LOWER SNAKE RIVER COMPENSATION PLAN:
Summer Steelhead Creel Surveys on the Grande Ronde, Wallowa, and Imnaha Rivers for the 2012-13 Run Year

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OREGON
Fish & Wildlife

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COMPENSATION PLAN

This report is available at: http://www.fws.gov/lsnakecomplan/reports/ODFWreports.html

Front cover photo: Kyle Bratcher fighting a summer steelhead on the lower Grande Ronde River near Troy, Oregon, in late October 2013 to collect broodstock for our Wallowa Hatchery program.

ANNUAL PROGRESS REPORT

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PREFACE

This report is for the funding period 1 October 2012 to 30 September 2013. The sampling period was from 1 September 2012 to 15 April 2013. 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 2012-2013 run year were primarily from the 2009 and 2010 brood years. Results of creel surveys conducted prior to fall 2012 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, 2012, 2013, and 2014), 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 2012 to 15 April 2013 in the Grande Ronde and Imnaha river basins.

ACKNOWLEDGMENTS

We would like to thank Mary Buckman for the statistical design and analysis of the data, Holly Stanton, Celeste Cole and Brad Smith for their dedication in conducting the surveys, and Rod Engle for reviewing the document. We would also like to thank Joe Bumgarner (Washington Department of Fish and Wildlife) for coordinating and Sean Taylor for conducting the Lower Grande Ronde survey during spring 2013. 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.

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SUMMARY

Creel survey data for the 2012-13 run year were indicative of less successful summer steelhead fisheries in the Grande Ronde and Imnaha River basins than in recent years. Estimated angler effort on the lower Grande Ronde River (14,514 hrs) was below the 10-year average (approx. 19,808 hrs) and on the Imnaha River effort (3,857 hrs) was also below the 10-year average (5,706 hrs). Total catch on the lower Grande Ronde River was 1,986 fish and on the Imnaha River it was 336 fish; 57% and 19% of their respective 10-year averages. Total steelhead harvest was similarly low at 594 fish (lower Grande Ronde River) and 126 fish (Imnaha River).

The total catch of wild steelhead in the lower Grande Ronde River for the current run year was 1,090 fish, which was the second lowest total since the 2000-01 run year. However, for the third year in a row catch of wild steelhead in the lower Grande Ronde River fishery comprised over 50% of the total steelhead catch. We speculate that the high percentage of wild steelhead in the catch may be due to a change in the ratio of hatchery to wild steelhead in the river, caused by a decline in the hatchery steelhead run.

This report includes angler harvest card data (total catch, effort, and harvest) for the middle Grande Ronde River, the Wallowa River and Rondowa survey areas for the 2011-12 run year, summarized in the appendices. Based on creel and harvest card data, combined total catch in those areas was 5,225 fish, total harvest was 2,401 fish, and total effort was 23,543 hours. All three metrics were lower than the prior run year and they were below their respective 10-year averages. Wild fish comprised 23.8% and 15.5% of the respective Wallowa and Rondowa catch, which was similar to previous years.

In every Grande Ronde basin fishery surveyed, catch rates during the 2012-13 run year were worse than they had been in at least the last three years. On the Wallowa River the catch rate (10 hrs/fish) was the poorest since the 2002-03 run year. Similarly, on the Imnaha River catch rates were 11 hrs/fish; the poorest rates since 1999-00.

Anglers harvested more two-ocean than one-ocean hatchery steelhead in every Grande Ronde fishery, but the proportions were nearly equal on the Imnaha River. More female steelhead were harvested in every fishery. The percent of local resident anglers participating in steelhead fisheries varied between 55 and 70% in Grande Ronde and Imnaha basin fisheries except at Big Sheep Creek in the Imnaha River basin, which had a much lower percent (27%) of local resident anglers.

For the fourth consecutive year, our creel surveyors scanned with a handheld wand detector all harvested steelhead adults to detect coded-wire tags, but we have yet to detect a stray adipose (Ad) -clipped adult. In the Imnaha River creel our surveyor did not recover any coded-wire tags from out of basin strays.

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 increased smolt-to-adult survival (Clarke et al. 2014), 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 (Flesher et al. 1994). This report summarizes results of creel surveys conducted during the fall of 2012 and the spring of 2013 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 2011-12 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 2012-13 steelhead angling season in the Grande Ronde and Imnaha river basins was open from 1 September 2012 to 15 April 2013.

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 in the Palmer Junction area, located 5.6 km upstream of Rondowa

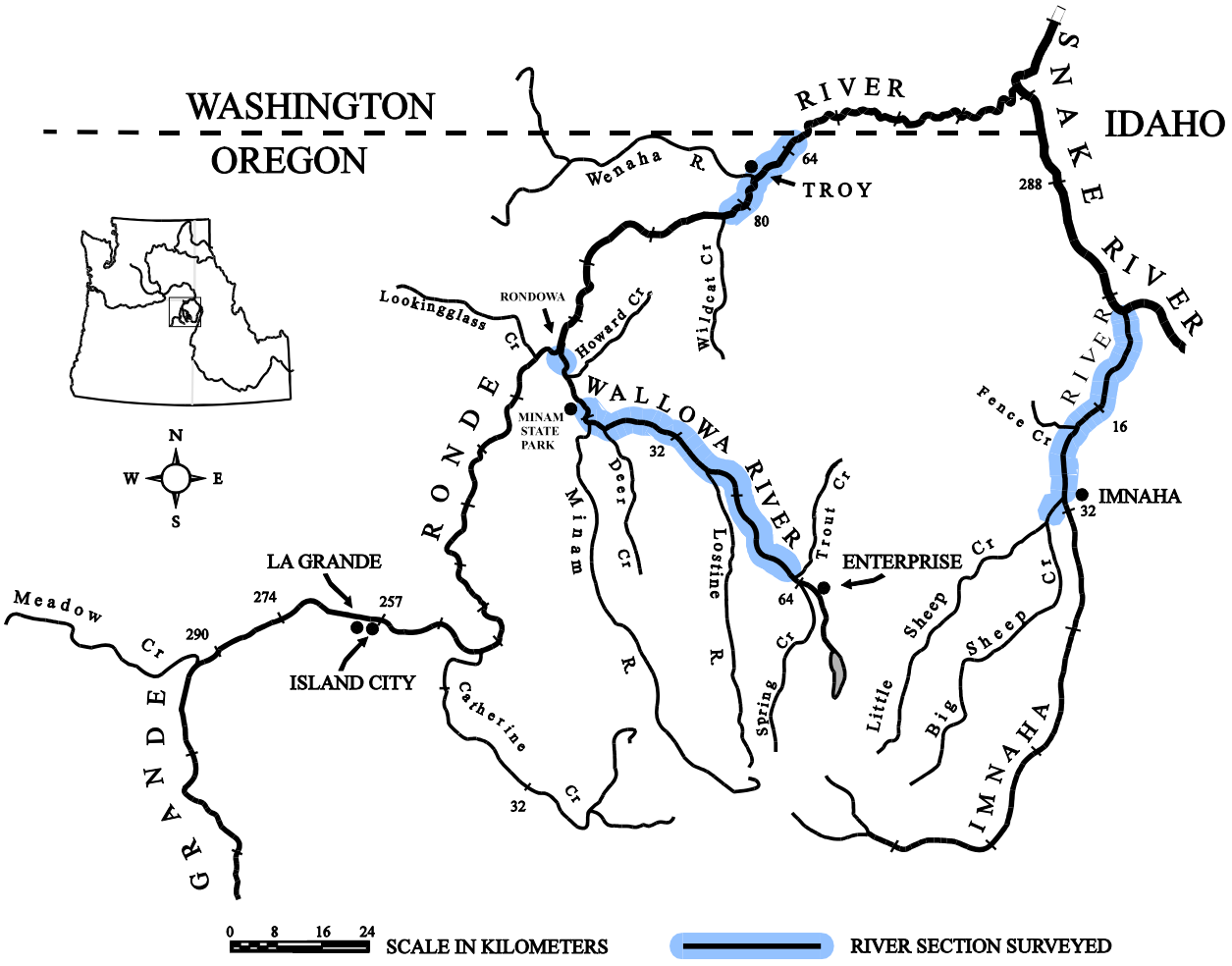

Figure 1. Map of northeastern Oregon showing where summer steelhead creel surveys were conducted in the Grande Ronde and Imnaha river basins during the 2012-13 run year.

on the Grande Ronde River, and on Smith Mountain Road at the Handcock Forest Management gate, approximately 16 km by road to Rondowa. Thus, for the Rondowa survey, we interviewed anglers leaving the parking areas near 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). Starting in 2013, the survey on the lower Grande Ronde River was conducted from 1 September 2012 to 31 March 2013, rather than through 15 April. Although the fishing season is through 15 April, the April creel was eliminated because prior years of data showed consistently low angler effort in early April. During the creel 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 2013. 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 2013. 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, 2013, 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 23 February, we surveyed five days each week (Sunday – Saturday) from 0900-1800 hours. From 24 February to 15 April, we surveyed four days each week from 0800-1900 hours.

