

LOWER SNAKE RIVER COMPENSATION PLAN:
Summer Steelhead Creel Surveys on the
Grande Ronde, Wallowa, and Imnaha
Rivers for the 2009-10 Run Year

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Fish Research and Development, NE Region



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Front cover photo: In memory of Bill Knox (1956-2012), shown here with a nice hatchery summer steelhead caught at Bluff Hole, his favorite fishing spot on the lower Grande Ronde River.

ANNUAL PROGRESS REPORT

FISH RESEARCH PROJECT
OREGON

PROJECT TITLE: Summer Steelhead Creel Surveys on the
Grande Ronde, Wallowa, and Imnaha
Rivers for the 2009-10 Run Year

CONTRACT NUMBER: 1411-A-J010

PROJECT PERIOD: 1 October 2009 to 30 September 2010

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December 2012

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3406 Cherry Avenue NE
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This project was financed by the U.S. Fish and Wildlife Service under
the Lower Snake River Compensation Plan.

PREFACE

This report is for the funding period 1 October 2009 to 30 September 2010. The sampling period was from 1 September 2009 to 15 April 2010. The report summarizes statistical angler surveys conducted during the summer steelhead angling season in major fishing areas on the Grande Ronde, Wallowa, and Imnaha rivers. Hatchery adult steelhead harvested during the 2009-2010 run year were primarily from the 2006 and 2007 brood years. Results of creel surveys conducted prior to fall 2009 are reported in previous Lower Snake River Compensation Plan evaluation annual reports (Carmichael et al. 1986, 1987, 1988, 1989, 1990; Flesher et al. 1991, 1992, 1993, 1994, 1995, 1996, 1997, 1999, 2000, 2001, 2004a, 2004b, 2005, 2007, 2008a, 2008b, 2009, 2010, and 2011), many of which are available at: <http://www.fws.gov/lsnakecomplan/reports/ODFWreports.html>. The steelhead angling season surveyed in this report, during which only adipose fin-clipped fish could be harvested, was open from 1 September 2009 to 15 April 2010 in the Grande Ronde and Imnaha river basins.

ACKNOWLEDGMENTS

We would like to thank Mary Buckman for the statistical design of these analyses, Andy VanSickle and Matt Nightengale for their dedication in conducting the surveys, and Steve Yundt for reviewing the document. We would also like to thank Joe Bumgarner (Washington Department of Fish and Wildlife) for coordinating and Mark Hall for conducting the Lower Grande Ronde survey during spring 2009. This project was financed as a cooperative agreement between the Oregon Department of Fish and Wildlife and the U.S. Fish and Wildlife Service under the Lower Snake River Compensation Plan.

CONTENTS

	Page
PREFACE	i
ACKNOWLEDGMENTS.....	ii
LIST OF FIGURES.....	iv
LIST OF TABLES.....	vi
LIST OF APPENDICES	vii
SUMMARY	1
INTRODUCTION.....	1
STUDY AREA	2
METHODS	4
ACCOMPLISHMENTS AND FINDINGS	6
MANAGEMENT IMPLICATIONS AND RECOMMENDATIONS	15
REFERENCES.....	21
APPENDICES.....	24

LIST OF FIGURES

<u>Number</u>		<u>Page</u>
1.	Map of northeastern Oregon showing where summer steelhead creel surveys were conducted in the Grande Ronde and Imnaha river basins during the 2009-10 run year	3
2.	Estimated total catch of summer steelhead (vertical bars show 95% confidence intervals) on the lower Grande Ronde River, two sections of the Imnaha River, and Big Sheep Creek during the 2009-10 run year ...	8
3.	Estimated total harvest of summer steelhead (vertical bars show 95% confidence intervals) on the lower Grande Ronde River, two sections of the Imnaha River, and Big Sheep Creek during the 2009-10 run year ...	8
4.	Estimated catch rate index (hours/fish) for summer steelhead (vertical bars show 95% confidence intervals) in the Grande Ronde and Imnaha river basins during the 2009-10 run year	9
5.	Estimated number of angler days for summer steelhead (vertical bars show 95% confidence intervals) on the lower Grande Ronde River, two sections of the Imnaha River, and Big Sheep Creek during the 2009-10 run year	10
6.	Estimated number of angler hours for summer steelhead (vertical bars show 95% confidence intervals) on the lower Grande Ronde River, two sections of the Imnaha River, and Big Sheep Creek during the 2009-10 run year	10
7.	Estimated percent of summer steelhead caught (vertical bars show 95% confidence intervals; using a binomial distribution) in the Grande Ronde and Imnaha river basins during the 2009-10 run year that were marked	11
8.	Angler effort for summer steelhead (vertical bars show 95% confidence intervals) in spring fishery areas (upper Grande Ronde River, Wallowa River, Catherine Creek, and Rondowa), the lower Grande Ronde River, and the Imnaha River for the 1985-86 to 2009-10 run years.....	17
9.	Number of hatchery summer steelhead harvested (vertical bars show 95% confidence intervals) by recreational anglers in spring fishery areas (upper Grande Ronde River, Wallowa River, Catherine Creek, and Rondowa), the lower Grande Ronde River, and the Imnaha River for the 1985-86 to 2009-10 run years.	17

LIST OF FIGURES (continued)

<u>Number</u>		<u>Page</u>
10.	Percent of local resident anglers (Union or Wallowa county residents), non-local Oregon resident anglers, and out-of-state anglers that fished in summer steelhead fisheries in the Grande Ronde and Imnaha river basins for the 1985-86 to 2008-09 run years.....	20
11.	Relation between angler harvest tag (punch card) and creel survey harvest for summer steelhead fisheries in the Grande Ronde (♦) and Imnaha (○) river basins for years when harvest estimates for specific reaches were available (1993-1996 for the upper Grande Ronde and Wallowa, 1994-1995 for Rondowa, 1992-1993 for Catherine Creek, 1993-spring 2009 for the lower Grande Ronde, and 1986-1996, 1999-2009 for the Imnaha fishery areas).....	20

LIST OF TABLES

<u>Number</u>		<u>Page</u>
1.	Percent age composition and mean fork length ($\pm 95\%$ confidence intervals) of hatchery summer steelhead sampled in creel surveys in the Grande Ronde and Imnaha river basins during the 2009-10 run year	12
2.	Residence of summer steelhead anglers interviewed during creel surveys in the Grande Ronde and Imnaha river basins during the 2009-10 run year	12
3.	Number of AdLV+CWT or AdRV+CWT marked summer steelhead recovered during creel surveys in the Grande Ronde and Imnaha river basins during the 2009-10 run year	13
4.	Estimated total catch (harvested and released) of hatchery and wild summer steelhead from statistical angler surveys on the lower Grande Ronde from 1 September to 15 April, and in the Imnaha River Basin (includes Big Sheep Creek beginning with run year 2009-10) from 1 February to 15 April for the 1985-86 to 2009-10 run years	18
5.	Catch rate index (hours/fish $\pm 95\%$ confidence intervals) in summer steelhead creel survey areas in the Grande Ronde and Imnaha river basins for the 1985-86 to 2009-10 run years	19

LIST OF APPENDICES

<u>Number</u>		<u>Page</u>
A-1.	Fishery statistics for summer steelhead on the lower Grande Ronde River during the 2009-10 run year	25
A-2.	Catch rate ($\pm 95\%$ confidence intervals) for summer steelhead at Rondowa during the 2009-10 run year	26
A-3.	Catch rate ($\pm 95\%$ confidence intervals) for summer steelhead on the Wallowa River during the 2009-10 run year	26
A-4.	Fishery statistics for summer steelhead in Section 1 (Fence Creek to town of Imnaha) of the Imnaha River during the 2009-10 run year	27
A-5.	Fishery statistics for summer steelhead in Section 2 (mouth to Fence Creek) of the Imnaha River during the 2009-10 run year	27
A-6.	Fishery statistics for summer steelhead in Big Sheep Creek (mouth to Little Sheep Creek) in the Imnaha River Basin during the 2009-10 run year	28
B.	Percent of marked hatchery summer steelhead caught during each survey month in the Grande Ronde and Imnaha river basins during the 2009-10 run year	29
C-1.	Estimated summer steelhead harvest, and observed and expanded harvest of coded-wire tagged steelhead in spring fisheries in the Grande Ronde basin for the 2008-09 run year	31
C-2.	Estimated catch of summer steelhead in spring fisheries in the Grande Ronde basin for the 2008-09 run year	32
C-3.	Estimated angler effort (hours) for summer steelhead in spring fisheries in the Grande Ronde basin for the 2008-09 run year	33
D.	Summary of adult steelhead recycled back to the Wallowa River fishery from the Big Canyon Facility for the 2009-10 run year	35

SUMMARY

In the 2009-10 run year the number of steelhead that returned to the Lower Snake River Compensation Plan area was the highest since 1975. For this reason, the bag limit for hatchery steelhead in the Grande Ronde and Imnaha river basins was increased in October from 3 to 5 fish. Estimated angler effort was the third highest since surveys began in 1985 on the lower Grande Ronde River and the second highest on the Imnaha River. Harvest and total catch estimates were the second highest on the lower Grande Ronde River and the highest on the Imnaha River. Catch and release of wild steelhead on the lower Grande Ronde was also the second highest estimated, although the percent of wild fish released was lower when compared to the previous year. In 2009-10 the lower 5 km of Big Sheep Creek, a tributary to the Imnaha River, was opened to steelhead fishing and was included in our survey. At the Imnaha River the number of wild steelhead caught and released is unknown due to unmarked hatchery returns in recent years, however both the number and percent of unmarked steelhead (both wild and hatchery fish) in the total catch was the highest estimated since we began surveys. In all sampled fisheries, catch rates were as high or higher than previous years, and they were much higher than the management goal of 10 hours per fish. Hatchery fish dominated the catch during the late fall and winter months on the lower Grande Ronde River and during the spring months on the Wallowa River and at Rondowa, and hatchery fish contributed substantially to the Imnaha River fishery, although many hatchery fish were not clipped and thus were indistinguishable from wild fish. Anglers harvested more one-ocean than two-ocean hatchery steelhead in all the fisheries, more females on the lower Grande Ronde, and more males on the Wallowa, Rondowa, and Imnaha fisheries. The percent of local resident anglers participating in summer steelhead fisheries was similar in Grande Ronde and Imnaha basin fisheries compared to the previous year except for Rondowa, which had a higher percent of local anglers. However, Rondowa continues to have the lowest percent of local anglers when compared to the other fisheries, whereas the Imnaha River consistently has the highest percent of local anglers. We continued sampling steelhead adults with an adipose fin clip and left or right ventral clip, indicating the presence of a coded-wire-tag (AdLV+CWT and AdRV+CWT), and in both the Grande Ronde and Imnaha basin fisheries we began sampling adipose clipped and coded-wire-tagged (Ad+CWT) fish as well by using a handheld wand detector to detect the coded-wire tag. Expanded estimates for the Wallowa and Rondowa fisheries will not be determined until statewide angler harvest tag summaries become available, however harvest, catch, and angler effort for the 2008-09 run year are reported in the appendices. Seventy-five adult steelhead were recycled back into the Wallowa River fishery from the Big Canyon Facility during the spring 2010 and they provided some additional harvest and catch and release opportunities for anglers.

INTRODUCTION

Summer steelhead (*Oncorhynchus mykiss*) fisheries in the Grande Ronde and Imnaha river basins were closed in 1974. This closure was prompted by declining adult returns, as indicated by adult counts at Ice Harbor Dam on the Snake River (USACOE

1996), and low steelhead redd counts on index streams in the Grande Ronde and Imnaha river basins (Oregon Department of Fish and Wildlife District Annual Reports 1949-1974). The Lower Snake River Compensation Plan (LSRCP), initiated by Congress in 1976, was developed to compensate for losses of anadromous salmonids in the Snake River basin from construction of the four lower Snake River dams built between 1962 and 1976. Thus, the focus of the LSRCP is the Snake River above Lower Granite Dam (Rkm 173), the uppermost of these four dams. One of the primary objectives of the LSRCP in Oregon is to restore historic recreational and tribal fisheries for summer steelhead in the Grande Ronde and Imnaha river basins (Carmichael 1989). Approximately 1.68 million steelhead smolts were targeted for release in Oregon each year during April and May in the Grande Ronde and Imnaha river basins between 1984 and 1999. In 2000, we reduced releases to approximately 1.2 million smolts in response to the National Marine Fisheries Service's recommendation to help reduce straying of Wallowa hatchery stock steelhead, primarily into the Deschutes River (mid-Columbia tributary). In 2007, we further reduced smolt releases to approximately 1.065 million, partly due to an increased release size from five to four fish per pound (fpp) for Wallowa stock, which is expected to increase smolt-to-adult survival, and due to a reduction of Imnaha stock Big Sheep direct stream releases. In 2009, smolt releases were reduced again to approximately 1.015 million, due to reductions in releases of Imnaha stock into Big Sheep Creek. Released smolts provide hatchery adult returns that contribute to recreational fisheries and may supplement natural spawning populations in northeast Oregon. Consumptive recreational fisheries for summer steelhead re-opened in 1986, in part as a result of increases in hatchery adult returns. Bag limits for hatchery steelhead were increased to five fish in the 2009-10 run year because of a strong anticipated return of hatchery origin adults.

