

LOWER SNAKE RIVER COMPENSATION PLAN:
Oregon Summer Steelhead Evaluation Studies
2001 and 2002 Bi-Annual Progress Report

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



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LOWER SNAKE RIVER
COMPENSATION PLAN

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Preface

The purpose of this progress report is to provide summary information for Lower Snake River Compensation Plan (LSRCP) summer steelhead programs operated by ODFW in the Grande Ronde and Imnaha river basins during 2001 and 2002. These ongoing monitoring programs provide technical, logistical, and biological information to managers charged with maintaining viable salmon and steelhead populations and associated fisheries in Northeast Oregon. This report is organized into fish culture monitoring for juveniles, adults, CWT recoveries, and estimates for total escapement. During the period covered in this report, steelhead from the 1996-1999 broods returned to spawn, steelhead from the 2000 and 2001 broods were released as smolts, and adult steelhead that returned to spawn were used to create the 2001 and 2002 broods.

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EXECUTIVE SUMMARY

Objectives

1. Document summer steelhead rearing and release activities at all LSRCP facilities.
2. Determine optimum rearing and release strategies that will produce maximum survival to adulthood for hatchery-produced summer steelhead smolts.
3. Document summer steelhead adult returns by stock to each LSRCP broodstock collection facility.
4. Determine if the total production of summer steelhead adults meet mitigation goals and index annual smolt survival and adult returns to Lower Granite Dam for production groups.
5. Participate in planning activities associated with anadromous fish production and management in the Grande Ronde and Imnaha river basins and participate in ESA permitting, consultation, and rearing activities.
6. Monitor natural spawning of summer steelhead in selected areas within the Grande Ronde Basin.
7. Determine the number of summer steelhead harvested annually and angler effort in recreational fisheries on the Grande Ronde, Wallowa, and Imnaha rivers.

Accomplishments and Findings

We accomplished all of our objectives in the 2001-02 period. In this report, we present data and results for objectives 1, 2, 3, 4 and 6. More complete analyses, results and discussion of rearing and release strategies for objective 2 will be presented in separate special reports (e.g. Ruzycski et al., 2003). To accomplish objective 5, project staff participated in planning and coordination with co-managers and development and writing of the annual operation plan. Data and results for objective 7 are published in separate annual creel survey reports (Carmichael et al., 1988b, 1989, 1990, Flesher et al., 1991, 1992, 1993, 1994, 1995, 1996, 1997, 1999; 2000, 2001, 2004a, 2004b, 2005).

The production goal of 870,000 Wallowa stock smolts was not achieved in 2001 or 2002, while the Imnaha stock production goal of 330,000 smolts was achieved in 2001 but not 2002. In 2001, we released 842,354 Wallowa stock steelhead smolts into the Grande Ronde Basin, and 342,622 Imnaha stock smolts into the Imnaha River Basin. In 2002, we released 831,918 smolts into the Grande Ronde Basin and 296,713 smolts into the Imnaha Basin. In both 2001 and 2002, we released experimental groups to evaluate forced and volitional release strategies at both Wallowa Fish Hatchery and the Big Canyon Facility. In 2001 and 2002, we released unclipped,

blank-wire tagged smolts in Little Sheep Creek, in addition to a group of visual implant elastomer (VIE) marked fish in 2001.

In 2001, a total of 1,262 and 862 Wallowa stock hatchery steelhead returned to Wallowa Fish Hatchery and the Big Canyon Facility, respectively. In addition, we trapped 71 natural steelhead at the Big Canyon Facility and released them upstream of the weir. At the Little Sheep Creek Facility, we trapped 1,224 Imnaha stock hatchery and 128 naturally produced steelhead adults. Of these, we released 672 hatchery and 100 natural steelhead above the weir, and outplanted 354 hatchery steelhead to Big Sheep Creek. In 2002, 2,951 and 2,737 Wallowa stock hatchery steelhead returned to Wallowa Fish Hatchery and the Big Canyon Facility, respectively. We also trapped 10 natural steelhead at Wallowa Fish Hatchery and trapped and released 209 natural steelhead at the Big Canyon Facility. At Little Sheep Creek Facility, 3,260 hatchery and 204 natural steelhead returned, and 1,194 hatchery and 186 natural steelhead were released above the weir. We also outplanted 1,840 adult hatchery steelhead to Big Sheep Creek in 2002 (2,030 steelhead were initially outplanted, but 190 of these fish that returned to the Little Sheep Creek Facility were passed above the weir upon recapture). During spawning in the spring of 2001, we collected 1,155,905 Wallowa stock eggs and 479,970 Imnaha stock eggs. In 2002, we collected 1,331,551 Wallowa stock eggs and 514,670 Imnaha stock eggs.

