

**A SUMMARY OF ANGLER SURVEYS FROM THE UPPER
RUBY RIVER (1999-2003)**



***Montana Fish,
Wildlife & Parks***

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**A SUMMARY OF ANGLER SURVEYS FROM THE UPPER
RUBY RIVER (1999-2003)**

A Summary Report

Based on angler surveys collected from the upper Ruby River over the years 1999-2003

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SYNOPSIS

Angler surveys were collected from six locations in the upper Ruby River drainage over the period 1999-2003. Data was summarized and analyzed using the 504 angler surveys collected over the five year period. Overall mean catch rates and Arctic grayling mean catch rates were greatest in 2003 at 6.17 fish/hr. And 4.27 fish/hr. respectively. Mean annual catch rates for cutthroat trout, brown trout, and mountain whitefish were highest in 2002 at 1.25 fish/hr., 0.26 fish/hr., and 0.55 fish/hr. respectively. Rainbow trout mean annual catch rates peaked in 2000 at 1.39 fish/hr. Spatial analysis of angling success showed that catch rates for Arctic grayling were highest in Reach B. Catch rates for cutthroat trout were highest in the headwaters of the upper Ruby River (Reach A) and catch rates for rainbow trout and brown trout were highest downstream in Reach D. No statistically significant differences were found for catch rates among study reaches for mountain whitefish and for overall catch rates. Anglers from 39 states and two foreign countries participated in the survey over the period 1999-2003. A vast majority (91%) of the anglers that participated in the survey were flyfisherman. These anglers followed a catch and release philosophy with harvest rates peaking in 2002 at 1.45 percent.

INTRODUCTION

Angler surveys are a valuable tool to fishery managers. Surveys can provide valuable information about fishing pressure, harvest rates, and angler demographics. Montana Fish, Wildlife & Parks (MFWP) has been collecting angler surveys from the upper Ruby River since 1999. These surveys are conducted in conjunction with the Arctic Grayling Recovery Project. The purpose of these surveys is to collect information that may help us to determine the level of success in reintroducing fluvial Arctic grayling to the upper Ruby River. The surveys also allow us to interact with the angling public and gauge their feelings of the reintroduction efforts. The surveys may also provide the information necessary to determine if the effort to reintroduce fluvial Arctic grayling is impacting the sport fishery either positively or negatively.

The purpose of this report is to summarize the angler surveys from the upper Ruby River from 1999 to 2003. Specifically we intend to evaluate the spatial and temporal trends in species specific catch rates, overall catch rates, angler demographics, and fish harvest rates.

METHODS

Data Collection

Creel boxes were installed in six locations along the upper Ruby River, upstream of Warm Springs Creek (Figure 1). Creel boxes were supplied with angler survey forms and pertinent information about the effort to reintroduce fluvial Arctic grayling in the upper Ruby River. The upper Ruby River was divided into 4 sections for the purpose of the survey. Section A consists of the headwaters of the Middle Fork, downstream to Three Forks Cow Camp. Section B consists of the area between Three Forks Cow Camp

downstream to Cottonwood Campground. Section C consists of the area between Cottonwood Campground downstream to the U.S. Forest Service boundary. Finally, Section D encompasses the stretch of river between the U.S. Forest Service boundary downstream to where the upper Ruby River meets Ruby Reservoir. The angler survey form asks the anglers to provide their name and address, along with information about the sections of the river that they fished, the date, how long they fished for, how many and what species of fish did they catch, and harvest from the upper Ruby River. Information is also gathered on whether the anglers fished specifically for grayling, what tackle they used, and whether or not they hired a guide for their fishing trip. The form also provides information on how to distinguish between Arctic grayling and mountain whitefish. Survey forms were either filled out immediately and deposited into the creel box or filled out at a later date and mailed into a FWP office. The data collected from the survey forms represent primarily summer and fall angling data. Surveys were collected as early as June and as late as November during each study year.

