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Montana Fish and Game Department
Fisheries Division
Helena, Montana

Job Progress Report
Investigation Project

State of Montana
Project No. F-12-R-21
Job No. II-b
Period Covered May 12, 1974-October 31, 1974

Title Western Montana Fishery Investigation
Title Georgetown Lake Summer Creel Census

Abstract

An estimated 52,194 fishermen fished 164,852 hours to creel 228,597 game fish during the 1974 summer fishing season on Georgetown Lake. The average catch rate was 1.39 fish per hour and the average trip length was 3.16 hours. Boat fishermen exerted 25 percent less effort than shore fishermen but the catch rate for boat fishermen was 90 percent higher than for shore fishermen. Total fishing pressure was 14.4 percent higher than the 1970 summer fishing season while game fish harvest increased by 81.3 percent.

Rainbow trout comprised 60.0 percent of the catch while kokanee accounted for 37.4 percent of the catch. Mean total lengths of rainbow trout and kokanee were 11.4 and 11.0 inches respectively.

Local anglers living within 40 miles of the lake accounted for 67.7 percent of the fishermen while 23.9 percent were state residents from farther away than 40 miles and 8.4 percent were nonresidents. Anglers may be harvesting as much as 60 percent of all rainbow trout planted in the lake.

Objective

The objective of this study is to obtain estimates of angler effort and success on Georgetown Lake during the 1974 summer fishing season in accordance with the Georgetown Lake Management Plan established in 1970.

Background

Georgetown Lake is a shallow, 2,768 acre lake located at an elevation of 6,500 feet approximately 18 miles west of Anaconda. Georgetown was the most heavily fished lake in Montana in 1970, sustaining 4 percent of the total fishing pressure in the state. ~~Subcatchable~~ rainbow trout are planted each spring while kokanee, brook trout, and arctic grayling ~~form self-sustaining populations.~~ Cutthroat trout dominated in the fishery until the 1940's when rainbow trout were planted and became the dominant species in the lake. Kokanee have increased in the catch in the past decade and provide a popular fishery.

Regulations

The 1974 general fishing season ran for 167 days from May 18 to October 31. Angling was allowed 24 hours a day but was generally confined to the period from 0500 to 2300 hours. A limit of ten pounds and one fish not to exceed ten fish per day was established for any combination of rainbow, cutthroat, and brown trout, and arctic grayling. An additional limit of ten pounds, no numerical limit, was set for brook trout. Anglers were also allowed ten kokanee until September 1 when the limit was raised to thirty-five.

Procedures

The census design was similar to that described by Spence (1970). The season was divided into five strata as follows:

Stratum I: Opening weekend

Stratum II: Week days, pre-Labor Day

Stratum III: Weekends and holidays through Labor Day

Stratum IV: Week days, post-Labor Day

Stratum V: Weekends and holidays, post-Labor Day

Car and boat counts were made on a randomly selected time basis in each sampling day (Table 1). The census schedule is on file at Region 2 Fish and

Game Headquarters. Shore fishermen were counted directly in this census instead of estimating their numbers from car counts and the average number of fishermen per car as was done in the past. This should improve the accuracy of shore fishermen estimates.

Table 1. Miscellaneous statistical data obtained from the census

	Stratum					
	I	II	III	IV	V	Entire Season
No. of days in season	2	73	33	41	18	167
No. of days sampled	2	43	33	26	18	122
No. of hours in season 1/	36	1314	594	738	324	3006
No. of hours sampled	36	252	198	84	84	652
No. shore counts	18	107	71	58	55	309
No. boat counts	16	145	127	26	29	343
No. shore fishermen contacted	75	179	205	124	90	633
No. boat fishermen contacted	3	164	233	53	49	502

1/ Based on an assumed fishing day of 18 hours

Individual anglers were interviewed upon completing their fishing trip and information on angler effort and success was recorded. Samples of fish creeled were measured for total lengths and a portion of the fish were weighed.

Some problems were encountered in data collection. Only one boat was interviewed in Stratum I (opening weekend) but this should have little effect on the overall results. Fish lengths varied little and an excessive number were measured while too few weights were recorded. Sampling needs should be anticipated and monitored to ensure adequate and uniform data collection. Some fishermen were interviewed before completing their fishing trip so mean trip length may be slightly underestimated. The irregular terrain around the lake made it difficult to achieve completely accurate shore and boat counts. A comparison of the counts with concurrent aerial surveys would give an estimate of count accuracy.

