

LOWER SNAKE RIVER COMPENSATION PLAN:
Summer Steelhead Creel Surveys on the
Grande Ronde, Wallowa, and Imnaha
Rivers for the 2002-03 Run Year

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



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ANNUAL PROGRESS REPORT

FISH RESEARCH PROJECT
OREGON

PROJECT TITLE: Summer Steelhead Creel Surveys on the
Grande Ronde, Wallowa, and Imnaha
Rivers for the 2002-03 Run Year

CONTRACT NUMBER: 1411-04-J071

PROJECT PERIOD: 1 April 2003 to 31 March 2004

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March 2005

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

PREFACE

This report is for the funding period 1 April 2003 to 31 March 2004. The sampling period was from 1 September 2002 to 15 April 2003. 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 2002-2003 run year were primarily from the 1999 and 2000 brood years. Results of creel surveys conducted prior to fall 2002 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, and 2004b). The steelhead angling season surveyed in this report, during which only adipose fin-clipped fish could be harvested, was open from 1 September 2002 to 15 April 2003 in the Grande Ronde and Imnaha River basins.

ACKNOWLEDGMENTS

We would like to thank Joe Krakker and Chris Starr for their review of the report, Mary Buckman for the statistical design and analysis of the data and Tracy Albert and Russell Peterson for their dedication in conducting the surveys. We would also like to thank Joe Bumgarner (Washington Department of Fish and Wildlife) for coordination and John Johnston for conducting the Lower Grande Ronde survey during spring 2003. 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

Angler effort during the 2002-03 run year was lower than the previous year on the lower Grande Ronde River and higher on the Imnaha River, and harvest was lower on the lower Grande Ronde River and similar on the Imnaha River than during the previous year. Catch rates in the Grande Ronde and Imnaha basins were higher than average since surveys began with the highest catch rates from January through March on the lower Grande Ronde River and in February and March on the Imnaha River. Hatchery summer steelhead dominated the catch during most months in Grande Ronde Basin fisheries. Releases of large numbers of unmarked hatchery steelhead in the Imnaha Basin make the contribution of hatchery adults to the fishery difficult to assess (the 2002-03 run year was the first year of unmarked hatchery returns). The unmarked hatchery adults can't be distinguished from wild adults by anglers and therefore are released. Anglers harvested more two-ocean compared to one-ocean hatchery steelhead and more females than males in all Grande Ronde and Imnaha basin fisheries. The percentage of local Oregon resident anglers (from Union or Wallowa counties), non-local Oregon resident anglers, and out-of-state anglers participating in summer steelhead fisheries during the 2002-03 run year was similar to the recent past. We sampled adipose and left ventral fin-clipped coded-wire tagged (AdLV+CWT) summer steelhead in both the Grande Ronde and Imnaha basin fisheries. Expanded estimates for the Wallowa and Rondowa fisheries will not be determined until statewide angler harvest tag (punch card) summaries become available (usually a two-year delay), however harvest, catch, and angler effort for the 2001-02 run year are reported in the appendices. The survey on the upper Grande Ronde River was discontinued due to elimination of hatchery steelhead releases under the present management program.

INTRODUCTION

Summer steelhead (*Oncorhynchus mykiss*) fisheries in the Grande Ronde and Imnaha 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 (U.S. Army Corps of Engineers 1996) and low steelhead redd counts on index streams in the Grande Ronde and Imnaha 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 basins (Carmichael 1989). Approximately 1.68 M steelhead smolts were targeted for release in Oregon each year during April and May in the Grande Ronde and Imnaha basins between 1984 and 1999. Beginning in 2000, we reduced releases to approximately 1.2 M smolts in response to the National Oceanic and Atmospheric Administration (NOAA) Fisheries recommendation to help reduce straying of Wallowa hatchery stock steelhead, primarily into the Deschutes River (mid-Columbia tributary). These fish 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 basins. The goal of these surveys is to provide annual harvest information needed to assess LSRCP goals (Carmichael and Wagner 1983). In general, the number of summer steelhead in the recreational fishery has been restored to historic values, but the fishery is concentrated at different times and places (Flesher et al. 1994). This report summarizes results of creel surveys conducted during the fall of 2002 and the spring of 2003 in the Grande Ronde and Imnaha basins. In addition, this report contains estimates of total effort, catch, and harvest for all fisheries in the Grande Ronde and Imnaha basins not reported in the previous annual report for the 2001-02 run year. The Grande Ronde and Imnaha basins encompass the major steelhead fisheries that occur in Oregon tributaries to the Snake River upstream of Lower Granite Dam.

STUDY AREA

Creel surveys on the Grande Ronde River were conducted on a lower 24 km section from the Oregon-Washington state line (Rkm 62) upstream to Wildcat Creek (Rkm 86, Figure 1). Surveys on the Wallowa River were conducted on a 6 km section from its confluence with the Grande Ronde River at Rondowa (mouth of the Wallowa River) upstream to Howard Creek (Rkm 6) and a 50 km section from Minam State Park (Rkm 13) upstream to the mouth of Trout Creek (Rkm 63) near Enterprise. Anglers who parked their vehicles at Minam State Park to fish just below the park were included in the Wallowa survey. Because vehicle access into Rondowa was limited, anglers parked their vehicles at Palmer Junction, located 5.6 km upstream of Rondowa on the Grande Ronde River and on Smith Mountain Road at the Boise Cascade gate, located on Smith Mountain which is approximately 16 km by road to Rondowa. Thus, for the Rondowa survey, we interviewed anglers leaving the parking areas at Palmer Junction and at the gate on Smith Mountain Road when they were encountered. The survey on the Imnaha River was conducted on the lower 32 km from its confluence with the Snake River (Rkm 0) upstream to the mouth of Big Sheep Creek (Rkm 32) near the town of Imnaha (Figure 1).

METHODS

For the lower Grande Ronde River survey, we used the methodology described by Carmichael et al. (1988). The survey on the lower Grande Ronde River was conducted from 1 September 2002 through 15 April 2003. Our goal was to sample 50% of the weekends (Saturday and Sunday) and holidays and 30% of the weekdays (Monday through Friday) during each month of each survey. Initially, sample days were chosen randomly in two-day blocks. They were then adjusted to equally represent the two

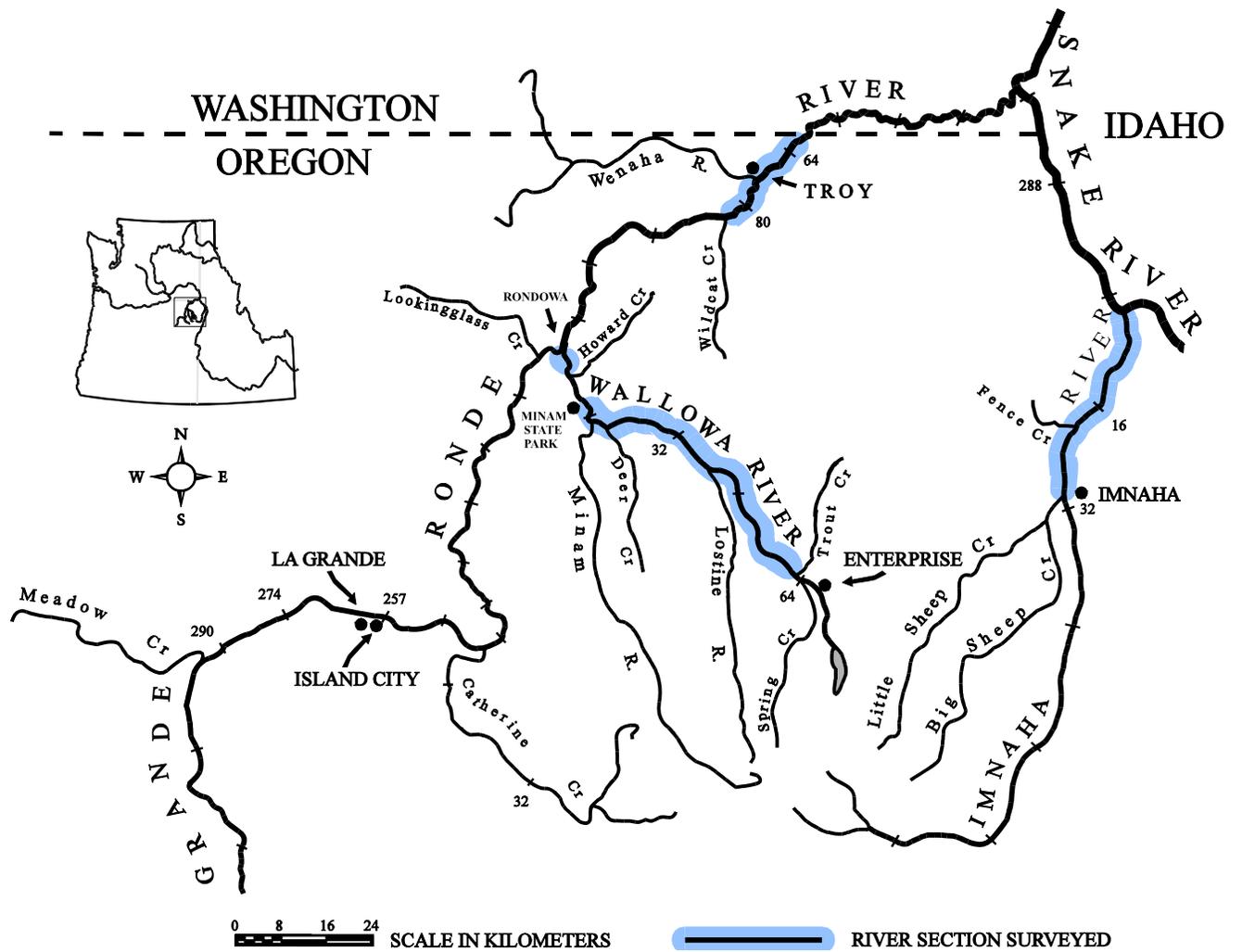


Figure 1. Map of northeastern Oregon showing where summer steelhead creel surveys were conducted in the Grande Ronde and Imnaha basins during the 2002-03 run year.

