



The trout fishery of the Bighorn River below Yellowtail Dam, Montana
by Harold Richard Stevenson

A thesis submitted in partial fulfillment of the requirements for the degree of MASTER OF SCIENCE
in Fish and Wildlife Management
Montana State University
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Abstract:

The fishery in three sections of the Bighorn River below Yellow-tail Dam was studied during 1972 and 1973. Estimates of catch rates of trout by fishermen on weekends and holidays were made during 1972 and estimates of fishing intensity, catch rates, and yield on weekends, holidays and weekdays were made during 1973. The growth rates of trout were calculated from scale samples taken during both years. Catch rates during 1972 and 1973 and fishing intensity and yield during 1973 increased as the season progressed. During the study, the catch of brown, rainbow and cutthroat trout ranged from 0.00 to 0.07, 0.26 to 0.67 and 0.00 to 0.05 fish per hour, respectively. During 1973, the estimated total number of fisherman days was 37.4 per surface acre in the afterbay below the dam (Section A) and 3,720 and 630 per stream mile in Sections B and C below the afterbay, respectively. During 1973, the estimated total yield was 37,321 trout caught during 18,648 fisherman days for an average of 2.00 fish per fisherman day. Rainbow trout made up 90.1 percent while hatchery rainbow made up at least 59.4 percent of the total yield. However, the percent of rainbow trout in the yield decreased with downstream progression while the percent of brown and cutthroat trout increased. Brown trout in the study area averaged 22.5 inches in total length at the fourth annulus. Wild brown and marked hatchery rainbow trout grew from approximately 7 to 13 and 6 to 12 inches, respectively, in a period of 5 months.

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Date *February 26, 1975*

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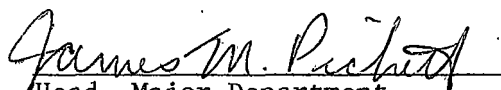
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ABSTRACT

The fishery in three sections of the Bighorn River below Yellow-tail Dam was studied during 1972 and 1973. Estimates of catch rates of trout by fishermen on weekends and holidays were made during 1972 and estimates of fishing intensity, catch rates, and yield on weekends, holidays and weekdays were made during 1973. The growth rates of trout were calculated from scale samples taken during both years. Catch rates during 1972 and 1973 and fishing intensity and yield during 1973 increased as the season progressed. During the study, the catch of brown, rainbow and cutthroat trout ranged from 0.00 to 0.07, 0.26 to 0.67 and 0.00 to 0.05 fish per hour, respectively. During 1973, the estimated total number of fisherman days was 37.4 per surface acre in the afterbay below the dam (Section A) and 3,720 and 630 per stream mile in Sections B and C below the afterbay, respectively. During 1973, the estimated total yield was 37,321 trout caught during 18,648 fisherman days for an average of 2.00 fish per fisherman day. Rainbow trout made up 90.1 percent while hatchery rainbow made up at least 59.4 percent of the total yield. However, the percent of rainbow trout in the yield decreased with downstream progression while the percent of brown and cutthroat trout increased. Brown trout in the study area averaged 22.5 inches in total length at the fourth annulus. Wild brown and marked hatchery rainbow trout grew from approximately 7 to 13 and 6 to 12 inches, respectively, in a period of 5 months.

INTRODUCTION

The construction of Yellowtail Dam and a deep water release from Bighorn Lake have allowed a trout fishery to develop in a reach of the Bighorn River below the dam. The purpose of this study was to determine the importance of the fishery by estimating fishing intensity, catch statistics and growth rates of trout in 14 miles of the Bighorn River immediately below Yellowtail Dam. Field work was conducted from June to September, 1972 and from April to September, 1973.

DESCRIPTION OF STUDY AREA

The Bighorn River originates in Wyoming and flows through Bighorn and Treasure counties in southcentral Montana. From below Yellowtail Dam it flows 80 miles northeast to join the Yellowstone River near Bighorn, Montana. The 14 and 38 miles of the river immediately below the dam lie in the Bighorn Canyon National Recreation Area and the Crow Indian Reservation, respectively.

Land use along the Bighorn River is primarily agricultural with at least 40,800 acres being irrigated from the river. Principally wheat and cattle are raised on non-irrigated land. Several oil wells are located on Soap Creek which enters the Bighorn River in the study area. Montana State Fish and Game Department Fishing Access sites are located at points on the river about 14 and 30 miles below Yellowtail Dam.

Seasonal preimpoundment flows of the Bighorn River during the 1964-1965 water year are presented in Figure 1. Mean flows were greater than 10,000 cfs 2 months and less than 4,000 cfs 9 months (U.S.G.S., 1965). Since regulation began in November, 1965, the river has had lower maximums and higher minimums. During the 1971-1972 water year (Figure 2) all mean monthly flows were less than 7,000 cfs and only four were less than 4,000 cfs (U.S.G.S., 1972).

