MONTANA FISH AND GAME DEPARTMENT
FISHERIES DIVISION
HELENA, MONTANA

JOB COMPLETION REPORT
RESEARCH PROJECT SEGMENT

State of Montana

Project No. F-7-R-16 Name: Northwest Montana Fishery Study

Job No. 1 Title: Inventory of Waters of the Project Area

Period Covered: July 1, 1966 to June 30, 1967

ABSTRACT:

Fish population surveys were conducted for 31 lakes in District One to provide additional information for the management of these lakes. Contour maps of 6 lakes were produced from electronic soundings.

A winter creel census was conducted during an eight-day special winter fishing season at Lake Mary Ronan. Total fishing pressure and harvest data were obtained.

Opening day creel census information was collected for Kilbrennan and Mary Ronan Lakes to obtain angling pressure and catch rates. The effect on the harvest of brook trout by the recent 10 pound brook trout limit is discussed briefly.

A rainbow tagging study was initiated for waters in the Swan River drainage. A total of 7,825 catchable rainbow trout were tagged at the Creston fish hatchery and stocked into Holland Lake, Swan Lake and Swan River in July 1966. Fishermen volunteer tag returns totaled 647 as of January 1967, for a return rate to the creel of 8.27 percent. A minimal amount of upstream and downstream movement was noted.

RECOMMENDATIONS:

It is recommended that the project be continued to obtain additional information on chemical, physical and biological characteristics of waters in the project area for purposes of evaluating present and instigating new management practices.

OBJECTIVES:

The objective of this project is to obtain biological, chemical and physical data on lakes, streams and reservoirs and to prescribe management practices where needed.

TECHNIQUES USED:

Experimental gill nets of graduated mesh size from 3/4 to 2 inches (bar measure) were used to sample fish populations in lakes. Individual total lengths and weights of fish were recorded and scale samples were collected for age and growth analysis. Age and growth data have not been analyzed to date but will be incorporated into the F-7-R-17 Completion Report. Lake depths were determined with a Bendix echo sounder or a Lowrance Fish-Lo-Kator. Tracings made from aerial photos, Geological Survey maps or Forest Service maps were enlarged with a pantograph and served as base maps. Electronic soundings provided information for bottom countours and data were transferred to the outline work map. Reduced copies of the finished lake contour maps were printed and made available for public distribution.

Alkalinity, pH, and conductivity of water samples were collected from most lake surveyed. Dissolved oxygen tests were made where necessary.

Colored plastic jaw tags, inserted in the lower jaw, were used to mark rainbow trout plants.

Lake survey data are kept on standard file cards at both the district and Helena offices.

FINDINGS:

The following fish species were collected from lake surveys conducted between July 1, 1966 and June 30, 1967. Game fish species found were lake whitefish (LWf) Coregonus clupeaformis; mountain whitefish (Wf) Prosopium williamsoni; kokanee (Kok) Oncorhynchus nerka; cutthroat trout (Ct) Salmo clarki; rainbow trout (Rb) Salmo gairdneri; brook trout (Eb) Salvelinus fontinalis; Dolly Varden (DV) Salvelinus malma; lake trout (LT) Salvelinus namaycush; largemouth bass (LMB) Micropterus salmoides. Non-game fish species found included: peamouth (PM) Mylocheilus caurinus; northern squawfish (SQ) Ptychocheilus oregonensis; redside shiner (RSS) Richardsonius balteatus; longnose sucker (LNSu) Catostomus catostomus; largescale sucker (CSu) Catostomus macrocheilus; pumpkinsee (PS) Lepomis gibbosus; yellow perch (YP) Perca flavescens; black bullhead (Bulh) Ictalurus melas. Abbreviations of fish species included in this report are listed above and are set off in parenthesis.

Lake Surveys

Fish population surveys were conducted for 31 lakes in the district where additional data were needed for management. A summary of the netting data collected for 27 lakes is presented in Table 1. Contour maps of 6 lakes have been drawn up and printed from sonar depth recordsing. Copies of these maps are available at the district office in Kalispell.