strata (weekend days and holidays, and weekdays). 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 and their vehicle, 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 the fish was coded-wire-tagged (CWT), as indicated by adipose and left ventral fin-clips (AdLV), 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 on the Imnaha River were conducted from 1 February through 15 April 2003. For the Imnaha River survey, we used a check station for the area below Fence Creek (Rkm 23) and a roving survey in the area above Fence 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 previous 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 the surveyor interviewed anglers 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, and 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 2003. We randomly selected the area to survey first and both areas were surveyed each sample day. Each sample day, the surveyor drove the survey route, stopped to interview anglers, then drove to the next area and repeated this sequence. For Rondowa, the surveyor checked the Palmer Junction parking area in February, then both Palmer Junction and Smith Mountain parking areas in March and April that anglers used to access Rondowa. If sufficient time was available, the surveyor returned to interview anglers in the first area surveyed that sample day. All harvested fish observed were sampled. From 1-28 February, we surveyed four days each week during a randomly selected morning (0800-1200) or afternoon (1300-1700) period. From 1 March to 15 April, we surveyed four full days each week from 0700-1800.

For the lower Grande Ronde River creel surveys, we estimated angler effort in hours and days, total catch, harvest, catch rate, percent hatchery fish in the catch, and the number of AdLV+CWT marked fish harvested (see Carmichael et al. 1988). Similar

statistics were estimated for the Imnaha River surveys, except the percent of marked fish was substituted for percent of hatchery fish, since unmarked hatchery steelhead were not distinguishable from wild adults. For the Wallowa and Rondowa survey areas, we estimated catch rate and percent hatchery fish in the catch. In addition, we determined age and sex 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 estimated total harvest by month for previous spring fisheries in the Grande Ronde and Imnaha basins (2001-02 run year) by using the punch card estimate of harvest and a regression between angler harvest tag (punch card) harvest and creel survey harvest for specific reaches within each basin for previous years. To estimate total catch, we multiplied total harvest estimates by the ratio of sampled catch to sampled harvest from creel surveys. To estimate total angler effort in hours, we used total catch divided by the sample catch rate (fish per hour) reported in Flesher et al. (2004b).

ACCOMPLISHMENTS AND FINDINGS

On the lower Grande Ronde River from 1 September 2002 to 15 April 2003, we sampled 52.1% of the weekends and holidays (37 days) and 30.8% of the weekdays (48 days) for a total of 85 sample days. On the Wallowa River from 1 February to 15 April 2003, we sampled 73.9% of the weekends and holidays (17 days) and 41.2% of the weekdays (21 days) for a total of 38 sample days. At Rondowa (mouth of the Wallowa River) from 1 February to 15 April 2003, we sampled 69.6% of the weekends and holidays (16 days) and 43.1% of the weekdays (22 days) for a total of 38 sample days. On the Imnaha River from 1 February to 15 April 2003, 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.

We estimated that 3,649 anglers fished for 20,510 hours on the lower Grande Ronde River during the 2002-03 season. They caught and released 1,181 wild and 330 hatchery steelhead and harvested 898 hatchery steelhead for a catch rate index of 8 hours per fish (Figures 2-6, Appendix A-1). The percent of steelhead caught that were hatchery origin ranged from 17% in September to 71% in November 2002 (Figure 7, Appendix B). Age composition of harvested hatchery steelhead was 44% 1:1 (one year spent in freshwater: one year spent in saltwater), and 56% 1:2 (one year spent in freshwater: two years spent in saltwater). Mean fork length ($\pm 95\%$ confidence interval) of harvested hatchery steelhead was 609 (± 6) mm for age 1:1, and 713 (± 8) mm for age 1:2 (Table 1). Sex composition was 38% male and 62% female (Table 1). Sixty-three percent of the anglers were local Oregon resident anglers, 23% were non-local Oregon resident anglers, 4% were Washington State residents and 10% resided outside the states of Oregon and Washington (Table 2). On the lower Grande Ronde River, anglers harvested an estimated 79 AdLV+CWT marked steelhead from our hatchery releases

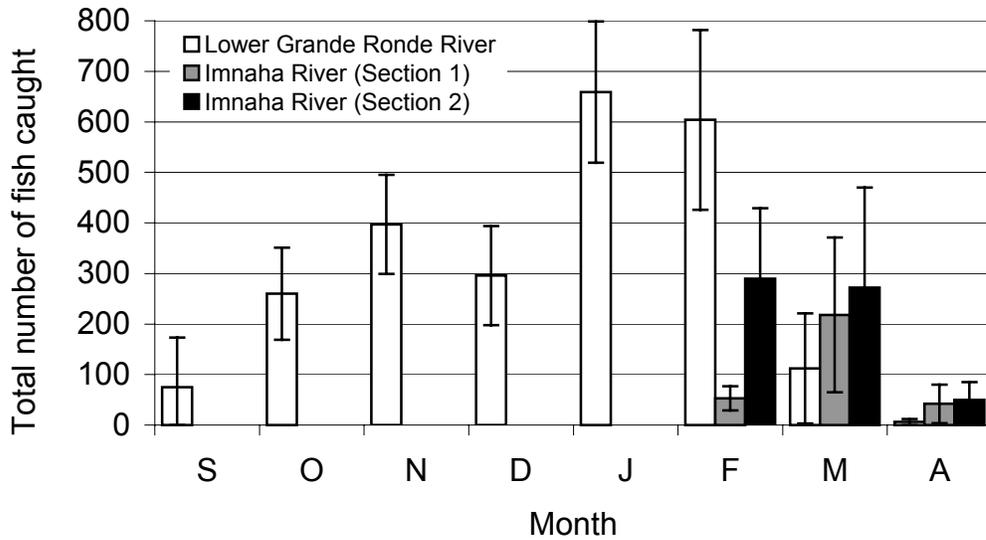


Figure 2. Estimated total catch of summer steelhead (\pm 95% confidence intervals) on the lower Grande Ronde River and two sections of the Imnaha River during the 2002-03 run year. Surveys were conducted from 1 September 2002 to 15 April 2003 on the lower Grande Ronde River and from 1 February to 15 April 2003 on the Imnaha River.

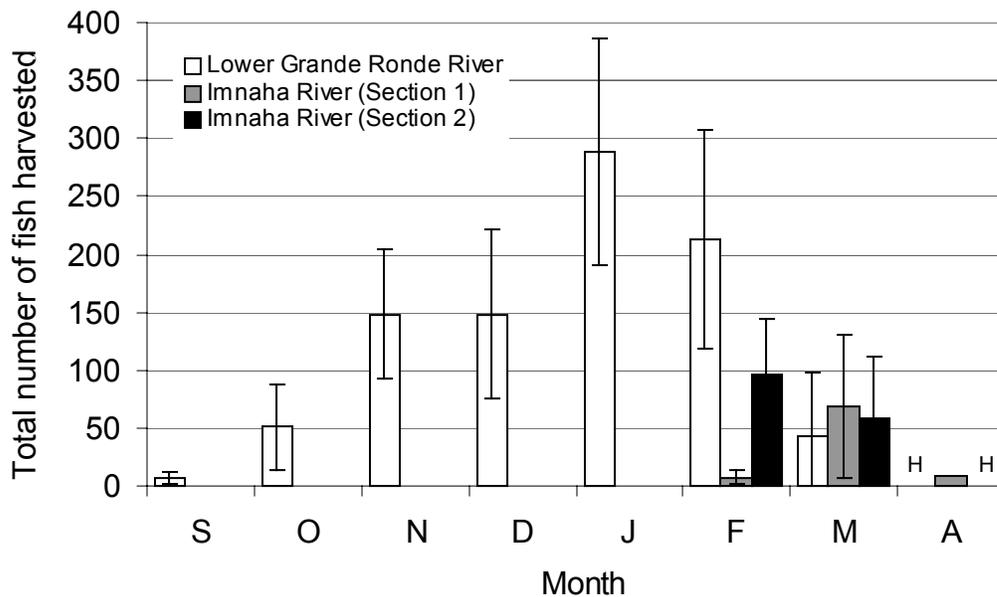


Figure 3. Estimated total harvest of summer steelhead (\pm 95% confidence intervals) on the lower Grande Ronde River and two sections of the Imnaha River during the 2002-03 run year. "H" indicates no harvest. Surveys were conducted from 1 September 2002 to 15 April 2003 on the lower Grande Ronde River and from 1 February to 15 April 2003 on the Imnaha River.

