MONTANA DEPARTMENT OF FISH, WILDLIFE AND PARKS

FISHERIES DIVISION

JOB PROGRESS REPORT

State: Montana Title: Southwest Montana Fisheries Study

Project No.: F-9-R-34 Title: Fishing Regulation Evaluation on

Job No.: II-c Major Trout Waters

Period Covered: July 1, 1985 through June 30, 1986

ABSTRACT

Two study sections, Pine Butte and Snoball, were established on the Madison River between 6.0-10.0 miles below Quake Lake to determine the effect of heavy angling pressure on wild trout populations. The Pine Butte section was open to catch-and-release fishing with artificial lures and flies only, with the Snoball section closed to fishing from 1977 through 1982 and then open to catch-and-release only fishing from 1983 through 1985. After six years of fishing closure the Snoball section showed a 345% increase in the number of wild brown and rainbow trout 13.0 inches and larger. No noticeable change in wild trout numbers over 13.0 inches was measured when the section was opened to catch-and-release fishing. After eight years of catch-and-release fishing in the Pine Butte section the number of wild brown and rainbow trout 13.0 inches and larger increased 275% over the 1977 levels.

BACKGROUND

The Madison River is a nationally-known "blue ribbon" wild trout stream that over the years has received a steady increase in angler use. Studies beginning in 1950 (USFWS 1951) and again in 1967 (Vincent 1969) show angling pressure increased about 14.3% annually during the 15-year period. Mail surveys conducted by the Montana Department of Fish, Wildlife and Parks in 1975 estimated a 5% per year increase in angling pressure from 1967 through 1975. Use increased 215 angler days per mile in 1952 to 953 angler days per mile in 1975. There was concern this could have had a detrimental effect on the number and size of wild trout available to future anglers. Also, there was considerable controversy over the potential effect of fishing from floating craft on the wild trout populations.

OBJECTIVES AND DEGREE OF ATTAINMENT

1. To determine the effect of angling on total numbers, size composition, species composition, age composition and total mortality rates of wild trout populations in two sections of the Madison River (data in report).

PROCEDURES

Electrofishing gear was used to sample fish populations in the Snoball and Pine Butte sections of the Madison River and in the Jack Smith Bridge and Durham Bridge sections of the Gallatin River. Population estimates in the Gallatin River were made in March-April prior to the opening day of fishing season and again in September-October after most of the angling pressure ceased and in September on the Madison River. The electrofishing was carried out while floating through the section in a fiberglass boat using a mobile positive electrode system. Two or more "marking" and/or "recapture" trips were necessary where sample sizes were small and/or efficiencies were low. Scale samples were taken for age determination with actual mathematical computations being made using a computer program employing methods described by Vincent (1971; 1974).

On the Madison River, the Pine Butte study section (3.0 miles in length) is located about six miles downstream from Quake Lake, while the Snoball section (4.5 miles in length) begins about one mile downstream from the end of the Pine Butte section (Figure 1).

FINDINGS

Madison River

Wild trout population studies conducted on the upper Madison River (Snoball study section) during 1975 and 1976 showed unusually high summer losses of larger (three-year-old and older) brown and rainbow trout (Vincent 1977). Angling regulations on the Madison River for 1975 and 1976 allowed a daily creel limit of 10 trout or 10 pounds and one trout. Creel census data from this study section showed summer (May-September) catch rates averaging 2.73 trout per hour in 1975 and 1.23 per hour in 1976. Angling pressure ranged from 720 to 1750 hours per mile for the two years. Given the high catch rates, angling pressure and summer mortality, the Snoball section was closed to fishing beginning with the 1977 fishing season. In addition, a second study section (Pine Butte) was established in 1977 as a control (open to fishing under the 10-trout limit). After a one-year fishing closure on the Snoball section, the high summer losses of older rainbow trout found in 1975 and 1976 (75%) dropped to 18% (Vincent 1979). Summer losses in the 10-trout limit section (Pine Butte) remained high on large wild rainbow trout (71%). With this information, angling regulations on the Pine Butte study section were changed from the 10 trout or 10 pounds and one trout creel limit to catch-and-release artificial lure-only fishing beginning with the 1978 fishing season.

