F-18-R-2 Ia
Region 1

MONTANA FISH, WILDLIFE & PARKS

FISHERIES DIVISION
JOB PROGRESS REPORT

STATE: MONTANA

PROJECT TITLE: STATEWIDE FISHERIES INVESTIGATIONS

PROJECT NO.: F-78-R-2

STUDY TITLE: SURVEY AND INVENTORY OF COLDWATER STREAMS

JOB NO.: I-a

JOB TITLE: NORTHWEST MONTANA COLDWATER STREAMS INVESTIGATIONS

PROJECT PERIOD: JULY 1, 1995 THROUGH JUNE 30, 1996

ABSTRACT

Department personnel continued annual monitoring of regional streams and rivers. Data analysis is generally incomplete and in progress. We collected population information on targeted streams and rivers. Bull trout redd counts were continued and whirling disease fish collection to sample for whirling disease was initiated. Personnel worked with private landowners and local agencies to minimize disturbance to streamside habitat through administration of the habitat protection laws. Personnel continued to increase public awareness of aquatic and fisheries resources through educational programs, meetings and interaction with media sources.

BACKGROUND

The coldwater fisheries resource of northwest Montana includes about 3,500 miles of streams ranging in size from average flows of less than 1 cfs up to 18,000 cfs. Stream dwelling Salmonidae include brook (*Salvelinus fontinalis*), brown (*Salmo trutta*), bull (*Salvelinus confluentus*), westslope cutthroat (*Oncorhynchus clarki*) and rainbow (*O. mykiss*) trout, and mountain whitefish (*Prosopium williamsoni*). Other species found in streams includes suckers (*Catostomus spp.*), northern squawfish (*Ptychocheilus oregonensis*), peamouth (*Mylocheilus caurinus*), redside shiners (*Richardsonius balteatus*) and sculpins (*Cottus spp.*). This survey and inventory project is an ongoing effort to update management programs to maintain and improve coldwater streams to support increasing demand upon the resource.

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 partially accomplished.

2. To implement fish stocking programs and/or fish eradication actions to maintain fish populations at levels consistent with habitat conditions and other limiting factors.

   It is the policy of Montana Department of Fish, Wildlife, and Parks (FWP) to manage stream fisheries for wild, self-sustaining populations except for the use of stocked fish to recover historic populations. Imprint planting was accomplished in the Tobacco River drainage (tributary to Lake Koocanusa) in spring 1995 when approximately 75,000 westslope cutthroat trout were released. Currently there appears to be little success from this program as evidenced by a lack of adult fish in the reservoir.

3. 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 accomplished; During calendar year 1994 project personnel reviewed a total of 395 private and government construction projects affecting streams in Flathead, Lincoln, Sanders, Lake, and portions of Missoula counties. Entities contacted included USFS, USACOE, Montana Department of State Lands, Montana Department of Transportation, the governments of the aforementioned counties, cities of Kalispell, Libby, Polson, Eureka, Troy, and numerous private individuals. FWP personnel served as liaison and provided technical assistance to Montana Department of Health and Environmental Sciences (Water Quality Bureau). Two project personnel continued to be team members on "Best Management Practices" (BMPs) timber harvest audits.

4. 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.

   With the help of private volunteers, FWP personnel taught three Youth Angler Education programs for children between the ages of 10 and 12 that included three classroom sessions and one fishing day that culminated in a certificate of completion for youth that

   passed the class. A Women's Angling Education Course was also initiated and instruction given at an adult education class at Flathead Valley Community College. Provided

technical information in the form of informational articles in local media and worked with media personnel to keep public informed of fisheries activities.

PROCEDURES

Fish Sampling Techniques

Methods used to estimate fish populations varied by stream and included the following:

1. Kootenai River Sampling. Numbers of rainbow trout and mountain whitefish were estimated in the Kootenai River. Fish were captured using a jet boat with boom electrodes powered by a Coffelt 2-C electrofishing unit. Fish were weighed and measured, fin clipped and released. Capture and recapture efforts were one week apart in late July-early August for trout and in April for mountain whitefish. Rainbow trout redds were counted in an area of the river between Alexander Creek and Fisher River.

2. Bull Trout Redd Counts. Biologists walked standard stream sections in Quartz Creek, West Fork Quartz Creek, Pipe Creek, Grave Creek and tributaries in the Kootenai River drainage and counted bull trout redds in late September and early October when maximum stream temperatures had fallen to 50° F or less.