For the lower Grande Ronde River and Imnaha 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). 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 2011-2012. 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 2013, 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 8 March and 29 March 2013, 100 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 2012 to 15 April 2013, we sampled 52.2% of the weekends and holidays (36 days) and 30.1% of the weekdays (43 days) for a total of 79 sample days. On the Wallowa River from 1 February to 15 April 2013, we sampled 78.3% of the weekends and holidays (18 days) and 41.2% of the weekdays (21 days) for a total of 39 sample days. During the same time period at Rondowa, we sampled 69.6% of the weekends and holidays (16 days) and 27.5% of the weekdays (14 days) for a total of 30 sample days. On the Imnaha River and Big Sheep Creek from 1 February to 15 April 2013, we sampled 52.2% of the weekends and holidays (12 days) and 29.4% of the weekdays (15 days) for a total of 27 sample days. Tables in Appendix A provide more details on sampling effort by fishing location.

We estimate that 2,868 anglers fished for 14,514 hours on the lower Grande Ronde River during the 2012-13 season. Anglers caught and released 1,090 wild and 302 hatchery steelhead, and harvested 594 hatchery steelhead for an average catch rate index of 7 hours per fish (Figures 2-6, Appendix Table A-1). The percent of steelhead caught that were hatchery origin ranged from 0% in March 2013 to 76% in September 2012 (Figure 7, Appendix Table B). Twenty-nine percent of harvested hatchery steelhead spent one year in freshwater and one year in saltwater (hereafter designated 1:1), and 71% spent one year in freshwater and two years in saltwater (designated 1:2, Table 1). Mean fork length (±95% confidence interval) of harvested hatchery steelhead was 573 (±10) mm for age 1:1, and 705 (±9) mm for age 1:2 (Table 1). Gender composition was 30% male and 70% female (Table 1). Fifty-five percent of the anglers on the lower Grande Ronde River were local Oregon resident anglers, 26% were non-

local Oregon resident anglers, 4% were Washington State residents and 15% resided outside the states of Oregon and Washington (Table 2). On the lower Grande Ronde River, anglers harvested an estimated 247 AdLV+CWT and AdRV+CWT marked steelhead from our hatchery releases and an estimated 9 AdLV+CWT marked steelhead from Washington Department of Fish and Wildlife's hatchery release site at the Cottonwood Conditioning Pond on the lower Grande Ronde River (Table 3).

At Rondowa, the catch rate index averaged 9 hours per fish (Figure 4, Appendix Table A-2). The percent of steelhead caught that were hatchery origin ranged from 0% in April to 91% in February (Figure 7, Appendix Table B). Age composition of harvested hatchery steelhead was 10% 1:1 and 90% 1:2 (Table 1). Mean fork length (±95% confidence interval) of harvested hatchery steelhead was 595 (±28) mm for age 1:1 and 711 (±11) mm for age 1:2 (Table 1). Gender composition was 23% male and 77% female (Table 1). Sixty percent of the anglers at Rondowa were local Oregon resident anglers, 32% were non-local Oregon resident anglers, 1% were Washington State residents and 7% resided outside the states of Oregon and Washington (Table 2). At Rondowa, anglers harvested 7 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 10 hours per fish (Figure 4, Appendix Table A-3). The percent of steelhead caught that were hatchery origin ranged from 21% in April to 84% in February (Figure 7, Appendix Table B). Age composition of harvested hatchery steelhead was 18% 1:1, and 82% 1:2 (Table 1). Mean fork length (±95% confidence interval) of harvested hatchery steelhead was 575 (±9) mm for age 1:1 and 718 (±5) mm for age 1:2 (Table 1). Gender composition was 33% male and 67% female (Table 1). Fifty-five percent of the anglers on the Wallowa River were local Oregon residents, 39% were non-local Oregon residents, 2% were Washington State residents and 4% resided outside the states of Oregon and Washington (Table 2). On the Wallowa River, anglers harvested 66 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 1,095 anglers fished for 3,914 hours. They caught and released 206 wild and 4 hatchery steelhead, and harvested 126 hatchery steelhead for an average catch rate index of 11 hours per fish (Figures 2-6, Appendix Tables A-4, A-5, and A-6). The percent of steelhead caught that were hatchery origin ranged from 0% in March in Big Sheep 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 48% 1:1 and 52% 1:2 (Table 1). Mean fork length(±95% confidence interval) of harvested hatchery steelhead was 553 (±28) mm for age 1:1 and 684 (±30) mm for age 1:2 (Table 1). Gender was 30% male and 70% female (Table 1). Seventy percent of the anglers on the Imnaha

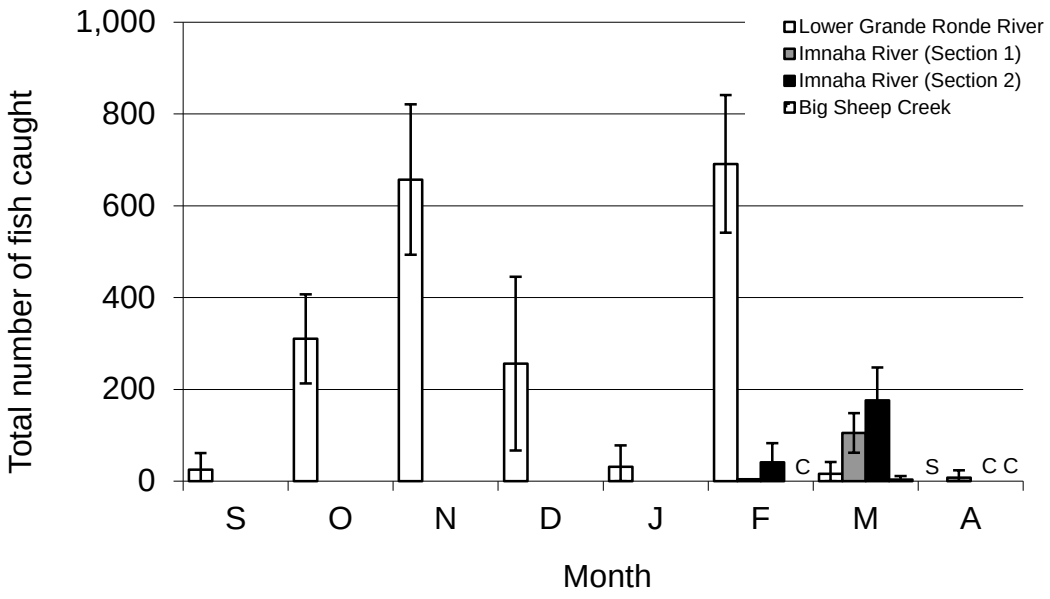

Figure 2. Estimated total catch of summer steelhead (vertical bars show 95% confidence intervals) on the lower Grande Ronde River, two sections of the Imnaha River, and Big Sheep Creek during the 2012-13 run year. "C" indicates no catch and "S" indicates no survey. Surveys were conducted from 1 September 2012 to 31 March 2013 on the lower Grande Ronde River, and from 1 February to 15 April 2013 on the Imnaha River and Big Sheep Creek.

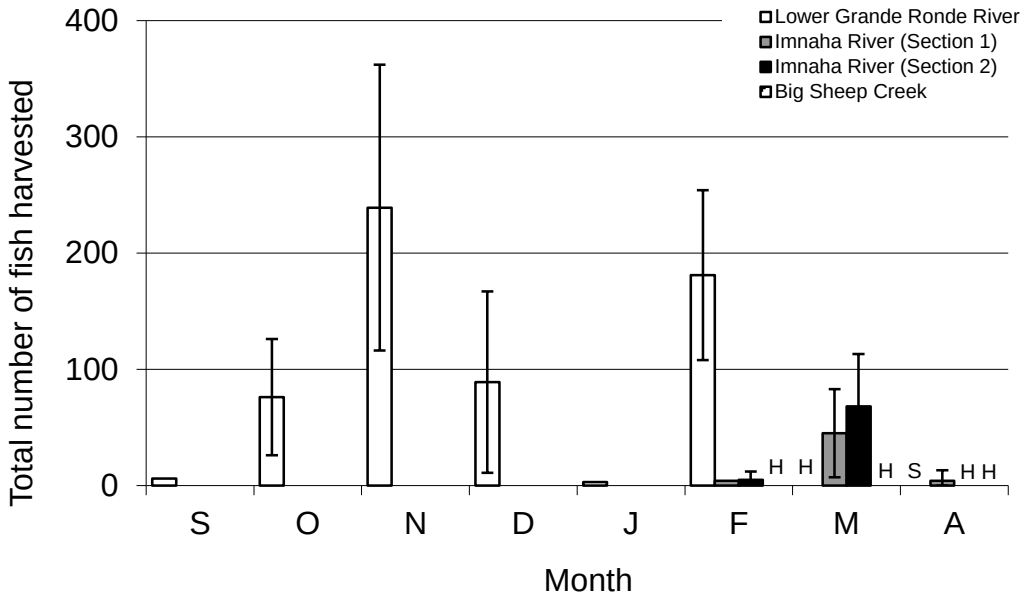

Figure 3. Estimated total harvest of summer steelhead (vertical bars show 95% confidence intervals) on the lower Grande Ronde River, two sections of the Imnaha River, and Big Sheep Creek during the 2012-13 run year. "H" indicates no harvest and "S" indicates no survey. Surveys were conducted from 1 September 2012 to 31 March 2013 on the lower Grande Ronde River, and from 1 February to 15 April 2013 on the Imnaha River and Big Sheep Creek.

