

MONTANA DEPARTMENT OF FISH, WILDLIFE AND PARKS

FISHERIES DIVISION  
JOB PROGRESS REPORT

STATE: MONTANA PROJECT TITLE: STATEWIDE FISHERIES INVESTIGATIONS  
PROJECT NO: F-46-R-2 STUDY TITLE: SURVEY AND INVENTORY OF COLDWATER  
AND WARMWATER ECOSYSTEMS  
JOB NO.: V-d JOB TITLE: NORTHEAST MONTANA COLDWATER  
ECOSYSTEM INVESTIGATIONS  
PROJECT PERIOD: JULY 1, 1988 THROUGH JUNE 30, 1989

ABSTRACT

An "opening day" creel census was conducted at Beaver Creek. This information will be compared to future "opening days" to develop harvest and pressure trend data. A total of 75 fishermen were interviewed. The overall trout catch rate for three sections was 2.94 fish per hour (f/h). Fishermen expended a total of 168.5 hours and harvested 189 trout. Trout populations in Sections 02 and 03 were estimated and compared to previous years. The extreme drought of 1988 did not appear to reduce total numbers of trout present, although larger fish were scarce and virtually all fish were heavily infested with black-spot disease. Growth rates of trout at Bear Paw Lake have declined due to competition with suckers. A survey of Bear Paw Lake anglers indicated a desire for larger trout even at the expense of lower catch rates. Only 14% of the respondents kept a limit of 5 trout and 43% kept no fish in 1988. Chemical rehabilitation is not a preferred option for sucker control. A system of trapping spawning suckers should be developed to reduce the adult sucker population. Eagle Lake and DeSmet rainbow trout were observed spawning in Beaver Creek above Beaver Creek Reservoir. The average size of trout gill netted in Beaver Creek Reservoir has increased for two consecutive years and is currently larger than in any previous year. However, catch per unit effort (CPUE) has decreased slightly. First year survival of Eagle Lake rainbow trout in Grasshopper Reservoir was outstanding and contributed to reduced growth. Annual removal of suckers by trapping and reduced stocking rates are expected to increase trout size significantly. Eagle Lake rainbow at Reser Reservoir exhibited a much lower mortality rate than Arlee rainbow.

OBJECTIVES AND DEGREE OF ATTAINMENT

Streams

1. To ensure within hydrologic constraints that stream flows supporting trout fisheries do not fall below 1975-85 averages.

Objective accomplished; data was collected for upper Cow Creek and instream flow recommendations were submitted.

2. To maintain all of the region's streambanks and channels in their present or improved condition. Objective accomplished utilizing state funding.
3. To maintain water quality at or above 1975-85 average levels. Objective accomplished; monitored compliance with water quality standards and adjusted streamflows in Beaver Creek for temperature moderation.
4. To maintain fish populations and habitat in streams at present levels. Objective accomplished and data presented.
5. To maintain at least 6,000 angler days per year and a trout catch of 0.5 fish per hour. Objective accomplished and data presented.
6. To develop fishing access site acquisition and development plan for the region. Objective accomplished utilizing state funds.
7. To establish cooperative watershed management plans with federal agencies. Objective accomplished utilizing state funds.
8. To obtain greater public involvement by attending approximately 20 public/sportsmen's club meetings and initiating 2 news releases per year. Objective accomplished utilizing state funding.

#### Lakes

1. To maintain 70,000 angler days per year and provide catch rates of 0.5 fish per hour or greater. Objective accomplished and data presented.
2. To maintain acceptable trout fishing in waters with nongame and/or predator species. Objective accomplished and data presented.
3. To increase the number and distribution of public fishing waters by acquiring 2 reservoirs every 5 years. Objective accomplished.
4. To obtain public input for management decisions by attending 20 sportsmen's club meetings and providing 3 news releases per year. Objective accomplished utilizing state funding.
5. To develop fishing access site acquisition and development plan for the region. Objective accomplished utilizing state funding.

## PROCEDURES

Streams were sampled with a direct current (DC) bank electrofishing unit. Population estimates were made using the two-catch method as described by Seber and LeCren, 1967. Beaver Creek creel census data was collected by interviewing all fishermen leaving the study area on the opening day of fishing season. Anglers were questioned as to hours, stream/sections fished and gear type. All fish creeled were measured for total length (TL) in inches.

Lakes were sampled with floating and/or sinking experimental gill nets. The gill nets measured 6 feet in depth and 125 feet in length and consisted of 25-foot panels of 3/4-, 1-, 1 1/4-, 1 1/2-, and 2-inch square mesh. Beach seining to determine abundance of sport and forage fishes was conducted in late summer utilizing a 100- x 9-foot seine of 1/4-inch square mesh.