RESULTS AND DISCUSSION

Kootenai River

RAINBOW TROUT

Life History:

The rainbow trout familiar to most anglers on the Kootenai River is likely a combination of wild native inland rainbow trout and coastal rainbow trout that were introduced by the federal government as early as the late 1800s. Stocking of coastal rainbow trout in the drainage by Montana Fish, Wildlife & Parks (FWP) is known from at least as early as 1936 and likely earlier than that.

Three life history strategies exist for rainbow trout in the Kootenai drainage: those that live in tributaries all their lives (resident); those that live and grow in the Kootenai River and spawn in a tributary (fluvial); and those that live and grow in Kootenay Lake, migrate up the Kootenai River and spawn in a tributary (adfluvial).

Fluvial rainbow trout range in length from 5 to 38 inches and weigh up to 30 pounds. Resident fish complete their entire life in their natal streams and, depending on the size of the stream, rarely grow larger than 12 inches (commonly lengths range from 4 to 8 inches).

Upon reaching the river, small rainbow trout are primarily drift feeders with a diverse food preference. They utilize more mayflies and caddisflies with Chironomidae being only 10 percent of their diet annually. With the closing of Libby Dam and subsequent entrainment of kokanee salmon beginning in the 1980s, kokanee have become an increasingly important food source for some rainbow trout below the dam. When rainbow trout reach about 13 inches in the Kootenai River, they will either switch from an insect to a fish diet and grow to very large size or they will continue to feed on insects and generally grow no larger than 18 to 20 inches. The mechanism that determines whether or not rainbow trout will switch to a fish diet is unknown.

Management Status:

Survey sampling of game fish species began in 1971 before water began storing behind Libby Dam and has continued through the 1994. Initially, four survey sections were established but rainbow and whitefish population estimates were only obtained at the "Flower-Pipe" section, a section between Flower and Pipe creeks below Libby. Relative species abundance was determined at the other three sections.

Surveys in the river above Libby before impoundment identified large numbers of whitefish and suckers and a few trout. By the mid-1970s, the whitefish population had expanded with slighter increases of trout. The study concluded trout numbers were being depressed due to gas supersaturation problems from the dam. Following the elimination of gas supersaturation, numbers of trout increased through the end of the study in 1981. Rainbow trout appeared to increase in relative abundance from 1971 to 1981 while cutthroat trout and bull trout declined. In the Flower-Pipe section below Libby immediately following dam construction, numbers of rainbow trout tripled and growth increased substantially (Tables 1 and 2). Like the upper section, numbers stabilized until the gas supersaturation problem was eliminated. A five-fold increase in numbers occurred from 1973 to 1981. This was accompanied by an initial increase and then by a decrease in the size of fish. The most important factors affecting rainbow growth were hypothesized to be density of bottom macroinvertebrate fauna, density of rainbow and whitefish, and water temperatures.

Population estimates since 1988 indicate a decline in numbers of rainbow trout as well as average size (Tables 1 and 2). Estimates from September, 1985 indicated there were approximately 52 age III and older rainbow per 1,000 feet of river compared to 16 per 1,000 feet in July, 1993. The number of III and older trout per 1,000 feet increased in the 1994 estimate to 24. A reduction in population size in the past in the Kootenai generally caused an increase in average size of the remaining lower numbers of fish. This has not been the case in the Kootenai from 1988 - 1994 (Table 2). Average length of Age II and older fish are reduced, indicating the environmental changes in the river have affected survival and food availability. Whitefish during this same period have seen an expansion in their numbers. Numbers of large rainbow (size range) have appeared below the dam since the late 1980s and a popular fishery has been created. FWP is currently monitoring that section of the river.

Several low water years in a row, competition with mountain whitefish, and increased fishing pressure have been speculated to be the cause of the reduced numbers and growth for rainbow

trout. From the 12 year period from 1975 to 1986, mean days that riverflow was below 3,100 cfs were 31. During years 1987, 1988 and 1990, the average number of days the river was under 3,100 cfs was 129.7 days, with a range of 93-161. This represents a 418 percent increase in number of days below 3,100 cfs in this 3 year period compared to the earlier 12 years of operation. Increased frequency and duration of 3,000 cfs discharge from Libby Dam is thought to potentially affect the river fishery in two major areas: 1) reducing the wetted area which reduces aquatic insect production and living space for fish; and 2) reducing water velocity which creates favorable living space for mountain whitefish and suckers at the expense of rainbow trout.

Table 1. Number of rainbow trout in the Flower Pipe section of the Kootenai River per 1,000 feet for the years 1973 through 1993.

