MONTANA DEPARTMENT OF FISH, WILDLIFE AND PARKS
FISHERIES DIVISION

JOB PROGRESS REPORT

State: Montana Title: Southwest Montana Fisheries Investigations

Project No.: F-9-R-32 Title: Fishing Regulation Evaluation on Major Trout

Job No.: II-c Waters

Period Covered: April 1, 1983 through March 31, 1984


## ABSTRACT

Two study sections--Pine Butte and Snoball--were established on the Madison River between 6.0 and 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 in 1983. 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. After six 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 274%.

Two study sections were established on the Gallatin River between the mouth of West Fork and Moose Creek to compare the effect of the special trout limit (three trout under 13.0 inches and one over 22 inches) versus the regular five trout with only one to exceed the 18-inch limit. After three fishing seasons under the special angling regulation wild rainbow trout between 13.0 and 21.9 inches in length in the Durham Bridge section decreased 44%, while the five trout limit area decreased only 29%. Annual fluctuations of 13-inch and larger wild rainbow over the three-year study period occurred in both study sections with variation in numbers showing similar trends in both sections. This suggests variations in habitat from year to year (change in water flows and winter icing conditions) is having the greatest controlling effect on large trout numbers.

## 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% increase in angling pressure from 1967 through 1975. This large increase in angling use of 215 angler days in 1952 to 953 angler days per mile in 1975, could have had a detrimental effect on the wild trout population in both number and sizes available to future anglers. Also, there has been considerable controversy as to whether or not fishing from floating craft has a detrimental effect 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 on wild trout populations in two sections of the Madison River and two sections in the Gallatin River (data in report).

2. To compare trout populations in the Gallatin River in one section where a five trout one over 18 inch creel limit is in effect to a section where a three trout under 13 inches and one over 22 inches limit exists (data in report).

## PROCEDURES

Electrofishing gear was used to sample fish populations in the Snoball and Pine Butte sections of the Madison Rivewr 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). On the Gallatin River, the Jack Smith Bridge section (2.2 miles in length) is located about two miles downstream from the West Fork, while the Durham Bridge section (2.0 miles in length) is located 2.6 miles below the end of the Jack Smith Bridge section (Figure 2).

## 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 adition, 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.

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 consistant 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 1982 and 1983 are shown in Table 1. After three years of fishing closure, the number of wild rainbow trout exceeding 13 inches increased 304% with similar sized brown trout increasing 405% (Table 2). By the sixth year of the fishing closure, the numbers of 13-inch and larger wild brown and rainbow trout had stabilized with little change in number over the 1979 figures. The opening of this study section in 1983 to catch-and-release fishing resulted in little change in the September, 1983 estimates of 13-inch and larger brown or rainbow trout numbers.

Estimates of the number of wild brown and rainbow trout 13.0 inches and larger are shown in Table 3. When the Pine Butte section fishing regulations were changed from the 10-trout limit in 1977 to the catch-and-release artificial lure-only regulation in 1978 the number of larger (13 inch and longer) brown and rainbow trout increased 84% after the first year under the special angling regulations (Vincent 1979). In 1981, after four years of catch-and-release only fishing, the number of 13-inch and larger brown and rainbow trout had increased 155% over the 1977 levels (Vincent 1983). Another increase in larger wild trout occurred in 1982 when the number of wild trout 13.0 inches and larger increased 258% over 1977 numbers. Estimates in September, 1983 showed little change from 1982 levels.

Gallatin River

Wild rainbow trout population estimates were made in two sections of the Gallatin River. These sections were set up to evaluate the effect of special creel limits on the wild trout populations. One section--Jack Smith Bridge--was maintained as a control where the trout limit was five trout of which only one could esceed 18 inches. The other section--Durham Bridge--was placed under the special angling regulation where the creel limit was four trout of which one could exceed 22 inches and three could be under 13.0 inches. Comparisons of the numbers, biomass and age structure of wild rainbow trout between the two sections are shown in Table 4.

The major objective of the special angling regulation on the Gallatin River was to increase the number of wild trout between 13.0 and 21.9 inches which should provide more anglers the opportunity to catch a larger wild trout. After three years of catch-and-release fishing for trout between 13.0-21.9 inches, the Durham Bridge section showed a 44% decline in this size group of trout (Table 5). The five-trout limit section which allowed no special protection to this size group showed only a 29% reduction in numbers. Both study sections had fluctuations in 13.0-inch and larger rainbow trout during the period, probably due to changes in habitat conditions. These habitat changes probably were a combination of annual water flow variations and changes of severity of winter icing conditions. Similar fluctuations in the number of 10.0-12.9-inch rainbow trout in both sections during the period of study further demonstrates habitat changes have more effect on wild rainbow trout numbers than angling pressure at this time. Conclusions from the Gallatin River special angling regulation study is that at this time limit restrictions beyond a five-trout limit are unnecessary and should be removed.

