

MONTANA DEPARTMENT OF FISH, WILDLIFE AND PARKS

FISHERIES DIVISION
JOB PROGRESS REPORT

STATE: MONTANA PROJECT TITLE: STATEWIDE FISHERIES
INVESTIGATIONS

PROJECT NO: F-46-R-3 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, 1989 THROUGH JUNE 30, 1990

ABSTRACT

Six streams in the Bear Paw Mountains were electrofished to determine the effects of a severe drought in 1988. The Clear Creek and Cow Creek fisheries were the least affected. Little Box Elder Creek, Beaver Creek, and Snake Creek showed considerable trout reductions. The trout population in Peoples Creek was apparently exterminated. An "opening day" creel census was conducted for the second consecutive year at Beaver Creek. Extreme wind conditions caused a very poor turnout of fishermen and little useful data was gathered. Beaver Creek Reservoir was gill netted and showed an increase in catch-per-unit-effort (CPUE) for trout. However, average size and condition decreased, possibly due to an increase in yellow perch numbers. A sucker removal project was initiated at Bear Paw Lake and 12,545 suckers weighing 8,986 pounds were removed from the reservoir during the May spawning period. The effort reduced the adult sucker population by at least 76%, but juvenile suckers increased by fall to a level 25% higher than in 1988. Trout growth had not improved by fall. Crayfish may also be disrupting the energy transfer to trout. A sucker removal project at Grasshopper Reservoir removed 1,785 fish totalling 1,530 pounds. The sucker gill-net catch the following fall was 84% less than the previous year. Trout growth improved throughout the summer. Largemouth bass have not provided significant predation on suckers and are rare contributors to the fishery. Management recommendations are included for all waters.

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 utilizing state funding.
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 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) backpack electrofishing unit. Population estimates were made using the two-pass method. 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 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. Frame traps of 1/4-, 1/2-, and 1-inch square mesh were utilized for sucker removal in Bear Paw Lake and Grasshopper Reservoir.

RESULTS AND DISCUSSION

Streams in the Bear Paw Mountains

An electrofishing survey of six trout streams in the Bear Paw Mountains was conducted to determine the effects of a severe drought experienced in 1988 and very low flows during the winter of 1988-89.

A 300-foot section of Little Box Elder Creek near Faber School yielded only two brook trout.

A 50-foot section of Clear Creek near Young's Ranch produced good numbers of both rainbow and brook trout, as well as mottled sculpins. No brown trout were seen.

Peoples Creek was electrofished at four locations above the town of Cleveland. No trout were found at any site, although several minnow species and suckers were common.

The South Fork of Cow Creek produced young-of-the-year (YOY), yearling, and adult brook trout in below average numbers.

The North Fork of Cow Creek yielded only two adult brook trout in 150 feet. Habitat in the upper reaches of this fork has deteriorated due to apparent overgrazing and heavy siltation in the stream bed.

A small pool on Snake Creek above the town of Lloyd yielded six YOY rainbow trout.

Beaver Creek Section 01 was electrofished immediately below Beaver Creek Reservoir. No estimate was made, but good numbers of YOY rainbow were found along with several adults and some recently stocked smallmouth bass fingerlings.

Fall estimates of trout were made for Sections 02 and 03 of Beaver Creek. Estimates and comparisons from previous years are presented in Table 1. Trout estimates from both sections decreased significantly from 1988 levels. Larger trout (>10") were rare or nonexistent. A few YOY trout were found in both sections. Every fish examined was heavily infested with "black-spot" disease, although the condition of all fish seemed fair to good.

Table 1. 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	1989
<u>Section 02</u>						
rainbow trout	51	68	36	11	90	36
<u>Section 03</u>						
rainbow trout	47	40	12	58	80	10
brook trout	172	186	149	188	169	40

Fish losses most likely resulted from low over-winter flows, although the stresses associated with the heavy parasitization are unknown.