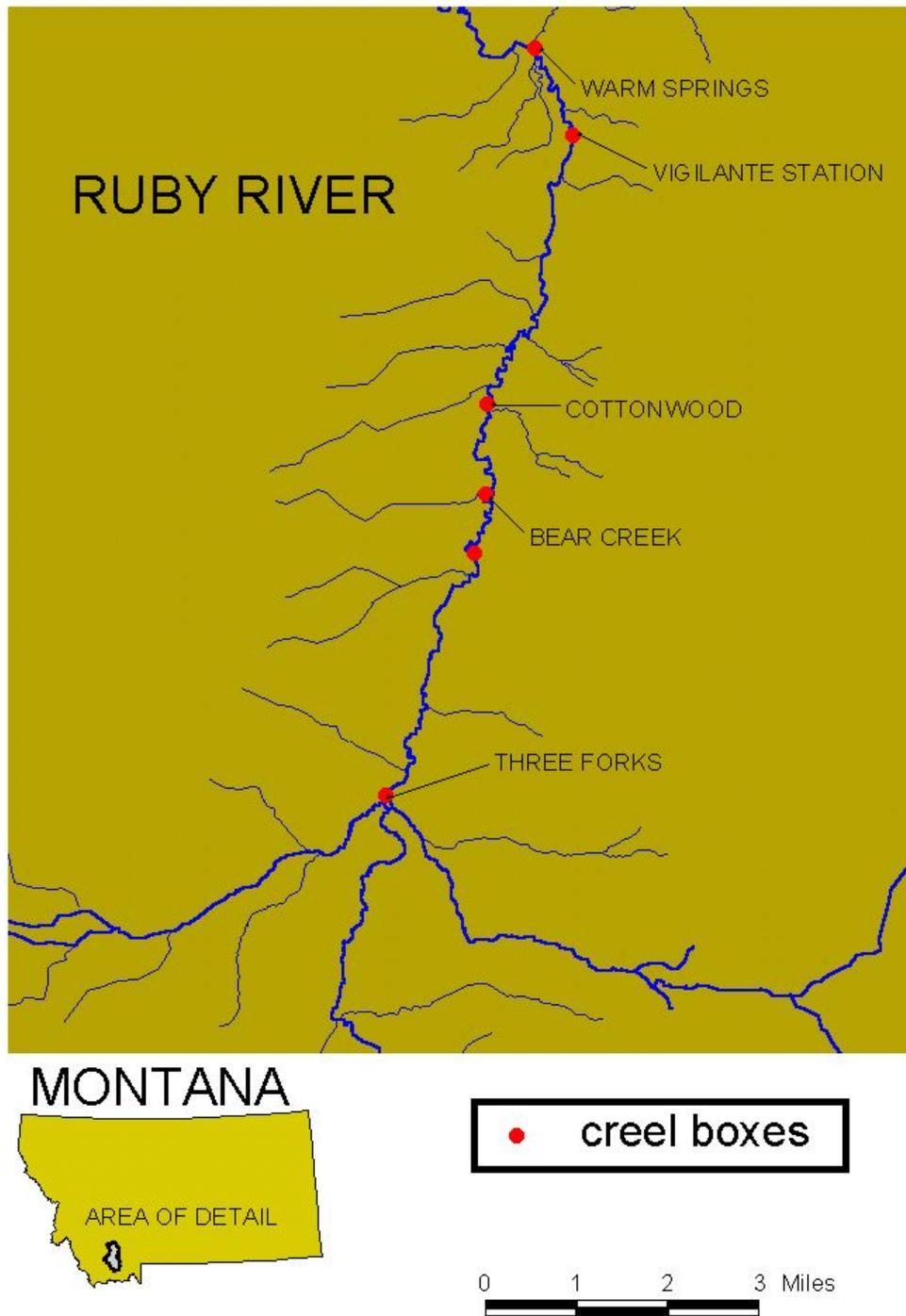


Figure 1. Locations of angler survey drop boxes within the upper Ruby River.

Data Analysis

Data from the angler survey forms were entered into an Excel spreadsheet. Statistical analysis of data was performed using SAS statistical analysis software. When appropriate, data was transformed to approximate normality. Statistical means were compared using analysis of variance (ANOVA) with a significance level established at $\alpha = 0.05$. We used a Tukey's multiple contrast test for post hoc comparison to determine statistical differences among survey reaches and survey years.

RESULTS

Temporal Variations in Data

We used data from 504 angler surveys for this portion of the analysis. We found significant differences in the annual mean catch rates of anglers that participated in our surveys over the period of 1999-2003 (Anova, $p < 0.0001$). Annual mean catch rates ranged from a low of 3.12 fish per hour in 2001 to a high of 6.17 fish per hour in 2003 (Figure 2). We also found significant differences in the species specific catch rates among the study years. Arctic grayling catch rates were significantly different among the study years (Anova, $p < 0.0001$). Annual mean catch rates for Arctic grayling ranged from a low of 0.25 fish per hour in 2001 to a high of 4.27 fish per hour in 2003 (Figure 3). These catch rates appear to be directly correlated to the number of Arctic grayling stocked within the upper Ruby River during that year.

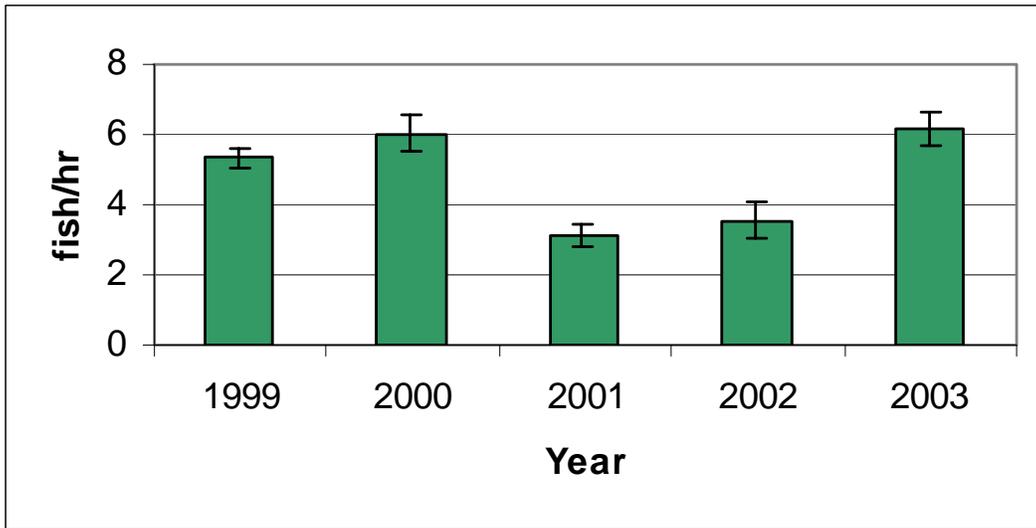


Figure 2. Annual variation in mean catch rates (fish/hr) by anglers that completed survey forms in the upper Ruby River (1999-2003).

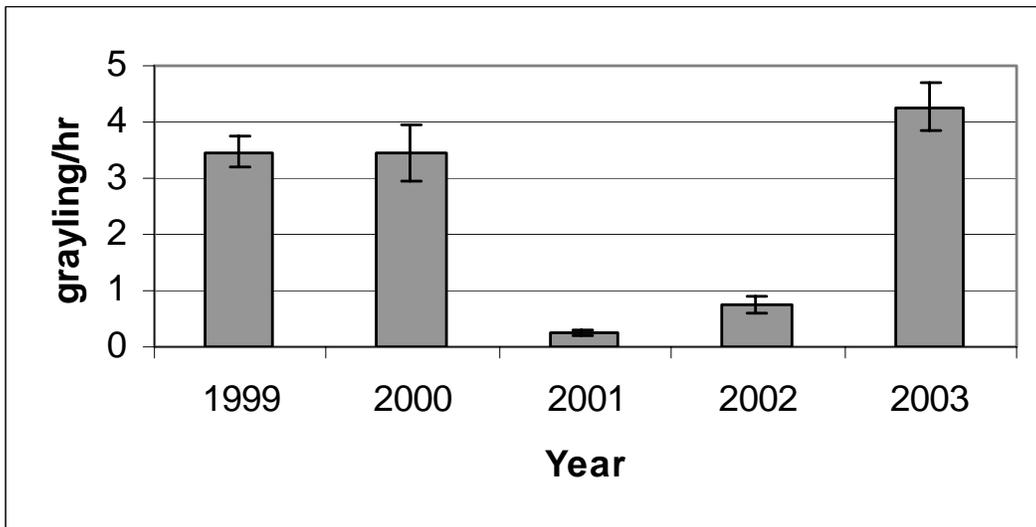


Figure 3. Annual variation in mean catch rates (fish/hr) of Arctic grayling by anglers that completed survey forms in the upper Ruby River (1999-2003).