Flathead River Drainage: Lake population surveys conducted in the Flathead River drainage include: Pratt, Double, Sawdust, Blaine, Mary Ronan, Skag, Upper Stillwater, Big Salmon, Black, North Jewel, Wildcat and Twin Lakes.

Pratt, Double and Sawdust Lakes are small pothole lakes located a few miles north of Creston. These are marginal trout waters presently managed for rainbow trout. The fish population of these lakes was sampled in July 1966. Sawdust Lake was found to have a fair population of rainbow trout. Pratt and Double Lakes contained large populations of non-game fish, mainly yellow perch and bullheads. Because of the high incidence of non-game species, rainbow trout plants in these (Pratt and Double) lakes will be discontinued for the present. A re-assessment of the management plans for other pothole lakes, being presently managed for rainbow trout, will be conducted in the near future.

The fish population of Lake Blaine was sampled with 4 gill nets in October 1966. Rough fish (suckers, squawfish, yellow perch and pumpkinseed) composed 98 percent of the catch while game fish (rainbow and lake trout) made up the remainder of the catch. The relatively few rainbow collected in the catch, coupled with poor angling success, would indicate poor survival of sub-catchable rainbow plants. Rainbow stock will be discontinued. Future management plans will include lake renovation and restocking with a suitable trout species.

The fish population of Lake Mary Ronan, near Proctor, was sampled with 5 gill nets in the fall of 1966 and the spring of 1967. Rainbow trout in the 10- to 12-inch class comprised about 90 percent of the rainbow captured in the spring sampling data. This size group was also prevalent in the opening day catches of rainbow trout. Kokanee averaging 13.0 inches in their third year of life comprised 32 percent of the kokanee in October 1966 netting efforts. In May 1967, kokanee in the third year of life averaged 10.0 inches and comprised 37 percent of the kokanee catch. Changes in present management plans are discussed in section concerning creel census.

Skag Lake was netted in the spring of 1967 after reports had been received of a winter fish kill. Several dead rainbow trout were observed along the shore line. One adult rainbow trout was observed cruising along the shore line. No fish were collected from two overnight gill net sets. The winter fish mortality was termed as "severe". Recommendations were made to stock rainbow trout fry to offset the loss.

Upper Stillwater Lake, north of Whitefish, was netted to determine the status of the existing fish population. Non-game fish, mainly peamouth, squawfish and yellow perch, comprised 54 percent of the catch. The lake supports an excellent population of mountain whitefish. This species made up 40 percent of the total fish population. No changes in present management of this lake are anticipated.

Table 1. Summary of gill net catch data from lake population surveys, 1966-1967

Lake (I.B.M. card no.)	No. of Net sets	Species (numbers)	Size range in inches (game species)	Percent of game species	Average length in inches (game species)
Flathead River Drainage					
Sawdust (07-9600-03)	1	Rb (11)	Rb (9.1-18.4)	100	Rb (16.1)
Pratt (07-8340-03)	1	YP (21)	YP (5.8-11.5)	0	YP (7.1)
Double (07-6020-03)	1	Bulh (54 (Rb (1)	Bulh (5.7-8.6) Rb (12.5)	2	Rb (12.5)
Blaine (07-5380-03)	4	Rb (1) Lt (1) PS (3) SQ (73) YP (16) CSu (11) FSu) (2)	Rb (25.0) 1/ Lt (30.0) 1/	2	Rb (25.0) 1/ Lt (30.0) 1/
Mary Ronan 2/ (07-7700-03)	5	Rb (4) KOK (54) PS (30)	Rb (9.7-10.6) KOK (7.3-20.1)	66	Rb (10.0) KOK (14.2)
Mary Ronan 3/ (07-7700-03)	5	Rb (45) LMB (8) KOK (58) PS (404)	Rb (10.0-18.6) LMB (7.3-8.1) KOK (9.0-15.6)	22	RB (12.2) LMB (7.9) KOK (12.5)
Skag (07-8620-03)	2	None	---	0	---
Upper Stillwater (07-9440-05)	5	Wf (91) Rb (2)* FSu (1) Eb (1) DV (CSu (6) SQ (21)	Wf (8.8-11.9) Rb (14.5-17.2) Eb (8.5) DV (8.0-15.1)	54	Wf (10.7) Rb (15.9) Eb (8.5) DV (10.9)
Rogers (07-9540_03)	3	None	---	---	---