# FIGURES AND TABLES

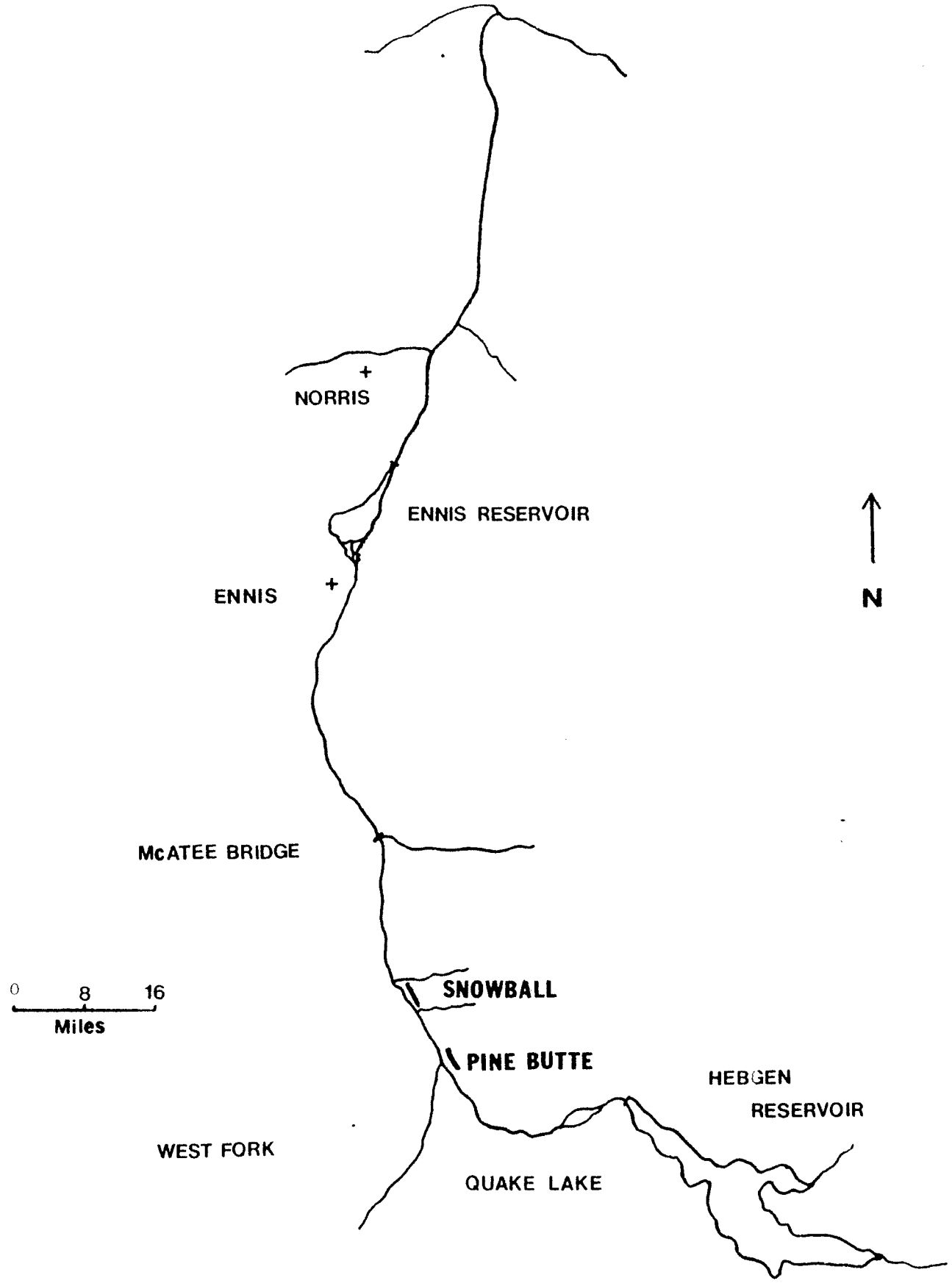


FIGURE 1. Map of the Madison River showing study sections.

