MONTANA FISH AND GAME DEPARTMENT
Fisheries Division
Helena, Montana

JOB COMPLETION REPORT
INVESTIGATIONS PROJECTS

State of Montana

Project No. F-12-R-9 Name: Western Montana Fishery Study

Job No. II-A Title: Georgetown Lake Creel Census

Period covered: December 1, 1962 to March 30, 1963

Abstract:

A winter creel census was conducted at Georgetown Lake during the 1962-1963 special 27 day winter ice fishing season. An estimated 11,774 fisherman harvested 34,969 game fish for 46,432 hours of fishing effort. The average hourly catch rate was 0.75 fish and the average catch per angler was 2.97 fish. Hatchery rainbow and cutthroat, exclusive of the 1961 plant, comprised 55.2 percent of the harvest. Local anglers made up 96.4 percent of the angling pressure.

Approximately one-third of the annual harvest and one-fourth of the annual fishing pressure occurs during the special ice fishing season. Winter anglers have been more successful than the summer anglers.

Recommendations:

Continue the winter census another year to determine the effect of fishing pressure and harvest with a more liberal season. Proposals were made to extend fishing privileges to include weekdays as well as weekends during the 1963-1964 winter ice fishing season. The number of fishing days will be increased from 27 to 71 days.

Objectives:

The objective of this project is to obtain necessary data for the determination of harvest and pressure estimates during the special ice fishing season on Georgetown Lake. In addition, it is desired to evaluate the contribution of hatchery planted trout to the Georgetown Lake fisheries.

Techniques used:

The 1962-1963 winter ice fishing season opened December 12, 1962 and continued through February 24, 1963. During this period, fishing was permitted during regular fishing hours (0500-2200 hours) on Saturdays, Sundays, and legal holidays. A creel census technician was on duty each day of the 27 day season.

Techniques cont.

Census days were designated as either morning or afternoon census periods and were of a 9-hour duration. The selection of census periods was chosen in a systematic random manner following an initial random selection of a time period. The morning census period began at 0600 hours and ended at 1500 hours. The evening census period began at 1200 hours and continued until 2100 hours. The census scheduling is shown in Appendix A.

Completed trip information was obtained from each fishing party. This information included: the number of anglers in the party, residency of the angler, length of the fishing trip, species caught, and the total number of fish caught. Clip marks of hatchery fish were recorded to provide information on the success of hatchery plants.

In addition to completed trip information, the census technician was instructed to obtain counts of angler cars during daylight hours and light counts on the ice during the hours of darkness. Light and car counts were made at 3-hour intervals from the beginning to the close of each census day. Consequently, four counts were made during the census day.

The number of anglers per light was determined by a subsample of the pre-dawn and late evening anglers. The number of anglers per car was established by dividing the total number of party contacts by the total number of anglers, since one census form was used for each car interview.

With one exception, the mechanics of the census were similar to census conducted on Georgetown Lake during the winter ice fishing season of 1960-1961. Formerly, the lake was divided into three areas to obtain catch and pressure data from each portion of the lake. Each area of the lake was sampled for a 3-hour period during the census day. This method of sampling was discontinued because certain areas of the lake had greater fishing use than others. Much valuable contact information was lost when sampling areas of light fishing pressure.

Contact information was taken from all areas of the lake as fishing parties departed from the ice. As snow conditions worsened, anglers were unable to drive onto the ice and fishermen concentrated their efforts to the more accessible areas along the highway. Efforts were made to obtain a larger number of contacts by sampling the areas with the greatest fishing pressure.

Prior to 1960, Georgetown Lake was stocked annually with 300,000 fingerling trout from the Anaconda Fish Hatchery. During the years 1958 through 1960, 150,000 each of cutthroat and rainbow trout were stocked, a third of which were distinctively marked. Previous investigation from a summer census conducted in 1961 has shown a greater return to the creel of rainbow than cutthroat trout. Consequently, from this evaluation, cutthroat trout were removed from the planting program and their numbers were replaced by rainbow trout on the 1962 and 1963 stocking programs. In 1961, 410,000 unmarked fish were planted in the lake. Of these 89,000 were 7 to 9 inch rainbow trout. In 1962, 225,927 rainbow were stocked of which 125,927 were of catchable size. Approximately one-third of the catchable fingerling rainbow were marked by removal of the right premaxillary bone.

for the operation of the census was formulated under the direction ment statistician. Census data were compiled monthly and reported arrative summaries. Census contact forms were sent to the depart- B. M. service and information was recorded on standard I. B. M. punch

The following species of game fish contributed to the Georgetown Lake fishery during the winter of 1962-1963: Rainbow trout (Rb), Salmo gardneri; cutthroat trout (Ct), Salmo clarki; Kokanee (KOK), Oncorhyncus nerka; brook trout (Eb), Salvelinus fontinalis; artic grayling (Gr), Thymallus arcticus; and brown trout (LL), Salmo trutta.

