MONTANA DEPARTMENT OF FISH, WILDLIFE AND PARKS

FISHERIES DIVISION
JOB PROGRESS REPORT

STATE: MONTANA

PROJECT TITLE: STATEWIDE FISHERIES INVESTIGATIONS

PROJECT NO.: F-46-R-1

STUDY TITLE: SURVEY AND INVENTORY OF COLDWATER STREAMS

JOB NO.: I-a

JOB TITLE: NORTHWEST MONTANA COLDWATER STREAM INVESTIGATIONS

PROJECT PERIOD: July 1, 1987 through June 30, 1988

ABSTRACT

Fish population sampling was done in Lake Creek, South Fork Flathead River, and Kootenai River. Population estimates for subject fish species were less than in previous years. Current drought conditions may be the major factor. Bull trout redd counts were made in four tributaries of Swan River above Swan Lake and numbers found were above those found in previous years.

OBJECTIVES AND DEGREE OF ATTAINMENT

1. To maintain, within legal limits, instream flows sufficient to maintain or enhance fish populations at existing levels. Objective accomplished utilizing state funding.

2. To maintain streambanks and channels in present or improved condition. Objective accomplished utilizing state funding. A total of 262 stream alteration projects were reviewed by Region One personnel plus 66 Corps of Engineers 404 permit applications.

3. To maintain water quality at or above present levels as measured by the State Water Quality Bureau and the U. S. Geological Service. Objective accomplished using state funding.

4. Maintain aquatic habitat and associated fish populations at or above present levels. Objective accomplished.

5. To maintain fish populations and harvest at acceptable levels to provide 163,300 angler days of use by 1992 and a catch rate of 0.5 fish/hour or greater. Objective partially accomplished. Current drought conditions appear to be having substantial detrimental effects upon stream fish populations.

6. To maintain a population of 1,300 rainbow trout per mile with 5 percent larger than 14 inches in the Kootenai. Objective may not have been

accomplished but failure most likely related to operation of Libby Dam by Corps of Engineers and Bonneville Power Administration. Previous reports on Kootenai River fish populations express fish numbers as number per 1,000 feet of stream. For continuity, this unit of measure has been used in this report.

7. To maintain or expand populations of species of special concern (westslope cutthroat trout, bull trout, and inland rainbow trout). Objective was accomplished. A special segment report for this objective has been submitted (Huston 1988).

8. To secure public access on currently used sites on private ground. Provide floating accesses 4-6 hours apart on major streams. Objective was accomplished using state funds. Survey of Kootenai River access started in conjunction with Parks Division and U. S. Forest Service.

9. To communicate and coordinate management strategies and problems with the public and other resource agencies to maintain fish populations at or above present levels. Objective was accomplished. A Swan River management plan was prepared and submitted for public review. Coordination meetings were held with the Lolo, Kootenai, and Flathead Forests. Resource coordination meetings were attended with Corps of Engineers and Bureau of Reclamation. (state funded)

PROCEDURES

Fish Sampling Techniques

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

1. Lake Creek sculpin (Cottuss spp.) sampling--Three 272 square foot areas of a riffle above and below the ASARCO Troy mine tailings pond were encircled with one-fourth inch bar mesh netting and the two-pass method used to estimate sculpin numbers. Population estimates from the three areas were combined and expanded to number of sculpins per 1,000 square feet of riffle.

2. Kootenai River rainbow trout sampling--The 11,000 foot long Alley Springs-Pipe Creek section of Kootenai River was sampled using a jet boat fitted with fixed booms, a 110 volt generator and a Coffelt VVP-2c electrofishing unit producing pulsed DC. Peterson mark and recapture estimates (Vincent 1971) were made with capture and recapture efforts being one week apart. Other data recorded included lengths and weights and scale samples for age and growth analysis.

