MONTANA DEPARTMENT OF FISH, WILDLIFE AND PARKS

FISHERIES DIVISION

JOB PROGRESS REPORT

State: Montana Title: Southwestern Montana Fisheries Study

Project No.: F-9-R-30 Title: Investigation of the influence of Clark Canyon Reservoir on the stream fishery of the Beaverhead River

Job No.: II-a

Project Period: July 1, 1981 through June 30, 1982

Report Period: July 1, 1981 through June 30, 1982

ABSTRACT

An estimated 1,015 age I and older rainbow trout were found in the Pipe Organ section of the Beaverhead River in fall, 1981. The strong 1977 year class that dominated rainbow populations in recent years has been reduced to a small percentage of the total population.

Brown trout increased 13 percent in number between spring, 1981 and spring, 1982. Age II brown trout were more abundant than in any previous sample. Age IV and older brown trout were less abundant than in any sample since 1970.

Trout populations in Pipe Organ section appear to be following a pattern similar to that of Hildreth section.

BACKGROUND

Effects of flow releases from Clark Canyon Dam on fish populations in the Beaverhead River have been monitored by the Montana Department of Fish, Wildlife and Parks since 1966. These studies have shown the Beaverhead to harbor excellent populations of trophy (over five lbs.) rainbow (Salmo gairdneri) and brown trout (Salmo trutta) in its upper reaches. Numbers of trophy trout are adversely affected by non-irrigation season (October 16-April 15) flows of less than 250 cfs (Nelson 1978). Reproduction of both rainbow and brown trout has been limited in some years by fluctuating flows during their respective spawning and incubation seasons.

Trout populations in the Hildreth section of the Beaverhead River (approximately two miles downstream of Clark Canyon Dam) were relatively stable and probably depressed through 1973. Rainbow trout increased dramatically in 1974 (Figure 1) and brown trout from 1975 through 1977