We also found significant differences among mean annual catch rates for cutthroat trout in the upper Ruby River over the period 1999-2003 (ANOVA, $p < 0.04$). Mean annual catch rates for cutthroat trout varied from a low of 0.59 fish per hour in 1999 to a high of 1.25 fish per hour in 2002 (Figure 4). Mean annual catch rates for brown trout were also found to be significantly different (Anova, $p < 0.003$). Mean annual catch rates ranged from a low of 0.06 fish per hour in 1999 to a high of 0.26 fish per hour in 2002 (Figure 5).

The mean annual catch rates for rainbow trout were also significantly different (Anova, $p < 0.03$). Mean annual catch rates for rainbow trout ranged from a low of 0.69 fish per hour in 2002 to a high of 1.39 in 2000 (Figure 6). Mountain whitefish was the only species included on the survey that we did not find significant differences in mean annual catch rates. Mean annual catch rates varied from a low of 0.07 fish per hour in 1999 to a high of 0.55 fish per hour in 2002 (Figure 7).

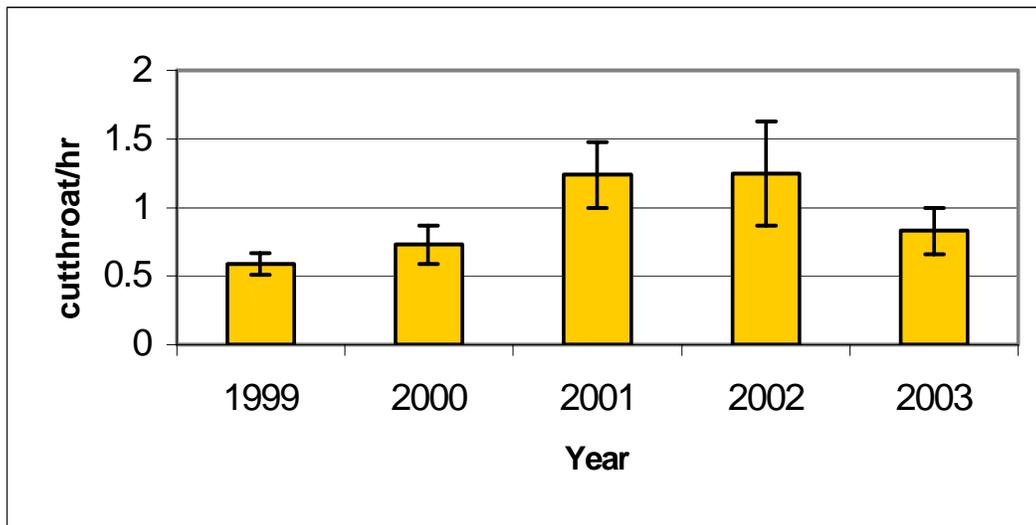


Figure 4. Annual variation in mean catch rates (fish/hr) of cutthroat trout by anglers that completed survey forms in the upper Ruby River (1999-2003).

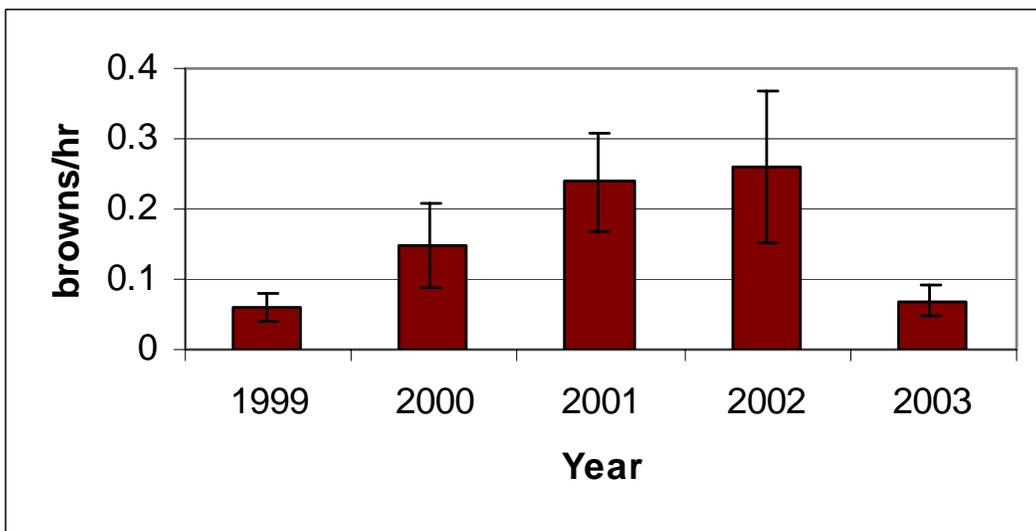


Figure 5. Annual variation in mean catch rates (fish/hr) of brown trout by anglers that completed survey forms in the upper Ruby River (1999-2003).

