

LOWER SNAKE RIVER COMPENSATION PLAN:
Summer Steelhead Creel Surveys on the
Grande Ronde, Wallowa, and Imnaha
Rivers for the 2010-11 Run Year

Oregon Department of Fish and Wildlife
Fish Research and Development, NE Region



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Front cover photo: Kyle Bratcher releasing a 32 inch wild male summer steelhead on the lower Grande Ronde River below Troy, OR, December 2011.

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PREFACE

This report is for the funding period 1 October 2010 to 30 September 2011. The sampling period was from 1 September 2010 to 15 April 2011. 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 2010-2011 run year were primarily from the 2007 and 2008 brood years. Results of creel surveys conducted prior to fall 2010 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, 2011, and 2012), 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 2010 to 15 April 2011 in the Grande Ronde and Imnaha river basins.

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CONTENTS

	Page
PREFACE	i
ACKNOWLEDGMENTS.....	ii
LIST OF FIGURES.....	iv
LIST OF TABLES.....	vi
LIST OF APPENDICES	vii
SUMMARY	1
INTRODUCTION.....	2
STUDY AREA	3
METHODS	4
ACCOMPLISHMENTS AND FINDINGS	6
MANAGEMENT IMPLICATIONS AND RECOMMENDATIONS	15
REFERENCES.....	22
APPENDICES.....	26

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 2010-11 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 2010-11 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 2010-11 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 2010-11 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 2010-11 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 2010-11 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 2010-11 run year that were marked	11
8.	Angler effort (in hours) for summer steelhead in spring fishery areas (upper Grande Ronde and Wallowa rivers, Catherine Creek, and Rondowa), the lower Grande Ronde River, and the Imnaha River for the 1985-86 to 2010-11 run years	17
9.	Number of hatchery summer steelhead harvested by recreational anglers in spring fishery areas (upper Grande Ronde and Wallowa rivers, Catherine Creek, and Rondowa), the lower Grande Ronde River, and the Imnaha River for the 1985-86 to 2010-11 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 2009-10 run years.....	21
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 2010 for the lower Grande Ronde, and 1986-1996, 1999-2010 for the Imnaha fishery areas).....	21

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 2010-11 run year	12
2.	Residence of summer steelhead anglers interviewed during creel surveys in the Grande Ronde and Imnaha river basins during the 2010-11 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 2010-11 run year	13
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 the 2009-10 run year) from 1 February to 15 April for the 1985-86 to 2010-11 run years.....	18
5.	Estimated total catch (harvested and released) of hatchery and wild summer steelhead from angler surveys conducted on the Wallowa River and at Rondowa from 1 February to 15 April for the 1985-86 to 2009-10 run years.....	19
6.	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 2010-11 run years.....	20

LIST OF APPENDICES

<u>Number</u>		<u>Page</u>
A-1.	Fishery statistics for summer steelhead on the lower Grande Ronde River during the 2010-11 run year	27
A-2.	Catch rate ($\pm 95\%$ confidence intervals) for summer steelhead at Rondowa during the 2010-11 run year	28
A-3.	Catch rate ($\pm 95\%$ confidence intervals) for summer steelhead on the Wallowa River during the 2010-11 run year	28
A-4.	Fishery statistics for summer steelhead in Section 1 (Fence Creek to town of Imnaha) of the Imnaha River during the 2010-11 run year	29
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 2010-11 run year	29
A-6.	Fishery statistics for summer steelhead in Big Sheep Creek (mouth to Little Sheep Creek) in the Imnaha River basin during the 2010-11 run year	30
B.	Percent of marked hatchery summer steelhead caught during each survey month in the Grande Ronde and Imnaha river basins during the 2010-11 run year	31
C-1.	Estimated harvest of summer steelhead, and observed and expanded harvest of coded-wire tagged steelhead in spring fisheries in the Grande Ronde basin for the 2009-10 run year	33
C-2.	Estimated catch of summer steelhead in spring fisheries in the Grande Ronde basin for the 2009-10 run year	35
C-3.	Estimated angler effort (hours) for summer steelhead in spring fisheries in the Grande Ronde basin for the 2009-10 run year	36
D.	Summary of adult steelhead recycled back to the Wallowa River fishery from the Big Canyon Facility for the 2010-11 run year	38

SUMMARY

In the 2010-11 run year, estimated angler effort was higher than the average since surveys began in 1985 on the lower Grande Ronde River (18,180 hours) and the third highest ever recorded on the Imnaha River (6,834 hours). Harvest and total catch estimates were well above average on both the lower Grande Ronde River and Imnaha rivers. Catch and release of wild steelhead on the lower Grande Ronde was also above average, and the percent of wild fish released on the lower Grande Ronde was the highest estimated since surveys began. On the Imnaha River the number of wild steelhead caught and released is unknown due to unmarked hatchery returns in recent years, although the number of unmarked hatchery and wild steelhead released was the third highest ever, and the percent of unmarked steelhead (both wild and hatchery fish) in the total catch was the fifth highest estimated since we began surveys.

This report includes angler harvest card data for the Wallowa River and Rondowa survey areas for the 2009-10 run year, summarized in the appendices. Based on creel and harvest card data, harvest and total catch were the highest estimated since surveys began, while catch and release of wild fish was the highest ever estimated on the Wallowa and second highest at Rondowa. The percent of wild fish in the catch for both Wallowa and Rondowa for the 2009-10 run year was similar to previous years.

In every fishery surveyed, catch rates during the 2010-11 run year were nearly as high or higher than the record setting 2009-10 run year (range: 3 – 6 hrs/fish), and were much higher than the overall management goal of 10 hours per fish. Hatchery and wild fish were equally present in the catch during the late fall and winter months on the lower Grande Ronde River but hatchery fish dominated the catch during the spring months on the Wallowa River and at Rondowa, and hatchery fish contributed substantially to the Imnaha River fishery. Since some Imnaha stock hatchery fish were not clipped they were indistinguishable from wild fish.

Anglers harvested more one-ocean than two-ocean hatchery steelhead in the lower Grande Ronde and Imnaha fisheries but more two-ocean than one-ocean fish in the Wallowa and Rondowa fisheries, and more females than males in all the 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 lower percent of out-of-state anglers. The lower Grande Ronde had the lowest percent of local anglers when compared to the other fisheries, whereas the Imnaha River had the highest percent of local anglers.

All harvested steelhead adults were scanned with a handheld wand detector to detect coded-wire tags but we have yet to detect a stray adipose (Ad) -clipped adult. However, in 2011 we again sampled stray Wallowa stock adults (AdLV clipped) in the Imnaha River. This year and last year are the only recent documented cases of Wallowa stock adults straying into the Imnaha Basin. There was one stray recovery in the recreational fishery and one at the Little Sheep Facility in both years, and all were from the 2007 brood released at Wallowa Hatchery.

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.

We began creel surveys for summer steelhead during the fall of 1985 in both the Grande Ronde and Imnaha river basins, the goal being 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 2010 and the spring of 2011 in the Grande Ronde and Imnaha river basins. In addition, this report contains estimates of total effort, catch, and harvest for all the spring fisheries in the Grande Ronde river basin, information that was not available for inclusion in the 2009-10 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 2010-11 steelhead angling season in the Grande Ronde and Imnaha river basins was open from 1 September 2010 to 15 April 2011.

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. Because vehicle access into Rondowa was limited, anglers parked their vehicles at Palmer Junction, located 5.6 km upstream of Rondowa on the

