MONTANA DEPARTMENT OF FISH AND GAME

FISHERIES DIVISION

JOB PROGRESS REPORT - SURVEY PROJECT

STATE: Montana TITLE: Southwestern Fishery Inventories

PROJECT NO. F-9-R-23 TITLE: Investigations of the Influence of Large Reservoirs on Stream Fisheries

JOB NO. I-d

PERIOD COVERED: October 1, 1973 - December 31, 1974

ABSTRACT

Trout population estimates were made on three sections of the Beaverhead River during 1973 and 1974 (Hildreth, Pipeorgan and Wheat). Trout population estimates on these study sections indicate that the 1972 year class of brown and rainbow trout was unusually low in numbers. Tagging data indicates that brown trout had a definite upstream spawning movement in October which hindered accurate brown trout estimates in the section just below Clark Canyon Dam (Hildreth). Angler returned tags would indicate a very low harvest rate of brown and rainbow trout during 1974 on the Hildreth (4.4%) and Pipeorgan (3.3%) study sections.

BACKGROUND

When a reservoir is constructed on a river, certain charges occur in the river system blow the dam. These changes affect the fish population either directly or indirectly. Clark Canyon Dam was built in 1964 on the Beaverhead River near Grant, Montana. Since completion, the discharge from the reservoir has significantly altered downstream flow patterns. During most years, there are periods when the river below the reservoir (dam site to Barrett's Diversion) is either dewatered (winter and early spring storage) or there is excessive flows from water released for irrigation (May through mid-September). These flow fluctuations which deviate from natural flows could affect wild trout numbers, trout spawning activities, survival of various age classes of trout and angling success. The excessive discharges could also affect bank stability and increase sedimentation rates downstream from the reservoir.

OBJECTIVES AND DEGREE OF ATTAINMENT

1. To obtain fish population estimates on two established sections of Beaverhead River. Estimates were made on three sections. Data are included in this report.

2. To take measurements of water velocity and stream bank cover within the above sections. This work was done. Data is filed in fish division files at Dillon field office.

3. To make fish population estimates and channel measurements on Big Hole and Jefferson Rivers as a preliminary to establishing study sections. Due to intensification of work on Beaverhead River, this work was postponed to a future year.

PROCEDURES

Fish populations were sampled using direct current electrofishing gear, which is operated from a 13-foot fiberglas boat. Population estimates were made using the Peterson makr-and-recapture method, as described by Vincent, 1971. There were approximately two week intervals between mark-and-recapture runs. Fish were measured to the nearest 0.1 inch and weighed to the nearest 0.02 pound. Scales were taken by 0.1 inch for age determination. Fish were marked by either partial fin clips or by numbered Floy anchor tags. Tagged trout were used to determine trout movement and harvest.

Three study sections were set up on the Beaverhead River below Clark Canyon Reservoir: (1) Hildreth - 12,000 feet in length about two miles below the dam; (2) Pipeorgan - 13,500 feet in length about eight miles below the Hildreth section; and (3) Wheat - 9659 feet in length about 27 miles below the dam (Figure 1). The Hildreth section was divided into eight subsections and the Pipeorgan sections into nine to aid in the detection of movement. Hildreth and Pipeorgan sections are revisions of two prveious sections set up by Wipperman in 1967. They include the original Hildreth and Pipeorgan study areas, plus an additional 5250 feet. Population estimates were made in October, 1973 and March, 1974 for Hildreth and Pipeorgan and In October, 1974 for Hildreth and Wheat sections.

FINDINGS

Population estimates in the Hildreth section show that the 1972 year class of brown and rainbow trout (yearling in October, 1973, estimate and two-year-olds in March, 1974, estimate) were extremely low (Table 1). Trout population estimates

TABLE 1. Estimated trout populations for the revised Hildreth section (12,000 feet) for Fall, 1973, Spring, 1974, and Fall, 1974. Confidence intervals for the total number and pounds expressed at the 80% level are shown in parentheses.

Date	Age Group I	II	III	IV+	Total Number	Pounds
			Brown Trout			
October, 1973	130	453	516	300	1399 (±222)	4064 (±609)
March, 1974	- 1/	87	186	463	736 (±76)	1986 (±210)
October, 1974	2086	379	549	377	3391 (±406)	5852 (±865)
			Rainbow Trout			
October, 1973	196	171	46	92	505 (±109)	1462 (±393)
March, 1974	- 1/	195	257	151	744 (±140)	1833 (±381)
October, 1974	1501	185	142	41	1869 (±336)	2978 (±513)

1/ Insufficient data for estimate.

