MONTANA FISH, WILDLIFE & PARKS

FISHERIES DIVISION
JOB PROGRESS REPORT

STATE:	MONTANA	PROJECT TITLE:	STATEWIDE FISHERIES INVESTIGATIONS
PROJECT NO.:	F-78-R-1	STUDY TITLE:	SURVEY AND INVENTORY OF COLDWATER LAKES
JOB NO.:	II-a	JOB TITLE:	NORTHWEST MONTANA COLDWATER LAKES INVESTIGATIONS

PROJECT PERIOD: JULY 1, 1994 THROUGH JUNE 30, 1995

ABSTRACT

Fish populations were surveyed in 23 lakes in the Clark Fork and Kootenai River drainages. Illegally transplanted fish continue to cause problems and two lakes are recommended for chemical rehabilitation. Kokanee stocking rates were adjusted in Crystal Lake to increase age at maturity and length at spawning.

BACKGROUND

The coldwater lake fisheries resource in northwest Montana is comprised of 412 coldwater lakes, ranging from low elevation valley floor lakes to high elevation mountain lakes. The survey and inventory of this fishery resource is an ongoing effort to update the management programs to maintain or improve coldwater lakes fisheries.

OBJECTIVES AND DEGREE OF ATTAINMENT

Activity 1 - Survey and Inventory

Objective: To survey and monitor the characteristics and trends of fish populations, angler harvest and preferences, and to assess habitat conditions in selected waters.

This objective was attained. Forty-six lakes in the Region One area were surveyed during the report period. Objectives of these surveys ranged from repeat genetic surveys, evaluation of kokanee populations to generalized population evaluations. Data from lakes in the Kootenai River drainage are presented in this report. Data from two reservoirs in the Clark Fork River (Noxon Rapids and Cabinet Gorge) and from repeat genetic surveys of four lakes in the Flathead River drainage are presented in special segment reports. Data from other work efforts are on file at Region One FWP Headquarters, Kalispell, Montana, and will be summarized in later reports.

Activity 2 - Fish Population Management
Objective: To implement fish stocking programs and/or fish eradication actions to maintain fish populations at levels consistent with habitat conditions and other limiting factors.

Objective was attained. Fish stocking programs for the region were updated. Survey data collected under Activity 1 from two lakes, Kilbrennen Lake near Troy, Montana and Blue Lake near Stryker, Montana, indicates that chemical rehabilitation would be desirable. Consideration is being given to make Kilbrennen Lake a brood lake for native inland rainbow trout.

Activity 3 - Technical Guidance
Objective: To review projects by government agencies and private parties which have the potential to affect fisheries resources, provide technical advice or decisions to mitigate effects on these resources, and provide landowners and other private parties with technical advice and information to sustain and enhance fisheries resources.

This objective was attained. Fisheries personnel commented on projects that had potential to affect lakeshores. Of special interest were private parties developing shoreline property leased from Washington Water Power Company on Noxon Rapids and Cabinet Gorge reservoirs.

Activity 4 - Aquatic Education
Objective: To enhance the public's understanding, awareness and support of the state's fishery and aquatic resources and to assist young people to develop angling skills and to appreciate the aquatic environment.

Objective was attained. Project personnel attended area sportsman clubs and presented programs as requested. Fishing and fishing ethics classes were given in the Libby and Noxon, Montana locales.

PROCEDURES

General lake surveys were done using standard experimental floating and sinking gill nets set overnight. Experimental gill nets are constructed of nylon, measure 6' x 125' and consist of five 25 foot connected panels measuring 3/4 inch - 2 inch bar mesh. Fish caught were identified to species, length and weights recorded and scale samples taken from gamefish for age-growth determination. Kokanee were obtained from standard gill nets samples or collected by seining or electrofishing during spawntaking operations. Mature male and female kokanee were measured separately for total length and otoliths collected for aging.

RESULTS AND DISCUSSION

General Lake Surveys

Fish population data were collected for 11 lakes in the Kootenai River drainage between June, 1994 and July, 1995. The lakes ranged in size from 10 to approximately 100 surface acres. Initial surveys in the 1960's and again in the mid 1980's established species composition for these lakes.

