LOWER SNAKE RIVER COMPENSATION PLAN:
Summer Steelhead Creel Surveys on the Grande Ronde, Wallowa, and Imnaha Rivers for the 2016-17 Run Year

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

Michael W. Flesher
Lance R. Clarke
Michelle Jones

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LOWER SNAKE RIVER
COMPENSATION PLAN

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Front cover photo: A frozen lower Grande Ronde River near Boggan's Oasis in Washington In December 2016. Photo by Mac Huff.

ANNUAL PROGRESS REPORT

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Prepared by: Michael W. Flesher
Lance R. Clarke
Michelle Jones

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Oregon Department of Fish and Wildlife
4034 Fairview Industrial Drive SE
Salem, OR 97302

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PREFACE

This report is for the funding period 1 October 2016 to 30 September 2017. The sampling period was from 1 September 2016 to 15 April 2017. 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 2016-2017 run year were primarily from the 2013 and 2014 brood years. Results of creel surveys conducted prior to fall 2016 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, 2014, 2015, 2016, 2017, and 2018), 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 2016 to 30 April 2017 in the Grande Ronde and Imnaha river basins.

ACKNOWLEDGMENTS

We would like to thank Mary Buckman (retired) for the statistical design of the data, Celeste Cole and Jonathan LaTour for their dedication in conducting the surveys, and Rod Engle, Pat Keniry, and Joseph Feldhaus for reviewing the document. We would also like to thank Todd Miller (Washington Department of Fish and Wildlife) for coordinating and Daniel Cunnane for conducting the lower Grande Ronde survey during spring 2017. 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 2016-17 run year indicate below average angler participation and success for summer steelhead fisheries in both the Grande Ronde and the Imnaha River basins. Angler effort on the lower Grande Ronde River (12,294 hrs) was lower than the previous season and about 80% of average(14,709 hrs) since we began surveys during the 1985-86 run year, while harvest in 2016-17 (379 fish) approached 50% of average (792 fish). For the second year in a row Imnaha River effort (900 hrs) and harvest (42) was the lowest observed since the mid-1990's. Anglers experienced below average fishing success in the lower Grande Ronde River as catch rates were 14 hrs/fish, but similar or better than average catch rates in all other NE Oregon fisheries.

The total catch of wild steelhead in the lower Grande Ronde River for the 2016-17 run year was 267 fish, below the average of 894 fish. Wild fish comprised 34% of total catch, whereas in the prior 6 years wild steelhead were at least 50% of the catch. On the Imnaha, wild fish were 56% of the total catch, similar to previous years, and are important to the success of recreational steelhead fisheries. Wild fish comprised 20% of the Wallowa River catch and 27% of the Rondowa catch.

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 2015-16 run year, summarized in the appendices. Based on creel and harvest card data, combined total catch in those areas was 6,902 fish, total harvest was 2,603 fish, and total effort was 27,349 hours. Angler effort, catch and harvest were lower than the 2014-15 season, and lower than the 10-year averages except total catch was higher.

Eighty-nine percent of anglers that participated in Imnaha basin fisheries were local residents whereas in Grande Ronde basin locations local residents comprised 36 to 72%. Out-of-state persons comprised 0 to 21% of the anglers, depending on location.

The 2016-17 fishing season was the second year in which regulation changes allowed anglers to target steelhead through the end of April. However, the end dates of our 2016-17 creel survey remained unchanged from prior seasons (31 March on the lower Grande Ronde, 15 April on the Wallowa and Imnaha rivers). The regulation change likely will not meaningfully affect total catch and harvest on the lower Grande Ronde River, since fishing effort there is typically low in April. However, steelhead are often present in the Wallowa and Imnaha rivers in late April, and empirical information suggests some anglers will target them. Thus, creel surveys of these fisheries in late April are advised if funding allows.

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 2016 and the spring of 2017 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 2015-16 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. The 2016-17 steelhead angling season in the Grande Ronde and Imnaha river basins was open from 1 September 2016 to 30 April 2017.

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

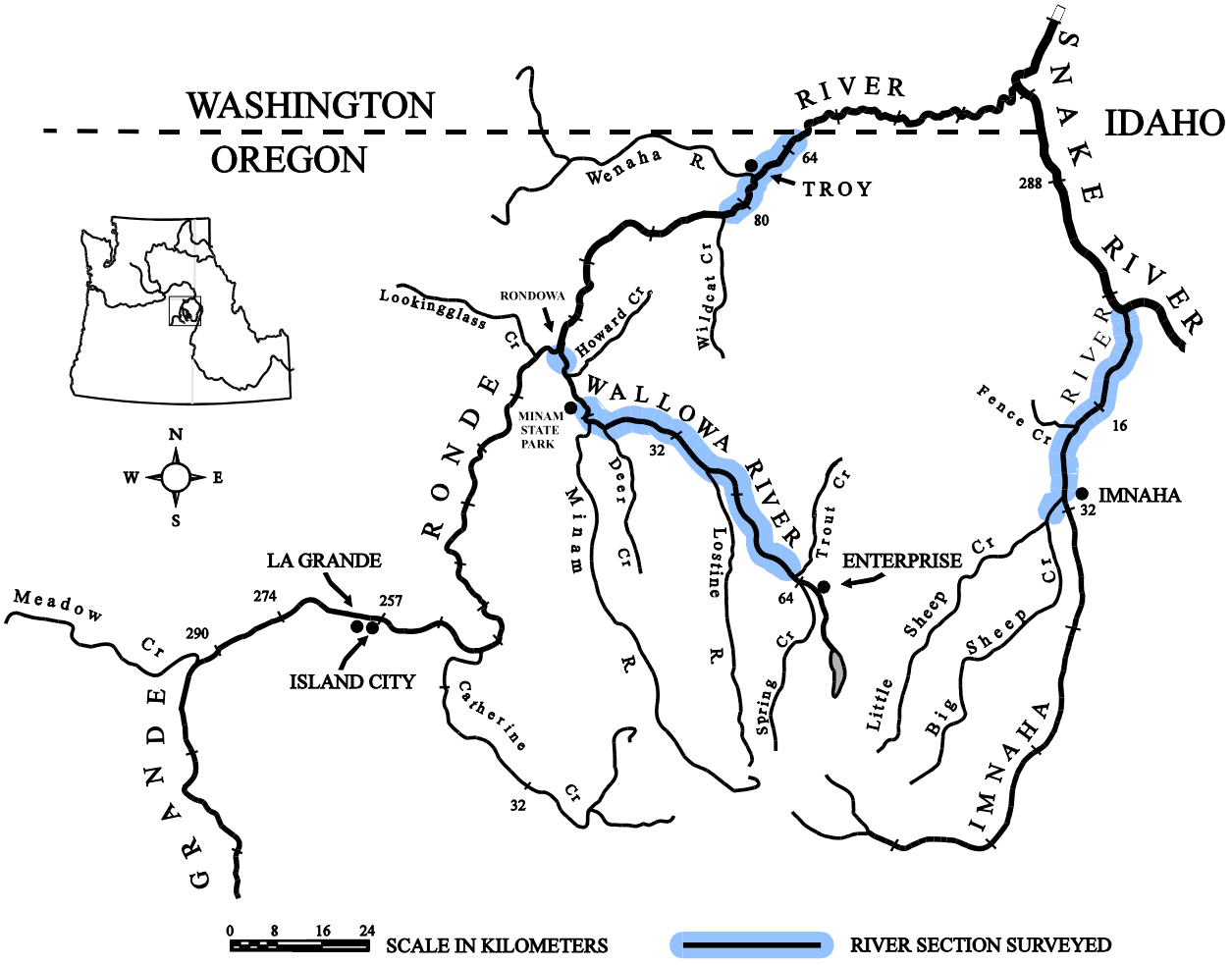

Figure 1. Map of northeastern Oregon showing where summer steelhead creel surveys were conducted in the Grande Ronde and Imnaha river basins during the 2016-17 run year.

on the Grande Ronde River, and on Smith Mountain Road at the Hancock 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

