MONTANA DEPARTMENT OF FISH, WILDLIFE AND PARKS

FISHERIES DIVISION
JOB PROGRESS REPORT

STATE: Montana PROJECT TITLE: Northwest Montana Fishery Study

PROJECT NO.: F-7-R-35 JOB TITLE: Inventory of waters of the project area

JOB NO.: I-a

PERIOD COVERED: July 1, 1985 to June 30, 1986

ABSTRACT

The winter fishing pressure estimate for Lake Mary Ronan in 1986 was 3,301 man days resulting in an estimated harvest of 16,175 fish. The estimated daily catch per angler was 4.9 fish. Kokanee comprised 95 percent of the catch. The opening day catch rate was 4.6 fish per angler with kokanee comprising 87 percent of the catch.

The average catch per net night (9.7 fish) of kokanee from fall gill net surveys for Lake Mary Ronan was the highest number recorded since 1965. The average catch of kokanee during spring netting was 3.0 fish.

Mysis sampling was conducted for 6 lakes in Region I. Dramatic increases in densities over the past 4 years in the number per meter square were found in Flathead, Swan, and Whitefish lakes.

Bull trout redd count inventories were conducted in fall, 1985 for selected tributaries in the North and Middle Forks of the Flathead River drainage and Swan River tributaries. Total redd counts in 1985 were below the average for the past several years.

Fish population estimates of westslope cutthroat trout for the Harrison Creek catch and release section in the South Fork of the Flathead River in 1985 decreased slightly from 1984. Average length of fish collected increased from 7.7 to 8.5 inches. The percent of fish less than 10 inches remained about the same--88 percent in 1985.

Electrofishing efforts were unsuccessful in obtaining valid estimates for the catch and release section of the Thompson River. Rainbow trout over 7 inches comprised 19 percent of the fish captured in 1984 compared to 21 percent captured in 1985.

The Woods Lake rainbow trout catch declined from 10 fish per net night in 1984 to 3 fish in 1986. The Eagle Lake strain rainbow outnumbered Arlee strain in 1986 by 2:1.

Lake whitefish and lake trout comprised 74 and 14 percent respectively of gill net catches from Whitefish Lake in 1985. Both these species showed significant increases over the sampling conducted in 1979 and 1984.

The average size of mature spawning kokanee is presented for 16 lakes sampled in 1985.

A total of 63 stream hydraulic notices (124 permits), 106 stream alteration projects involving the private sector (310 permits), and 8 lake-shore alteration projects (175 permits) were reviewed during the 1985-1986 report period.

Four proposed micro hydro projects are currently active. Fisheries mitigation plans are being pursued through the FERC permit processing procedures.

Mountain lake surveys were conducted for 4 lakes in the Flathead and Kootenai River drainages. In addition westslope cutthroat samples were taken from 7 mountain lakes in the South Fork of the Flathead River to test for genetic purity.

Species and waters referred to are itemized on the last page of this report.

BACKGROUND

The fisheries resource in Region I is supported by 645 lakes totalling 240,000 acres and 2,400 miles of trout streams. The total estimated fishing pressure for Region I (1984-1985) as determined by a statewide mail questionnaire survey was 455,936 man days of fishing effort. Approximately 67 percent of the angling pressure was expended on trout lakes, 28 percent on trout streams, 3 percent on warm water lakes and reservoirs, and the remaining 2 percent undesignated (lakes and streams). The monitoring of the fisheries resource is an ongoing project to update the fisheries management program for maintaining or improving the fishery. Particular emphasis will be given to the following objectives.

OBJECTIVES

1. To monitor the kokanee fishery of Lake Mary Ronan by conducting a quantitative creel census during the winter fishing season and creel check on the opening day of the general fishing season. In addition, spring and fall gill net surveys were

conducted to provide information on catch success, size, growth and age class distribution of kokanee.

2. To establish relative abundance of kokanee and other associated game fish species in large regional lakes.

3. To determine fisheries potential of lakes and streams by obtaining chemical, physical, and biological parameters for management of sport fish species.

4. To monitor kokanee size fluctuations of annual spawning populations in several lakes.

5. To investigate and approve stream and lakeshore alteration projects as required by the Montana Natural Streambed and Land Preservation Act, the Stream Protection Act, and the Lakeshore Protection Act.

6. To survey fish populations in high mountain lakes in the South Fork of the Flathead River drainage.

PROCEDURES

General lake and stream inventories are conducted as described in the Montana Lake and Stream Inventory Manual. Surveys include procedures to obtain fish population information by use of gill nets, trap nets, seining, electrofishing, scale reading for age and growth analysis, creel census for fishing pressure and harvest data and water chemistry, plankton and bottom fauna collections for monitoring water quality.