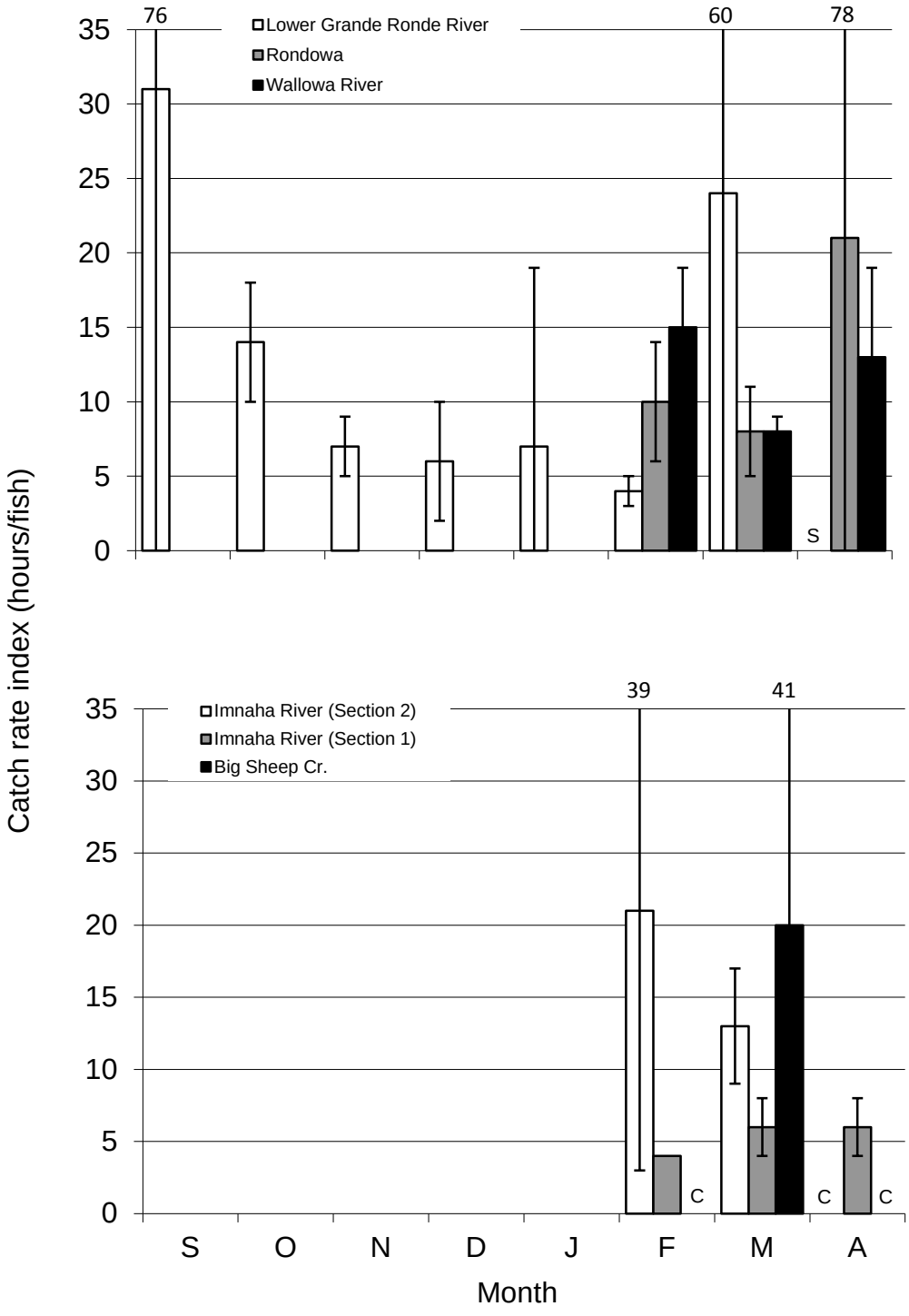

Figure 4. Estimated catch rate index (hours/fish) for summer steelhead (vertical bars show 95% confidence intervals) in the Grande Ronde and Imnaha river basins during the 2012-13 run year. "S" indicates no survey and "C" indicates no catch. Survey areas and times include the lower Grande Ronde River (1 September 2012 – 31 March 2013), and Rondowa, Wallowa River, two sections of the Imnaha River, and Big Sheep Creek (1 February – 15 April 2013). Note: A lower catch rate index implies better angling success.

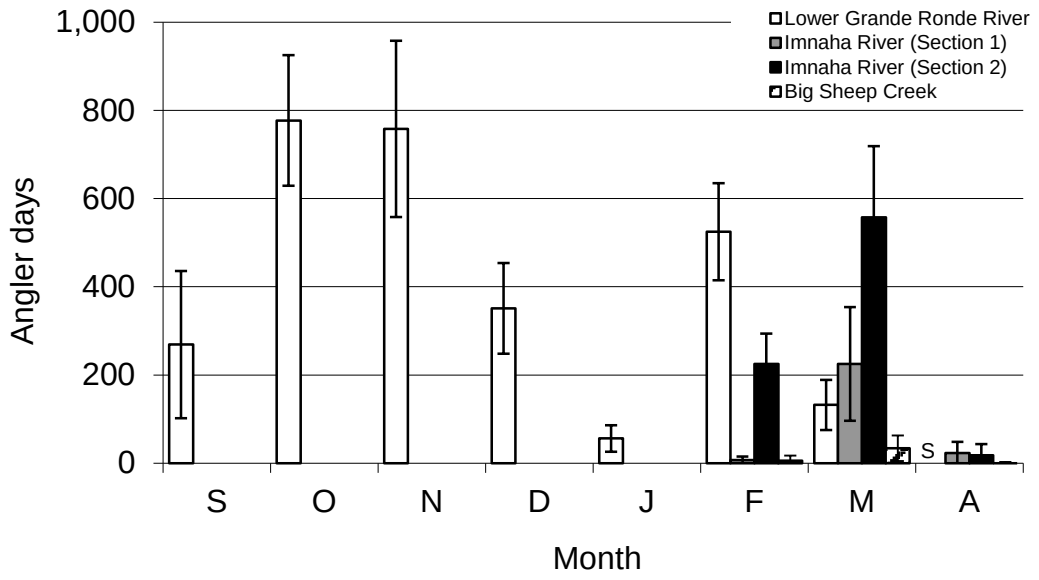

Figure 5. Estimated number of angler days for summer steelhead (vertical bars show 95% confidence intervals) on the lower Grande Ronde River, two sections of the Imnaha River, and Big Sheep Creek during the 2012-13 run year. "S" indicates no survey. Surveys were conducted from 1 September 2012 to 31 March 2013 on the lower Grande Ronde River, and from 1 February to 15 April 2013 on the Imnaha River and Big Sheep Creek.

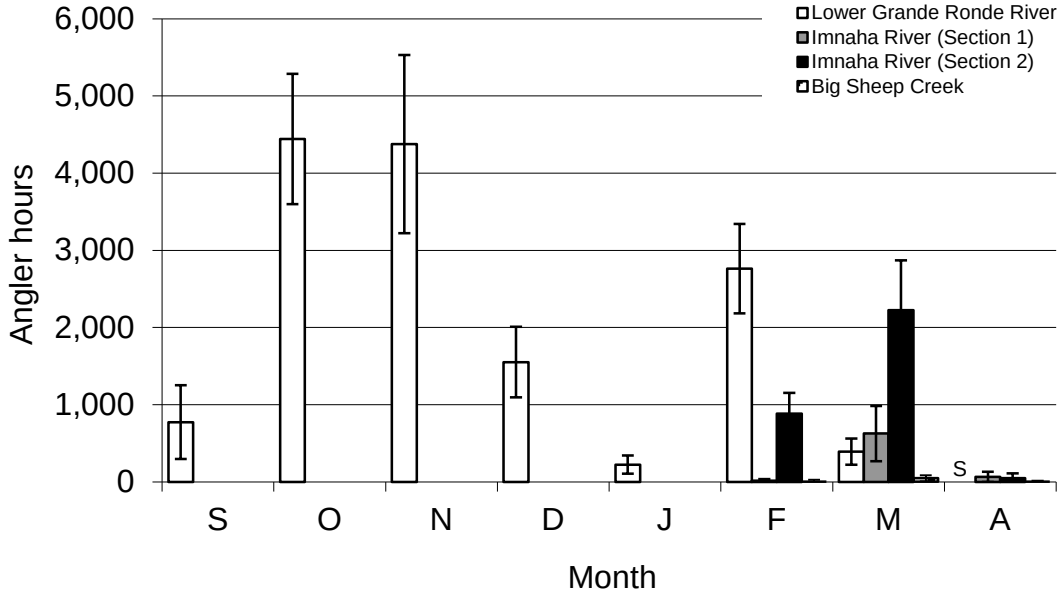

Figure 6. Estimated number of angler hours for summer steelhead (vertical bars show 95% confidence intervals) on the lower Grande Ronde River, two sections of the Imnaha River, and Big Sheep Creek during the 2012-13 run year. "S" indicates no survey. Surveys were conducted from 1 September 2012 to 31 March 2013 on the lower Grande Ronde River, and from 1 February to 15 April 2013 on the Imnaha River and Big Sheep Creek.

