Table 6). The average length of the bluegills and crappies was 6.2 and 9.5 inches, respectively. The catch of 73 northern pike was the largest ever recorded for this lake, over half of which were caught through the ice. No rainbow trout were planted in 1965 and only one from a previous planting was caught. This fish bore a sea lamprey scar.

Nearly one-third (31.9%) of the anglers still-fished from a boat with angleworms and caught 45% of the catch--mostly perch. Anglers who used artificial lures were much more successful than in previous years. In 1964 only 15 fish were caught on artificials whereas 200 were taken in 1965.

Grebe Lake. --In 568 trips anglers fished 1,613 hours and caught 674 fish that weighed 231.6 pounds (Table 5). Twenty-six per cent of them caught at least one fish. This lake contains only three species of game fish. Perch (average length, 7.3 inches)

Table 5. --The fishing pressure, yield, and fishing quality on the lakes in the Rifle River Recreation Area in 1965

Lake	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	Percentage fishermen successful
Devoe	2,170	16.7	6,830	52.5	2,379	18.3	749.0	5.8	0.35	20
Grebe	568	7.9	1,613	22.4	674	9.4	231.6	3.2	0.42	26
Grousehaven	443	4.7	1,316	13.8	311	3.3	111.5	1.2	0.24	16
Lodge	315	18.7	870	51.8	753	44.8	185.3	11.0	0.87	36
Scaup	85	14.7	208	35.9	197	34.0	48.1	8.3	0.95	33
Jewett	126	9.8	238	18.4	74	5.7	20.1	1.6	0.31	15
South Pond	39	30.0	55	42.3	51	39.2	12.9	9.9	0.93	31
Total or average	3,746	-	11,130	-	4,439	-	1,358.5	-	0.40	25

Table 6. --Species composition by number (N) and weight (W) in pounds of the catch from seven lakes on the Rifle River Recreation Area in 1965

Species	Devoe		Grebe		Grousehaven		Lodge		Scaup		South Pond		Area totals
	N	W	N	W	N	W	N	W	N	W	N	W	
Yellow perch	1,593	202.3	585	96.9	205	28.1	54	6.9	9	2.4	-	-	2,446
Bluegill	259	45.0	-	-	18	3.4	319	32.3	164	29.9	35	9.6	869 ^a
Black crappie	204	89.2	43	23.7	1	0.3	17	4.2	2	0.8	-	-	267
Rock bass	116	24.1	-	-	29	6.6	5	0.7	-	-	1	0.3	151
Northern pike	73	293.1	46	111.0	5	22.1	-	-	3	9.3	-	-	127
Largemouth bass	44	39.8	-	-	10	8.9	87	87.8	2	1.2	-	-	143
Smallmouth bass	33	37.2	-	-	27	35.5	-	-	-	-	-	-	60
Pumpkinseed	26	2.8	-	-	10	1.8	11	1.3	1	0.2	2	0.3	50
Bullheads	22	5.8	-	-	1	0.5	258	51.8	5	2.5	12	2.5	298
Bluegill x pumpkinseed	1	0.3	-	-	1	0.1	2	0.3	11	1.8	1	0.2	16
Brown trout	4	5.5	-	-	-	-	-	-	-	-	-	-	4
Longear sunfish	2	0.1	-	-	-	-	-	-	-	-	-	-	2
Rainbow trout	1	2.3	-	-	-	-	-	-	-	-	-	-	1
White sucker	1	1.5	-	-	4	4.2	-	-	-	-	-	-	5
Totals	2,379	749.0	674	231.6	311	111.5	753	185.3	197	48.1	51	12.9	4,439

^a Includes 74 bluegills caught in Jewett Lake. They weighed 15.3 pounds.

comprised 87% of the catch. The mean length of the crappies was 10.1 inches; pike, 22.8 inches. The age composition of the catch is shown in Table 7. Eighty-three per cent of the perch were 3 years old and 3-year-olds also dominated the crappie catch. Age groups III and IV each comprised about 42% of the pike catch.

Many fish were marked in the spring of 1965 for a population estimate. The percentage of marked fish recovered by anglers (shown below) is equivalent to the estimated exploitation rate of the larger fish. A winter value is shown for pike also, because nearly half the catch was taken through the ice before the marking period in the spring. Hence

Species	Minimum length (inches)	Number marked	Number of marked fish caught	Percentage of recovery
Crappie	7.0	1,228	11	0.9
Perch	6.0	593	32	5.3
Pike	20.0	140	4	2.8
Pike ^a	19.0	106	10	9.4

^aMarked in the spring of 1964 and taken through the ice the following winter.

one recovery rate is based on fish marked in the spring of 1964 (less three caught in summer of 1964). The true winter rate of exploitation was somewhat higher, however, because natural mortality must have reduced the marked population even further. Nevertheless, spearing was at least three times more effective than open water angling for pike. Exploitation rates were small for all species, especially so in the open-water period.