In August 2019, the statistical creel program (programmed output using SAS software, SAS Institute 1988-2019) that expands sample data from the lower Grande Ronde fishery to estimate angler effort, catch, harvest, catch rate, and number of coded wire tag recoveries for the entire fishery was re-written in *R* programming language (R Core Team, 2017). For this report, the Imnaha creel results were prepared using SAS Studio (SAS Institute 2019). Future analysis of creel data will use programs written in *R* rather than SAS Studio to estimate total catch, effort and harvest for Grande Ronde and Imnaha basin fisheries. For the lower Grande Ronde River survey, we used the methodology described by Carmichael et al. (1988). Starting in 2013 and continuing through the present creel season, the survey on the lower Grande Ronde River has been conducted from 1 September to 31 March, rather than surveying through the 15 April fishery closure. Although the fishing season has now been extended to 30 April (beginning in 2016), we still do not creel in April because prior years of data show consistently low angler effort in April. During the creel season our goal was to sample 50**%** of the weekends and holidays and 30% of the weekdays during each month. 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), sex, 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 2017. 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 2017. We surveyed the Wallowa River area each sample day and surveyed the Rondowa area every other sample day. Beginning in 2012, we also surveyed the Rondowa area every weekend sample day to increase the number of interviews. 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 used by anglers to access Rondowa and spent an hour interviewing anglers returning from Rondowa, and then repeated the sequence. During February, 2017 the Smith Mountain road was 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 interviewed anglers there. 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 25 February, we surveyed five days each week (Sunday – Saturday) from 0900-1800 hours. From 26 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, sex ratio, 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 do not creel certain springtime fishery locations in the Grande Ronde Basin (e.g., Catherine Creek and the upper Grande Ronde River) because these un-surveyed areas no longer receive hatchery supplementation so any harvest would be due to straying of hatchery fish from areas with active hatchery supplementation programs and it is believed that angler effort is low. On the Wallowa River and at Rondowa, our creel surveys are limited to angler interviews and sampling their catch. In un-surveyed areas, and areas where pressure counts are not conducted (e.g., Wallowa River and Rondowa), we rely on angler harvest card data for information on angler effort and success. 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 2015-2016. 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).

ACCOMPLISHMENTS AND FINDINGS

On the lower Grande Ronde River from 1 September 2016 to 31 March 2017, we sampled 58.8% of the fishable weekends and holidays (30 days) and 35.7% of the fishable weekdays (41 days) for a total of 71 sample days. There were 17 weekends and holidays and 29 weekdays (N = 46 days) that we did not include in our fishery expansions due to frozen and unfishable river conditions. On the Wallowa River from 1 February to 15 April 2017, we sampled 81.8% of the weekends and holidays (18 days) and 34.6% of the weekdays (18 days) for a total of 36 sample days. During the same time period at Rondowa, we sampled 50.0% of the weekends and holidays (11 days) and 15.4% of the weekdays (8 days) for a total of 19 sample days. On the Imnaha River and Big Sheep Creek from 1 February to 15 April 2017, we sampled 54.5% of the weekends and holidays (12 days) and 40.4% of the weekdays (21 days) for a total of 33 sample days. Tables in Appendix A provide more details on sampling effort by fishing location.

We estimate that 2,274 anglers fished for 12,294 hours on the lower Grande Ronde River during the 2016-17 season. Anglers caught and released 267 wild and 131 hatchery steelhead, and harvested 379 hatchery steelhead for an average catch rate index of 14 hours per fish (Figures 2-6, Appendix Table A-1). The percent of steelhead caught that were hatchery origin ranged from 10% (March 2017) to 71% (October 2016,

Figure 7, Appendix Table B). Nineteen percent of harvested hatchery steelhead spent one year in freshwater and one year in saltwater (hereafter designated 1:1), and 81% 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 577 (±21) mm for age 1:1, and 694 (±12) mm for age 1:2 (Table 1). Sex ratio was 37% male and 63% female (Table 1). Thirty-six percent of the anglers on the lower Grande Ronde River were local Oregon residents, 34% were non-local Oregon residents, 9% were Washington State residents and 21% resided outside the states of Oregon and Washington (Table 2). On the lower Grande Ronde River, anglers harvested an estimated 56 Ad+CWT, AdLV+CWT, or 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 60% in February to 75% in March (Figure 7, Appendix Table B). Age composition of harvested hatchery steelhead was 46% 1:1 and 54% 1:2 (Table 1). Mean fork length (±95% confidence interval) of harvested hatchery steelhead was 588 (±73) mm for age 1:1 and 698 (±119) mm for age 1:2 (Table 1). Sex ratio was 23% male and 77% female (Table 1). Seventy-two percent of the anglers at Rondowa were local Oregon residents, and 28% were non-local Oregon resident anglers (Table 2). At Rondowa, we sampled 3 Ad+CWT, AdLV+CWT, or 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 Wallowa River, the catch rate index averaged 9 hours per fish (Figure 4, Appendix Table A-3). The percent of steelhead caught that were hatchery origin ranged from 77% in April to 95% in March (Figure 7, Appendix Table B). Age composition of harvested hatchery steelhead was 7% 1:1 and 93% 1:2 (Table 1). Mean fork length (±95% confidence interval) of harvested hatchery steelhead was 577 (±21) mm for age 1:1 and 694 (±12) mm for age 1:2 (Table 1). Sex ratio was 36% male and 64% female (Table 1). Fifty-two percent of the anglers on the Wallowa River were local Oregon residents, 39% were non-local Oregon residents, 4% were Washington State residents and 5% resided outside the states of Oregon and Washington (Table 2). On the Wallowa River, we sampled 23 Ad+CWT, AdLV+CWT or 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 (no anglers were counted on Big Sheep Creek during the 2016-17 season), we estimate that 345 anglers fished for 900 hours. They caught and released 63 wild and 8 hatchery steelhead, and harvested 42 hatchery steelhead for an average catch rate index of 8 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 44% (March 2017 in Section 2 - mouth to Fence Creek) to 75% (March 2017 in Section 1 - Fence Creek to the town of Imnaha; Figure 7, Appendix Table B). Age composition of harvested hatchery steelhead was 35% 1:1 and 65% 1:2 (Table 1).

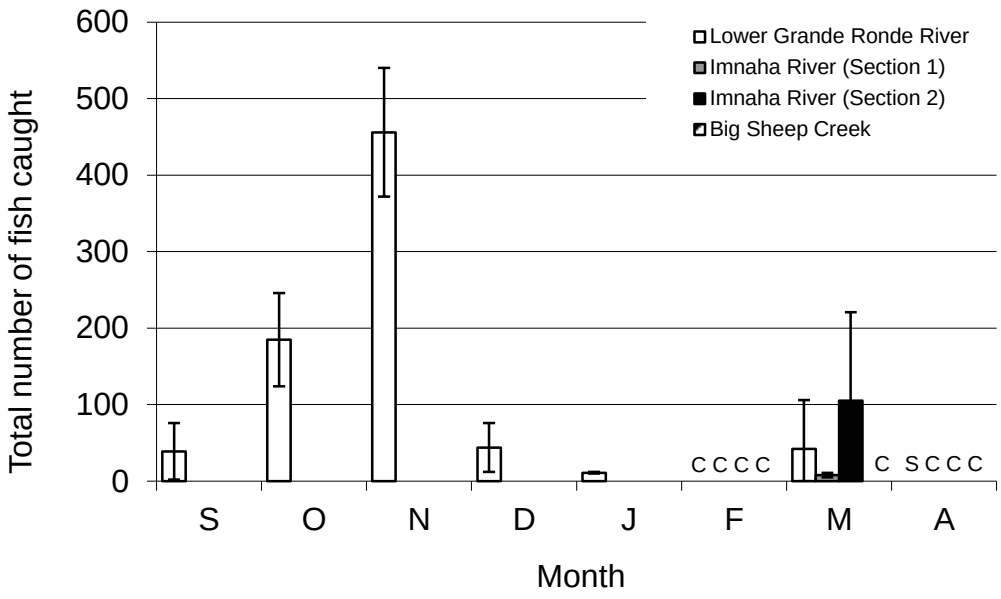

Figure 2. Estimated total catch of summer steelhead (vertical bars show 95% confidence intervals) on the lower Grande Ronde River, two sections of the Imnaha River, and Big Sheep Creek during the 2016-17 run year. "C" indicates no catch and "S" indicates no survey. Surveys were conducted from 1 September 2016 to 31 March 2017 on the lower Grande Ronde River, and from 1 February to 15 April 2017 on the Imnaha River and Big Sheep Creek.