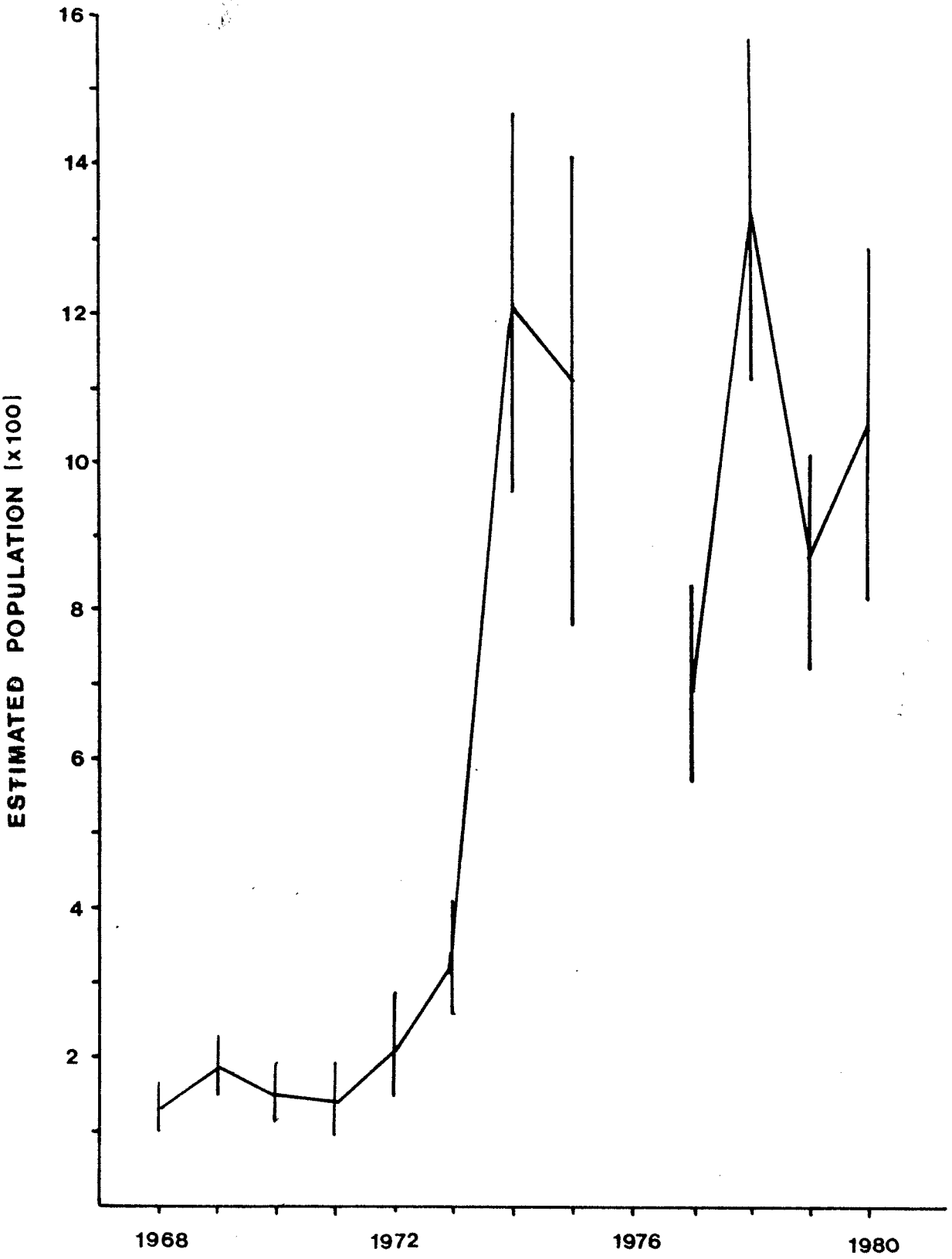

Figure 1. Fall rainbow trout population estimates and 80 percent confidence limits in the Hildreth section (6,455 ft.) of the Beaverhead River, 1968-80.

(Figure 2). Although populations of both species have fluctuated in recent years, both have remained substantially higher than pre-1974 populations. Increased trout populations are attributed to changes in Clark Canyon operation resulting in more favorable flow regimes (Wells 1981). Growth rates of both species declined as populations increased (Wells 1979). Numbers of trophy trout decreased. Trout populations appeared to reach carrying capacity of the stream in 1977-78 (McMullin 1982). Total trout biomass in the Hildreth section was relatively constant from 1977-78 through 1979-80.

The Hildreth section has not been sampled since fall, 1980 due to landowner difficulties. Beginning with spring, 1981, sampling has been conducted in the Pipe Organ section (13,125 ft.), approximately six miles downstream of the Hildreth section.

OBJECTIVES AND DEGREE OF ATTAINMENT

To determine trout populations in the Pipe Organ section of the Beaverhead River. Data are presented.

To evaluate the effect of flow releases on trout populations. This was not accomplished due to an access problem. We plan to address this objective in future segments.

PROCEDURES

Trout populations were sampled with boat-mounted electrofishing equipment. Modified Petersen estimates of trout populations were calculated by age class. Flows were measured at a USGS gauge near Grant, Montana.

FINDINGS

Rainbow Trout

An estimated 1,015 age I and older rainbow trout were found in the Pipe Organ section in fall, 1981 (77/1,000 ft.). The population was dominated by younger fish; age IV and older rainbows accounted for only nine percent of the total population by number (Table 1). The strong 1977 year class, which dominated biomass in the Hildreth section in fall, 1980, represents only a small portion of the total biomass. There are no previous fall estimates in the Pipe Organ section with which to compare 1981 data. The section was sampled each fall from 1967 through 1973, however, too few rainbow were captured to make a reliable estimate.

Occasional rainbow population estimates have been obtained in spring, since 1972. Although spring estimates of rainbow populations may be biased by spawning movements, they are nevertheless valid indicators of trends in relative abundance.