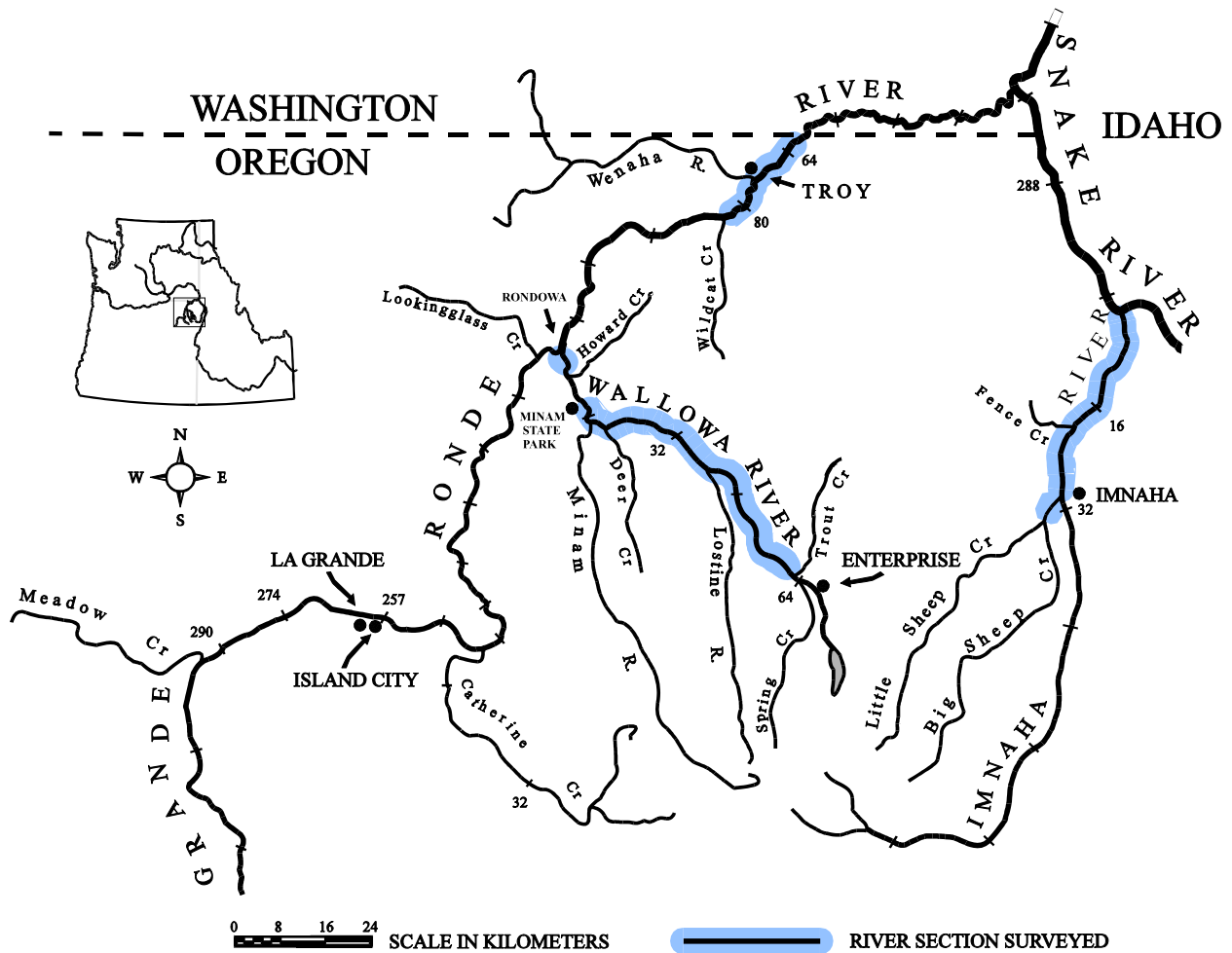


Figure 1. Map of northeastern Oregon showing where summer steelhead creel surveys were conducted in the Grande Ronde and Imnaha river basins during the 2010-11 run year.

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 2010 to 15 April 2011. 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 (Ad) 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), 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 2011. 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 2011. We surveyed the Wallowa River area each sample day and surveyed the Rondowa area 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 survey 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, 2011, 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 26 February, we surveyed five days each week (Sunday – Saturday) from 0900-1800 hours. From 27 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.

We cannot creel certain springtime fishery locations in the Grande Ronde basin (e.g., Catherine Creek), and on the Wallowa River and Rondowa our creel is limited to angler interviews and sampling their catch. In these instances we rely on angler harvest card data for additional information. For example, 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 become available. However, there is usually a one or two-year delay in obtaining final angler harvest card estimates. For this reason the current annual report has harvest estimates for run year 2009-2010. 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).

Figures 8, 9, 10, and 11, and Table 6 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 2011, hatchery adult returns were recycled from the Big Canyon Facility back into the Wallowa River fishery, using methodology described by Flesher et al. (2007). Between 11 March and 1 April, 101 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 2010 to 15 April 2011, we sampled 53.5% of the weekends and holidays (38 days) and 30.8% of the weekdays (48 days) for a total of 86 sample days. On the Wallowa River from 1 February to 15 April 2011, we sampled 95.2% of the weekends and holidays (20 days) and 49.1% of the weekdays (26 days) for a total of 46 sample days. During the same time period at Rondowa, we sampled 47.6% of the weekends and holidays (10 days) and 30.2% of the weekdays (16 days) for a total of 26 sample days. On the Imnaha River and Big Sheep Creek from 1 February to 15 April 2011, we sampled 52.4% of the weekends and holidays (11 days) and 28.3% of the weekdays (15 days) for a total of 26 sample days.

We estimate that 3,780 anglers fished for 18,180 hours on the lower Grande Ronde River during the 2010-11 season. They caught and released 1,780 wild and 434 hatchery steelhead, and harvested 1,000 hatchery steelhead for an average catch rate index of 6 hours per fish (Figures 2-6, Appendix Table A-1). The percent of steelhead caught that were hatchery origin ranged from 0% in March 2011 to 56% in December 2010 (Figure 7, Appendix Table B). Fifty-seven percent of harvested hatchery steelhead spent one year in freshwater and one year in saltwater (hereafter designated 1:1), 42% spent one year in freshwater and two years in saltwater (designated 1:2), and 1% spent two years in freshwater and one year in saltwater (designated 2:1; Table 1). Mean fork length ($\pm 95\%$ confidence interval) of harvested hatchery steelhead was 576 (± 5) mm for age 1:1, 690 (± 10) mm for age 1:2, and 581 mm for age 2:1 (Table 1). Gender composition was 42% male and 58% female (Table 1). Forty-nine percent of

the anglers on the lower Grande Ronde River were local Oregon resident anglers, 30% were non-local Oregon resident anglers, 9% were Washington State residents and 12% resided outside the states of Oregon and Washington (Table 2). On the lower Grande Ronde River, anglers harvested an estimated 251 AdLV+CWT and AdRV+CWT marked steelhead from our hatchery releases (Table 3).

At Rondowa, the catch rate index averaged 4 hours per fish (Figure 4, Appendix Table A-2). The percent of steelhead caught that were hatchery origin ranged from 67% in March to 85% in February (Figure 7, Appendix Table B). Age composition of harvested hatchery steelhead was 35% 1:1 and 65% 1:2 (Table 1). Mean fork length ($\pm 95\%$ confidence interval) of harvested hatchery steelhead was 576 (± 19) mm for age 1:1 and 706 (± 14) mm for age 1:2 (Table 1). Gender composition was 45% male and 55% female (Table 1). Fifty-eight percent of the anglers at Rondowa were local Oregon resident anglers, and 42% were non-local Oregon resident anglers (Table 2). At Rondowa, anglers harvested 8 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 card 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 42% in April to 88% in February (Figure 7, Appendix Table B). Age composition of harvested hatchery steelhead was 40% 1:1, and 60% 1:2 (Table 1). Mean fork length ($\pm 95\%$ confidence interval) of harvested hatchery steelhead was 581 (± 3) mm for age 1:1, 702 (± 4) mm for age 1:2, and 583 (± 0) mm for age 2:1 (Table 1). Gender composition was 41% male and 59% female (Table 1). Sixty percent of the anglers on the Wallowa River were local Oregon residents, 35% were non-local Oregon residents, 3% were Washington State residents and 2% resided outside the states of Oregon and Washington (Table 2). On the Wallowa River, anglers harvested 162 AdLV+CWT and AdRV+CWT marked steelhead from our hatchery releases; however, expanded estimates for the entire fishery, as reported on in Table 3, will not be determined until state angler harvest card data become available.

On the Imnaha River and Big Sheep Creek, we estimate that 1,672 anglers fished for 6,834 hours. They caught and released 1,500 unmarked (wild and hatchery) and 188 hatchery steelhead, and harvested 466 hatchery steelhead for an average catch rate index of 3 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 0% in April in Section 2 (mouth upstream to Fence Creek) to 100% in February in Section 1 (Fence Creek upstream to Big Sheep Creek, Figure 7, Appendix Table B). Age composition of harvested hatchery steelhead was 67% 1:1 and 33% 1:2 (Table 1). Mean fork length ($\pm 95\%$ confidence interval) of harvested hatchery steelhead was 573 (± 10) mm for age 1:1 and 682 (± 13) mm for age 1:2 (Table 1). Gender was 32% male and 68% female (Table 1). Seventy-seven percent of the anglers on the Imnaha River were local Oregon residents, 12% were non-local Oregon residents, 3% were Washington State residents and 8% resided outside the states of Oregon and Washington (Table 2).

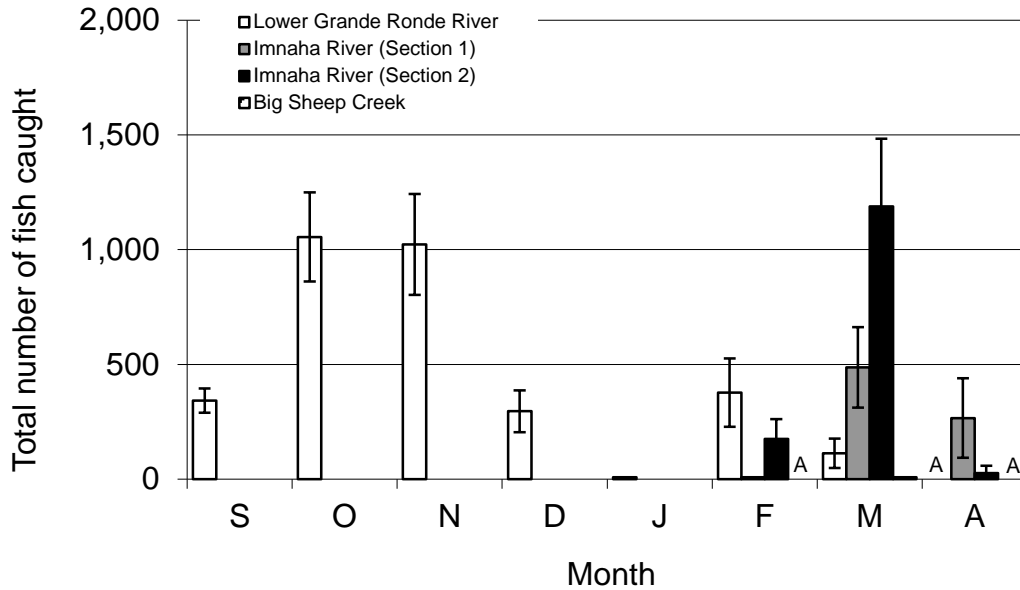


Figure 2. Estimated total catch of summer steelhead (vertical bars show 95% confidence intervals) on the lower Grande Ronde River, two sections of the Imnaha River, and Big Sheep Creek during the 2010-11 run year. "A" indicates no anglers. Surveys were conducted from 1 September 2010 to 15 April 2011 on the lower Grande Ronde River, and from 1 February to 15 April 2011 on the Imnaha River and Big Sheep Creek.