Information regarding the species composition of the catch by percent, and numbers recorded by the census technician, are presented in Table 1.

Table 1. Species composition by percent of catch recorded by census technician, Georgetown Lake, 1962-1963 winter census (numbers of fish are in parenthesis).

Rb*	Rb**	Ct	Ct***	Kok.	Eb.	Gr.	LL
54.5	17.3	14.4	1.1	6.7	6.1	trace	trace
(1001)	(573)	(477)	(41)	(221)	(201)	(1)	(1)

*Unmarked hatchery Rb and Ct (includes wild fish and the 1961 plant which was not marked, and the unmarked two-thirds of all other plants)
** Marked hatchery rainbow (one-third of plant marked)
*** Marked hatchery cutthroat (one-third of plant marked)

Rainbow and cutthroat trout are the two most important species which contribute to the Georgetown Lake fishing. These species comprise 86.9 percent of the harvest.

As was stated previously, one-third of the 1962 hatchery plants in Georgetown Lake were marked. The percent of harvest of both rainbow and cutthroat hatchery trout, exclusive of the 1961 plant, was 55.2 percent. The composition of wild and unmarked rainbow stocked in 1961, was 19.8 percent. Unmarked and wild cutthroat made up 12.2 percent of the catch.

During the 1962-1963 winter ice fishing season, the census technician interviewed 1114 fishermen. These anglers were successful in catching 3314 fish for 4397 hours of fishing effort. The catch rate per angler was 2.97 fish and the average hourly catch rate was 0.75 fish. The average length of angler trip was 3.97 hours.

For purposes of data analysis, the season was stratified into two segments, opening day (strata 1) and weekends and holidays, (strata 2). These strata are treated independently.

The data analysis is dependent upon the relationship between angler and light counts, angler and car counts, and the expansion of contact data for the period of day not censused.

To calculate the fishing pressure in terms of total number of anglers, the average number of fishermen per hour is multiplied by the total possible fishing hours for each strata to obtain the total hourly effort expended. This value is then divided by the average length of trip to determine the total number of fishermen. The total number of anglers during the season is the combined angler-use from strata I and II. Harvest estimates can then be derived from the catch-per-angler-hour value for each strata.

The procedure for calculating the total number of anglers is as follows:

(1) Multiply the average number of anglers per light by the total light counts to determine total light-angler counts.

(2) Multiply the average number of anglers per car by the number of car counts to determine car-angler counts.

(3) Add the total car and light counts.

(4) Divide the car and light counts by the number of hourly counts to establish the average number of anglers per hour.

(5) Multiply the number of hours in the fishing day by the average number of angler hours per day.

(6) Divide the total number of angler hours by the average length of fishing trip to determine the total number of anglers.

(7) Add the total number of anglers from strata I and strata II.

Harvest estimates were determined by multiplying the total number of fisherman by the hourly catch rate.

A general description of data analysis is described in Appendix B. The values obtained for the computation of data are shown in Appendix C. Total estimates of fishermen, hours fished, harvest and fiducal limits at the 95 percent level are presented in Table 2.

Table 2. Estimates of fishermen, hours fished, harvest anf fiducal limits at the 95 percent level

	Lower limit	Point estimate	Upper limit
Fishermen			
Opening day	1,235	1,366	1,497
Weekends and holidays	9,808	10,408	11,008
Total fishermen	11,043	11,774	12,505
Hours fished			
Opening day	4,802	5,313	6,443
Weekends and holidays	37,165	41,119	45,073
Total hours fished	41,967	46,432	51,516
Harvest			
Opening day	3,560	3,719	3,878
ekends and holidays	30,016	31,250	32,072
Total Harvest	33,576	34,969	35,950

Approximately 12 percent of the seasonal fishing pressure and harvest was accounted for on opening day. The number of angler trips on opening day was 1366 as compared to an average of 400 per day on weekends and holidays for the remainder of the season.