An "opening day" 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 a yearly indicator of use and harvest. The study area is described in detail in a previous report (Gilge, 1988). The creel census was conducted again in 1989 with poor results. Only 11 fishermen were interviewed; 4 fished Section 03, 7 fished Section 02, and no one had fished Section 01. Brook trout were the only fish caught. Only two brook trout were kept, but they were beheaded and gutted when observed, so no length/weight data was obtained. A number of smaller brook trout were caught and released. The overall catch rate was 2.5 fish-per-hour (f/h) for Section 03 and 9.0 f/h for Section 02. This limited data is of little use in determining long-term harvest trends. The poor showing of fishermen was a direct result of weather conditions on this day. From sunup to sundown, 30-50 mph winds buffeted the area making fishing extremely difficult. Fishermen may also have presumed, correctly, that fish stocks were depleted due to the severe drought experienced the previous year. The "opening day" creel will be conducted again in 1990.

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 were short-lived. Previous studies at Beaver Creek Reservoir indicated both the Eagle Lake and DeSmet rainbow had increased longevity over Arlee rainbow and that Eagle Lake were easier to catch than DeSmet (Needham and Gilge, 1987). The stocking of DeSmet ceased in 1988 and the reservoir has since been planted exclusively with Eagle Lake rainbow.

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 2. Though the CPUE of hatchery trout increased slightly over 1988, the average size and condition decreased. Trout condition is believed to be associated with white sucker numbers which have declined considerably due to northern pike predation. However, the yellow perch population has been steadily increasing since their illegal introduction in 1987. Yellow perch may be effectively competing with trout, which could explain the poorer trout condition.

Northern pike numbers peaked in 1987, but no reproduction has been documented since, due to poor spawning conditions.

Table 2. Summary of gill net catches and relative abundance of fishes in Beaver Creek Reservoir, 1974-89.

Year	Rainbow Trout			Northern Pike			Walleye			Yellow Perch			Sucker Sp.
	CPUE ¹	Ave. Lgth. (in.)	Ave. Wt. (lbs.)	C ²	CPUE	Ave. Lgth. (in.)	Ave. Wt. (lbs.)	CPUE	Ave. Lgth. (in.)	Ave. Wt. (lbs.)	CPUE	Ave. Lgth. (in.)	
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	18.0
1988	9.7	14.7	1.17	36.83	3.0	27.6	7.30	0.7	10.6	.36	8.2	5.9	18.0
1989	10.7	13.1	.80	35.59	1.2	30.3	8.31	0.0	---	---	9.2	7.6	16.8

¹Number of fish caught per gill net.

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

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. White 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 and the loss of fishing opportunities during detoxification time. Chemical rehab involves the undesirable feature of killing numerous, slow-growing trout, and drawdown contributes to bank sloughing and downstream siltation problems.

A sucker control program was initiated in 1989 utilizing frame traps and electrofishing. A wire mesh frame trap with blocking wings was positioned in Beaver Creek as it enters Bear Paw Lake. Fish were emptied from the traps every two or three days. Three hundred feet of stream above the reservoir was electrofished and all suckers removed every visit to the traps. Trapping began May 2 and continued through May 24, at which time the sucker catch became insignificant. A total of 12,545 suckers weighing 8,986 pounds were removed.

Fall gill netting indicated that the effort reduced the number of suckers greater than 10 inches by 76%. However, the catch of juvenile suckers less than 10 inches increased 25% over 1988 levels. Rainbow trout average size decreased from 1988 levels, cutthroat growth showed little improvement. Cutthroat trout averaged 8.1 inches compared with an average of 7.9 inches in 1988. Twice as many trout were netted in 1989 compared to 1988. As seen in previous years, fishing pressure decreased as average size of fish declined. The larger number of small resident trout increased intraspecific competition for food, exacerbating the problem. Juvenile suckers are not as susceptible to capture as they do not congregate in the creek to spawn. The topography of the reservoir with its

steep sides and submerged woody vegetation does not facilitate frame trapping. Though trapping is very labor intensive, it is still a preferred option over draining and rehabilitation with fish toxicant. Several years of trapping may be required before significant growth of trout is achieved. Crayfish have become extremely abundant in recent years and may have an effect on food availability for trout. A study from Newcastle Reservoir in Utah by Hepworth and Duffield concluded that crayfish changed the reservoir ecosystem by altering the food web, thereby reducing energy transfer to rainbow trout.