We began creel surveys for summer steelhead during the fall of 1985 in both the Grande Ronde and Imnaha river basins. The goal of these surveys is to provide annual harvest information needed to assess LSRCP goals (Carmichael and Wagner 1983). In general, the number of summer steelhead in the recreational fishery has been restored to historic values, but the fishery is concentrated at different times and places (Fletcher et al. 1994). This report summarizes results of creel surveys conducted during the fall of 2009 and the spring of 2010 in the Grande Ronde and Imnaha river basins. In addition, this report contains estimates of total effort, catch, and harvest for all fisheries in the Grande Ronde river basin, information that was not available for inclusion in the 2008-09 annual report. The Grande Ronde and Imnaha river basins encompass the major steelhead fisheries that occur in Oregon tributaries to the Snake River upstream of Lower Granite Dam. As in recent years, the 2009-10 steelhead angling season in the Grande Ronde and Imnaha river basins was open from 1 September 2009 to 15 April 2010.

STUDY AREA

Creel surveys on the Grande Ronde River were conducted on a lower 24 km section from the Oregon-Washington state line (Rkm 62) upstream to Wildcat Creek (Rkm 86,

Figure 1). Surveys on the Wallowa River were conducted on a 6 km section from its confluence with the Grande Ronde River at Rondowa (mouth of the Wallowa River) upstream to Howard Creek (Rkm 6) and a 50 km section from Minam State Park (Rkm 13) upstream to the mouth of Trout Creek (Rkm 63) near Enterprise. Anglers who parked their vehicles at Minam State Park to fish just below the park were included in the Wallowa survey.

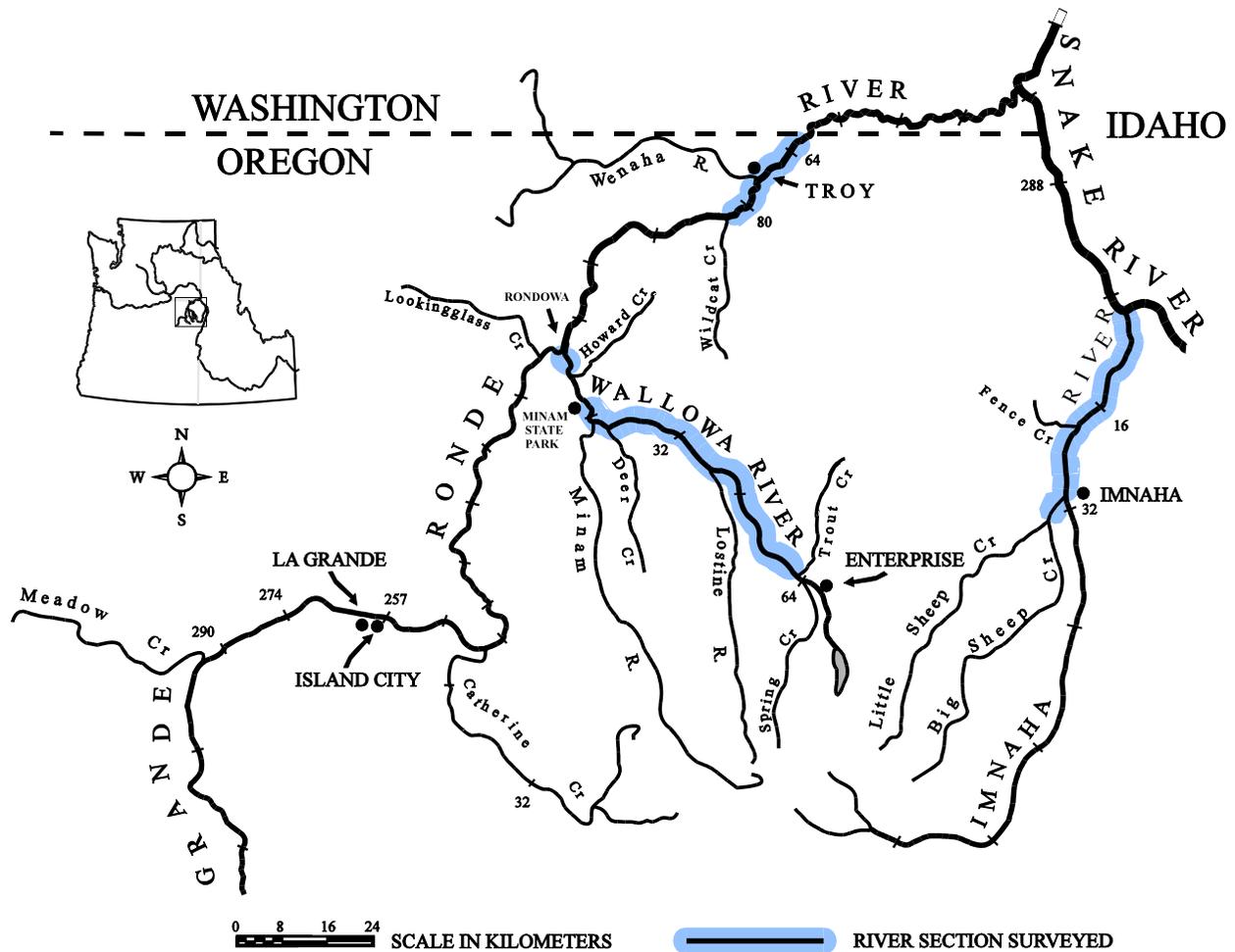


Figure 1. Map of northeast Oregon showing where summer steelhead creel surveys were conducted in the Grande Ronde and Imnaha river basins during the 2009-10 run year.

Because vehicle access into Rondowa was limited, anglers parked their vehicles at Palmer Junction, located 5.6 km upstream of Rondowa on the Grande Ronde River, and on Smith Mountain Road at the Forest Capital Partners gate, approximately 16 km by road to Rondowa. Thus, for the Rondowa survey, we interviewed anglers leaving the parking areas at Palmer Junction and at the gate on Smith Mountain Road when they were encountered. The survey on the Imnaha River was conducted on the lower 32 km, from its confluence with the Snake River (Rkm 0) upstream to the mouth of Big Sheep Creek (Rkm 32) near the town of Imnaha, and beginning in 2010, on the lower 5 km section of Big Sheep Creek from the mouth upstream to Little Sheep Creek (Rkm 5, Figure 1).

METHODS

For the lower Grande Ronde River survey, we used the methodology described by Carmichael et al. (1988). The survey on the lower Grande Ronde River was conducted from 1 September to 6 December 2009 and from 17 December 2009 to 15 April 2010. The survey was not conducted from 7-16 December 2009 because there was no angling effort due to the river freezing over within the survey area. Our goal was to sample 50% of the weekends and holidays and 30% of the weekdays during each month of each survey. Sample days were chosen randomly in two-day blocks, representing two strata (weekend days and holidays, and weekdays). On each sample day, beginning at a randomly selected start time, the creel surveyor conducted a pressure count by tallying all anglers and vehicles every three hours while driving a vehicle along the entire survey route. Between pressure counts, the surveyor interviewed anglers by recording a description of each angler, what species of fish they were angling for, what type of angling gear they were using, their residence, the number of hours they had fished, and the number and species of fish caught. The surveyor also sampled all harvested fish by recording fork length (mm), gender, fin clips, and any external tags. If a hatchery fish, as indicated by an adipose clip, was coded-wire-tagged (CWT), as indicated by either a left or right ventral fin-clip (AdLV or AdRV) or by use of a wire detector (Northwest Marine Technology, handheld wand detector) on hatchery fish without a ventral fin-clip, the surveyor asked permission from the angler to collect the snout, then excised the snout behind the eye and placed it with an identification number in a plastic bag for later processing.

Surveys in the Imnaha basin were conducted from 1 February through 15 April 2010. For these surveys we used a check station for the Imnaha River area below Fence Creek (Rkm 23) and a roving survey in the area above Fence Creek and at Big Sheep Creek. We selected sample days using the same methodology described for the lower Grande Ronde River survey. Our goal was to survey 50% of the weekends and 30% of the weekdays during each month of each survey. For the check station, we used the methodology described by Carmichael et al. (1988). The check station was designed so that anglers leaving the lower river area during a sample day would stop voluntarily and the surveyor would interview each angler and sample all harvested fish. At the end of the second sample day, the surveyor would drive to Cow Creek (Rkm 7) and interview all anglers encountered that fished during the two-day period and did not exit through the check station. For the roving survey, we followed the same procedures as

on the lower Grande Ronde River survey except that anglers were interviewed during pressure counts. For each pressure count, the surveyor closed the check station, interviewed and enumerated all anglers from Fence Creek to the town of Imnaha, then up Big Sheep Creek to the mouth of Little Sheep Creek and then returned. Time spent away from the check station was recorded, and catch and harvest data was expanded to account for the unsampled time.

For the Wallowa River and Rondowa survey areas, one surveyor conducted angler interviews from 1 February to 15 April 2010. We surveyed the Wallowa River area each sample day and surveyed both the Wallowa and Rondowa survey areas every other sample day. At the Wallowa River, the surveyor drove a route from Trout Creek downstream to Minam State Park, stopping to interview anglers along the way, then waited at the park for approximately one hour and interviewed returning anglers that had hiked below the park to fish, and then repeated this sequence. On alternate sample days, the surveyor drove the route from Minam State Park upstream to Trout Creek, stopping to interview anglers along the way, then drove to the Smith Mountain parking area that anglers use to access Rondowa and spent an hour interviewing anglers returning from Rondowa, and then repeated the sequence. For the month of February, 2010, the Smith Mountain road is closed to reduce vehicle disturbance of wildlife. Anglers also access Rondowa from the community of Palmer Junction on the Grande Ronde River, so our surveyor also went there for angler interviews. During the rest of the season, the surveyor would occasionally drive to the Palmer Junction area to check for anglers accessing Rondowa. All harvested fish observed were sampled. From 1 February to 27 February, we surveyed five days each week (Sunday – Saturday) from 0900-1800 hours. From 28 February to 15 April, we surveyed four days each week from 0800-1900 hours.

For the lower Grande Ronde River creel surveys, we estimated angler effort in hours and days, total catch, harvest, catch rate, percent hatchery fish in the catch, and the number of AdLV+CWT, AdRV+CWT, AdRV-only, and Ad+CWT marked fish harvested (see Carmichael et al. 1988). Similar statistics were estimated for the Imnaha River surveys, except the percent of marked fish was substituted for percent of hatchery fish, since unmarked hatchery steelhead were not distinguishable from wild adults. For the Wallowa and Rondowa survey areas, we estimated catch rate, percent hatchery fish in the catch, and the number of AdRV-only and CWT marked fish harvested. In addition, we determined age and gender composition and mean fork length of harvested fish in all survey areas. Catch rate was expressed as an index, hours per fish, in which lower values indicate better angling success and higher values indicate poorer angling success.

In the Grande Ronde basin we are not able to creel certain spring fishery locations (e.g., Catherine Creek). In these instances we estimate total monthly harvest by regressing angler harvest card estimates against creel survey harvest estimates for specific reaches in the Grande Ronde and Imnaha basins. The regression is updated annually as harvest data becomes available. However, there is usually a one or two-year delay in obtaining final angler harvest tag estimates. For this reason the current

annual report has harvest estimates for run year 2008-2009. Total catch for these areas is estimated by multiplying total harvest estimates by the ratio of sampled catch to sampled harvest as determined by creel surveys. Total angler effort (hours) is total catch divided by the sample catch rate (fish/hour).

Figure 8, 9, 10, and 11, and Table 5 also include data from creel surveys conducted on the upper Grande Ronde River from 1989 to 2002 and Catherine Creek in 1992, 1993, and 1997 to 1999, and were originally reported on in Carmichael et al. (1989, 1990), and Flesher et al. (1991, 1992, 1993, 1994, 1995, 1996, 1997, 1999, 2000, 2001, 2004a, and 2004b).

In spring 2010, we recycled hatchery adult returns from the Big Canyon Facility back into the Wallowa River fishery, using methodology described by Flesher et al. (2007). Between 18 March and 2 April, 75 adipose fin-clipped adults trapped at the Big Canyon Facility (located at the mouth of Deer Creek) were transported and released into the Wallowa River 1.6 Rkm below the mouth of Deer Creek. As in past years, fish were uniquely marked using an opercle punch to identify them as recycled. Recaptures at the Big Canyon Facility were enumerated by opercle punch and euthanized. When creeling occurred after a recycled steelhead release our surveyor checked harvested fish for opercle punches.