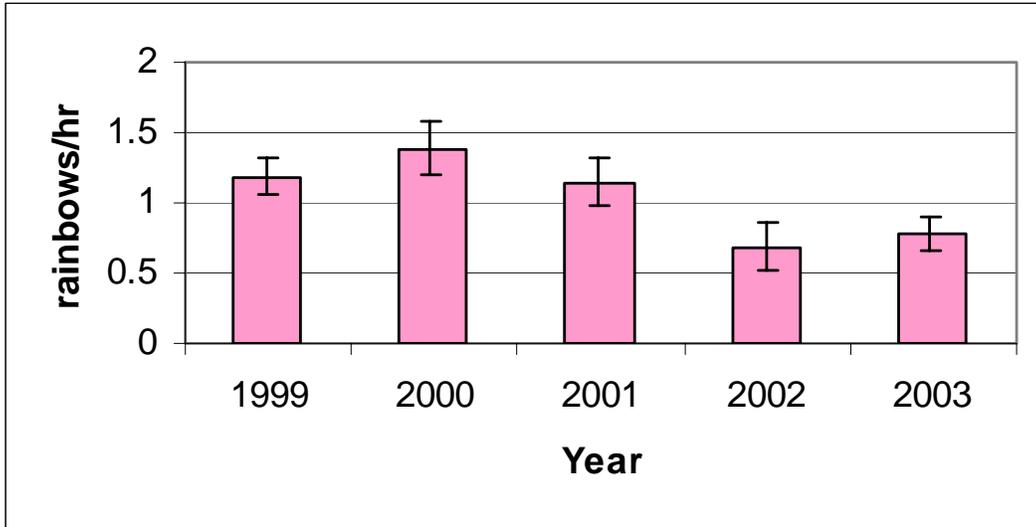


Figure 6. Annual variation in mean catch rates (fish/hr) of rainbow trout by anglers that completed survey forms in the upper Ruby River (1999-2003).

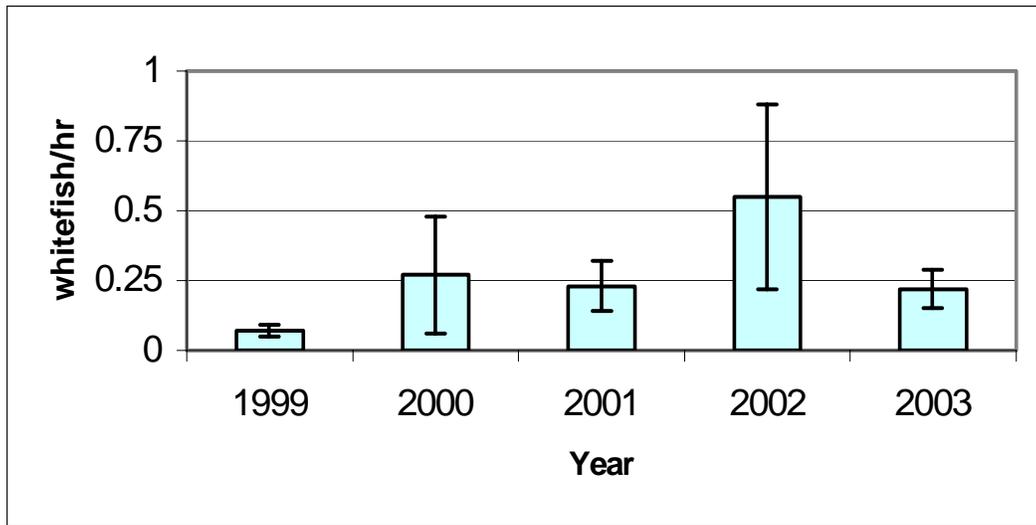


Figure 7. Mean catch rates (fish/hr) of mountain whitefish by anglers that completed survey forms in the upper Ruby River (1999-2003).

Spatial Variation in Data

The basis for this portion of the analysis is to determine statistical differences in the data among the four study reaches established on the angler survey form. Again, data was summarized and analyzed from 504 angler surveys collected between the years 1999-2003. We found significant differences in mean catch rates for Arctic grayling among study reaches (Anova, $p < 0.0001$). Mean catch rates ranged from a low of 1.0 fish per hour in Section D to a high of 3.91 fish per hour in Section B (Figure 8). These catch rates appear to be correlated to the spatial variation in Arctic grayling stocking locations. Most of the fish are stocked in Section B and this area appears to be offering the best angling opportunities for fluvial Arctic grayling. Mean catch rates were also found to be significantly different for cutthroat trout (Anova, $p < 0.0001$), brown trout (Anova, $p < 0.0001$), and rainbow trout (Anova, $p < 0.0001$). The spatial variation of mean catch rates for these species is shown in Figures 9, 10, and 11. We found no significant differences in the total mean catch rates or the mean catch rates for mountain whitefish among the study reaches. The spatial patterns for these parameters are shown in Figures 12 and 13.

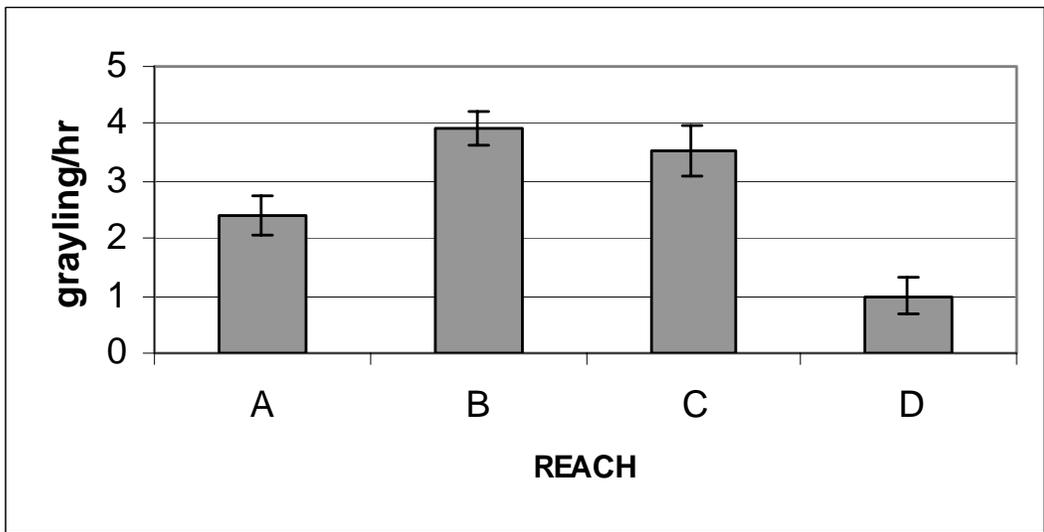


Figure 8. Spatial variation of mean catch rates (fish/hr) of Arctic grayling by anglers that completed survey forms in the upper Ruby River (1999-2003).