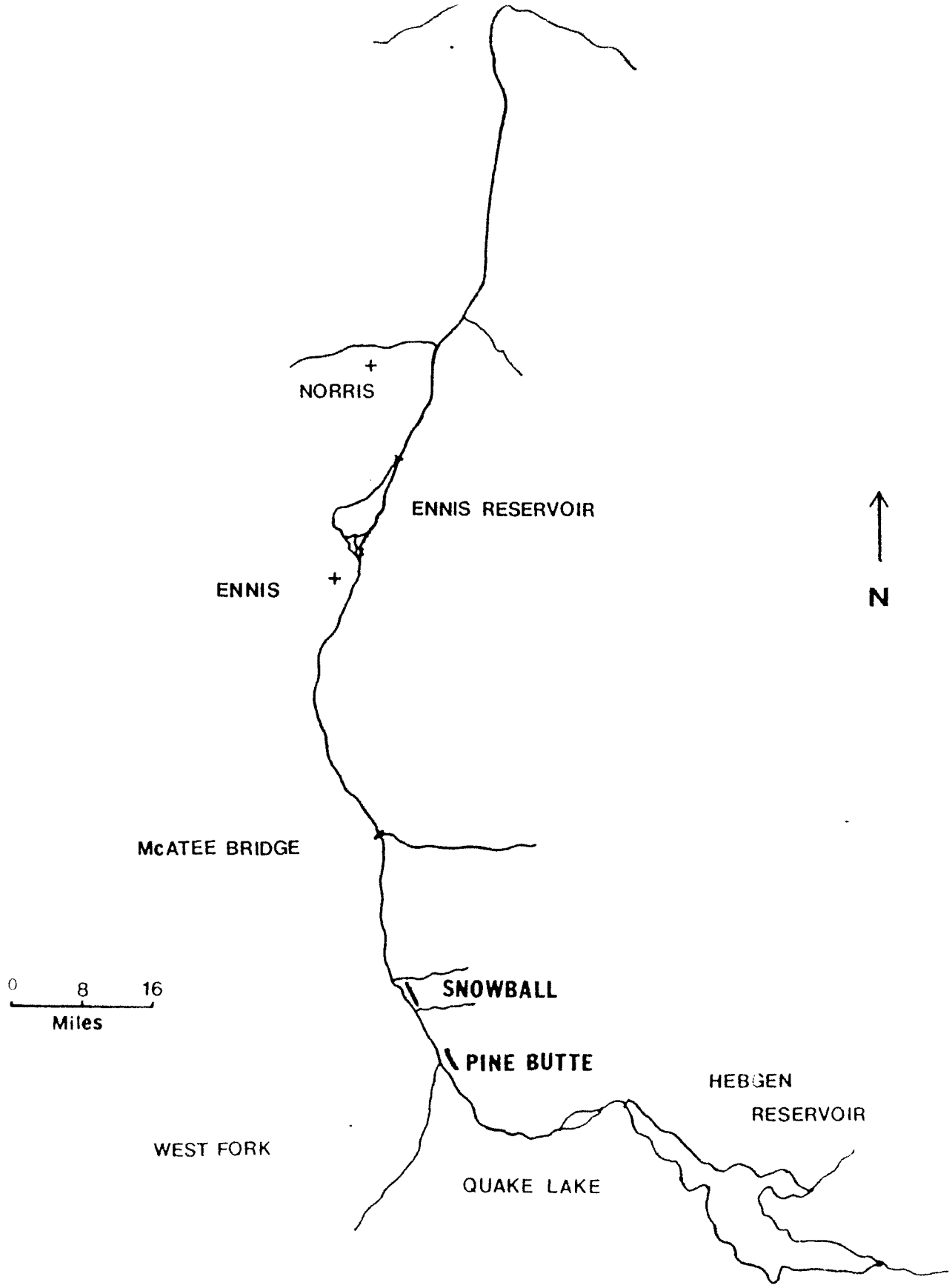

FIGURE 1. Map of the Madison River showing study sections.