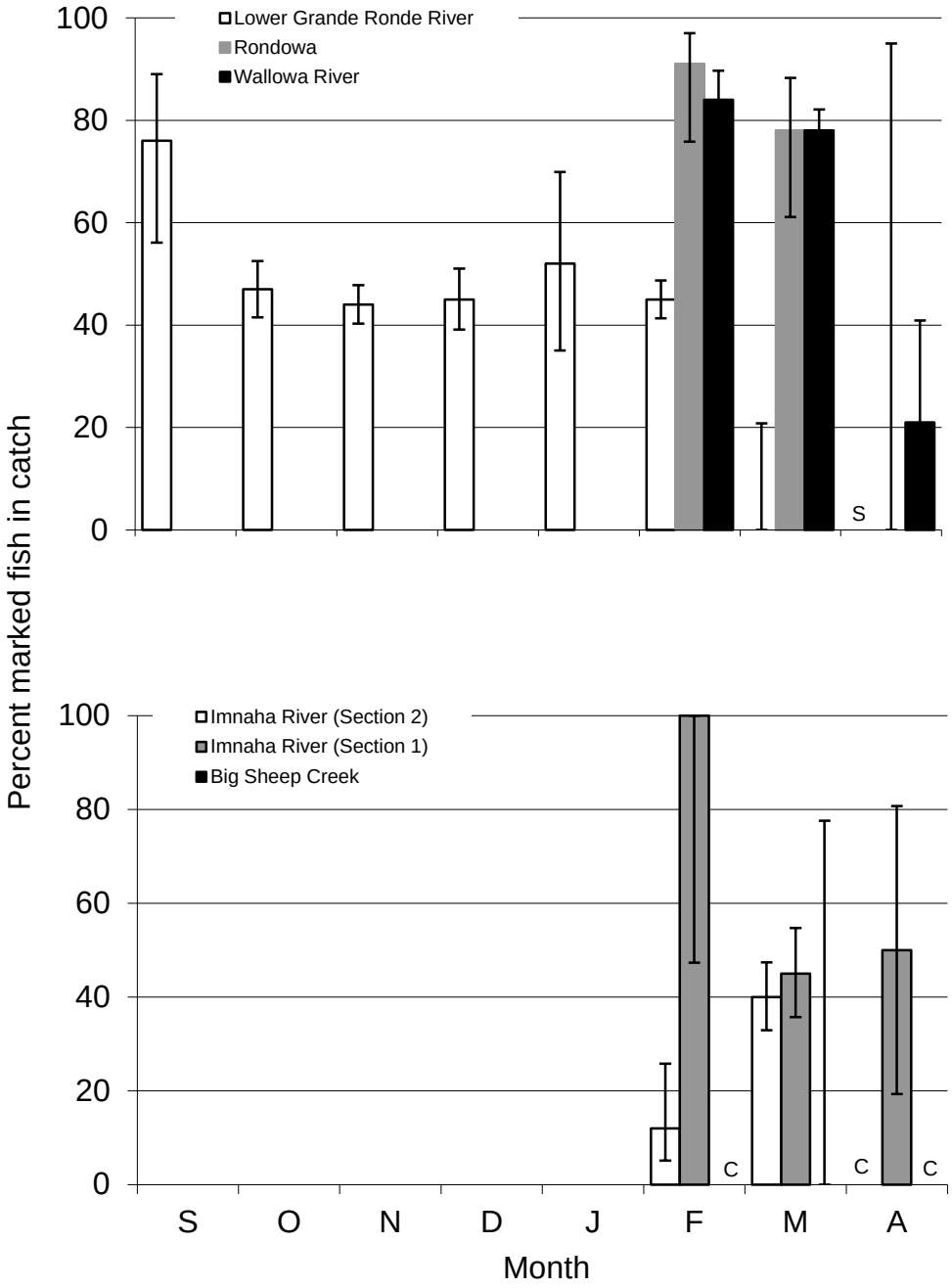

Figure 7. Estimated percent of summer steelhead caught (vertical bars show 95% confidence intervals; using a binomial distribution) in the Grande Ronde and Imnaha river basins during the 2012-13 run year that were marked. "S" indicates no survey and "C" indicates no catch. All unmarked fish were considered to be wild. Survey areas and times include the lower Grande Ronde River (1 September 2012 – 31 March 2013), and Rondowa, Wallowa River, two sections of the Imnaha River, and Big Sheep Creek (1 February - 15 April 2013).

Table 1. Percent age composition and mean fork length (± 95% confidence intervals) of hatchery summer steelhead sampled in creel surveys in the Grande Ronde and Imnaha river basins during the 2012-13 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 2013 and Little Sheep Creek Facility (for the Imnaha River basin including the Imnaha River and Big Sheep Creek) in 2012 and 2013. 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.

Creek survey	Age composition (%)				Mean fork length (mm)					
area, gender	N	1:1	1:2	2:1	N	1:1	N	1:2	N	2:1
Lower GR R.										
Males	41	49	51	0	19	578±16	20	741±18	0	-
Females	95	20	80	0	18	567±14	72	696±9	0	-
Total	136	29	71	0	37	573±10	92	705±9	0	-
Rondowa										
Males	12	33	67	0	3	597±52	6	748±37	0	-
Females	40	2	98	0	1	590	29	703±9	0	-
Total	52	10	90	0	4	595±28	35	711±11	0	-
Wallowa R.										
Males	99	27	73	0	26	583±14	69	740±10	0	-
Females	197	13	86	0	25	567±13	165	708±6	0	-
Total	296	18	82	0	51	575±9	234	718±5	0	-
Imnaha R. basin										
Males	12	58	42	0	5	555±67	3	745±207	0	-
Females	28	43	57	0	7	552±36	10	666±10	0	-
Total	40	48	52	0	12	553±28	13	684±30	0	-

Table 2. Residence of summer steelhead anglers interviewed during creel surveys in the Grande Ronde and Imnaha river basins during the 2012-13 run year. Local Oregon resident anglers were from Union and Wallowa counties.

		Percent			
Creel survey area	Number of anglers	Local Oregon resident anglers	Non-local Oregon resident anglers	Washington resident anglers	Other out-of-state anglers[a]
Lower GR River	800	55	26	4	15
Rondowa	105	60	32	1	7
Wallowa River	1,263	55	39	2	4
Imnaha River	375	70	19	0	11
Big Sheep Creek	11	27	46	0	27

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 2012-13 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 02 97	Spring Cr.	Fall Brood/April	2010	3	23
	09 02 99	Spring Cr.	Fall Brood/April	2010	3	17
	09 03 17	Spring Cr.	Prod./Vol./May	2010	1	3
	09 03 18	Deer Cr.	Volitional/May	2010	1	12
	09 03 19	Deer Cr.	Prod./April	2010	1	2
	09 03 20	Spring Cr.	Prod./April	2010	1	5
	09 46 71	Spring Cr.	Fall Brood/April	2009	3	19
	09 46 72	Spring Cr.	Prod./April	2009	5	35
	09 46 73	Spring Cr.	Prod./April	2009	2	14
	09 46 74	Spring Cr.	Prod./April	2009	5	28
	09 46 75	Spring Cr.	Fall Brood/April	2009	5	26
	09 46 76	Spring Cr.	Fall Brood/April	2009	2	6
	09 46 77	Spring Cr.	Fall Brood/April	2009	1	12
	09 46 78	Spring Cr.	Prod./April	2009	3	11
	09 46 79	Deer Cr.	Volitional/May	2009	4	17
	09 46 80	Deer Cr.	Prod./April	2009	3	17
	63 51 71	-	WDFW[c]	2009	2	9
Wallowa River	09 02 97	Spring Cr.	Fall Brood/April	2010	2	ND
	09 02 99	Spring Cr.	Fall Brood/April	2010	2	ND
	09 03 16	Spring Cr.	Fall B./Vol./May	2010	2	ND
	09 03 17	Spring Cr.	Prod./Vol./May	2010	1	ND
	09 03 18	Deer Cr.	Volitional/May	2010	1	ND
	09 03 19	Deer Cr.	Prod./April	2010	3	ND
	09 03 22	Spring Cr.	Prod./April	2010	1	ND
	09 45 88	Spring Cr.	Prod./Vol./May	2008	1	ND
	09 46 71	Spring Cr.	Fall Brood/April	2009	3	ND
	09 46 72	Spring Cr.	Prod./April	2009	6	ND
	09 46 73	Spring Cr.	Prod./April	2009	8	ND
	09 46 74	Spring Cr.	Prod./April	2009	6	ND
	09 46 75	Spring Cr.	Fall Brood/April	2009	1	ND
	09 46 76	Spring Cr.	Fall Brood/April	2009	3	ND
	09 46 78	Spring Cr.	Prod./April	2009	7	ND
	09 46 79	Deer Cr.	Volitional/May	2009	11	ND
	09 46 80	Deer Cr.	Prod./April	2009	10	ND
Rondowa	09 46 73	Spring Cr.	Prod./April	2009	1	ND
	09 46 75	Spring Cr.	Fall Brood/April	2009	1	ND
	09 46 76	Spring Cr.	Fall Brood/April	2009	2	ND
	09 46 78	Spring Cr.	Prod./April	2009	1	ND
	09 46 80	Deer Cr.	Prod./April	2009	2	ND
Imnaha River	09 46 70	L. Sheep Cr.	Volitional/April	2009	2	9