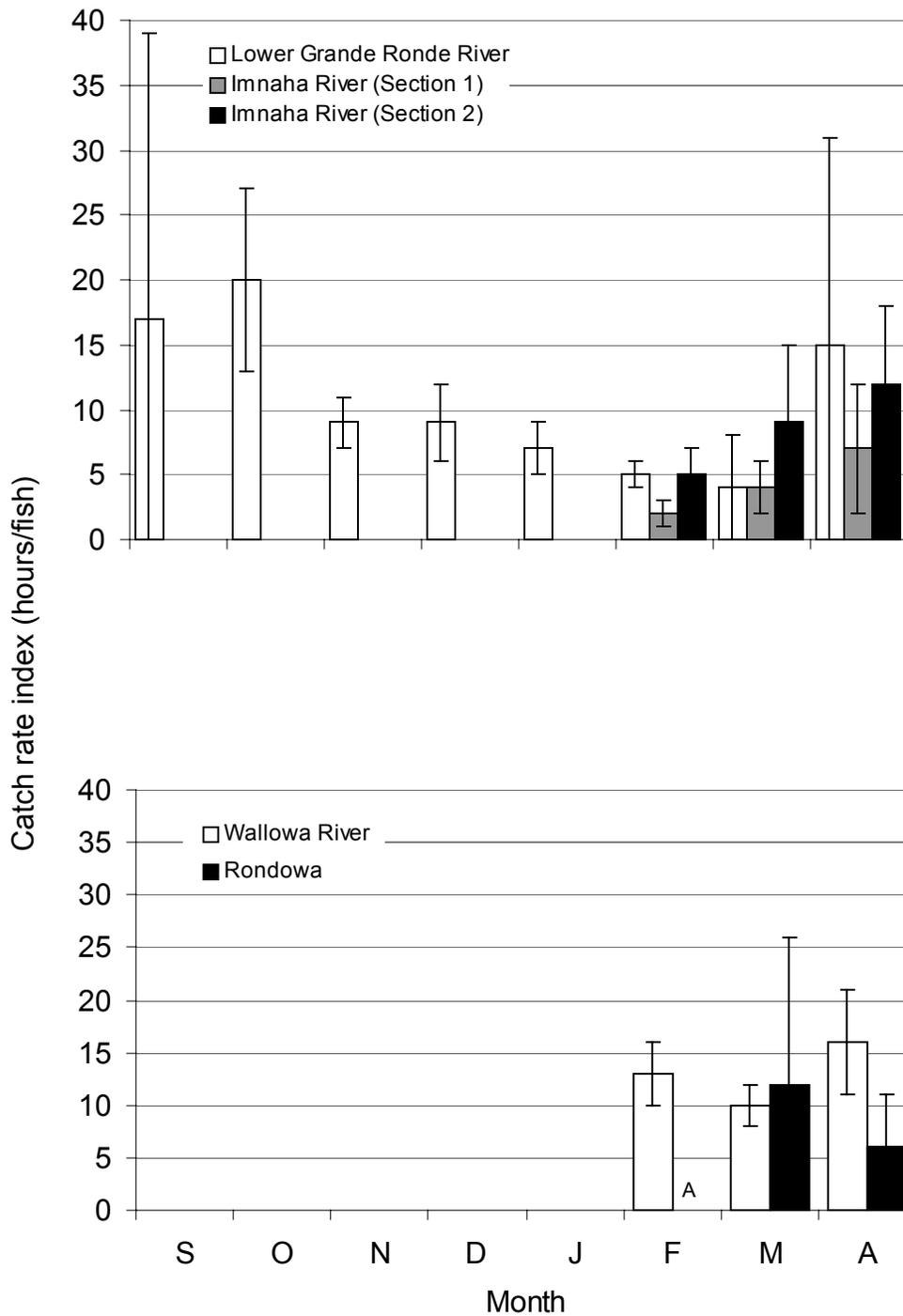


Figure 4. Estimated catch rate index (hours/fish) for summer steelhead (\pm 95% confidence intervals) in the Grande Ronde and Imnaha basins during the 2022-03 run year. "A" indicates no anglers. Survey areas and times include the lower Grande Ronde River (1 September 2022 - 15 April 2023), and Rondowa, Wallowa River, and two sections of the Imnaha River (1 February - 15 April 2023). Note: A lower catch rate index implies better angling success.

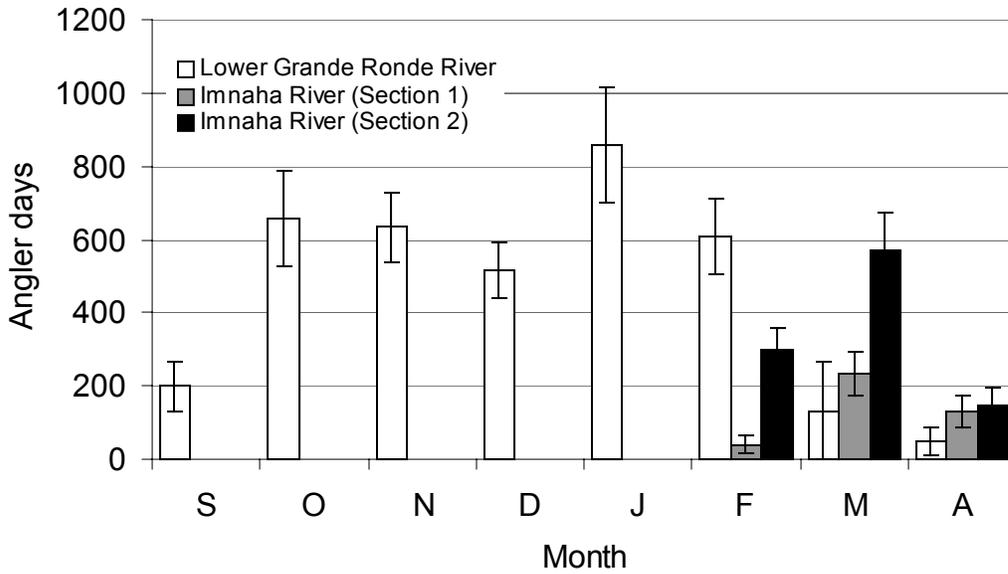


Figure 5. Estimated number of angler days for summer steelhead (\pm 95% confidence intervals) on the lower Grande Ronde River and two sections of the Imnaha River during the 2002-03 run year. Surveys were conducted from 1 September 2002 to 15 April 2003 on the lower Grande Ronde River and from 1 February to 15 April 2003 on the Imnaha River.

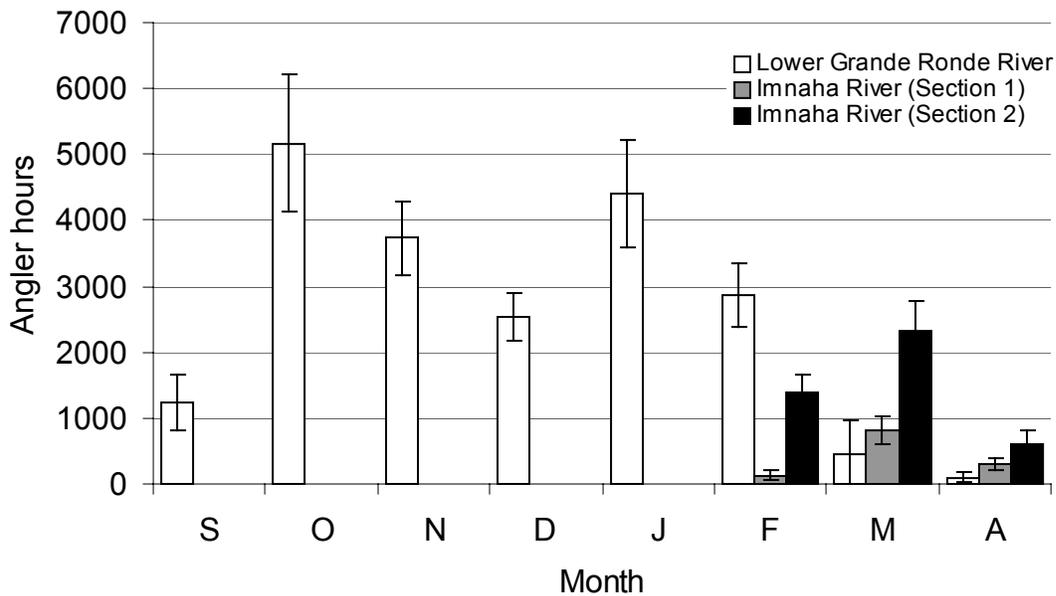


Figure 6. Estimated number of angler hours for summer steelhead (\pm 95% confidence intervals) on the lower Grande Ronde River and two sections of the Imnaha River during the 2002-03 run year. Surveys were conducted from 1 September 2002 to 15 April 2003 on the lower Grande Ronde River and from 1 February to 15 April 2003 on the Imnaha River.