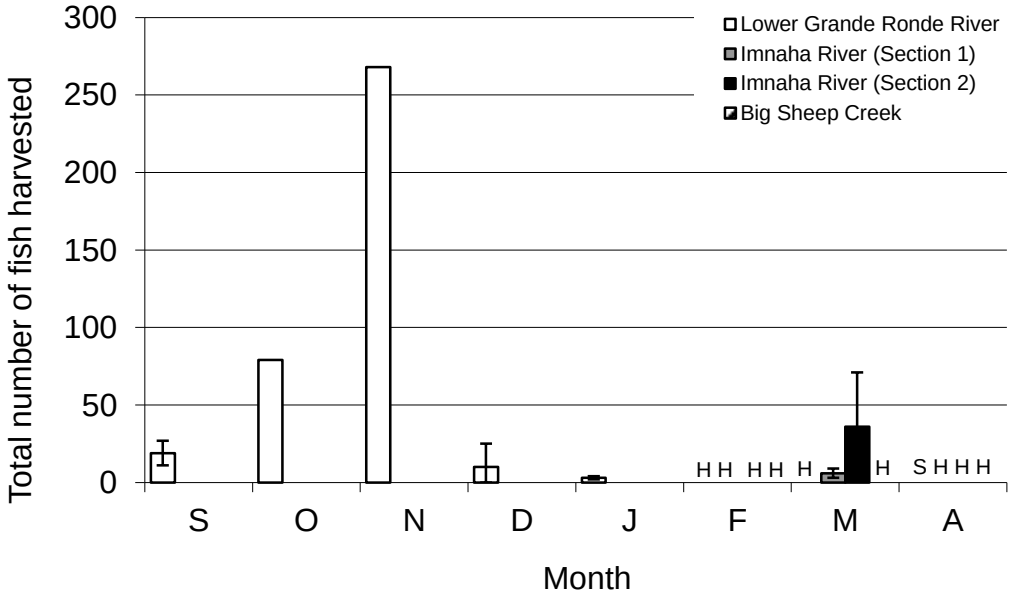

Figure 3. Estimated total harvest of summer steelhead (vertical bars show 95% confidence intervals) on the lower Grande Ronde River, two sections of the Imnaha River, and Big Sheep Creek during the 2016-17 run year. "H" indicates no harvest and "S" indicates no survey. Surveys were conducted from 1 September 2016 to 31 March 2017 on the lower Grande Ronde River, and from 1 February to 15 April 2017 on the Imnaha River and Big Sheep Creek.

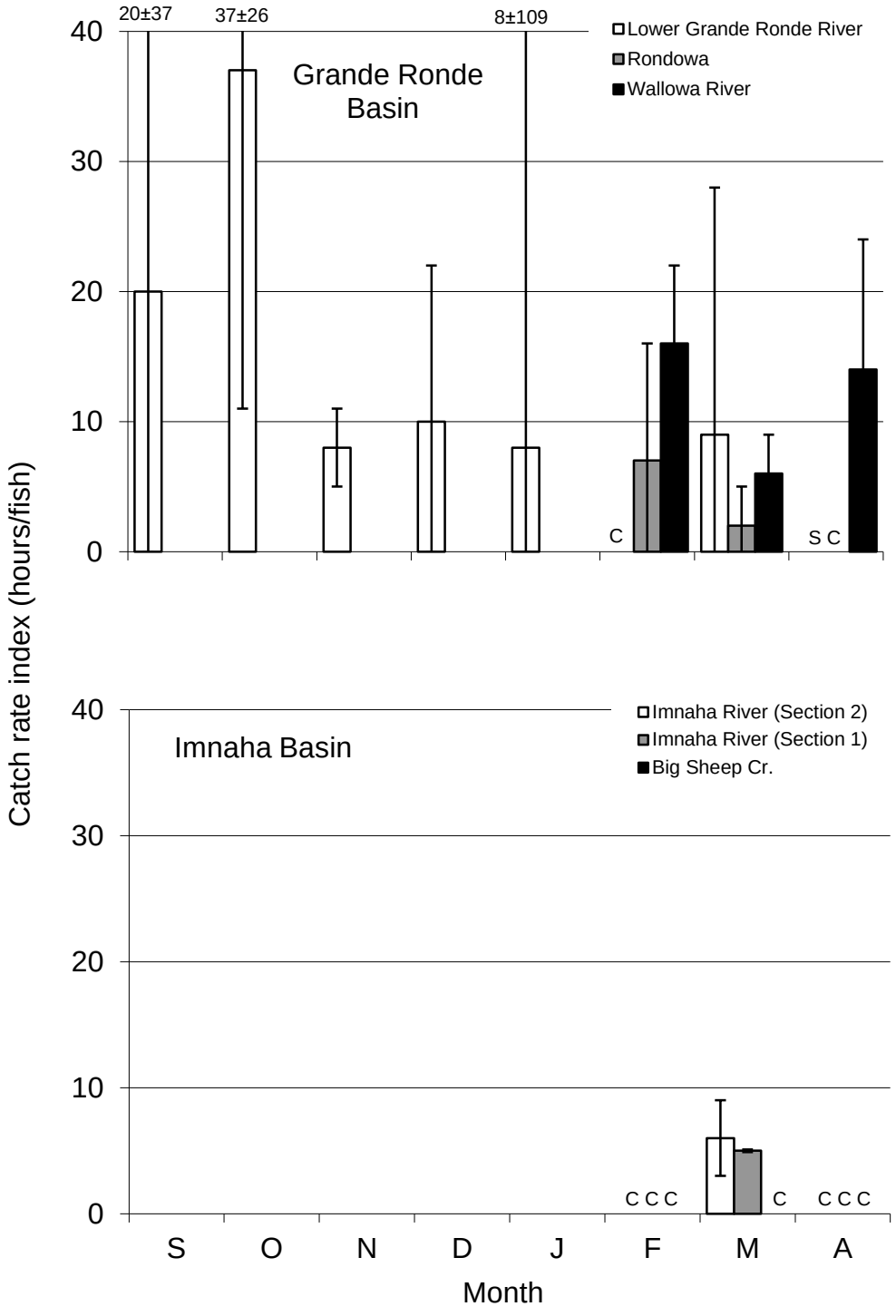

Figure 4. Estimated catch rate index (hours/fish) for summer steelhead (vertical bars show 95% confidence intervals) in the Grande Ronde and Imnaha river basins during the 2016-17 run year. "S" indicates no survey and "C" indicates no catch. Survey areas and times include the lower Grande Ronde River (1 September 2016 - 31 March 2017), and Rondowa, Wallowa River, two sections of the Imnaha River, and Big Sheep Creek (1 February - 15 April 2017). Note: A lower catch rate index implies better angling success.