Table 7. --Estimated age composition of the anglers' catch from
Grebe Lake, 1965

Age group	Year class	Species		
		Black crappie	Yellow perch	Northern pike
I	1964	-	2	-
II	1963	2	88	2
III	1962	28	488	20
IV	1961	13	7	19
V	1960	-	-	5
Total catch		43	585	46

Grousehaven Lake. --As usual, angling success in this marl lake was the poorest of any lake in the Area. A total of 311 fish were caught in 1,316 hours of fishing. Perch comprised about two-thirds (66%) of the catch of 11 kinds of fish, and their average length was 7.4 inches. Nearly twice as many smallmouth bass were caught this year than in 1964. Forty-eight per cent of the anglers still-fished with earthworms for bait and accounted for 74% of the catch.

Lodge Lake. --Thirty-six per cent of the fishermen caught and kept at least one fish from this lake, the highest success ratio for any of the Area lakes (Table 5). A total of 753 fish that weighed 185.3 pounds were caught in 870 hours of angling, and the average catch per hour was a respectable 0.87. Bluegills and bullheads dominated the catch (42 and 34%, respectively), and the average length of the bluegills caught was 5.6 inches. However, the 87 largemouth bass caught represents one of the highest bass yields ever recorded for this lake (Table 6). Seventy-two per cent of these bass were taken on artificial lures by casting. Anglers who still-fished with worms took 63% of the total catch of all species from this lake.

Other lakes. --Three other Area lakes received a small amount of fishing pressure. There were 85 fishing trips on Scaup Lake and 39 on South Pond. The highest rates of fishing success occurred on these lakes (0.95 and 0.93 fish per hour, respectively) with bluegills contributing the most fish to their respective catches. Both lakes are small and usually overlooked by Area anglers although South Pond (1.3 acres) is close to the campground. Scaup Lake (5.8 acres) has an inconvenient access point.

Jewett Lake contains only bluegills stocked in 1963 and 1964 plus their progeny. In 1964 only 2 fish were caught, but 74 were taken in 1965 by 15% of the anglers. All of these fish were caught by anglers who still-fished with earthworms. These bluegills averaged 6.9 inches long. Since many fish were marked in the spring for a population estimate, we estimated the rates of exploitation for certain segments of the population from the percentage of capture of these fin-clipped fish by anglers. These rates are shown below:

Stock	Minimum length (inches)	Number marked	Number of marked fish caught	Percentage of recovery
1963 plant	8.6	14	8	57.1
1963 year class	4.0	58	7	12.0
1964 plant	5.6	190	51	26.8
All bluegills	4.0	262	53	20.2

(2) Calculation of production and sustained yields

This segment involves the preparation of a manuscript on bluegill production and theoretical sustained yields computed from data collected between 1957 and 1962 from Jewett and Lodge lakes. A revision of the original manuscript is being written but was not completed during this biennium.

Job No. 5. --Study of systematic errors associated with multiple census population estimates

Although this job was inactive, some of the population data gathered for other purposes in 1965-1966 should be pertinent to this study. A final report for this job will be forthcoming in the next segment (1966-1967).

Job No. 6. --Evaluation of watershed and stream improvement practices

A final report on this job is being edited.

Job No. 7. --Study of lakes subject to extreme oxygen depletion

This job is to be terminated and a final report is pending by the end of the next biennium (1966-1967). During the period 1965-1966, two oxygen checks were made on Grebe and Lodge lakes 5 feet below the top of the ice (Feb. 17 and Mar. 3, 1966). No serious oxygen depletion was detected. On both dates in Grebe Lake, an oxygen content of over 9.0 ppm was measured at this depth at three sites; 6.2 ppm at 10 feet on March 11. In Lodge Lake the February measurements averaged 2.4 ppm for two locations; 6.1 ppm in March (but 8.5 ppm at a depth of 2 feet).

The over-winter survival capabilities of a population of pike, perch, and black crappies in Grebe Lake was checked for the sixth consecutive winter but no critical oxygen levels developed again in 1965-1966. Other data on this population are reported in Job No. 11.