ACCOMPLISHMENTS AND FINDINGS

On the lower Grande Ronde River from 1 September 2009 to 6 December 2009, and from 17 December 2009 to 15 April 2010, we sampled 49.3% of the weekends and holidays (34 days) and 30.4% of the weekdays (45 days) for a total of 79 sample days. On the Wallowa River from 1 February to 15 April 2010, we sampled 95.2% of the weekends and holidays (20 days) and 47.2% of the weekdays (25 days) for a total of 45 sample days. During the same time period at Rondowa, we sampled 57.1% of the weekends and holidays (12 days) and 26.4% of the weekdays (14 days) for a total of 26 sample days. On the Imnaha River from 1 February to 15 April 2010, we sampled 52.4% of the weekends and holidays (11 days) and 34.0% of the weekdays (18 days) for a total of 29 sample days. On Big Sheep Creek from 1 March to 15 April 2010, we sampled 50.0% of the weekends and holidays (6 days) and 32.4% of the weekdays (11 days) for a total of 17 sample days.

We estimate that 5,325 anglers fished for 25,508 hours on the lower Grande Ronde River during the 2009-10 season. They caught and released 2,121 wild and 1,024 hatchery steelhead, and harvested 2,262 hatchery steelhead for an average catch rate index of 5 hours per fish (Figures 2-6, Appendix Table A-1). The percent of steelhead caught that were hatchery origin ranged from 0% in April 2010 to 73% in December 2010 (Figure 7, Appendix Table B). Seventy-six percent of harvested hatchery steelhead spent one year in freshwater and one year in saltwater (hereafter designated 1:1), and 24% spent one year in freshwater and two years in saltwater (designated 1:2; Table 1). Mean fork length ($\pm 95\%$ confidence interval) of harvested hatchery steelhead

was 590 (± 4) mm for age 1:1, and 681 (± 9) mm for age 1:2, (Table 1). Gender composition was 45% male and 55% female (Table 1). Sixty-six percent of the anglers on the lower Grande Ronde River were local Oregon resident anglers, 19% were non-local Oregon resident anglers, 6% were Washington State residents and 9% resided outside the states of Oregon and Washington (Table 2). On the lower Grande Ronde River, anglers harvested an estimated 542 AdLV+CWT and AdRV+CWT marked steelhead from our hatchery releases and an estimated 15 AdLV+CWT marked steelhead from two Washington Department of Fish and Wildlife release sites; the Dayton Acclimation Pond on the Touchet River and the Cottonwood Conditioning Pond on the lower Grande Ronde River (Table 3).

At Rondowa, the catch rate index averaged 3 hours per fish (Figure 4, Appendix Table A-2). The percent of steelhead caught that were hatchery origin ranged from 64% in April to 86% in February (Figure 7, Appendix Table B). Age composition of harvested hatchery steelhead was 84% 1:1 and 16% 1:2 (Table 1). Mean fork length ($\pm 95\%$ confidence interval) of harvested hatchery steelhead was 595 (± 4) mm for age 1:1 and 676 (± 13) mm for age 1:2 (Table 1). Gender composition was 53% male and 47% female (Table 1). Forty-six percent of the anglers at Rondowa were local Oregon resident anglers, 39% were non-local Oregon resident anglers, 5% were Washington State residents and 10% resided outside the states of Oregon and Washington (Table 2). At Rondowa, anglers harvested 28 AdLV+CWT and AdRV+CWT marked steelhead from our hatchery releases, however expanded estimates for the entire fishery will not be determined until state angler harvest tag data become available, as reported in Table 3.

On the Wallowa River, the catch rate index averaged 4 hours per fish (Figure 4, Appendix Table A-3). The percent of steelhead caught that were hatchery origin ranged from 81% in March to 92% in February (Figure 7, Appendix Table B). Age composition of harvested hatchery steelhead was 79% 1:1, and 21% 1:2 (Table 1). Mean fork length ($\pm 95\%$ confidence interval) of harvested hatchery steelhead was 601 (± 2) mm for age 1:1, 687 (± 6) mm for age 1:2, and 571 mm for age 2:1 (Table 1). Gender composition was 56% male and 44% female (Table 1). Sixty-five percent of the anglers on the Wallowa River were local Oregon residents, 30% were non-local Oregon residents, 2% were Washington State residents and 3% resided outside the states of Oregon and Washington (Table 2). On the Wallowa River, anglers harvested 208 AdLV+CWT and AdRV+CWT marked steelhead from our hatchery releases, however expanded estimates for the entire fishery, as reported in Table 3, will not be determined until state angler harvest tag data become available.

On the Imnaha River and Big Sheep Creek, we estimate that 2,416 anglers fished for 8,902 hours. They caught and released 4,481 unmarked (wild and hatchery) and 519 hatchery steelhead, and harvested 736 hatchery steelhead for an average catch rate index of 2 hours per fish (Figures 2-6, Appendix Tables A-4, A-5, and A-6). The percent of steelhead caught that were known hatchery origin ranged from 10% in April

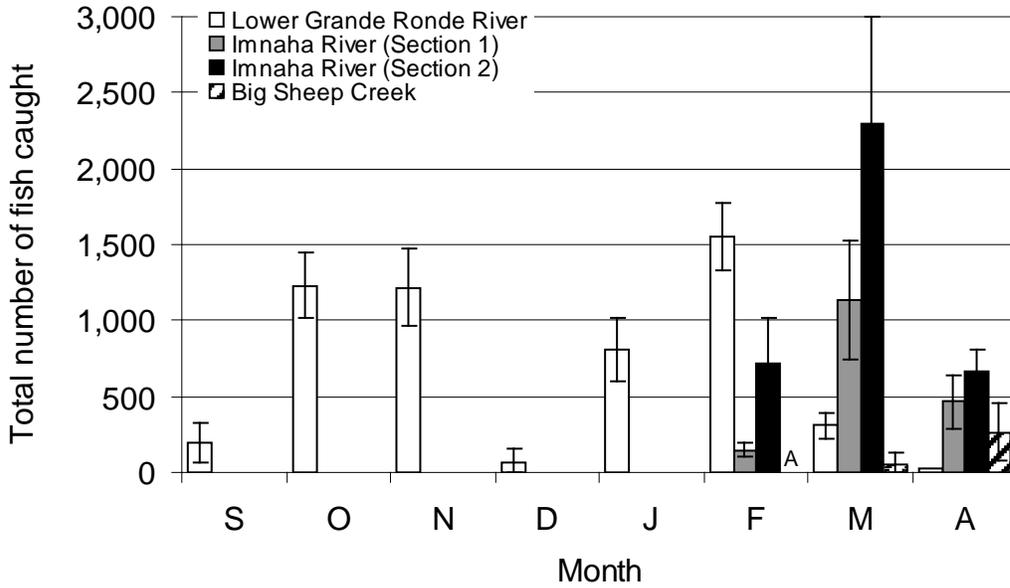


Figure 2. Estimated total catch of summer steelhead (vertical bars show 95% confidence intervals) on the lower Grande Ronde River, two sections of the Imnaha River, and Big Sheep Creek during the 2009-10 run year. "A" indicates no anglers. Surveys were conducted from 1 September 2009 to 15 April 2010 on the lower Grande Ronde River, and from 1 February to 15 April 2009 on the Imnaha River and Big Sheep Creek.

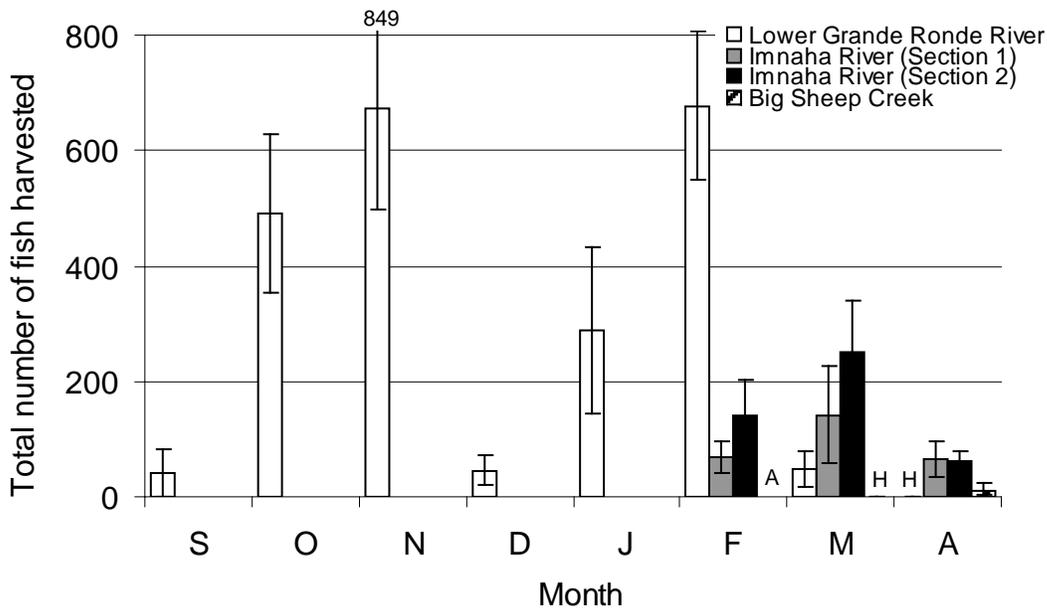


Figure 3. Estimated total harvest of summer steelhead (vertical bars show 95% confidence intervals) on the lower Grande Ronde River, two sections of the Imnaha River, and Big Sheep Creek during the 2009-10 run year. "A" indicates no anglers and "H" indicates no harvest. Surveys were conducted from 1 September 2009 to 15 April 2010 on the lower Grande Ronde River, and from 1 February to 15 April 2010 on the Imnaha River and Big Sheep Creek.

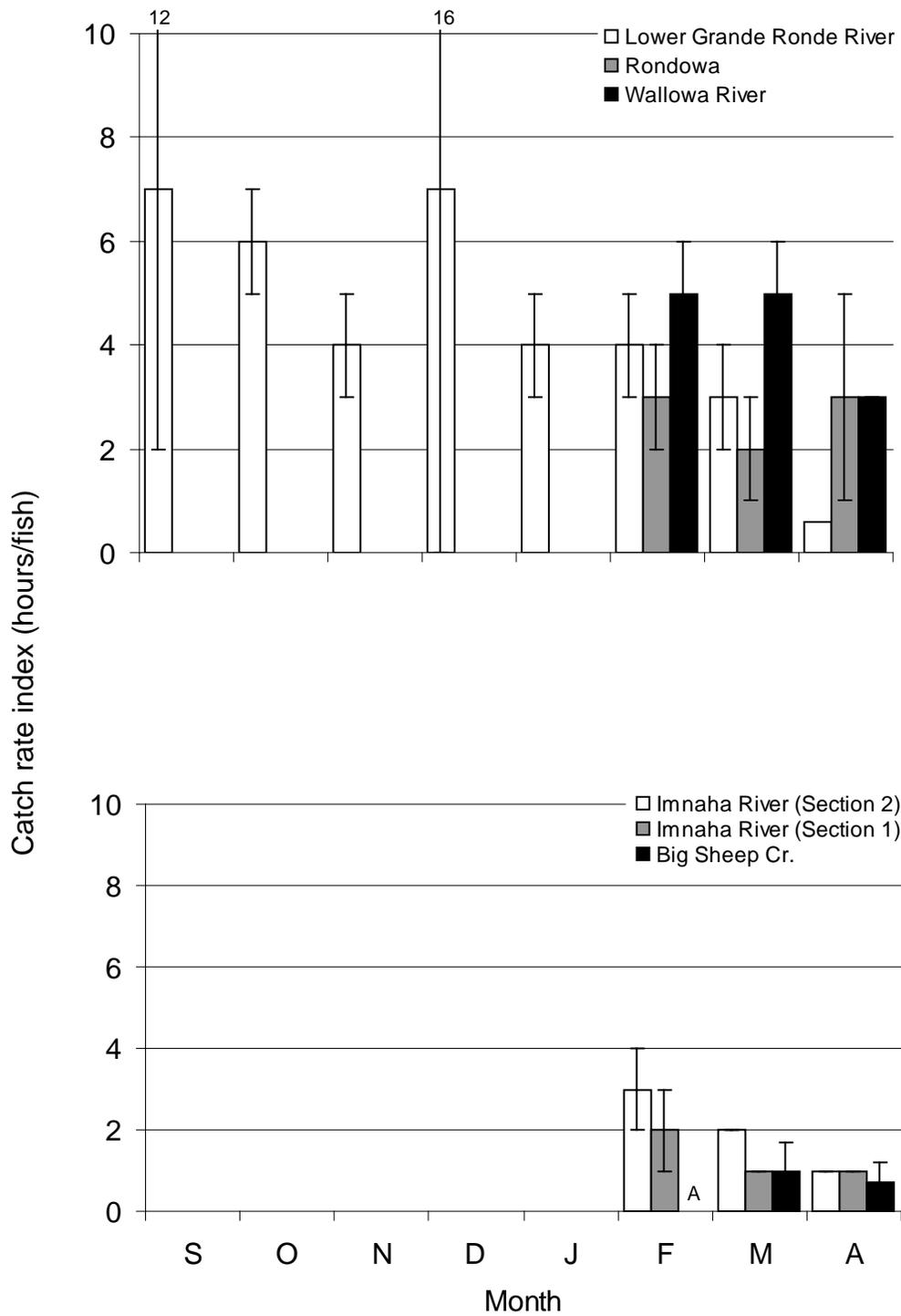


Figure 4. Estimated catch rate index (hours/fish) for summer steelhead (vertical bars show 95% confidence intervals) in the Grande Ronde and Imnaha river basins during the 2009-10 run year. "A" indicates no anglers. Survey areas and times include the lower Grande Ronde River (1 September 2009 – 15 April 2010), and Rondowa, Wallowa River, two sections of the Imnaha River, and Big Sheep Creek (1 February – 15 April 2010). Note: A lower catch rate index implies better angling success.