3. Thompson River trout sampling--Two sections, one 10,000 and the other 11,000 feet long, were sampled in Thompson River to determine effects of a catch and release fishing regulation upon trout numbers and size. Population numbers were estimated using the Peterson mark and recapture method with marking and recapture estimates being about one week apart. The 10,000 foot long section (Bighole) is within the boundaries of a 6.8 mile long catch and release

section while the 11,000 foot long section (19 Mile) is about 7 miles upstream from the Bighole section and about two mile above the catch and release section.

4. South Fork Flathead River---Fish populations in three sections of the South Fork Flathead River were estimated using snorkel counts (Zubik and Fraley 1988). The Harrison section, 1.3 miles long, is located about 3 miles downstream from the Bob Marshall Wilderness boundary. This section is within the confines of a trout catch and release fishing area. The two upstream sample areas were both within the boundaries of the Bob Marshall Wilderness and fishing limits allow anglers to keep three trout all of which must be less than 12 inches long. The Blackbear section, nine miles upstream into the wilderness, was 2.6 miles long while the Gordon Creek section, 25 miles into the wilderness, was 1.3 miles long.

Bull Trout Redd Counts

Bull trout spawning starts when maximum stream temperature drops to about 50°F, usually in early October. One or two person teams walk standard stream sections counting only those redds that can be positively identified. Streams counted included Lion, Squeezer, Elk, and Goat creeks, all tributary to Swan River above Swan Lake.

Age and Growth

Fish scale impressions were made on strips of acetate and read using a microfiche reader. Magnification used varied with species and size of scale but was uniform for individual scale collections. A straight line relationship between fish body length and scale length was assumed.

FINDINGS AND DISCUSSION

Lake Creek

A major hard rock mining operation in the Stanley Creek drainage tributary to Lake Creek, Lincoln County, Montana, has caused considerable concern about potential effects upon the biota of Lake Creek. The mine's waste rock slurry pipeline traverses Stanley Creek, crosses Lake Creek, and terminates in a settling pond in close proximity to Lake Creek. There are concerns about pipeline breaks (which have occurred) and leaking of settling pond material into Lake Creek.

Lake Creek in the vicinity of the settling pond and downstream for at least six miles supports a small trout population which is difficult to estimate using electrofishing techniques because of deep pools with good log jam cover and low conductivity. Good populations of sculpins do exist above and below the tailings ponds. Sculpins, because of their habitat preferences, are sensitive to habitat deterioration, especially silt deposition and water quality changes. Sculpin populations were estimated in two riffle areas, one above the tailings and pipeline crossing and the other below the tailings pond. The same riffle areas were sampled in 1977, 1986, and 1987. Table 1 shows the number of sculpins per 1,000 square feet of creek bottom by year.

Table 1. Numbers of sculpins per 1,000 square feet of riffle area, Lake Creek above and below mine tailings pond, August, 1977, 1986, and 1987.

Year	Area	No. Sculpins Per 1,000 Ft.²	Average Length (inches)	Range (inches)
1977	Above pond	92	2.0	1.2 - 3.3
1986	Above pond	237	1.7	0.9 - 3.0
1987	Above pond	197	1.9	1.0 - 2.8
1977	Below pond	206	2.1	1.2 - 3.6
1986	Below pond	274	1.8	0.8 - 3.8
1987	Below pond	155	1.8	0.7 - 2.9

Kootenai River

A population estimate was attempted on rainbow trout inhabiting a section of the Kootenai River downstream from Alley Spring rapids to about 1,000 feet below the mouth of Pipe Creek. Sampling done in September, 1987, had to be terminated earlier than expected when the jet outboard engine malfunctioned during the recapture effort. A total of 283 rainbow and 23 cutthroat were marked and released on the marking effort, but only 157 rainbow and 10 cutthroat were captured on the recapture effort before the boat engine seized. The unequal catch between the mark and recapture effort is thought to be the major cause for the low 1987 population estimate (Table 2) when compared to previous years' estimates. The 1987 data are hand calculated preliminary estimates as data have not yet been analyzed by computer.

Table 2. Number of rainbow trout per 1,000 feet in lower Flower-Pipe section of Kootenai River, March, 1981; May, 1984; and September, 1986 and 1987.