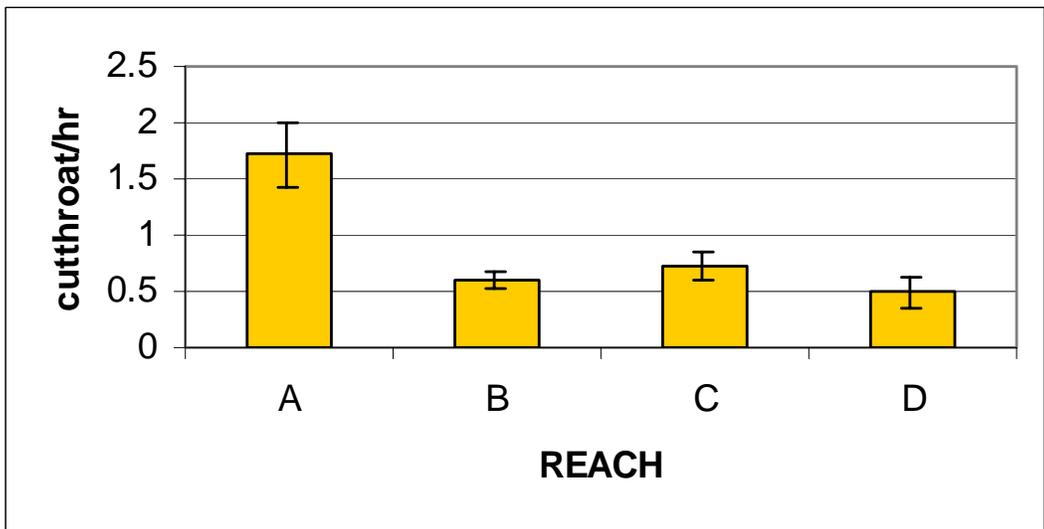


Figure 9. Spatial variation of mean catch rates (fish/hr) of cutthroat trout by anglers that completed survey forms in the upper Ruby River (1999-2003).

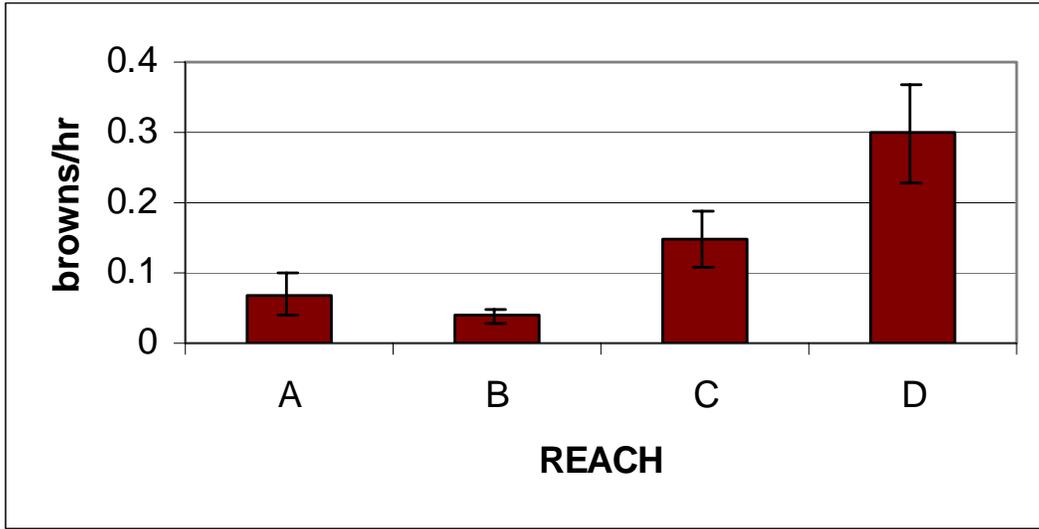


Figure 10. Spatial variation of mean catch rates (fish/hr) of brown trout by anglers that completed survey forms in the upper Ruby River (1999-2003).

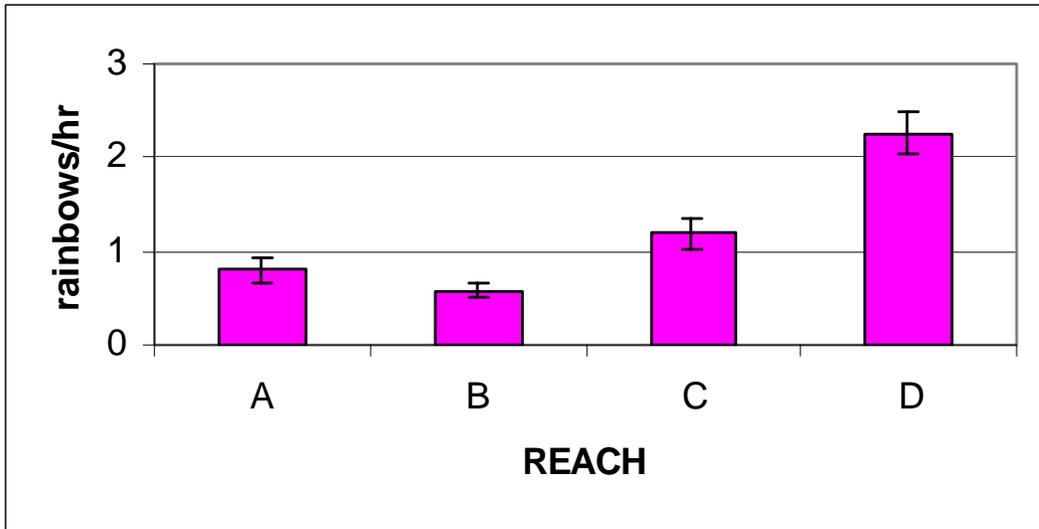


Figure 11. Spatial variation of mean catch rates (fish/hr) of rainbow trout by anglers that completed survey forms in the upper Ruby River (1999-2003).