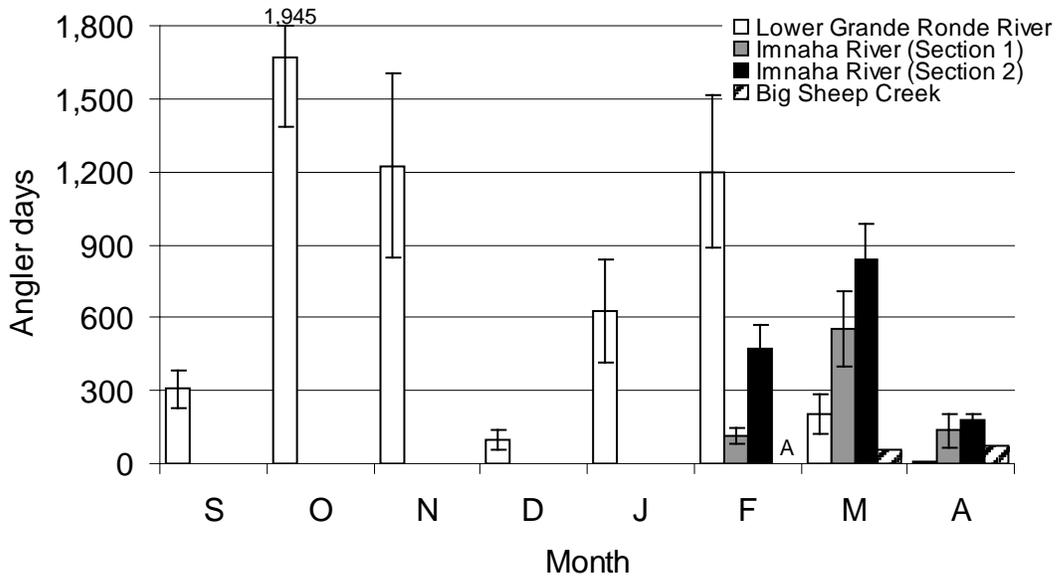


Figure 5. Estimated number of angler days for summer steelhead (vertical bars show 95% confidence intervals) on the lower Grande Ronde River, two sections of the Imnaha River, and Big Sheep Creek during the 2009-10 run year. "A" indicates no anglers. Surveys were conducted from 1 September 2009 to 15 April 2010 on the lower Grande Ronde River, and from 1 February to 15 April 2010 on the Imnaha River and Big Sheep Creek.

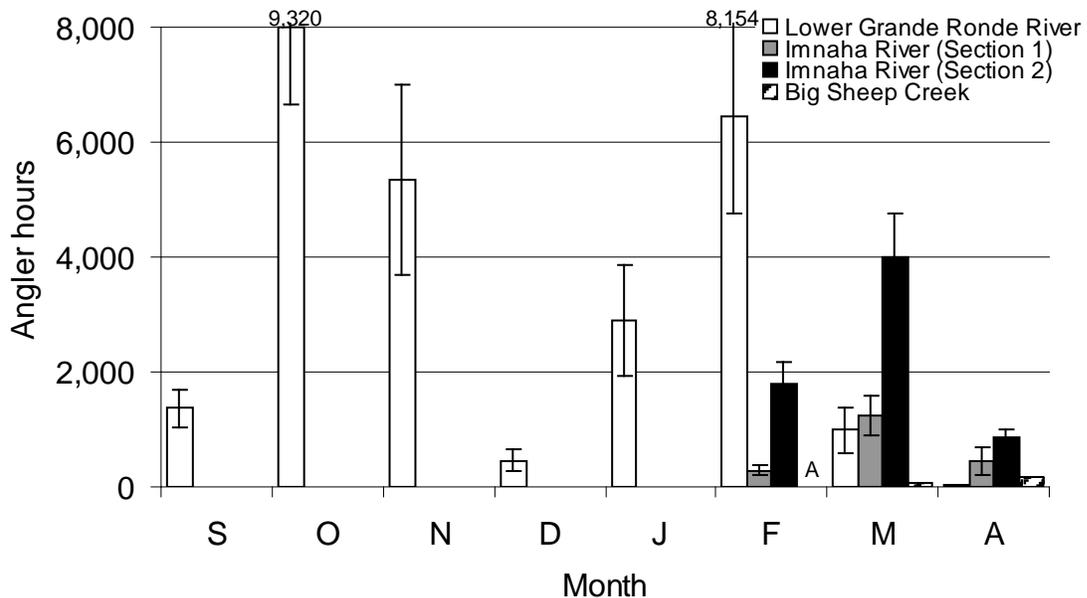


Figure 6. Estimated number of angler hours for summer steelhead (vertical bars show 95% confidence intervals) on the lower Grande Ronde River, two sections of the Imnaha River, and Big Sheep Creek during the 2009-10 run year. "A" indicates no anglers. Surveys were conducted from 1 September 2009 to 15 April 2010 on the lower Grande Ronde River, and from 1 February to 15 April 2010 on the Imnaha River and Big Sheep Creek.

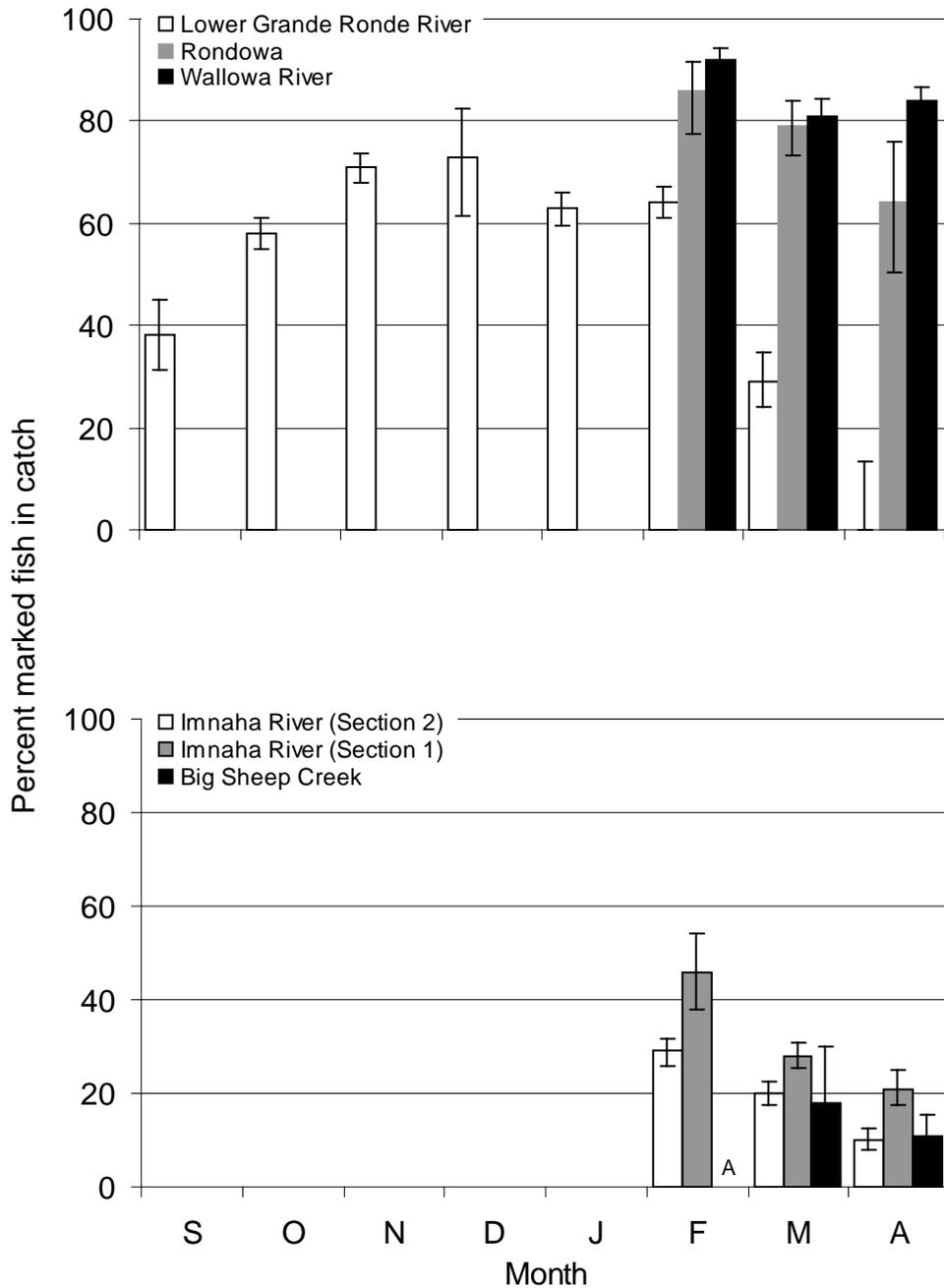


Figure 7. Estimated percent of summer steelhead caught (vertical bars show 95% confidence intervals; using a binomial distribution) in the Grande Ronde and Imnaha river basins during the 2009-10 run year that were marked. "A" indicates no anglers. In the Grande Ronde basin all unmarked fish were wild, whereas in the Imnaha basin unmarked fish were of both wild and hatchery origin. Survey areas and times include the lower Grande Ronde River (1 September 2009 – 15 April 2010), and Rondowa, Wallowa River, two sections of the Imnaha River, and Big Sheep Creek (1 February - 15 April 2010).

Table 1. Percent age composition and mean fork length (\pm 95% confidence intervals) of hatchery summer steelhead sampled in creel surveys in the Grande Ronde and Imnaha river basins during the 2009-10 run year. Age composition and mean fork length by age are estimated from fork lengths of harvested fish and age-length keys developed from hatchery returns to Wallowa Hatchery in 2010 and Little Sheep Creek Facility (for the Imnaha River basin including the Imnaha River and Big Sheep Creek) in 2009 and 2010. Age is expressed as years spent in freshwater prior to ocean migration:years spent in the ocean prior to spawning migration. “-” indicates not sampled or undefined.

Creel survey area, gender	Age composition (%)				Mean fork length (mm)						
	N	1:1	1:2	2:1	N	1:1	N	1:2	N	2:1	
Lower GR R.											
Males	134	88	12	0	113	604 \pm 6	15	696 \pm 19	0	-	
Females	163	67	33	0	104	593 \pm 5	52	677 \pm 10	0	-	
Total	297	76	24	0	217	590 \pm 4	67	681 \pm 9	1	-	
Rondowa											
Males	92	90	10	0	83	598 \pm 6	9	693 \pm 27	0	-	
Females	83	77	23	0	64	591 \pm 6	19	668 \pm 15	0	-	
Total	175	84	16	0	147	595 \pm 4	28	676 \pm 13	0	-	
Wallowa R.											
Males	480	86	14	0	405	607 \pm 3	68	698 \pm 10	1	571	
Females	381	71	29	0	267	592 \pm 3	109	680 \pm 6	0	-	
Total	861	79	21	0	672	601 \pm 2	177	687 \pm 6	1	571	
Imnaha R. basin											
Males	101	88	12	0	71	599 \pm 7	10	676 \pm 16	0	-	
Females	161	68	31	1	88	586 \pm 6	40	672 \pm 7	1	565	
Total	262	76	24	0	159	592 \pm 5	50	673 \pm 6	0	-	

Table 2. Residence of summer steelhead anglers interviewed during creel surveys in the Grande Ronde and Imnaha river basins during the 2009-10 run year. Local Oregon resident anglers were from Union and Wallowa counties.

Creel survey area	Number of anglers	Percent			
		Local Oregon resident anglers	Non-local Oregon resident anglers	Washington resident anglers	Other out-of-state anglers ^a
Lower GR River	852	66	19	6	9
Rondowa	136	46	39	5	10
Wallowa River	1,742	65	30	2	3
Imnaha River	829	71	19	2	8
Big Sheep Creek	40	77.5	17.5	0	5

^a Out-of-state anglers on the Wallowa River included an angler from South Africa, and on the Imnaha River an angler from Germany.

Table 3. Number of AdLV+CWT or AdRV+CWT marked summer steelhead recovered during creel surveys in the Grande Ronde and Imnaha river basins during the 2009-10 run year. Recoveries were expanded for the entire fishery.