		Number of Rainbow Trout/1,000 ft by Age Class				
Year	Month	I	II	III	IV and older	Total
1981	March	--	184	24	4	212
1984	May	5	119	66	7	197
1986	September	36	161	93	18	308
1987	September	85	49	11	3	148

Almost all of the rainbow trout inhabiting Kootenai River in the Flower-Pipe area spawn in tributaries and most young smolt into the river at or near one year of age (X_1 smolts) or at or near two years of age (X_2). Age of rainbow trout at smolting has not changed from 1981 (Table 3).

Table 3. Age of smolting for rainbow trout in lower Flower-Pipe section, 1974, 1981, 1984, 1986, and 1987.

	Percentage				
Smolt Age	1974	1981	1984	1986	1987
X_1	64	83	84	83	83
X^{e}	36	17	16	17	17

Growth of rainbow trout collected from the Flower-Pipe section is shown in Table 4. Growth rates for the most part have declined since 1981.

Table 4. Length in inches at annulus formation of one-year old smolting rainbow, Flower-Pipe section of Kootenai River, 1981, 1985, and 1987.

Year	I	II	III	IV
1981	3.7*	10.1	13.4	14.7
1985	2.9 (64)**	9.0 (42)	12.5 (19)	15.1 (3)
1987	3.0 (162)	8.4 (66)	11.6 (23)	13.5 (5)

* Sample size unknown but is several hundred fish.
** Sample size given in parenthesis.

Even though it is acknowledged that the 1987 population estimate is not correct, the author, who has electrofished the Alley Springs-Pipe section 12 years since 1973, thinks that number of rainbow trout was less in 1987 than in 1986. Growth rates have declined from 1981 to 1985 and to 1987. Reasons for declining fish numbers and growth rates are speculated to be a reaction to a combination of factors. These factors are: 1) greater frequency and duration of Libby Dam releases of 3,000 cfs since 1985 compared to previous years; 2) low tributary flow during the last two to three years due to drought; 3) type of aquatic insects found in the Kootenai River; and 4) competition with mountain whitefish.

Number of mountain whitefish in the sample section has always been much greater than rainbow trout and in recent years was 780 per 1,000 feet of stream in 1981 and 550 per 1,000 feet in 1984. Mountain whitefish numbers have not been estimated since 1984. Competition for food may occur between mountain whitefish and rainbow trout less than 10 inches long (DosSantos and Huston 1983). Mountain whitefish prefer areas of lower water velocities than rainbow trout. Greater frequency and duration of 3,000 cfs flows may favor whitefish since water velocity would be slower. Greater duration of 3,000 cfs flows will reduce wetted river bottom and insect production. Larger insects such as stoneflies are essentially absent from Kootenai River below Libby Dam and caddisflies are not abundant (Perry and Huston 1983). Small insects such as the midges and mayflies are the most abundant insects in the river.

Thompson River

In May, 1984, a 6.8 mile section of the Thompson River extending from the mouth of Deerhorn Creek downstream to the confluence of the West Fork of the Thompson River was designated as a catch-and-release fishery. A 10,000 foot electrofishing section (Bighole) was established within the catch-and-release portion to monitor fish under a no harvest regulation. An 11,000 foot section, 19 Mile, upstream from the catch-and-release area and under general fishing regulations was monitored for comparison.

In September, 1987, a population of 64 rainbow trout 4.0 inches and larger, per 1,000 feet was estimated for the Big Hole section (Table 5). This estimate was 45 percent below the 1985-1987 average.

Table 5. Summary of Thompson River fish population estimates and river discharge.