[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 51 71 were Wallowa stock released by WDFW in 2010 in the lower Grande Ronde River at the Cottonwood Conditioning Pond, Washington.*

River were local Oregon residents, 19% were non-local Oregon residents, and 11% resided outside the states of Oregon and Washington (Table 2). On Big Sheep Creek, 27 percent of the anglers were local Oregon residents, 46% were non-local Oregon residents, and 27% resided outside the states of Oregon and Washington (Table 2). On the Imnaha River and Big Sheep Creek, anglers harvested an estimated 9 AdLV+CWT marked steelhead from our hatchery releases (Table 3).

Angler effort on the lower Grande Ronde was 70% of last year whereas the Imnaha was similar to last year, and both were below their respective 10-year averages (Figure 8). Harvest on the lower Grande Ronde was 40% of last year and the lowest observed in 13 years, while harvest on the Imnaha was the same as last years' harvest, which is the lowest observed in the last 11 years (Figure 9). Total catch (harvested and released) on the lower Grande Ronde and Imnaha was the lowest observed in the last 4 and 13 run years, respectively. Similarly, catch and release of wild steelhead on the lower Grande Ronde and Imnaha was the lowest in the last 3 and 12 run years, respectively (Table 4). On the Imnaha, over 60% of the catch was wild fish, which is higher than the average from run years prior to 2002-03 when no unmarked hatchery fish were returning. On the Wallowa and at Rondowa, estimates of total catch are from the previous run year (2011-12), and total catch was average since we began surveys on the Wallowa and just above average at Rondowa, while harvest was 3rd highest on the Wallowa and 4th highest at Rondowa since surveys began during the 1985-86 run year (Table 5). Catch and release of wild fish was the fourth highest estimated on the Wallowa and the seventh highest at Rondowa for the years that were sampled. The percent of wild fish in the catch for Wallowa was the highest observed in the last ten years, while Rondowa was similar to previous years. Catch rates were poorer than in recent years in all fisheries (Table 6). The percent of local resident anglers participating in summer steelhead fisheries was lowest on Big Sheep Creek and highest on the Imnaha River (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 continue to see 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 (2011-12) were 1,208 fish at Rondowa, 957 fish in the Wallowa River, and 236 fish in the middle Grande Ronde River, for a total harvest estimate of 2,401 fish in the Grande Ronde basin, excluding the lower Grande Ronde River (Figure 9, Appendix Table C-1). We estimated 211 coded-wire-tagged fish were harvested at Rondowa, and 256 coded-wire-tagged fish were harvested in the Wallowa River in the 2011-12 run year. Total catch estimates for spring steelhead fisheries in the 2011-12 run year were 2,950 fish at Rondowa, 1,829 fish in the Wallowa River, and 446 fish in the middle Grande Ronde River, for a total catch estimate of 5,225 fish in the Grande Ronde basin, excluding the lower Grande Ronde River (Appendix Table C-2). Angler effort for

the 2011-12 run year was estimated to be 9,358 hours at Rondowa, 11,397 hours in the Wallowa River, and 2,788 hours in the middle Grande Ronde River, for a total effort estimate of 23,543 hours in the Grande Ronde basin, excluding the lower Grande Ronde River (Appendix Table C-3).

Of the 100 summer steelhead that were recycled to the Wallowa River fishery in 2013, 66 fish were recaptured at the Big Canyon Facility and an estimated 24 recycled fish were harvested in the fishery for a total estimated recovery of 90 recycled fish (Appendix Table D).

MANAGEMENT IMPLICATIONS AND RECOMMENDATIONS

The 2012-13 adult Wallowa stock steelhead return to the Lower Snake River Compensation Plan Area (7,138 adults, reported in the 2013 Annual Progress Report) was lower than the 10-year average of 12,872. Our fisheries data indicate that the below-average run may have led to a decline in angler participation, as angler effort, harvest and total catch were below average in fisheries on the Grande Ronde River. Similarly, the Imnaha stock steelhead return was 1,154 adults, below the 10-year average run of 3,732 adults, and harvest and catch were also below average. The catch rate (hours/fish) on the Imnaha River was the poorest since the 1999-00 fishing season.

This was the fourth year for a fishery at Big Sheep Creek, a tributary to the Imnaha River. Although we thought that angler effort may steadily increase as anglers became aware of this newly-opened stream section, the number of angler days still remains low. In the 2012-13 run year we estimate angler effort at 57 angler hours, compared to 82, 61, and 266 angler hours in the prior three years. Angler effort at Big Sheep Creek remains a small part of the total Imnaha effort and the very low catch rate of 24 hours/fish suggests that fishing effort on Big Sheep Creek will not increase substantially until another large steelhead run increases fishing pressure on the mainstem Imnaha River, which in turn could motivate anglers to seek out this lightly-fished stream section.

The 2012-13 run was the fourth year in which our creel surveyors electronically scanned all harvested hatchery fish for coded-wire tags, which allows 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.

Recycling adult steelhead returns to the Big Canyon Facility back into the Wallowa River for the recreational fishery in 2013 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 90% of the fish were accounted for either by their return to the Big Canyon Facility or in the harvest. Although the percentage of recycled fish

that could be accounted for was higher than normal—the average for the proceeding five years is 77%—any unaccounted for adults may potentially spawn in nature, Thus, managers should weigh this risk against the fisheries benefits from recycling.

The total catch of wild steelhead in the lower Grande Ronde River for the current run year was 1,090 fish, which was the second lowest total since the 2000-01 run year. However, for the third year in a row catch of wild steelhead in the lower Grande Ronde River fishery comprised over 50% of the total steelhead catch. In the 22 fishing seasons prior to the 2010-11 season there were only five years in which the wild steelhead catch approached or exceeded 50% of the total catch. Our data for upriver Grande Ronde basin fisheries (e.g., Rondowa and Wallowa River) does not indicate an obvious trend towards higher catch of wild steelhead. The high catch rates of wild fish could be explained by a changed ratio of wild fish to hatchery fish in the lower Grande Ronde River, potentially driven by better than average annual returns of wild fish. However, population estimates based on redd surveys do not suggest an increasing trend in wild fish abundance, although confidence intervals on those annual estimates were always ≥ 30% (Jonasson et al. 2015). A declining run of hatchery fish and a stable run of wild fish would also change the ratio of wild to hatchery fish, potentially resulting in higher wild fish catch rates. This may be the best explanation for the observed pattern. Other factors that affect catch rates are the timing of fish entry into the lower Grande Ronde River and the amount and characteristics of the fishing pressure. We recommend continued monitoring of the wild steelhead catch to determine whether this short term trend persists into the future.

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 2012-13 run year will be reported in the 2013-14 annual creel report.

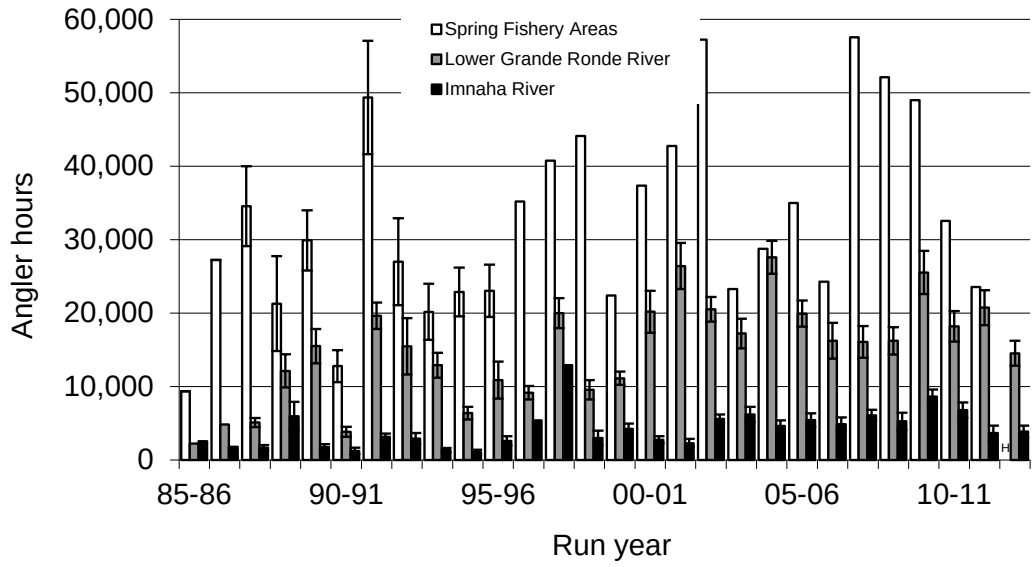

Figure 8. Angler effort (in hours) for summer steelhead in spring fishery areas (upper Grande Ronde and Wallowa rivers, Catherine Creek, and Rondowa), the lower Grande Ronde River, and the Imnaha River for the 1985-86 to 2012-13 run years. Not shown are 266, 61, 82, and 57 angler hours on Big Sheep Creek (Imnaha basin) for the 09-10,10-11, 11-12, and 12-13 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.