Creel survey area	Tag code	Release site	Experimental group ^a	Brood Year	Number recovered		
					Observed	Expanded ^b	
Lower Grande Ronde River	09 43 05	Spring Cr.	Prod./April	2006	4	24	
	09 43 63	Spring Cr.	Prod./Vol./May	2006	1	7	
	09 44 01	Spring Cr.	Prod./April	2006	4	27	
	09 44 04	Spring Cr.	Fall B./April	2006	3	26	
	09 44 09	Spring Cr.	Prod./April	2007	4	31	
	09 44 10	Spring Cr.	Prod./April	2007	3	24	
	09 44 11	Spring Cr.	Prod./April	2007	1	10	
	09 44 12	Spring Cr.	Prod./Vol./May	2007	2	12	
	09 44 13	Deer Cr.	Prod./April	2007	2	12	
	09 44 14	Deer Cr.	Vol./May	2007	4	32	
	09 45 44	Spring Cr.	Fall B./April	2007	18	129	
	09 45 45	Spring Cr.	Fall B./April	2007	10	71	
	09 45 46	Spring Cr.	Fall B./April	2007	12	95	
	09 45 47	Spring Cr.	Fall B./Vol./May	2007	6	42	
	63-36-65	-	WDFW ^c	2006	1	7	
	63-40-99	-	WDFW ^c	2007	1	8	
	Wallowa River	09 43 05	Spring Cr.	Prod./April	2006	7	ND
		09 43 63	Spring Cr.	Vol./May	2006	1	ND
		09 44 01	Spring Cr.	Prod./April	2006	4	ND
		09 44 02	Spring Cr.	Prod./April	2006	6	ND
09 44 04		Spring Cr.	Fall B./April	2006	5	ND	
09 44 05		Spring Cr.	Fall B./April	2006	3	ND	
09 44 06		Spring Cr.	Fall B./May	2006	3	ND	
09 44 07		Deer Cr.	Prod./April	2006	11	ND	
09 44 08		Deer Cr.	Vol./May	2006	3	ND	
09 44 09		Spring Cr.	Prod./April	2007	16	ND	
09 44 10		Spring Cr.	Prod./April	2007	11	ND	
09 44 11		Spring Cr.	Prod./April	2007	12	ND	
09 44 12		Spring Cr.	Prod./Vol./May	2007	9	ND	
09 44 13		Deer Cr.	Prod./April	2007	31	ND	
09 44 14		Deer Cr.	Vol./May	2007	28	ND	
09 45 44		Spring Cr.	Fall B./April	2007	15	ND	
09 45 45		Spring Cr.	Fall B./April	2007	16	ND	
09 45 46		Spring Cr.	Fall B./April	2007	12	ND	
09 45 47		Spring Cr.	Fall B./Vol./May	2007	15	ND	
Rondowa		09 43 05	Spring Cr.	Prod./April	2006	1	ND
	09 43 63	Spring Cr.	Vol./May	2006	2	ND	
	09 44 02	Spring Cr.	Prod./April	2006	1	ND	
	09 44 08	Deer Cr.	Vol./May	2006	1	ND	
	09 44 09	Spring Cr.	Prod./April	2007	3	ND	
	09 44 10	Spring Cr.	Prod./April	2007	1	ND	
	09 44 11	Spring Cr.	Prod./April	2007	4	ND	
	09 44 13	Deer Cr.	Prod./April	2007	3	ND	
	09 44 14	Deer Cr.	Vol./May	2007	2	ND	
	09 45 44	Spring Cr.	Fall B./April	2007	4	ND	
	09 45 46	Spring Cr.	Fall B./April	2007	2	ND	
	09 45 47	Spring Cr.	Fall B./Vol./May	2007	4	ND	

Table 3. Continued.

Creel survey area	Tag Code	Release site	Experimental group ^a	Brood Year	Number recovered	
					Observed	Expanded ^b
Imnaha River	09 43 04	L. Sheep Cr.	Vol./April	2006	4	13
	09 44 10	Spring Cr.	Prod./April	2007	1	3
	09 45 43	L. Sheep Cr.	Vol./April	2007	16	46

^a Production (Prod.) and Fall Brood (Fall B.) releases are forced-released over a 24-hour period. The volitional (Vol.) releases are a current management strategy designed to help remove steelhead smolts that may residualize.

^b ND indicates expansions not determined until statewide annual harvest card data become available.

^c Steelhead with tag code 63 36 65 were Lyons Ferry Hatchery stock released by Washington Department of Fish and Wildlife (WDFW) at the Dayton Acclimation Pond in the Touchet River, Washington, in 2007, and those with tag code 63 40 99 were Wallowa stock released by WDFW in 2008 in the lower Grande Ronde River at the Cottonwood Conditioning Pond, Washington.

in Section 2 (mouth upstream to Fence Creek) to 46% in February in Section 1 (Fence Creek upstream to Big Sheep Creek, Figure 7, Appendix Table B). Age composition of harvested hatchery steelhead was 76% 1:1 and 24% 1:2 (Table 1). Mean fork length ($\pm 95\%$ confidence interval) of harvested hatchery steelhead was 592 (± 5) mm for age 1:1 and 673 (± 6) mm for age 1:2 (Table 1). Gender composition was 39% male and 61% female (Table 1). Seventy-one percent of the anglers on the Imnaha River were local Oregon residents, 19% were non-local Oregon residents, 2% were Washington State residents and 8% resided outside the states of Oregon and Washington (Table 2). On Big Sheep Creek, 77.5 percent of the anglers on the Imnaha River were local Oregon residents, 17.5% were non-local Oregon residents, and 5% resided outside the states of Oregon and Washington (Table 2). On the Imnaha River and Big Sheep Creek, anglers harvested an estimated 62 AdLV+CWT marked steelhead from our hatchery releases, including an estimated three stray Wallowa stock steelhead released from Wallowa Fish Hatchery in the Grande Ronde river basin (Table 3).

Angler effort was the third highest on the lower Grande Ronde River and second highest on the Imnaha River since surveys began during the 1985-86 run year (Figure 8). Harvest was the second highest on the lower Grande Ronde River and over three times the average, while harvest on the Imnaha River was the highest estimated and over four times the average since surveys began in the mid-eighties (Figure 9). Total catch (harvested and released) on the Lower Grande Ronde was also the second highest estimated and catch on the Imnaha was the highest since surveys began (Table 4). Similarly, catch and release of wild steelhead on the lower Grande Ronde was second highest estimated although the percent of wild in the total catch was lower than the previous year. On the Imnaha, the number of unmarked hatchery and wild fish was the highest estimated and the percent of unmarked fish in the total catch was also the highest estimated since the early eighties when only wild fish were returning. Catch rates were as high or higher in all fisheries when compared to previous years (Table 5). Compared to the previous year, the percent of local resident anglers participating in summer steelhead fisheries was similar on the Lower Grande Ronde River, Wallowa, and Imnaha rivers, and higher at Rondowa (Table 2). Similar to recent past run years, the Imnaha River fishery and Big Sheep Creek beginning this run year, had the highest

percent of local Oregon resident anglers (71% on the Imnaha River and 77.5% on Big Sheep Creek), and the fishery at Rondowa had the lowest percent of local resident anglers (46%). For the Grande Ronde and Imnaha basin fisheries as a whole, the percent of local resident anglers has decreased while the percent of non-local and out-of-state anglers has increased (Figure 10). This trend is primarily due to an increase in the number of non-local and out-of-state anglers.

We found a statistically significant linear relationship ($P < 0.001$) between angler harvest tag harvest estimates and creel harvest estimates for summer steelhead fisheries in the Grande Ronde and Imnaha river basins (Figure 11). Total harvest estimates for spring steelhead fisheries in the previous run year (2008-09) were 8 fish in the upper Grande Ronde River, 1,166 fish at Rondowa, 1,467 fish in the Wallowa River, 11 fish in the Wenaha River, and 166 fish in the middle Grande Ronde River, for a total harvest estimate of 2,818 fish in the Grande Ronde basin, excluding the lower Grande Ronde River (Figure 9, Appendix Table C-1). We estimated 8 coded-wire-tagged fish were harvested at Rondowa, and 254 coded-wire-tagged fish were harvested in the Wallowa River in the 2008-09 run year. Total catch estimates for spring steelhead fisheries in the 2008-09 run year were 14 fish in the upper Grande Ronde River, 2,368 fish at Rondowa, 2,670 fish in the Wallowa River, 52 fish in the Wenaha River, and 292 fish in the middle Grande Ronde River, for a total catch estimate of 5,396 fish in the Grande Ronde basin, excluding the lower Grande Ronde River (Appendix Table C-2). Angler effort for the 2008-09 run year was estimated to be 109 hours in the upper Grande Ronde River, 27,830 hours at Rondowa, 21,436 hours in the Wallowa River, 505 hours in the Wenaha River, and 2,237 hours in the middle Grande Ronde River, for a total effort estimate of 52,117 hours in the Grande Ronde basin, excluding the lower Grande Ronde River (Appendix Table C-3).

We recycled 75 summer steelhead to the Wallowa River fishery in 2010. Twenty-nine recycled fish were recaptured at the Big Canyon Facility and an estimated 15 recycled fish were harvested in the fishery for a total estimated recovery of 44 recycled fish (Appendix Table D).

MANAGEMENT IMPLICATIONS AND RECOMMENDATIONS

The 2009-10 adult steelhead return to the Lower Snake River Compensation Plan Area was the largest since data began being collected in 1975, and it was the likely catalyst for strong angler participation in steelhead fisheries. Angler effort was the third highest on the Grande Ronde River and second highest on the Imnaha River since we began angler surveys in the mid-1980s. Harvest and total catch was the second highest on the Grande Ronde River and the highest estimated on the Imnaha River since we began surveys. Catch and release of wild steelhead on the lower Grande Ronde was second highest estimated although the percent of wild fish in the total catch was lower as compared to the previous year. In the Imnaha River fishery it is unknown whether a trend exists for wild steelhead caught and released because of returning unmarked hatchery fish, although the percent of unmarked fish (both wild and

unmarked hatchery) in the total catch was the highest estimated since the mid-eighties when only wild fish were returning. Catch rates were as high or higher than any previous year in every fishery surveyed during the 2009-10 run year, and were much higher than the overall management goal of 10 hours per fish.

This was the first season for a fishery at Big Sheep Creek, a tributary to the Imnaha River. Total angling effort at Big Sheep Creek was lower than in the mainstem Imnaha River, which is to be expected given the difference in size between the two, but catch rates were higher at Big Sheep Creek. Anglers at Big Sheep Creek have the opportunity to fish for adult hatchery steelhead from two sources; those that have been outplanted at Rkm 13 following capture at the Little Sheep Creek weir and adult returns from Big Sheep Creek smolt releases. We expect angler effort to increase in the future as anglers become more familiar with the newly opened area.

Due to the large run of hatchery origin fish in 2009-10, anglers were allowed to harvest up to five adipose-clipped steelhead, rather than the typical three fish limit. The change may have increased overall harvest. On the lower Grande Ronde River, 7.5% of all surveyed anglers that harvested fish had harvested at least four fish, while at Rondowa and the Wallowa River 23.8% and 8.9% of anglers harvested at least four fish. At the Imnaha River, only 2.9% of anglers that harvested fish retained at least four fish, suggesting that the regulation change was not as effective at increasing harvest there.

Beginning with the 2009-10 run year, our creel surveyors began electronic scanning of all harvested hatchery fish for coded-wire tags, which allowed us to detect wire in non-ventral-clipped adult steelhead. Since non-ventral-clipped fish that have coded-wire are usually strays from out-of-basin hatchery releases, the electronic scanning procedure will assist with identifying and quantifying stray hatchery steelhead.

Recycling adult steelhead returns to the Big Canyon Facility back into the Wallowa River for the recreational fishery in 2010 provided additional catch and harvest opportunities for anglers, and reduced the number of surplus adults at the facility. However, we estimate that only 59% of the recycled fish were accounted for either by their return to the Big Canyon Facility or in the harvest. Unaccounted for adults may potentially spawn in nature; thus, managers should weigh this risk against the fisheries benefits from recycling.

These fishery statistics continue to illustrate the importance of current hatchery programs to the success of recreational summer steelhead fisheries in both the Grande Ronde and Imnaha river basins. Statistics for the Wallowa and Rondowa fisheries for the 2009-10 run year will be reported in the 2010-11 annual report.