FINDINGS

The 1974 Summer Fishery

An estimated 52,194 fishermen fished 164,852 hours to creel 228,597 fish (Table 2). The average catch rate was 1.39 fish per hour with a mean trip length of 3.16 hours (Table 3). Effort for boat fishermen was 25 percent lower than for shore fishermen but the catch rate for boat fishermen was nearly 90 percent higher than that of shore fishermen (1.89 and 1.01 respectively). The correlations between hours fished and fish caught were computed for all strata and fishermen but were not significant.

Table 2. Estimates of total fishermen, hours fished, and fish harvested in Georgetown Lake in summer, 1974

	Point estimate	95% Confidence interval
Fishermen		
Shore	29,696	26,381 - 33,011
Boat	22,498	16,380 - 28,616
Total	52,194	45,235 - 59,153
Hours fished		
Shore	94,429	84,889 - 103,969
Boat	70,423	51,709 - 89,137
Total	164,852	143,846 - 185,858
Fish harvested		
Shore	95,580	84,709 - 106,451
Boat	133,017	98,445 - 167,589
Total	228,597	192,355 - 264,839

Table 3. Mean rates of fishing effort and success in Georgetown Lake in summer, 1974, with 95 percent confidence intervals in parentheses 1/

	Shore	Boat	All fishermen
Fish/hour	1.01 (0.95-1.07)	1.89 (1.77-2.02)	1.39 (1.33-1.45)
Fish/angler	3.22 (3.03-3.42)	5.91 (5.56-6.26)	4.38 (4.19-4.57)
Length of trip (hours)	3.18 (3.05-3.31)	3.13 (2.99-3.27)	3.16 (3.06-3.26)

1/ The 95 percent confidence intervals are calculated as the point estimate ± 2 standard errors

A check of anglers showed that 67.7 percent resided within a 40-mile radius of the lake while another 23.9 percent were state residents living more than 40 miles away. Non-residents accounted for 8.4 percent of the anglers.

The mean total length of rainbow trout checked was 11.4 inches while kokanee averaged 11.0 inches (Table 4). Mean monthly lengths were computed for all species but did not vary significantly and were not included in this report. Rainbow trout averaged 0.9 pounds in weight while kokanee averaged 0.4 pounds. Weight samples were small and variable but indicated a total harvest of 172,448.9 pounds for a yield of 59.1 pounds per acre (Table 4).

~~Table 4. Comparison of the angling harvests of game fish in Georgetown Lake in the summers of 1970 and 1974. Number of fish checked in parentheses~~

Table 4. Comparison of the angling harvests of gamefish in Georgetown Lake in the summers of 1970 and 1974. Number of fish checked in parentheses

	Percent of catch	Number harvested	Mean length(in.)	Mean weight(lbs.)	Yield (lbs./acre)
1970					
Rainbow trout	84.7 (6426)	106,814	11.6 (486)	0.7 (486)	25.1
Kokanee	11.3 (860)	14,250	11.5 (61)	0.5 (61)	2.5
Brook trout	3.2 (243)	4,035	11.2 (20)	0.6 (20)	0.9
1974					
Rainbow trout	60.0 (3411)	137,181	11.4 (3226)	0.9 (169)	43.6
Kokanee	37.4 (2128)	85,564	11.0 (1139)	0.4 (37)	13.3
Brook trout	2.3 (133)	5,258	10.9 (117)	1.2 (4)	2.2

Changes in the Fishery

The 1974 creel census results were compared to the results of the 1970 summer creel census and pre-1970 progress reports as reported in the Georgetown Lake pre-study of 1973. Several trends were indicated. Fishing pressure has increased an average of 6 percent per year in the past but increased only 3.6 per cent per year between 1970 and 1974. Game fish harvest, however, has increased at a high rate, increasing 81.3 per cent between 1970 and 1974. Rainbow trout decreased in the percentage of the catch (Table 4) but increased in total numbers caught by 28.4 percent and kokanee more than tripled in the percentage of the catch while the numbers harvested increased by a factor of six. Changes in the population, refinement of fishing techniques, and liberalized regulations probably account for most of the changes in the salmon fishery. Boat fishermen harvested the majority of the salmon (Table 5) and this accounted for most of the increases in boat fishermen success and their gain in success rates over shore fishermen.

The mean size of fish caught varied little (Table 4) but due to the high harvest, the yield per acre had more than doubled between 1970 and 1974. The current yield of 59.1 pounds per acre is excellent for a cold-water fishery.