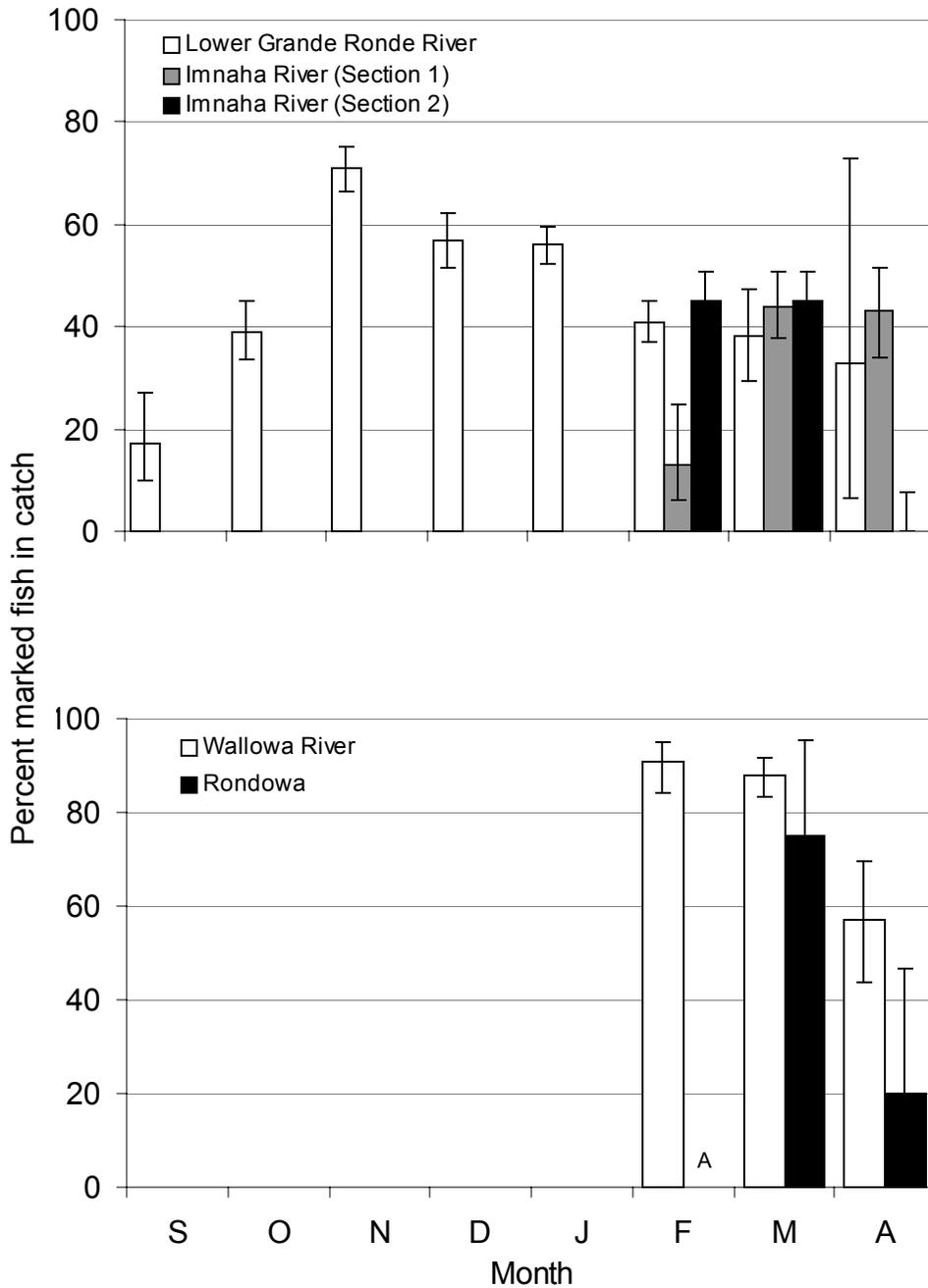


Figure 7. Estimated percent of summer steelhead caught (\pm 95% confidence intervals; using a binomial distribution) in the Grande Ronde and Imnaha basins during the 2002-03 run year that were marked. In the Grande Ronde Basin all unmarked fish were wild, whereas in the Imnaha Basin unmarked fish were of both wild and hatchery origin. "A" indicates no anglers. Survey areas and times include the lower Grande Ronde River (1 September 2002 - 15 April 2003), and Rondowa, Wallowa River, and two sections of the Imnaha River (1 February-15 April 2003).

Table 1. Percent age composition and mean fork length (\pm 95% confidence intervals) of hatchery summer steelhead sampled in creel surveys in the Grande Ronde and Imnaha basins during the 2002-03 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 2003 and Little Sheep Creek Facility (for the Imnaha River survey area) in 2002. Age is expressed as years spent in freshwater prior to ocean migration:years spent in the ocean prior to spawning migration.

Creel survey area, sex	N	Age composition (%)		Mean fork length (mm)	
		1:1	1:2	1:1	1:2
Lower GR River					
Males	78	62	38	617 \pm 8	705 \pm 17
Females	129	34	66	600 \pm 8	716 \pm 9
Total	207	44	56	609 \pm 6	713 \pm 8
Rondowa					
Males	1	100	0	630	-
Females	3	0	100	-	730 \pm 108
Total	4	25	75	630	730 \pm 108
Wallowa River					
Males	81	57	43	610 \pm 9	733 \pm 19
Females	134	26	74	604 \pm 13	719 \pm 8
Total	215	38	62	607 \pm 6	723 \pm 8
Imnaha River					
Males	23	43	57	618 \pm 15	727 \pm 39
Females	53	30	70	619 \pm 13	730 \pm 11
Total	76	34	66	619 \pm 9	730 \pm 12

Table 2. Residence of summer steelhead anglers interviewed during creel surveys in the Grande Ronde and Imnaha basins during the 2002-03 run year. Local Oregon resident anglers were from Union and Wallowa counties.

Creel survey area	Number of anglers	Percent			
		Local Oregon resident anglers	Non-local Oregon resident anglers	Washington resident anglers	Other out-of-state anglers
Lower GR River	1064	63	23	4	10
Rondowa	39	51	46	0	3
Wallowa River	1329	64	31	2	3
Imnaha River	484	83	13	2	2

and an estimated 12 AdLV+CWT marked steelhead that were strays from Washington Department of Fish and Wildlife releases on the Grande Ronde River at the Cottonwood Conditioning Pond, Washington (Table 3).

At Rondowa, the catch rate index averaged 8 hours per fish (Figure 4, Appendix A-2). The percent of steelhead caught that were hatchery origin ranged from 20% in April to 75% in March (Figure 7, Appendix B). Age composition of harvested hatchery

Table 3. Number of AdLV+CWT marked summer steelhead recovered during creel surveys in the Grande Ronde and Imnaha basins during the 2002-03 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 29 30	Spring Cr.	Prod./April	1999	2	7
	09 29 31	Spring Cr.	Prod./April	1999	2	10
	09 29 33	Spring Cr.	Forced/May	1999	2	7
	09 29 34	Deer Cr.	Prod./April	1999	2	9
	09 29 35	Deer Cr.	Prod./April	1999	2	7
	09 29 36	Deer Cr.	Volitional/May	1999	3	14
	09 32 12	Spring Cr.	Prod./April	2000	3	12
	09 32 13	Spring Cr.	Forced/May	2000	2	11
	09 32 14	Spring Cr.	Volitional/May	2000	1	2
	63 13 09	-	WDFW ^c	1999	2	12
Wallowa River	09 29 30	Spring Cr.	Prod./April	1999	2	ND
	09 29 31	Spring Cr.	Prod./April	1999	3	ND
	09 29 32	Spring Cr.	Volitional/May	1999	2	ND
	09 29 33	Spring Cr.	Forced/May	1999	1	ND
	09 29 34	Deer Cr.	Prod./April	1999	5	ND
	09 29 35	Deer Cr.	Prod./April	1999	5	ND
	09 29 36	Deer Cr.	Volitional/May	1999	3	ND
	09 29 37	Deer Cr.	Forced/May	1999	2	ND
	09 32 12	Spring Cr.	Prod./April	2000	2	ND
	09 32 15	Deer Cr.	Prod./April	2000	2	ND
	09 32 16	Deer Cr.	Forced/May	2000	3	ND
	09 32 17	Deer Cr.	Volitional/May	2000	2	ND
	Rondowa	09 29 34	Deer Cr.	Prod./April	1999	1
09 32 15		Deer Cr.	Prod./April	2000	1	ND
Imnaha River	09 29 27	L. Sheep Cr.	Prod./April	1999	7	15
	09 29 28	L. Sheep Cr.	Prod./April	1999	1	4
	09 29 29	L. Sheep Cr.	Prod./May	1999	3	12
	09 32 10	L. Sheep Cr.	Prod./April	2000	3	13
	09 32 11	L. Sheep Cr.	Prod./May	2000	1	2

^a Prod. indicates production releases.