Experimental gill nets, 125 feet in length by 6 feet in depth with a graduated mesh size from 1/2 to 2 inches were used to sample fish in lakes. Mysis (Mysis relicta) collections were taken by making replicate 30 meter vertical hauls with a 1 meter diameter net 2 feet in length with a mesh size of 0.05 mm.

Information derived from fisherman interviews (Lake Mary Ronan) were recorded on census forms and included the number of anglers per party, hours fished, total fish caught, species, and residency of anglers. Traffic counters were installed at two locations to enumerate vehicle traffic by fisherman accessing the lake. Angling pressure and fish harvest estimates were derived from a combination of creel data and traffic counts collected at time intervals between census days.

Fish population estimates were derived from Chapman's modification of the Peterson mark and recapture formula. Fish data were collected by boat electrofishing, hook and line, and snorkeling.

FINDINGS

Lake Mary Ronan

Winter Creel Census

A winter creel census was conducted at Lake Mary Ronan on 12 days during the period of January 9 through March 15, 1986 (closing date for the winter fishing season).

Winter fishing pressure and harvest estimates from the state park and south side access points are presented in Table 1. The estimated seasonal fishing pressure was 3,301 fisherman days and the total harvest was estimated at 16,175 fish. The average daily use was 51 anglers with a daily average harvest of 249 fish. Kokanee salmon comprised 95 percent of the catch, cutthroat trout 4 percent, and rainbow trout 1 percent. The estimated daily catch per angler, fishing an average of 3.2 hours, was 4.9 fish. Angling success was the best through January, but gradually declined through February.

Table 1. Fishing pressure and harvest estimates for State Park and south side access area of Lake Mary Ronan, winter, 1986.

				State Park			South Side Road				
Time Interval	Days	Anglers /Party	Catch/ Angler	Cars	Anglers	Harvest	Cars	Anglers	Harvest	Total Anglers	Total Harvest
1/09-3/15	65	2.0	4.9	1,366	2,684	13,152	315	617	3,023	3,301	16,175

Age group composition of the kokanee was 19 percent II+ fish and 81 percent III+ fish. Age II+ fish averaged 10.0 inches, ranging in size from 8.6 to 10.8 inches. Age III+ fish averaged 11.7 inches and ranged in size from 10.9 to 13.5 inches. The average size and species composition of the catch is presented in Table 2.

Table 2. Average size (total length in inches) and species composition of catch, Lake Mary Ronan 1985-1986 winter creel.

Species	No. of Fish	Avg. Size	Range	Composition
Kokanee	1042	11.4	8.4 - 13.7	95%
Westslope cutthroat	46	11.2	10.0 - 11.9	4%
Rainbow	11	14.5	11.3 - 19.4	1%

Flathead County residents comprised 51 percent of the anglers followed by Lake County with 30 percent. Ninety-eight percent of the fisherman resided in a 4-county area within an 80-mile radius of Lake Mary Ronan. The remainder of the fishermen resided in outlying counties in Montana or were non-residents.

In comparing similar data collected during a winter creel census in 1984-1985; the catch rate declined by almost 2 fish per angler. However, the average size of II+ and III+ kokanee increased by 0.6 and 0.8 inches respectively.

Opening Day Creel Census

Opening day creel census data have been collected annually since 1965. Both opening day and winter creel data provide an indication of the well being of the fish population in any given season.

In 1986, a total of 79 anglers contacted caught 365 fish of which 87 percent were kokanee. Westslope cutthroat comprised 11 percent of the catch while rainbow trout and largemouth bass made up the remaining 2 percent of the catch. Catch rates were 4.6 fish per angler day and 1.1 fish per angler hour. Missoula County residents comprised 53 percent of the anglers followed by 21 percent for Flathead County and 11 percent for Lake County. Other Montana counties comprised 11 percent of the anglers and non-residents 4 percent.

In comparison to the 1985 opening day census, angler success increased by 1.5 fish per angler and 0.2 fish per hourly effort. Age III+ kokanee exhibited an average increased of 1.0 inch from 11.4 to 12.4 inches. The increase in size is believed to be in response to reduced annual kokanee fry stocking. Annual kokanee plants were reduced from 500,000 to 400,000 1-inch fish beginning in 1984. A summary of opening day catch data for 1985 and 1986 is shown in Table 3.

Table 3. Summary of Lake Mary Ronan opening day creel census data for 1985 and 1986. Percent species composition is shown in parenthesis.

