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1971 SUMMARY OF CLARK CANYON - BEAVERHEAD RIVER PROJECT

INTRODUCTION

This report presents accomplishments on the Beaverhead River - Clark Canyon Project. The basic plan for the continuing 1972 study is presented in the last two sections.

The Beaverhead River - Clark Canyon Project was initiated in 1969 but did not have a full-time biologist until 1970 and the position was vacated again in February 1971. Data collected in 1969 and 1970 was summarized by Peterson (1971). In April 1971 a project biologist was assigned to the project on a full-time basis and a revised work plan was prepared (Miller 1971).

Overall progress on most phases of the study is on schedule. However, high water has hindered some aspects of the riverine study. High water caused some problems with flow regulation for the semiannual, spring and fall, fish population sampling. Fall electrofishing dates for 1971, established at a meeting with Bureau of Reclamation representatives, were set for four days in September. However in early September, the Bureau advised that they could not reduce Clark Canyon Dam releases during September. The sampling was rescheduled and accomplished in October, after the irrigation season. Fish movement associated with spawning activities in October introduces sampling errors that cannot be properly evaluated.

CLARK CANYON RESERVOIR - 1971

Stocking

Rainbow trout fingerlings were stocked in Clark Canyon during May, June, and July. On May 4th, 36,000 fingerlings averaging 4 to 5 inches were planted. Between June 9th and July 6th, 108,657 fingerlings averaging 6 inches long were planted. In the latter planting, 22,644 fingerlings were fin clipped for subsequent identification in the catch. The total plant was 144,657 fingerlings. This is slightly less than the 151,556 planted in 1970.

Recommendations were made to increase the 1972 plant of rainbow trout fingerlings to 250,000. Recommendations were also made to stock all the fingerlings at 6 inches during the first part of May. Increased stocking was requested to determine if the reservoir could produce more rainbow trout poundage or a higher catch rate than at present.

Catch

Creel census and fisherman counts were conducted to determine catch data on Clark Canyon Reservoir using the method of Peterson (1970). Counts were made on 78 days between May 25th and December 31st or on 33 percent of the days. Between June 6th and December 29th, 633 fishermen were interviewed to determine catch and number of hours fished.

Total 1971 catch was estimated at 28,000 to 30,000 trout during 68,500 man-hours of fishing. These total figures are based on the following: Between May 1st and December 31st, an estimated 22,588 trout were caught during 55,500 man-hours of fishing. Catch per man-hour for this period was 0.41 fish. By extrapolation, an estimated 13,000 fishing hours were expended between January 1st and April 30th. With an approximate catch of 0.4 fish per man-hour, the January to April catch would be 5,200 fish. Summing the two period catches results in the total catch figure presented.

Fish Growth

A percentage of both the 1970 and '71 rainbow trout fingerlings stocked in Clark Canyon were marked. In 1970, 8.3 percent of the fingerlings were marked, while 15.7 percent were marked in 1971. During creel checks, fish were measured and checked for these marks.

In July of 1971, after the 1970 fingerlings had been in the reservoir for one year, they averaged 15.0 inches (Table 1). This represents a net growth of nine inches in the first year. The 1971 plant averaged 12 inches after 6 months in the reservoir, a net growth of 6 inches.

TABLE 1. Average monthly length of 1970 and 1971 stocked rainbow trout in Clark Canyon Reservoir, determined from creel checks

Date		Average length of 1970 plants in inches	Average length of 1971 plants in inches
07/01 - 08/12	1970*	6.0	---
06/08 - 06/23	1971	13.3	---
06/09 - 07/06	" *	---	6.0
07/05 - 07/31	"	15.0	7.0+
08/11 - 08/31	"	15.2	9.1
09/09 - 09/27	"	15.9	10.7
10/03 - 10/25	"	16.4	11.7
11/13 - 12/11	"	17.3	12.0

*planting dates

BEAVERHEAD RIVER - 1971

Flows

Generally, flows were high in the Beaverhead River throughout 1971. Flows at the Grant gauging station, immediately below Clark Canyon Dam, in cfs averaged 490[1] for April, 860 for May, 950 for June, 890 for July, and 915 for August. This gives an overall average flow of greater than 900 cfs between May 1st and September 1st. Average flow at the Grant station for this same period in 1964, before Clark Canyon Dam was completed, was 465 cfs. Average flow for this station in 1969, with the East Bench Project in operation for five years, was 705 cfs.

Winter flows during 1971 were much higher than normal. Downstream flooding occurred during October and November. This flooding has been documented with aerial photos. These high flows, both summer and winter, have a deterimental effect on the physical environment of the Beaverhead River.

Catch

The estimated trout harvest for the upper Beaverhead River (above Barretts diversion) was 10 to 25 percent of the standing population of age II trout and older. (The spring population estimate was 125 trout per 1000 feet of stream.) In numbers this represents a harvest of 1,000 to 2,500 trout in 16 miles of stream. The above estimate is based on two methods of sampling: (1) fisherman tag returns, and (2) periodic fisherman counts and spot creel checks.