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

^c Steelhead with tag code 63 13 09 were released by Washington Department of Fish and Wildlife (WDFW) in the lower Grande Ronde River at the Cottonwood Conditioning Pond, Washington, on 1 April 2000.

steelhead was 25% 1:1 and 75% 1:2. Mean fork length ($\pm 95\%$ confidence interval) of harvested hatchery steelhead was 630 mm for age 1:1 (one male) and 730 (± 108) mm for age 1:2 (Table 1). Sex composition was 25% male and 75% female (Table 1). Fifty-one percent of the anglers were local Oregon resident anglers, 46% were non-local Oregon resident anglers, and 3% resided outside the states of Oregon and Washington (Table 2). At Rondowa, anglers harvested 2 AdLV+CWT marked steelhead from our hatchery releases, however, expanded estimates for the entire fishery will not be determined until angler harvest tag data become available (Table 3).

On the Wallowa River, the catch rate index averaged 12 hours per fish (Figure 4, Appendix A-3). The percent of steelhead caught that were hatchery origin ranged from 57% in April to 91% in February (Figure 7, Appendix B). Age composition of harvested hatchery steelhead was 38% 1:1, and 62% 1:2. Mean fork length ($\pm 95\%$ confidence interval) of harvested hatchery steelhead was 607 (± 6) mm for age 1:1, and 723 (± 8) mm for age 1:2 (Table 1). Sex composition was 38% male and 62% female (Table 1). Sixty-four percent of the anglers were local Oregon residents, 31% were non-local Oregon residents, 2% were Washington State residents and 3% resided outside the states of Oregon and Washington (Table 2). On the Wallowa River, anglers harvested 32 AdLV+CWT marked steelhead from our hatchery releases, however, expanded estimates for the entire fishery will not be determined until state harvest tag data become available (Table 3).

On the Imnaha River, we estimated that 1,419 anglers fished for 5,587 hours. They caught and released 552 unmarked (wild and hatchery) and 134 hatchery steelhead and harvested 239 hatchery steelhead for a catch rate index of 6 hours per fish (Figures 2-6, Appendices A-4 and A-5). The percent of steelhead caught that were known hatchery origin ranged from 0% in April in Section 2 to 45% in February and March in Section 2 (Figure 7, Appendix B). Age composition of harvested hatchery steelhead was 34% 1:1, and 66% 1:2. Mean fork length ($\pm 95\%$ confidence interval) of harvested hatchery steelhead was 619 (± 9) mm for age 1:1, and 730 (± 12) mm for age 1:2 (Table 1). Sex composition was 30% male and 70% female (Table 1). Eighty-three percent of the anglers were local Oregon residents, 13% were non-local Oregon residents, 2% were Washington State residents and 2% resided outside the states of Oregon and Washington (Table 2). On the Imnaha River, anglers harvested an estimated 46 AdLV+CWT marked steelhead from our hatchery releases (Table 3).

Angler effort (Figure 8) was lower than the previous year on the lower Grande Ronde River and higher on the Imnaha River, and harvest (Figure 9) was lower on the lower Grande Ronde and similar on the Imnaha River than during the previous year. Catch rates in the Grande Ronde and Imnaha basins were higher than average since surveys began (Table 4) with the highest catch rates from January through March on the lower Grande Ronde River and in both February and March on the Imnaha River (Figure 4, Appendices A-1 through A-5).

The residence of anglers participating in summer steelhead fisheries in the Grande Ronde and Imnaha basins was similar to the recent past; 25 percent of the anglers

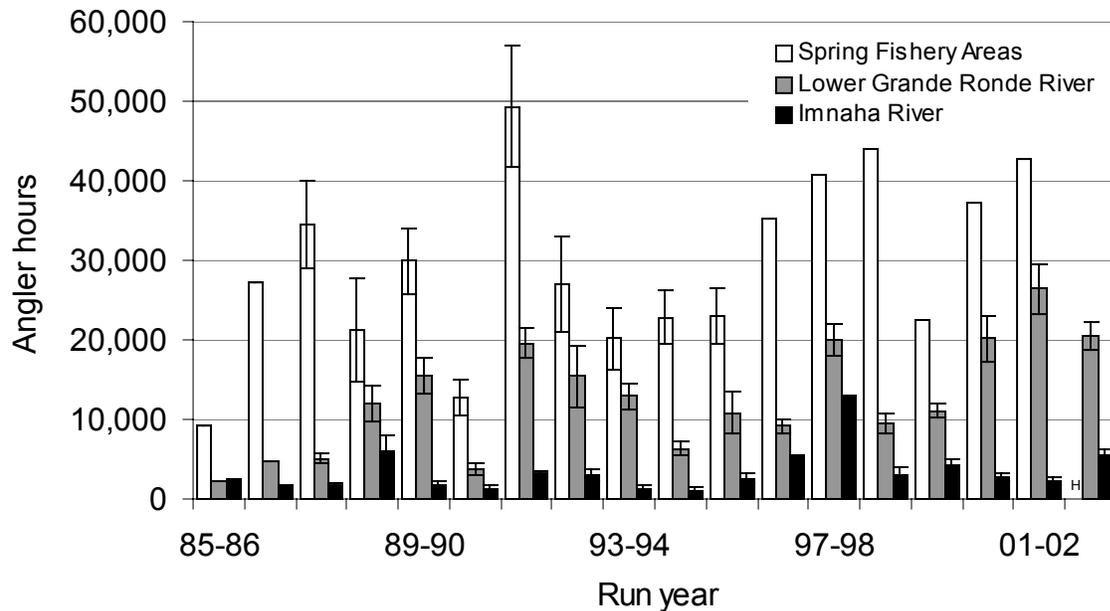


Figure 8. Angler effort for summer steelhead ($\pm 95\%$ confidence intervals) in spring fishery areas (upper Grande Ronde River, Wallowa River, Catherine Creek, and Rondowa), the lower Grande Ronde River, and the Imnaha River for the 1985-86 to 2002-03 run years. “H” indicates this value must be estimated from harvest card data, which was not available when this report was submitted. Confidence intervals not available 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.