	1985	1986
No. Parties	32	30
No. Anglers	67	79
No. Fish Caught	209	365
Kokanee	190 (91)	317 (87)
Cutthroat Trout	0 (0)	40 (11)
Largemouth Bass	10 (5)	1 (1)
No. Hours Fished	259	337
Avg. Length Trip (hrs)	3.87	4.26
No. Fish/angler	3.12	4.62
Avg. Catch/Hour	0.81	1.08
Residency of Anglers (Percent)		
Missoula County	55	53
Flathead County	21	21
Lake County	5	9
Other Counties	16	12
Non-resident	3	5

Gill Net Surveys - (Fall and Spring)

Gill net surveys are conducted annually in spring and fall to compare catch success of kokanee and trout. A total of 6 gill nets (3 floating and 3 sinking nets) are fished overnight for each sampling period. The catch per net night in the fall of 1985 averaged 9.7 kokanee (I+ and II+ fish) and was the highest number recorded for the fall sampling period since 1965. Rainbow trout averaged 3.5 fish per net night in the fall of 1984 as compared to 2.5 fish in 1985. Westslope cutthroat trout increased from 0.3 fish in 1984 to 3.5 fish in 1985.

The catch per net night of kokanee (Age II+ and III+) in the spring of 1985 was 14.2 fish per net night as compared to 3.0 in 1986. Rainbow trout averaged 2.0 fish in 1985 as compared to 1.7 fish in 1986. The average catch of westslope cutthroat trout in 1985 was 0.2 fish per net night as compared to 0.5 fish in 1986. Size increases of both II+ and III+ kokanee were similar to those of measurements taken from creel census studies. A summary of gill net catch statistics for the past two years is shown in Table 4.

Table 4. Comparison of Lake Mary Ronan gill net catch data of kokanee and trout for spring and fall netting series, 1984 through 1986. (Mature spawning kokanee not included in fall netting data.)

	Fall 1984				Fall 1985			
Species	No.	Avg.Catch Per Net	Avg. Size	Standard Deviation	No.	Avg.Catch Per Net	Avg. Size	Standard Deviation
Kokanee (I+)	13	2.2	8.4	0.29	28	4.7	8.7	0.33
Kokanee (II+)	6	1.0	0.8	0.29	30	5.0	10.9	0.46
Avg. Combined	19	3.2	9.2	--	58	9.7	9.7	--
Rainbow Trout	21	3.5	13.0	3.19	15	2.5	14.0	4.44
Westslope Cutthroat Trout	2	0.3	13.5	0.78	21	3.5	10.3	0.39

	Spring 1985				Spring 1986			
Species	No.	Avg.Catch Per Net	Avg. Size	Standard Deviation	No.	Avg.Catch Per Net	Avg. Size	Standard Deviation
Kokanee (II+)	31	5.2	9.6	0.35	7	1.2	9.8	0.46
Kokanee (III+)	54	9.0	11.4	0.45	11	1.8	12.4	0.58
Avg. Combined	85	14.2	10.8	--	18	3.0	11.4	--
Rainbow Trout	12	2.0	13.2	1.92	10	1.7	14.6	3.24
Westslope Cutthroat Trout	1	0.2	12.5	0.00	3	0.5	11.6	0.98

Lake and Stream Surveys

Mysis Monitoring

Mysis (opposum shrimp) were first introduced into northwestern lakes in 1968, 1975, and 1976 in an attempt to improve local sports fisheries. Initial introductions from Waterton Lakes, Alberta, Canada, were made into 13 lakes (Domrose 1982). In 1981, Mysis were first recorded in Flathead Lake and were believed to have entered by downstream drift from either Whitefish or Swan lakes. Since 1983, 6 lakes having viable Mysis populations were monitored during the month of June to follow population trend increases. In 1985 and 1986 temperature profiles and plankton samples were simultaneously collected along with vertical net hauling for Mysis. In addition, monthly samples on Whitefish and Swan lakes were collected from June, 1985, through June, 1986, to determine seasonal density changes. Preliminary results from June Mysis sampling are presented in Table 5.

Table 5. Northwest Montana regional lake Mysis monitoring, June 1983 - June 1986.

Lake	Mysis per square meter 1983	1984	1985	1986
Ashley	1.3	13.0	12.1	36.9
Little Bitterroot	7.3	24.5	21.9	16.4
Flathead	0	5.1	19.3	176.4
McGregor	6.1	13.7	3.8	11.8
Swan	20.1	71.0	94.9	251.6
Whitefish	18.5	86.3	229.0	175.8

Mysis samples collected by replicate, total depth, vertical hauls from two deep water stations in each lake. In 1983, samples were collected in 30 m hauls with a larger mesh net.

Bull Trout Redd Inventories

Bull trout redd inventories have been conducted in the North and Middle Fork of the Flathead River since 1979. The initial inventory studies were funded by the Environmental Protection Agency (EPA) to develop a fisheries resource monitoring program for the upper Flathead River basin. In 1983, the monitoring program was turned over to the State and Bonneville Power Administration (BPA) contract studies to continue redd count surveys for selected areas of major bull trout spawning streams. A summary of bull trout spawning redd counts since 1979 in the Upper Flathead River drainage is shown in Table 6. The 1985 redd count (168) is far below the 7-year average of 234 in the North Fork. However, fall stream flows in late-September were 3 times greater than normal due to heavy rains. High flows may have obliterated some of the redds. However, the Middle Fork tributary redd counts (173) were higher than the 7-year average of 136. Redd count inventories in the Middle Fork drainage were conducted in early September prior to high fall flows. This may account for identification of a larger number of bull trout redds.