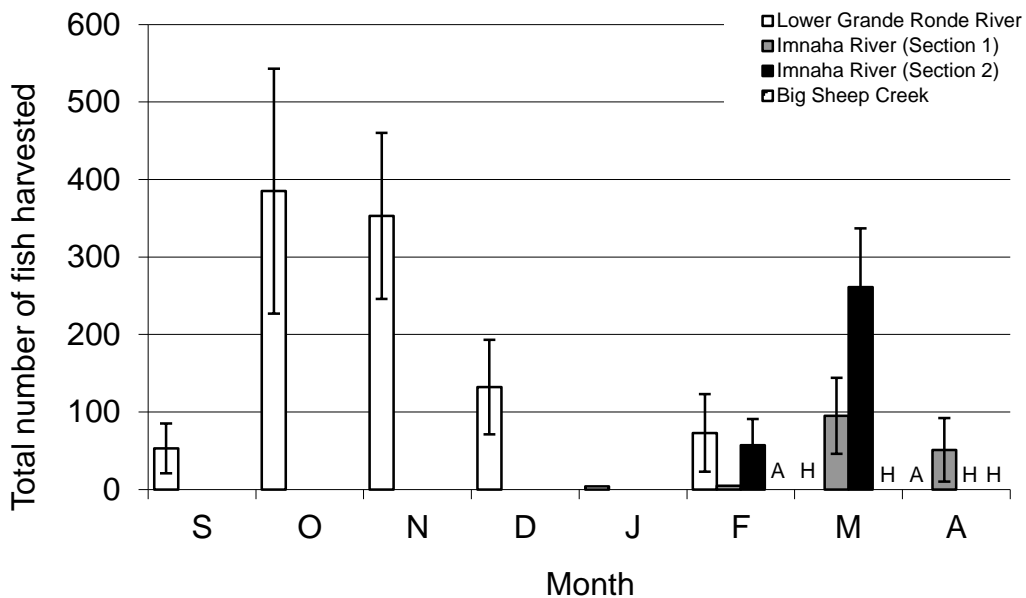


Figure 3. Estimated total harvest of summer steelhead (vertical bars show 95% confidence intervals) on the lower Grande Ronde River, two sections of the Imnaha River, and Big Sheep Creek during the 2010-11 run year. "A" indicates no anglers and "H" indicates no harvest. Surveys were conducted from 1 September 2010 to 15 April 2011 on the lower Grande Ronde River, and from 1 February to 15 April 2011 on the Imnaha River and Big Sheep Creek.

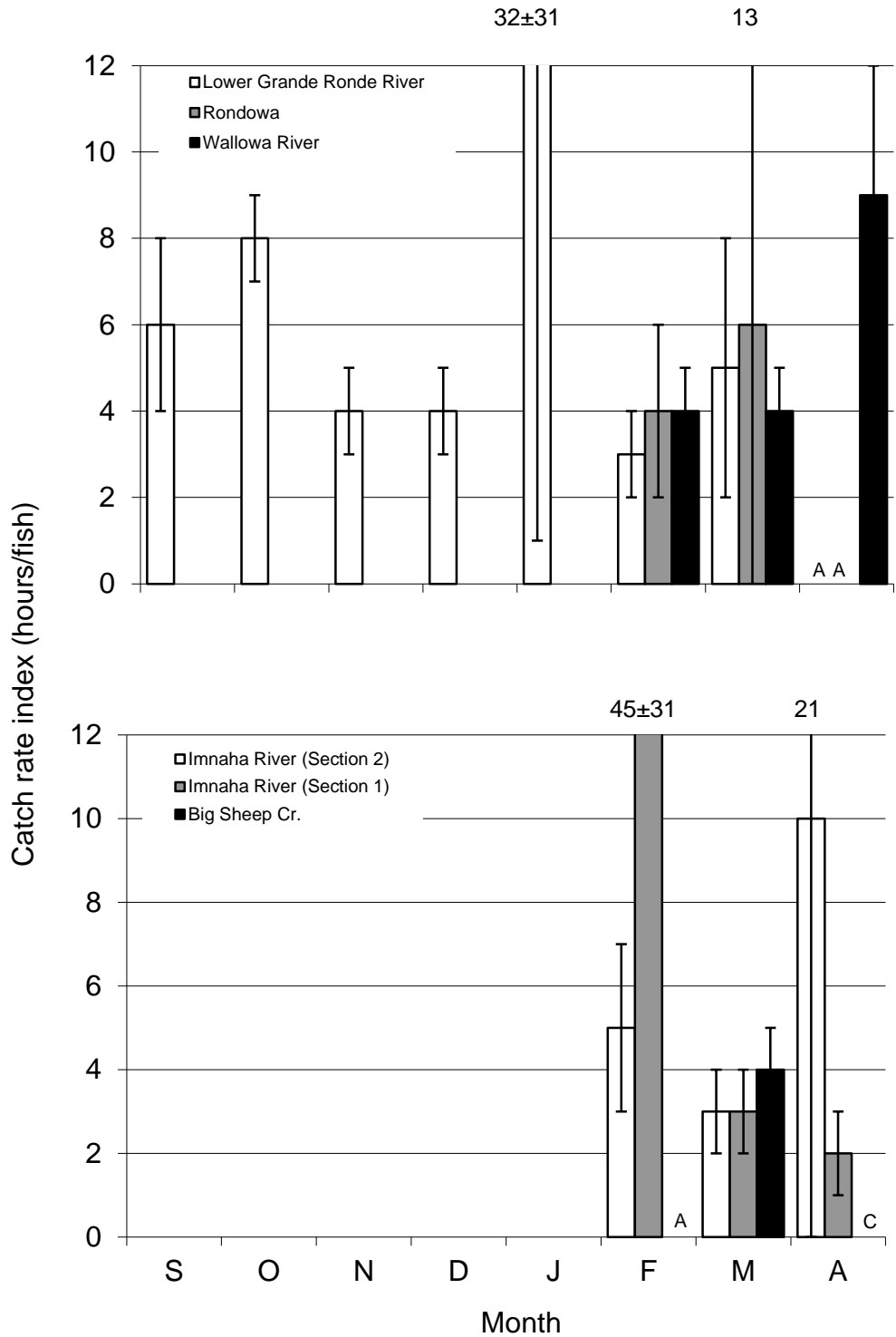


Figure 4. Estimated catch rate index (hours/fish) for summer steelhead (vertical bars show 95% confidence intervals) in the Grande Ronde and Imnaha river basins during the 2010-11 run year. "A" indicates no anglers and "C" indicates no catch. Survey areas and times include the lower Grande Ronde River (1 September 2010 – 15 April 2011), and Rondowa, Wallowa River, two sections of the Imnaha River, and Big Sheep Creek (1 February – 15 April 2011). Note: A lower catch rate index implies better angling success.

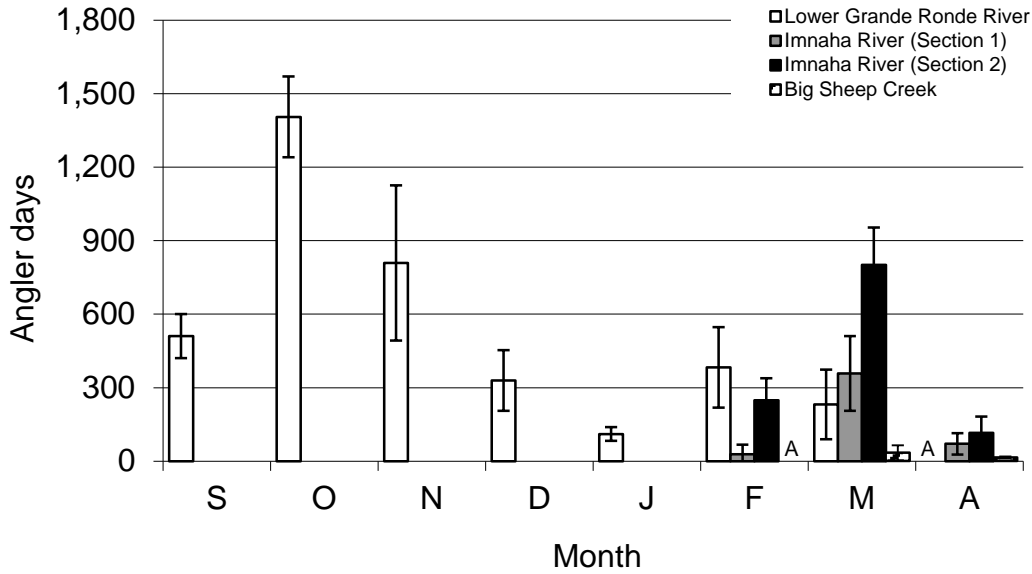


Figure 5. Estimated number of angler days for summer steelhead (vertical bars show 95% confidence intervals) on the lower Grande Ronde River, two sections of the Imnaha River, and Big Sheep Creek during the 2010-11 run year. "A" indicates no anglers. Surveys were conducted from 1 September 2010 to 15 April 2011 on the lower Grande Ronde River, and from 1 February to 15 April 2011 on the Imnaha River and Big Sheep Creek.