Section	Date	Number Fish per 1,000'	Percent >12"	Mean Monthly Discharge (CFS)
Big Hole	7/85	277	5	290
Big Hole	9/86	84	1	191
Big Hole	9/87	64	6	128
19 Mile	7/85	256	1	290
19 Mile	7/86	188	2	191
19 Mile	9/87	83	0.2	128

The population estimate for the 19 Mile section was 83 rainbow trout (>4.0 inches) per 1,000 feet. This estimate also represents a 47 percent reduction below the three year average. A summary of the Thompson River estimates is shown in Table 5. River discharges (monthly mean) from a downstream station are also included in Table 5. Low water years during 1986 and 1987 may be limiting fish populations within the sections. To evaluate this, the Big Hole section and a downstream area were snorkeled to determine fish habitat preference. The lower area contains a much higher ratio of pools and deep water in comparison to the Big Hole section. In a one-pass observation of both sections, 6.4 fish were observed in the Big Hole section compared to 118 per 1,000 feet in the lower area.

South Fork Flathead River

Fishing regulations for portions of the South Fork Flathead River were changed in 1983 to limit harvest and reduce the effects of increased pressure on the cutthroat fishery. Limits within the Bob Marshall Wilderness Complex were reduced to 3 fish <12 inches, daily and in possession and the portion of river from the Meadow Creek footbridge downstream ten miles to the Spotted Bear footbridge was designated catch-and-release with artificial flies and lures only. Because of the wilderness designation and remoteness of the areas, angling and snorkeling methods were utilized to estimate fish populations. Table 6 compiles comparative data from past surveys. The percent of fish >12 inches, catch rates and average fish lengths were derived from Department anglers.

Table 6. South Fork Flathead River survey data, 1960-1987.

Section	Year	Percent Fish >12"	Mean Length (inches)	Catch Rate Fish/Hour	Estimate (method) Fish/mile
Gordon	1987	20	10.7	1.36	97 (snorkel)
	1986	31	10.8	8.7	306 (snorkel-Peterson)
	1985	24	10.2	7.0	- none -
	1984	18	9.5	n/a	404 (snorkel-Peterson)
	1981	8	9.1	3.7	- none -
	1960	11	9.0	n/a	- none -
Black Bear	1987	27	10.8	1.7	242 (snorkel)
	1986	13	9.1	n/a	- none -
	1985	9	9.0	6.3	880 (snorkel-Peterson)
	1983	2	8.4	n/a	1136 (hook & line-Peterson)
Harrison	1987	16	9.5	3.9	159 (snorkel)
	1986	----------	----------	none ----------	----------
	1985	2	8.5	2.1	359 (snorkel-Peterson)
	1984	2	7.7	1.7	359 (hook & line-Peterson)

The Gordon section represents the most upstream section within the wilderness complex. It is 1.3 miles in length and is typified by a flat, bowl shaped channel with shallow edges and a deeper mid channel. Average channel width is 103 feet and there were about 1.8 riffle: pool complexes per mile. The 2.6 mile long Black Bear section is below the Gordon section and also within the wilderness. This section is generally flat and bowl shaped, however, there is less channel braiding. Average stream width is 140 feet with 3.3 riffle: pool complexes per mile. The 1.3 mile Harrison catch-and-release section is below the Black Bear section just outside of the wilderness. The channel is more "u" shaped with deep edges and mid channel. Average width is 149 feet and there are about 1.8 riffle: pool complexes per mile. Meadow Creek Gorge, at the upper end of the section, may be a migration barrier to spring spawning westslope cutthroat from Hungry Horse Reservoir.

The percent of westslope cutthroat trout >12 inches has increased steadily in all sections with the Black Bear and Gordon sections the most pronounced. Mean lengths have also increased in all sections. Catch rates are good in that they exceed 1 fish/hour, however, they are quite variable. This is probably due to a number of factors which may include: angler ability, weather conditions, flow conditions, temperatures, and fish abundance. Similar factors may have affected the population estimates which show a decline in more recent years. Critical factors appear to be river discharge, suitable habitat, and water temperature.

Swan River Drainage Bull Trout Redd Counts

Redd counts were made in four Swan River tributaries: Elk, Goat, Squeezer, and Lion creeks. Number of bull trout redds found in each of these creeks since 1982 is listed in Table 7. Prior to 1984, a portion of Elk Creek was the only

water closed to fishing, but since 1984, all streams listed in Table 7 have been closed in their entirety. Numbers of redds found in the four creeks have shown great variability between years which, at this time, cannot be explained.