Table 6. Bull trout redd counts for selected areas of tributaries chosen for monitoring in the Flathead drainage.

Stream	YEAR 1979	1980	1981	1982	1983	1984	1985
North Fork:							
Big	10	20	18	41	22	9	9
Coal	38	34	23	60	73	61	40
Whale	35	45	98	211	141	133	94
Trail	34	31	78	94	56	32	25
TOTAL	117	130	217	406	292	235	168*
Middle Fork:							
Morrison	25	75	32	86	67	38	99
Granite	14	34	14	34	31	47	24
Lodgepole	32	14	18	23	23	23	20
Ole		19	19	51	35	26	30
TOTAL	71	142	83	194	156	134	173
GRAND TOTAL	188	272	300	600	448	369	341

*High flows may have obliterated some of the redds.

In the Swan River drainage 4 bull trout streams were inventoried. The total for the Swan River drainage (109) is the lowest since counts began in 1982. The average number of redds for the 4-year period of record is 208. A summary of bull trout spawning redd counts from 1982 through 1985 is shown in Table 7. Abnormal high fall flows in 1985 could be responsible for obscuring many of the redds.

Table 7. Number of bull trout redds found in 4 selected tributaries to the Swan River during 1982 through 1985.

Creek	Number of Redds 1982	1983	1984	1985
Elk	56	91	93	19
Goat	33	39	31(20)	40
Lion	63	49	88	26
Squeezer	41	57	83	24
TOTAL	193	236	295	109

South Fork Flathead River

The catch and release section for cutthroat trout on the South Fork of the Flathead River above Hungry Horse Dam extends for a distance of 10 miles from the Meadow Creek Foot Bridge downstream to the Spotted Bear Ranger Foot Bridge.

Because of the remoteness of the area, angling and snorkeling methods were used to determine population estimates. In August of 1984 and 1985, a 7,300 foot section between Harrison Creek and Cedar Creek was fished intensively by 4 anglers for a 2-day period. All fish caught were tagged and returned to the water. A recapture run was conducted 2 weeks later.

In 1984 a total of 152 cutthroat were caught on the marking run and 91 on the recapture run including 21 recaptures. In 1985 a total of 138 cutthroat were caught on the marking run and only 11 fish on the recapture run with only 3 recaptures. Because of the low number of recaptures, the population estimate in 1985 was determined by snorkeling. Preliminary estimates of the Harrison Creek catch and release section for 1984 and 1985 are shown in Table 8.

Table 8. Population estimates for cutthroat trout sampling in Harrison Creek catch and release section of the South Fork Flathead River.

Year	Method	Estimate No/1000'	Mean Length(in)	Range(in)	% < 10 in
1984	Hook & Line-- Peterson	75	7.7	4.4-13.3	86
1985	Snorkel --Peterson	65	8.5	6.0-14.0	88

Since the inception of the catch and release fishery, there appears to be a slight decrease in cutthroat trout densities and a slight increase in mean total length. The percent of fish smaller than 10 inches remains about the same. This section of the South Fork will be compared to nearby sections of the river which are open to harvest under either the general trout stream limit (5 fish/day) or the wilderness limit (3 fish/day, none >12 inches).

Thompson River

A 6.8 mile section of the Thompson River was designated as a catch and release fishery in May, 1984. The stream section extends from the mouth of Deerhorn Creek downstream to the west fork of the Thompson River. In April, 1984, a 6,000 foot stream section (Big Hole section) was electrofished to establish a base fish population estimate. This section is located about mid way through the catch and release area.

In 1984 an estimate of 480 rainbow trout 4 inches and larger or 80 fish per 1,000 feet of stream was calculated for this section. In 1985, electrofishing efforts to obtain population estimates were unsuccessful due to high water. A length frequency of rainbow trout collected from the Big Hole section for 1984 and 1985 is presented in Table 9. A summary of fish population estimates for the years 1973 through 1985 from various sections of the Thompson River is shown in Table 10. It would appear the percent of rainbow trout greater than 7.0 inches have declined significantly over the past 12 years with present levels ranging from 19 to 21 percent. Only a slight increase of rainbow trout exceeding 7.0 inches was noted in the catch and release section in 1985 as compared to 1984. Further data collections are scheduled for the fall of 1986 and 1987, and these will be compared to sections upstream (Meadow Creek and Little Thompson) which are open to harvest under the general fishing regulations (5 trout/day, only 1 >14 inches).