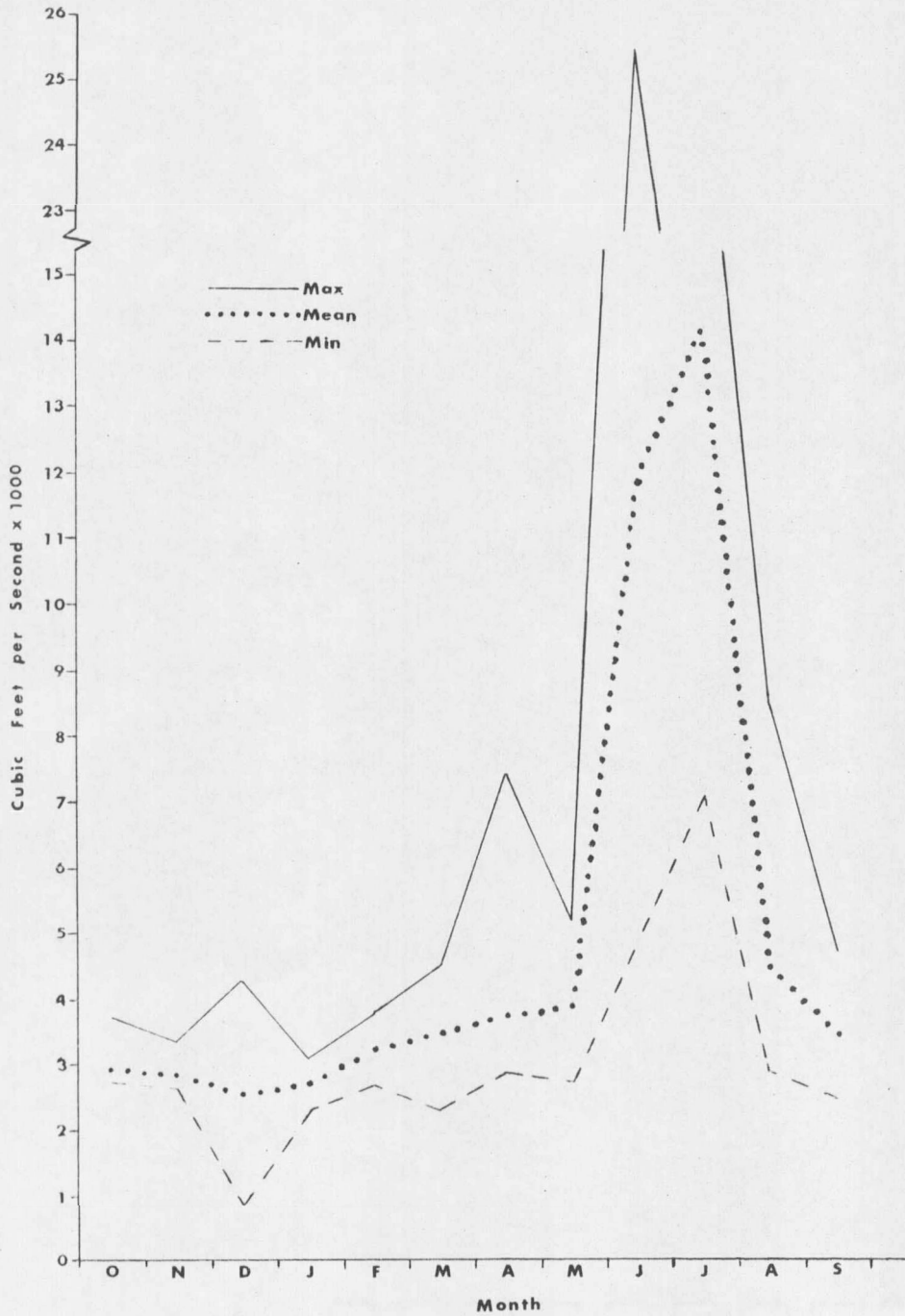


Figure 1. Monthly flows in the Bighorn River from October, 1964 through September, 1965 (Data from U.S.G.S.).