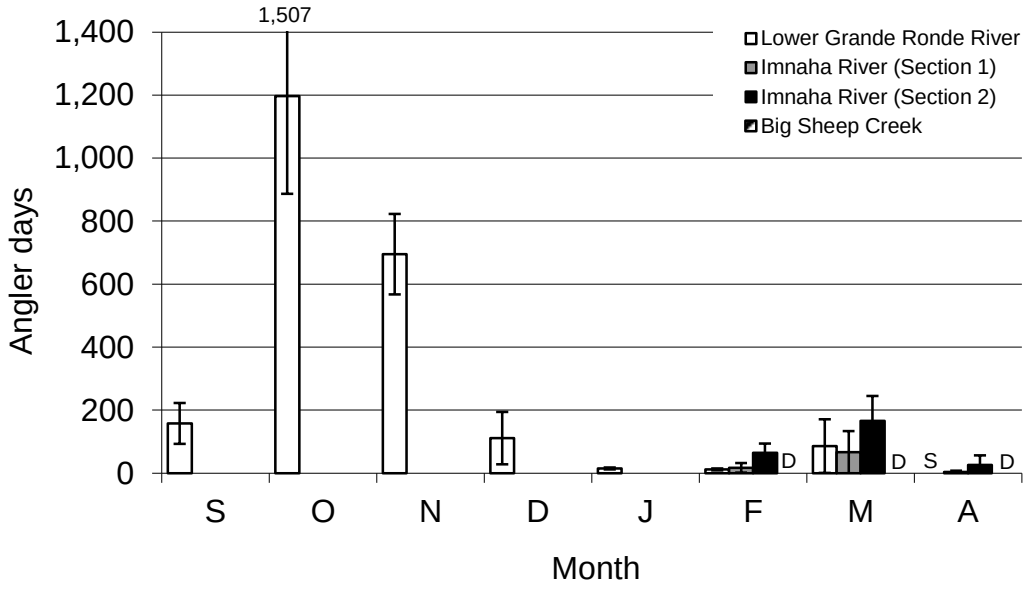

Figure 5. Estimated number of angler days for summer steelhead (vertical bars show 95% confidence intervals) on the lower Grande Ronde River, two sections of the Imnaha River, and Big Sheep Creek during the 2016-17 run year. "S" indicates no survey and "D" indicates no angler days. Surveys were conducted from 1 September 2016 to 31 March 2017 on the lower Grande Ronde River, and from 1 February to 15 April 2017 on the Imnaha River and Big Sheep Creek.

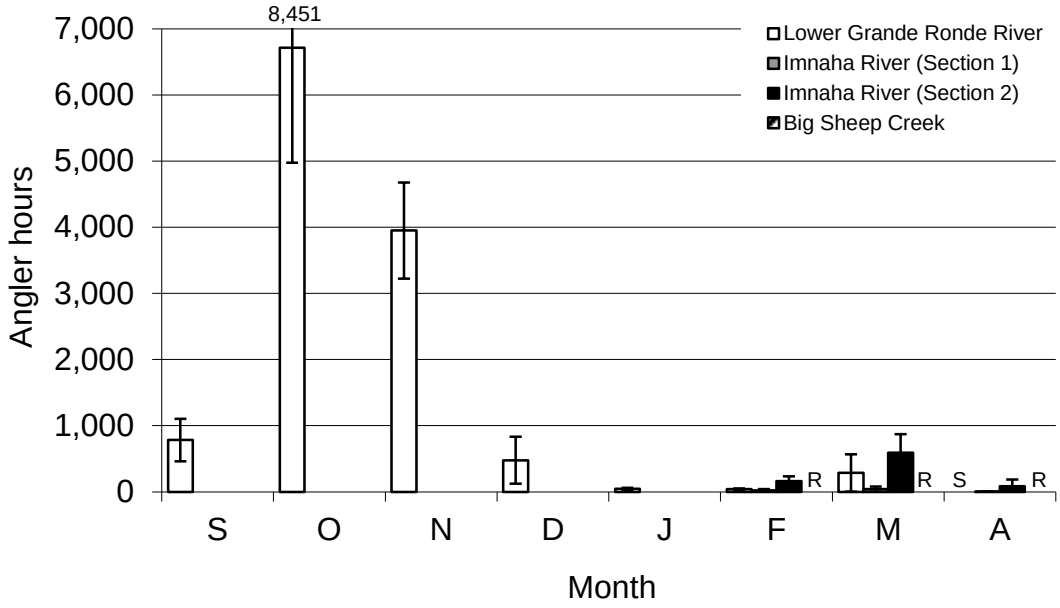

Figure 6. Estimated number of angler hours for summer steelhead (vertical bars show 95% confidence intervals) on the lower Grande Ronde River, two sections of the Imnaha River, and Big Sheep Creek during the 2016-17 run year. "S" indicates no survey and "R" indicates no angler hours. Surveys were conducted from 1 September 2016 to 31 March 2017 on the lower Grande Ronde River, and from 1 February to 15 April 2017 on the Imnaha River and Big Sheep Creek.

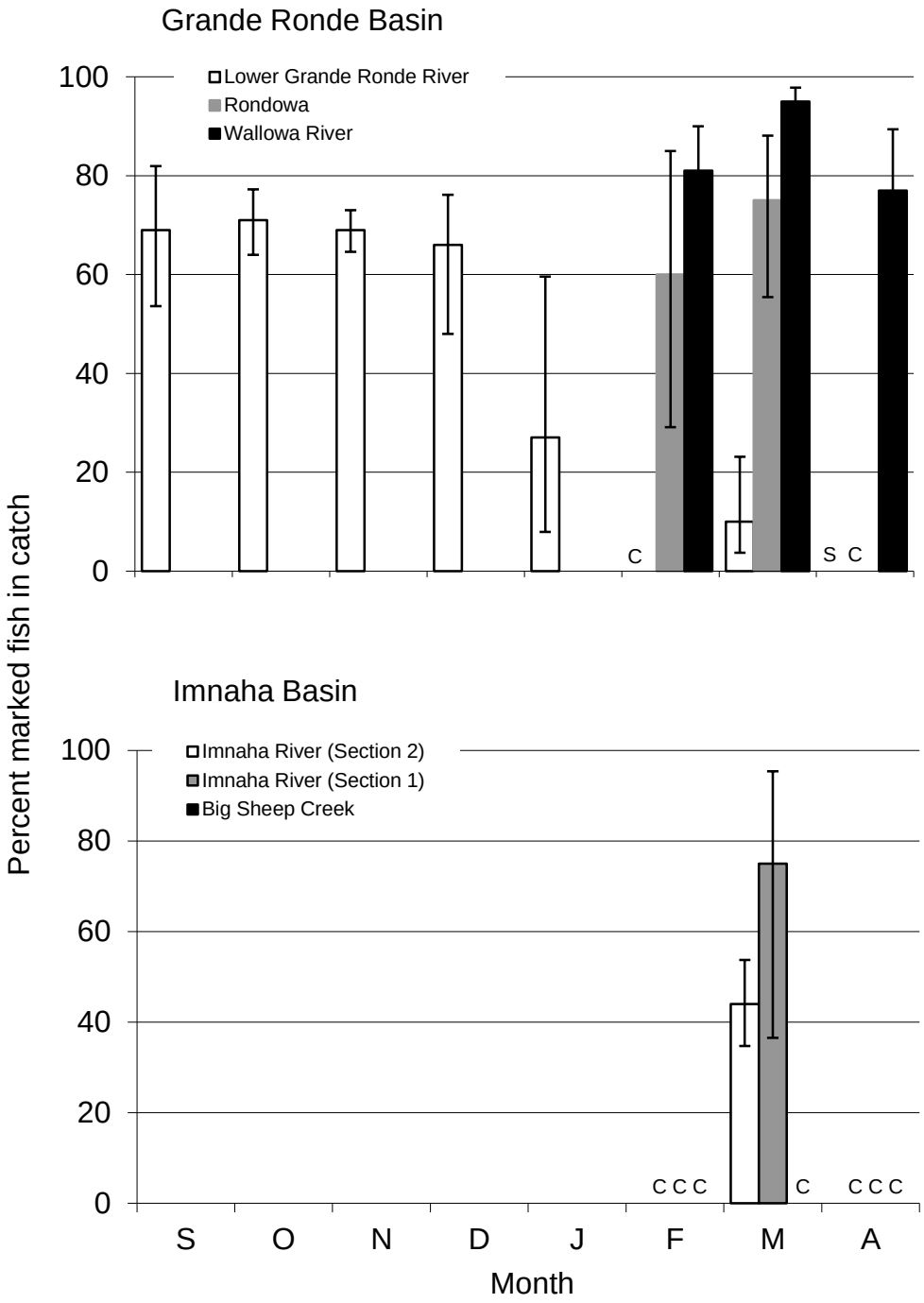

Figure 7. Estimated percent of summer steelhead caught (vertical bars show 95% confidence intervals; using a binomial distribution) in the Grande Ronde and Imnaha river basins during the 2016-17 run year that were marked. "S" indicates no survey and "C" indicates no catch. All unmarked fish were considered to be wild. Survey areas and times include the lower Grande Ronde River (1 September 2016 - 31 March 2017), and Rondowa, Wallowa River, two sections of the Imnaha River, and Big Sheep Creek (1 February - 15 April 2017).