Table 9. Length frequency distribution of rainbow trout collected from Big Hole section of the Thompson River in 1984 and 1985.

Size	1984	1985	Size	1984	1985
3.0 - 3.9	16	20	10.0 - 10.9	2	3
4.0 - 4.9	9	141	11.0 - 11.9	0	1
5.0 - 5.9	36	65	12.0 - 12.9	0	1
6.0 - 6.9	34	35	13.0 - 13.9	1	1
7.0 - 7.9	12	30	14.0 - 14.9	1	0
8.0 - 8.9	1	15	15 and up	1	1
9.0 - 9.9	1	10	TOTAL	114	313

Table 10. Summary of Thompson River fish population estimates.

Mo.	Year	Section	Section Length(ft)	Total est. 4" and over per 1,000 ft. stream Rb	Eb	Mwf	DV	Total	% Rb over 7"
Apr	1973	Meadow Creek	9,000	81	88	133	-	302	58
Sept	1979	Meadow Creek	9,000	124	51	9	-	175	9
Apr	1974	Little Thompson	11,000	62	-	240	-	302	-
Apr	1983	Little Thompson	11,000	57	13	120	-	190	54
July	1985	Little Thompson	8,360*	256	52	230	-	538	20
Apr	1984	Big Hole**	6,000	80	-	80	-	160	19
July-Aug	1985	Big Hole**	6,000	^	^	^	^		21

Rb = Rainbow
EB = brook trout
Mwf = mountain whitefish
DV = bull trout

*section shortened in 1985
**catch/release
^no valid estimate

Woods Lake

Woods Lake is a closed basin lake with a surface area of 19.5 acres having an average depth of 12 feet. This lake was designated as a catch and release fishery, using artificial flies and lures only, effective with the 1984-1985 fishing regulations beginning May 1, 1984. The lake also supports an abundant population of redside shiners. In May, 1983, 1,000 each of Arlee and Eagle lake strain rainbow trout averaging 5 inches were stocked in Woods Lake to compare survival, growth, and catchability of the two strains of rainbow trout. Arlee fish were identified with an adipose fin clip. Population sampling was conducted by gill netting, and the results of the 1984 and 1986 catch data are shown in Table 11.

Table 11. Summary of gill net catch data collected from Woods Lake October, 1984, and May-June, 1986.

	1984*			1986**		
Species--Strain	Number Caught	Avg.Lgth (inches)	Avg. Wt. (pounds)	Number Caught	Avg.Lgth (inches)	Avg. Wt. (pounds)
Rb (Arlee)	9	12.7	0.73	5	15.1	1.39
Rb (Eagle Lake)	1	15.8	1.43	10	15.6	1.37
Wct(1981 plant)	1	14.4	1.03	0	-	-

*Sample--1 floating and 1 sinking net
**Sample--1 floating and 5 sinking nets
Rb = rainbow trout
Wct - westslope cutthroat trout

The average growth increments for Arlee rainbow was 8.2 inches or an average increment of about 0.7 inches per month from time of stocking until captured in 1984. From 1984 to 1986, Arlee fish grew only an average of 2.4 inches (0.13 inches per mont), but doubled their weight. Eagle Lake fish appeared to grow at a faster rate averaging an increase of 11.3 inches the first 12 months after stocking, but this was based only on one fish. By 1986 the Eagle lake fish averaged 15.6 inches or about 0.5 inches larger than the Arlee fish. However, the average weight (Eagle Lake fish) was about the same as the Arlee fish.

The Eagle Lake rainbow is regarded as a piscivorous species. This feeding trait was not apparent in Woods Lake as the incidence of fish in the diet was only 20 percent. Leeches, dragon fly larvae, snails, and caddis comprised the main food items. Even though redside shiners were readily available as forage fish as a food item, they did not show up in the diet of the Eagle Lake fish.

The catch per net night (bottom sets dropped off significantly from 10 fish in 1984 to 3 fish in 1986. The Eagle Lake strain fared much better than the Arlee fish remaining longer in the system. However, population levels of both strains appeared low in 1986. It appears stocking every third year will be necessary to maintain an acceptable catch and release fishery for 14 to 16-inch fish. Although catch and release signs are posted at several access points, illegal removal of fish may be a factor in low trout survival. The Woods Lake fishery is being compared to nearby Dollar Lake which has received similar plants of rainbow strains but is open to harvest under the general fishing limits (10 trout/day).

Whitefish Lake

Whitefish Lake was gill netted in May, 1985, with 3 sinking nets and 6 floating nets. Lake whitefish comprised 74 percent of the catch followed by lake trout with 14 percent. Bull trout, westslope cutthroat, and northern pike comprised the remaining 12 percent of the catch. A summary of the 1985 gill net catch (game fish species) is presented in Table 12.