Rainbow trout in the Pipe Organ section have followed a pattern similar to that of rainbows in the Hildreth section. Initially, low populations increased dramatically after spawning flow criteria were established in 1973

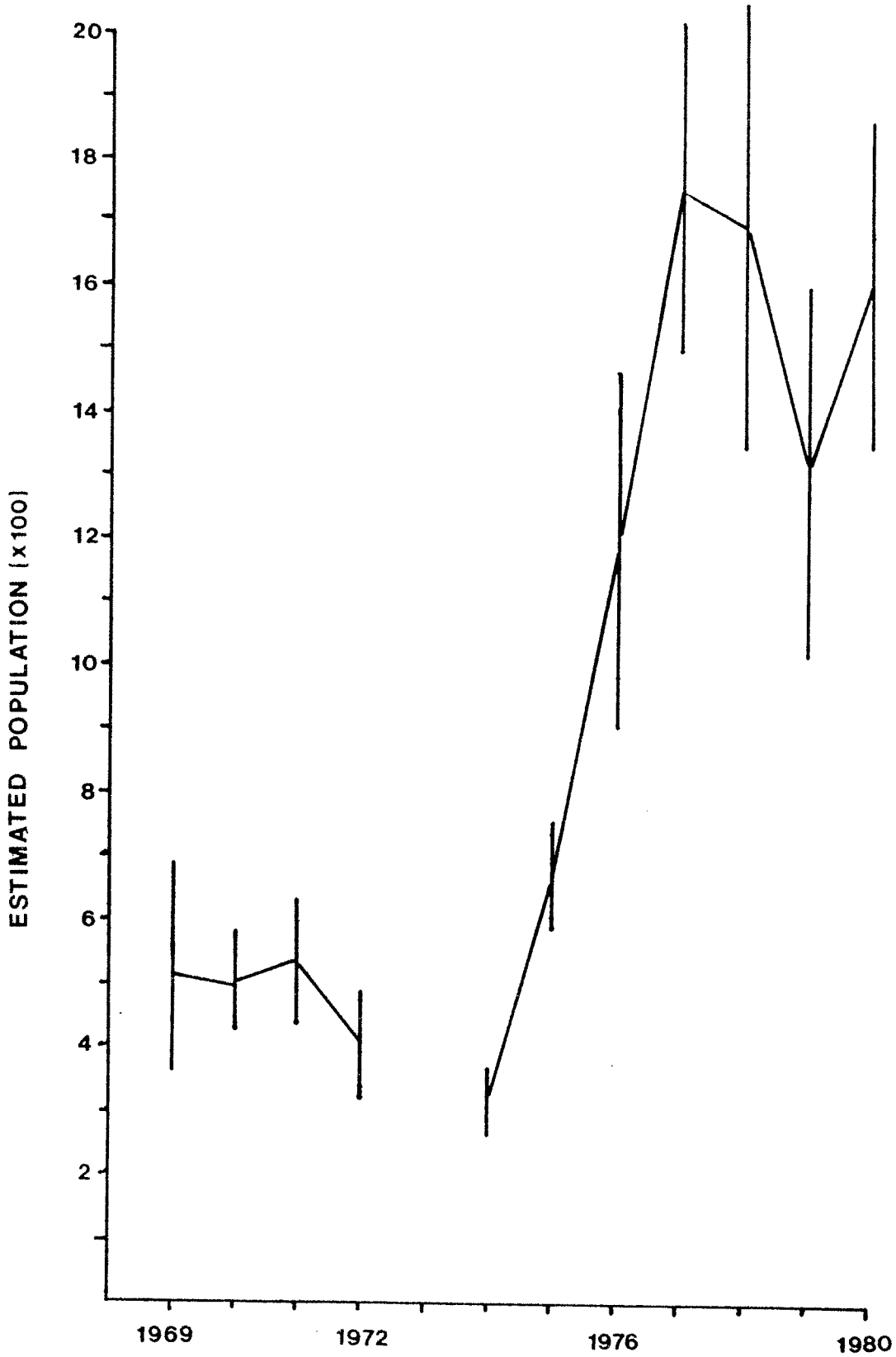

Figure 2. Spring brown trout population estimates and 80 percent confidence limits in the Hildreth section (6,455 ft.) of the Beaverhead River, 1969-80.

(Figure 3). Rainbows in the Pipe Organ section were slower to respond to improved flows than rainbows in the Hildreth section. Numbers of rainbow increased fourfold in the Hildreth section one year after flow criteria were established. Numbers of rainbow in the Pipe Organ section were essentially unchanged during the same time period, however, a fourfold increase occurred between 1974 and 1976.