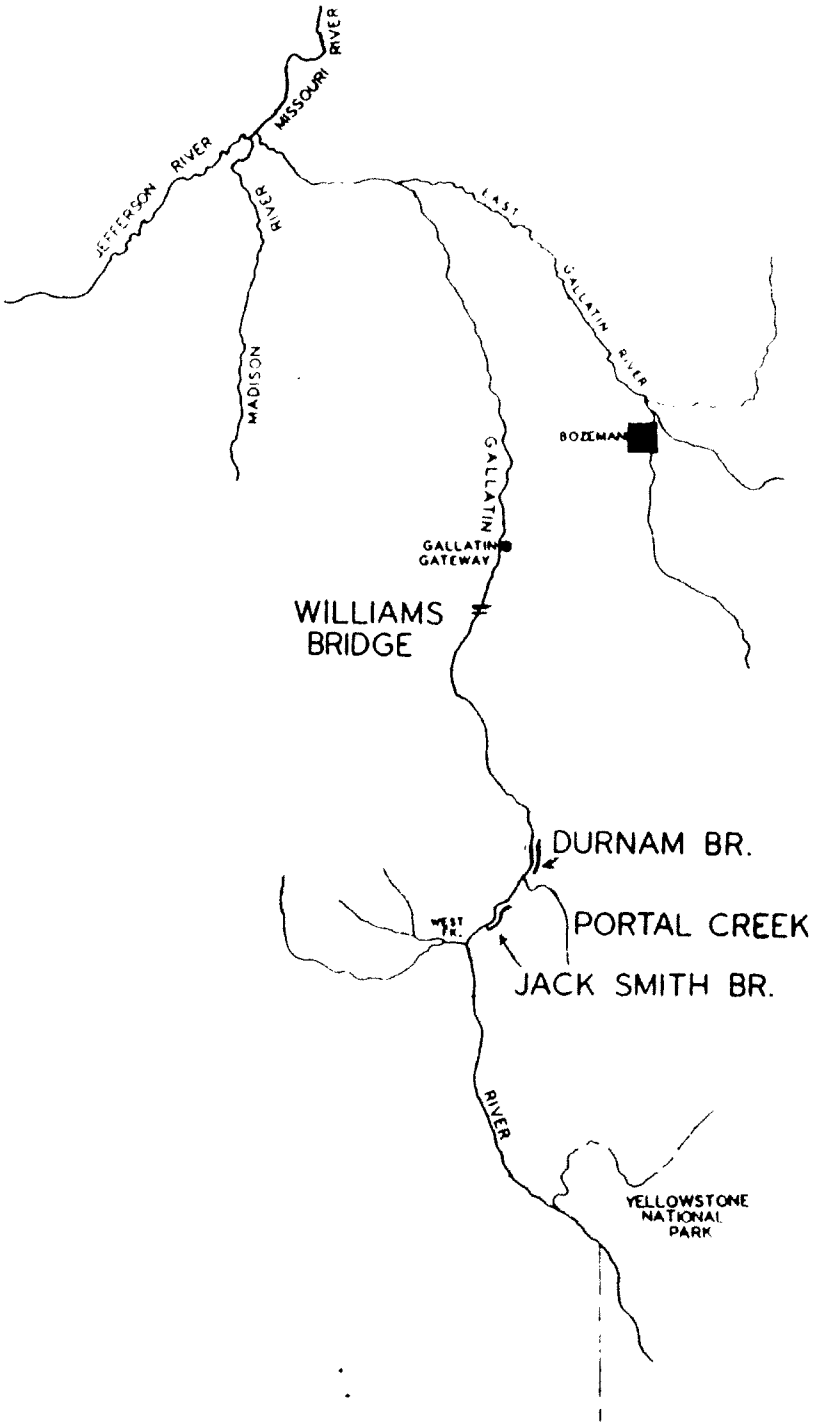


FIGURE 2. Map of the Gallatin River showing study sections.

Table 1. Wild brown and rainbow trout population, biomass and age structure estimates for the Snoball study section of the closed-to-fishing season (1982) and the open to catch-and-release artificial lures-only fishing season (1983) (80% confidence intervals shown in parentheses; section length is 4.5 miles).

| | Age Group | | | | | Totals | |
|---|---|---|---|---|---|---|---|
| YEAR | I | II | III | IV | IV+ | Number | Weight (lbs) |
| | | | | Rainbow Trout | | | |
| 9/82 | 5176 | 2361 | 1438 | 807 | 2037 | 11,819 (± 626) | --[2] |
| 9/83 | 4964 | 1143 | 644 | 1188 | 1354 | 9,293 (± 298) | -- |
| | | | | Brown Trout | | | |
| 9/82 | 2908 | 1880 | 648 | 1129[1] | -- | 6,565 (± 352)[1] | -- |
| 9/83 | 1796 | 867 | 592 | 607 | 645 | 4,507 (± 137) | -- |

[1] Adjusted estimate of four-year-old and older brown trout due to spawning movement.