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 2016-17 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 2017 and Little Sheep Creek Facility (for the Imnaha River basin including the Imnaha River and Big Sheep Creek) in 2016 and 2017. 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	Age composition (%)					Mean fork length (mm)							
area, sex	N	1:1	1:2	1:3	1:4	N	1:1	N	1:2	N	1:3	N	1:4
Lower GR R.													
Males	32	22	78	0	0	5	592±32	20	703±18	0	-	0	-
Females	54	17	83	0	0	7	566±33	36	689±17	0	-	0	-
Total	86	19	81	0	0	12	577±21	56	694±12	0	-	0	-
Rondowa.													
Males	3	33	67	0	0	1	640	1	760	0	-	0	-
Females	10	50	50	0	0	3	570±90	3	677±190	0	-	0	-
Total	13	46	54	0	0	4	588±73	4	698±119	0	-	0	-
Wallowa R.													
Males	31	10	90	0	0	5	592±32	20	703±18	0	-	0	-
Females	56	5	95	0	0	7	566±33	36	689±17	0	-	0	-
Total	87	7	93	0	0	12	577±21	56	694±12	0	-	0	-
Imnaha R. basin													
Males	2	0	100	0	0	0	-	1	735	0	-	0	-
Females	15	40	60	0	0	4	581±32	6	654±47	0	-	0	-
Total	17	35	65	0	0	4	581±32	7	666±47	0	-	0	-

Table 2. Residence of summer steelhead anglers interviewed during creel surveys in the Grande Ronde and Imnaha river basins during the 2016-17 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
Lower GR River	617	36	34	9	21
Rondowa	25	72	28	0	0
Wallowa River	534	52	39	4	5
Imnaha River	114	89	8	0	3
Big Sheep Creek	0	0	0	0	0

Table 3. Number of Ad+CWT, AdLV+CWT or AdRV+CWT marked summer steelhead recovered during creel surveys in the Grande Ronde and Imnaha river basins during the 2016-17 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 07 72	Spring Cr.	Production/April	2013	1	4
	09 07 74	Spring Cr.	Fall Brood/April	2013	2	7
	09 07 75	Spring Cr.	Production/April	2013	2	9
	09 07 76	Spring Cr.	Prod/Vol/May	2013	2	9
	09 07 77	Spring Cr.	Production/April	2013	2	11
	09 08 06	Spring Cr.	Fall Brood/April	2014	1	5
	09 08 13	Deer Cr.	Fall Brood/April	2014	1	7
	09 27 45	Deer Cr.	Production/April	2013	1	4
Wallowa River	09 07 71	Spring Cr.	Fall Brood/April	2013	1	ND
	09 07 76	Spring Cr.	Prod/Vol/May	2013	1	ND
	09 07 79	Deer Cr.	Fall Brood/April	2013	6	ND
	09 07 80	Deer Cr.	Prod/Vol/May	2013	9	ND
	09 08 11	Spring Cr.	Prod/Vol/May	2014	1	ND
	09 27 45	Deer Cr.	Production/April	2013	5	ND
Rondowa	09 08 11	Spring Cr.	Prod/Vol/May	2014	1	ND
	09 08 13	Deer Cr.	Fall Brood/April	2014	1	ND
	09 27 45	Deer Cr.	Production/April	2013	1	ND

[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.*

Mean fork length (±95% confidence interval) of harvested hatchery steelhead was 581 (±32) mm for age 1:1 and 666 (±47) mm for age 1:2 (Table 1). Sex ratio was 12% male and 88% female (Table 1). Eighty-nine percent of the anglers on the Imnaha River were local Oregon residents, 8% were non-local Oregon residents and 3% resided outside the states of Oregon and Washington (Table 2). On the Imnaha River, we estimated that anglers did not harvest any Ad+CWT or AdLV+CWT marked steelhead from our hatchery releases.

Angler effort on the lower Grande Ronde was lower than last year but similar to two and three years ago, and only 80% of average since we began surveys over 30 years ago, while the Imnaha effort was the lowest observed on record and only 22% of average (Figure 8).

Harvest on the lower Grande Ronde was the lowest observed since the mid-90's. Compared to recent years, the 2016-17 run year was similar to both the 2014-15 and 2015-16 run years but is near half of the average harvest since we began surveys in 1985. The Imnaha had the lowest observed harvest since the mid-1990s and only 22% of the average since surveys began in 1985 (Figure 9). Total catch (harvested and released) on the lower Grande Ronde and the Imnaha Rivers was the lowest observed since the late 1990s and mid-1990s, respectively (Table 4). Catch and release of wild steelhead this year on the lower Grande Ronde was 34% of the total catch, whereas on

the Imnaha wild fish were over 50% of the total catch. It is difficult to know whether catch of wild steelhead is trending upward on the Imnaha due to unmarked hatchery fish in the returns from years 2003-2012.

Total catch, harvest, and release of both hatchery and wild steelhead for the 2015-16 run year on the Wallowa, as determined by angler harvest card data that is accessible on a one-year delay, were lower than the 2014-15 run year but at or above the 10-year average (Table 5). In contrast at Rondowa, these same metrics were higher than the 2014-15 run year except for harvest which was lower, and all but harvest were above the 10-year average.

Catch rates in 2016-17 were lower in all Grande Ronde basin steelhead fisheries but higher in the Imnaha fishery compared to the previous year, and were also higher than the overall average since surveys began in 1985 in all fisheries except for the lower Grande Ronde fishery (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 (Table 2). For the Grande Ronde and Imnaha basin fisheries as a whole (based on angler days), 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). Based on this relationship, total harvest estimates for spring steelhead fisheries in run year 2015-16 were 1,133 fish at Rondowa, 1,300 fish in the Wallowa River and 170 fish in the middle Grande Ronde River, for a total harvest estimate of 2,603 fish in the Grande Ronde basin, excluding the lower Grande Ronde River (Figure 9, Appendix Table C-1). We estimated 57 coded-wire-tagged fish were harvested at Rondowa and 197 coded-wire tagged fish were harvested in the Wallowa River in run year 2015-16. Total catch estimates for spring steelhead fisheries in run year 2015-16 were 3,727 fish at Rondowa, 2,824 fish in the Wallowa River, and 351 fish in the middle Grande Ronde River, for a total catch estimate of 6,902 fish in the Grande Ronde basin, excluding the lower Grande Ronde River (Appendix Table C-2). Angler effort for run year 2015-16 was estimated to be 10,479 hours at Rondowa, 15,123 hours in the Wallowa River, and 1,747 hours in the middle Grande Ronde River, for a total effort estimate of 27,349 hours in the Grande Ronde basin, excluding the lower Grande Ronde River (Appendix Table C-3).

MANAGEMENT IMPLICATIONS AND RECOMMENDATIONS

The 2016-17 adult Wallowa stock steelhead return to the Lower Snake River Compensation Plan Area (3,546 adults, to be reported in the 2017 Annual Progress Report) was well below the 10-year average (from 2007-2016) of 11,949 adults. Our

fisheries data indicate that despite the below average run, angler participation on the lower Grande Ronde River was similar to the previous two run years. However, total catch, harvest and catch rates were reflective of the low run and were similar to the late 1990s. Similarly, the Imnaha stock steelhead return was 708 adults, below the 10-year average run of 3,787 adults, and for the second year in a row, angler effort, catch and harvest were the lowest observed since the mid-1990s. Low adult returns coupled with many unfishable days due to very cold conditions followed by high and muddy river conditions during the spring may best explain the poor fishing success on the lower Grande Ronde and Imnaha rivers.