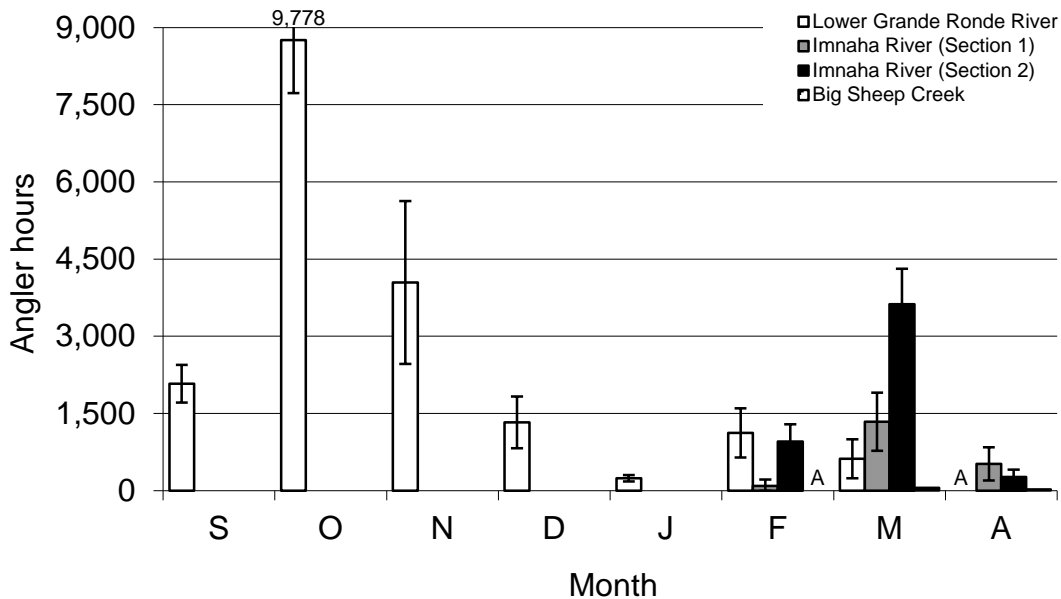


Figure 6. Estimated number of angler hours for summer steelhead (vertical bars show 95% confidence intervals) on the lower Grande Ronde River, two sections of the Imnaha River, and Big Sheep Creek during the 2010-11 run year. "A" indicates no anglers. Surveys were conducted from 1 September 2010 to 15 April 2011 on the lower Grande Ronde River, and from 1 February to 15 April 2011 on the Imnaha River and Big Sheep Creek.

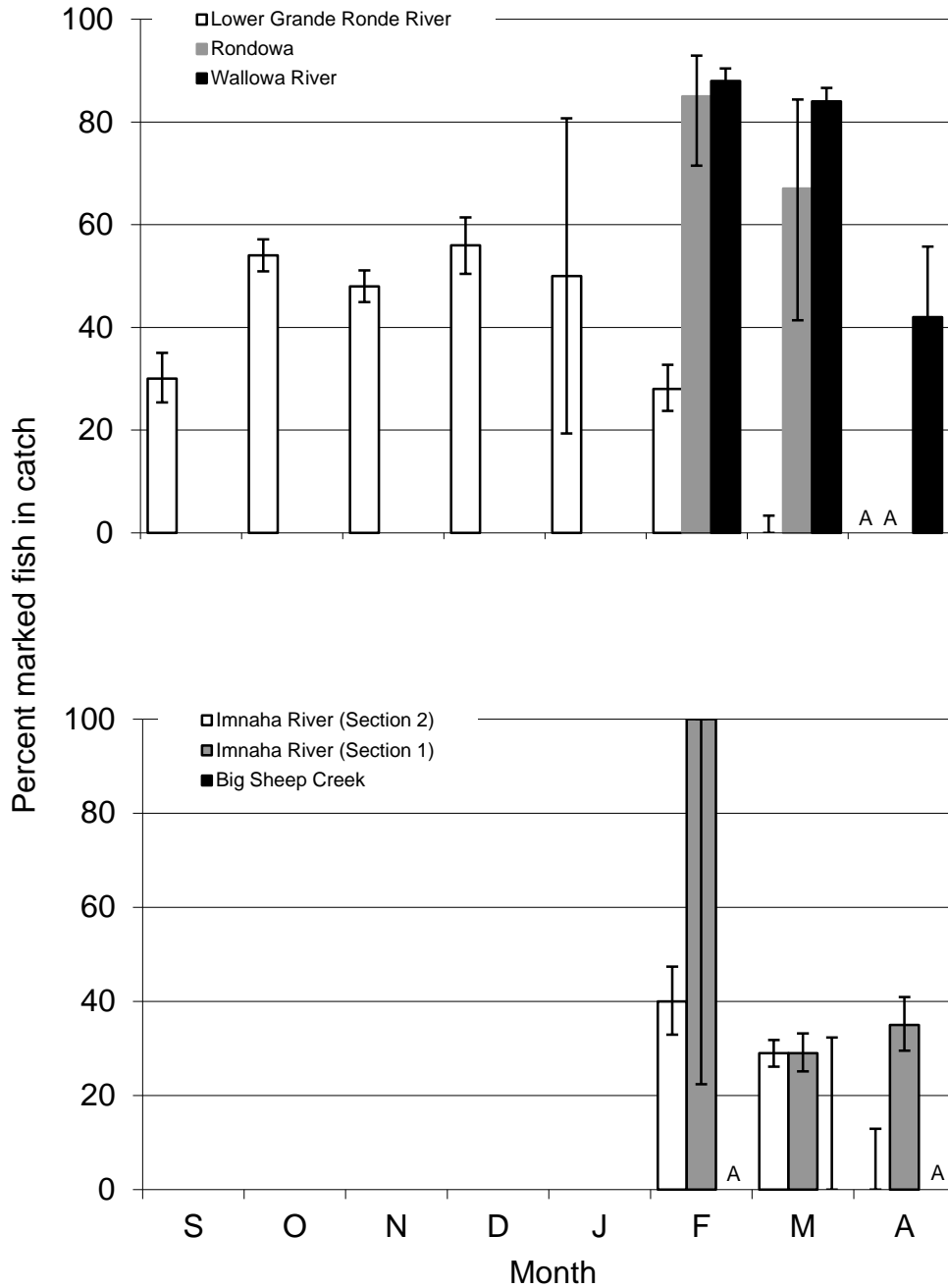


Figure 7. Estimated percent of summer steelhead caught (vertical bars show 95% confidence intervals; using a binomial distribution) in the Grande Ronde and Imnaha river basins during the 2010-11 run year that were marked. "A" indicates no anglers. In the Grande Ronde basin all unmarked fish were wild, 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 2010 – 15 April 2011), and Rondowa, Wallowa River, two sections of the Imnaha River, and Big Sheep Creek (1 February - 15 April 2011).

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 2010-11 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 2011 and Little Sheep Creek Facility (for the Imnaha River basin including the Imnaha River and Big Sheep Creek) in 2010 and 2011. 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	73	74	26	0	50	583 \pm 8	18	715 \pm 18	0	-
Females	102	45	54	1	42	568 \pm 7	51	681 \pm 12	1	581
Total	175	57	42	1	92	576 \pm 5	69	690 \pm 10	1	581
Rondowa										
Males	18	50	50	0	9	583 \pm 26	9	721 \pm 23	0	-
Females	22	77	23	0	5	563 \pm 37	16	698 \pm 17	0	-
Total	40	35	65	0	14	576 \pm 19	25	706 \pm 14	0	-
Wallowa R.										
Males	287	62	38	0	176	584 \pm 4	109	726 \pm 8	1	583
Females	414	25	75	0	103	575 \pm 5	308	693 \pm 4	2	583 \pm 0
Total	701	40	60	0	279	581 \pm 3	417	702 \pm 4	3	583 \pm 0
Imnaha R. basin										
Males	42	90	10	0	26	568 \pm 13	3	708 \pm 90	0	-
Females	88	56	44	0	34	577 \pm 14	27	679 \pm 13	0	-
Total	130	67	33	0	60	573 \pm 10	30	682 \pm 13	0	-

Table 2. Residence of summer steelhead anglers interviewed during creel surveys in the Grande Ronde and Imnaha river basins during the 2010-11 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	808	49	30	9	12
Rondowa	43	58	42	0	0
Wallowa River	1,620	60	35	3	2
Imnaha River	513	77	12	3	8
Big Sheep Creek	14	79	7	0	14

^a Out-of-state anglers on the Lower Grande Ronde River include one angler from Great Britain.