The compensation goals of 9,184 Wallowa stock and 2,000 Imnaha stock adults above Lower Granite Dam were both exceeded in the 2001-02 run year. This was the second year in our program history that we met Wallowa stock goals and the first year we met Imnaha stock goals. We estimated that 7,840 Wallowa stock hatchery steelhead returned to the LSRCP compensation area in 2001 (85.4% of goal) and 14,062 returned in 2002 (153.1% of goal). The return of Imnaha steelhead to the compensation area was 1,552 (77.6% of goal) in 2001 and 5,321 (266.1% of goal) in 2002.

INTRODUCTION

The main objectives of this report are to document fish culture practices, describe adult returns, and assess success towards meeting LSRCP goals for Grande Ronde and Imnaha steelhead. We report on juvenile steelhead rearing and release activities for the 2000 and 2001 brood years (BY) released in 2001 and 2002, respectively. Included are collection, spawning, and adult characteristics for the 2001 and 2002 returns, returns from experimental releases, supplementation in Little Sheep Creek, and success toward achieving compensation goals.

Generally speaking, the data in this report were derived from hatchery inventories and standard databases (i.e., PSMFC RMIS, ODFW coded-wire tag) or through standard measuring techniques. As such, specific protocols are usually not described. In cases where expansions of data or unique methodologies were used, protocols are described in more detail. Additional descriptions of protocols can be found in the 2001 and 2002 work statements (Carmichael et al. 2001, 2002). Coded-wire tag (CWT) data that were collected from 2001-2002 adult returns were used to evaluate smolt-to-adult survival rates in experimental rearing and release groups. In 2001-2002, experimental treatments from which fish returned included forced vs. volitional release, growth and density treatments, and a pre-smolt release strategy. In 2001-2002, experimental treatments for which fish were released included forced vs. volitional, and acclimated vs. direct stream release strategies. We also released non-clipped, blank-wire tagged and visual implant elastomer (VIE) marked steelhead. Analysis of specific survival studies will be completed once all brood years have returned and CWT data are complete for a given experiment, and will be published in special reports. In addition, much of the data that we discuss in this report will be used in separate and specific evaluations of ongoing supplementation programs for steelhead in the Imnaha River Basin. We began culture evaluations in 1983 and have dramatically improved many practices. Progress for work completed in previous years is presented in annual progress reports (Carmichael and Wagner, 1983; Carmichael and Messmer, 1985; Carmichael et al., 1986a, 1987, 1988a, 1999, 2004, 2005a; 2005b, Messmer et al., 1989, 1990, 1991, 1992, 1993; Jonasson et al., 1994, 1995, 1996, and Whitesel et al., 1993), annual creel survey reports (Carmichael et al., 1988b, 1989, 1990, Flesher et al., 1991, 1992, 1993, 1994, 1995, 1996, 1997, 1999; 2000, 2001, 2004a, 2004b, 2005), a United States v. Oregon production report (Carmichael et al., 1986b), and a five-year study plan (Carmichael 1989). Progress of related work completed in 2001 and 2002 is presented in summer steelhead creel annual progress reports (Flesher et al., 2004a, and 2004b), and the steelhead life history, genetics, and kelt reconditioning 1997-2001 progress report (Ruzycki et al., 2003).

RESULTS AND DISCUSSION

Juveniles

2001

Wallowa egg-to-embryo survival for the 2000 BY was 89.0%, within the range of recent brood years (1993-1999 BY range: 71.8-91.6%), and embryo-to-smolt survival was 91.3%, within the range of recent brood years (1993-1999 BY range: 89.4-97.5%; Table 1). Imnaha egg-to-embryo survival for the 2000 BY was 81.7%, within the range of recent brood years (1993-1999