Catch rates also reflected the lower than average adult return and poor fishing conditions on the lower Grande Ronde River, however on the Imnaha and Wallowa rivers catch rates were average and were above average at Rondowa, suggesting that anglers still had some success during the spring fishery. Catch and release of wild steelhead are part of the catch rate formula and except for the lower Grande Ronde fishery, the percent of wild steelhead in the total catch was higher than average for all spring fisheries, including 56% on the Imnaha, 27% at Rondowa and 20% on the Wallowa River. This suggests that the wild fish portion of the total catch contributes heavily to the success of recreational steelhead fisheries in both the Grande Ronde and Imnaha basins, especially in low hatchery return years.

The 2016-17 fishing season was the second year in which regulation changes allowed anglers to target steelhead through the end of April; however, the end dates of our 2016-17 creel survey remained unchanged from prior seasons (31 March on the lower Grande Ronde, 15 April on the Wallowa and Imnaha rivers). We do not believe the regulation change will meaningfully affect total catch and harvest on the lower Grande Ronde River, since fishing effort there is typically low in April. However, steelhead are often present in the Wallowa and Imnaha rivers in late April, and empirical information suggests some anglers will target them. Thus, creel surveys of these fisheries in late April are advised if funding allows.

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 2016-17 run year will be reported in the 2017-18 annual creel report.

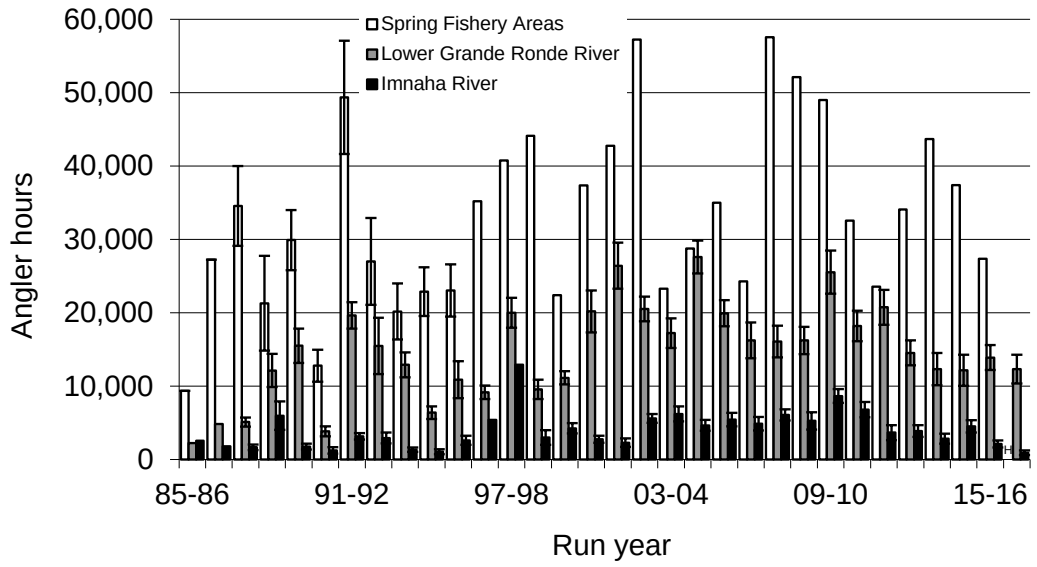

Figure 8. Angler effort (in hours) for summer steelhead in spring fishery areas (upper Grande Ronde and Wallowa rivers, Catherine Creek, and Rondowa), the lower Grande Ronde River, and the Imnaha River for the 1985-86 to 2016-17 run years. Not shown are 266, 61, 82, 57, 62, 97, 18 and 0 angler hours on Big Sheep Creek (Imnaha basin) for the 09-10 through 16-17 run years, respectively. "H" is a value to be estimated from angler harvest card 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.

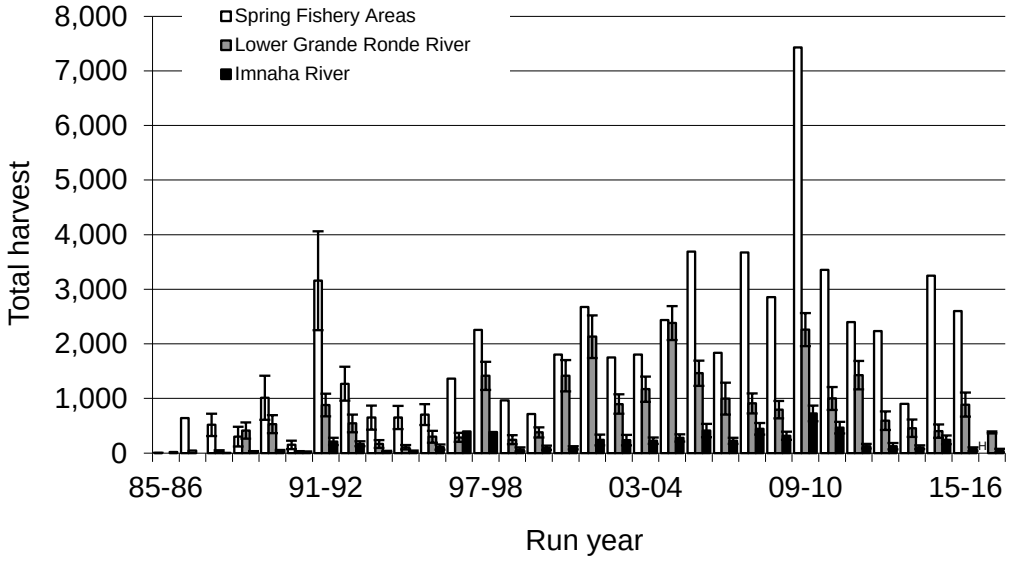

Figure 9. Number of hatchery summer steelhead harvested by recreational anglers in spring fishery areas (upper Grande Ronde and Wallowa rivers, Catherine Creek, and Rondowa), the lower Grande Ronde River, and the Imnaha River for the 1985-86 to 2016-17 run years. Not shown are 8, 0, 0, 0, 0, 6, 2 and 0 hatchery fish harvested on Big Sheep Creek (Imnaha basin) for the 09-10 through 16-17 run years, respectively. "H" is a value to be estimated from angler harvest card 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 2016-17 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[c]	594	302	1,090	1,986	126	4	206	336
13-14[c]	454	154	786	1,394	106	23	279	408
14-15[c]	401	184	1,069	1,654	249	134	442	825
15-16[c]	903	492	1,410	2,805	75	38	119	232
16-17[c]	379	131	267	777	42	8	63	113
Average	779	394	894	2,067	174	100	535	809

[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-Apr), and 95-96 (Sept-15Nov, Mar-15Apr).*

[c] *Angler surveys on the lower Grande Ronde River beginning with the 2012-13 run year were conducted from Sept-Mar.*

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 2015-16 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
12-13	773	182	404	1,359	1,178	273	317	1,768
13-14	558	261	280	1,099	280	2	139	421
14-15	1,690	1,082	662	3,434	1,303	997	890	3,190
15-16	1,300	951	573	2,824	1,133	1,574	1,020	3,727
Average	910	524	435	1,868	916	662	533	2,110

[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 (Feb-Apr), and 90-91 (16Feb-15Apr), and at Rondowa during run years 87-88 and 94-95 (Mar-15Apr), 89-90 (17-31Mar), and 93-94 (16Mar-15Apr).*

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 2016-17 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
13-14	9±2	-	-	65±93	10±2	7±2	-
14-15	7±3	-	-	5±1	5±1	6±1	4±1
15-16	5±1	-	-	3±1	5±1	9±3	7±3
16-17	14±10	-	-	4±3	9±3	8±4	-
Average	10±2	20±5	21±24	10±6	11±3	9±2	8±11