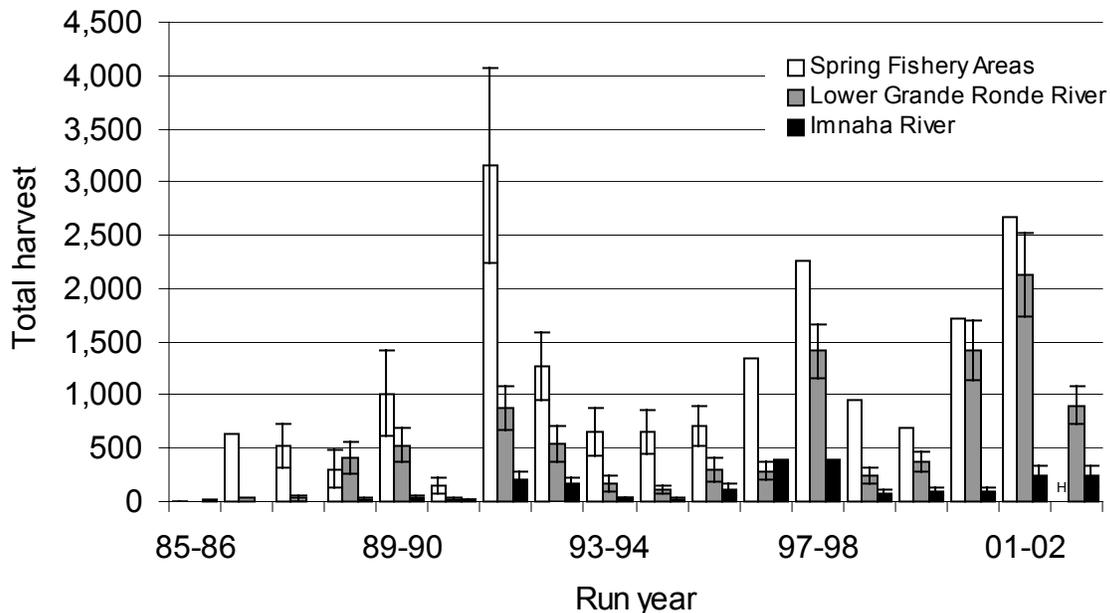


Figure 9. Number of hatchery summer steelhead harvested ($\pm 95\%$ confidence intervals) by recreational anglers in spring fishery areas (upper Grande Ronde River, Wallowa River, Catherine Creek, and Rondowa), the lower Grande Ronde River, and the Imnaha River for the 1985-86 to 2002-03 run years. H indicates this value must be estimated from harvest card data, which was not available when this report was submitted. Confidence intervals not available 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. Catch rate index (hours/fish \pm 95% confidence intervals) in summer steelhead fisheries creel survey areas in the Grande Ronde and Imnaha basins for the 1985-86 to 2002-03 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
85-86	8 \pm 7	-	-	-	7 \pm 7	15 \pm 7
86-87	9 \pm 3	-	-	-	11 \pm 3	9 \pm 8
87-88	10 \pm 4	-	-	11 \pm 9	16 \pm 3	24 \pm 9
88-89	14 \pm 4	40 \pm 55	-	-	43 \pm 21	18 \pm 11
89-90	14 \pm 4	14 \pm 8	-	34 \pm 27	17 \pm 5	20 \pm 8
90-91	19 \pm 8	24 \pm 11	-	-	6 \pm 2	13 \pm 6
91-92	11 \pm 3	10 \pm 3	3 \pm 3	6 \pm 1	10 \pm 2	4 \pm 1
92-93	9 \pm 2	14 \pm 4	49 \pm 49	-	11 \pm 2	8 \pm 1
93-94	18 \pm 5	31 \pm 17	-	12 \pm 4	17 \pm 3	13 \pm 3
94-95	21 \pm 6	25 \pm 13	-	15 \pm 5	17 \pm 3	17 \pm 8
95-96	11 \pm 2	15 \pm 4	-	-	21 \pm 4	7 \pm 2
96-97	14 \pm 4	18 \pm 9	33 \pm 69	-	13 \pm 3	6 \pm 2
97-98	7 \pm 1	13 \pm 9	7 \pm 10	11 \pm 6	10 \pm 1	18 \pm 9
98-99	17 \pm 4	19 \pm 9	14 \pm 20	-	18 \pm 4	20 \pm 7
99-2000	11 \pm 2	25 \pm 19	-	8 \pm 7	17 \pm 4	12 \pm 3
2000-01	6 \pm 1	18 \pm 17	-	6 \pm 4	11 \pm 2	6 \pm 1
2001-02	5 \pm 1	11 \pm 17	-	7 \pm 4	7 \pm 1	3 \pm 1
2002-03	8 \pm 1	-	-	8 \pm 6	12 \pm 2	6 \pm 2
Average	12 \pm 2	20 \pm 5	21 \pm 18	12 \pm 6	15 \pm 4	12 \pm 3

were non-local Oregon residents (Figure 10). The Imnaha River fishery had the highest percent of local resident anglers (83%), and the fishery at Rondowa had the highest percentage (46%) of non-local Oregon resident anglers, while the lower Grande Ronde River fishery had the highest percent (14%) of out-of-state anglers.

There was a significant linear relationship between angler harvest tag (punch card) harvest estimates and creel harvest estimates for specific reaches in previous years (Figure 11). Total harvest estimates for spring steelhead fisheries in the 2001-02 run year were 34 fish in the upper Grande Ronde River, 8 fish in Catherine Creek, 874 fish at Rondowa, 1,492 fish in the Wallowa River, 3 fish in the Wenaha River, and 265 fish in the middle Grande Ronde River, for a total harvest estimate of 2,676 fish in the Grande Ronde Basin, excluding the lower Grande Ronde River (Figure 9, Appendix C-1). We estimated 3 coded-wire tagged fish were harvested at Rondowa and 186 coded-wire tagged fish were harvested in the Wallowa River in the 2001-02 run year. Total catch estimates for spring steelhead fisheries in the 2001-02 run year were 65 fish in the upper Grande Ronde River, 13 fish in Catherine Creek, 1,349 fish at Rondowa, 2,683 fish in the Wallowa River, 7 fish in the Wenaha River, and 505 fish in the middle Grande Ronde River, for a total catch estimate of 4,622 fish in the Grande Ronde Basin, excluding the lower Grande Ronde River (Appendix C-2). Angler effort for the 2001-02 run year was estimated to be 682 hours in the upper Grande Ronde River, 134 hours in Catherine Creek, 17,166 hours at Rondowa, 20,119 hours in the Wallowa River, 26 hours in the Wenaha River, and 4,597 hours in the middle Grande Ronde River, for a

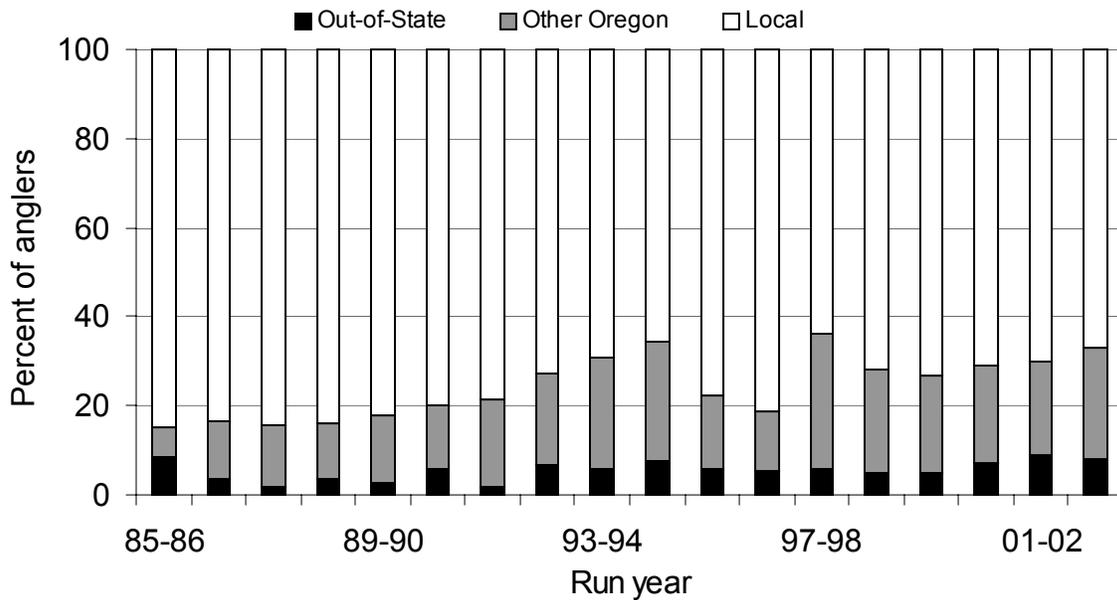


Figure 10. Percent of local resident anglers (Union or Wallowa county residents), non-local Oregon resident anglers, and out-of-state anglers that fished in summer steelhead fisheries in the Grande Ronde and Imnaha basins for the 1985-86 to 2002-03 run years.

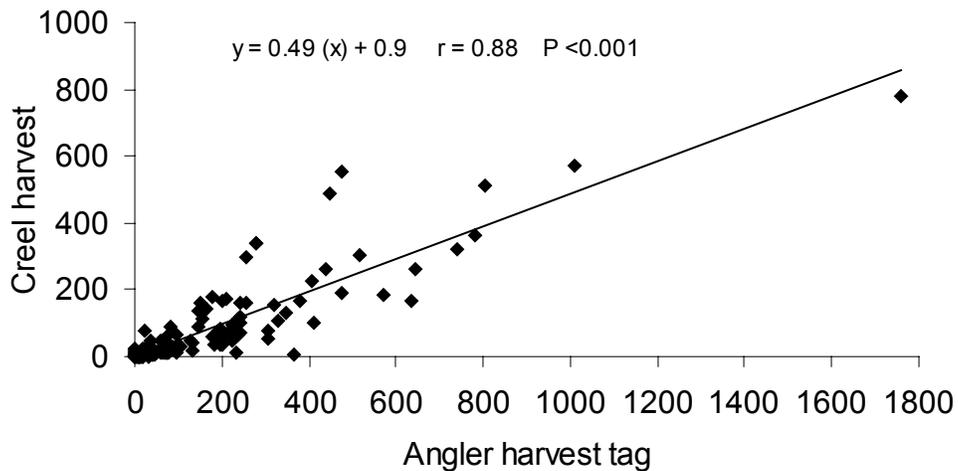


Figure 11. Relationship of angler harvest tag (punch card) and creel survey harvest for summer steelhead fisheries in the Grande Ronde and Imnaha basins for years when harvest estimates for specific reaches were available (1993-1996 for the upper Grande Ronde, Wallowa, and Rondowa, 1992-1993 for Catherine Creek, 1993-2002 for the lower Grande Ronde, and 1986-2002 for the Imnaha fishery areas).

total effort estimate of 42,724 hours in the Grande Ronde Basin, excluding the lower Grande Ronde River (Figure 8, Appendix C-3).

MANAGEMENT IMPLICATIONS AND RECOMMENDATIONS

Although angler effort and harvest were lower than the previous year, catch rates remained higher than average during most months of the Grande Ronde and Imnaha basin steelhead fisheries for the 2002-03 run year. Hatchery fish dominated the catch in four of the 8 months during the fishery on the lower Grande Ronde, and in all three months surveyed on the Wallowa River. On the Imnaha River, unmarked hatchery fish began returning as adults during the 2002-03 run year, however, only marked (adipose fin-clipped) hatchery fish are recognizable to anglers. Thus, both marked and unmarked hatchery steelhead contribute substantially to angler catch rates and probably dominate the catch during most of the spring months on the Imnaha River. These fishery statistics illustrate the importance of current hatchery programs to the success of recreational summer steelhead fisheries in these basins.