## RESULTS AND DISCUSSION

### Beaver Creek

A creel census was initiated in 1988 to gather trend information on trout harvest from Beaver Creek. Because the third Saturday in May is the general trout stream opening day with a large number of anglers usually present, this day was chosen as an indicator for long-term harvest data.

The study area consisted of 16 miles of stream entirely within Beaver Creek County Park. Two on-stream reservoirs, Bear Paw Lake and Beaver Creek Reservoir, subdivide the study area into three sections. The most downstream section, 01, consists of 2 miles of stream immediately below Beaver Creek Reservoir. Rainbow and brown trout are the primary trout species present. Section 02 is 7 miles long and is bounded below by Beaver Creek Reservoir and above by Bear Paw Lake. This section contains rainbow, brown, brook, and cutthroat trout. The uppermost section, 03, is 7 miles in length and bounded below by Bear Paw Lake and above by the Rocky Boy Reservation. It has an excellent brook trout population and some rainbow and cutthroat trout. A single county road transects the park which allowed virtually all fishermen to be interviewed as they left the park. Data was compiled by stream section to determine preference and pressure differences.

A total of 75 fishermen were interviewed: 9 from section 01, 42 from section 02, and 24 from section 03. The majority of anglers fished with bait, but flies or lures were also used. Catch rates for all trout species were lowest in section 01, and highest in section 03 (Table 1). Trout were caught in section 01 at a rate of 1.14 f/h, in section 02 at 2.58 f/h, and section 03 at 4.27 f/h. The overall catch rate for the three sections was 2.94 f/h and overall harvest rate was 1.09 f/h. Fishermen expended a total of 168.5 hours and harvested 189 trout from all sections. Considerably more trout were harvested per mile from section 02 and 03 than section 01. Total harvest of the

various trout species and mean lengths are presented in Table 2. The mean total lengths of rainbow, brook, brown, and cutthroat trout creeled were 10.0, 7.4, 9.3, and 10.0 inches, respectively. Only two fishermen creeled a limit of 10 fish, although 18 fishermen caught 10 or more fish. Children under 12 years of age accounted for 27% of the fishing pressure, but only 14% of the total harvest. Extremely low flows, very hot weather, and a new park user fee reduced opening day fishing pressure in 1988. Low pressure may have accounted for catch rates exceeding the target rate of 0.5 f/h.

Table 1. Catch rates (harvest rates in parenthesis) for trout from three sections of Beaver Creek, "opening day" creel census, 1988.

	Rainbow	Brown	Brook	Cutthroat	Grand Totals
Section 01	1.07 (0.29)	0.07 (0.07)	0 (0)	0 (0)	1.14 (0.36)
Section 02	1.60 (0.49)	0.07 (0.04)	0.51 (0.20)	0.39 (0.18)	2.58 (0.90)
Section 03	0.96 (0.25)	0 (0)	3.71 (1.52)	0.08 (0.08)	4.27 (1.73)

Table 2. Numbers and mean lengths of trout creeled from three sections of Beaver Creek on "opening day", 1988.

	Rainbow		Brown		Brook		Cutthroat		Total Trout Harvest
	No.	Ave. TL	No.	Ave. TL	No.	Ave. TL	No.	Ave. TL	
Section 01	4	11.6	1	9.4	0	---	0	----	5
Section 02	52	9.9	4	9.3	21	8.7	19	9.8	96
Section 03	12	11.4	0	---	72	7.0	4	12.1	88

Trout populations in sections 02 and 03 of Beaver Creek were estimated in the fall of 1988. One of the severest droughts on record was experienced during the summer of 1988. Streamflows were occasionally less than 1.0 cubic foot per second and water temperatures on several days exceeded 80°F. Estimates from the two study sections were compared to estimates made from 1980-83 as presented in Table 3. It is apparent from the population comparisons that the trout fishery in 1988 did not suffer severe losses as expected. Despite extremely poor water conditions, the trout populations of both sections met or exceeded most previous estimates. However, few large trout were found and the condition of trout observed in 1988 was extremely poor. Most fish were heavily infested with black-spot disease from larval trematodes. This disease had not been observed previously in Beaver Creek trout populations. Young-of-the-year trout were found in both sections, but in very low numbers. Timely releases of cool water from Bear Paw Lake may have been instrumental in minimizing temperature related mortality in section 02.

Table 3. Fall estimates of Age I and older trout from two sections of Beaver Creek. Estimates are presented as number of trout per 1,000 feet of stream.