Table 1. cont'd

Whitefish (07-9540-03)	5	LWf (77) DV (10) Wf (6) Lt (1) CSu (1) CRC (12) SQ (22)	LWf (9.5-19.5) Wf (8.0-10.6) DV (7.9-29.3) Lt (21.8)	73	LWf (13.7) Wf (9.6) DV (17.1) Lt (21.8)
Upper Whitefish (07-8620-03)	3	DV (15) Ct (1) FSu (20)	DV (7.7-15.6) Ct (7.7)	44	DV (12.3) Ct (7.7)
Big Salmon (8-8140-03)	10	Wf (126) DV (59) Ct* (22) FSu (64)	Wf (7.0-13.0) DV (7.4-29.8) CT* (6.6-16.6)	76	Wf (9.2) DV (13.8) Ct* (10.9)
Black (8-8160-03)	1	Ct* (7)	Ct* (10.5-16.0)	100	Ct* (13.7)
North Jewel (8-9370-03)	1	Rb (5)	Rb (5.9-14.0)	100	Rb (10.1)
Kootenai River Drainage					
Island (11-8580-03	3	FSu (58) SQ (15) CSu (1) PS (95)	---	0	---
Lynch (11-9100-03)	2	FSu (14) SQ (6) PS (1)	---	0	---
Loon (Hwy. 2) (11-8940-03)	3	Wf (5) LMB (3) Rb (3) SQ (10) CSu (10) PS (12) CRC (92)	Wf (8.6-12.2) LMB (11.3-13.2) Rb (11.3-12.8)	8	Wf (11.0) LMB (12.4) Rb (12.1)
Horseshoe (Hwy. 2) (11-8520-03)	3	SQ (50) PS (1) CSu (28) FSu (1)	---	0	---
Loon (11-8960-03)	3	Eb (7) RS (2)	Eb (14.2-17.2)	78	Eb (15.2)
Marl (11-9120-03)	3	Wf (34) Eb (1) Rb (3) SQ (38)	Wf (10.0-14-6 Rb (16.1-25.5) Eb (9.9)	50	Wf (12.0) Rb (21.1)

Table 1. cont'd

Alkali (11-7820-03)	2	None	---	0	---
Othorp (11-9320-03)	3	Rb (8)	Rb (11.8-17.2)	100	Rb (14.6)
Hoskins (11-8540-03)	2	Ct (36)	Ct (10.7-14.1)	100	Ct (12.3)
Sophie (11-9620-03)	3	Rb (14) Ct (1) DV (8) FSu (32) SQ (119)	Rb (11.1-17.5) Ct (11.5) DV (9.2-13.8)	13	Rb (13.3) Ct (11.5) DV (12.3)
Clark Fork River Drainage					
Rainbow-Dog (5-9408-04)	2	Rb (7)	Rb (5.9-12.1)	100	Rb (8.6)
McGregor (5-9216-03)	5	Rb (13) Lt (29) Wf (3) FSu (31)	Rb (11.4-14.4) Lt (10.6-20.5) Wf (10.5-13.3)	59	Rb (13.4) Lt (16.7)
Wanless (5-9776-03)	2	Ct (13)	Ct (6.0-16.1)	100	(Ct (10.4)
Cirque #2 (5-8551-03)	1	Ct (3)	Ct (11.0-13.6)	100	Ct (12.4)