[2] Total biomass estimates not calculated, but will be included in future report.

Table 2. Comparison of the 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 aritifical lure regulation (all estimates made for September and are expressed as number per mile; 80% confidence intervals shown in parentheses [numbers are expressed as trout per mile]).

| Year | Rainbow Trout | Brown Trout | Total |
|---|---|---|---|
| | | 10 Trout or 10 lbs/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 Lure-Only | |
| 1983 | 510 | 283 | 793 (± 171) |

[1] Adjusted estimate due to spawning movement.

Table 3. Comparison of the number of brown and rainbow trout 13.0 inches and larger in the Pine Butte section of the Madison River between year(s) with a 10 trout or 10 pound and one trout limit and those with a catch-and-release aritificial lures-only regulation (estimates are for the fall period--September; 80% confidence intervals shown in parentheses and numbers are shown as trout per mile).

| Year | Rainbow Trout | Brown Trout | Total |
|---|---|---|---|
| | 10 Trout or 10 lbs/One Trout Limit | | |
| 1977 | 156 | 188 | 344 (± 133) |
| | Catch-and-Release/Artificial Lure-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) |

Table 4. Wild rainbow trout population, biomass and age structure estimates for the Durham Bridge and Jack Smith Bridge sections of the Gallatin River for 1982 and 1983 (80% confidence intervals shown in parentheses).

| Age Group | 1982 Spring Est. (March) | 1982 Fall Est. (October) | 1983 Spring Est. (March) | 1983 Fall Est. (October) |
|---|---|---|---|---|
| **Special Angling Regulation Section (Durham Bridge)[1] (2.0 Miles)** | | | | |
| III | 2651 | 2356 | 3226 | 2636 |
| IV | 1119 | 623 | 1951 | 1203 |
| V | 386 | 190 | 978 | 209 |
| VI + | 121 | 89 | 282 | 80 |
| Total No.: | 4277 (± 574) | 3918 (± 614) | 6437 (± 1001) | 4128 (± 449) |
| Total Lbs: | 1471 (± 203) | 1429 (± 260) | 2236 (± 342) | 1656 (± 180) |
| **Five Trout Limit Section (Jack Smith Bridge) (2.2 Miles)** | | | | |
| III | 2964 | 2216 | 3351 | 2850 |
| IV | 1579 | 698 | 2146 | 1059 |
| V | 453 | 105 | 698 | 166 |
| VI + | 162 | 45 | 139 | 59 |
| Total No.: | 5158 (± 583) | 3064 (± 401) | 6334 (± 823) | 4134 (± 576) |
| Total Lbs: | 2078 (± 209) | 1443 (± 178) | 2467 (± 289) | 1970 (± 219) |

Table 5. Comparison of the number of wild rainbow trout by size between the Durham Bridge (special angling regulation) and the Jack Smith Bridge (5-trout limit) sections on the Gallatin River (80% confidence intervals shown in parentheses; number estimates shown per mile).

| | 10.0 - 12.9 Inches | | 13.0-Inch and Larger | |
|---|---|---|---|---|
| Month/Year | Special Regulation[1] | 5-Trout Limit | Special Regulation[1] | 5-Trout Limit |
| Oct., 1981 | 1024 (± 207) | 1121 (± 485) | 156 (± 55) | 171 (± 52) |
| Mar., 1982 | 658 (± 74) | 925 (± 48) | 95 (± 30) | 145 (± 25) |
| Oct., 1982 | 735 (± 90) | 885 (± 61) | 98 (± 42) | 74 (± 12) |
| Mar., 1983 | 980 (± 101) | 1050 (± 69) | 133 (± 51) | 133 (± 36) |
| Oct., 1983 | 999 (± 58) | 1166 (± 60) | 87 (± 22) | 121 (± 19) |

[1] Four-trout limit of which three must be under 13.0 inches and one over 22 inches.

## LITERATURE CITED

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Prepared By: E. Richard Vincent
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Waters
Referred To:

| | |
|---|---|
| Madison River | 13-3440-01 |
| Gallatin River | 09-2090-01 |