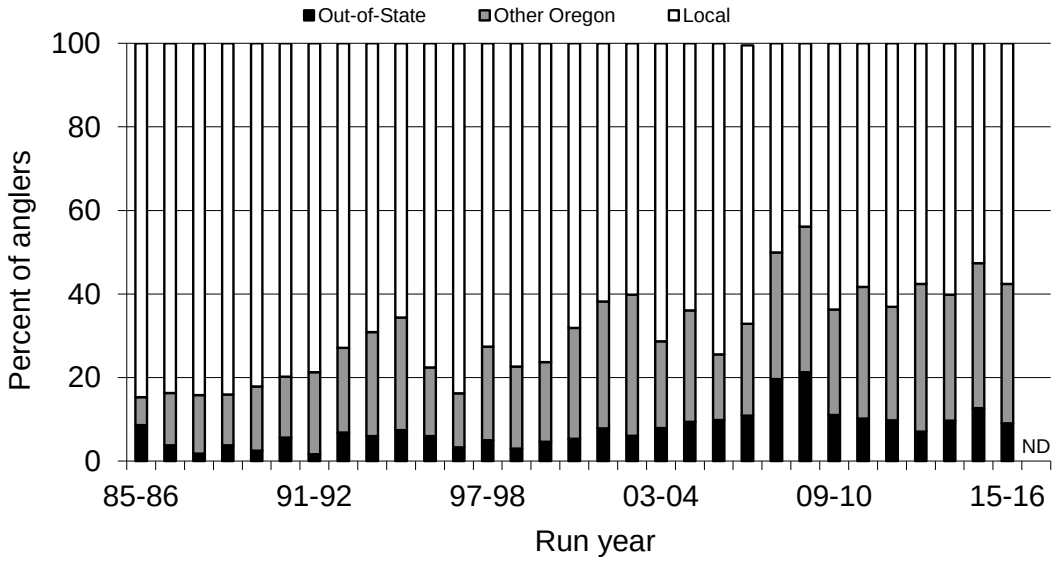

Figure 10. Percent of local resident anglers (Union or Wallowa county residents), non-local Oregon resident anglers, and out-of-state anglers that fished in summer steelhead fisheries in the Grande Ronde and Imnaha river basins for the 1985-86 to 2015-16 run years. ND indicates not determined until statewide annual harvest card data become available.

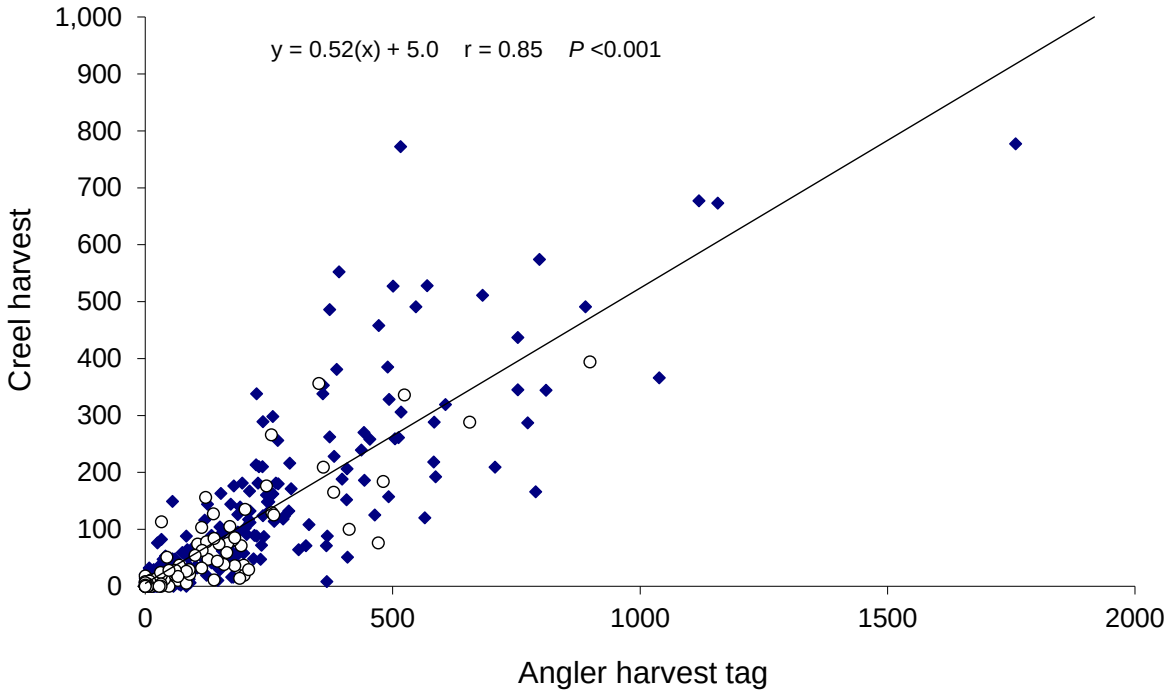

Figure 11. Relation between angler harvest card (punch card) and creel survey harvest for summer steelhead fisheries in the Grande Ronde (♦) and Imnaha (○) river basins for years when harvest estimates for specific reaches were available (1993-1996 for the upper Grande Ronde and Wallowa, 1994-1995 for Rondowa, 1992-1993 for Catherine Creek, 1993-spring 2016 for the lower Grande Ronde, and 1986-1996, 1999-2016 for the Imnaha fishery areas).

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APPENDIX A

Fishery Statistics for the 2016-17 run year

Appendix Table A-1. Fishery statistics for summer steelhead on the lower Grande Ronde River during the 2016-17 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
September:								
Weekday	8	31	494±287	24±31	17	0.049±0.064	20±26	88±51
Weekend	5	28	289±145	15±19	2±8	0.052±0.066	19±24	70±35
Total	13	59	783±321	39±37	19±8	0.050±0.092	20±37	158±65
October:								
Weekday	7	147	4,166±1,434	100±46	58	0.024±0.011	42±19	733±252
Weekend	6	151	2,547±981	85±40	21	0.033±0.016	30±15	464±179
Total	13	298	6,713±1,738	185±61	79	0.027±0.019	37±26	1,197±310
November:								
Weekday	6	71	1,613±384	229±66	123	0.142±0.041	7±2	298±71
Weekend	6	122	2,336±617	227±52	145	0.097±0.022	10±2	397±105
Total	12	193	3,949±726	456±84	268	0.127±0.046	8±3	695±128
December:								
Weekday	4	25	297±307	36±32	8±15	0.122±0.108	8±7	72±74
Weekend	3	19	180±180	8±0	2	0.044±0.037	23±19	39±39
Total	7	44	477±356	44±32	10±15	0.098±0.114	10±2	111±83
January:								
Weekday	4	4	21±0	0	0	-	-	10±0
Weekend	4	4	25±0	11±0	3±0	0.421±1.641	2±8	5±0
Total	8	8	46±0	11±0	3±0	0.120±1.641	8±109	15±0
February:								
Weekday	6	3	40±0	0	0	-	-	12±0
Weekend	3	0	0	0	0	-	-	0
Total	9	3	40±0	0	0	-	-	12±0
March:								
Weekday	6	11	282±282	42±64	0	0.147±0.228	20±26	85±85
Weekend	3	1	4	0	0	-	-	1±0
Total	9	12	286±282	42±64	0	0.107±0.228	9±19	86±85
Grand total	71	617	12,294±1,964	777±131	379±17	0.069±0.050	14±10	2,274±363

Appendix Table A-2. Catch rate (±95% confidence intervals) for summer steelhead at Rondowa during the 2016-17 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	3	6	0.333±0.443	3±4
Weekend	2	9	-	-
Total	5	15	0.137±0.164	7±9
March:				
Weekday	3	0	-	-
Weekend	6	10	0.415±0.339	2±2
Total	9	10	0.415±0.339	2±3
April:				
Weekday	2	0	-	-
Weekend	3	0	-	-
Total	5	0	-	-
Grand total	19	25	0.271±0.218	4±3