Fishing pressure from anglers living within 40 miles of the lake increased by 19 percent while the percentage of nonresidents (8.4 percent) was only half of estimated 1970 percentage.

Table 5. Species composition in percent 1/ of creeled fish checked in the 1974 Georgetown Lake summer creel census (number of fish checked in parentheses)

	Rainbow trout	Cutthroat trout	Kokanee	Brook trout	Grayling & other spp.
Shore	91.5 (2146)	0.0 (1)	3.9 (91)	4.2 (99)	0.0 (9)
Boat	37.9 (1265)	0.0 (0)	61.0 (2037)	1.0 (34)	0.0 (2)
Total	60.0 (3411)	0.0 (1)	37.4 (2128)	2.3 (133)	0.0 (11)

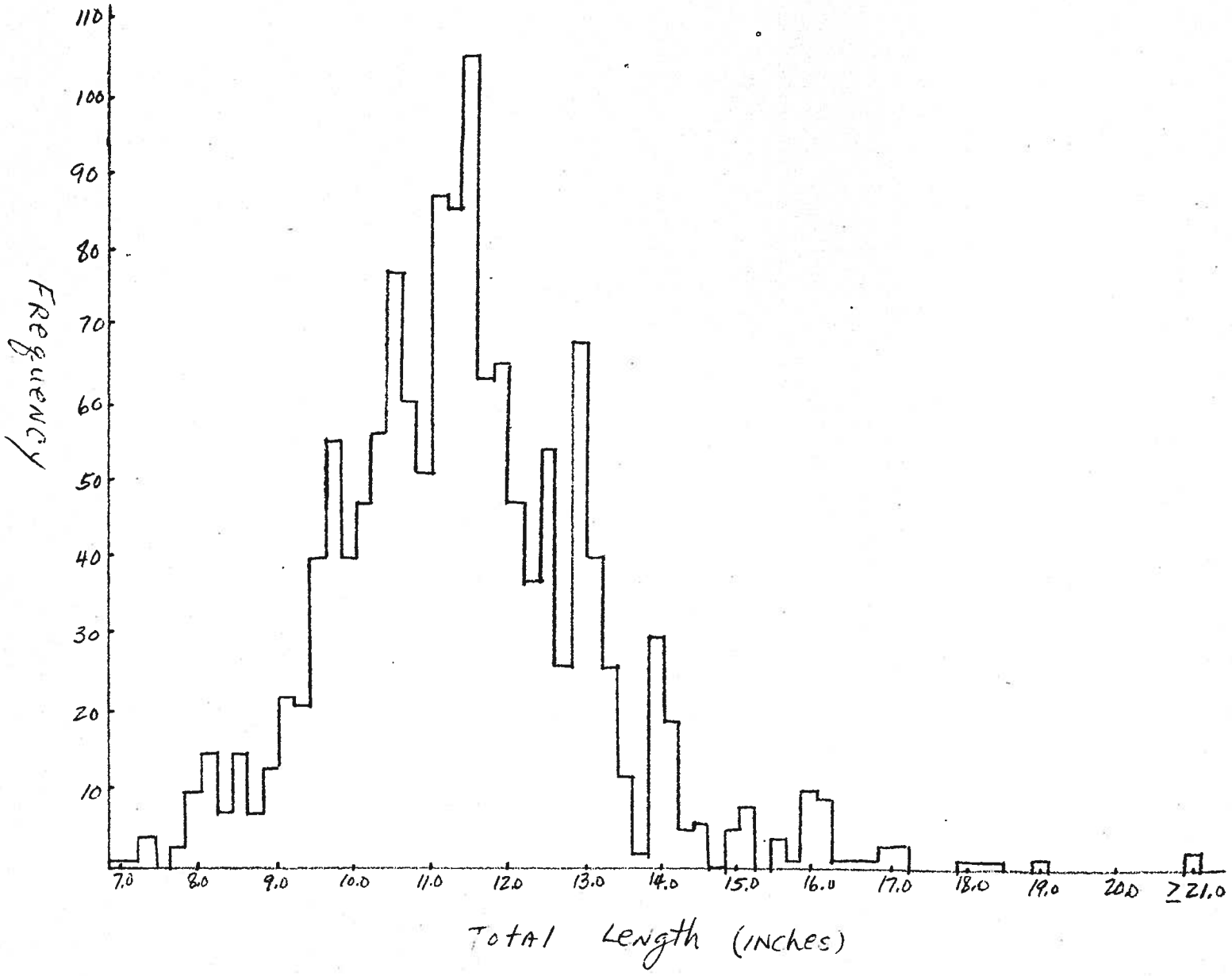
1/ Percentages do not add to 100% due to rounding errors

The Role of Hatchery Trout in the Fishery

Rainbow trout are the only fish currently stocked in Georgetown Lake. The results of the 1974 creel census give an approximate estimate of the rate of return on these trout.