Table 12. Summary of gill net catch (game fish species for Whitefish Lake, May, 1985). (Sample size in parentheses.)

Fish Species	Total Length Inches	Catch per Net	
		Sinking	Floating
Wct	12.7 (4)	0.0	0.7
Lwf	13.0 (74)	29.0	0.8
NP	18.3 (3)	1.0	0.0
DV	14.2 (5)	1.3	0.2
LT	15.9 (14)	3.7	0.5

Wct = westslope cutthroat trout Lwf = lake whitefish
Np = northern pike DV = bull trout Lt = lake trout

Compared to catch data compiled in 1979 and 1984, lake whitefish appear to be on the increase. In 1979, the catch per net night (sinking nets) was 6.1 fish, in 1984, 12.8 fish, and 1985, 29.0 fish; almost a fivefold increase. The numbers of lake trout also increased. In 1979 lake trout averaged 0.7 fish per net night (sinking nets) increasing to 3.0 fish in 1984 and 3.7 fish in 1985. The catch per net night for other game fish species--westslope cutthroat trout, bull trout, and northern pike has remained relatively constant.

Lake Monitoring of Kokanee Populations

The first introduction of kokanee into Montana waters occurred in 1916 when fish were stocked in Flathead lake. The progeny of these fish resulted in subsequent introductions into numerous lakes in northwestern Montana. In the past, egg-taking operations to supply management needs have taken place in numerous lakes and stream in northwestern Montana. In more recent years primary egg sources have been from Flathead Lake at Somers Bay and Lake Mary Ronan. Egg takes have ranged from 1,500,000 to 3,000,000 eggs. At present, 13 larger lakes are maintained by hatchery stocking. In 1986, initial plants were made into Foy and Lower Thompson lakes. A total of 7 lakes including Flathead and Lake Koocanusa are being managed for naturally reproducing fish.

The average size of mature spawning kokanee has been monitored for the past several years from 16 lakes in Region I. Fish are collected by beach seining in conjunction with hatchery egg-take operations, overnight gill net sets, and electrofishing. The information derived from these data is used in part to develop management strategies, primarily adjustments in stocking numbers and creel limits for individual waters. A summary of the average length of mature kokanee during the fall of 1985 is presented in Table 13.

Table 13. Average length of male and female spawning kokanee collected in the fall of 1985.

			Males			Females		
Lake	Surface Acres	a/ S/N	No. Fish	Avg. Length	Size Range	No. Fish	Avg. Length	Size Range
Ashley	3244	N	58	11.1	10.1-12.2	16	10.8	10.0-11.4
Blaine	372	N	54	9.2	8.7-10.0	27	9.2	8.5- 9.5
Bull	1250	S	7	14.1	12.8-14.8	3	14.0	13.7-14.3
L.Bitterroot	2925	S*	107	10.8	9.9-14.6	13	10.5	10.0-12.2
Crystal	178	S	35	15.1	12.0-16.5	8	16.2	12.3-18.5
Dickey	579	S	1	9.6	-	0	-	-
Glen	340	S	9	12.2	11.9-12.5	9	12.3	11.7-13.1
Holland	408	S	Not sampled in 1985----lake froze over early					
Lindbergh	725	S	Not sampled in 1985----lake froze over early					
L.Mary Ronan	1505	S	21	13.5	12.5-14.6	47	13.2	
Mid.Thompson	602	N	6	13.0	12.3-13.4	15	12.4	12.0-12.8
McGregor	1328	S	No fish caught					
Spar	392	S	18	18.0	17.8-19.6	21	17.2	16.0-18.0
Swan	2680	N	57	9.7	8.9-11.1	20	9.4	7.7-10.9
Tally	1326	N	1	9.3	-	1	13.9	-
Whitefish	3350	S	No sample collected in 1985					

a/N = naturally reproducing population
S = Stocked population

Stream Alteration Projects

A total of 63 stream hydraulic notices affecting fish habitat were reviewed under the Stream Protection Act in Region 1 during the report period. A breakdown of projects submitted for review by various government agencies is as follows: U. S. Forest Service---41; County Highway Department--9; State Dept. of Highways--7; State Lands (Division of Forestry)--5; U. S. Fish and Wildlife Service--1; and municipal--1. In addition, 106 stream alteration projects involving the private sector were reviewed under the Natural Streambed and Land Preservation Act. These include 54 projects in Flathead County, 35 in Lincoln County, 10 in Sanders County, 5 in Lake County, and 2 in Missoula County. Corps of Engineers 404 permits were processed for Lincoln County (2), Sanders County (1), and Flathead County (1).

Recommendations for a total of 8 lakeshore alteration projects were submitted to local county governments. County governments have final jurisdiction approving these projects under the Lakeshore Protection Act.