After six years of fishing closure (1977-1982), the Snoball study section was opened to fishing in 1983 under the catch-and-release artificial lure-only regulation to be consistent with the Pine Butte section. Estimates of age structure, total number, and total biomass for wild brown and rainbow trout for the Snoball section for 1984 and 1985 are shown in Table 1. After three years of fishing closure, the number of wild rainbow trout exceeding 13 inches increased 304% with numbers then stabilizing the next three years of the closure (Table 2). After this study section was opened to catch-and-release only fishing, little change was noted in the 1983 through 1985 estimates. Brown trout numbers increased 405% after three years of fishing closure with numbers somewhat unstable for the next three years of the closure, but numbers were always larger than during years with the 10 trout limit. When the study section was opened to catch-and-release only fishing in 1983, little change in numbers was noted.

In 1978, the 10 trout or 10 pounds and one trout angling regulation in the Pine Butte study section was changed to a catch-and-release/artificial lure only regulation. Estimates of age structure, total number, and total biomass for wild brown and rainbow trout for the Pine Butte section for 1984 and 1985 are shown in Table 3. Three years after the special angling regulation was instituted the number of brown and rainbow trout larger than 13 inches had increased 155% over the 1977 numbers (Table 4). Approximately five years after the special angling regulation was instituted the total number of wild trout exceeding 13.0 reached its maximum (258% greater than the 1977 numbers) and then from 1982-85 the numbers seem to stabilize at approximately 1300/mile.

LITERATURE CITED

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Waters Referred to: Madison River 13-3440-01

Table 1. Wild brown and rainbow trout population, biomass and age structure estimates for the Snoball study section for September, 1984 and 1985 (80% confidence intervals shown in parentheses). Section length is 4.5 miles.

Year	Age Group I	II	III	IV+	Total Number	Total Biomass (lbs.)
				Rainbow Trout		
1984	10,538	952	781	2735	15,006 (±2937)	4985 (±654)
1985	1)	1324	766	1843	3933 (±877)	3450 (±610) 2)
				Brown Trout		
1984	2408	971	638	1301	5318 (±865)	3478 (±743)
1985	3837	1295	918	1194	7244 (±1669)	4658 (±1379)

1) Insufficient recaptures to make a mark-recapture estimate.

2) Estimate includes only two-year-old and older rainbow trout.

Table 2. Comparison of the fall (Sept.) number of brown and rainbow trout over 13 inches in the Snoball section between years closed to fishing and those years open to either a 10 trout limit or a catch-and-release artificial lure regulation (80% confidence intervals shown in parentheses). Numbers expressed as trout per mile.

Year	Rainbow Trout	Brown Trout	Total Trout
		10 Trout or 10 lbs. and One Trout	
1975	187	54	241 (±80)
1976	130	60	190 (±56)
		Closed to Fishing	
1977	269	117	376 (±105)
1978	318	306	624 (±175)
1979	525	303	827 (±278)
1980	502	199	701 (±153)
1981	368	241	609 (±101)
1982	530	316[1)]	846 (±171)
		Catch-and-Release/Artificial Lures Only	
1983	510	283	793 (±171)
1984	549	343	892 (±151)
1985	462	428	890 (±299)

1) Adjusted estimate, due to spawning movement.

Table 3. Wild brown and rainbow trout population, biomass and age structure estimates for the Pine Butte catch-and-release/artificial lure only study section for September 1984 and 1985 (80% confidence intervals are shown in parentheses). Section length is 3.0 miles.

Year	Age Group				Total	
	I	II	III	IV+	Number	Biomass (lbs.)
				Rainbow Trout		
1984	8532	1221	1162	2839	13,754 (±3098)	5260 (±787)
1985	5398	1352	1184	2037	9951 (±1440)	4599 (±580)
				Brown Trout		
1984	1138	878	600	1011	3627 (±552)	2844 (±620)
1985	1617	663	698	869	3987 (±692)	3244 (±896)

Table 4. Comparison of the fall (Sept.) number of brown and rainbow trout over 13 inches in the Pine Butte section between years with a 10 trout limit and a catch-and-release only regulation (80% confidence intervals shown in parentheses). Numbers expressed as trout per mile.

Year	Rainbow Trout	Brown Trout	Total Trout
		10 Trout or 10 lbs. and One Trout	
1977	156	188	344 (±133)
		Catch-and-Release/Artificial Lures Only	
1978	333	300	633 (±223)
1979	479	427	906 (±300)
1980	464	299	763 (±197)
1981	515	361	876 (±257)
1982	710	522	1232 (±193)
1983	721	567	1288 (±169)
1984	845	456	1301 (±223)
1985	807	483	1290 (±222)