		AGE						
Month	Year	I	II	III	IV & Older	Total	Age II & Older	Age III & Older
April	1973	—	8	23	13	44	44	36
April	1974	—	35	31	5	71	71	36
April	1975	—	36	21	10	67	67	31
—	1976					No Data		
March	1977	—	42	25	4	71	71	29
May	1978	—	97	25	4	126	126	29
March	1979	—	68	24	4	96	96	28
March	1980	—	96	25	4	125	125	29
March	1981	—	180	30	3	213	213	33
					1982 - 1984	No Data		
September	1985	395	148	47	5	595	200	52
September	1986	211	88	11	1	311	100	12
September	1987	94	52	11	1	160	66	14
September	1988	150	68	10	3	231	81	13
September	1989	293	68	10	3	374	81	13
September	1990	279	80	13	—	372	93	13
August	1991	394	130	12	—	372	93	13
July	1993	250	171	13	3	437	187	16
August	1994	162	100	22	2	285	124	24

Table 2. Average length of rainbow trout in the Flower/Pipe section of the Kootenai River by age class for 1971 through 1990.

	Average Length by Age Class (in inches)			
Year	I	II	III	IV and Older
1973	–	9.5	10.9	14.4
1974	–	10.4	11.9	15.0
1975	–	10.6	12.0	15.3
1976	–	–	–	–
1977	–	11.1	15.3	18.9
1978	–	10.9	13.5	15.6
1979	–	10.4	13.7	14.8
1980	–	10.5	13.5	16.9
1981	–	9.9	11.2	17.4
1982-1984			—NO DATA—	
1985	2.9	9.0	12.5	16.1
1986	—	—	—	—
1987	3.0	8.4	11.6	13.1
1988	2.9	8.9	12.2	13.7
1989	3.0	8.5	11.4	14.0
1990	3.1	7.9	11.0	—
1991	2.9	7.3	12.1	—
1993	3.1	7.1	11.3	13.5
1994	3.4	7.2	10.2	13.8

In 1983, the river fishing regulations changed from 10 pounds and one fish not to exceed 10 fish to five trout per day, only one greater than 14 inches. Population estimates indicated no increase in overall rainbow populations after 1983 or in numbers of fish greater than 14 inches (Age 4 and older). Comparing creel data from 1978 to 1989 indicate fewer rainbows were being harvested, fewer anglers were fishing with bait, and catch rates were only slightly less. FWP is also estimating numbers of trout with hooking scars from all types of tackle. In 1993, 8 percent of the trout age III and older had hooking scars as opposed to 4 percent of the trout age II and younger, indicating the possibility of increased susceptibility of older fish to angling. It may also be possible that the older fish had more scars because they were exposed to fishing pressure for the extra year.

In 1994, the fishing regulations were modified to include a slot limit between Libby Dam and Kootenai Falls. The new limit allows three trout less than 13 inches and one trout greater than 18 inches. The first year of population estimates since the regulation change showed an increase in trout III+ and older, but the numbers were not statistically significant. FWP will continue to monitor the population for two to three generations (6 to 10 years) to evaluate its success.

Spawning:

About 131 miles of stream are accessible for spawning and rearing for rainbow trout above Kootenai Falls. Major spawning areas documented include Bobtail, Pipe, Quartz, and Libby creeks and the Fisher River. Libby Creek was determined to be the most important spawning and nursery tributary downstream from Libby Dam.

FWP monitored several tributaries to the Kootenai River between 1971 and 1981. Based on information gathered, Bobtail Creek was chosen as an indicator stream. In 1993 monitoring was re-established. Since trapping began in 1976, the number and average length of spawning rainbow trout has decreased (Table 3).

The first evidence of rainbow trout spawning in the main stem was found in 1981. Spawning activity was located between the mouths of Fisher River and Dunn Creek. Redd counts have been made in the Blackwell Flats area of the river below the dam since the early 1980s. Rainbow spawning generally occurred during a period when dam releases were stable, currently flows designed to increase spawning success for Kootenai River white sturgeon are initiated during peak rainbow trout spawning so present operation may be harmful to spawning fish and incubating embryos. Since 1987 redd counts on the main stem have decreased substantially (1981 = 14 redds; 1982 = 37 redds; 1987 = 61 redds; 1989 = 51 redds; 1990 = 11 redds; 1992 = 7 redds; 1993 = 15 redds; 1994 = 18 redds and 1995 = 31 redds.

Table 3. Results from spawning migration trapping on Bobtail Creek, 1976 - 1993.