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 2010-11 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 44 09	Spring Cr.	Prod./April	2007	1	3
	09 44 10	Spring Cr.	Prod./April	2007	1	2
	09 44 11	Spring Cr.	Prod./April	2007	1	8
	09 44 12	Spring Cr.	Prod./Vol./May	2007	2	5
	09 44 13	Deer Cr.	Prod./April	2007	4	26
	09 44 14	Deer Cr.	Volitional/May	2007	1	2
	09 45 44	Spring Cr.	Fall Brood/April	2007	5	34
	09 45 45	Spring Cr.	Fall Brood/April	2007	2	5
	09 45 46	Spring Cr.	Fall Brood/April	2007	2	11
	09 45 47	Spring Cr.	Fall B./Vol./May	2007	4	17
	09 45 81	Spring Cr.	Prod./April	2008	2	13
	09 45 82	Spring Cr.	Prod./April	2008	2	12
	09 45 83	Spring Cr.	Prod./April	2008	3	9
	09 45 84	Spring Cr.	Fall Brood/April	2008	3	21
	09 45 85	Spring Cr.	Fall Brood/April	2008	4	19
	09 45 86	Spring Cr.	Fall B./Vol./May	2008	3	23
	09 45 87	Deer Cr.	Prod./April	2008	2	12
	09 45 88	Spring Cr.	Prod./Vol./May	2008	3	14
	09 45 89	Deer Cr.	Volitional/May	2008	2	15
	Wallowa River	09 44 01	Spring Cr.	Prod./April	2006	1
09 44 09		Spring Cr.	Prod./April	2007	12	ND
09 44 10		Spring Cr.	Prod./April	2007	5	ND
09 44 11		Spring Cr.	Prod./April	2007	8	ND
09 44 12		Spring Cr.	Prod./Vol./May	2007	9	ND
09 44 13		Deer Cr.	Prod./April	2007	24	ND
09 44 14		Deer Cr.	Volitional/May	2007	22	ND
09 45 44		Spring Cr.	Fall Brood/April	2007	7	ND
09 45 45		Spring Cr.	Fall Brood/April	2007	4	ND
09 45 46		Spring Cr.	Fall Brood/April	2007	3	ND
09 45 47		Spring Cr.	Fall B./Vol./May	2007	6	ND
09 45 80		Spring Cr.	Fall Brood/April	2008	4	ND
09 45 81		Spring Cr.	Prod./April	2008	4	ND
09 45 82		Spring Cr.	Prod./April	2008	6	ND
09 45 83		Spring Cr.	Prod./April	2008	8	ND
09 45 84		Spring Cr.	Fall Brood/April	2008	7	ND
09 45 85		Spring Cr.	Fall Brood/April	2008	1	ND
09 45 86		Spring Cr.	Fall B./Vol./May	2008	5	ND
09 45 87		Deer Cr.	Prod./April	2008	7	ND
09 45 88		Spring Cr.	Prod./Vol./May	2008	3	ND
09 45 89	Deer Cr.	Volitional/May	2008	16	ND	
Rondowa	09 44 09	Spring Cr.	Prod./April	2007	1	ND
	09 44 14	Deer Cr.	Volitional/May	2007	2	ND
	09 45 80	Spring Cr.	Fall Brood/April	2008	1	ND
	09 45 81	Spring Cr.	Prod./April	2008	1	ND
	09 45 84	Spring Cr.	Fall Brood/April	2008	1	ND
	09 45 85	Spring Cr.	Fall Brood/April	2008	1	ND
	09 45 87	Deer Cr.	Prod./April	2008	1	ND

Table 3. Continued.

Creel survey area	Tag Code	Release site	Experimental group ^a	Brood Year	Number recovered	
					Observed	Expanded ^b
Imnaha River	09 45 43	L. Sheep Cr.	Volitional/April	2007	5	20
	09 45 44	Spring Cr.	Fall Brood/April	2007	1	3
	09 45 79	L. Sheep Cr.	Volitional/April	2008	4	14

^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.

On Big Sheep Creek, 79 percent of the anglers were local Oregon residents, 7% were non-local Oregon residents, and 14% resided outside the states of Oregon and Washington (Table 2). On the Imnaha River and Big Sheep Creek, anglers harvested an estimated 37 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 lower than last year but above average when compared to previous years on the lower Grande Ronde while the Imnaha was the third highest estimated since surveys began during the 1985-86 run year (Figure 8). Harvest on the lower Grande Ronde was also lower than last year but above average while harvest on the Imnaha was the second highest estimated—only last year was higher—since we began surveys (Figure 9). Total catch (harvested and released) on the lower Grande Ronde was lower than last year but was over 1,200 fish higher than the average, and catch on the Imnaha was also lower than last year's record total catch but over 1,300 fish higher than the average and third highest since surveys began (Table 4). Similarly, catch and release of wild steelhead was lower than last year's second highest catch on the lower Grande Ronde; however, the percent of wild steelhead in the total catch was the highest since surveys began. On the Imnaha, the number of unmarked hatchery and wild fish released was the third highest estimated and the percent of unmarked fish in the total catch was the fifth highest estimated since the early eighties when only wild fish were returning. On the Wallowa and at Rondowa, estimates of total catch are from the previous run year (2009-10), and were the highest harvest and total catch estimated since surveys began during the 1985-86 run year (Table 5). Catch and release of wild fish was the highest estimated on the Wallowa since the mid-eighties when there were wild and unmarked hatchery fish returning, and second highest at Rondowa for the years that were sampled. The percent of wild fish in the catch for both Wallowa and Rondowa was similar to previous years. Catch rates were nearly as high or higher than last year's record catch rates in all fisheries and much higher than the 10 hours per fish management goal (Table 6). The percent of local resident anglers participating in summer steelhead fisheries was lowest on the lower Grande Ronde River and highest on the Imnaha River and Big Sheep Creek (Table 2). 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 since we began

surveys in the 1985-86 run year (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 harvest estimates generated from angler harvest cards and those from our creel surveys 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 (2009-10) were 56 fish in the upper Grande Ronde River, 3,725 fish at Rondowa, 2,231 fish in the Wallowa River, 25 fish in the Wenaha River, and 1,390 fish in the middle Grande Ronde River, for a record total harvest estimate of 7,427 fish in the Grande Ronde basin, excluding the lower Grande Ronde River (Figure 9, Appendix Table C-1). We estimated 617 coded-wire-tagged fish were harvested at Rondowa, and 474 coded-wire-tagged fish were harvested in the Wallowa River in the 2009-10 run year. Total catch estimates for spring steelhead fisheries in the 2009-10 run year were 106 fish in the upper Grande Ronde River, 8,051 fish at Rondowa, 4,218 fish in the Wallowa River, 70 fish in the Wenaha River, and 2,555 fish in the middle Grande Ronde River, for a total catch estimate of 15,000 fish in the Grande Ronde basin, excluding the lower Grande Ronde River (Appendix Table C-2). Angler effort for the 2009-10 run year was estimated to be 402 hours in the upper Grande Ronde River, 20,024 hours at Rondowa, 16,515 hours in the Wallowa River, 452 hours in the Wenaha River, and 11,586 hours in the middle Grande Ronde River, for a total effort estimate of 48,979 hours in the Grande Ronde basin, excluding the lower Grande Ronde River (Appendix Table C-3).

One hundred and one summer steelhead were recycled to the Wallowa River fishery in 2011. Forty-nine recycled fish were recaptured at the Big Canyon Facility and an estimated 25 recycled fish were harvested in the fishery for a total estimated recovery of 74 recycled fish (Appendix Table D).

MANAGEMENT IMPLICATIONS AND RECOMMENDATIONS

The 2010-11 adult steelhead return to the Lower Snake River Compensation Plan Area (17,177 adults) was lower than the prior year's record return of 33,623 adults, but still larger than an average year. Our fisheries data reflect the good run, as angler effort, harvest and total catch were above average on both the Grande Ronde and Imnaha rivers. Catch and release of wild steelhead on the lower Grande Ronde River was lower than the previous year; however, the percent of wild fish in the total catch was the highest estimated since we began surveys.

This was the second year for a fishery at Big Sheep Creek, a tributary to the Imnaha River. Although we thought that angler effort may increase this year compared to last year as anglers became aware of this newly-opened stream section, the number of anglers was only 37% of last year, while angler numbers in the Imnaha were 71% of last year. We still expect angler effort to increase in the future as anglers become more familiar with the newly opened area.

The 2010-11 run was the second year in which our creel surveyors electronically scanned 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. To date, no harvested stray steelhead with an adipose-only fin clip have been sampled in either the Grande Ronde or Imnaha basin recreational fisheries. However, for the second straight year we sampled stray Wallowa stock steelhead in the Imnaha recreational fishery and at the Little Sheep Facility. These strays were from a brood year 2007 release at Wallowa Hatchery, and they had an exceptionally high survival and a record number of returning adults. Given the large run size, there was a greater probability of sampling a stray Wallowa stock adults in the Imnaha River. However, the small number ($n = 2$) of observed Wallowa stock stray recoveries in the Imnaha basin makes it difficult to reliably estimate the actual number of these strays.

Recycling adult steelhead returns to the Big Canyon Facility back into the Wallowa River for the recreational fishery in 2011 provided a small additional catch and harvest opportunity for anglers, and reduced the number of surplus adults at the facility. However, we estimate that only 73% of the 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 2010-11 run year will be reported in the 2011-12 annual report.