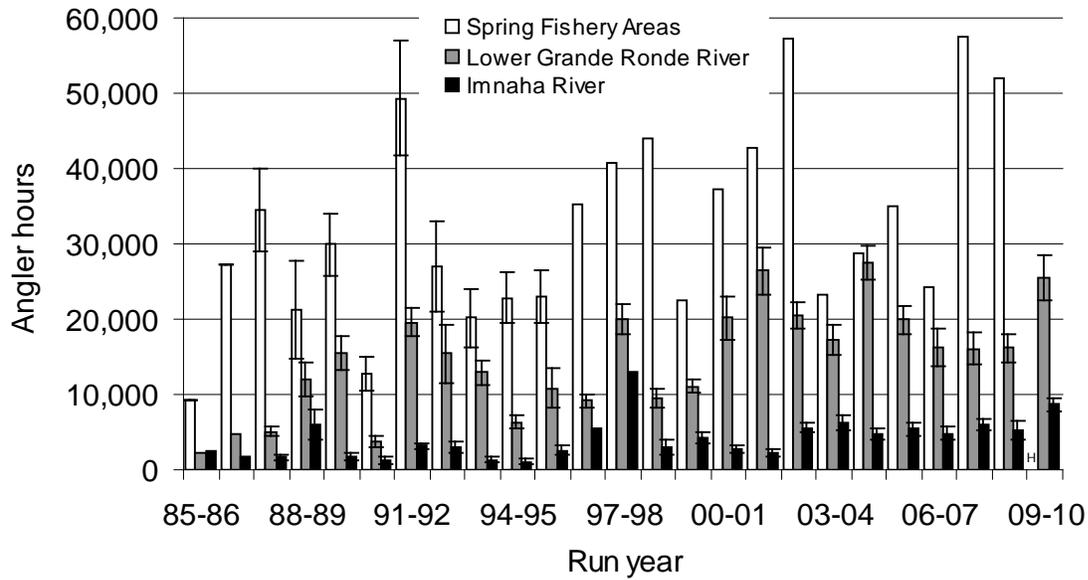


Figure 8. Angler effort (hours) for summer steelhead in spring fishery areas (upper Grande Ronde and Willowa rivers, Catherine Creek, and Rondowa), the lower Grande Ronde River, and the Imnaha River for the 1985-86 to 2009-10 run years. Not shown is 266 angler hours on Big Sheep Creek (Imnaha basin) for the 09-10 run year. “H” is a value to be estimated from harvest tag data, which was not available when this report was submitted. Vertical bars are 95% confidence intervals, which are unavailable for the 85-86 and 86-87 run years, the Imnaha fishery for the 96-97 and 97-98 run years, and for spring fishery areas beginning with the 96-97 run year.

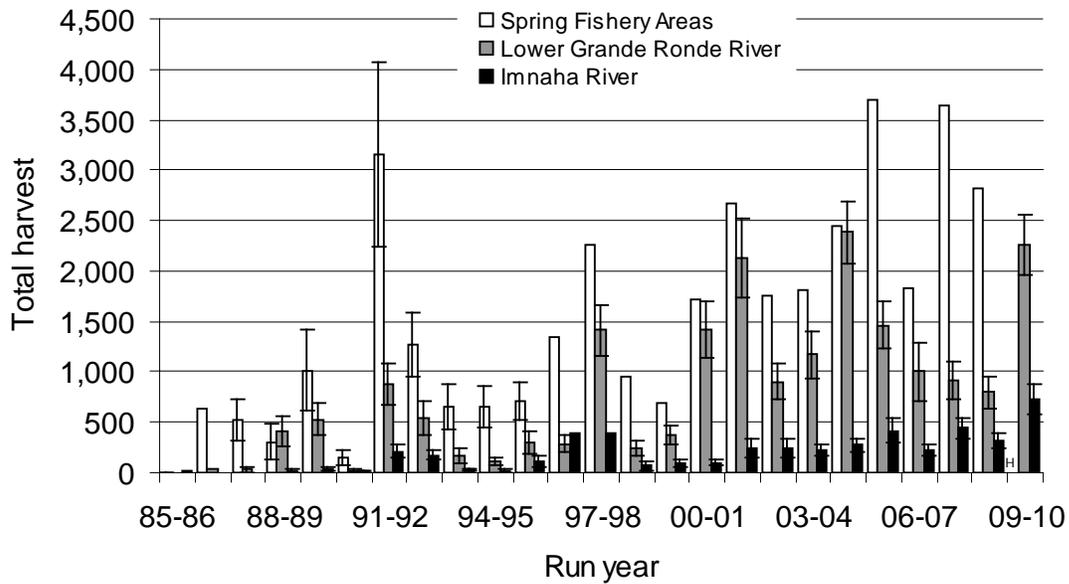


Figure 9. Number of hatchery summer steelhead harvested by recreational anglers in spring fishery areas (upper Grande Ronde and Willowa rivers, Catherine Creek, and Rondowa), the lower Grande Ronde River, and the Imnaha River for the 1985-86 to 2009-10 run years. Not shown is 8 fish harvested on Big Sheep Creek (Imnaha basin) for the 09-10 run year. H is a value to be estimated from harvest tag data, which was not available when this report was submitted. Vertical bars are 95% confidence intervals, which are unavailable for the 85-86 and 86-87 run years, the Imnaha fishery for the 96-97 and 97-98 run years, and for spring fishery areas beginning with the 96-97 run year.

Table 4. Estimated total catch (harvested and released) of hatchery and wild summer steelhead from statistical angler surveys conducted on the lower Grande Ronde River from 1 September to 15 April, and in the Imnaha River Basin (includes Big Sheep Creek beginning with run year 2009-10) from 1 February to 15 April for the 1985-86 to 2009-10 run years. Fishing regulations were not consistent among years and river sections, which may have affected the number of harvested hatchery fish. "-" indicates a statistical angler survey was not conducted.

Run year	Lower Grande Ronde River				Imnaha River Basin			
	Harvest	Released		Total catch	Harvest	Released		Total Catch
		Hatchery	Natural ^a			Hatchery	Natural ^a	
85-86 ^b	0	0	289	289	18	0	153	171
86-87 ^b	45	0	524	569	0	8	192	200
87-88 ^b	31	9	455	495	4	0	65	69
88-89 ^b	413	87	385	885	19	4	308	331
89-90 ^b	530	60	512	1,102	37	9	43	89
90-91 ^b	18	87	99	204	15	35	50	100
91-92 ^b	879	494	410	1,783	212	180	321	713
92-93 ^b	544	567	573	1,684	171	65	130	366
93-94 ^b	168	84	483	735	29	0	72	101
94-95 ^b	107	45	150	302	24	0	39	63
95-96 ^b	300	263	387	950	112	67	210	389
96-97	286	179	193	658	-	-	-	-
97-98	1,415	908	432	2,755	-	-	-	-
98-99	244	119	213	576	67	39	44	150
99-00	380	120	474	974	98	50	190	338
00-01	1,417	619	1,240	3,276	97	86	309	492
01-02	2,132	1,059	1,968	5,159	242	210	273	725
02-03	898	330	1,181	2,409	239	134	552	925
03-04	1,172	756	1,052	2,980	228	120	921	1,269
04-05	2,381	1,468	2,627	6,476	278	154	1,050	1,482
05-06	1,462	1,008	1,692	4,162	412	330	1,120	1,862
06-07	999	641	814	2,454	225	70	465	760
07-08	910	287	567	1,764	443	338	1,572	2,353
08-09	795	336	937	2,068	319	108	638	1,065
09-10	2,262	1,023	2,122	5,407	736	519	4,481	5,736
Average	792	422	791	2,005	175	110	574	859

^a Includes unmarked hatchery fish for run years 85-86 to 88-89 on the lower Grande Ronde River, and run years beginning with 02-03 on the Imnaha River.

^b Angler surveys were conducted only during selected months (in parentheses) on the lower Grande Ronde River during run years 85-86 (Oct-Nov), 86-87 and 87-88 (Sept-Dec), 88-89 and 92-93 (Sept-Dec, 15Feb-15Apr), 89-90 and 93-94 (Sept-Dec, Feb-15Apr), 90-91 (Sept-Dec, Mar-15Apr), 95-96 (Sept-Jan, 16Feb-15Apr), and on the Imnaha River during run years 85-86 and 86-87 (Oct-Nov, Mar), 87-88 and 89-90 through 94-95 (Mar-15Apr), 88-89 (Mar-30Apr), and 95-96 (Sept-15Nov, Mar-15Apr).

Table 5. Catch rate index (hours/fish \pm 95% confidence intervals) in summer steelhead creel survey areas in the Grande Ronde and Imnaha river basins for the 1985-86 to 2009-10 run years. Note that a lower catch rate index implies greater angling success. "-" indicates not sampled or undefined.

Run year	Catch rate index (hours/fish)						
	Lower GR River	Upper GR River	Catherine Creek	Rondowa	Wallowa River	Imnaha River	Big Sheep Creek
85-86	8 \pm 7	-	-	-	7 \pm 7	15 \pm 7	-
86-87	9 \pm 3	-	-	-	11 \pm 3	9 \pm 8	-
87-88	10 \pm 4	-	-	11 \pm 9	16 \pm 3	24 \pm 9	-
88-89	14 \pm 4	40 \pm 55	-	-	43 \pm 21	18 \pm 11	-
89-90	14 \pm 4	14 \pm 8	-	34 \pm 27	17 \pm 5	20 \pm 8	-
90-91	19 \pm 8	24 \pm 11	-	-	6 \pm 2	13 \pm 6	-
91-92	11 \pm 3	10 \pm 3	3 \pm 3	6 \pm 1	10 \pm 2	4 \pm 1	-
92-93	9 \pm 2	14 \pm 4	49 \pm 49	-	11 \pm 2	8 \pm 1	-
93-94	18 \pm 5	31 \pm 17	-	12 \pm 4	17 \pm 3	13 \pm 3	-
94-95	21 \pm 6	25 \pm 13	-	15 \pm 5	17 \pm 3	17 \pm 8	-
95-96	11 \pm 2	15 \pm 4	-	-	21 \pm 4	7 \pm 2	-
96-97	14 \pm 4	18 \pm 9	33 \pm 69	-	13 \pm 3	6 \pm 2	-
97-98	7 \pm 1	13 \pm 9	7 \pm 10	11 \pm 6	10 \pm 1	18 \pm 9	-
98-99	17 \pm 4	19 \pm 9	14 \pm 20	-	18 \pm 4	20 \pm 7	-
99-00	11 \pm 2	25 \pm 19	-	8 \pm 7	17 \pm 4	12 \pm 3	-
00-01	6 \pm 1	18 \pm 17	-	6 \pm 4	11 \pm 2	6 \pm 1	-
01-02	5 \pm 1	11 \pm 17	-	7 \pm 4	7 \pm 1	3 \pm 1	-
02-03	8 \pm 1	-	-	8 \pm 6	12 \pm 2	6 \pm 2	-
03-04	6 \pm 1	-	-	3 \pm 2	7 \pm 1	5 \pm 1	-
04-05	4 \pm 0	-	-	5 \pm 1	5 \pm 1	4 \pm 1	-
05-06	5 \pm 1	-	-	2 \pm 1	7 \pm 1	3 \pm 1	-
06-07	8 \pm 1	-	-	6 \pm 2	7 \pm 1	6 \pm 1	-
07-08	9 \pm 1	-	-	7 \pm 2	7 \pm 1	3 \pm 0	-
08-09	8 \pm 1	-	-	12 \pm 4	8 \pm 1	5 \pm 1	-
09-10	5 \pm 0	-	-	3 \pm 1	4 \pm 0	2 \pm 0	0.8 \pm 0.3
Average	10 \pm 2	20 \pm 5	21 \pm 24	9 \pm 4	12 \pm 3	10 \pm 3	0.8 \pm 0.3

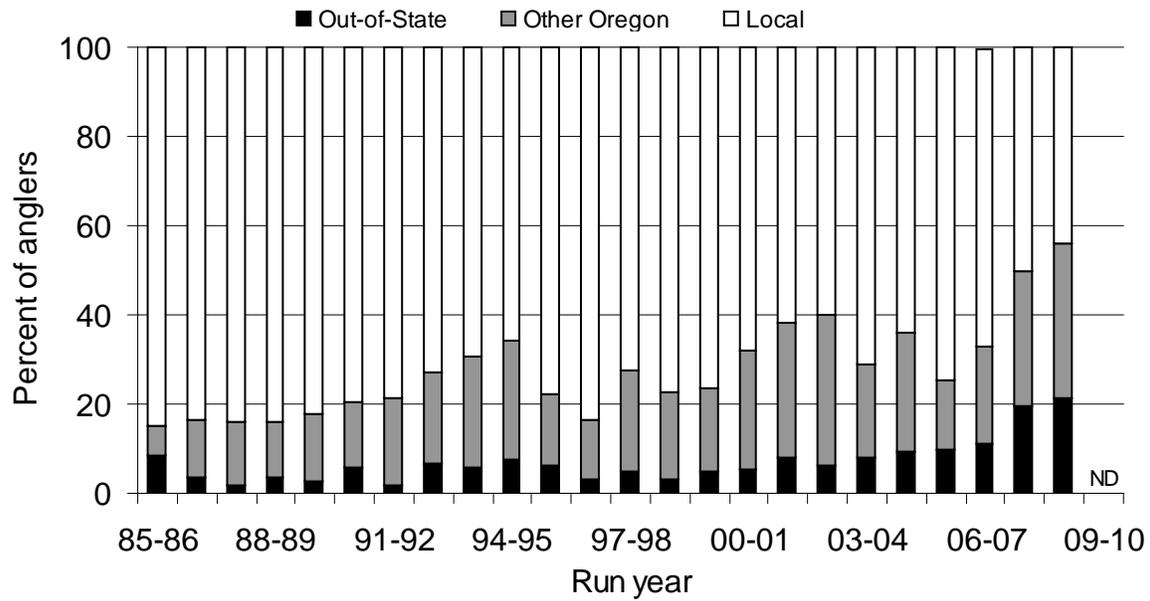


Figure 10. Percent of local resident anglers (Union or Wallowa county residents), non-local Oregon resident anglers, and out-of-state anglers that fished in summer steelhead fisheries in the Grande Ronde and Imnaha river basins for the 1985-86 to 2008-09 run years. ND indicates not determined until statewide annual harvest card data become available.