Kilbrennan Lake has been a very popular brook trout fishery for Lincoln County residents and as many as 25 boats might be on the 57 acre lake in a single day in the 1960s and 1970s. Catch rates approached two fish per hour with more than five fish per angler day. Sometime prior to 1976, black bullheads were illegally introduced into the lake. In 1976, gill netting showed 12.5 bullheads per net. In 1993, there were 73.8 bullheads per net. These trends continued in 1995 (Table 1). The bullheads are stunted and growth and survival of brook trout has declined greatly. Use of the lake by fishermen has decreased dramatically in the last decade.

No official records exist for Banana Lake prior to 1988. In 1988, Banana Lake was gill netted to identify species composition and angling opportunities. Species composition in the lake consisted of longnose suckers, northern squawfish, and pumpkinseeds from unauthorized plants. Montana Fish, Wildlife & Parks (FWP) chemically rehabilitated the lake with rotenone in the fall of 1988 and in 1989 planted the lake with rainbow trout.

A gill net survey in 1992 indicated that the rehabilitation was a success (no targeted nongame species were found) and rainbow trout planted in 1989 showed good growth and condition. Banana Lake was surveyed again in 1994 (Table 1). Rainbow trout from both 1991 and 1993 plants were caught in the nets and both showed above average growth and conditions. Currently FWP manages the lake with plants of rainbow trout on a two-year rotating basis to maximize growth.

Table 1. Summary of gill net sets for 11 lakes in the Kootenai River drainage between June, 1994 and July, 1995.

Lake (water code)	Date	Species	# Nets	# per Net	Mean Length (mm)	Range (mm)	Mean Weight (g)	Range (g)	Other Species (Number Per Net)
Big Therriault (11-9760)	6/24/94	HCT	3	12.5	228	171-465	175	44-1170	
		WCT		2.7	265	169-365	232	42-494	
Marl Lake (11-9120)	6/22/94	NP	4	1.8	471	331-606	860	232-1584	YP>8"(4.5) YP<8"(9.3) CRF(1.8) FSU(0.3)
Loon Lake (11-8980)	6/30/94	EBT	6	8.3	230	181-310	140	66-316	
		BBH		10.0	163	131-200	69	36-132	
Lost Lake (11-9010)	6/3/94	EBT	2	2.3	224	154-288	133	36-262	FSU(18.7) YP>8"(2.3) YP<8"(33.7)

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Lake (water code)	Date	Species	# Nets	# per Net	Mean Length (mm)	Range (mm)	Mean Weight (g)	Range (g)	Other Species (Number Per Net)
Leon Lake (11-8760)	6/1/94		3						YP>8"(1.0) YP<8"(55.7) CRF(2.7)
Myron Lake (11-9290)	6/2/94	RB	3	1.3	352	346-355	451	388-484	
		HCT		0.3	380		570		
L. Loon Lake (11-8880)	6/2/94	SMB	4	.25	385		914		MWF(2.25) NSQ(3.5) CSU(1.25) FSU(0.5) CRC(0.25) YP<8"(0.25) RSS(0.25)
Banana Lake (11-7852)	6/2/94	RB	3	5.7	301	295-406	328	118-654	
Howard Lake (11-8560)	5/23/95	RB	3	30.3	268	176-430	210	58-768	
Kilbrennan Lake (11-8640)	5/24/95	RB	3	3.3	304	158-362	275	38-468	
		EBT		9.0	265	146-380	189	32-488	YP(0.2)*
		BBH		46.3	182	131-220	81	28-128	
Carpenter Lake (11-8060)	6/8/95	RB	2	1.5	458	427-505	1035	894-1430	
		HCT		0.5	289		218		
		DV*		0.5	460		1028		
		LMB		1.5	211	120-288	227	144-380	
		BG		9.5	165	152-182	88	68-122	
		YP*		0.5	242		184		

* Fish that were captured for the first time in respective lakes

BBH = Black Bullhead
DV = Bull Trout
KOK AD = Kokanee Adult
LT = Lake Trout
PS = Pumpkinseed
CRC = Peamouth
EBT = Brook Trout
KOK IM = Kokanee Immature
MWF = Mountain Whitefish
RSS = Redside Shiner
CRF = Crayfish
FSU = Longnose Sucker
LMB = Largemouth Bass
NP = Northern Pike
SMB = Smallmouth Bass
CSU = Largescale Sucker
HCT = hatchery westslope cutthroat
LING = Burbot
NSQ = Northern Squawfish
YP>8" = Yellow Perch greater than eight inches
YP<8" = Yellow Perch less than eight inches

Kokanee Monitoring

In 1993 and 1994, gill netting efforts were continued to monitor total length of mature spawning kokanee from lakes to assess stocking success. A summary of the mean lengths for males and females is presented in Table 2.