Estimates of total harvest and harvest of AdLV+CWT marked steelhead, total catch, and angler effort (in hours) for the 2002-03 spring angler surveys will not be available until statewide angler harvest tag data become available (usually a two-year delay).

We discontinued surveys on the upper Grande Ronde due to the low angler effort expended there and the elimination of hatchery releases of steelhead resulting from the present management program.

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APPENDIX A

Fishery statistics for the 2002-03 run year

Appendix A-1. Fishery statistics for summer steelhead on the lower Grande Ronde River during the 2002-03 run year. Statistics include mean estimates \pm 95% confidence intervals. Only adipose fin-clipped fish were harvested. "-" indicates not sampled or undefined.

Month, day type	Sample size		Total Hours	Total catch	Total harvest	Catch rate		Angler days
	Days	Anglers				fish/h	h/fish	
September:								
Weekday	6	23	689 \pm 378	53 \pm 97	4	0.076 \pm 0.141	13 \pm 24	104 \pm 57
Weekend	6	50	555 \pm 174	22 \pm 12	3 \pm 5	0.040 \pm 0.022	25 \pm 14	95 \pm 30
Total	12	73	1244 \pm 416	75 \pm 98	7 \pm 5	0.060 \pm 0.079	17 \pm 22	199 \pm 67
October:								
Weekday	7	101	3064 \pm 859	156 \pm 70	24 \pm 24	0.051 \pm 0.023	20 \pm 9	367 \pm 103
Weekend	4	86	2101 \pm 581	104 \pm 58	27 \pm 28	0.050 \pm 0.028	20 \pm 11	289 \pm 80
Total	11	187	5165 \pm 1037	260 \pm 91	51 \pm 37	0.050 \pm 0.018	20 \pm 7	656 \pm 132
November:								
Weekday	6	86	2186 \pm 397	269 \pm 89	92 \pm 50	0.123 \pm 0.041	8 \pm 3	386 \pm 70
Weekend	6	121	1550 \pm 396	128 \pm 42	56 \pm 26	0.083 \pm 0.027	12 \pm 4	249 \pm 64
Total	12	207	3736 \pm 560	397 \pm 98	148 \pm 56	0.106 \pm 0.026	9 \pm 2	635 \pm 95
December:								
Weekday	6	54	1454 \pm 273	191 \pm 85	102 \pm 68	0.131 \pm 0.058	8 \pm 4	365 \pm 69
Weekend	5	95	1082 \pm 252	105 \pm 49	46 \pm 26	0.097 \pm 0.045	10 \pm 5	152 \pm 35
Total	11	149	2536 \pm 371	296 \pm 98	148 \pm 73	0.117 \pm 0.038	9 \pm 3	517 \pm 76
January:								
Weekday	7	79	1592 \pm 631	315 \pm 114	115 \pm 73	0.198 \pm 0.071	5 \pm 2	454 \pm 180
Weekend	4	129	2823 \pm 509	344 \pm 82	173 \pm 66	0.122 \pm 0.029	8 \pm 2	403 \pm 73
Total	11	208	4415 \pm 811	659 \pm 140	288 \pm 98	0.149 \pm 0.032	7 \pm 2	857 \pm 157
February:								
Weekday	6	66	1377 \pm 439	357 \pm 170	144 \pm 90	0.259 \pm 0.112	4 \pm 2	309 \pm 99
Weekend	5	140	1478 \pm 205	247 \pm 52	69 \pm 27	0.167 \pm 0.035	6 \pm 1	299 \pm 41
Total	11	206	2855 \pm 484	604 \pm 178	213 \pm 94	0.212 \pm 0.057	5 \pm 1	608 \pm 103
March:								
Weekday	6	21	416 \pm 487	88 \pm 105	43 \pm 54	0.211 \pm 0.240	5 \pm 6	120 \pm 140
Weekend	5	5	48 \pm 22	24 \pm 30	0	0.491 \pm 0.539	2 \pm 2	9 \pm 4
Total	11	26	464 \pm 488	112 \pm 109	43 \pm 54	0.240 \pm 0.222	4 \pm 4	129 \pm 136
April:								
Weekday	4	8	82 \pm 76	6 \pm 6	0	0.075 \pm 0.078	13 \pm 14	46 \pm 43
Weekend	2	1	13	0	-	-	-	2
Total	6	9	95 \pm 76	6 \pm 6	0	0.065 \pm 0.068	15 \pm 16	48 \pm 38
Grand total	85	1065	20510 \pm 1684	2409 \pm 316	898 \pm 177	0.118 \pm 0.015	8 \pm 1	3649 \pm 300

Appendix A-2. Catch rate ($\pm 95\%$ confidence intervals) for summer steelhead at Rondowa during the 2002-03 run year. Only adipose fin-clipped fish were harvested. "-" indicates not sampled or undefined.

Month, day type	Sample size		Catch rate	
	Days	Anglers	fish/h	(h/fish)
February:				
Weekday	8	0	-	-
Weekend	5	0	-	-
Total	13	0	-	-
March:				
Weekday	8	12	0.157 \pm 0.184	6 \pm 8
Weekend	7	8	-	-
Total	15	20	0.082 \pm 0.095	12 \pm 14
April:				
Weekday	6	3	0.125 \pm 0.538	8 \pm 34
Weekend	4	16	0.175 \pm 0.164	6 \pm 5
Total	10	19	0.170 \pm 0.149	6 \pm 5
Grand total	38	39	0.124 \pm 0.084	8 \pm 6

Appendix A-3. Catch rate ($\pm 95\%$ confidence intervals) for summer steelhead on the Wallowa River during the 2002-03 run year. Only adipose fin-clipped fish were harvested.

Month, day type	Sample size		Catch rate	
	Days	Anglers	fish/h	(h/fish)
February:				
Weekday	8	173	0.098 \pm 0.030	10 \pm 3
Weekend	6	282	0.063 \pm 0.018	16 \pm 5
Total	14	455	0.076 \pm 0.016	13 \pm 3
March:				
Weekday	8	280	0.103 \pm 0.034	10 \pm 3
Weekend	7	348	0.092 \pm 0.021	11 \pm 2
Total	15	628	0.097 \pm 0.018	10 \pm 2
April:				
Weekday	5	103	0.078 \pm 0.038	13 \pm 6
Weekend	4	143	0.052 \pm 0.022	19 \pm 8
Total	9	246	0.062 \pm 0.020	16 \pm 5
Grand total	38	1329	0.084 \pm 0.011	12 \pm 2

Appendix A-4. Fishery statistics for summer steelhead in Section 1 (Fence Creek to town of Imnaha) of the Imnaha River during the 2002-03 run year. Statistics include mean estimates $\pm 95\%$ confidence intervals. Only adipose fin-clipped fish were harvested.

Month, day type	Sample size		Total hours	Total catch	Total harvest	Catch rate		Angler days
	Days	Anglers				fish/h	h/fish	
February:								
Weekday	6	5	54 \pm 59	34 \pm 20	0	0.638 \pm 0.157	2 \pm 1	20 \pm 22
Weekend	5	12	70 \pm 48	19 \pm 14	7 \pm 6	0.275 \pm 0.071	4 \pm 1	20 \pm 14
Total	11	17	124 \pm 76	53 \pm 24	7 \pm 6	0.433 \pm 0.079	2 \pm 1	40 \pm 25
March:								
Weekday	6	25	360 \pm 182	143 \pm 142	45 \pm 58	0.396 \pm 0.333	3 \pm 3	124 \pm 63
Weekend	5	49	458 \pm 104	75 \pm 58	24 \pm 23	0.164 \pm 0.089	6 \pm 3	111 \pm 25
Total	11	74	818 \pm 210	218 \pm 153	69 \pm 62	0.266 \pm 0.155	4 \pm 2	235 \pm 60
April:								
Weekday	3	14	217 \pm 91	19 \pm 25	0	0.086 \pm 0.100	12 \pm 14	90 \pm 38
Weekend	2	8	85 \pm 44	23 \pm 29	9	0.265 \pm 0.237	4 \pm 4	39 \pm 20
Total	5	22	302 \pm 101	42 \pm 38	9	0.137 \pm 0.098	7 \pm 5	129 \pm 43
Grand total	27	113	1244 \pm 245	313 \pm 160	85 \pm 63	0.251 \pm 0.105	4 \pm 2	404 \pm 80

Appendix A-5. Fishery statistics for summer steelhead in Section 2 (mouth to Fence Creek) of the Imnaha River during the 2002-03 run year. Statistics include mean estimates $\pm 95\%$ confidence intervals. Only adipose fin-clipped fish were harvested.