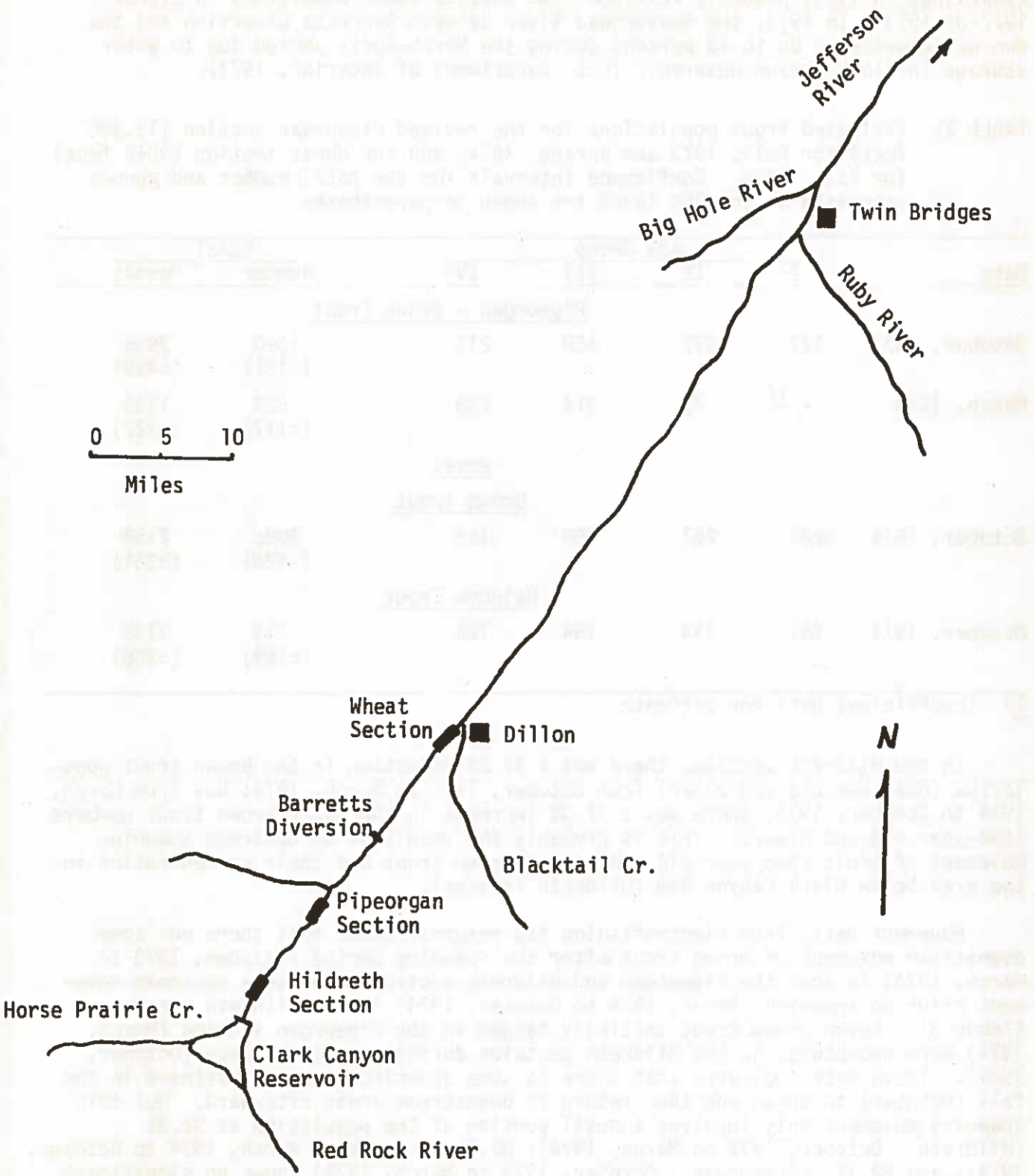

FIGURE 1. Map of Beaverhead River showing study sections

On the Pipeorgan and Wheat sections show that the 1972 year class was extremely low in other areas of the Beaverhead River (Table 2). This poor year class (yearlings in 1973) probably resulted from adverse water conditions in either 1972 or 1973. In 1973, the Beaverhead River between Barretts Diversion and the dam was dewatering up to 43 percent during the March-April period due to water storage in Clark Canyon Reservoir (U.S. Department of Interior, 1973).

TABLE 2. Estimated trout populations for the revised Pipeorgan section (13,500 feet) for Fall, 1973 and Spring, 1974; and for Wheat section (9640 feet) for Fall, 1974. Confidence intervals for the total number and pounds expressed at the 80% level are shown in parentheses.