BY range: 76.7-90.8%), and Imnaha embryo-to-smolt survival was 93.9%, within the range of the recent past (1993-1999 BY range: 85.6-94.9%; Table 1). Mortality during the egg-to-embryo stage varies annually due to natural variability (e.g. egg fertility, sperm viability) and hatchery conditions (e.g. water temperature, presence of fungus), while mortality during the embryo-to-smolt stage occurs during an extended rearing and release phase and has multiple causes. At Irrigon Hatchery, some loss occurs due to cold water disease when fry are held in indoor tanks supplied with well water. Other mortality occurs during transportation of eggs from Wallowa Hatchery to Irrigon Hatchery and the return trip of smolts to acclimation and release sites, and during acclimation when fish are held in concrete raceways. We released 842,354 Wallowa stock smolts in 2001, less than our production goal of 870,000 smolts, but exceeded our Imnaha stock production goal of 330,000 smolts by releasing 342,662 smolts (Table 2). Hatchery managers attempt to meet production goals every year, however variation in mortality at various stages of rearing from fertilizing eggs to acclimating smolts results in fewer or more fish being released in any given year. Managers periodically adjust the number of eggs collected based on recent hatchery performance. Details of experimental and production releases for the 2000 BY are shown in Table 2. To evaluate different rearing and release strategies, we marked and released six groups of Wallowa stock steelhead and two groups of Imnaha stock steelhead smolts with adipose-left ventral clips and coded-wire-tags (AdLV and CWT), while a third group of Imnaha stock smolts were blank-wire-tagged but not adipose clipped (No Ad and BWT), and a fourth group was VIE marked but not adipose clipped (Table 3). We marked 98.8% of Wallowa stock smolts and 98.5% of Imnaha stock smolts with an adipose fin clip, which was within the range of recent years (1993-1999 BY range: 98.4-99.6%; Table 3). Fin clip quality and tag retention for experimental groups averaged 89.1% for Wallowa and 86.5% for Imnaha stocks, which is below the range in recent years (1993-1999 BY range: 91.7-99.3%; Table 3). We VIE marked 88.5% of a group of 45,496 unclipped Imnaha stock smolts released into Big Sheep Creek. The density of residual hatchery steelhead was higher than the density of wild *O. mykiss* at index sites in both the Grande Ronde and Imnaha basins in 2001, the same pattern we have observed since residual sampling began in 1996 (Tables 4 and 5). Most (85.7-100%) of these residual hatchery steelhead were males in 2001, similar to the sex ratio observed in previous years.

2002

Egg-to-embryo survival for Wallowa stock for the 2001 BY was 86.5%, within the range of recent brood years (1993-2000 BY range: 71.8-91.6%), and embryo-to-smolt survival was 92.9%, within the range of recent brood years (1993-2000 BY range: 89.4-97.5%; Table 6). Imnaha egg-to-embryo survival for the 2001 BY was 81.2%, within the range of recent brood years (1993-2000 BY range: 76.7-90.8%), and Imnaha embryo-to-smolt survival was 93.5%, which is within the range of recent years (1993-2000 BY range: 85.6-94.9%; Table 6). We did not meet our smolt production goals of 870,000 Wallowa stock smolts or 330,000 Imnaha stock smolts, releasing 831,918 Wallowa stock smolts and 296,713 Imnaha stock smolts (Table 7). To evaluate the influence of forced versus volitional release strategies on smolt-to-adult survival and to monitor survival of major production releases, we marked (AdLV and CWT) six groups of Wallowa stock and three groups of Imnaha stock smolts (Table 7). We marked 97.8% of the smolts released in the Grande Ronde Basin and 99.6% of the smolts released in the Imnaha Basin with an adipose fin clip. Fin clip quality and tag retention of experimental groups averaged 91.7% for Wallowa stock and 90.7% for Imnaha stock, which is within the program's range in the recent past (1993-2000 BY range: 86.5-99.3%; Table 8). The density of residual hatchery

steelhead was lower than the density of wild *O. mykiss* at index sites in the Grande Ronde Basin for the first time since sampling was initiated in 1996 (Table 4). The density of residual hatchery steelhead was nearly equal the density of wild *O. mykiss* in the Imnaha Basin in 2002 (Table 5). All of the residual hatchery steelhead were males in both the Grande Ronde and Imnaha basins in 2002 (Tables 4 and 5).