For the purposes of this estimate, the assumptions of constant mortality and recruitment were made. Mortality (harvest) has increased at slightly less than 4 percent per year while recruitment (stocking) has averaged 308,000 per year (Table 7) with approximately 10 percent average variation. In addition, most fish appear to be harvested within 2 years of planting (Figure 1). The above rates were constant enough over the short term to justify the assumptions. Natural reproduction is not known but is assumed to be minimal.

Figure 1. The Length-frequency distribution of Rainbow trout creeled by anglers on George-Town Lake in July and August, 1974.



Accordingly, the harvest of 137,000 rainbows in the summer would indicate a return of 45 percent of planted rainbows. In addition, ice fishermen harvest approximately 45,000 rainbows each winter (Georgetown Lake Pre-Study, 1973; Miller, 1974). This total yearly harvest of more than 180,000 rainbows would indicate that nearly 60 percent of a plant of rainbows is eventually harvested by anglers. Angling mortality due to bait fishermen landing and releasing small rainbows may account for a portion of the unharvested population. It would appear that rainbows are subject to heavy exploitation and this may account for the small average size of creeled fish.

RECOMMENDATIONS

Correct interpretation of the creel census results hinges on the availability of good biological information on growth, mortality, and recruitment in the fishery. To gain this information, all fish planted in the lake should be marked with flourescent pigments and recovered through the summer with gill net sets and a limited creel census.

Literature Cited

Deer Lodge and Granite County Committees for Rural Development. 1973. Georgetown Lake Pre-Study. 24 pp.

Miller, B., and R. Marcoux. 1974. Inventory of Waters of the Project Area. Montana Federal Aid Project F-12-R-20 (Progress Report for Job 1-a), Montana Department of Fish and Game, Mimeo, 13 pp.

Spence, L. 1970. Georgetown Lake Summer Creel Census. Montana Federal Aid Project F-12-R-17 (Progress Report for Job 1-b), Montana Department of Fish and Game, Mimeo, 30 pp.

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Date: January, 1976

Water Referred To: 2-06-7961-5 Georgetown Lake

Table 6. Average effort and success rates by strata from individual fishermen interviews. Standard errors of the means are in parentheses

	Shore fishermen			Boat fishermen			All fishermen		
Stratum	Hours Per man	Fish Per man	Fish Per hr.	Hours Per man	Fish Per man	Fish Per hr.	Hours Per man	Fish Per man	Fish Per hr.
I	3.37 (0.17)	3.27 (0.30)	0.97 (0.08)	4.50 (0.00)	0.00 (0.00)	0.00 (0.00)	3.46 (0.16)	3.01 (0.28)	0.87 (0.08)
II	3.25 (0.10)	3.41 (0.16)	1.05 (0.04)	3.09 (0.08)	5.91 (0.23)	1.92 (0.08)	3.17 (0.07)	4.57 (0.14)	1.44 (0.04)
III	2.99 (0.10)	2.78 (0.15)	0.93 (0.05)	3.09 (0.12)	4.95 (0.23)	1.60 (0.09)	3.04 (0.08)	3.73 (0.13)	1.23 (0.05)
IV	3.27 (0.16)	4.23 (0.25)	1.30 (0.08)	3.31 (0.22)	11.40 (1.61)	3.44 (0.43)	3.28 (0.13)	6.11 (0.46)	1.87 (0.13)
V	4.31 (0.24)	4.59 (0.30)	1.07 (0.08)	3.62 (0.22)	11.65 (1.20)	3.22 (0.24)	4.01 (0.17)	7.61 (0.54)	1.90 (0.10)
Total	3.18 (0.06)	3.22 (0.10)	1.01 (0.03)	3.13 (0.07)	5.91 (0.17)	1.89 (0.06)	3.16 (0.05)	4.38 (0.09)	1.39 (0.03)

Table 7. Plantings of rainbow trout in Georgetown Lake, 1969-1974

Year	Number	Size
1969	299,692	4 - 9"
1970	348,720	5
1971	350,446	4 - 6
1972	300,129	4
1973	301,718	5
1974	249,595	6