1/ Estimated length - fish released
2/ Fall netting data - 1966
3/ Spring netting data - 1967
* Includes RbxCt hybrids

Rogers Lake, a grayling brood lake, located west of Kalispell, was netted in the spring of 1967 to determine the survival of adult grayling. This investigation was initiated after the grayling spawning run failed to materialize. The absence of grayling in Rogers Lake probably results from a combination of factors; a partial winter mortality due to oxygen deficiency and natural mortality of over-age brood fish. Annual restocking efforts of grayling fry have been made in previous years but failed. Grayling fry entering the lake were subject to predation by a well established redside shiner population. It is recommended that the lake be renovated in the summer of 1967 and restocked with grayling fry to develop grayling brood stock.

The fish population of Whitefish Lake was sampled with 5 gill nets in May, 1967. Lake Whitefish was the predominant species comprising 82 percent of the game fish composition. Dolly Varden trout made up 11 percent of the game fish species, the largest weighing 11.25 pounds. No change in present management plans is anticipated.

Upper Whitefish Lake was sampled with 3 gill nets in August, 1966. Dolly Varden trout composed 52 percent of the total catch. All were less than the 18 inch minimum size limit for this species in the Flathead River drainage. Cutthroat trout populations, once numerous in this drainage, were sparse. It is recommended that sub-catchable cutthroat trout be introduced to replenish cutthroat populations and the size limit on Dolly Varden be removed to increase the harvest of this species.

Big Salmon Lake, located in the Bob Marshall Wilderness area, was surveyed to determine the extent of downstream migration of rainbow trout from the upper portion of the drainage and to determine the extent of hybridization with the native cutthroat species. The species composition of the catch from 10 gill net sets is as follows: mountain whitefish 47 percent, Dolly Varden 22 percent, cutthroat trout 8 percent and longnose sucker 23 percent.

A number of 14 to 16 inch cutthroat trout were caught by hook and line and released in the Big Salmon River approximately one mile above the lake. Although several lakes at the headwaters of the drainage are populated with rainbow trout little evidence of hybridization was found. Examination of 70 cutthroat trout from the lake-river complex showed only 2 fish with visible characteristics of hybridization. No changes in management plans were recommended for Big Salmon Lake.

Four lakes were surveyed in the Jewel Basin area. Netting data were collected from Black and North Jewel Lakes. These lakes contain fair populations of cutthroat trout and rainbow trout respectively. Hook and line sampling was accomplished for Wildcat and Twin Lakes. Several-14 inch cutthroat were collected from Wildcat Lake. No fish were collected from Twin Lakes. This lake appears to be very shallow and would probably not support fish life through the winter. No changes in management were recommended for these lakes.

Kootenai River Drainage: Lakes surveyed in the Kootenai River Drainage include: Island, Lynch, Loon (Hwy. 2), Horseshoe (Hwy. 2), Loon (Trego), Marl, Alkali, Othorp, Hoskins, and Sophie.

Island and Lynch Lakes are located in the upper Fisher River Drainage and were surveyed in July, 1966. No game fish were collected from either lake. The lakes are warm, shallow and choked with dense weed growth. Island Lake has a maximum depth of 40 feet and could be considered as marginal trout habitat. No change in present management plans is being considered. In the future when the demand for additional trout waters exists, Island Lake could be renovated and converted to a trout producing lake.

Loon Lake (Hwy. 2) was sampled with 3 gill nets shortly after ice break-up in April, 1967. The nets were placed in shallow areas of submerged vegetation in an attempt to determine trends in an existing northern pike spawning population. No northern pike were collected. Two adult northern pike had been captured in a similar netting effort in the spring of 1964 and were the first recorded from the Kootenai Drainage. Subsequent annual spring netting efforts have failed to capture this species. It is believed poorly considered stocking of northern pike by some mis-informed sportsmen failed to materialize. No changes in present management plans are anticipated.

