MONTANA'S MADISON RIVER - A CONTINUUM OF MANAGEMENT CHALLENGE[1]

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Abstract. A combined trout population-fisherman harvest study was begun on the upper Madison in 1975. Initial results found unusually high summer trout mortality rates (70%) with correspondingly low winter rates (5-15%). Fisherman harvest did not explain the high summer rates. A two-year fishing closure showed summer mortality rates reducing to less than 30% and trout populations increased dramatically. Implementation of a catch and release-artificial lure regulation also decreased summer mortality rates and allowed for a population increase the first year. The number of hours fished declined by 40% during the first year of catch and release but was slightly higher than pre-restrictive levels the second year. Long-term data are needed to fully evaluate restrictive regulations.

BACKGROUND

Reflecting back to Wild Trout Symposium I in 1974, I remember a talk by Bob Hunt of Wisconsin where he believed that trout fishing regulations should assume first priority where (1) habitat quality is not an issue or (2) the threat of overfishing is so serious that it must receive special management attention (King 1975).

For many years habitat issues dominated our management approach to "keep a quality Madison River fishery." First, Montana Power who controls flows at Hebgen Dam, a major storage reservoir for downstream power production and Ennis Dam where low-head hydropower is produced, modified flow regimes to benefit the fishery. Spring flows were increased and water stored during high flow periods rather than the low flow winter period. Trout populations responded significantly to these management changes (Vincent 1969).

In the 1969 Montana legislature, water was appropriated instream to provide for preservation of the fisheries in the Madison River, thus publicly recognizing the habitat needs of this renowned "blue ribbon" fishery. Subsequent studies on the effects of planting hatchery trout on wild trout populations also led to increases in the wild trout fishery (Vincent 1973), and in 1973 led to a wild trout management policy on the entire Madison River in Montana which today remains a popular program with considerable support. Montana's Water Quality Act provides for protection of water quality and Montana Stream Preservation Acts give relative assurance for protection of the natural channel characteristics and in many cases the associated riparian habitat.

Other than the threat of subdivisions ruining the aesthetic values of the Madison, and a thermal problem below Ennis Dam, which is being studied, the Madison is a Montana river where habitat quality and fishermen impacts share equal management priority.

The Madison River is divided into two areas. The upper Madison from Quake Lake to Ennis Lake is mostly single channeled, rarely over four feet deep, with a riffle-run pattern that leaves the trout rather vulnerable to the angler. Flows range from 1000 to 1500 cfs entering Ennis Lake. With the exception of a section with many brushy channels where brown trout are abundant, rainbow is the dominant species.

The upper river with its high productivity, good water temperatures, generally good flow regimes, high scenic values and renowned salmon fly hatch has been a primary attraction to

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anglers from around the world. Fishing pressure is greater here than on most other Montana rivers and continues to increase. Fisherman use averaged 252 fisherman days/mile in 1952, 650 in 1967, and 953 in 1975.

The lower Madison from Ennis Lake to its mouth still has environmental influences that impair the fishing quality. The thermal influence of shallow Ennis Lake which averages nine feet in depth, frequently raises summer water temperatures to 80° F (Vincent 1978a) and summer trout fishing is virtually nil. Management emphasis is directed toward solving this thermal problem via a Blue Ribbons APO Thermal Steering Committee (Shouse 1978).

FISHERMAN HARVEST - TROUT POPULATION STUDIES

Following the implementation of the wild trout management policy in 1973 on the upper Madison, a section in the brushy channels area about 15 miles upstream from Ennis Lake continued to show annual increases in both number and size of the wild trout populations (Vincent 1976). Upstream in the West Fork of the Madison area, where a predominately rainbow fishery was found, fishermen complained that, although fishing was good, the size of trout was declining.

In 1975 and 1976, the Department began monitoring fisherman harvest and trout populations in a 4.5 mile section (Snoball), approximately 12 miles downstream from Quake Lake. A ten fish or ten pounds and one fish regulation was in effect with a season length from the third Saturday in May through February. Estimates of angling pressure revealed that during the May 15 - September 15 period in 1975 when no float fishing was allowed, the total angling pressure was 3238 hours versus 7867 hours in 1976 when float and shore fishing were both allowed (Vincent 1977). An average of 19 float fishing boats per day were observed in 1976 with 75% of them commercially guided. Non-residents made up over 85% of the fishermen.

Fly fishermen increased from 39% of total anglers in 1975 to 60% in 1976, thus reflecting the boat use which is primarily fly fishermen. The number of released fish "seven inches and greater" increased during the float fishing year primarily due to the increase in fly fishermen who tend to release more fish. The total harvest of trout seven inches or greater decreased from 21% to 17% of the spring populations as a result of more being released even though angling pressure doubled from the previous year.

Of greatest biological significance, however, was unusually high summer mortality rates observed for III+ rainbow and brown trout in the section. Summer mortality rates were about 70% (Vincent 1977) with winter rates ranging from 5-15%. Mortality in this instance means the loss of fish either through natural causes, harvest, or catch and release mortality. Both rates were unusual with respect to other Montana rivers where mortality rates are more evenly distributed between summer and winter with winter frequently experiencing higher rates. Since the high summer mortality rates of large trout could not be totally explained by harvest rates (less than 35%), other factors were considered that could possibly influence mortality rates. These included: (1) Natural population dynamics for this area; (2) A possible environmental factor and/or; (3) A combination of harvest, natural, and release mortality.