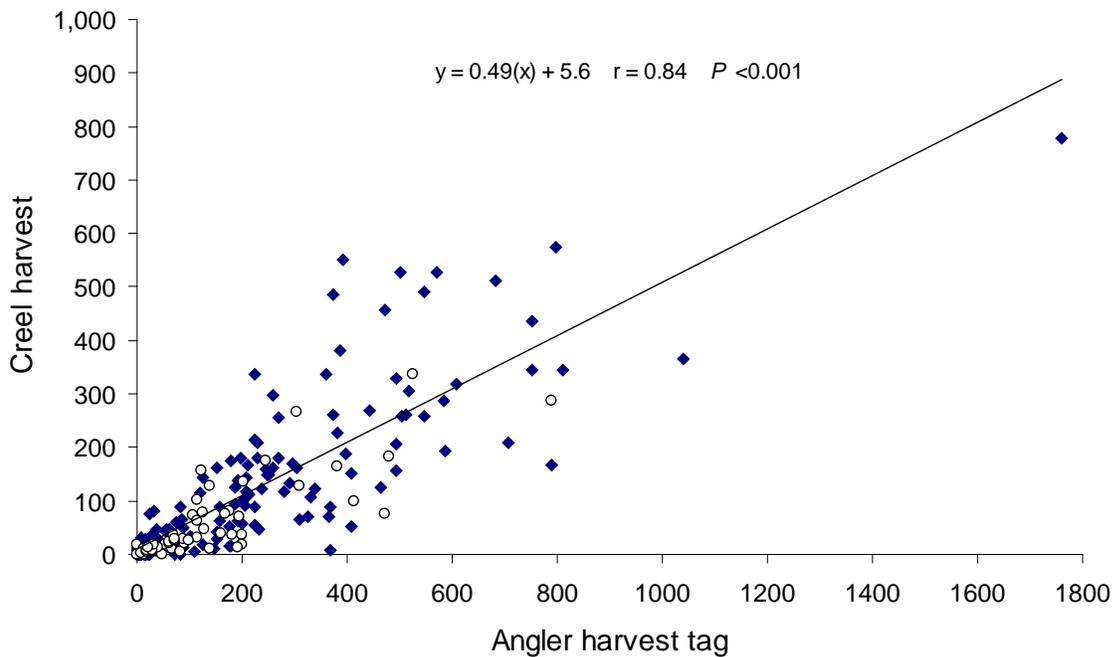


Figure 11. Relation between angler harvest tag (punch card) and creel survey harvest for summer steelhead fisheries in the Grande Ronde (♦) and Imnaha (○) river basins for years when harvest estimates for specific reaches were available (1993-1996 for the upper Grande Ronde and Wallowa, 1994-1995 for Rondowa, 1992-1993 for Catherine Creek, 1993-spring 2009 for the lower Grande Ronde, and 1986-1996, 1999-2009 for the Imnaha fishery areas).

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APPENDIX A

Fishery Statistics for the 2009-10 run year

Appendix Table A-1. Fishery statistics for summer steelhead on the lower Grande Ronde River during the 2009-10 run year. Statistics include mean estimates \pm 95% confidence intervals. Only adipose fin-clipped fish were harvested. "-" indicates not sampled or undefined. "h" indicates hour.

Month, day type	Sample size		Total Hours	Total Catch	Total harvest	Catch rate		Angler days
	Days	Anglers				fish/h	h/fish	
September:								
Weekday	7	32	785 \pm 334	162 \pm 129	32 \pm 40	0.206 \pm 0.164	5 \pm 4	176 \pm 75
Weekend	5	41	578 \pm 46	32 \pm 33	9 \pm 12	0.055 \pm 0.057	18 \pm 19	132 \pm 11
Total	12	73	1,363 \pm 337	194 \pm 133	41 \pm 41	0.142 \pm 0.098	7 \pm 5	308 \pm 76
October:								
Weekday	7	160	5,045 \pm 1,109	852 \pm 188	344 \pm 120	0.169 \pm 0.037	6 \pm 1	982 \pm 216
Weekend	5	134	2,940 \pm 743	377 \pm 107	147 \pm 69	0.128 \pm 0.037	8 \pm 2	684 \pm 173
Total	12	294	7,985 \pm 1,335	1,229 \pm 217	491 \pm 138	0.154 \pm 0.027	6 \pm 1	1,666 \pm 279
November:								
Weekday	6	84	3,709 \pm 1,640	947 \pm 237	529 \pm 154	0.255 \pm 0.064	4 \pm 1	909 \pm 402
Weekend	5	77	1,632 \pm 261	271 \pm 82	144 \pm 84	0.166 \pm 0.050	6 \pm 2	316 \pm 51
Total	11	161	5,341 \pm 1,660	1,218 \pm 251	673 \pm 176	0.228 \pm 0.047	4 \pm 1	1,225 \pm 381
December:								
Weekday	4	15	342 \pm 166	46 \pm 84	29	0.134 \pm 0.244	7 \pm 13	72 \pm 35
Weekend	4	12	116 \pm 79	24 \pm 33	16 \pm 26	0.206 \pm 0.281	5 \pm 7	27 \pm 18
Total	8	27	458 \pm 184	70 \pm 90	45 \pm 26	0.152 \pm 0.196	7 \pm 9	99 \pm 40
January:								
Weekday	6	34	1,019 \pm 603	338 \pm 169	131 \pm 112	0.332 \pm 0.166	3 \pm 2	250 \pm 148
Weekend	6	87	1,881 \pm 768	470 \pm 127	156 \pm 91	0.249 \pm 0.068	4 \pm 1	376 \pm 154
Total	12	121	2,900 \pm 976	808 \pm 212	287 \pm 144	0.279 \pm 0.073	4 \pm 1	626 \pm 211
February:								
Weekday	6	105	4,311 \pm 1,226	1,136 \pm 198	502 \pm 115	0.264 \pm 0.046	4 \pm 1	754 \pm 214
Weekend	3	42	2,148 \pm 1,171	420 \pm 105	175 \pm 58	0.196 \pm 0.038	5 \pm 1	444 \pm 242
Total	9	147	6,459 \pm 1,695	1,556 \pm 224	677 \pm 129	0.241 \pm 0.033	4 \pm 1	1,198 \pm 314
March:								
Weekday	5	12	476 \pm 390	148 \pm 66	36 \pm 28	0.311 \pm 0.136	3 \pm 1	98 \pm 80
Weekend	4	20	511 \pm 88	159 \pm 46	12 \pm 14	0.311 \pm 0.091	3 \pm 1	102 \pm 18
Total	9	32	987 \pm 399	307 \pm 81	48 \pm 32	0.311 \pm 0.081	3 \pm 1	200 \pm 81
April:								
Weekday	4	1	15	25	0	1.709	0.6	3
Weekend	2	0	0	-	-	-	-	-
Total	6	1	15	25	0	1.709	0.6	3
Grand total	79	856	25,508 \pm 2,945	5,407 \pm 487	2,262 \pm 301	0.202 \pm 0.019	5 \pm 0	5,325 \pm 615

Appendix Table A-2. Catch rate ($\pm 95\%$ confidence intervals) for summer steelhead at Rondowa during the 2009-10 run year. Only adipose fin-clipped fish were harvested. "-" indicates not sampled or undefined. "h" indicates hour.

Month, day type	Sample size		Catch rate	
	Days	Anglers	fish/h	(h/fish)
February:				
Weekday	5	17	0.423 \pm 0.237	2 \pm 1
Weekend	5	30	0.265 \pm 0.120	4 \pm 2
Total	10	47	0.322 \pm 0.112	3 \pm 1
March:				
Weekday	6	18	0.339 \pm 0.217	3 \pm 2
Weekend	5	42	0.545 \pm 0.174	2 \pm 1
Total	11	60	0.482 \pm 0.137	2 \pm 1
April:				
Weekday	3	16	0.372 \pm 0.312	3 \pm 2
Weekend	2	7	0.322 \pm 0.624	3 \pm 6
Total	5	23	0.355 \pm 0.260	3 \pm 2
Grand total	26	130	0.407 \pm 0.088	3 \pm 1

Appendix Table A-3. Catch rate ($\pm 95\%$ confidence intervals) for summer steelhead on the Wallowa River during the 2009-10 run year. Only adipose fin-clipped fish were harvested. "h" indicates hour.

Month, day type	Sample size		Catch rate	
	Days	Anglers	fish/h	(h/fish)
February:				
Weekday	11	278	0.261 \pm 0.054	4 \pm 1
Weekend	8	356	0.159 \pm 0.039	6 \pm 2
Total	19	634	0.204 \pm 0.032	5 \pm 1
March:				
Weekday	7	232	0.200 \pm 0.049	5 \pm 1
Weekend	8	397	0.211 \pm 0.043	5 \pm 1
Total	15	629	0.207 \pm 0.033	5 \pm 1
April:				
Weekday	7	276	0.436 \pm 0.086	2 \pm 1
Weekend	4	209	0.350 \pm 0.079	3 \pm 1
Total	11	485	0.397 \pm 0.059	3 \pm 0
Grand total	45	1,748	0.256 \pm 0.023	4 \pm 0

Appendix Table A-4. Fishery statistics for summer steelhead in Section 1 (Fence Creek to town of Imnaha) of the Imnaha River during the 2009-10 run year. Statistics include mean estimates $\pm 95\%$ confidence intervals. Only adipose fin-clipped fish were harvested. "-" indicates not sampled or undefined. "h" indicates hour.

Month, day type	Sample size		Total Hours	Total catch	Total harvest	Catch rate		Angler days
	Days	Anglers				fish/h	h/fish	
February:								
Weekday	7	30	224 \pm 80	130 \pm 47	61 \pm 25	0.582 \pm 0.169	2 \pm 1	56 \pm 20
Weekend	5	25	63 \pm 18	20 \pm 22	8 \pm 9	0.324 \pm 0.211	3 \pm 2	58 \pm 17
Total	12	55	287 \pm 82	150 \pm 52	69 \pm 27	0.525 \pm 0.140	2 \pm 1	114 \pm 33
March:								
Weekday	7	72	680 \pm 283	666 \pm 296	80 \pm 66	0.979 \pm 0.363	1 \pm 0	287 \pm 119
Weekend	4	76	553 \pm 184	467 \pm 261	62 \pm 51	0.845 \pm 0.334	1 \pm 0	268 \pm 89
Total	11	148	1,233 \pm 337	1,133 \pm 395	142 \pm 83	0.919 \pm 0.250	1 \pm 0	555 \pm 152
April:								
Weekday	4	36	284 \pm 152	309 \pm 164	38 \pm 29	1.089 \pm 0.462	0.9 \pm 0	81 \pm 43
Weekend	2	20	177 \pm 184	156 \pm 71	26 \pm 12	0.876 \pm 0.281	1 \pm 0	54 \pm 56
Total	6	56	461 \pm 239	465 \pm 179	64 \pm 31	1.007 \pm 0.304	1 \pm 0	135 \pm 70
Grand total	29	259	1,981 \pm 421	1,748 \pm 436	275 \pm 93	0.882 \pm 0.172	1 \pm 0	804 \pm 171

Appendix Table A-5. Fishery statistics for summer steelhead in Section 2 (mouth to Fence Creek) of the Imnaha River and overall total for Section 1 and 2 combined during the 2009-10 run year. Statistics include mean estimates $\pm 95\%$ confidence intervals. Only adipose fin-clipped fish were harvested. "h" indicates hour.

Month, day type	Sample size		Total Hours	Total catch	Total harvest	Catch rate		Angler Days
	Days	Anglers				fish/h	h/fish	
February:								
Weekday	7	95	942 \pm 310	314 \pm 153	71 \pm 36	0.334 \pm 0.131	3 \pm 1	268 \pm 88
Weekend	5	123	834 \pm 251	397 \pm 268	69 \pm 50	0.476 \pm 0.197	2 \pm 1	201 \pm 60
Total	12	218	1,776 \pm 399	711 \pm 309	140 \pm 62	0.400 \pm 0.116	3 \pm 1	469 \pm 105
March:								
Weekday	7	169	2,536 \pm 699	1,390 \pm 581	158 \pm 73	0.548 \pm 0.191	2 \pm 1	542 \pm 149
Weekend	4	147	1,478 \pm 232	906 \pm 406	94 \pm 47	0.613 \pm 0.194	2 \pm 1	294 \pm 46
Total	11	316	4,014 \pm 736	2,296 \pm 709	252 \pm 87	0.572 \pm 0.140	2 \pm 0	836 \pm 153
April:								
Weekday	4	44	638 \pm 136	445 \pm 150	37 \pm 18	0.697 \pm 0.187	1 \pm 0	125 \pm 27
Weekend	2	24	227 \pm 53	214 \pm 13	24 \pm 2	0.943 \pm 0.041	1 \pm 0	51 \pm 12
Total	6	68	865 \pm 146	659 \pm 150	61 \pm 18	0.761 \pm 0.138	1 \pm 0	176 \pm 30
Grand total	29	602	6,655 \pm 850	3,666 \pm 787	453 \pm 108	0.551 \pm 0.092	2 \pm 0	1,481 \pm 189
Sec.1 + 2	29	861	8,636 \pm 949	5,414 \pm 900	728 \pm 143	0.627 \pm 0.081	2 \pm 0	2,285 \pm 251

Appendix Table A-6. Fishery statistics for summer steelhead in Big Sheep Creek (mouth to Little Sheep Creek) in the Imnaha River basin during the 2009-10 run year. Statistics include mean estimates \pm 95% confidence intervals. Only adipose fin-clipped fish were harvested. "h" indicates hour.