Horseshoe Lake (Hwy. 2) was sampled to determine the status of the game fish population. Netting results indicated an abundant population of rough fish species, namely squawfish and suckers. No trout species were collected. It is recommended that the lake be rehabilitated and restocked with a trout species.

Fish population sampling was conducted for Loon and Marl Lakes in the vicinity of Stryker. A few brook trout were collected from Loon Lake and mountain whitefish was the most abundant game fish collected from Marl Lake. It is recommended that cutthroat trout be introduced into Loon Lake to supplement the brook trout population and also in Marl Lake.

Alkali and Othrop are hardwater lakes in the vicinity of Eureka and were sampled to determine the success of catchable rainbow plants. No fish were collected from Alkali Lake and only 8 rainbow were collected from Othrop Lake. Repeated stocking efforts of catchable size rainbow have failed to provide a fishery. Attempts will be made to establish a warm water fishery by introducing largemouth bass.

Hoskins Lake, a small pothole lake in the upper Yaak River Drainage, was sampled with 2 gill nets in the fall of 1966. The lake was stocked with 3-inch cutthroat trout in the fall of 1964 after sampling earlier in that year showed the lake to be devoid of fish life. Cutthroat trout averaging 18 fish per net and 12.3 inches in length were collected in 1966. It is recommended that this lake be stocked with sub-catchable cutthroat trout every third year.

Three gill net sets were made in Sophie Lake to determine the abundance of game fish and the incidence of a tapeworm (Diphyllabothridae) in rainbow trout. Northern squawfish and longnose sucker, composed 80 percent of the fish population. Game fish included rainbow trout, Dolly Varden and cutthroat trout. About 90 percent of the rainbow trout possessed the larval tapeworm. The tapeworm larva was not present in either the cutthroat trout or Dolly Varden. A high incidence of tapeworm (Ligula sp.) was present in the sucker population. No changes in present management are recommended. When larger cutthroat become available for stocking it is recommended that this species be substitued for rainbow.

Clark Fork Drainage: Population surveys of lakes in the Clark Fork Drainage included: Rainbow-Dog, McGregor, Wanless, and four Cirque Lakes.

Rainbow-Dog Lake was sampled with 2 gill nets set in April, 1967 to check the survival of sub-catchable rainbow trout plants. The lake was stocked in September, 1966 following lake rehabilitation in June, 1966. Few trout were collected from the nets. It was believed that the sub-catchable plant had not grown sufficiently to be collected by netting. This belief was substantiated when increasing numbers of larger trout were being caught by anglers later in the summer. Present management recommendations are to continue stocking sub-catchable rainbow trout on alternate years.

McGregor Lake was netted to determine the success of a rainbow trout introduction in 1966. Prior to 1966 few game fish except lake trout were collected from gill net samples. Population sampling in June, 1967 gave evidence of good survival and growth of rainbow trout. Rainbow trout comprised 30 percent of the game fish collected and game fish made up 59 percent of all fish caught. It is recommended that sub-catchable rainbow trout plants be continued on an annual or biennial basis.

Wanless lake and four Cirque Lakes were sampled in September, 1966. These lakes lie off one of the main trails leading into the heart of the Cabinet Mountain Wilderness Area. Cirque Lakes 1, 3 and 4 were sampled by angling. An adequate self-sustaining population of cutthroat was present in Cirque Lakes 3 and 4. A remnant population of older cutthroat was caught in a gill net set in Cirque Lake 2. No fish were collected from Cirque Lake 1 by angling efforts and no evidence of fish life was observed. Fair numers of cutthroat trout were netted from Wanless Lake. Cutthroat fry plants were recommended for Cirque Lakes 1 and 2. No changes in management were recommended for Wanless Lake and Cirque Lakes 3 and 4.

Lake Mary Ronan Winter Creel Census

The creel census was conducted to determine total harvest and fishing pressure during the special winter fishing season. The winter fishing season opened February 4, 1967 and extended through February 26, 1967. Fishing was permitted on weekends only during the hours of 8 A. M. to 5 P. M. Creel census data were collected during the eight day (4 weekends) season. Census clerks were on duty for the entire length of the fishing day.