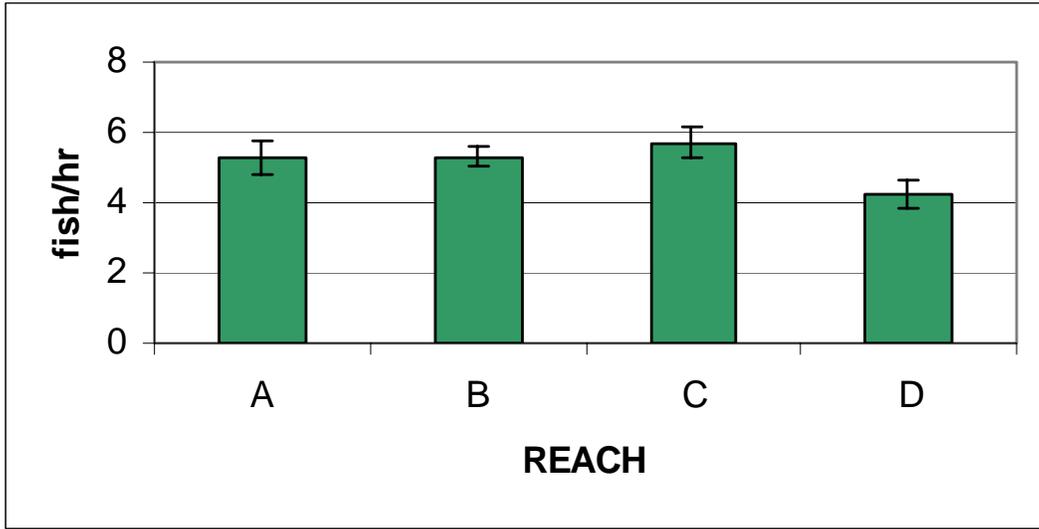


Figure 12. Spatial pattern of mean catch rates (fish/hr) by anglers that completed survey forms in the upper Ruby River (1999-2003).

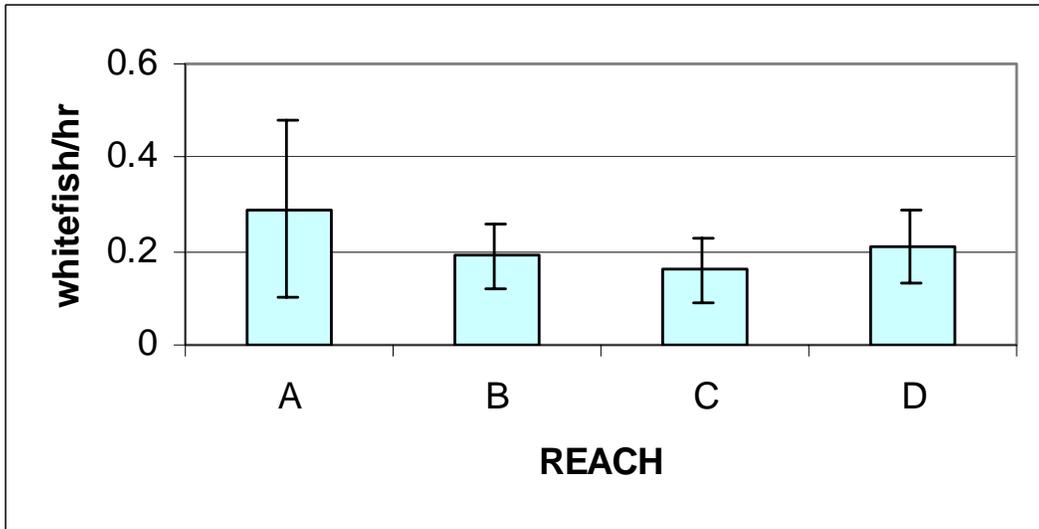


Figure 13. Spatial pattern of mean catch rates (fish/hr) of mountain whitefish by anglers that completed survey forms in the upper Ruby River (1999-2003).

Angler Demographics and Angling Habit Patterns

We used 488 angler surveys from the period 1999-2003 for the analysis of this section of the report. Completed surveys of the angling experience of the upper Ruby River over the five year study period came from anglers residing in 39 different states and two foreign countries (Figure 14). The average length of the angling day ranged from a low of 2.67 hours in 2002 to a high of 3.46 hours in 1999 (Figure 15). The average length of the angling day tended to be longer in the lower reaches of the upper Ruby River. The length of the average angling day ranged from a high of 3.57 hours in Section D to a low of 3.08 hours in Section A (Figure 16). Approximately 91 percent of anglers that completed the surveys over the period 1999-2003 fished with flies (Figure 17). Only two percent of anglers from the survey used bait (Figure 17). Very few of the anglers that participated in the survey indicated that they harvested fish from their catch. Annual harvest rates ranged from a high of 1.45 percent in 2002 to a low of 0.47 percent in 2000. Harvest rates were greatest in Section D at 1.02 percent and lowest in Section A at 0.49 percent. Approximately 15 percent of anglers surveyed stated that they were fishing specifically for Arctic grayling. Only three anglers participating in the survey stated that they had hired a guide for their fishing trip.

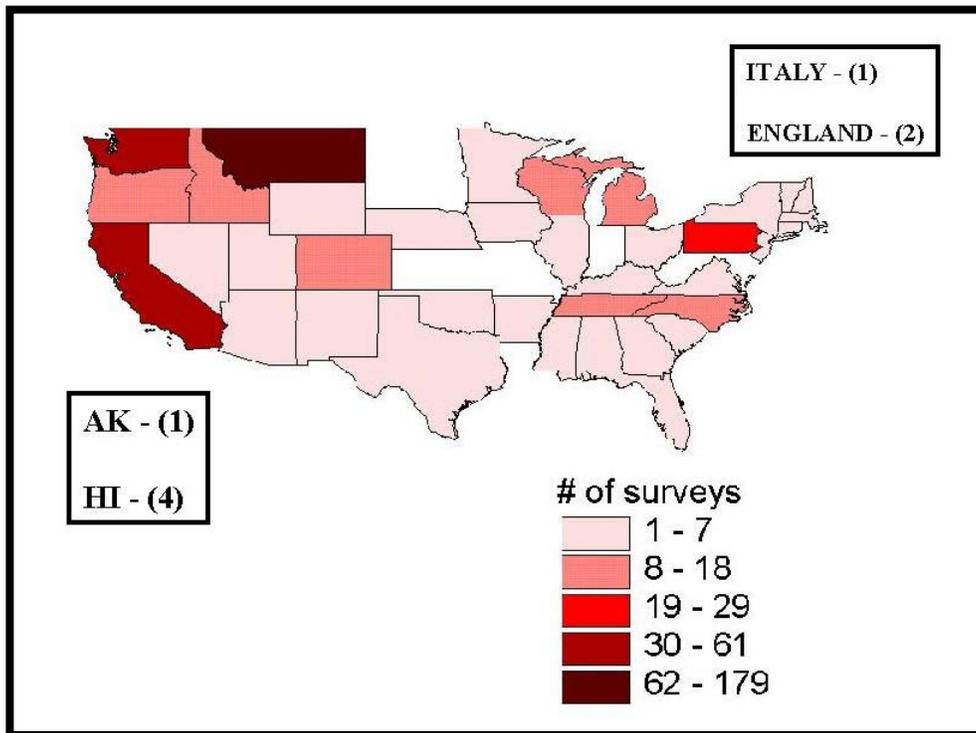


Figure 14. Residency and participation level patterns of anglers in the upper Ruby River angler surveys (1999-2003).