Year	Trapping Dates	Number Caught	Mean Length (Inches)
1976	April 1 through May 4*	39*	13.4
1977	March 25 through May 25	131	15.8
1978	March 21 through May 8	155	12.8
1979	March 22 through Jun 4	382	12.6
1980	March 26 through June 1	205	12.4
	1981 through 1992 no data gathered		
1993	April 1 through May 27	56	11.1
1994	March 28 through May 20	124	8.2
1995	April 7 through May 25	80	11.8

*Trap taken down due to high water.

Mountain Whitefish

Management Status:

Mountain whitefish numbers and size showed a similar trend as rainbow since dam construction. The population showed an initial increase in numbers, followed by a stabilization of numbers with final dramatic increases once the gas supersaturation problem was resolved in the early 1970s (Table 4). Growth also declined as numbers of whitefish increased (Table 5). Although numbers of mountain whitefish increased in the late 1970s, growth was not affected as much as in the case of rainbow trout. By the early 1980s, however, growth rates had been reduced and continued to decline as the population continued to expand (Table 4). In response to renewed interest in the commercial harvest of mountain whitefish on the Kootenai River, population estimates were reestablished in the Flower/Pipe Creek section. The most recent estimate (1995) showed numbers still quite high compared to the 1970s and 1980s.

There is considerable overlap in habitat selection and diet of rainbow trout and mountain whitefish when residing in the same stream. Mountain whitefish were found to feed in the water column and foraging substrate. Major food items were Chironomidae larvae and adults. Whitefish were also found to have a high seasonal use of caddisfly larvae and adults; gastropods; and mayflies. Rainbow were found to be primarily drift feeders with a more diverse food preference. In general they utilized more mayflies and caddisflies with Chironomidae being only 10 percent of their diet annually. The overlap in the whitefish and rainbow diet was found higher among smaller and younger fish. Small rainbow were found to have over 85 percent of their diet from Chironomidae alone.

With respect to habitat preference, whitefish chose deeper areas, while rainbow chose higher percent of sand substrate, higher velocities, shallower water, and more boulders for resting. The proximity of whitefish to the bottom explained 96 percent of the two species microhabitat variation. Most habitat similarities were found between small rainbow and whitefish.

Spawning habitat for mountain whitefish is considered excellent throughout the entire Kootenai River downstream from Libby Dam. Main stem spawning increased from 5 sites between the rereg dam site downstream to Libby in 1973 to 17 in 1979. Major tributary spawning areas include the Fisher River and Libby, Pipe, and Quartz creeks. Spawning runs of mountain whitefish ascending Fisher River were sampled from 1969 through 1979. The estimated run increased from about 2,000 fish in 1969 to 20-30,000 in 1978 and 1979, respectively, reflecting the increases in the river population.

Improved water quality in the Fisher River and Wolf Creek has also increased survival. Timing of the run has shifted since the construction of Libby Dam and the selective withdrawal system with the population initiating spawning after the Kootenai River is cooled to about 10° C. Whitefish were found to migrate considerable distances to spawn. A large part of the Fisher River run comes from the Kootenai below the re-reg dam site. With respect to the lower Kootenai River, the majority of the mountain whitefish spawning occurs in Callahan, Lake, and O'Brien creeks and the Yaak River.

Table 4. Number of mountain whitefish in the Flower/Pipe section of the Kootenai River per 1,000 feet for the years 1973 through 1995.

		Age				
Month	Year	I & II	III	IV	V & Older	Total
April	1973	188	296	18	---	502
April	1974	332	48	55	7	442
March	1975	317	75	51	29	472
---	1976			No Data		
March	1977	349	20	71	34	474
May	1978	95	461	16	71	643
March	1979	318	101	172	32	622
March	1980	52	247	205	52	556
March	1981	332	156	250	69	807
		1982 - 1988	No Data			
September*	1989	1284	775	197	36	2292
September*	1990	964	584	180	129	1857
April	1995	339	467	210	44	1060

* These were fall estimates and may be artificially inflated due to spawning congregations.

Table 5. Average length of mountain whitefish in the Flower Pipe section of the Kootenai River by Age class for 1971 through 1990.

Kootenai River - Flower Pipe Section Mountain Whitefish						
		Average Length by Age Class (in inches)				
Month	Year	I	II	III	IV	V
April	1971	4.7	7.9	10.3	12.2	---
April	1973	---	8.7	10.9	11.7	12.6
April	1974	---	10.3	11.2	12.1	13.8
March	1975	---	10.3	11.3	12.0	13.2
	1976	---	---	---	---	---
March	1977	---	10.5	14.1	15.1	16.6
May	1978	---	10.3	12.6	14.5	16.1
March	1979	---	9.8	12.3	13.4	16.4
March	1980	---	10.1	11.7	13.5	15.7
March	1981	---	9.4	12.0	13.1	15.6
	1982-1988			---NO DATA---		
September	1989	4.4	9.2	11.3	13.0	14.3
September	1990	4.2	8.5	11.1	12.4	13.4
April	1995	5.3	9.5	11.5	12.8	14.0

Bull Trout Population Analysis

KOOTENAI RIVER DRAINAGE

Bull trout redds were counted in 11 tributaries of Kootenai River or Koocanusa in 1994. These counts are summarized in Table 6 below and compared to previous years' data.