In comparison to the winter census conducted on Georgetown Lake during the 1960-1961 winter season, the number of angler trips, harvest, and total fishing hours declined appreciably over the 1962-1963 winter season. The number of angler trips declined from 15,324 to 11,774 or in terms of trips per acre dropped from 5.1 to 3.9. The total hourly effort decreased from 68,868 to 46,452 hours. Total harvest showed a decrease of approximately 15,000 fish, dropping from 49,175 to 34,967. The hourly catch rate increased slightly from 0.71 during the 1960-1961 season to 0.75 for the 1962-1963 season.

Additional creel information was obtained by a summer creel census during the summer of 1962. Total pressure and harvest data for the combined winter and summer census are shown in Table 3.

Table 3. Georgetown Lake pressure and harvest estimates during the summer of 1962 and winter of 1962-1963

	Fishermen	Hours fished	Harvest	Catch per hour	Anglers per acre
Summer census (May 20-Oct. 31)	44,500	174,629	82,970	0.48	14.8
Winter census (Dec 12-Feb 24)	11,774	46,432	34,969	0.75	3.9
Combined total	56,274	221,061	117,939	0.53	18.7

Approximately one-fifth of the total angling pressure and one-third of the harvest occurred during winter ice fishing season. The winter hourly catch rate increased by 0.27 fish per hour as compared to the summer hourly catch rate.

The estimated weight of the total catch was calculated by multiplying the total number of each species by the average weight of each species. Individual weights were collected from 605 fish. The estimated weights and numbers of four species of game fish are presented in Table 4.

Table 4. Average weight, estimated total numbers and estimated total weight of fish checked through checking station. Total number of fish weighed in parenthesis.

Species	Average weight (lbs)	Estimated number	Estimated weight (lbs)
Rb (498)	0.77	25,038	19,279
Ct (55)	1.15	5,455	6,273
Eb (47)	0.79	2,133	1,685
Kok (5)	1.24	2,343	2,905
		Total weight	30,142

By weight, rainbow trout made up approximately 60 percent of the harvest. The total harvest of game fish was 30,142 pounds.

A check on the residency of anglers shows that the winter-ice fishing is primarily of local significance. Approximately 97% of the anglers reside within a 40-mile radius of the lake. Most of the local pressure comes from the urban areas of Anaconda and Butte. About 3% of the angling pressure resides at a distance of greater than 40 miles and about 1% of the anglers are from out of state.

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Appendix A.

Georgetown Lake winter creel census schedule-1962-1963

December	9, 15, 16*, 22*, 23, 25*, 29, 30*
January	1, 5*, 6, 12*, 13, 19*, 21, 26*, 27
February	2*, 3, 9*, 10, 12*, 16, 17*, 22, 23*, 24

* indicates afternoon census day.

Appendix B.

Summary of Georgetown Lake data analysis

Strata I (opening day)

	No. of counts at 3-hour intervals	Total lights or cars counted	Ave. no. of anglers per car or light	Estimated fishermen
Light counts	1	140	1.46	204
Car counts	3	508	2.06	1046
Total	4			1250

$\frac{1250}{4}$ = (Estimated fishermen) = 312.5 (ave. no. of anglers per hourly count)
(No. of counts at 3-hour intervals)

312.5 x 17 (total fishing hours in strata I) = 5312.5

$\frac{5312.5}{3.89}$ = (total angler-hours in strata I) = 1366 (total fishermen)
(ave. length of trip in hours)

5312.5 x 0.70 (catch per angler-hour) = 3719 (total harvest)

Strata II (weekends and holidays)

	No. of counts at 3-hour intervals	Total lights or cars counted	Ave. no. of anglers per car or light	Estimated fishermen
Light counts	31	1141	1.59	1814
Car counts	69	3653	2.05	7489
Total	100			9303

$\frac{9303}{100}$ = (Estimated fishermen) = 93.03 (ave. no. of anglers per hourly-count)
(No. of counts at 3-hour intervals)

93.03 x 442 (total angler-hours in strata II) = 41,119

$\frac{41,119}{3.95}$ = (total angler-hours in strata II) = 10,408 (total fishermen)
(ave. length of trip)

41,119 x 0.76 (catch per angler-hour) = 31,250 (total harvest)

Appendix C.

Values obtained for use in computation of data for Strata I and II.

	Strata I (opening day)	Strata II (weekends an holidays)
Number of fishing days in season	1	26
Number of fishing hours in season	17	442
Anglers per light	1.46	1.59
Anglers per car	2.06	2.05
Average number of anglers per hourly count	312.5	93.0
Total fishing pressure in hours	5,313	41,119
Total number of anglers	1,366	10,408
Total harvest	3,719	31,250
Average length of trip (hours)	3.89	3.95
erage catch per angler	2.68	3.00
Average catch per angler-hour	0.70	0.76