Table 1. Total numbers and weight, mean length and mean weight by year class of rainbow trout in the Pipe Organ section (13,125 ft.) of the Beaverhead River, fall, 1981.

Age Class	Number	Weight (lbs.)	Mean Length (in.)	Mean Weight (lbs.)
I	426	398	12.9	0.93
II	366	641	15.9	1.75
III	132	334	18.2	2.52
IV & older	91	307	20.0	3.37

Brown Trout

An estimated 248 brown trout per 1,000 ft. of stream resided in the Pipe Organ section in spring, 1982, an increase of 10 percent over spring, 1981 (Table 2). Age II fish (1980 year class) dominated the population comprising 63 percent of the total. Only 12 age IV and older brown trout/ 1,000 ft. were found, the lowest density since 1970. Age III brown trout were more abundant than in any previous estimate.

Total biomass of brown trout in Pipe Organ section increased 13 percent over spring, 1981 to 245.1 lbs./1,000 ft. Biomass of age II and III brown trout was the highest ever recorded for Pipe Organ section (Table 3). Biomass of age IV and older brown trout was the lowest since 1970. Mean weights of brown trout in spring, 1982 were similar to those in previous estimates (Table 4).

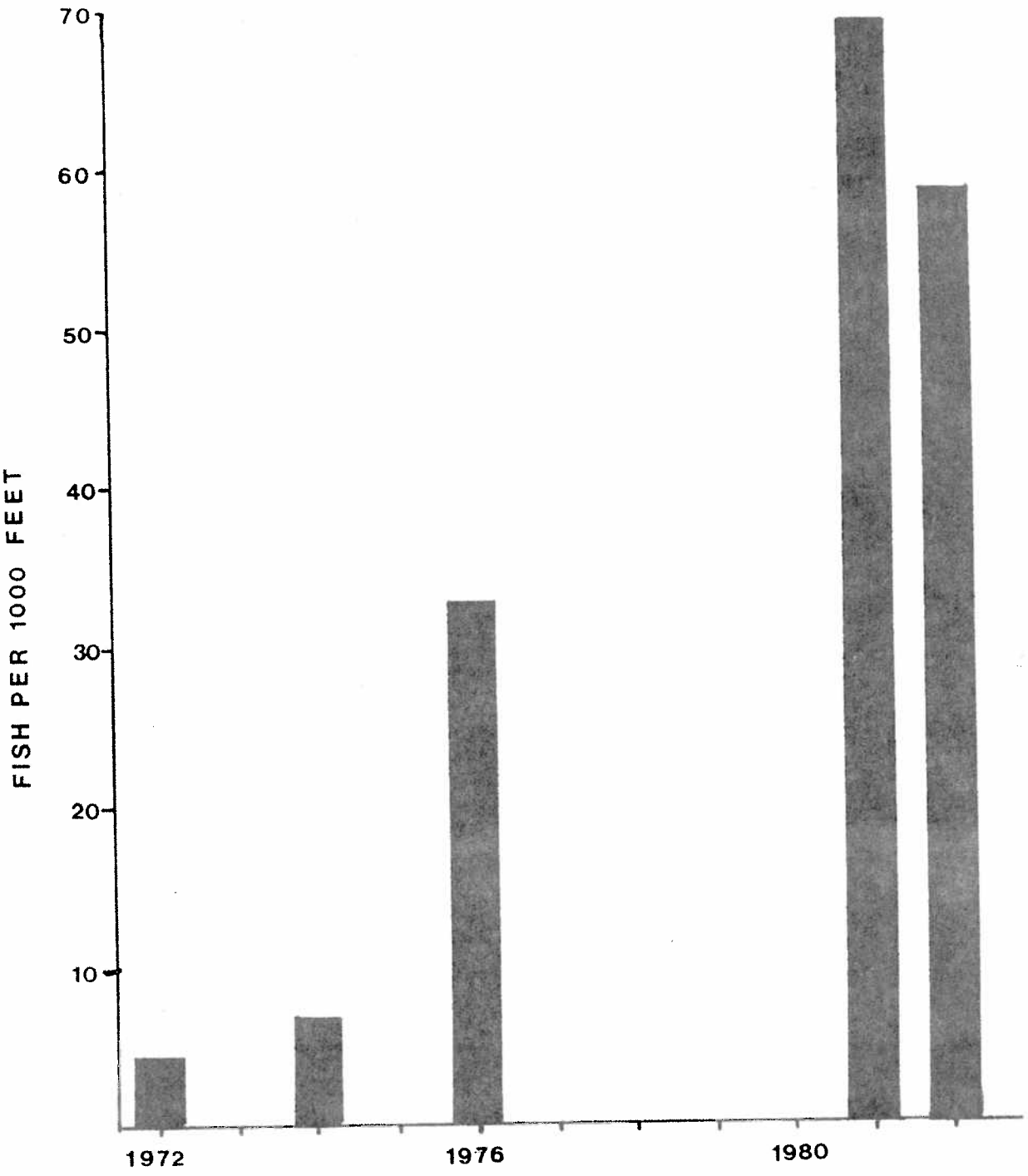

Figure 3. Spring rainbow trout population estimates in the Pipe Organ section of the Beaverhead River, 1972-82.

Table 2. Estimated spring populations (fish per 1,000 ft.) of age II and older brown trout in Pipe Organ section of the Beaverhead River. Section length has varied from 8,513 ft. to 14,162 ft. Eighty percent confidence limits in parentheses.

	Age Class			
	II	III	IV & older	Total
1968	51	24	21	96 ($\pm$23)
1969		no estimate		
1970	64	54	4	122 ($\pm$15)
1971	32	74	32	138 ($\pm$37)
1972	72	43	51	166 ($\pm$21)
1973		no estimate		
1974	12	44	29	85 ($\pm$11)
1975		no estimate		
1976	93	87 (III & older)		180 ($\pm$30)
1977-80		no estimate		