Table 2. Mean length of spawning kokanee collected from selected lakes in the 1993-1994.

		Males			Females		
Lake	Surface Area	No. Fish	Mean Length (mm)	Size Range (mm)	No. Fish	Mean Length (mm)	Size Range (mm)
Bull Lake	1250	20	399	384 - 437	23	366	340 - 394
Crystal Lake	178	10	399	391 - 437	10	366	341 - 394
Dickey Lake	625	25	331	297 - 354	25	317	294 - 327
Glen Lake	340	25	274	254 - 290	25	270	251 - 296
Middle Thompson Lake	602	51	490	439 - 516	34	457	444 - 470
Spar Lake	392	14	320		14	336	

Crystal Lake:

Because they are connected through a passable channel, Crystal Lake and Lavon Lake will be considered as a single management unit for the purposes of this document. Crystal Lake is a medium sized closed-basin lake connected to Lavon Lake through a 20 feet wide by 4 feet deep channel.

Crystal Lake has a maximum depth of 154 feet and has a surface area of 178 acres. Lavon Lake is a small, relatively deep, lake. It has a maximum depth of 91 feet and has a surface area of 17 acres. Between March 1, 1993 and February 28, 1994, FWP estimated that 2,868 anglers of which 84 percent were residents, fished at Crystal and Lavon Lakes (Montana Statewide Angling Pressure Report).

Management of Crystal Lake and Lavon Lake commenced in 1924 when Crystal Lake was stocked with 100,000 chinook salmon and Lavon Lake was stocked with bass and sunfish. Angling success was marginal and several other species were tried including rainbow trout, cutthroat trout, brook trout, coho salmon and arctic grayling. The lakes already had strong populations of largescale suckers. Coho salmon plants were relatively successful through the 1950's but sucker numbers continued to dominate gill net catches. The Libby Rod and Gun Club offered to run traps in the spring to capture spawning suckers that traveled through the channel.

FWP rehabilitated the lakes in August of 1960 using Toxaphene. Because of lake depths, slow mixing and toxicity of Toxaphene, Lavon Lake would not support fish until 1962 and Crystal Lake until 1964. In 1962 Lavon was planted with an unknown number of kokanee salmon and Crystal Lake was planted with kokanee and rainbow trout. In 1964 Lavon Lake was officially removed from the stocking list although it continued to receive a portion of Crystal Lake plants. The lakes remained relatively clear of unwanted species until the early 1970's when unauthorized plants established yellow perch and pumpkinseed populations in both lakes.

A self-reproducing population of kokanee salmon was established from plants between 1964 to 1967. Between 1967 and 1976 angling was excellent for large kokanee and FWP planted only rainbow trout in Crystal Lake. In 1976 FWP initiated kokanee stocking for Crystal Lake to enhance fishing opportunities. At the same time FWP began monitoring kokanee populations in Crystal Lake (Table 3). Kokanee plants continued through the 1970's and early 1980's with very good success.

In the mid to late 1980's, Crystal Lake was stocked annually with about 50,000 kokanee (Table 3). In 1988 kokanee eggs were scarce and Crystal Lake was not stocked. To make up for the loss, 100,000 to 132,000 kokanee were planted between 1990 and 1992 and unfortunately kokanee lengths dropped from 16 - 20 inches in 1988 to 9 - 14 inches in 1990. Two possible outcomes could have occurred. First, kokanee are known to exhibit inverse density dependent growth (as numbers of kokanee increase, their size decreases to compensate for less space and food).

It is possible that by doubling the stocking level, Crystal Lake kokanee reacted by slowing their growth. Second, it is possible that the source of eggs from one or more of those years were from a genetic stock that is slower growing and spawns at a younger age (normally kokanee spawn as three-year-olds in Crystal Lake, during the time of smaller kokanee, most were spawning as two-year-olds). In 1993, FWP returned the kokanee plant in Crystal Lake to 50,000 per year (historic levels). Lengths of kokanee have since increased from means of 9.2-9.5 inches to 10.7-11.0 inches. In 1994, kokanee were back to near historic lengths.

Table 10. Summary of Kokanee gill netting and hatchery stocking rates for Crystal Lake, Montana, 1975-1993.