	1980	1981	1982	1983	1988	
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<u>Section 02</u>						
rainbow trout	51	68	36	11	90	28
<u>Section 03</u>						
rainbow trout	47	40	12	58	80	10
brook trout	172	186	149	188	169	36
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#### Bear Paw Lake

Bear Paw Lake is a 45 surface-acre reservoir on Beaver Creek in the Bear Paw Mountains. It is maintained with annual plants of McBride strain cutthroat and Eagle Lake rainbow trout. In recent years, summer fishing pressure has exceeded 140 angler days per surface acre. Fishing pressure becomes excessive when acceptable-size fish are readily available. A creel reduction from 10 to 5 fish was imposed in 1987 to distribute the catch under such conditions. Suckers overpopulate periodically and the reservoir was chemically rehabilitated in 1983. Post-rehabilitation trout growth in 1984 and 1985 was excellent. However, sucker gill net catches have increased from a catch per net of 9 in 1985 to 210 in 1988. The large sucker increase reduced growth rates of trout significantly in 1988 and fishing pressure declined noticeably. Respondents to an angler survey indicated a desire to catch larger fish even at the expense of catching fewer fish. Only 14% of the respondents kept a limit of 5 trout and 43% kept no fish in 1988.

Drawdown and chemical rehabilitation is not a preferred option for sucker control in this reservoir. This is primarily due to the heavy recreational use it receives, detoxification time, invertebrate loss, and subsequent trout mortality. A long-term plan for sucker control should be implemented to provide acceptable size trout. Large numbers of spawning suckers ascend Beaver Creek in early May and the majority of spawning is presumed to take place in the creek. Removal by trapping may provide a significant reduction in the adult population. A predator capable of reducing the juvenile sucker population should be considered for introduction. Smallmouth bass may provide suitable predation, be compatible with stocked trout, and provide an additional sport fish. The Arlee strain of rainbow has not been utilized in the drainage for several years due to its short-lived nature and poor natural reproduction. However, it exhibits growth rates superior to most wild rainbow strains and should be considered in future stocking strategies for Bear Paw Lake.

#### Beaver Creek Reservoir

Stocking of Eagle Lake and DeSmet rainbow trout commenced in 1985 to provide a longer-lived trout capable of utilizing Beaver Creek for natural reproduction. The domestic Arlee rainbow stocked previously had failed to provide significant natural reproduction and was short-lived. Previous studies at Beaver Creek Reservoir indicated both the Eagle Lake and DeSmet rainbow had increased longevity over Arlee rainbow and that the Eagle Lake was easier to catch than the DeSmet (Needham and Gilge, 1987). The stocking of DeSmet ceased in 1988 and the reservoir has since been planted exclusively with Eagle Lake rainbow.

Attempts to determine spawning utilization of Beaver Creek by Eagle Lake and DeSmet trout were made in April of 1988. Two readily accessible riffles above Beaver Creek Reservoir were electrofished. The lower riffle was approximately 100 yards above the reservoir. The upper riffle was located about 1 mile above the reservoir immediately above a water weir.

Spawning trout and redds were observed at the lower riffle on April 9. Of 23 trout over 10 inches sampled at this site, 12 were positively identified as DeSmet or Eagle Lake rainbow by their fin clips. The site was observed again on April 28. At that time, hundreds of white suckers had invaded the same riffle and were spawning over the top of trout redds. The riffles were totally disturbed by the sucker spawning activity and about a dozen large trout remained aggressively defending redds.

At the upper riffle, 12 redds were observed on April 7. A sample of spawning rainbows at this site showed at least 3 of the 27 rainbow trout over 10.0 inches to be positively DeSmet or Eagle Lake rainbow.

DeSmet and Eagle Lake rainbow trout are utilizing Beaver Creek for spawning, but hatching success is unknown. Recruitment of these young fish may be severely limited by predation of perch and northern pike in Beaver Creek Reservoir.

Gill-net surveys were conducted in 1974, 1977, and annually since 1980. These surveys were conducted to monitor growth and survival of hatchery trout and to determine population trends of other fishes. Results of these netting efforts are summarized in Table 4.

The average size of hatchery trout has increased for two consecutive years and is currently larger than in any previous year. The gill-net CPUE, however, has decreased slightly for two consecutive years, although the overall condition of trout has remained relatively stable. Trout condition is thought to be closely related to sucker numbers, which have decreased significantly since northern pike became established.

The northern pike population peaked in 1977 and is currently dominated by Age III and older fish. No northern pike natural reproduction was observed in 1988. Yellow perch first appeared in netting efforts in 1987. Perch CPUE increased from 0.3 in 1987 to 8.2 in 1988. Yellow perch are anticipated to replace white suckers as the primary forage fish for northern pike and walleye. Future trout growth and condition may related to yellow perch numbers due to food competition.

#### Grasshopper Reservoir

This reservoir has received alternate year plants of Arlee and Eagle Lake strain fingerling rainbow trout. This was done to utilize the longevity of Eagle Lake rainbow along with the growth and catchability characteristics of the Arlee.