An attempt was made to obtain completed trip information from as many anglers as possible. This information included: the number of fishermen in each party, the length of time spent fishing, species caught, total number of fish caught, bait used and the county residence of the fishermen. When time permitted, census clerks collected total lengths, weights and scale samples from game fish species.

The following species of fish were checked during the special winter fishing season: rainbow trout, largemouth bass, and pumpkinseed.

Creel census clerks interviewed a total of 437 fishermen for completed trip information. These fishermen were successful in catching 116 game fish during 1488 hours of fishing effort. The average length of angler trip was 3.36 hours. The average catch per angler was 0.26 fish and the average hourly catch rate was 0.08 fish. A summary of the creel census data is presented in Table 2.

Rainbow trout comprised 97 percent of the winter game fish harvest. Largemouth bass, the only other game species observed, made up the remaining 3 percent. No kokanee were accounted for despite their predominance in the summer game fish harvest. One kokanee was reported caught but not observed by the census clerk. The kokanee was described as soft, heavily scarred, and was presumably a late spawner. In addition to the game fish harvest, 28 pumpkinseeds averaging about 6 inches were checked by census takers.

Lake Mary Ronan supported an average of 55 fishermen trips per day during the special winter season. Approximately 65 percent of the total fishing pressure was concentrated on the first weekend of the season. Thereafter, fishing pressure declined rapidly. Only 16 percent of the total fishing pressure was applied during the second half of the season.

Catch success was exceptionally poor. The daily catch rate per angler ranged from 0.01 (Feb. 5) to a high of 0.88 (Feb. 25). Saturday fishermen experienced somewhat better success than did the Sunday fishermen.

A check on county residence of anglers showed that 46 percent of the fishermen resided in Lake County, 38 percent in Flathead County, 9 percent in Missoula County, 4 percent in Sanders County and 2 percent in other counties in Montana. Out of state anglers from Washington and Idaho made up the remaining 1 percent of the fishermen.

Recommendations are: (1) propose a special winter angling season for Lake Mary Ronan during the winter of 1968; (2) expand the season to six weeks and allow fishing on both weekends and weekdays; (3) conduct a creel census to collect information on total harvest and fishing pressure during the special season.

Opening Day Creel Census

Kilbrennan Lake: Creel census information was obtained at Kilbrennan Lake (58.5 acres) on the opening day of the general fishing season May 21, 1967. The census was conducted to determine the effect of a recent state-wide 10 pound brook trout limit on the harvest of one of the better producing brook trout lakes in Montana.

Table 2. Lake Mary Ronan winter creel census data summary - 1967

Date	Number Fishermen	Total hours	Fish caught by species Rb	LMB	Total fish caught	Average length of trip	Catch per angler	Catch per hour
Feb. 4	183	642	43	1	44	3.51	0.24	.07
Feb. 5	105	290	4	0	4	2.76	0.04	.01
Weekend total	288	932	47	1	48	3.24	0.17	.05
Feb. 11	41	136	23	1	24	3.32	0.59	.18
Feb. 12	44	107	12	2	14	2.43	0.32	.13
Weekend total	85	243	35	3	38	2.86	0.45	.16
Feb. 18	19	100	9	0	9	5.34	0.48	.09
Feb. 19	11	20	2	0	2	1.82	0.18	.10
Weekend total	30	120	11	0	11	3.98	0.37	.09
Feb. 25	17	100	15	0	15	5.85	0.88	.15
Feb. 26	23	94	4	0	4	4.07	0.17	.05
Weekend total	40	194	19	0	19	4.82	0.48	.10
Season total	443	1,488	112	4	116	3.36	0.26	.08

In most Montana waters populated by brook trout, this species tends to over-populate and produce a poor quality fishery of small undesirable fish. The liberalized brook trout limit was adopted by the Montana Fish and Game Commission and put into effect on May 22, 1966. It is believed that the special brook trout limit may provide greater utilization of this species and allow better growth conditions by reducing the number of smaller brook trout, especially in streams.