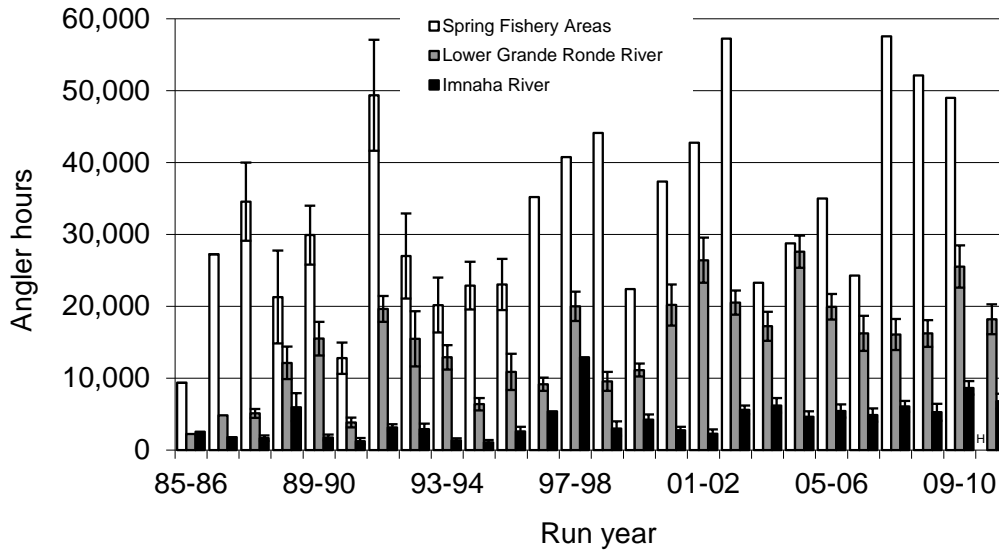


Figure 8. Angler effort (in hours) for summer steelhead in spring fishery areas (upper Grande Ronde and Willowa rivers, Catherine Creek, and Rondowa), the lower Grande Ronde River, and the Imnaha River for the 1985-86 to 2010-11 run years. Not shown are 266 and 49 angler hours on Big Sheep Creek (Imnaha basin) for the 09-10 and 10-11 run years, respectively. "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.

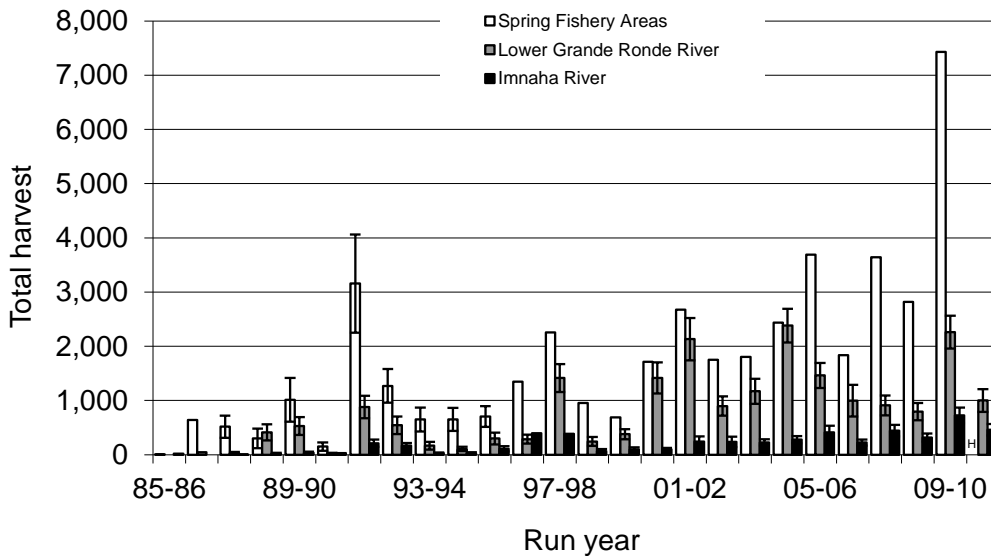


Figure 9. Number of hatchery summer steelhead harvested by recreational anglers in spring fishery areas (upper Grande Ronde and Willowa rivers, Catherine Creek, and Rondowa), the lower Grande Ronde River, and the Imnaha River for the 1985-86 to 2010-11 run years. Not shown are 8 and 0 hatchery fish harvested on Big Sheep Creek (Imnaha basin) for the 09-10 and 10-11 run years, respectively. "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 the 2009-10 run year) from 1 February to 15 April for the 1985-86 to 2010-11 run years. Angling 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			Total Catch	
	Harvest	Released		Harvest	Released			
		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	1,024	2,121	5,407	736	519	4,481	5,736
10-11	1,000	434	1,780	3,214	466	188	1,500	2,154
Average	800	422	829	2,051	187	113	612	912

^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. Estimated total catch (harvested and released) of hatchery and wild summer steelhead from angler surveys conducted on the Wallowa River and at Rondowa from 1 February to 15 April for the 1985-86 to 2009-10 run years. Estimates for run years 1985-86 to 1995-96 are based on a statistical angler survey and estimates for run years 1996-97 to present are based on a regression between angler harvest card data and creel survey harvest data. Angling regulations were not consistent among years and river sections, which may have affected the number of harvested hatchery fish. "-" indicates that an angler survey was not conducted.

Run year	Wallowa River			Rondowa			Total Catch	
	Harvest	Released		Harvest	Released			
		Hatchery	Natural ^a		Hatchery	Natural ^a		
85-86	2	0	1,331	1,333	-	-	-	-
86-87	641	0	1,880	2,521	-	-	-	-
87-88 ^b	447	0	1,517	1,964	70	0	273	343
88-89 ^b	294	21	152	467	-	-	-	-
89-90 ^b	798	376	239	1,413	38	0	20	58
90-91 ^b	0	924	146	1,070	-	-	-	-
91-92	1,514	821	333	2,668	832	537	229	1,598
92-93 ^b	1,083	732	305	2,120	-	-	-	-
93-94 ^b	481	75	285	841	143	38	47	228
94-95 ^b	565	245	300	1,110	61	17	44	122
95-96	495	214	167	876	-	-	-	-
96-97	679	380	151	1,210	434	255	82	771
97-98	1,139	525	132	1,796	733	90	154	977
98-99	468	150	121	739	282	94	73	449
99-00	300	88	135	523	238	450	136	824
00-01	925	491	379	1,795	465	229	126	820
01-02	1,492	793	398	2,683	874	145	330	1,349
02-03	861	524	282	1,667	687	955	2,077	3,719
03-04	948	574	281	1,803	754	607	934	2,295
04-05	809	879	241	1,929	1,125	565	662	2,352
05-06	1,638	1,006	329	2,973	1,667	2,441	695	4,803
06-07	720	470	216	1,406	881	448	362	1,691
07-08	1,399	1,000	251	2,650	2,050	1,903	649	4,602
08-09	1,467	766	437	2,670	1,166	511	691	2,368
09-10	2,231	1,328	659	4,218	3,725	2,514	1,812	8,051
Average	856	495	427	1,778	854	621	495	1,969

^a Includes unmarked hatchery fish for run years 85-86 to 88-89.

^b Angler surveys were conducted only during selected dates (in parentheses) on the Wallowa River during run years 88-89 and 92-93 (1 Feb-30 Apr), and 90-91 (16 Feb-15 Apr), and at Rondowa during run years 87-88 and 94-95 (1 Mar-15 Apr), 89-90 (17 Mar-31 Mar), and 93-94 (16 Mar-15 Apr).

Table 6. 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 2010-11 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
10-11	6 \pm 1	-	-	4 \pm 2	4 \pm 0	3 \pm 0	4 \pm 1
Average	10 \pm 2	20 \pm 5	21 \pm 24	9 \pm 4	12 \pm 3	10 \pm 3	2 \pm 20

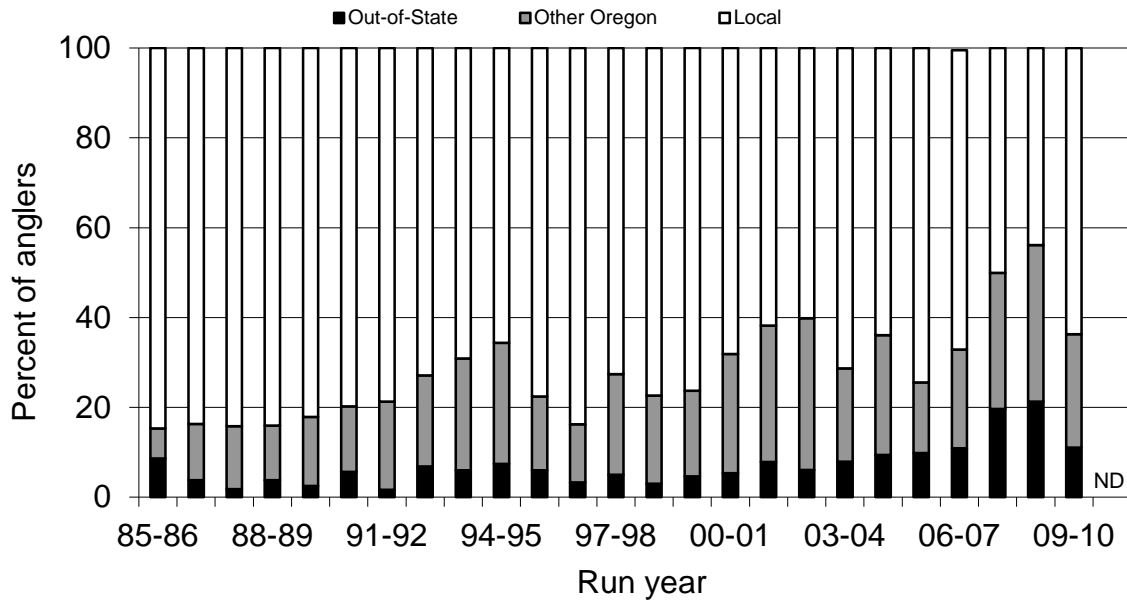


Figure 10. Percent of local resident anglers (Union or Wallowa county residents), non-local Oregon resident anglers, and out-of-state anglers that fished in summer steelhead fisheries in the Grande Ronde and Imnaha river basins for the 1985-86 to 2009-10 run years. ND indicates not determined until statewide annual harvest card data become available.