Grasshopper Reservoir

The most recent stocking strategy for this reservoir includes alternate year plants of Arlee and Eagle Lake rainbow trout. This is done to utilize the longevity of Eagle Lake rainbow, along with the growth and catchability characteristics of the Arlee.

Poor trout growth in the past has been associated with high numbers of white suckers in the reservoir. Spring trapping and removal of suckers was conducted in both 1988 and 1989. The removal of 1,969 suckers weighing 1,531 pounds was accomplished in 1988 in 12 trap-days. A similar catch in 1989 of 1,785 fish totalling 1,530 pounds was made with twice the effort, or 24 trap-days. Fall gill netting in 1989 showed a reduction in the sucker catch by 84% from 1988 (Table 3). Mean length and condition of trout improved from 1988 levels.

Largemouth bass were stocked several years ago to aid in sucker reduction efforts, but a population has not established and catches are rare. It is believed bass will not provide any significant predation or contribute to the fishery in the future.

Table 3. Results of gill net sampling in Grasshopper Reservoir, 1988-89.

Year	No. Trout/ Net	Mean Lgth. (in.)	Mean Wt. (lbs.)	C Factor	No. Suckers/ Net
1988	75	9.4	0.29	34.92	42.3
1989	27	11.9	0.60	35.60	6.7

RECOMMENDATIONS

Peoples Creek: Re-establish brook trout populations with fingerling plants.

Clear Creek: Reintroduce brown trout with fingerling plants.

Beaver Creek: Continue opening day creel census and monitor trout populations in all sections.

Beaver Creek Reservoir: Implement creel census to determine harvest rates of trout and contributions of other sport fish. Experiment with Arlee rainbow plants to determine if catch rates and growth rates can be improved.

Bear Paw Lake: Continue sucker removal. Reduce trout plants until significant growth is achieved. Consider Arlee rainbow trout and/or smallmouth bass in future stocking strategies. Conduct creel census to determine harvest data.

Grasshopper Reservoir: Continue annual sucker removal. Adjust stocking rates to maintain a trout gill-net catch between 25-35 fish per net.

LITERATURE CITED

- Gilge, K. W., 1988. Northeast Montana Coldwater Ecosystem Investigations, Job Prog. Rept. for D-J Project F-46-R-2, Job No. V-d. 10pp. (mimeo).
- Hepworth, Dale K. and Daniel J. Duffield, 1987. Interactions Between an Exotic Crayfish and Stocked Rainbow Trout in Newcastle Reservoir, Utah. No. Amer. Jour. of Fisheries Mgt. 7:554-561.
- Needham, Robert G. and Kent Gilge, 1987. Inventory and Survey of the Project Area, Job Prog. Rept. for D-J Project F-11-R-34, Job. No. I-a. 40pp. (mimeo).

Waters referred to:

15-4570-03	Beaver Creek Reservoir
15-4560-05	Bear Paw Lake
15-5380-07	Grasshopper Reservoir
15-0320-01	Beaver Creek
15-0960-01	Clear Creek
16-0940-01	Cow Creek
15-2080-01	Little Box Elder Creek
15-3240-01	Peoples Creek
15-3640-01	Snake Creek

Key words or fish species:

creel census, Eagle Lake rainbow trout, sucker removal

Prepared by: Kent W. Gilge

Date: June 30, 1990