1981	150	58	17	225 ($\pm$24)
1982	156	80	12	248 ($\pm$23)

Table 3. Estimated spring biomass (lbs. per 1,000 ft.) of brown trout in Pipe Organ section of the Beaverhead River. Section length has varied from 8,513 ft. to 14,162 ft.

	Age Class			
	II	III	IV & older	Total
1970	47.2	83.8	9.9	140.9
1971	24.3	94.0	56.3	174.6
1972	45.9	54.8	103.4	204.1
1973		no estimate		
1974	9.6	71.6	70.1	151.3
1975		no estimate		
1976	63.7	140.6 (III & older)		204.3
1977-80		no estimate		
1981	107.0	73.0	36.1	216.1
1982	111.2	106.4	27.6	245.1

Table 4. Mean spring weights (lbs.) of brown trout by age class in the Pipe Organ section of the Beaverhead River, 1970-82.

	Age II	Age III	Age IV & older
1970	0.74	1.55	2.38
1971	0.75	1.27	1.76
1972	0.64	1.28	2.01
1973	--	--	--
1974	0.80	1.68	2.35
1975	--	--	--
1976	0.69	--	--
1977-80	--	--	--
1981	0.71	1.25	2.16
1982	0.71	1.33	2.28
Mean	0.72	1.39	2.16

DISCUSSION

Trout populations in the Pipe Organ section appear to have followed the same pattern as those of the Hildreth section. Abundance of both trout species has increased since Clark Canyon flow criteria were established in 1973. Brown trout numbers have continued to increase (Figure 3) while rainbow numbers have fallen off slightly (Figure 4). The decrease in rainbows is probably due to senescent mortality of the 1977 year class, which has dominated Beaverhead rainbow populations in recent years.

Rainbow trout year classes since 1977 have been relatively weak while brown trout continue to produce strong year classes. The downward trend in rainbow populations will continue unless another strong year class replaces the 1977 year class.

RECOMMENDATIONS

This project should be continued. Studies of effects of flows and population density on recruitment and production in the upper Beaverhead River should continue.