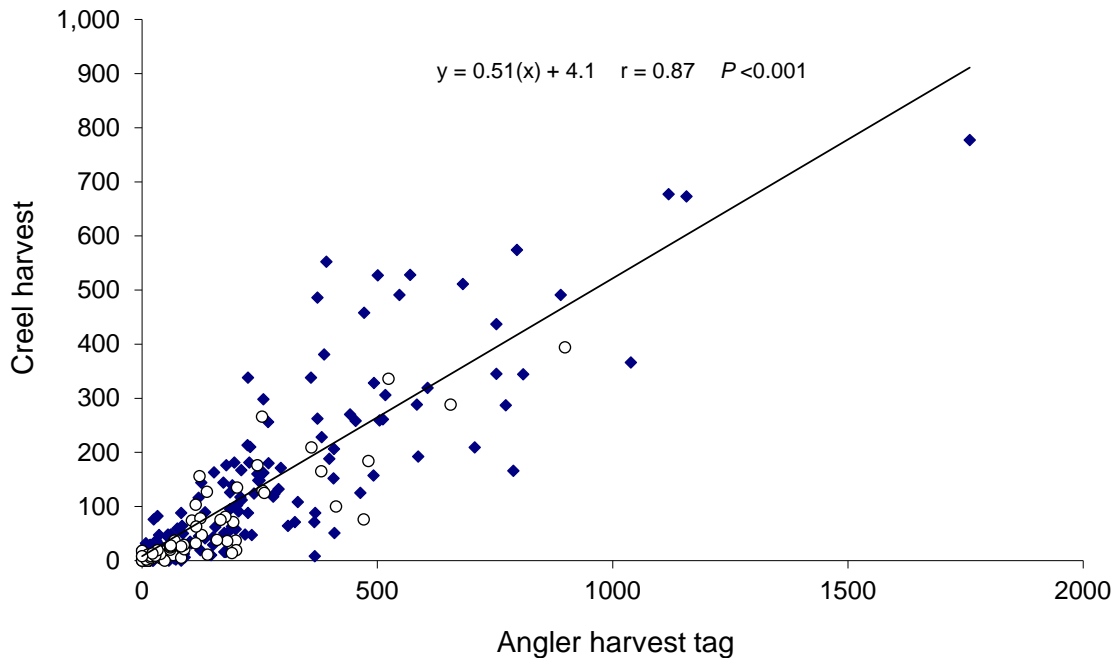


Figure 11. Relation between angler harvest tag (punch card) and creel survey harvest for summer steelhead fisheries in the Grande Ronde (◆) and Imnaha (○) river basins for years when harvest estimates for specific reaches were available (1993-1996 for the upper Grande Ronde and Wallowa, 1994-1995 for Rondowa, 1992-1993 for Catherine Creek, 1993-spring 2010 for the lower Grande Ronde, and 1986-1996, 1999-2010 for the Imnaha fishery areas).

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APPENDIX A

Fishery Statistics for the 2010-11 run year

Appendix Table A-1. Fishery statistics for summer steelhead on the lower Grande Ronde River during the 2010-11 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	57	1,268 \pm 265	269 \pm 98	44 \pm 30	0.213 \pm 0.078	5 \pm 3	286 \pm 60
Weekend	5	67	809 \pm 249	73 \pm 33	9 \pm 12	0.091 \pm 0.041	11 \pm 5	225 \pm 69
Total	12	124	2,077 \pm 364	342 \pm 104	53 \pm 32	0.165 \pm 0.050	6 \pm 2	511 \pm 90
October:								
Weekday	6	135	5,662 \pm 942	654 \pm 164	265 \pm 144	0.116 \pm 0.029	9 \pm 2	879 \pm 146
Weekend	5	143	3,090 \pm 406	401 \pm 104	120 \pm 67	0.130 \pm 0.034	8 \pm 2	526 \pm 69
Total	11	278	8,752 \pm 1,026	1,055 \pm 194	385 \pm 158	0.121 \pm 0.022	8 \pm 1	1,405 \pm 165
November:								
Weekday	6	89	2,873 \pm 1,548	647 \pm 185	193 \pm 86	0.225 \pm 0.065	4 \pm 1	576 \pm 310
Weekend	6	93	1,172 \pm 332	376 \pm 118	160 \pm 63	0.321 \pm 0.100	3 \pm 1	233 \pm 66
Total	12	182	4,045 \pm 1,583	1,023 \pm 220	353 \pm 107	0.253 \pm 0.054	4 \pm 1	809 \pm 317
December:								
Weekday	6	26	590 \pm 457	118 \pm 71	64 \pm 55	0.201 \pm 0.120	4 \pm 2	173 \pm 134
Weekend	5	73	737 \pm 208	178 \pm 58	68 \pm 28	0.242 \pm 0.079	4 \pm 1	156 \pm 44
Total	11	99	1,327 \pm 502	296 \pm 91	132 \pm 61	0.224 \pm 0.069	4 \pm 1	329 \pm 124
January:								
Weekday	6	4	55	0	0	-	-	21
Weekend	6	28	184 \pm 60	8 \pm 7	4	0.040 \pm 0.038	25 \pm 24	90 \pm 29
Total	12	32	239 \pm 60	8 \pm 7	4	0.031 \pm 0.030	32 \pm 31	111 \pm 28
February:								
Weekday	6	24	674 \pm 435	285 \pm 143	68 \pm 50	0.422 \pm 0.213	2 \pm 1	222 \pm 143
Weekend	5	41	448 \pm 200	92 \pm 41	5 \pm 6	0.205 \pm 0.092	5 \pm 2	161 \pm 72
Total	11	65	1,122 \pm 479	377 \pm 149	73 \pm 50	0.336 \pm 0.133	3 \pm 1	383 \pm 164
March:								
Weekday	7	16	423 \pm 370	58 \pm 54	0	0.137 \pm 0.125	7 \pm 6	146 \pm 128
Weekend	5	12	195 \pm 76	55 \pm 35	0	0.283 \pm 0.177	4 \pm 3	86 \pm 34
Total	12	28	618 \pm 378	113 \pm 64	0	0.183 \pm 0.102	5 \pm 3	232 \pm 142
April:								
Weekday	3	0	-	-	-	-	-	0
Weekend	2	0	-	-	-	-	-	0
Total	5	0	-	-	-	-	-	0
Grand total	86	808	18,180 \pm 2,078	3,214 \pm 362	1,000 \pm 209	0.177 \pm 0.020	6 \pm 1	3,780 \pm 432

Appendix Table A-2. Catch rate ($\pm 95\%$ confidence intervals) for summer steelhead at Rondowa during the 2010-11 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	7	17	0.259 \pm 0.176	4 \pm 3
Weekend	4	8	0.295 \pm 0.201	3 \pm 2
Total	11	25	0.272 \pm 0.126	4 \pm 2
March:				
Weekday	6	5	0.122 \pm 0.227	8 \pm 15
Weekend	4	13	0.169 \pm 0.223	6 \pm 8
Total	10	18	0.159 \pm 0.172	6 \pm 7
April:				
Weekday	3	0	-	-
Weekend	2	0	-	-
Total	5	0	-	-
Grand total	26	43	0.227 \pm 0.100	4 \pm 2

Appendix Table A-3. Catch rate ($\pm 95\%$ confidence intervals) for summer steelhead on the Wallowa River during the 2010-11 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	13	403	0.281 \pm 0.060	4 \pm 1
Weekend	8	338	0.215 \pm 0.041	5 \pm 1
Total	21	741	0.250 \pm 0.037	4 \pm 1
March:				
Weekday	8	308	0.248 \pm 0.054	4 \pm 1
Weekend	8	430	0.238 \pm 0.035	4 \pm 1
Total	16	738	0.242 \pm 0.030	4 \pm 1
April:				
Weekday	5	84	0.145 \pm 0.067	7 \pm 3
Weekend	4	58	0.071 \pm 0.044	14 \pm 9
Total	9	142	0.115 \pm 0.044	9 \pm 3
Grand total	46	1,621	0.235 \pm 0.022	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 2010-11 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	6	8	75 \pm 125	0	0	-	-	25 \pm 42
Weekend	5	10	12 \pm 7	2 \pm 4	2	0.157 \pm 0.105	6 \pm 4	3 \pm 2
Total	11	18	87 \pm 125	2 \pm 4	2	0.022 \pm 0.015	45 \pm 31	28 \pm 40
March:								
Weekday	6	39	661 \pm 514	252 \pm 122	34 \pm 31	0.381 \pm 0.158	3 \pm 1	180 \pm 140
Weekend	4	67	677 \pm 240	235 \pm 126	61 \pm 37	0.347 \pm 0.131	3 \pm 1	178 \pm 63
Total	10	106	1,338 \pm 567	487 \pm 175	95 \pm 49	0.364 \pm 0.103	3 \pm 1	358 \pm 152
April:								
Weekday	3	21	484 \pm 323	266 \pm 173	51 \pm 41	0.549 \pm 0.305	2 \pm 1	61 \pm 41
Weekend	2	8	34 \pm 22	0	0	-	-	10 \pm 6
Total	5	29	518 \pm 324	266 \pm 173	51 \pm 41	0.513 \pm 0.285	2 \pm 1	71 \pm 44
Grand total	26	153	1,943 \pm 665	755 \pm 246	148 \pm 63	0.288 \pm 0.054	3 \pm 1	457 \pm 156