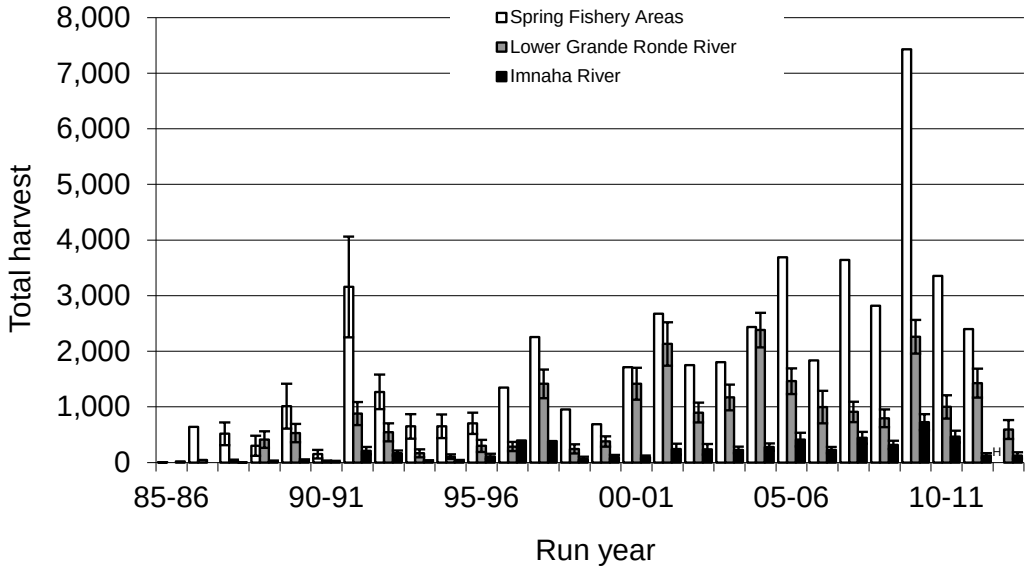

Figure 9. Number of hatchery summer steelhead harvested by recreational anglers in spring fishery areas (upper Grande Ronde and Wallowa rivers, Catherine Creek, and Rondowa), the lower Grande Ronde River, and the Imnaha River for the 1985-86 to 2012-13 run years. Not shown are 8, 0, 0, and 0 hatchery fish harvested on Big Sheep Creek (Imnaha basin) for the 09-10, 10-11, 11-12, and 12-13 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 2012-13 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.

	Lower Grande Ronde River				Imnaha River Basin			
		Released		Total		Released		Total
Run year	Harvest	Hatchery	Natural[a]	catch	Harvest	Hatchery	Natural[a]	Catch
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
11-12	1,427	398	2,460	4,285	126	71	238	435
12-13	594	302	1,090	1,986	126	4	206	336
Average	815	417	897	2,129	182	107	582	871

[a] *Includes unmarked hatchery fish for run years 85-86 to 88-89 on the lower Grande Ronde River, and for run years 02-03 to 11-12 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 2011-12 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.

	Wallowa River				Rondowa			
		Released		Total		Released		Total
Run year	Harvest	Hatchery	Natural[a]	catch	Harvest	Hatchery	Natural[a]	Catch
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
10-11	1,526	880	521	2,927	1,577	847	862	3,286
11-12	957	503	369	1,829	1,208	1,053	689	2,950
Average	884	510	428	1,822	905	652	521	2,079

[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 (1Mar-15Apr), 89-90 (17 Mar-31 Mar), and 93-94 (16 Mar-15 Apr).*

Table 6. Catch rate index (hours/fish ±95% confidence intervals) in summer steelhead creel survey areas in the Grande Ronde and Imnaha river basins for the 1985-86 to 2012-13 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±7	-	-	-	7±7	15±7	-
86-87	9±3	-	-	-	11±3	9±8	-
87-88	10±4	-	-	11±9	16±3	24±9	-
88-89	14±4	40±55	-	-	43±21	18±11	-
89-90	14±4	14±8	-	34±27	17±5	20±8	-
90-91	19±8	24±11	-	-	6±2	13±6	-
91-92	11±3	10±3	3±3	6±1	10±2	4±1	-
92-93	9±2	14±4	49±49	-	11±2	8±1	-
93-94	18±5	31±17	-	12±4	17±3	13±3	-
94-95	21±6	25±13	-	15±5	17±3	17±8	-
95-96	11±2	15±4	-	-	21±4	7±2	-
96-97	14±4	18±9	33±69	-	13±3	6±2	-
97-98	7±1	13±9	7±10	11±6	10±1	18±9	-
98-99	17±4	19±9	14±20	-	18±4	20±7	-
99-00	11±2	25±19	-	8±7	17±4	12±3	-
00-01	6±1	18±17	-	6±4	11±2	6±1	-
01-02	5±1	11±17	-	7±4	7±1	3±1	-
02-03	8±1	-	-	8±6	12±2	6±2	-
03-04	6±1	-	-	3±2	7±1	5±1	-
04-05	4±0	-	-	5±1	5±1	4±1	-
05-06	5±1	-	-	2±1	7±1	3±1	-
06-07	8±1	-	-	6±2	7±1	6±1	-
07-08	9±1	-	-	7±2	7±1	3±0	-
08-09	8±1			12±4	8±1	5±1	-
09-10	5±0			3±1	4±0	2±0	0.8±0.3
10-11	6±1			4±2	4±0	3±0	6±1
11-12	5±1			3±1	6±1	8±2	-
12-13	7±1			9±2	10±1	11±3	24±25
Average	10±2	20±5	21±24	9±3	12±3	10±2	10±30

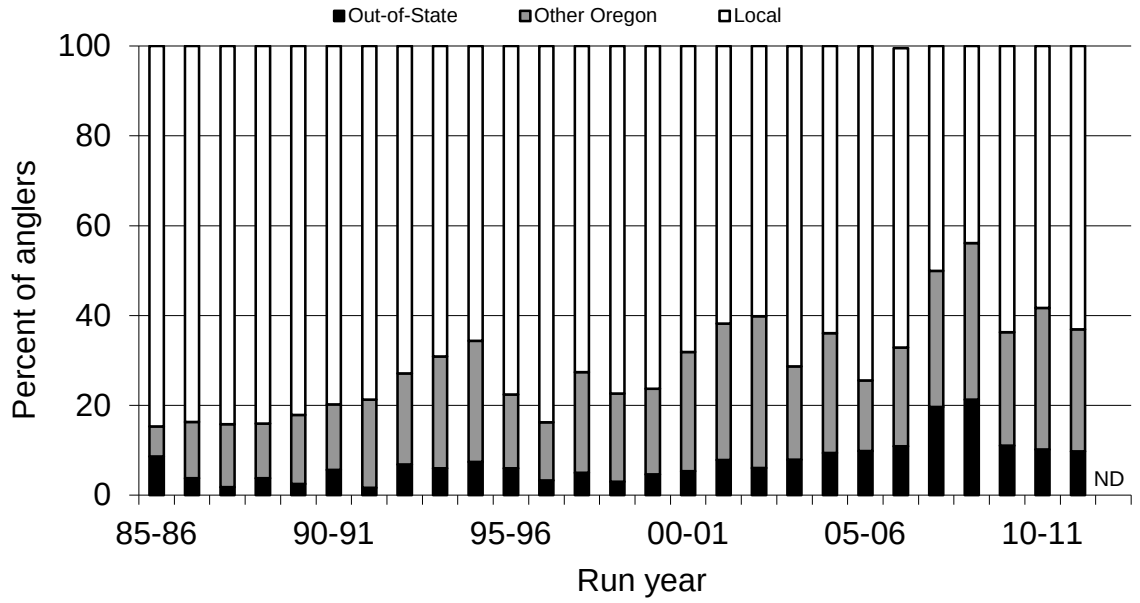

Figure 10. Percent of local resident anglers (Union or Wallowa county residents), non-local Oregon resident anglers, and out-of-state anglers that fished in summer steelhead fisheries in the Grande Ronde and Imnaha river basins for the 1985-86 to 2011-12 run years. ND indicates not determined until statewide annual harvest card data become available.