Table 7. Number of bull trout redds found in four tributaries of the Swan River during 1982 through 1987.

	1982	1983	1984	1985	1986	1987
Swan Drainage:						
Elk	56	91	93	19	53	162
Goat	33	39	31	40	56	31
Squeezer	41	57	83	24	55	64
Lion	63	49	88	26	46	33
Total	193	236	295	109	210	290

RECOMMENDATIONS

It is recommended that the following fish population sampling be done in 1988-1989 work period:

1. Kootenai River - Rainbow trout populations in two sections of the Kootenai River should be sampled during the 1988-1989 time period. Sampling the Alley Springs-Pipe Creek section should be continued as the long-term rainbow trout population monitoring area while a section near Libby Dam (the Jennings section) should be sampled in 1988. This Jennings section encompasses the only known area where rainbow trout spawn in Kootenai River proper and the area will be inundated if the City of Libby is granted a license to build a lowhead hydroelectric impoundment. The Jennings section was last sampled in 1981 as part of Corps of Engineers funded Libby Dam fishery contracts.

   An effort should be made in the near future to estimate number of mountain whitefish inhabiting the Alley Springs-Pipe Creek section.

2. Thompson River - Trout population estimates should be made in the Bighole section to evaluate changes in fish population related to continued drought conditions and catch-and-release fishing regulations. Additionally, a several thousand foot long section located between Indian Creek and Meadow Creek should be sampled to determine species composition changes that might occur following planting of brown trout (Salmo trutta) in 1988.

3. Swan River Drainage - Mainstem Swan River upstream from Bigfork Dam to the Condon Bridge, about 50 miles, was changed from the general season fishing regulations to a catch-and-release area for cutthroat and rainbow trout in 1988. One or more fish population monitoring areas should be sampled within the special regulation area to determine standing crop in 1988. These same areas should be sampled for several years to determine effects of the special fishing regulations upon cutthroat and rainbow trout population structure.

Bull trout redd counts should be continued in the Swan River tributaries for several years to determine population trends. Fishery information about Swan River and Swan Lake may provide information to determine possible reasons for annual variations in redd counts.

4. Accelerated reconstruction of federal highways in northwest Montana, primarily U. S. Hwy. 2 running east-west, may result in considerable channel changes in two small streams. These streams, McGregor Creek and Swamp Creek, are considered or thought to be spawning and rearing areas for rainbow trout from Thompson River or Kootenai River. Redd counts and/or population estimates should be made in these streams in spring 1989.

LITERATURE CITED

DosSantos, Joseph and Joe Huston. 1983. Kootenai River investigations final report, 1972-1982, section B. Montana Dept. of Fish, Wildlife and Parks, Helena, MT.

Perry, Sue Appert and Joe Huston. 1983. Kootenai River investigations final report, 1972-1982, section A. Montana Dept. of Fish, Wildlife and parks, Helena, MT.

Vincent, R. E. 1971. Electrofishing and fish population estimates. The Prog. Fish Cult. 33(3):163-169.

Zubik, Raymond J. and John J. Fraley. 1988. comparison of snorkel and mark-recapture estimates for trout populations in large streams. N. Amer. Jour. Fish Mgmt., 8:58-62.

Prepared by: Joe E. Huston

Date: August 24, 1988

Waters referred to: Elk Creek 07-1340-01
Goat Creek 07-1720-01
Indian Creek 11-3200
Kootenai River 11-3500-01
Lake Creek 11-3540-01
Lion Creek 07-2420-01
McGregor Creek 05-4608
Pipe Creek 11-5160
S.F. Flathead River 08-6660
Squeezer Creek 07-4340-01
Swamp Creek 11-6740
Swan Lake 07-9000
Swan River 07-4560
Thompson River 05-7248-01

Key words: fish population estimates, rainbow trout, sculpins, cutthroat trout