Month, day type	Sample size		Total hours	Total catch	Total harvest	Catch rate		Angler days
	Days	Anglers				fish/h	h/fish	
February:								
Weekday	6	42	806 \pm 224	180 \pm 119	61 \pm 42	0.223 \pm 0.123	4 \pm 2	147 \pm 41
Weekend	5	89	584 \pm 167	110 \pm 72	35 \pm 24	0.189 \pm 0.075	5 \pm 2	154 \pm 44
Total	11	131	1390 \pm 279	290 \pm 139	96 \pm 49	0.209 \pm 0.078	5 \pm 2	301 \pm 60
March:								
Weekday	6	82	1414 \pm 370	216 \pm 190	52 \pm 53	0.153 \pm 0.114	7 \pm 5	306 \pm 80
Weekend	5	114	923 \pm 239	56 \pm 57	6 \pm 8	0.061 \pm 0.043	16 \pm 11	262 \pm 68
Total	11	196	2337 \pm 440	272 \pm 198	58 \pm 54	0.116 \pm 0.071	9 \pm 6	568 \pm 107
April:								
Weekday	3	15	366 \pm 187	22 \pm 21	0	0.060 \pm 0.049	17 \pm 14	79 \pm 40
Weekend	2	29	250 \pm 79	28 \pm 28	0	0.112 \pm 0.078	9 \pm 6	67 \pm 21
Total	5	44	616 \pm 203	50 \pm 35	0	0.081 \pm 0.043	12 \pm 6	146 \pm 48
Grand total	27	371	4343 \pm 560	612 \pm 245	154 \pm 73	0.141 \pm 0.046	7 \pm 2	1015 \pm 131

Appendix B. Percent of marked hatchery summer steelhead caught during each survey month in the Grande Ronde and Imnaha basins during the 2002-03 run year. For the Imnaha River, these percentages do not include catch of unmarked hatchery fish. Total catch for the Lower Grande Ronde and Imnaha rivers and sampled catch for the Upper Grande Ronde and Wallowa rivers and Rondowa are shown in parentheses. 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	17(75)	39(260)	71(397)	57(296)	56(659)	41(604)	38(112)	33(6)
Rondowa	-	-	-	-	-	-(0)	75(8)	20(15)
Wallowa River	-	-	-	-	-	91(117)	88(237)	57(56)
Imnaha River (Section 1)	-	-	-	-	-	13(53)	44(218)	43(42)
Imnaha River (Section 2)	-	-	-	-	-	45(290)	45(272)	0(50)

APPENDIX C

Fishery statistics for spring fisheries for the 2001-02 run year

Appendix C-1. Estimated harvest of summer steelhead and observed and expanded harvest of AdLV+CWT marked steelhead in spring fisheries in the Grande Ronde Basin for the 2001-02 run year. Total harvest = 0.488 (harvest card) + 0.851. Sample rate expansion = total harvest/sampled fish. A sample rate expansion of 25 or greater was considered unreliable, therefore expanded equals observed. Harvest estimates made 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.

Fishery, location code, statistics, tagcode	Fishery statistics and number of tags recovered by month									Expanded tags
	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	Total	
Upper Grande Ronde (233)										
Angler harvest cards	0	0	20	0	0	16	20	4		
Total harvest	-	-	11	-	-	9	11	3	34	
Catherine Creek (120)										
Angler harvest cards	0	0	0	0	0	0	4	8		
Total harvest	-	-	-	-	-	-	3	5	8	
Rondowa (234)										
Angler harvest cards	4	4	39	24	122	382	1084	118		
Sampled fish	0	0	0	0	0	1	16	2		
Total harvest	3	3	20	13	60	187	530	58	874	
Sample rate expansion	-	-	-	-	-	187.0	33.1	29.0		
092563						0	1	0	1	1
092604						0	1	0	1	1
092931						0	0	1	1	1
Wallowa (235)										
Angler harvest cards	4	12	28	35	71	142	2002	749		
Sampled fish	0	0	0	0	0	12	191	58		
Total harvest	3	7	15	18	35	70	978	366	1492	
Sample rate expansion	-	-	-	-	-	5.8	5.1	6.3		
092562						0	1	2	3	18
092563						0	2	0	2	10
092602						1	1	0	2	11
092603						0	1	0	1	5
092604						0	2	1	3	17
092605						0	1	0	1	5
092931						0	2	0	2	10
092933						0	0	1	1	6
092934						1	7	2	10	54
092935						0	4	2	6	33
092937						0	2	1	3	17
Wenaha (184)										
Angler harvest cards	0	0	0	4	0	0	0	0		
Total harvest	-	-	-	3	-	-	-	-	3	
Middle Grande Ronde (232)										
Angler harvest cards	0	28	47	75	20	99	252	8		
Total harvest	-	15	24	37	11	49	124	5	265	
Total Grande Ronde harvest (excluding lower Grande Ronde)									2676	

Appendix C-2. Estimated catch of summer steelhead in spring fisheries in the Grande Ronde Basin for the 2001-02 run year. Total catch = (sampled catch/sample harvest) x total harvest. For months with little or no sampling, the average proportion was used. For areas with little or no sampling, data from the survey in closest proximity was used. Does not include the lower Grande Ronde fishery. "-" indicates not sampled or undefined.

Fishery ^a , statistics	Fishery statistics by month								
	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	Total
Upper Grande Ronde									
Sampled harvest	-	-	-	-	-	0	0	0	0
Sampled catch	-	-	-	-	-	0	3	0	3
Total harvest	-	-	11	-	-	9	11	3	34
Total catch	-	-	20	-	-	20	21	4	65
Catherine Creek									
Sampled harvest	-	-	-	-	-	-	-	-	-
Sampled catch	-	-	-	-	-	-	-	-	-
Total harvest	-	-	-	-	-	-	3	5	8
Total catch	-	-	-	-	-	-	6	7	13
Rondowa									
Sampled harvest	-	-	-	-	-	1	16	2	19
Sampled catch	-	-	-	-	-	1	24	4	29
Total harvest	3	3	20	13	60	187	530	58	874
Total catch	5	5	31	20	92	285	795	116	1349
Wallowa									
Sampled harvest	-	-	-	-	-	12	191	58	261
Sampled catch	-	-	-	-	-	26	362	85	473
Total harvest	3	7	15	18	35	70	978	366	1492
Total catch	5	13	27	33	63	152	1854	536	2683
Wenaha									
Sampled harvest	-	-	-	-	-	-	-	-	-
Sampled catch	-	-	-	-	-	-	-	-	-
Total harvest	-	-	-	3	-	-	-	-	3
Total catch	-	-	-	7	-	-	-	-	7
Middle Grande Ronde									
Sampled harvest	-	-	-	-	-	-	-	-	-
Sampled catch	-	-	-	-	-	-	-	-	-
Total harvest	-	15	24	37	11	49	124	5	265
Total catch	-	27	43	67	20	106	235	7	505
Total Grande Ronde catch (excluding lower Grande Ronde)									4622

^a We used Wallowa data for the upper Grande Ronde, middle Grande Ronde, and Catherine Creek, and lower Grande Ronde data (in Fleisher et al. 2004b) for the Wenaha.

Appendix C-3. Estimated angler effort (hours) of summer steelhead in spring fisheries in the Grande Ronde Basin for the 2001-02 run year. Angler effort in hours = Total catch/sampled catch rate in fish per hour. For months with little or no sampling, the average proportion was used. For areas with little or no sampling, data from the survey in closest proximity was used. Does not include the lower Grande Ronde fishery. "-" indicates not sampled or undefined.

Fishery ^a , statistics	Fishery statistics by month								
	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	Total
Upper Grande Ronde									
Catch rate	-	-	-	-	-	-	0.106	-	0.091
Total catch	-	-	20	-	-	20	21	4	65
Angler effort	-	-	220	-	-	220	198	44	682
Catherine Creek									
Catch rate	-	-	-	-	-	-	-	-	-
Total catch	-	-	-	-	-	-	6	7	13
Angler effort	-	-	-	-	-	-	57	77	134
Rondowa									
Catch rate	-	-	-	-	-	0.026	0.182	0.147	0.146
Total catch	5	5	31	20	92	285	795	116	1349
Angler effort	34	34	212	137	630	10962	4368	789	17166
Wallowa									
Catch rate	-	-	-	-	-	0.055	0.162	0.110	0.136
Total catch	5	13	27	33	63	152	1854	536	2683
Angler effort	37	96	199	243	463	2764	11444	4873	20119
Wenaha									
Catch rate	-	-	-	-	-	-	-	-	-
Total catch	-	-	-	7	-	-	-	-	7
Angler effort	-	-	-	26	-	-	-	-	26
Middle Grande Ronde									
Catch rate	-	-	-	-	-	-	-	-	-
Total catch	-	27	43	67	20	106	235	7	505
Angler effort	-	199	316	493	147	1927	1451	64	4597
Total Grande Ronde angler effort (excluding lower Grande Ronde)									42724

^a We used Wallowa data for the upper Grande Ronde, middle Grande Ronde, and Catherine Creek, and lower Grande Ronde data (in Flesher et al. 2004b) for the Wenaha.