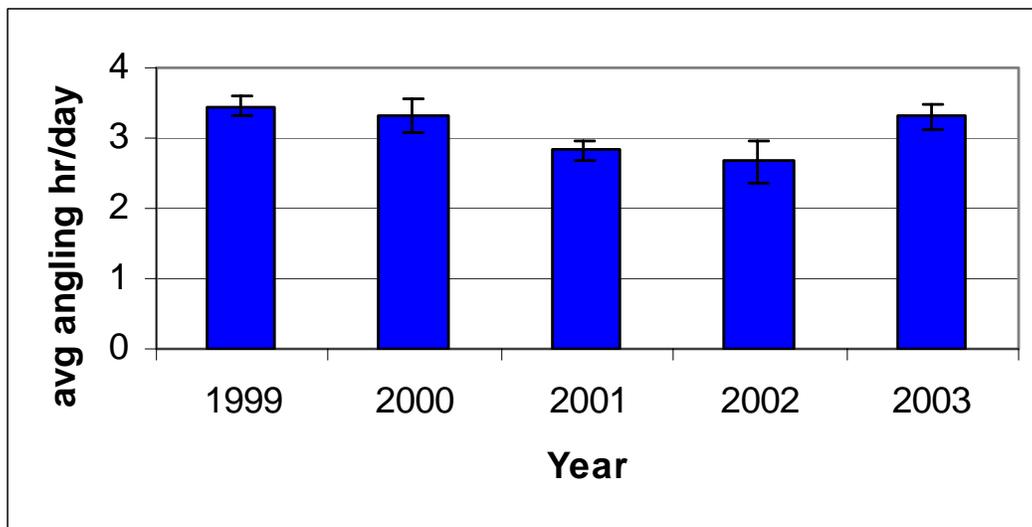


Figure 15. Annual variation in length (hrs) of average angling days (1999-2003).

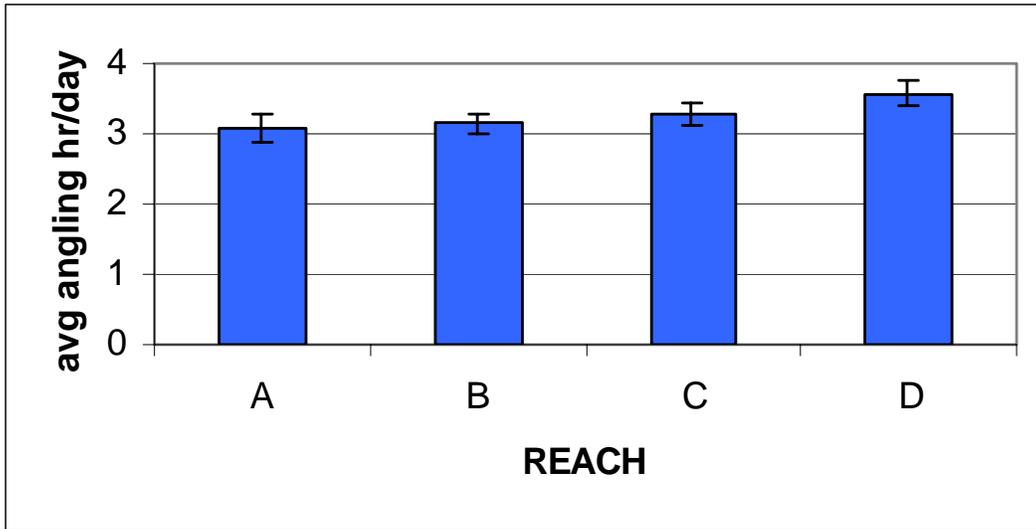


Figure 16. Spatial variation in length (hrs) of average angling days (1999-2003).

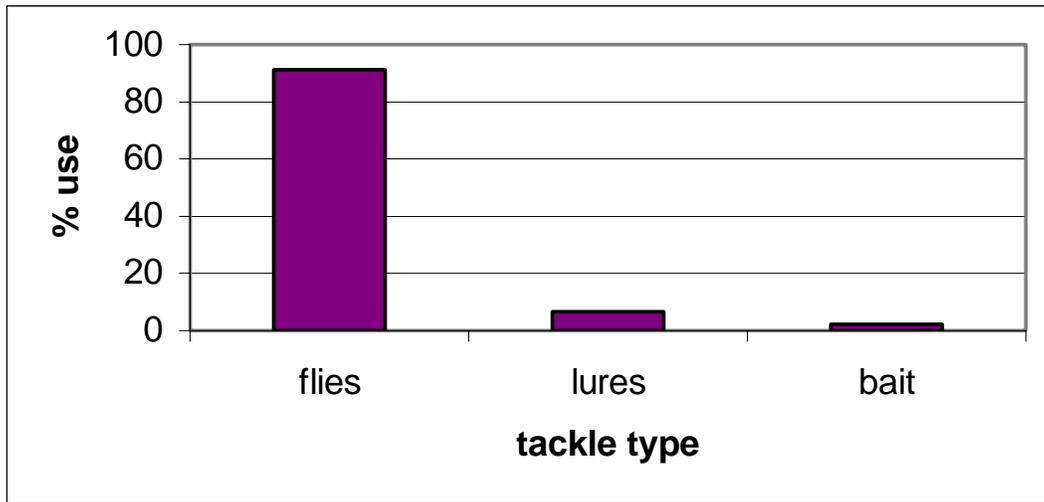


Figure 17. Fishing tackle preferences of anglers participating in the upper Ruby River angler surveys (1999-2003).