Month, day type	Sample size		Total Hours	Total catch	Total harvest	Catch rate		Angler Days
	Days	Anglers				fish/h	h/fish	
March:								
Weekday	7	14	51 \pm 40	17 \pm 46	0	0.341 \pm 0.471	3 \pm 4	38 \pm 30
Weekend	4	8	30 \pm 23	40 \pm 49	0	1.351 \pm 0.986	0.7 \pm 0.5	22 \pm 17
Total	11	22	81 \pm 47	57 \pm 67	0	0.714 \pm 0.470	1 \pm 0.7	60 \pm 35
April:								
Weekday	4	12	144 \pm 88	154 \pm 186	8 \pm 14	1.070 \pm 0.823	0.9 \pm 0.7	49 \pm 30
Weekend	2	6	41 \pm 44	111 \pm 20	0	2.715 \pm 0.348	0.4 \pm 0.1	22 \pm 24
Total	6	18	185 \pm 99	265 \pm 187	8 \pm 14	1.432 \pm 0.646	0.7 \pm 0.3	71 \pm 38
Grand total	17	40	266 \pm 109	322 \pm 199	8 \pm 14	1.214 \pm 0.473	0.8 \pm 0.3	131 \pm 54

APPENDIX B

Percent of Summer Steelhead That Were Marked Hatchery Fish and Caught during the 2009-10 Run Year

Appendix Table B. Percent of marked hatchery summer steelhead caught during each survey month in the Grande Ronde and Imnaha River basins during the 2009-10 run year. For the Imnaha River and Big Sheep Creek, percentages include catch of marked hatchery fish only. In parentheses are total catch for the Lower Grande Ronde and Imnaha rivers and Big Sheep Creek, and sampled catch for the Upper Grande Ronde and Wallowa rivers and Rondowa. On the Imnaha River, Section 1 is from Fence Creek upstream to the town of Imnaha, and Section 2 is from the mouth upstream to Fence Creek. "-" indicates not sampled or undefined.

Creel survey area	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr
Lower GR River	38(194)	58(1,229)	71(1,218)	73(70)	63(808)	64(1,556)	29(307)	0(25)
Rondowa	-	-	-	-	-	86(99)	79(217)	64(53)
Wallowa River	-	-	-	-	-	92(457)	81(511)	84(659)
Imnaha River (Section 1)	-	-	-	-	-	46(150)	28(1,133)	21(465)
Imnaha River (Section 2)	-	-	-	-	-	29(711)	20(2,296)	10(659)
Big Sheep Cr.	-	-	-	-	-	-	18(57)	11(265)

APPENDIX C

Fishery Statistics for Spring Fisheries for the 2008-09 Run Year

Appendix Table C-1. Estimated summer steelhead harvest, and observed and expanded harvest of coded-wire tagged steelhead in spring fisheries in the Grande Ronde basin for the 2008-09 run year. Total harvest = 0.493 (harvest card) + 5.596. Sample rate expansion = total harvest/sampled fish. A sample rate expansion of 25 or greater was considered unreliable; in such cases expanded = observed. Harvest estimates are only for months when steelhead angling season was open (Sept - April) and angler harvest card data was greater than zero. Does not include the lower Grande Ronde (location code 231) fishery. "-" indicates not sampled or undefined. No harvest on Catherine Creek (location code 121).

Fishery, location code, statistics, tagcode	Fishery statistics and number of tags recovered by month									Expanded tags
	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	Total	
Upper Grande Ronde (233)										
Angler harvest cards	0	0	5	0	0	0	0	0		
Total harvest	-	-	8	-	-	-	-	-	8	
Rondowa (234)										
Angler harvest cards	0	20	109	159	248	948	761	41		
Sampled fish	0	0	0	0	0	12	11	0		
Total harvest	-	15	59	84	128	473	381	26	1,166	
Sample rate expansion	-	-	-	-	-	39.4	34.6	0.0		
07 41 35						0	1	0	1	1
09 26 44						0	1	0	1	1
09 44 01						1	0	0	1	1
09 44 02						0	1	0	1	1
09 44 04						1	0	0	1	1
09 44 06						0	1	0	1	1
09 44 07						2	0	0	2	2
Wallowa (235)										
Angler harvest cards	0	0	50	70	299	715	1,465	309		
Sampled fish	0	0	0	0	0	216	233	50		
Total harvest	-	-	30	40	153	358	728	158	1,467	
Sample rate expansion	-	-	-	-	-	1.7	3.1	3.2		
07 41 31						1	1	0	2	5
07 41 32						1	1	1	3	8
07 41 33						3	1	1	5	11
07 41 34						12	8	1	21	48
07 41 35						1	0	0	1	2
09 26 44						2	2	0	4	9
09 26 45						2	2	0	4	9
09 43 01						2	1	0	3	6
09 43 02						0	5	3	8	25
09 43 03						1	2	0	3	8
09 43 05						3	0	0	3	5
09 43 63						3	0	0	3	5
09 44 01						0	1	0	1	3
09 44 02						5	3	0	8	17
09 44 03						2	2	0	4	9
09 44 04						5	2	0	7	14
09 44 05						4	3	0	7	16
09 44 06						2	1	0	3	6
09 44 07						9	6	2	17	40
09 44 08						1	1	1	3	8
Wenaha (184)										
Angler harvest cards	10	0	0	0	0	0	0	0		
Total harvest	11	-	-	-	-	-	-	-	11	

Appendix Table C-1. continued.

Fishery, location code, statistics, tagcode	Fishery statistics and number of tags recovered by month									Expanded tags
	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	Total	
Middle Grande Ronde (232)										
Angler harvest cards	5	35	50	35	5	96	15	5		
Total harvest	8	23	30	23	8	53	13	8	166	
Total Grande Ronde harvest (excluding lower Grande Ronde)									2,818	

Appendix Table C-2. Estimated catch of summer steelhead in spring fisheries in the Grande Ronde basin for the 2008-09 run year. Total catch = (sampled catch/sample harvest) x total harvest. For months with little or no sampling, the average proportion was used. For areas with little or no sampling, data from the survey in closest proximity was used. Does not include the lower Grande Ronde fishery. "-" indicates not sampled or undefined.

Fishery ^a , statistics	Fishery statistics by month								
	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	Total
Upper Grande Ronde									
Sampled harvest	-	-	-	-	-	-	-	-	-
Sampled catch	-	-	-	-	-	-	-	-	-
Total harvest	-	-	8	-	-	-	-	-	8
Total catch	-	-	14	-	-	-	-	-	14
Catherine Creek									
Sampled harvest	-	-	-	-	-	-	-	-	-
Sampled catch	-	-	-	-	-	-	-	-	-
Total harvest	-	-	-	-	-	-	-	-	0
Total catch	-	-	-	-	-	-	-	-	0
Rondowa									
Sampled harvest	-	-	-	-	-	12	11	0	23
Sampled catch	-	-	-	-	-	21	26	0	47
Total harvest	-	15	59	84	128	473	381	26	1,166
Total catch	-	31	121	172	262	828	901	53	2,368
Wallowa									
Sampled harvest	-	-	-	-	-	216	233	50	499
Sampled catch	-	-	-	-	-	357	443	93	893
Total harvest	-	-	30	40	153	358	728	158	1,467
Total catch	-	-	54	72	274	592	1,384	294	2,670
Wenaha									
Sampled harvest	-	-	-	-	-	-	-	-	-
Sampled catch	-	-	-	-	-	-	-	-	-
Total harvest	11	-	-	-	-	-	-	-	11
Total catch	52	-	-	-	-	-	-	-	52
Middle Grande Ronde									
Sampled harvest	-	-	-	-	-	-	-	-	-
Sampled catch	-	-	-	-	-	-	-	-	-
Total harvest	8	23	30	23	8	53	13	8	166
Total catch	14	41	54	41	14	88	25	15	292
Total Grande Ronde catch (excluding lower Grande Ronde)									5,396

^a Wallowa data were used for the upper Grande Ronde, middle Grande Ronde, and Catherine Creek; lower Grande Ronde data, in Flesher et al. 2011, were used for the Wenaha.

Appendix Table C-3. Estimated angler effort (hours) for summer steelhead in spring fisheries in the Grande Ronde basin for the 2008-09 run year. Angler effort in hours = Total catch/sampled catch rate in fish per hour. For months with little or no sampling, the average proportion was used. For areas with little or no sampling, data from the survey in closest proximity was used. Does not include the lower Grande Ronde fishery. "-" indicates not sampled or undefined.

Fishery ^a , statistics	Fishery statistics by month									
	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	Total	
Upper Grande Ronde										
Catch rate	-	-	-	-	-	-	-	-	-	
Total catch	-	-	14	-	-	-	-	-	14	
Angler effort	-	-	109	-	-	-	-	-	109	
Catherine Creek										
Catch rate	-	-	-	-	-	-	-	-	-	
Total catch	-	-	-	-	-	-	-	-	0	
Angler effort	-	-	-	-	-	-	-	-	0	
Rondowa										
Catch rate	-	-	-	-	-	0.126	0.066	-	0.084	
Total catch	-	31	121	172	262	828	901	53	2,368	
Angler effort	-	369	1,440	2,048	3,119	6,571	13,652	631	27,830	
Wallowa										
Catch rate	-	-	-	-	-	0.147	0.123	0.097	0.128	
Total catch	-	-	54	72	274	592	1,384	294	2,670	
Angler effort	-	-	422	563	2,141	4,027	11,252	3,031	21,436	
Wenaha										
Catch rate	-	-	-	-	-	-	-	-	-	
Total catch	52	-	-	-	-	-	-	-	52	
Angler effort	505	-	-	-	-	-	-	-	505	
Middle Grande Ronde										
Catch rate	-	-	-	-	-	-	-	-	-	
Total catch	14	41	54	41	14	88	25	15	292	
Angler effort	109	297	422	320	1099	599	203	155	2,237	
Upper Grande Ronde										
Total Grande Ronde angler effort (excluding lower Grande Ronde)										52,117

^a Wallowa data were used for the upper Grande Ronde, middle Grande Ronde, and Catherine Creek; lower Grande Ronde data, in Flesher et al. 2011, were used for the Wenaha.

APPENDIX D

Summary of Recycled Steelhead for the 2009-10 Run Year

Appendix Table D. Summary of adult steelhead recycled back to the Wallowa River fishery from the Big Canyon Facility for the 2009-10 run year. "-" indicates not sampled or undefined.

Date of release, Percent of Of release	Location and number of fish ^a						Percent of Release	
	Upstream		Downstream		Subtotal			
	M	F	M	F	M	F		
	Released							
27 March 2010	0	0	10	6	10	6	16	
3 April 2010	0	0	4	5	4	5	9	
11 April 2010	0	0	28	22	28	22	50	
Subtotal	0	0	42	33				
Total	0		75		42	33	75	
	Recaptured at Big Canyon ^b							
27 March 2010	-	-	1	1	1	1	2	13%
3 April 2010	-	-	2	1	2	1	3	33%
11 April 2010	-	-	17	7	17	7	24	48%
Subtotal	0	0	20	9				
Total	0		29		20	9	29	39%
% of release	0%		39%		48%	27%		
	Observed and estimated (in parentheses) harvest ^c							
27 March 2010	-	-	0	0	0	0	0	0%
3 April 2010	-	-	1(3)	0	1(3)	0	1(3)	33%
11 April 2010	-	-	1(3)	3(9)	1(3)	3(9)	4(12)	24%
Subtotal	0	0	2(6)	3(9)				
Total	0		5(15)		2(6)	3(9)	5(15)	20%
% of release	0%		20%		14%	27%		
	Total recovered (Big Canyon + estimated harvest)							
27 March 2010	-	-	1	1	1	1	2	13%
3 April 2010	-	-	5	1	5	1	6	67%
11 April 2010	-	-	20	16	20	16	36	72%
Subtotal	0	0	26	18				
Total	0		44		26	18	44	59%
% of release	0%		59%		62%	55%		

^a Release site was 1.6 km downstream of Deer Creek (Rkm 18) on the Wallowa River.

^b Recaptures of recycled fish were euthanized.

^c For the 2009-10 run year, harvest of recycled fish was estimated using the regression: creel harvest = 0.394 (number released) - 14.9, $r = 0.90$, $P = 0.014$, $N = 6$, from data for run years 2002-03 to 2007-08.