The first method of estimating fishermen harvest is based on tag return data; that is, on tags returned by fishermen catching tagged fish in the Hildreth section of the upper Beaverhead River. An estimated 6 percent, 29 out of 516, of the tags were returned from those fish tagged in March 1971. This 6 percent tag return is low because of (1) tag loss from the fish before being caught, estimated at 10 percent loss; (2) failure of fishermen to return tags, estimated as 30 percent nonreturn; and (3) fish caught before tagging in March were not available in the sample, estimated at less than 5 percent. Adjusting the 6 percent return figure for the three percentage variations gives a harvest figure of approximately 10 percent or 1,000 trout for the section of river above Barretts diversion.

In the second method of estimating harvest, bank and boat fishermen were counted on sample days and at different times during the day. Between May 21st and December 29th, counts were made on 72 days, or on approximately 30 percent of the days. Using the method described by Peterson (1970) it is estimated there were 6,700 man-hours of fishing. From June 6th until October 11th, 332 fishermen on the Beaverhead River were interviewed in order to determine number and species of trout caught. Of the fish checked, 85 percent were brown trout and 15 percent were rainbow trout. Catch per man-hour by month varied from 0.29 to 0.45 fish per hour (Table 2). The harvest estimate based on the above is 2,500 fish or approximately 25 percent of the age II+ trout in the standing

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[1] Flow figures unchecked and rounded off. Rough figures obtained from USGS.

population for the section of river above Barretts diversion.

TABLE 2. Fish caught, hours fished, and catch per man-hour of fishermen checked on the Beaverhead River, 1971

Month	Total Trout Caught Brown	Rainbow	Total Hours Fished	Catch per Man-hour Fishing
June	38	11	168.5	0.29
July	55	17	194.0	0.37
August	122	14	305.5	0.45
Sept - Oct	11	2	34.0	0.38
Total	226	44	702.0	
			Mean $\bar{x}$ =	0.38

The trout harvest figure from creel checks and counts (second method above) is probably the most reliable estimator since fewer variables affected it. However, the creel-count harvest figure is slightly high because aerial count flights could not be made in poor weather conditions. Since fishing pressure would be low during inclement weather, these missing counts would cause the total fishing pressure figure to be too high. In the opinion of the investigator, the true harvest figure is probably near 2,000 trout or 20 percent of the age II and older trout in the upper 16 miles of the Beaverhead River.

Almost all boat fishermen observed were seen after 4:00 p.m. Number of boats observed in the Barretts to Clark Canyon section ranged between 0 and 9; however, 2 or 3 boats were the most common numbers counted. More bank fishermen were observed after 5:00 p.m. on weekdays than earlier in the day (Table 3). Thus, local residents seem to be fishing after business hours. On weekends more bank fishermen were generally observed at midday. In November and December no river fishermen were observed.

Population Estimates

Fall trout population estimates for age I and older trout were made for the Pipeorgan and Hildreth sections of the upper Beaverhead River and compared to previous years estimates (Table 4). During the last four years, fall trout populations in the upper Beaverhead seem to be rather steady. The 1967 estimate reflects the low water condition, 80 to 100 cfs dam releases, which occurred in October and November of 1966. The low fall and winter releases decreased winter trout survival.

TABLE 3. Number of bank fishermen counted at four times during the day by month and weekday vs weekend, Beaverhead River above Barretts diversion, 1971

Month		Time: 8 AM - 11 AM Range	8 AM - 11 AM Mean	11 AM - 2 PM Range	11 AM - 2 PM Mean	2 PM - 5 PM Range	2 PM - 5 PM Mean	5 PM - 8 PM Range	5 PM - 8 PM Mean
June	wkday	0-	0	0-8	2.3	0-7	5.0	*5-	5.0
	wkend	--	-	4-6	4.6	4-12	7.2	7-	7.0
July	wkday	--	-	2-13	6.3	0-9	4.5	1-11	7.0
	wkend	--	-	2-18	8.3	2-13	5.2	0-8	4.3
Aug	wkday	1-5	3.6	2-6	3.6	0-3	1.3	0-5	2.7
	wkend	2-	2.0	6-	6.0	0-	0.0	2-10	4.3
Sept & Oct	wkday	2-	2.0	--	--	1-4	2.0	4-	4.0
	wkend	3-	3.0	2-12	6.0	2-3	2.5	0-3	1.7

*all ranges with only one number represent only one observation

TABLE 4. Point estimates for fall trout populations in two sections of the upper Beaverhead River, population of age I and older, population expressed as numbers per 1,000 feet of stream

Year	Hildreth Section Brown	Hildreth Section Rainbow	Pipeorgan Section Brown	Pipeorgan Section *Rainbow
1966	116	19	--	
1967	99	20	96	
1968	127	22	185	
1969	172	30	189	
1970	136	24	193	
1971	142	18	184	

* Not enough rainbow trout captured in the Pipeorgan section to make an estimate. Total number of rainbow trout captured in the 8,250-foot section by year is as follows: 1967-8, 1968-6, 1969-17, 1970-20, 1971-15.