To define fisherman impacts, a fishing closure was imposed in 1977 on the six mile Snoball section and another intensively fished control section (Pine Butte) was established where fisherman use was monitored for fisherman harvest-trout population relationships.

First Year Closure Results

Summer mortality rates for the wild trout in the "closed to fishing" section (Snoball) dropped dramatically from over 70% to less than 20% during the first summer of closure. Winter mortality rates still remained low and thus the populations of both rainbow and brown trout increased over 100%.

Mortality rates in the Pine Butte section where a ten trout or ten pounds and one trout limit was allowed, remained high, with rainbow trout populations experiencing the highest losses. Fisherman harvest alone accounted for 63% of the spring numbers of IV and older rainbow trout (Vincent 1978b).

With this data as background, the fisherman was shown to have a significant influence on the wild trout populations and in particular the larger trout. The Department then established a management goal for the Madison which is to provide the opportunity to catch wild trout in the 14-18 inch range. Since this goal could not be attained with the regulations of ten fish or ten pounds and one fish, and the fact that fishermen generally were selective to larger fish, additional restrictions were imposed. A catch and release artificial lure regulation was implemented in 1977 with the objective of reducing fishing mortality as much as possible and in an attempt to increase the population of larger trout. The closure (Snoball) was maintained to provide data as to the true fishery potential of the Madison under current habitat limitations.

Second Year Closure and Catch and Release Results

After two years of closure, the Snoball section showed an increase of trout over 12 inches ranging from 225% for rainbow to 341% for brown trout (Table 1). Summer mortality rates increased from the 1977 rate of 18% to 30% indicating the population was beginning to approach the true carrying capacity governed by limiting factors such as flow, water quality, habitat and food. The number of rainbow trout 15 inches and greater had more than doubled the first year after closure, but did not show a continuing increase in the second year.

About 25 brown trout per mile over 15 inches were found in the Snoball section for the two years prior to closure and their numbers increased to 84 the first year after closure and to 137 the second year.

After one year of catch and release-artificial lure regulations on the Pine Butte section in 1978, the number of trout 12 inches and larger increased from 555 per mile to 1169 per mile (Table 2). Rainbow trout over 15 inches did not show an increase, while brown trout increased from 106 to 159. Growth rates of brown trout were greater than for rainbow and this partially accounts for the movement of the species into the upper size category. The previously low numbers of rainbow over 12 inches, the slower growth rate, habitat limitations, or release mortality may be factors limiting the increase in rainbow over 15 inches in the catch and release section. The number of trout caught per hour increased from 1.32 in 1977 to 2.75 during the year of catch and release fishing.

Fishing pressure during the first year of catch and release fishing dropped approximately 40% which was similar to the amount of use bait fishermen had exerted prior to the restrictive regulations. In 1979, pressure increased and is slightly higher than pre-restrictive regulation levels.

Table 1. Changes in number of brown and rainbow trout per mile in the Snoball section (4.5 miles) following two years of fishing closure.[1/]

	Limit - 10 trout or 10 lbs. and 1 trout		Closed to Fishing	
	1975	1976	1977	1978
Rainbow Trout				
12" and larger	275	176	509	572
15" and larger	25	28	64	55
Brown Trout				
12" and larger	79	96	273	424
15" and larger	26	21	84	137

[1/] Data from Vincent 1979.

Table 2. Changes in number of brown and rainbow trout per mile in the Pine Butte section (3.0 miles) following one year of catch and release fishing.[1/]

	Limit - 10 trout or 10 lbs. and 1 trout	Catch and Release Artificial Lure
	1977	1978
Rainbow Trout		
12" and larger	277	720
15" and larger	62	62
Brown Trout		
12" and lrrger	278	449
15" and larger	106	159

[1/] Data from Vincent 1979.

THE FUTURE

In a recent article in Trout Magazine (19(4)), Del Graff, Chief of Fisheries from Pennsylvania, indicates time is needed for evaluation of our restrictive regulation programs. After nearly five years of investigation on the Madison, it is clear that we do not yet have the answers to reach our goal. Mr. Graff's comments should be seriously pondered by the layman and professional. We can't react to a single year of data and be expected to predict what our results will be.

We need time, maybe ten years or more, to truly evaluate the closed section. What is the potential of the Madison to produce trout? Is the goal of having the opportunity to catch wild trout in the 14-18 inch size range realistic? The information from the closure would prove invaluable in evaluating our future management programs.

What are the impacts of releasing fish? We know about types of hooks, but catching and releasing a fish involves much more than the hook. Can releasing mortality have significant implications as angling pressure increases? These questions deserve answers and time is needed to answer them.

Today there is a general outcry from a segment of the fisherman population to intensively regulate our streams. Let's take a lesson from Pennsylvania where a moratorium was requested to evaluate special regulations before creating new ones (Graff 1977). Rather than implement a regulation for regulations sake, the layman and professional alike should work together to define the kind of fishery expected and establish a realistic goal of management based on the capability of the stream to produce. If regulations are then geared to attain the goal, we'll all be better satisfied with the fisheries of the future. But first, let's be wary and ensure we keep equal energies for the assaults on the habitat which will, in the end, mean survival or loss of fishing as we know it today.

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