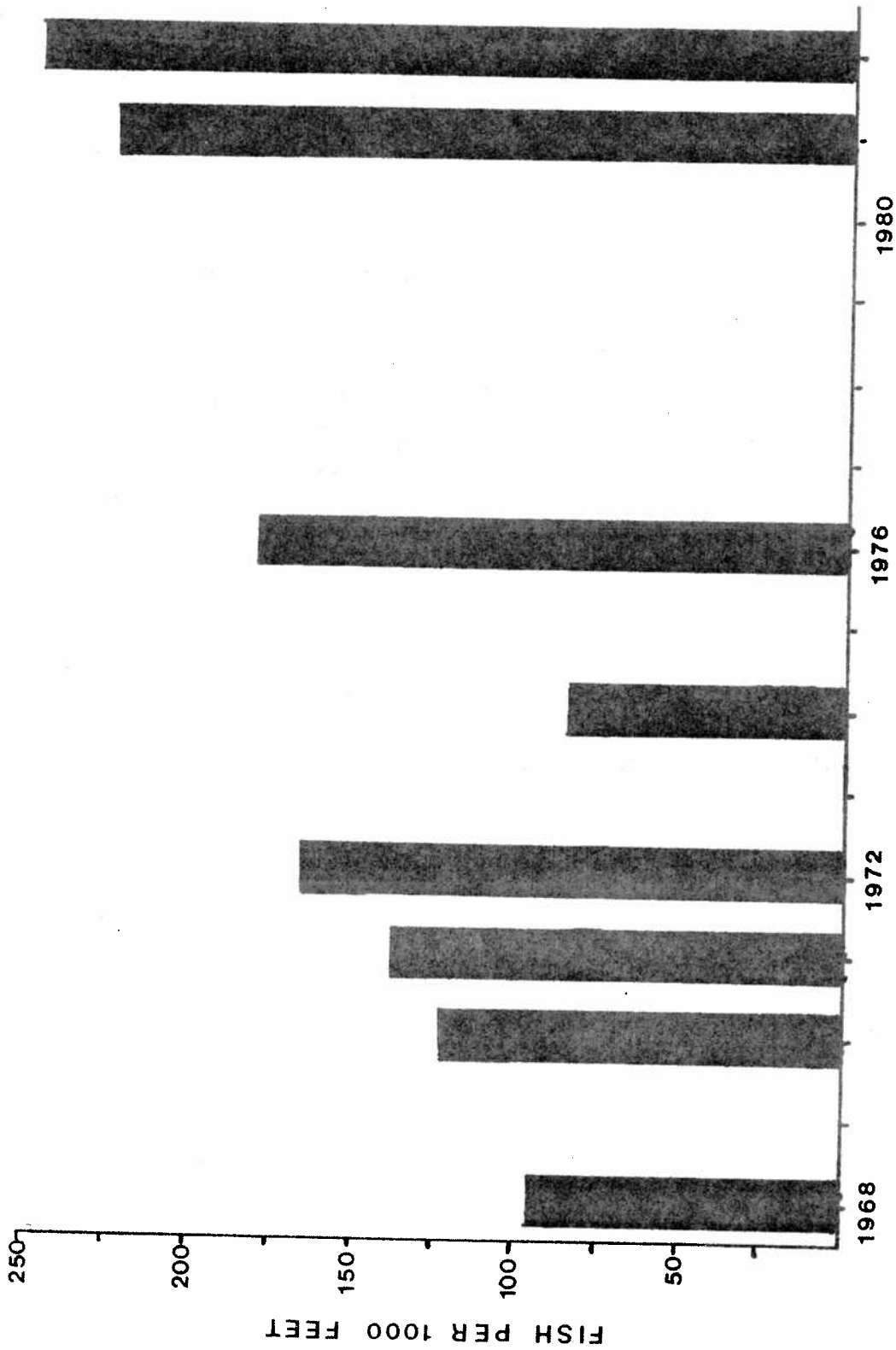

Figure 4. Spring brown trout population estimates in the Pine Organ section of the Beaverhead River, 1968-82.

LITERATURE CITED

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Prepared by: Steve L. McMullin

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Waters Referred to: Beaverhead River, 3-01-0500-01

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Population dynamics