During the summer of 1971, population estimates were made for a section of river near Dillon, designated as Wheat, and for a section 48 river miles downstream from the dam near Point of Rocks, designated as Blaine. The 1971 Wheat section had a point population estimate of 163 trout, 113 brown trout, and 47 rainbow trout, per 1,000 feet of stream. The Blaine section had a point estimate of 47 brown trout per 1,000 feet of stream. Only two rainbow trout were captured in the 14,000-foot Blaine section and one of these was a hatchery fish. The hatchery fish came either from the reservoir, 48 river miles upstream, or from the Jefferson River, 30 miles downstream. The Blaine river section supports a trout population only one-third the size of populations upstream from the town of Dillon.

Infrared Photography

On August 10th, a photography crew from Colorado State University took aerial infrared photos and thermal imagery of the entire Beaverhead River. These photos are being compared with photos taken the previous year to determine the extent of changes that have occurred in the river. The preliminary report on this comparison indicated a number of changes in the river bed between years; however, no major oxbow cutoffs were observed. From the thermal imagery a possible seep around Clark Canyon Dam was observed about midway up the east bank. The presence of a high water table was apparent from the thermal imagery which showed vegetation growth and a general moist appearance of the floodplain area. Additional information on the photos will be forthcoming before June 1972.

Water Temperature

Mean water temperature was compared for three locations along the Beaverhead River. These three sites are (1) Grant, 0.4 miles downstream from Clark Canyon Dam; (2) Barretts, 14 river miles downstream from Clark Canyon Dam; and (3) Blaine, 48 river miles downstream from the dam. During July and until the 20th of August, the mean daily water temperature at Blaine was greater than the other two locations. From August 20th until September 30th, the Grant station recorded the greater mean daily temperature. During October much variation occurred between the three stations. In November the Blaine area recorded greater mean daily temperatures than either the Grant or Barretts locations. In December the Blaine section had the coldest mean water temperature of the three locations.

Mean daily temperature, expressed in degrees F, at the three locations had the following ranges: Grant 65.0 - 32.1, Barretts 63.8 - 32.2, and Blaine 66.7 - 33.0. Absolute daily temperatures ranged as follows: Grant 66 - 32, Barretts 68 - 32, and Blaine 72 - 32.

BEAVERHEAD RIVER TRIBUTARIES

Red Rock River

On August 20th, the Red Rock River was electrofished approximately four miles upstream from Clark Canyon Reservoir. In 2.5 miles of stream, 648 fish were observed. Of this total number, 41 percent were mountain whitefish, 33

percent brown trout, 21 percent suckers (mostly white suckers, a few longnose suckers) and 6 percent rainbow trout. On December 5th, the Red Rock River immediately below Lima Reservoir was electrofished. Hundreds of burbot and suckers were observed; however, only five trout were seen. The five trout were all cutthroat ranging in length from 13.0 to 19.8 inches.

Other Tributaries

Grasshopper, Blacktail and Rattlesnake Creeks were spot sampled in July. Species observed by location are:

Grasshopper Creek (3 miles above mouth) - brown trout, mountain whitefish, white suckers, sculpins;

Blacktail Creek (near mouth) - rainbow trout, brown trout, longnose suckers, sculpins;

Blacktail Creek (near Matador Ranch - approximately 8 miles above mouth) - brook trout, mountain whitefish, sculpins;

Rattlesnake Creek (near Argenta) - brook trout, rainbow trout, sculpins.

AREAS OF STUDY FOR 1972

Continuing Studies

Fisherman counts and creel census work will continue for Clark Canyon Reservoir and the Beaverhead River. Spring and fall population estimates for the various sections along the Beaverhead River will continue to be made. Comparative population data to that taken in 1971 will be gathered. Limited gill netting on Clark Canyon Reservoir in the spring and during the summer will be continued. River temperatures will be taken. Further analysis of the 1970 and '71 infrared photos and the thermal imagery will be done at Colorado State University. No photography is planned for 1972.

Additional Studies

Biological data on the Beaverhead River trout will be gathered. These data include fecundity, spawning time, spawning success and time of fry emergence from the gravel.

Spring spawning of the suckers in Clark Canyon Reservoir will be observed to determine time and place of spawning. Sucker numbers and sizes at spawning can be determined by electrofishing and tagging these fish in the river and recapturing them later in the reservoir by trapping. In conjunction with studying the suckers, Red Rock River and Horse Prairie Creek will be spot sampled by electrofishing to determine if reservoir suckers and rainbow trout are utilizing these areas for spawning.

Water chemistry on the Beaverhead River will be analyzed to determine what changes in water quality have occurred since the dam was constructed.

LITERATURE CITED

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