Occasionally moderate winterkills of fish have occurred in Lodge Lake in former years. As in 1964, a fall population estimate was made for this lake in October 1965 in the event of a winterkill. This was to be followed up by a similar spring estimate to ascertain the magnitude of such mortality had it occurred. Despite no winterkill, a spring estimate (1966) was made for this population prior to a subsequent removal of all fish. The methods used in the fall were the same as those described in the previous report for 1964-1965 (Research and Development Report No. 56). Both electrofishing gear and trap nets were used in the spring. Where applicable these population data will be incorporated in the study described for Job No. 5. A summary of the best estimates in the fall (1965) for fish at least 4.0 inches long indicated a population of over 42,000 fish, 93% of which were bluegills. A year ago (1964) the fall population was estimated to be 32,000 fish, 79% of which were bluegills.

Job No. 8. --Development and management of bluegill populations in warm-water lakes.

This job was terminated in June, 1966 and a final report is pending. However, the work on bluegill populations will continue under Job No. 5 in F-29-R. Two factors influenced the decision to cancel this job: (1) As originally conceived, the bluegill study was to be carried out in two natural lakes at the Rifle River Recreation Area and four ponds near Grand Rapids in southwestern Michigan.

As explained in last year's report (1964-1965), South Pond had to be dropped from the experiment, leaving one population in a natural lake (which must be censused by indirect means) to be compared with results obtained from four drainable ponds; (2) only one natural lake was available for a study of perch-only populations (See F-29-R, Job No. 11). In order to replicate the latter work, it seemed logical to assign Jewett Lake (and Lodge Lake) to the perch study, thereby providing three situations in which the methods of evaluation will be similar. This will be done in the next segment.

Estimates of the bluegill population in Jewett Lake were made in October 1965 and May 1966. The methods of trapping and computation were the same as described in previous reports. An additional estimate for small fish was attempted in June using a-c electrofishing gear. The numbers of bluegills present in October and May are shown in Table 8. On the whole, the agreement between these consecutive estimates is good and most of the confidence limits attest to their reliability, especially fish at least 4.0 inches long. The large 1963 year class almost completely dominates the population and very few members of the 1964 year class survived. The estimate of 900 is not a reliable one since it is based on only 1 yearling fish among the scale samples collected in the fall of 1965. No 2-year-olds were scale-sampled in May 1966 but 2 were among the scale samples taken while electrofishing in June. The original brood stocks had almost disappeared from the population by May 1966. Anglers accounted for some but natural mortality was the principal cause for their rapid decline.

Table 8 . --Estimated bluegill populations in Jewett Lake in October, 1965 and May, 1966. Confidence limits (P = 0.95) in parentheses.

Source	\hat{P}^a	Year class or stock			
		1964	1963	1964 plant	1963 plant
<u>October 1965</u>					
1963 planting	2 (2-2)	-	-	-	2
1964 planting	44 (41-48)	-	-	44	-
Progeny:					
2.0-2.9	22,660 (15,870-166,670)	900	21,760	-	-
3.0-3.9	36,400 (34,800-38,200)	-	36,400	-	-
4.0-4.9	1,630 (1,420-1,910)	-	1,630	-	-
5.0-7.0	300 (270-330)	-	300	-	-
Totals	61,036	900	60,090	44	2
<u>May 1966</u>					
1963 planting	1 ^b	-	-	-	1
1964 planting	30 (30-30)	-	-	30	-
1963 year class:					
2.0-2.9	5,840 (2,825-?)	-	5,840	-	-
3.0-3.9	58,530 (41,840-97,090)	-	58,530	-	-
4.0-4.9	1,110 (890-1,460)	-	1,110	-	-
5.0-7.0	260 (250-280)	-	260	-	-
Totals	65,771	-	65,740	30	1

^a Values over 100 rounded to nearest unit of 10.

^b Only fish caught.

Additional data on seasonal growth, food habits, and bottom fauna populations will be discussed in the final report.

Job No. 9. --Preparation of a report on the movement of fish in Area streams and connecting lakes

This job has been terminated and a final report is pending. The job was inactive during this period.

Job No. 10. --Development of electronic fishing gear

This job is being terminated and a final report is pending. No work was done on this job in 1965-1966.

Job No. 11. --Experimental management of a warm-water fishery for maximum equilibrium yield

A spring population estimate was made in April, 1966 for the fifth consecutive year. Trapping activities were started on April 4 and continued through May 5. The same gear and procedures were used as were described in the 1964-1965 report except that no bullheads were removed from the lake. A summary of the estimates by species and year class is presented in Table 9. Judging by the confidence limits computed for each estimate, the pike estimates appear to be the best. These data will be used in conjunction with previous population information, additional growth data acquired from scale samples collected in July and October, 1965, and estimates of mortality to compute

Table 9. --Estimated population of fish in Grebe Lake in April, 1966.¹
Confidence limits (P = 0.95) in parentheses.