The management of Kilbrennan Lake is quite unique from most other lakes in the state in that the brook trout is protected during spawning and the winter months by a closed season. Fishing starts annually with the general stream fishing season in mid-May and closes October 1. With the exception of Lake Mary Ronan all other fishing lakes in the district are open year around.

Kilbrennan Lake supports a self-sustaining population of brook trout which is not supplemented by hatchery fish. This type of management has proved quite successful for this lake for the past eight years.

Opening day fishing pressure for 1967 was almost twice as great as on opening day of 1966. This increase is probably due to the influx of Libby Dam workers into the area and ideal weather conditions. A total of 335 anglers were contacted during the hours of 8:30 A. M. and 7:00 P. M. This was estimated to be about 75 percent of the opening day angling pressure. During this period 2,027 fish were checked of which 98 percent were brook trout. Rainbow trout composed the remaining 2 percent of the catch. The lake supported 6.95 angler trips and yielded 42 fish per surface acre. The total estimated harvest was 900 pounds or 15.4 pounds per surface acre. Local anglers from Libby and Troy made up 92 percent of the angling pressure.

The average catch per angler increased from 5.9 fish in 1966 to 6.1 fish in 1967 despite heavier fishing pressure in 1967. The average individual total length and weight for brook trout decreased from 10.9 inches and 0.46 pounds in 1966 to 10.1 inches and 0.37 pounds in 1967. Comparative census data from the opening days of 1966 and 1967 are shown in Table 3.

Table 3. Summary of opening day creel census data for Kilbrennan Lake,(1966-1967)

Year	Fishermen contacted	Estimated number fishermen	Average catch per fishermen	Estimated total number harvested	Estimated harvest (trout per acre)	Estimated total pounds
1966	177	228	5.9	1,345	23.0	619
1967	335	407	6.1	2,460	42.0	900

A total of 11.9 percent of the anglers contacted exceeded the 10 fish limit which would have been permitted under the 1965-1966 regulations. On the opening day of 1966,12.0 percent of the anglers exceeded the 10 trout limit.

The liberalized brook trout limit increased the total harvest during opening day in 1967 by 212 fish, which represents 8.6 percent of the total opening day harvest.

At present there appears to be no apparent danger of over harvesting brook trout at Kilbrennan Lake by allowing 10 pounds (no limit in number) in the brook trout limit. None of the 335 anglers caught the allowable 10 pound limit of brook trout. Two parties (5 anglers) averaged 18 fish each, the maximum average number of fish caught per angler. It is recommended that the opening day census be repeated in 1968 to further evaluate the effect of this liberalized brook trout limit on harvest and catch rates.

Lake Mary Ronan: A qualitative type creel census was conducted at Lake Mary Ronan on the opening day of fishing season in 1967. A total of 98 fishermen contacted caught 118 fish at the rate of 0.25 fish per hour. The average catch per angler was 1.20 fish. These catch rates are comparable to those reported for opening day in 1966 but are considerably better than average catch rates reported for the winter of 1967. Opening day angling pressure was considerably higher in 1967 than in 1966. A comparison of opening day census data for 1966 and 1967 is shown in Table 4.

Table 4. Summary of opening day creel census for Lake Mary Ronan for 1966 and 1967

Year	Fishermen contacted	Hours fished	Number fish caught	Average number caught per acre	Average number caught per hour
1966	65	248	80	1.21	0.31
1967	98	463	118	1.20	0.25

Swan River Drainage Tagging Study

A rainbow trout tagging study was initiated in July, 1966 to determine the movements and return to the creel of catchable size fish stocked in the Swan River drainage. A total of 40,312 rainbow trout raised in the Creston Fish Hatchery were released in the lake-river system of the Swan River drainage between July 11 and 15, 1966. Approximately one-fifth of the number of fish released (7,815) were marked with various colored plastic jaw tags inserted in the lower jaw. The color combination identified the release point of each introduction.