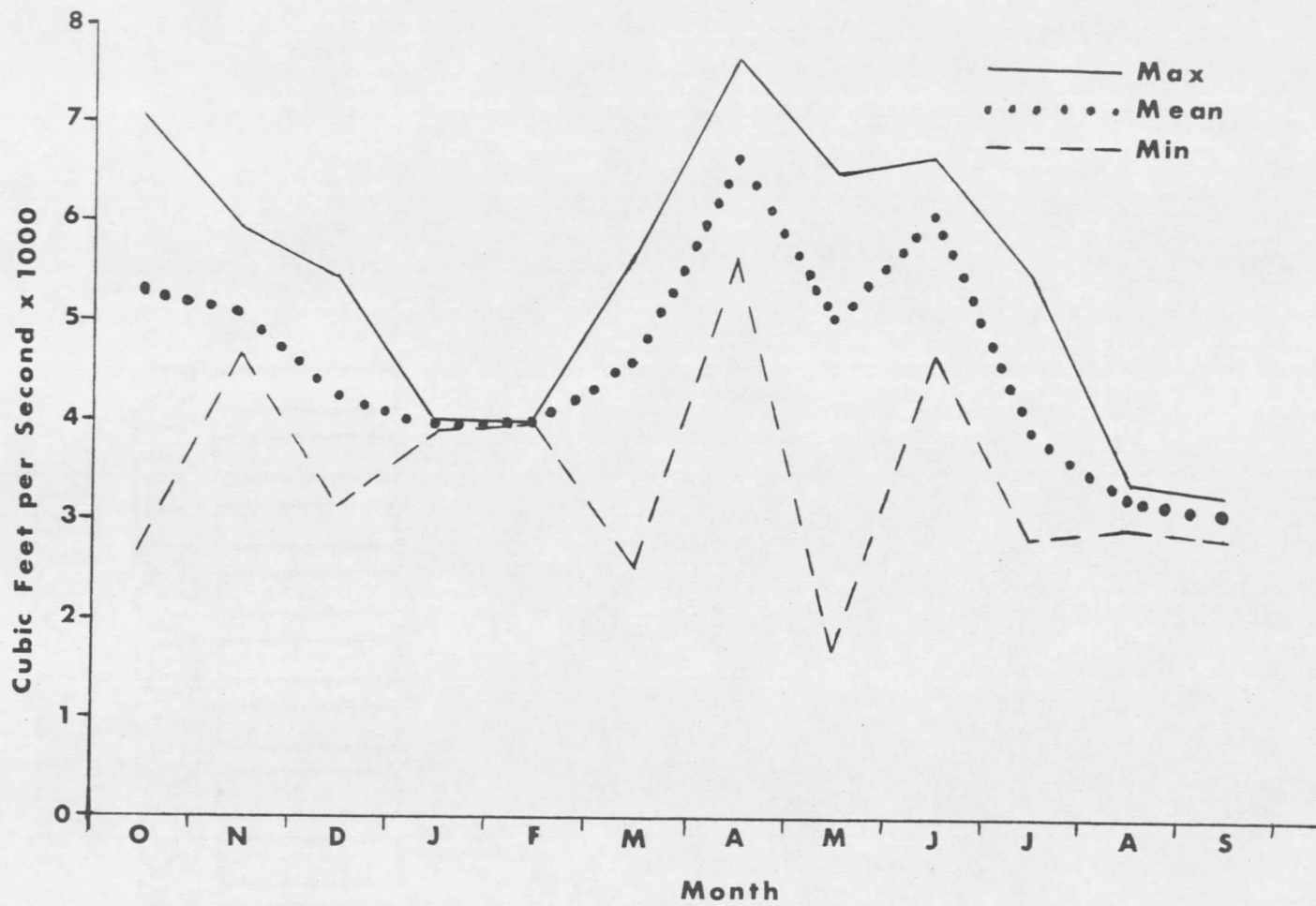


Figure 2. Monthly flows in the Bighorn River from October, 1971 through September, 1972 (Data from U.S.G.S.).

Daily fluctuations of flows in the Bighorn River are greatly moderated by the presence of the Yellowtail Afterbay Dam located 2.3 miles below Yellowtail Dam. Although water levels in the afterbay fluctuate as much as 15 feet daily, little change occurs in the river below.

Water temperatures in the river below the afterbay measured from January, 1963 through September, 1965 and from January, 1971 through September, 1973 (U.S.G.S., 1964, 1965, 1971, 1972, 1973 and Agaard, 1969) are presented in Figures 3 and 4, respectively. Following impoundment, the maximum temperatures were decreased, minimum temperatures were increased and changes occurred more slowly than before impoundment.

The nitrogen-phosphorus ratio is favorable (Wright and Soltero, 1973) and levels of calcium, alkalinity, total hardness and conductivity in the Bighorn River are relatively high (Table 1) indicating the river has a high potential of biological productivity (Stumm, 1970). However, supersaturation of nitrogen gas extends for at least 20 miles downstream from the afterbay dam (Bur. of Rec., 1973).

Although reservoir influents carried heavy sediment loads, the discharge from Yellowtail Dam had a maximum turbidity of 30 Standard Jackson Turbidity Units during 1968 and 1969 (Wright and Soltero, 1973). However, turbidity is progressively added to the river from the afterbay to its mouth by tributary streams and irrigation returns.