Species and inch group	\hat{P}^a	Year class				
		1965	1964	1963	1962	1961
<u>Pike</u>						
14.9-17.9	340 (300-410)	-	190	130	20	-
18.0-19.9	510 (430-640)	-	70	310	130	-
20.0-23.9	530 (440-650)	-	5	235	270	20
24.0 and over	45 (30-80)	-	-	5	30	10
Totals	1,425	-	265	680	450	30
<u>Perch</u>						
3.0-3.9	1,560 (920-5,100)	1,560	-	-	-	-
4.0-4.9	65,690 (43,480-142,860)	-	65,690	-	-	-
5.0-6.9	1,870 (1,200-4,250)	-	500	660	710	-
7.0 and over	620 (340-3,790)	-	-	40	530	50
Totals	69,740	1,560	66,190	700	1,240	50
<u>Black crappie</u>						
5.0-6.9	3,200 (2,100-6,760)	-	350	2,850	-	-
7.0-8.9	590 (370-1,600)	-	-	300	290	-
9.0 and over	830 (700-1,020)	-	-	35	720	75
Totals	4,620	-	350	3,185	1,010	75

¹ Not shown is an estimate of 58,110 black bullheads (4-7 inches) with fiducial limits of 55,550-62,500.

^a Values over 100 rounded to the nearest unit of 10, others to 5.

production and maximum yield values. Perch and crappie ovaries were collected as well as stomachs and bottom fauna samples (See Job No. 12). Manipulation of the pike population by cropping with nets at a pre-determined rate will be done in the next biennium under Job No. 7 in F-29-R.

Job No. 12. --Bottom fauna populations in the lakes at the Rifle River Research Station and their utilization by certain species of fish

This job was concluded during this period and a final report is in preparation. During this biennium 48 bottom samples were taken in Grebe Lake in July 1965 and 24 in May 1966. These collections were sorted, identified, counted, and volumetric measurements taken. The sampling sites were the same as used in prior collections and were taken with an Ekman dredge.

Stomach samples were collected periodically from perch, black crappies, and black bullheads in Grebe Lake and most of these were analyzed. Also the stomachs of dead pike in the nets were examined in the field for food material. Having data on both the benthic population and the stomach contents we expect to determine what proportion of the food resources in the lake are being utilized. Plankton were not sampled in this biennium.

During the past year the stomach contents from 2.0-inch bluegills in Jewett Lake were examined. These collections were obtained in October 1963 and June 1965. The principal items found are shown below:

Item	June, 1965 (26 fish)		October, 1963 (57 fish)	
	Percent- age total number	Percent- age occur- rence	Percent- age total number	Percent- age occur- rence
Midges	30	100	trace	7
Cladocera	47	96	92	100
Ostracods	14	85	trace	13
Amphipods	2	69	trace	1
Molluscs	4	81	0	0

Hunting and trapping

Statistics on hunting and trapping done in 1965 are presented in Table 10. In other years information on all species bagged during the small game season was collected but in 1965 emphasis was placed on ruffed grouse and woodcock. Hunting pressure declined by approximately one-third from that of 1964 but the number of grouse harvested dropped 43%; there was a 62% drop in the woodcock harvest.

Deer hunting results were summarized by Louis C. Ruch in Game Division Report No. 2486. There was a 6% increase in the legal buck kill over that of 1964; 74% of them were 1 1/2 years old. However the total kill was approximately 13% less than the total kill in 1964.

Table 10. --Summary of hunting and trapping statistics for the
Rifle River Recreation Area, 1965

Season and game species	Number of permits	Hunting hours or trap nights	Number of animals harvested
HUNTING			
<u>Small game</u>	660	-	-
Ruffed grouse	-	-	58
Woodcock	-	-	33
<u>Deer</u>	2,829	12,110	
Gun	-	-	106 ^a
Archery	565	2,220	1
TRAPPING			
Beaver	-	-	5
Otter	-	-	1
Muskrat	-	-	9
Raccoon	-	-	2

^a Includes five unclaimed deer.

The oldest buck was 3 1/2 years old; the heaviest weighed 143 pounds. On the first day of the season, 666 permits were issued for this 6-square-mile area. Seventy-seven per cent of the deer harvest occurred in the first 3 days. Archers bagged one buck during the archery season.

Trapping activity declined considerably in 1965 from that of previous years and few animals were taken. Ten individuals trapped in the Area during the spring and fall seasons.

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