Four release areas were selected along the Swan River above Swan Lake. These include: the upper Swan River below Holland and Lindbergh Lakes, the Condon area near Strom's store and the mouth of Cold Creek, the Salmon Prairie area near Salmon Prairie and the mouth of Lion Creek, and the Goat Creek area near the mouth of Goat Creek and Point Pleasant campground. Additional releases were made in Swan and Holland Lakes.

Prior to the study the public was informed of the stocking program through the press and the local radio station. Fishermen were urged to return fish tags to either the Fish and Game Department or to 12 tag recover stations. Business establishments and Forest Service Ranger Stations in the Swan River valley from Big Fork to Seeley Lake served as tag collectors. Posters were also displayed at fishing access points along the Swan River at Swan Lake and Holland Lake. Posters gave notice of the tagging study and instructions on where to return fish tags.

The data collected from the tagging investigation are summarized in Table 5 to January 23, 1967. No additional tags were brought to tag recovery stations after this date and none were turned into District One (Kalispell) Fish and Game headquarters. One tagged fish caught and released in the Swan River in the fall of 1967 was reported to the Fish and Game office.

Rainbow trout plants were made during the week of July 11-15, 1966 at 6 release areas in the Swan River, Swan Lake and Holland Lake. During the week the fish were released, 36 percent of all tag returns were collected,by the end of the 3rd week following release, 70 percent of all tag returns had been collected. The remaining 30 percent of the tag returns trickled in very slowly through the 10th week after stocking. No tags were turned in after the 19th of September 1966.

A total of 647 voluntary tag returns were reported from the 6 release points. The percent of returned tags ranged from a low of 2.5 percent from the Swan Lake release to a high of 13.0 percent of those released at the Goat Creek-Point Pleasant area. Tagged fish returned to the creel were 8.3 percent of all tagged fish released.

No patterns were established by upstream or downstream movements of tagged trout. In general, movements were minimal and the vast majority of tag returns were reported in the immediate vicinity of the respective release areas. The maximum downstream movement was recorded from tag recoveries of two fish caught 15 miles below their releast point at Condon. The maximum upstream movement was recorded from 6 tag recoveries of fish caught 6 miles above that release point at Salmon Prairie.

Fifteen rainbow trout planted in Holland Lake were recaptured in an inlet stream above the lake. Upstream movement from lake to stream was also noted at Swan Lake where 12 fish from the Swan Lake release were recaptured in the mouth of the Swan River. No tags were reported any further downstream than the outlet of the Swan River below Swan Lake.

In view of these findings, the contribution made by stocked rainbow trout is too low to justify the costs of stocking catchable size fish. The stocking of catchable size rainbow trout provided only a short term fishery during the first 21 days after stocking. Furthermore, the return to the creel of tagged fish was extremely low averaging 8.3 percent, far lower than the minimum of 40 percent return suggested by our stocking criteria.

Table 5. Rainbow trout stocked, tagged and recovered by numbers and percent Swan River drainage, 1966

Release area and tag color	Number released	Number tagged	Percent tagged	Tags recovered	Percent tags recovered
Holland Lake (blue-black)	12,516	689	5.4	53	7.8
Upper Swan River (green-black)	3,472	872	15.1	58	6.7
Condon (yellow-brown)	6,000	3,000	50.0	262	8.7
Salmon River (white-black)	4,730	730	15.4	54	7.4
Goat Creek (yellow-black)	5,490	1,490	27.1	194	13.0
Swan Lake (white-brown)	8,104	1,053	13.0	26	2.5
Total	40,312	7,825	19.9	647	8.3

It is recommended that stocking of catchable rainbow trout be discontinued in the Swan River, Swan Lake and Holland Lake. Experimental imprint plants of westslope cutthroat fry in tributary streams of the Swan River and Holland Lake will be made in an attempt to replenish spawning runs of cutthroat trout.

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