Gill netting in 1988 showed outstanding survival of Eagle Lake fingerlings planted a year earlier. The catch of 225 trout greatly exceeded the previous four-year average of 65 trout. Mean length of trout decreased from 11.3 inches TL in 1987 to 9.3 inches TL in 1988. This was expected as a result of increased competition and low water levels experienced in 1988. A reduction in the Eagle Lake stocking rate and an annual removal of adult suckers should increase trout size in the future.

The 1988 sucker catch of 127 fish was below the previous years' catch of 191, due in part to the removal of 1,969 suckers the previous spring by trap nets. No suckers less than 12.0 inches TL were taken in the gill nets which may be a result of unsuccessful reproduction the last few years. Largemouth bass predation may have reduced the number of small suckers. Bass did not appear to prey significantly on fingerling trout.

#### Reser Reservoir

This reservoir was first stocked with trout in 1985 after the largemouth bass population was severely depressed by overharvest. Arlee strain rainbow trout have exhibited exceptional growth, but survival based on netting and fishermen harvest appears to be poor. A study to determine strain related mortality was begun in 1988. A spring plant of 12,145

Table 4. Summary of gill net catches and relative abundance of fishes in Beaver Creek Reservoir, 1974-88.

Year	Rainbow Trout			Northern Pike			Walleye			Yellow Perch			Sucker Sp.
	CPUE <sup>1</sup>	Ave. Lgth. (in.)	Ave. Wt. (lbs.)	C <sup>2</sup>	CPUE	Ave. Lgth. (in.)	Ave. Lgth. (in.)	Ave. Wt. (lbs.)	CPUE	Ave. Lgth. (in.)	Ave. Wt. (lbs.)	CPUE	
1974	24.0	10.7	0.60	48.98	---	---	---	---	---	---	---	---	89.7
1977	35.0	10.1	0.39	37.85	---	---	---	---	---	---	---	---	115.7
1980	23.3	10.1	0.35	33.97	---	---	---	---	---	---	---	---	83.3
1981	7.0	10.4	0.35	31.11	---	---	---	---	---	---	---	---	171.7
1982	8.3	11.2	0.55	37.15	2.3	15.8	0.99	---	---	---	---	---	112.3
1983	3.3	11.8	0.62	37.74	3.7	25.1	4.78	---	---	---	---	---	99.7
1984	3.0	11.3	0.59	40.89	3.7	26.6	5.49	---	---	---	---	---	58.7
1985	3.0	11.9	0.77	45.82	4.3	26.0	5.72	---	---	---	---	---	68.3
1986	13.0	11.9	0.66	39.16	4.2	16.7	2.13	---	---	---	---	---	42.0
1987	11.3	13.6	0.92	36.57	5.2	22.0	2.81	---	---	0.3	6.3	.12	18.0
1988	9.7	14.7	1.17	36.83	3.0	27.6	7.30	0.7	10.6	8.2	5.9	.10	18.0

<sup>1</sup>Number of fish caught per gill net.

<sup>2</sup>Condition factor =  $\frac{W \times 10^5}{L^3}$



fingerling Arlee rainbow was made, followed in September with 4,220 fin-clipped Eagle Lake rainbow fingerlings. Gill-net sampling in April of 1989 captured 19 Arlee and 36 Eagle Lake rainbow. Assuming a static mortality rate through the year, a return rate of 1.7 Arlee rainbows to every Eagle Lake rainbow would be expected. The actual gill net return ratio was 1.9 Eagle Lake to every Arlee rainbow. The Arlee rainbow were exposed to some additional mortality related to fishing, but it was believed to be insignificant. The higher survival rate of Eagle Lake rainbow is consistent with results from other reservoirs in the area (Gilge, 1988). Growth of Eagle Lake trout is expected to be slower than that of Arlee rainbow, but fish may achieve greater size due to increased longevity and more fish should be available for harvest. A combination of Arlee and Eagle Lake trout may provide optimum trout fishing in this reservoir.

#### RECOMMENDATIONS

1. Beaver Creek: Continue population monitoring. Continue to gather harvest data using an "opening day" creel census.

Monitor infestation of "black-spot disease".

2. Bear Paw Lake: Develop and institute a long-term sucker control program.

Adjust stocking rates to provide for larger fish. Consider Arlee strain rainbow trout and smallmouth bass in future stocking strategies.

3. Beaver Creek Reservoir: Continue stocking of catchable-size trout.

Monitor growth and survival of hatchery trout and population status of other species.

4. Grasshopper Reservoir: Reduce Eagle Lake rainbow stocking rate.

Develop and implement an annual sucker removal program.

5. Reser Reservoir: Continue Arlee rainbow stocking with occasional plants of Eagle Lake fingerlings.

#### LITERATURE CITED

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Waters referred to:

15-4570-03 Beaver Creek Reservoir  
15-4560-05 Bear Paw Lake  
15-5380-07 Grasshopper Reservoir  
15-8860-06 Reser Reservoir  
15-0320-01 Beaver Creek

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