Micro-Hydro Projects

Preliminary permit applications for micro-hydro projects have dropped off sharply during the report period. Only 4 projects are currently being pursued in Region I. These include Boulder Creek in Lake County, Tony Creek and Prospect Creek in Sanders County, and Stanton Creek in Flathead County.

Boulder Creek and Tony Creek are small high gradient streams that do not support fish populations. Minimum flows of 1/2 to 1 cfs were recommended to support riparian wildlife species .

Prospect Creek, tributary to the Clark Fork River, supports migratory runs of bull trout and brown trout. Minimum bypass flows of 44 cfs have been established to provide protection of the fish and wildlife resources immediately downstream from the diversion structure. The Federal Energy Regulatory Commission (FERC) issued a license to construct, operate, and maintain the project May, 1986. Within 6 months of the issuance of license, the applicant will be required to submit a plan to control erosion, turbidity and sedimentation from construction and operation of the project, monitoring and maintenance of the project, design plans on intake structures and fish screening, upstream and downstream fish passage facilities, tailrace designed to protect fish entry from the natural stream, and plans to provide an entrance into the penstock and subsequent supersaturation of gas in water discharge. These provisions must be approved by FERC before operation of the project commences.

Stanton Creek supports a resident population of westslope cutthroat trout. Stream cross sections were measured during early summer high flows. Unusual heavy rains in late summer and fall of 1985 made it impossible to collect low flow wetted perimeter measurements. Wetted perimeter discharge measurements will be repeated in 1986 to establish minimum flow recommendations for Stanton Creek.

Mountain Lake Surveys

Several lakes were surveyed by helicopter in the North Fork of the Flathead River, Stillwater River, Fisher River, and Libby Creek drainages August, 1985. Five small lakes along Stryker Ridge were observed from the air and were judged too shallow to support fish populations. Ramsey Lake was too small to set down the helicopter and will have to be ground surveyed. Midas (Standard) Lake was observed from the air and the lake bed was found to be dry. A summary of lakes surveyed with gill nets set overnight is shown in Table 14.

Table 14. Summary of overnight gillnet catches from helicopter mountain lake surveys conducted August, 1985. [Average size of fish (inches) in parentheses.]

Lake	Location T	R	S	Surface Acres	No. Fish	Species a/	No.	Avg.Lgth
Mystery	32N	23W	08	2	28	Wct	28	8.5
Hidden	34N	25W	35	15	36	Wct	1	11.4
						Ps	29	4.2
						NP	6	13.9
Wall	33N	24W	22	29	--	-	-	-
Stony*	23N	29W	01	3	2	Wct	2	18.4

Wct = westslope cutthroat trout Ps = pumpkinseed
NP = northern pike
*Two overnight net sets; all others are one overnight set

One gill net set overnight in Mystery Lake yielded a catch of 28 westslope cutthroat trout averaging 8.5 inches with a size range of 6.6 to 12.1 inches. The catch from Hidden Lake was comprised of 29 pumpkinseed averaging 4.2 inches, 6 northern pike averaging 13.9 inches (maximum of 31 inches and 9.8 pounds), and 1 westslope cutthroat trout, 11.4 inches. One gill net set in Wall Lake turned up empty. Two overnight gill net sets in Stony Lake caught 2 westslope cutthroat trout averaging 18.4 inches.

South Fork Flathead River Drainage Lakes

Electrophoretic Genetic Analysis

Samples of fish for electrophoretic genetic analysis were collected from several high mountain lakes in the South Fork Flathead River drainage. These lakes located in and adjacent to the Jewel Basin hiking area include: Tom, Clayton, Margaret, and 4 Jewel Basin lakes (East, West, North, and South). The results of the electrophoretic testing at the University of Montana Genetics Laboratory are shown in Table 15.

Table 15. Electrophoretic analysis of fish caught in Tom Tom, Clayton, Margaret, and Jewel Basin Lakes, 1985.

Lake	Location T	R	S	Surface Acres	Species a/	No.
Clayton	28N	18W	16	62	Wct	12
					WctxYct	2
Margaret	27N	18W	24	46	Wct	30
					WctxYct	1
Tom Tom	27N	18W	25	10	Yct	11
Jewel Basin	28N	18W	18	17	Rb	10

a/Wct = westslope cutthroat trout, the native Salmo
Yct = Yellowstone cutthroat trout
Rb = rainbow trout
WctxYct = westslope-Yellowstone hybrid

Tom Tom and the Jewel Basin lakes contained populations of pure Yellowstone cutthroat and rainbow trout respectively, both non-native species in the South Fork Flathead River drainage. Yellowstone cutthroat were planted in Tom Tom Lake in 1941 and rainbow trout in the Jewel Basin lakes in the late 1920's.