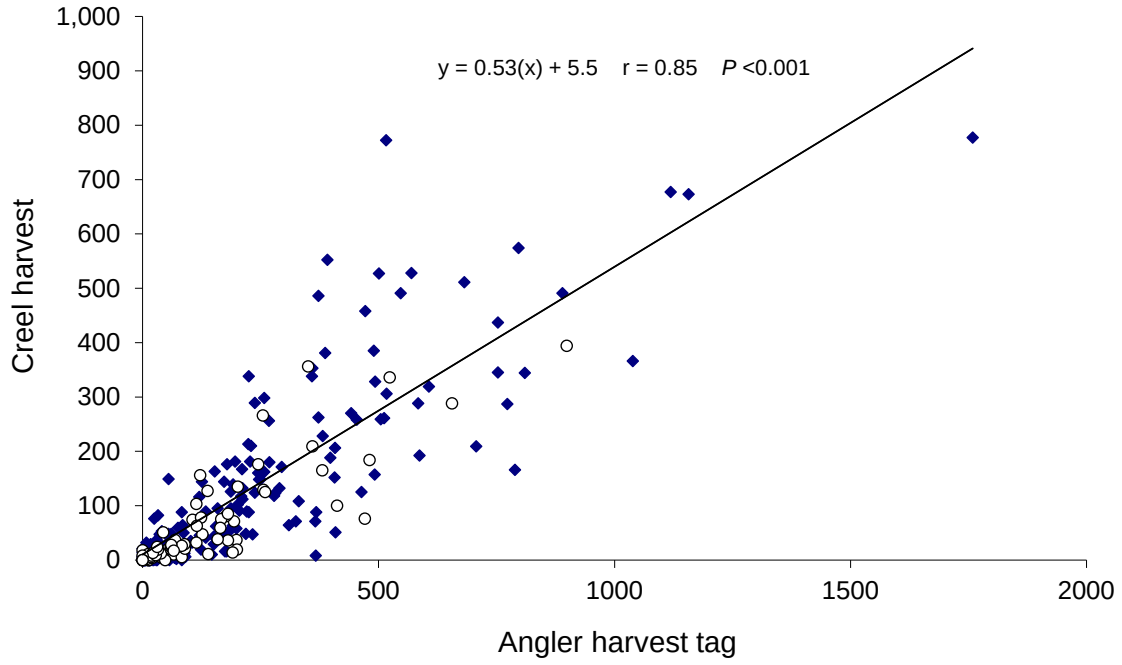

Figure 11. Relation between angler harvest tag (punch card) and creel survey harvest for summer steelhead fisheries in the Grande Ronde (♦) and Imnaha (○) river basins for years when harvest estimates for specific reaches were available (1993-1996 for the upper Grande Ronde and Wallowa, 1994-1995 for Rondowa, 1992-1993 for Catherine Creek, 1993-spring 2012 for the lower Grande Ronde, and 1986-1996, 1999-2012 for the Imnaha fishery areas).

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APPENDIX A

Fishery Statistics for the 2012-13 run year

Appendix Table A-1. Fishery statistics for summer steelhead on the lower Grande Ronde River during the 2012-13 run year. Statistics include mean estimates ±95% confidence intervals. Only adipose fin-clipped fish were harvested. "-" indicates not sampled or undefined. "h" indicates hour. Note: This is the first year that 1-15 April was not surveyed due to low angler effort.

Month,	Sample size		Total	Total	Total	Catch rate		Angler
day type	Days	Anglers	Hours	Catch	harvest	fish/h	h/fish	days
September:								
Weekday	6	19	531±457	13±12	0	0.024±0.022	42±39	199±171
Weekend	6	31	241±138	12±34	6	0.050±0.141	20±56	70±40
Total	12	50	772±478	25±36	6	0.032±0.046	31±45	269±167
October:								
Weekday	8	106	3,040±786	175±76	37±39	0.057±0.025	18±8	497±129
Weekend	4	96	1,401±306	135±61	39±31	0.097±0.043	10±4	280±61
Total	12	202	4,441±844	310±97	76±50	0.070±0.022	14±4	777±148
November:								
Weekday	6	66	2,975±1,133	486±155	186±117	0.164±0.052	6±2	522±199
Weekend	5	79	1,400±223	171±54	53±35	0.122±0.039	8±3	236±38
Total	11	145	4,375±1,155	657±164	239±123	0.150±0.038	7±2	758±200
December:								
Weekday	5	44	779±310	207±188	71±77	0.266±0.241	4±4	188±75
Weekend	6	85	772±335	49±23	18±16	0.063±0.029	16±7	163±71
Total	11	129	1,551±457	256±189	89±78	0.165±0.122	6±4	351±103
January:								
Weekday	6	6	80±62	4±14	0	0.048±0.178	21±78	25±19
Weekend	5	11	143±100	27±45	3	0.190±0.314	5±8	31±22
Total	11	17	223±118	31±47	3	0.139±0.211	7±11	56±30
February:								
Weekday	6	72	1,517±493	543±146	128±68	0.358±0.096	3±1	292±95
Weekend	5	138	1,244±304	148±36	53±27	0.119±0.029	8±2	233±57
Total	11	210	2,761±579	691±150	181±73	0.250±0.054	4±1	525±110
March:								
Weekday	6	15	133±125	4±13	0	0.030±0.098	33±108	67±63
Weekend	5	32	258±113	12±23	0	0.046±0.078	22±37	65±28
Total	11	47	391±168	16±26	0	0.041±0.062	24±36	132±57
Grand total	79	800	14,514±1,691	1,986±314	594±170	0.137±0.022	7±1	2,868±334

Appendix Table A-2. Catch rate (±95% confidence intervals) for summer steelhead at Rondowa during the 2012-13 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	8	0.128±0.125	8±8
Weekend	5	42	0.096±0.044	10±5
Total	10	50	0.101±0.041	10±4
March:				
Weekday	6	11	0.046±0.064	22±30
Weekend	8	35	0.158±0.060	6±2
Total	14	46	0.132±0.051	8±3
April:				
Weekday	3	1	0.300	3
Weekend	3	8	-	-
Total	6	9	0.047±0.125	21±57
Grand total	30	105	0.113±0.032	9±3

Appendix Table A-3. Catch rate (±95% confidence intervals) for summer steelhead on the Wallowa River during the 2012-13 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	10	223	0.078±0.025	13±4
Weekend	6	248	0.054±0.017	19±6
Total	16	471	0.066±0.015	15±4
March:				
Weekday	7	275	0.130±0.026	8±2
Weekend	9	409	0.115±0.022	9±2
Total	16	684	0.121±0.017	8±1
April:				
Weekday	4	46	0.098±0.069	10±7
Weekend	3	62	0.061±0.038	17±10
Total	7	108	0.075±0.035	13±6
Grand total	39	1,263	0.098±0.012	10±1

Appendix Table A-4. Fishery statistics for summer steelhead in Section 1 (Fence Creek to town of Imnaha) of the Imnaha River during the 2012-13 run year. Statistics include mean estimates ±95% confidence intervals. Only adipose fin-clipped fish were harvested. "-" indicates not sampled or undefined. "h" indicates hour.

Month,	Sample size		Total	Total	Total	Catch rate		Angler
day type	Days	Anglers	Hours	catch	harvest	fish/h	h/fish	days
February:								
Weekday	6	3	11±18	4	4	0.364	3	4±7
Weekend	5	5	5±5	0	0	-	-	3±3
Total	11	8	16±19	4	4	0.253	4	7±8
March:								
Weekday	6	35	412±353	74±30	35±35	0.180±0.062	6±2	128±110
Weekend	5	27	214±59	31±31	10±15	0.147±0.102	7±5	97±27
Total	11	62	626±358	105±43	45±38	0.169±0.053	6±2	225±129
April:								
Weekday	3	6	56±69	8±16	4±9	0.158±0.170	6±6	19±23
Weekend	2	2	7±3	0	0	-	-	4±2
Total	5	8	63±69	8±16	4±9	0.141±0.151	7±7	23±25
Grand total	27	78	705±365	117±46	53±39	0.168±0.049	6±2	255±132

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 2012-13 run year. Statistics include mean estimates ±95% confidence intervals. Only adipose fin-clipped fish were harvested. "-" indicates not sampled or undefined. "h" indicates hour.

Month,	Sample size		Total	Total	Total	Catch rate		Angler
day type	Days	Anglers	Hours	Catch	harvest	fish/h	h/fish	Days
February:								
Weekday	6	46	577±245	36±42	3±7	0.064±0.061	16±15	145±62
Weekend	5	50	306±118	5±5	2±2	0.016±0.010	63±39	80±31
Total	11	96	883±271	41±42	5±7	0.047±0.040	21±18	225±69
March:								
Weekday	6	89	1,097±386	98±66	46±44	0.089±0.051	11±6	315±111
Weekend	5	121	1,126±517	78±28	22±9	0.069±0.017	14±3	242±111
Total	11	210	2,223±645	176±72	68±45	0.079±0.027	13±4	557±162
April:								
Weekday	3	2	37±63	0	0	-	-	10±17
Weekend	2	4	9±13	0	0	-	-	8±12
Total	5	6	46±64	0	0	-	-	18±25
Grand total	27	312	3,152±703	217±83	73±45	0.069±0.022	14±4	800±178
Sec.1 + 2	27	390	3,857±792	334±95	126±59	0.087±0.020	11±3	1,055±217

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 2012-13 run year. Statistics include mean estimates ±95% confidence intervals. Only adipose fin-clipped fish were harvested. "-" indicates not sampled or undefined. "h" indicates hour.