	Mean Lengths (Ranges) of Spawning Adults		Hatchery Plants and Hatchery Origin	
Year	Male	Female	Kokanee Salmon	Rainbow Trout
1975	18.1 (17.2-19.8)	17.6 (15.8-18.4)	—	4,995(A)
1976	17.1	17.6	90,000(S)	5,033(A)
1977	17.3 (12.4-20.1)	18.0 (14.9-21.6)	100,000(S)	7,168(A)
1978	16.5 (15.2-19.5)	15.6 (11.0-20.5)	50,000(S)	7,000(A)
1979	17.5 (13.9-18.5)	17.2 (16.6-18.1)	50,000(S)	7,038(A)
1980	19.2 (one fish)	none captured	50,000(S)	7,029(A)
1981	not sampled	none captured	none stocked	7,517(A)
1982	not sampled	none captured	50,000(S)	7,708(A)
1983	not sampled	none captured	50,000(MS)	7,027(A)
1984	not sampled	none captured	49,982(MS)	7,072(A)
1985	15.1 (12.0-16.5)	16.2 (12.3-18.5)	none stocked	10,017(A)
1986	14.4 (13.6-16.6)	14.0 (13.4-15.2)	50,000(S)	10,014(A)
1987	not sampled	none captured	50,000(S)	8,739(A)
1988	18.2 (17.7-20.5)	17.9 (16.9-19.0	none stocked	8,007(A)
1989	not sampled	none captured	50,000(MS)	8,000(A)
1990	9.6 (8.8-11.2) 14.2 (12.8-17.1)	9.3 (8.8-9.7) 14.1 (12.7-17.1)	100,000(MS)	9,000(A)
1991	9.0 (8.2-9.8)	9.1 (8.3-9.7)	100,000(MS)	8,000(A)
1992	9.5 (8.7-10.4)	9.2 (8.7-10.3)	132,000(S)	8,000(A)
1993	10.7 (9.8-11.4)	11.0 (10.4-11.8)	50,000(S)	8,000(A)
1994	15.7 (15.4-17.2)	14.4 (13.4-15.5)	50,000(S)	8,000(A)

A=Arlee Hatchery MS=Murray Springs Hatchery S=Somers Hatchery

RECOMMENDATIONS

Recommendations for work items in fiscal year 1996 are listed below:

1. Status of rainbow trout and cutthroat trout populations should continue to be monitored in Lake Koocanusa and compared to fish numbers in the 1978-1981 era which was immediately before kokanee became established.

2. Continue surveying small lakes within the region as the need or opportunity arises.

3. In cooperation with the U.S. Forest Service and/or Bonneville Power Administration funded hydropower mitigation, chemically rehabilitate Blue Lake near Stryker, Montana and Kilbrennan Lake near Troy, Montana to remove undesirable nongame fish and re-establish a sport fisheries.

4. Continue to monitor success of planting kamloops or Girrard (Duncan strain) rainbow trout in a wide variety of lake habitats ranging from lakes of several thousand acres surface area down to less than 100 surface acres.

5. Continue regulating water levels in Ashley Lake to provide good flows for the outlet stream without deleterious effects upon the lake fishery.

6. Continue monitoring of kokanee populations in region lakes every one to four years on a scheduled basis to detect population changes. Much of this data can be obtained during kokanee spawning efforts.

7. Develop plans to establish a broodstock of genetically pure inland rainbow that may be maintained in a hatchery or in a brood lake.

8. Monitoring of the Lake Mary Ronan fishery will be emphasized as it supports a major sport fishery and kokanee egg collection. This lake was illegally planted with yellow perch (*Perca flavescens*) in spring 1992. Data to be collected includes kokanee year class strengths, angler catch data, kokanee egg collecting, numbers of rainbow and cutthroat spawning in tributaries, and abundance of yellow perch.

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Key Words: kokanee, lake survey

Waters referred to:

Banana Lake	11-7852	Big Therriault Lake	11-9760	Bull Lake	11-8040
Carpenter Lake	11-8060	Crystal Lake	11-8180	Dickey Lake	11-8220
Glen Lake	11-8380	Howard Lake	11-8560	Kilbrennen Lake	11-8640
Leon Lake	11-8760	Loon Lake	11-8980	Little Loon Lake	11-8880
Lost Lake	11-9010	Marl Lake	11-9120	Myron Lake	11-9290
Spar Lake	11-9640	Middle Thompson Lake	05-9232		