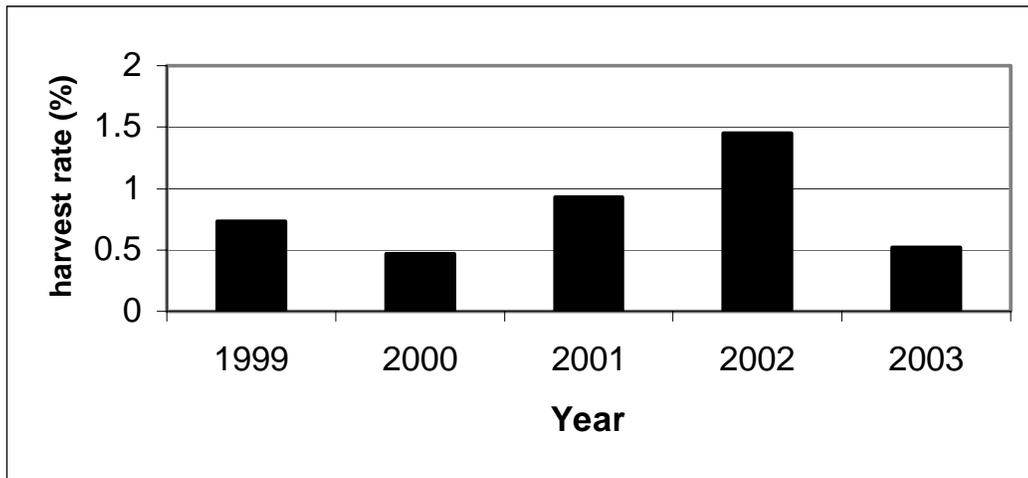


Figure 18. Annual variation in harvest rates from the upper Ruby River angler survey (1999-2003).

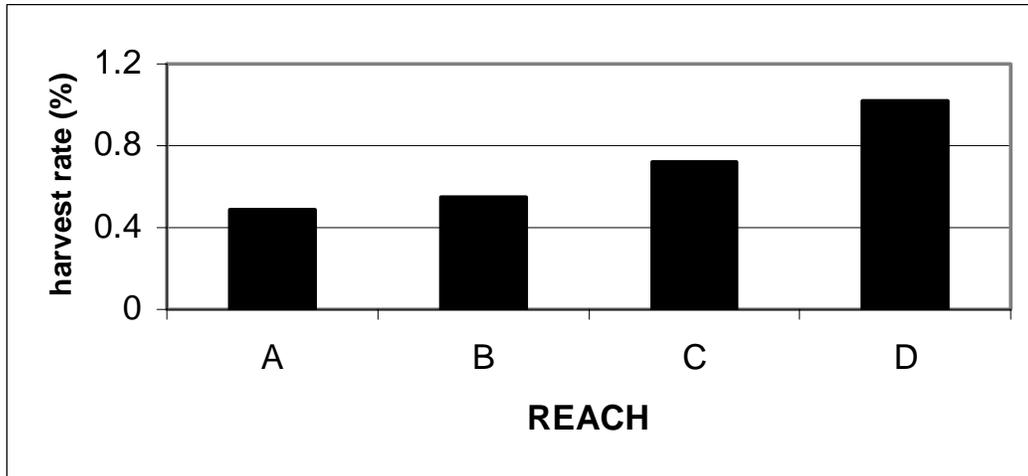


Figure 19. Spatial variation in annual harvest rates from the upper Ruby River angler surveys (1999-2003).

DISCUSSION

The upper Ruby River is a popular fishing destination for anglers throughout the United States. The angling population of the upper Ruby River also includes individuals from foreign countries. The results of our survey show that a majority of the anglers tend to fish with flies and practice catch and release. While our harvest rate estimates were low, it is possible that they were overestimates. Roach et al. (1999) show that harvest rate estimates produced from angler surveys with study designs similar to ours were often overestimates when compared to on-site angler surveys.

A vast majority of the anglers surveyed were targeting game fish species other than Arctic grayling. It is important that we recognize this attitude and continue to communicate why reintroducing fluvial Arctic grayling to the upper Ruby River is an important and necessary project. While it is impossible to restrict the movement of Arctic grayling after they are planted into the river, whenever possible popular fishing locations such as campgrounds should be avoided as planting locations.

The upper Ruby River is a high quality fishery with anglers averaging approximately five fish per hour in each of the study reaches from 1999-2003 (Figure 12). The best fishing for rainbow and brown trout is in the lower reaches of the river, while fishing for Arctic grayling and cutthroat trout is best in the upper reaches. It is important to note that many of the cutthroat trout in the river are hybridized. The survey form currently does not give the angler an option to choose hybridized cutthroat trout or cutbows. Annual catch rates for Arctic grayling seem to be strongly correlated to annual stocking numbers. Catch rates dropped severely in both 2001 and 2002 when low numbers of Arctic grayling were planted in the river. Annual catch rates of rainbow trout

are dropping slightly. This drop may be due to the increased occurrence of whirling disease downstream of the mouth of Warm Springs Creek near Vigilante Station (Lamothe and Magee 2004). Approximately 60 percent of the rainbow trout handled in the Canyon fish population monitoring reach had signs of whirling disease (Lamothe and Magee 2004).

It is important to remember that the data for this report was provided by anglers willing to fill out and deposit one of our survey forms. Previous investigations of angler survey data have shown the effect of the nonresponse bias (what are the angling results and habits of anglers that didn't fill out the surveys) can alter the results of the data (Fisher 1996). We feel that this is most likely the case with regards to our estimates of angling pressure on Section D. Angling pressure in Section D are probably under estimated due to the lack of a angler service station in this section of the river. This lack of data may have impacts on the spatial and temporal trends of data from this report.

The upper Ruby River is a high quality fishery enjoyed by anglers from all over our country and the world. It is important to remember this fact when addressing the needs of our native fish species. To this point in time, we believe that the reintroduction of fluvial Arctic grayling into the upper Ruby River has increased angling opportunities without degrading the quality of the existing fishery.

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