Month,	Sample size		Total	Total	Total	Catch rate		Angler
day type	Days	Anglers	Hours	catch	harvest	fish/h	h/fish	Days
February								
Weekday	6	1	9±16	0	0	-	-	6±11
Weekend	5	0	-	-	-	-	-	0
Total	11	1	9±16	0	0	-	-	6±11
March:								
Weekday	6	5	31±37	0	0	-	-	24±29
Weekend	5	4	15±13	2±7	0	0.157±0.163	6±6	9±8
Total	11	9	46±39	2±7	0	0.050±0.052	20±21	33±28
April:								
Weekday	3	0	-	-	-	-	-	0
Weekend	2	1	2±2	0	0	-	-	1±1
Total	5	1	2±2	0	0	-	-	1±1
Grand total	27	11	57±42	2±7	0	0.041±0.042	24±25	40±29

APPENDIX B

Percent of Summer Steelhead That Were Marked Hatchery Fish and Caught during the 2012-13 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 2012-13 run year. In parentheses are total catch for the Lower Grande Ronde and Imnaha rivers and Big Sheep Creek, and sampled catch for the Wallowa River 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	76(25)	47(310)	44(657)	45(256)	52(31)	45(691)	0(16)	-
Rondowa	-	-	-	-	-	91(35)	78(37)	0(1)
Wallowa River	-	-	-	-	-	84(117)	78(333)	21(28)
Imnaha River (Section 1)	-	-	-	-	-	100(4)	45(105)	50(8)
Imnaha River (Section 2)	-	-	-	-	-	12(41)	40(176)	-(0)
Big Sheep Cr.	-	-	-	-	-	-(0)	0(2)	-(0)

APPENDIX C

Fishery Statistics for Spring Fisheries for the 2011-12 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 2011-12 run year. Total harvest = 0.525 (harvest card) + 5.524. 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 120).

Fishery, location code,	Fishery statistics and number of tags recovered by month									Expanded
statistics, tagcode	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	Total	tags
Upper Grande Ronde (233)										
Angler harvest cards	0	0	0	0	0	0	0	0		
Total harvest	-	-	-	-	-	-	-	-	0	
Rondowa (234)										
Angler harvest cards	4	7	15	18	159	1,107	851	57		
Sampled fish	0	0	0	0	0	35	21	0		
Total harvest	8	9	13	15	89	587	452	35	1,208	
Sample rate expansion	-	-	-	-	-	16.8	21.5	-		
09 45 80						1	0		1	17
09 45 84						1	0		1	17
09 45 87						1	0		1	17
09 46 75						0	1		1	22
09 46 77						1	1		2	39
09 46 79						1	0		1	17
09 46 80						1	3		4	82
Wallowa (235)										
Angler harvest cards	0	18	15	15	75	661	864	101		
Sampled fish	0	0	0	0	0	207	193	31		
Total harvest	-	15	13	13	45	353	459	59	957	
Sample rate expansion	-	-	-	-	-	1.7	2.4	1.9		
09 45 80						2	2	0	4	8
09 45 81						4	0	0	4	7
09 45 82						0	2	0	2	5
09 45 83						0	2	0	2	5
09 45 84						1	1	0	2	4
09 45 85						4	1	0	5	9
09 45 86						3	3	0	6	12
09 45 87						3	4	0	7	15
09 45 88						2	0	1	3	5
09 45 89						4	3	1	8	16
09 46 71						2	0	0	2	3
09 46 72						9	5	0	14	27
09 46 73						4	3	1	8	16
09 46 74						6	0	0	6	10
09 46 75						3	1	0	4	7
09 46 76						6	3	0	9	17
09 46 77						5	2	1	8	16
09 46 78						5	3	0	8	16
09 46 79						10	4	1	15	29
09 46 80						10	5	0	15	29

Appendix Table C-1. continued.

Fishery, location	Fishery statistics and number of tags recovered by month									Expanded
code, statistics, tagcode	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	Total	tags
Wenaha (184)										
Angler harvest cards	0	0	0	0	0	0	0	0		
Total harvest	-	-	-	-	-	-	-	-	0	
Middle Grande Ronde (232)										
Angler harvest cards	0	62	84	11	13	137	66	4		
Total harvest	-	38	50	11	12	77	40	8	236	
Total Grande Ronde harvest (excluding lower Grande Ronde)									2,401	

Appendix Table C-2. Estimated catch of summer steelhead in spring fisheries in the Grande Ronde basin for the 2011-12 run year. Total catch = (sampled catch/sampled 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 statistics by month								
Fishery[a], statistics	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	Total
Upper Grande Ronde									
Sampled harvest	-	-	-	-	-	-	-	-	-
Sampled catch	-	-	-	-	-	-	-	-	-
Total harvest	-	-	-	-	-	-	-	-	0
Total catch	-	-	-	-	-	-	-	-	0
Catherine Creek									
Sampled harvest	-	-	-	-	-	-	-	-	-
Sampled catch	-	-	-	-	-	-	-	-	-
Total harvest	-	-	-	-	-	-	-	-	0
Total catch	-	-	-	-	-	-	-	-	0
Rondowa									
Sampled harvest	-	-	-	-	-	35	21	0	56
Sampled catch	-	-	-	-	-	87	50	0	137
Total harvest	8	9	13	15	89	587	452	35	1,208
Total catch	20	22	32	37	218	1,459	1,076	86	2,950
Wallowa									
Sampled harvest	-	-	-	-	-	207	193	31	431
Sampled catch	-	-	-	-	-	368	366	87	821
Total harvest	-	15	13	13	45	353	459	59	957
Total catch	-	29	25	25	86	628	870	166	1,829
Wenaha									
Sampled harvest	-	-	-	-	-	-	-	-	-
Sampled catch	-	-	-	-	-	-	-	-	-
Total harvest	-	-	-	-	-	-	-	-	0
Total catch	-	-	-	-	-	-	-	-	0
Middle Grande Ronde									
Sampled harvest	-	-	-	-	-	-	-	-	-
Sampled catch	-	-	-	-	-	-	-	-	-
Total harvest	-	38	50	11	12	77	40	8	236
Total catch	-	72	95	21	23	137	76	22	446
Total Grande Ronde catch (excluding lower Grande Ronde)									5,225

[a] *Wallowa data were used for the upper Grande Ronde, middle Grande Ronde, and Catherine Creek; lower Grande Ronde data, in Flesher et al. 2014, 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 2011-12 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 statistics by month								
Fishery[a], statistics	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	Total
Upper Grande Ronde									
Catch rate	-	-	-	-	-	-	-	-	-
Total catch	-	-	-	-	-	-	-	-	0
Angler effort	-	-	-	-	-	-	-	-	0
Catherine Creek									
Catch rate	-	-	-	-	-	-	-	-	-
Total catch	-	-	-	-	-	-	-	-	0
Angler effort	-	-	-	-	-	-	-	-	0
Rondowa									
Catch rate	-	-	-	-	-	0.286	0.367	-	0.313
Total catch	20	22	32	37	218	1,459	1,076	86	2,950
Angler effort	64	70	102	118	696	5,101	2,932	275	9,358
Wallowa									
Catch rate	-	-	-	-	-	0.162	0.166	0.133	0.160
Total catch	-	29	25	25	86	628	870	166	1,829
Angler effort	-	181	156	156	538	3,877	5,241	1,248	11,397
Wenaha									
Catch rate	-	-	-	-	-	-	-	-	-
Total catch	-	-	-	-	-	-	-	-	0
Angler effort	-	-	-	-	-	-	-	-	0
Middle Grande Ronde									
Catch rate	-	-	-	-	-	-	-	-	-
Total catch	-	72	95	21	23	137	76	22	446
Angler effort	-	450	594	131	144	846	458	165	2,788
Total Grande Ronde angler effort (excluding lower Grande Ronde)									23,543

[a] *Wallowa data were used for the upper Grande Ronde, middle Grande Ronde, and Catherine Creek; lower Grande Ronde data, in Flesher et al. 2014, were used for the Wenaha.*

APPENDIX D

Summary of Recycled Steelhead for the 2012-13 Run Year

Appendix Table D. Summary of adult steelhead recycled back to the Wallowa River fishery from the Big Canyon Facility for the 2012-13 run year.

Date and percent of release	Number of fish[a]		
	Male	Female	Total
		Released	
8 March 2013	10	15	25
15 March 2013	11	14	25
22 March 2013	11	14	25
29 March 2013	13	12	25
Total	45	55	100
		Recaptured at Big Canyon[b]	
8 March-29 March 2013	32	34	66
% of release	71%	62%	66%
		Observed and estimated (in parentheses) harvest[c]	
8 March-29 March 2013	2(10)	3(14)	5(24)
% of release	22%	25%	24%
		Total recovered (Big Canyon + estimated harvest)	
8 March-29 March 2013	42	48	90
% of release	93%	87%	90%

[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 2012-13 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.*