Both Clayton and Margaret lakes contained mixed populations of westslope and hybridized Yellowstone cutthroat. Yellowstone cutthroat were planted in Clayton Lake in 1926, 1927, 1930, 1950, 1952, and 1953. Westslope cutthroat were planted in 1982. Westslope cutthroat caught in 1985 included fish from 1982 and

1982 year classes. These native fish have maintained population purity in spite of repeated Yellowstone cutthroat introductions.

Margaret Lake was planted with Yellowstone cutthroat in 1948 and with westslope in 1982. Thirty of 31 fish collected in 1985 tested out as westslope cutthroat trout and ranged from 8 to 15 inches total length. As with Clayton lake, westslope cutthroat retained a large degree of purity.

The 4 Jewel Basin lakes are small, shallow interconnected lakes. Gear was transported into these lakes by helicopter and physical surveys made. The combined surface area of the lakes is 17.3 acres and the volume 123 acre feet. The rainbow trout in the lakes are migrating downstream through Graves Creek into Hungry Horse Reservoir in the South Fork of the Flathead River. Hybrid rainbow x westslope cutthroat have been found in the drainage. Because of concerns for the genetic purity of the westslope cutthroat population in the South Fork drainage, the decision was made to chemically treat the lakes to remove the rainbows and replant the lakes to pure westslope cutthroat to remove the downstream drift of a non-native species (rainbow). These lakes will be treated with Rotenone in early September of 1986 and replanted with westslope cutthroat trout. Equipment will be ferried to the site using a helicopter.

RECOMMENDATIONS

It is recommended that winter creel and annual fish population monitoring for Lake Mary Ronan be continued. A summer creel census should be initiated within the next few years to determine total fishing use and harvest. A fish management monitoring report (Lake Mary Ronan) from 1965 through 1986 will be completed as a Job I-a supplement in January of 1987.

Continue monitoring lake and stream fish populations in the region to update the fish management program for maintaining or improving the fishery.

Mysis monitoring will continue through 1986 with final results to follow in a Job I-a supplement to document the impacts of Mysis on fisheries.

Bull trout redd count inventories will continue to be monitored on an annual basis for selected streams in the Flathead River drainage.

Monitor kokanee populations in lakes to evaluate the effects of changes in fishing regulations, stocking rates, and spawning conditions.

Prepared by: Robert Domrose
Date: September 15, 1986

Waters referred to:

lakes--water code

Ashley--07-5220
Bull--11-8040
Clayton--08-8340
Crystal--11-8180
Dickey--11-8220
Flathead--07-6400
Foy--07-6420
Glen--11-8380
Hidden--07-6722
Holland--07-6780
Jewel Basin--North--08-9370
East--08-8530
South--08-9710
West--no code
Lake Blaine--07-5380
Lake Koocanusa--11-8690
Lake Mary Ronan--07-7700
Little Bitterroot--07-7300
Lindbergh--07-7260
Margaret--08-9180
McGregor--05-9216
Middle Thompson--05-9232
Midas(Standard)--11-9680
Mystery--07-8090
Ramsey--11-9420
Spar--11-9640
Stony--05-9584
Swan--07-9000
Tally--07-9060
Tom Tom--08-9860
Wall--07-9500
Whitefish--07-9540
Woods--07-9580

rivers/streams--water code

Big Creek--08-0680
Boulder--07-0520
Cedar--07-1400
Clark Fork--05-1440
Coal Creek--08-1620
Elk--07-1340
Deerhorn--05-1984
Fisher--11-2320
Flathead River--07-1560
Middle Fork--08-4700
North Fork--08-5100
South Fork--08-6580
Goat--07-1720
Granite--08-3080
Harrison--08-3280
Kootenai River--11-3500
Libby Creek--11-3660
Lion--07-2420
Lodgepole--08-4240
Meadow Creek--08-4680
Morrison--08-4940
Ole--08-5150
Prospect--05-5648
Squeezer--07-4340
Stanton--08-6980
Stillwater--07-4420
Swan River--07-2371
Thompson--05-7264
Tony--no code
Trail--08-7330
Whale--08-7700

Fish species referred to:

kokanee Oncorhynchus nerka
westslope cutthroat trout Salmo clarki lewisi
rainbow trout Salmo gairdneri
bull trout Salvelinus malma
lake whitefish Coregonus clupea formis
lake trout Salvelinus namaycush
largemouth bass Micropterus salmoides

redside shiner Richardsonius balteatus
northern pike Esox lucius
pumpkinseed Lepomis gibbosus
Yellowstone cutthroat trout Salmo clarki bouvieri

LITERATURE CITED

Domrose, R. J. 1982. Mysis introductions into western Montana, Dept. of Fish, Wildlife, and Parks, Kalispell, MT, 5p unpublished

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Domrose, R. J. 1982. Mysis introductions into western Montana, Dept. of Fish, Wildlife, and Parks, Kalispell, MT, 5p unpublished.