Table 6. Number of bull trout redds from annual monitoring sections in major Kootenai River/Koocanusa spawning tributaries.

Stream	1990	1991	1992	1993	1994
Quartz	32	32	4	34	37
W. Fork Quartz	44	43	13	55	27
Pipe	6	5	11	6	7
O'Brien	*	*	30	24	7
Grave	*	*	30	23	57
Clarence	*	*	*	8	13
Blue Sky	*	*	*	5	1
Wigwam	*	*	*	*	63
Lodgepole	*	*	*	*	5
Ram	*	*	*	*	9

*No counts conducted.

Clark Fork of the Columbia Drainage

Bull trout redd counts are summarized in report F-78-R-1, Job II-a, Coldwater Lakes, Noxon Rapids and Cabinet Gorge Special Segment.

Clark Fork Brown Trout Enhancement

Trout populations in the Clark Fork are chronically low downstream from the mouth of the Flathead River. Since the limiting factor(s) were not known, an experimental stocking program was initiated to determine if juvenile recruitment was the primary limiting factor. The river was planted over a 40-mile stretch downstream from the mouth of the Flathead River as shown in Table 7.

Table 7. Brown trout plants in the Clark Fork River.

Year	Size (Inches)	Number
1990	4.9	24,910
1991	5.2	18,540
1992	5.2	22,110
1993	6.7	5,143
1994	6.7	5,772

The river was sampled during the same period using a jetboat with fixed boom electrodes fished at night. Sampling captured large numbers of suckers, mountain whitefish, and northern squawfish along with a few yellow perch, largemouth bass, westslope cutthroat, and rainbow trout. No brown trout were captured. Due to the apparent lack of success the program was terminated.

RECOMMENDATIONS

Recommendations for work to be accomplished in fiscal year 1996 are presented below by drainage and include:

1. Survey and Inventory

   A. Populations of rainbow trout and mountain whitefish should be determined annually in one or two sections of Kootenai River downstream from Libby Dam to determine population trends.

   B. Monitoring of population trends of bull trout should be continued by trapping or making redd counts in Kootenai River and Clark Fork River drainages to estimate adult spawning escapement.

   C. Number of rainbow trout spawning in Kootenai River between Alexander Creek and Fisher River should be determined annually by making redd counts to determine status of main stem natural reproduction.

   D. Genetics of the large rainbow trout in Kootenai River below Libby Dam should be determined by collecting adipose fins for starch gel electrophoresis.

   E. Sculpin sampling in Lake Creek should be continued.

F. Continue redband distribution work to include high mountain lakes and streams not finished in calendar year 1994.

G. Survey salmon snag fishery below Libby Dam and below Kootenai Falls to determine use, harvest, and exploitation.

2. Fish Population Management

A. Continue to monitor imprint plants going into Tobacco River drainage

B. Assess possibility of creating artificial spawning habitat in the inlet tributary to Kilbrennan Lake.

C. Terminate brown trout imprint plants in the Clark Fork River due to poor survival and harvest.

3. Technical Guidance

A. Continue to provide technical assistance to private and public entities as needed

B. Continue to provide input on BMP audit teams.

4. Aquatic Education

A. Continue to provide Youth Angler Education classes in Libby.

B. Initiate new angler education classes in Eureka and Noxon.

C. Continue to provide articles to local media and participate in media coverage.

Prepared by: Mike E. Hensler
Date: July 24, 1995

Waters referred to:

Kootenai River (11-3500)
Feeder Creek (11-3440)
Quartz Creek (11-5320)
Pipe Creek (11-5160)
Grave Creek (11-2720)
Blue Sky Creek (11-0500)
Ram Creek (Canada)
Bobtail Creek (11-0520)
Flathead River (07-1560)
Lake Koocanusa (11-8690)
Lake Creek (11-3540)
Tobacco River (11-6920)
West Fork Quartz Creek (11-7460)
O'Brien Creek (11-4820)
Clarence Creek (11-1100)
WigWam River (11-7540)
Lodgepole Creek (Canada)
Alexander Creek (11-0040)
Clark Fork River (05-1140)
Kilbrennan Lake (11-8640)