Date	Age Group I	II	III	IV+	Total Number	Pounds
			Pipeorgan - Brown Trout			
October, 1973	127	572	458	213	1390 (±181)	2985 (±429)
March, 1974	- 1/	75	314	238	627 (±117)	1148 (±222)
			Wheat			
			Brown Trout			
October, 1974	1265	261	403	155	2086 (±428)	2168 (±361)
			Rainbow Trout			
October, 1974	257	174	154	128	713 (±169)	1132 (±266)

1/ Insufficient data for estimate.

In the Hildreth section, there was a 47.2% reduction in the brown trout population (one-year-old and older) from October, 1973 to March, 1974; but from March, 1974 to October, 1974, there was a 77.3% increase in the adult brown trout numbers (two-year-old and older). This is probably the result of an upstream spawning movement of adult (two-year-old and older) brown trout and their concentration in the area below Clark Canyon Dam (Hildreth section).

Movement data, from electrofishing tag returns, shows that there was some downstream movement of brown trout after the spawning period (October, 1973 to March, 1974) in both the Pipeorgan and Hildreth sections; and some upstream movement prior to spawning (March, 1974 to October, 1974) in the Hildreth section (Table 3). Seven brown trout initially tagged in the Pipeorgan section (March, 1974) were recaptured in the Hildreth sectuion during spawning season (October, 1974). These data indicates that there is some spawning movement upstream in the fall (October) to spawn and then return to downstream areas afterward. But this spawning movement only involves a small portion of the population as 92.3% (Hildreth - October, 1973 to March, 1974); 82.6% (Hildreth - March, 1974 to October, 1974); and 89.1% (Pipeorgan - October, 1973 to March, 1974) shows no significant movement. Similar spawning movement probably occurs in rainbow trout during the spring, but since there are few rainbow trout below the Hildreth section, this has less significance in the spring (March) rainbow trout estimates.

Angler tag return information on the Pipeorgan and Hildreth sections show a very low rate of wild trout harvest (Table 4). Anglers seem to take a greater percentage of the brown trout than rainbow trout in the Hildreth section. The low rate of angler returned tags could be due to several factors: (1) high tag loss rate; (2) poor angler cooperation and (3) poor angling conditions in 1974.

TABLE 3. Movement of tagged wild brown and rainbow trout in the Hildreth and Pipeorgan sections from October, 1973 through October, 1974. Movement information obtained by electrofishing.

	No Movement	Movement to Adjacent Section Upstream	Movement to Adjacent Section Downstream	Movement more than 2400 feet Upstream	Movement more than 2400 feet Downstream
		Hildreth Section			
Oct.,1973-March, 1974					
Brown Trout	38	6	5	0	4
Rainbow Trout	18	5	6	5	5
March, 1974-Oct., 1974					
Brown Trout	13	3	6	4	0
Rainbow Trout	6	3	2	1	3
		Pipeorgan Section			
Oct.,1973-March, 1974					
Brown Trout	41	5	3	2	4

TABLE 4. Annual tag return rate (trout harvest) for the Pipeorgan and Hildreth sections of the Beaverhead River.

Tag Return Period	Number Tagged	Tags Returned	Percent Returned
		Pipeorgan - Brown Trout	
Oct.,1973-Oct.,1974	222	9	4.1
March,1974 to Dec. 31, 1974	336	11	3.3
		Hildreth - Brown Trout	
Oct.,1973 to Oc., 1974	235	14	6.0
March,1974 to Dec. 31, 1974	218	12	5.5
		Hildreth - Rainbow Trout	
Oct.,1973 to Oct., 1974	107	3	2.8
March, 1974 to Dec. 31, 1974	180	4	2.2

RECOMMENDATIONS

The existing fish population work on the Beaverhead River should be continued. New sections should be set up on the lower reaches of the river (Barretts to the mouth) to determine what happens to the trout populations after the irrigation water is removed from the river during the May to October period. Prime spawning areas should be measured and spawning success should be examined in various areas below

the reservoir. Stream habitat should be measured on representative areas from the dam to the mouth and then correlated with existing trout population work. There should be some monitoring of the sediment problem caused by flow regime manipulation at Clark Canyon Reservoir.

LITERATURE CITED

U.S. Department of Interior, Biological Survey - Water Resources Division. 1973. Water resource data for Montana. Part I: Surface Water Records, U.S. Biological Survey, 421 Federal Building, Helena, Montana.

Vincent, E.R. 1971. River electrofishing and fish population estimates. Prog. Fish Culturist, 33(3): 163-169.

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Waters referred to:

Beaverhead River - 3-01-0495-10