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 2010-11 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	6	31	372 \pm 184	87 \pm 81	30 \pm 32	0.233 \pm 0.158	4 \pm 3	109 \pm 54
Weekend	5	87	578 \pm 286	89 \pm 24	27 \pm 11	0.155 \pm 0.026	6 \pm 1	140 \pm 69
Total	11	118	950 \pm 340	176 \pm 85	57 \pm 34	0.186 \pm 0.064	5 \pm 2	249 \pm 89
March:								
Weekday	6	155	2,735 \pm 647	932 \pm 284	211 \pm 75	0.341 \pm 0.089	3 \pm 1	604 \pm 143
Weekend	4	101	884 \pm 244	256 \pm 80	50 \pm 16	0.290 \pm 0.064	3 \pm 1	197 \pm 54
Total	10	256	3,619 \pm 691	1,188 \pm 295	261 \pm 76	0.328 \pm 0.069	3 \pm 1	801 \pm 153
April:								
Weekday	3	16	220 \pm 141	26 \pm 32	0	0.117 \pm 0.124	9 \pm 10	87 \pm 56
Weekend	2	15	41 \pm 46	0	0	-	-	29 \pm 33
Total	5	31	261 \pm 148	26 \pm 32	0	0.099 \pm 0.105	10 \pm 11	116 \pm 66
Grand total	26	405	4,830 \pm 784	1,390 \pm 309	318 \pm 83	0.288 \pm 0.054	3 \pm 1	1,166 \pm 189
Sec.1 + 2	26	558	6,773 \pm 1,028	2,145 \pm 395	466 \pm 105	0.317 \pm 0.049	3 \pm 0	1,623 \pm 246

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 2010-11 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	6	0	-	-	-	-	-	0
Weekend	5	0	-	-	-	-	-	0
Total	11	0	-	-	-	-	-	0
March:								
Weekday	6	7	22 \pm 26	0	0	-	-	27 \pm 32
Weekend	4	5	27 \pm 36	9 \pm 4	0	0.316 \pm 0.058	3 \pm 1	7 \pm 9
Total	10	12	49 \pm 44	9 \pm 4	0	0.176 \pm 0.032	6 \pm 1	34 \pm 31
April:								
Weekday	3	4	12 \pm 3	0	0	-	-	15 \pm 4
Weekend	2	0	-	-	-	-	-	0
Total	5	4	12 \pm 3	0	0	-	-	15 \pm 4
Grand total	26	16	61 \pm 44	9 \pm 4	0	0.167 \pm 0.031	6 \pm 1	49 \pm 35

APPENDIX B

Percent of Summer Steelhead That Were Marked Hatchery Fish and Caught during the 2010-11 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 2010-11 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	30(342)	54(1,055)	48(1,023)	56(296)	50(8)	28(377)	0(113)	-(0)
Rondowa	-	-	-	-	-	85(47)	67(18)	-(0)
Wallowa River	-	-	-	-	-	88(605)	84(683)	42(52)
Imnaha River (Section 1)	-	-	-	-	-	100(2)	29(487)	35(266)
Imnaha River (Section 2)	-	-	-	-	-	40(176)	29(1,188)	0(26)
Big Sheep Cr.	-	-	-	-	-	-(0)	0(9)	-(0)

APPENDIX C

Fishery Statistics for Spring Fisheries for the 2009-10 Run Year

Appendix Table C-1. Estimated harvest of summer steelhead, and observed and expanded harvest of coded-wire tagged steelhead in spring fisheries in the Grande Ronde basin for the 2009-10 run year. Total harvest = 0.508 (harvest card) + 4.109. 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	10	19	0	13	0	13	13		
Total harvest	-	9	14	-	11	-	11	11	56	
Rondowa (234)										
Angler harvest cards	29	160	150	73	547	1,964	3,292	1,055		
Sampled fish	0	0	0	0	0	59	98	18		
Total harvest	19	85	80	41	282	1,002	1,676	540	3,725	
Sample rate expansion	-	-	-	-	-	17.0	17.1	30.0		
09 43 05						1	0	0	1	17
09 43 63						1	1	0	2	34
09 44 02						1	0	0	1	17
09 44 05						1	0	0	1	17
09 44 07						1	0	0	1	17
09 44 08						1	1	0	2	34
09 44 09						0	2	1	3	35
09 44 10						0	1	0	1	17
09 44 11						1	6	0	7	120
09 44 13						1	2	1	4	52
09 44 14						2	1	1	4	52
09 45 44						1	2	1	4	52
09 45 46						2	1	0	3	51
09 45 47						4	2	0	6	102
Wallowa (235)										
Angler harvest cards	15	29	73	39	127	820	1,697	1,525		
Sampled fish	0	0	0	0	0	254	280	327		
Total harvest	12	19	41	24	69	421	866	779	2,231	
Sample rate expansion	-	-	-	-	-	1.7	3.1	2.4		
09 43 05						2	5	0	7	18
09 43 63						0	0	1	1	2
09 44 01						2	2	0	4	9
09 44 02						2	2	2	6	14
09 44 04						4	1	0	5	10
09 44 05						3	0	0	3	5
09 44 06						1	2	0	3	8
09 44 07						7	4	0	11	24
09 44 08						1	1	1	3	7
09 44 09						8	5	3	16	35
09 44 10						4	4	3	11	26
09 44 11						2	5	5	12	30
09 44 12						5	3	1	9	19
09 44 13						4	11	17	32	81
09 44 14						8	12	9	29	71
09 45 44						11	4	1	16	32

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	
09 45 45						16	1	0	17	30
09 45 46						13	0	0	13	22
09 45 47						12	3	1	16	31
Wenaha (184)										
Angler harvest cards	10	0	5	10	0	0	0	0		
Total harvest	9	-	7	9	-	-	-	-	25	
Middle Grande Ronde (232)										
Angler harvest cards	0	198	223	10	299	915	985	51		
Total harvest	-	105	117	9	156	469	504	30	1,390	
Total Grande Ronde harvest (excluding lower Grande Ronde)									7,427	

Appendix Table C-2. Estimated catch of summer steelhead in spring fisheries in the Grande Ronde basin for the 2009-10 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	-	9	14	-	11	-	11	11	56
Total catch	-	17	26	-	21	-	20	22	106
Catherine Creek									
Sampled harvest	-	-	-	-	-	-	-	-	-
Sampled catch	-	-	-	-	-	-	-	-	-
Total harvest	-	-	-	-	-	-	-	-	0
Total catch	-	-	-	-	-	-	-	-	0
Rondowa									
Sampled harvest	-	-	-	-	-	59	98	18	175
Sampled catch	-	-	-	-	-	99	217	53	369
Total harvest	19	85	80	41	282	1,002	1,676	540	3,725
Total catch	40	179	169	86	595	1,681	3,711	1,590	8,051
Wallowa									
Sampled harvest	-	-	-	-	-	254	280	327	861
Sampled catch	-	-	-	-	-	457	511	659	1,627
Total harvest	12	19	41	24	69	421	866	779	2,231
Total catch	23	36	77	45	130	757	1,580	1,570	4,218
Wenaha									
Sampled harvest	-	-	-	-	-	-	-	-	-
Sampled catch	-	-	-	-	-	-	-	-	-
Total harvest	9	-	7	9	-	-	-	-	25
Total catch	43	-	13	14	-	-	-	-	70
Middle Grande Ronde									
Sampled harvest	-	-	-	-	-	-	-	-	-
Sampled catch	-	-	-	-	-	-	-	-	-
Total harvest	-	105	117	9	156	469	504	30	1,390
Total catch	-	198	221	17	295	844	920	60	2,555
Total Grande Ronde catch (excluding lower Grande Ronde)									15,000

^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 2009-10 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	-	17	26	-	21	-	20	22	106
Angler effort	-	66	102	-	82	-	97	55	402
Catherine Creek									
Catch rate	-	-	-	-	-	-	-	-	-
Total catch	-	-	-	-	-	-	-	-	0
Angler effort	-	-	-	-	-	-	-	-	0
Rondowa									
Catch rate	-	-	-	-	-	0.322	0.482	0.355	0.407
Total catch	40	179	169	86	595	1,681	3,711	1,590	8,051
Angler effort	98	440	415	211	1,462	5,220	7,699	4,479	20,024
Wallowa									
Catch rate	-	-	-	-	-	0.204	0.207	0.397	0.256
Total catch	23	36	77	45	130	757	1,580	1,570	4,218
Angler effort	90	141	301	176	508	3,711	7,633	3,955	16,515
Wenaha									
Catch rate	-	-	-	-	-	-	-	-	-
Total catch	43	-	13	14	-	-	-	-	70
Angler effort	303	-	57	92	-	-	-	-	452
Middle Grande Ronde									
Catch rate	-	-	-	-	-	-	-	-	-
Total catch	-	198	221	17	295	844	920	60	2,555
Angler effort	-	773	863	66	1,152	4,137	4,444	151	11,586
Upper Grande Ronde									
Total Grande Ronde angler effort (excluding lower Grande Ronde)									48,979

^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 2010-11 Run Year

Appendix Table D. Summary of adult steelhead recycled back to the Wallowa River fishery from the Big Canyon Facility for the 2010-11 run year.

Date and percent of release	Number of fish ^a		
	Male	Female	Total
		Released	
11 March 2011	16	10	26
17 March 2011	13	12	25
25 March 2011	10	15	25
1 April 2011	8	17	25
Total	47	54	101
		Recaptured at Big Canyon ^b	
11 March-1 April 2011	28	21	49
% of release	60%	39%	49%
		Observed and estimated (in parentheses) harvest ^c	
11 March-1 April 2011	1(8)	2(17)	3(25)
% of release	17%	31%	25%
		Total recovered (Big Canyon + estimated harvest)	
11 March-1 April 2011	36	38	74
% of release	77%	70%	73%

^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 2010-11 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.