Appendix Table A-3. Catch rate (±95% confidence intervals) for summer steelhead on the Wallowa River during the 2016-17 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	9	116	0.041±0.025	25±15
Weekend	6	111	0.085±0.044	12±6
Total	15	227	0.062±0.024	16±6
March:				
Weekday	5	41	0.060±0.068	17±19
Weekend	8	170	0.183±0.102	5±3
Total	13	211	0.166±0.088	6±3
April:				
Weekday	4	43	0.164±0.040	6±5
Weekend	4	53	0.014±0.016	70±80
Total	8	96	0.074±0.057	14±10
Grand total	36	534	0.106±0.038	9±3

Appendix Table A-4. Fishery statistics for summer steelhead in Section 1 (Fence Creek to town of Imnaha) of the Imnaha River during the 2016-17 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	8	3	17±18	0	0	-	-	8±8
Weekend	5	2	4±5	0	0	-	-	9±11
Total	13	5	21±18	0	0	-	-	17±15
March:								
Weekday	9	2	11±11	6±3	6±3	0.559±0.052	2±0	5±5
Weekend	4	8	28±37	2±1	0	0.087±0.013	11±2	62±82
Total	13	10	39±39	8±3	6±3	0.216±0.017	5±0	67±67
April:								
Weekday	4	0	0	0	0	-	-	0
Weekend	3	1	2±2	0	0	-	-	4±4
Total	7	1	2±2	0	0	-	-	4±4
Grand total	33	16	62±43	8±3	6±3	0.135±0.011	7±1	88±61

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 2016-17 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	8	14	107±64	0	0	-	-	31±19
Weekend	5	15	57±34	0	0	-	-	34±20
Total	13	29	164±72	0	0	-	-	65±29
March:								
Weekday	9	36	293±139	57±60	26±28	0.192±0.132	5±3	92±44
Weekend	4	34	297±245	48±99	10±21	0.162±0.144	6±5	74±61
Total	13	70	590±282	105±116	36±35	0.177±0.098	6±3	166±79
April:								
Weekday	4	2	3±5	0	0	-	-	1±2
Weekend	3	15	81±101	0	0	-	-	25±31
Total	7	17	84±101	0	0	-	-	26±31
Grand total	33	116	838±308	105±116	36±35	0.124±0.069	8±4	257±94
Sec.1 + 2	33	132	900±311	113±116	42±35	0.125±0.064	8±4	345±119

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 2016-17 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	8	0	0	0	0	-	-	0
Weekend	5	0	0	0	0	-	-	0
Total	13	0	0	0	0	-	-	0
March:								
Weekday	9	0	0	0	0	-	-	0
Weekend	4	0	0	0	0	-	-	0
Total	13	0	0	0	0	-	-	0
April:								
Weekday	4	0	0	0	0	-	-	0
Weekend	3	0	0	0	0	-	-	0
Total	7	0	0	0	0	-	-	0
Grand total	33	0	0	0	0	-	-	0

APPENDIX B

Percent of Summer Steelhead That Were Marked Hatchery Fish and Caught during the 2016-17 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 2016-17 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	69(39)	71(185)	69(456)	66(44)	27(11)	-(0)	10(42)	-
Rondowa	-	-	-	-	-	60(10)	75(28)	-(0)
Wallowa River	-	-	-	-	-	81(47)	95(122)	77(26)
Imnaha River (Section 1)	-	-	-	-	-	-(0)	75(8)	-(0)
Imnaha River (Section 2)	-	-	-	-	-	-(0)	44(105)	-(0)
Big Sheep Cr.	-	-	-	-	-	-(0)	-(0)	-(0)

APPENDIX C

Fishery Statistics for Spring Fisheries for the 2015-16 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 2015-16 run year. Total harvest = 0.519 (harvest card) + 4.499. 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 Upper Grande Ronde (location code 233), Catherine Creek (location code 120), or Wenaha (location code 184).

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
Rondowa (234)										
Angler harvest cards	0	19	38	76	153	961	863	14		
Sampled fish	0	0	0	0	0	27	13	0		
Total harvest	-	14	24	44	84	503	452	12	1,133	
Sample rate expansion	-	-	-	-	-	18.6	34.8	-		
09 05 56						1	0	0	1	19
09 07 74						2	0	0	2	37
09 07 79						0	1	0	1	1
Wallowa (235)										
Angler harvest cards	0	0	51	70	118	905	1,169	139		
Sampled fish	0	0	0	0	0	265	128	13		
Total harvest	-	-	31	41	66	474	611	77	1,300	
Sample rate expansion	-	-	-	-	-	1.8	4.8	5.9		
09 05 54						2	1	0	3	9
09 05 55						2	0	0	2	4
09 05 58						1	1	0	2	7
09 05 59						1	0	0	1	2
09 05 60						1	0	0	1	2
09 05 61						2	3	2	7	30
09 07 70						1	0	0	1	2
09 07 71						3	2	0	5	15
09 07 72						0	2	0	2	10
09 07 73						5	0	0	5	9
09 07 74						9	1	0	10	21
09 07 75						1	2	0	3	12
09 07 76						5	0	0	5	9
09 07 79						7	6	0	13	42
09 07 80						5	0	0	5	9
09 27 45						2	2	0	4	14
Middle Grande Ronde (232)										
Angler harvest cards	0	57	101	13	35	63	7	0		
Total harvest	-	34	57	11	23	37	8	-	170	
Total Grande Ronde harvest (excluding lower Grande Ronde)									2,603	

Appendix Table C-2. Estimated catch of summer steelhead in spring fisheries in the Grande Ronde basin for the 2015-16 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	-	-	-	-	-	27	18	0	45
Sampled catch	-	-	-	-	-	99	51	2	152
Total harvest	-	14	24	44	84	503	452	12	1,133
Total catch	-	47	81	149	284	1,844	1,281	41	3,727
Wallowa									
Sampled harvest	-	-	-	-	-	276	139	15	430
Sampled catch	-	-	-	-	-	548	296	57	901
Total harvest	-	-	31	41	66	474	611	77	1,300
Total catch	-	-	65	86	138	941	1,301	293	2,824
Wenaha									
Sampled harvest	-	-	-	-	-	-	-	-	-
Sampled catch	-	-	-	-	-	-	-	-	-
Total harvest	-	-	-	-	-	-	-	-	0
Total catch	-	-	-	-	-	-	-	-	0
Middle Grande Ronde									
Sampled harvest	-	-	-	-	-	-	-	-	-
Sampled catch	-	-	-	-	-	-	-	-	-
Total harvest	-	34	57	11	23	37	8	-	170
Total catch	-	71	119	23	48	73	17	-	351
Total Grande Ronde catch (excluding lower Grande Ronde)									6,902

[a] *Wallowa data were used for the upper Grande Ronde, middle Grande Ronde, and Catherine Creek; lower Grande Ronde data, in Flesher et al. 2018, 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 2015-16 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	-	-	-	-	-	0.444	0.275	-	0.361
Total catch	-	47	81	149	284	1,844	1,281	41	3,727
Angler effort	-	130	224	413	787	4,153	4,658	114	10,479
Wallowa									
Catch rate	-	-	-	-	-	0.220	0.175	0.150	0.198
Total catch	-	-	65	86	138	941	1,301	293	2,824
Angler effort	-	-	328	434	697	4,277	7,434	1,953	15,123
Wenaha									
Catch rate	-	-	-	-	-	-	-	-	-
Total catch	-	-	-	-	-	-	-	-	0
Angler effort	-	-	-	-	-	-	-	-	0
Middle Grande Ronde									
Catch rate	-	-	-	-	-	-	-	-	-
Total catch	-	71	119	23	48	73	17	-	351
Angler effort	-	359	601	116	242	332	97	-	1,747
Total Grande Ronde angler effort (excluding lower Grande Ronde)									27,349

[a] *Wallowa data were used for the upper Grande Ronde, middle Grande Ronde, and Catherine Creek; lower Grande Ronde data, in Flesher et al. 2018, were used for the Wenaha.*