Adults

2001

The weirs were installed on January 22nd at Big Canyon Facility, February 20th at Wallowa Fish Hatchery and February 28th at Little Sheep Creek Facility (Table 9). Returns to the Little Sheep Creek Facility were predominately hatchery fish, with only 128 natural steelhead returning. Similar to Little Sheep Creek, most of the adults that returned to the Big Canyon Facility were of hatchery origin, with only 71 natural steelhead returning. Natural steelhead returned over the same time period as hatchery steelhead, but few natural adult returns make run timing comparisons difficult. The majority of hatchery adults that returned to Wallowa Fish Hatchery, Big Canyon Facility and Little Sheep Creek Facility spent one year in the ocean (Table 10). Seventy-six percent of natural fish returning to the Little Sheep Creek Facility were one ocean fish (97 of 128) and 62% of natural fish returning to the Big Canyon Facility were one ocean fish (44 of 71).

The majority of hatchery adults that returned to Wallowa Fish Hatchery in 2001 were spawned or killed (Table 10). In 2001, no Big Canyon hatchery returns were needed for the Grande Ronde steelhead hatchery program due to the large number of adults returning to Wallowa Fish Hatchery. We outplanted 81 adult hatchery steelhead from Wallowa Fish Hatchery and 125 hatchery adults from Big Canyon Facility to local ponds for harvest opportunities. At Big Canyon Facility, all 71 natural fish and no hatchery fish were passed above the weir to spawn naturally. We retained 16% of the hatchery fish and 22% of the natural fish for spawning at Little Sheep Creek Facility, and outplanted 354 adults to Big Sheep Creek. Forty-four of the 354 outplanted fish were recaptured at least once at the Little Sheep Creek Facility in 2001 (Table 11). One hundred natural fish and 672 hatchery adults were released above the weir in Little Sheep Creek to spawn naturally, resulting in 87% of fish above the weir being of hatchery origin. Length-at-age data for Wallowa stock adults are presented in Figure 1 and Imnaha stock adult data are presented in Figure 2.

We exceeded our egg take goals for both Wallowa and Imnaha stocks in 2001. The percent mortality from green egg-to-eyed embryo ranged from 9-28% for Wallowa stock from 8 weekly spawns, and from 5-29% for Imnaha stock from 8 weekly spawns (Table 12). Over the last seven brood years (1994-2000 BY), the range of green egg-to-embryo mortality was 1-29% for Wallowa stock and 1-57% for Imnaha stock.

2002

Weirs were installed on January 23rd at the Big Canyon Facility, February 14th at Wallowa Fish Hatchery and February 26th at Little Sheep Creek Facility (Table 13). Hatchery fish comprised 94% of the steelhead returning to Little Sheep Creek Facility (204 natural), 92% of steelhead returning to Big Canyon Facility (209 natural), and 99.7% of the returns to Wallowa Fish Hatchery (10 natural). Typical of most years, the majority of hatchery adults that returned

to Wallowa Fish Hatchery, Big Canyon Facility, and Little Sheep Creek Facility were fish that spent one year in the ocean (Table 14).

The majority of adult returns to Wallowa Fish Hatchery in 2002 were spawned or killed (Table 14). Of the adult returns to Big Canyon Facility, we outplanted 170 steelhead to local ponds for harvest opportunities. We passed all 209 natural steelhead and no hatchery steelhead above the weir at Big Canyon Facility for natural production. We observed 87 redds in the 12 miles of Deer Creek above the weir during five spawning ground surveys conducted between April 8th and June 5th. We found a ratio of 2.40 fish per redd, 1.38 females per redd, and 7.25 redds per mile (Table 15). We retained 226 of 3,260 hatchery steelhead (6.9%) and 17 of 204 natural steelhead (8.3%) at Little Sheep Creek Facility for spawning, and outplanted 1,840 steelhead to Big Sheep Creek (2,030 steelhead were initially outplanted, but 190 of these fish that returned to the Little Sheep Creek Facility were passed upon recapture). Of the outplanted steelhead, 734 fish (36.2%) were recaptured at the Little Sheep Creek Facility at least once in 2002 (Table 11). Outplanted males tended to return to Little Sheep Creek Facility at a higher rate than females and a higher number of outplants in 2002 resulted in a much higher rate of recapture at the Little Sheep Creek Facility (Table 11). Hatchery fish comprised 87% of the adults released above the weir to spawn naturally. Length-at-age data for Wallowa stock adults are presented in Figure 3, and Imnaha stock data are presented in Figure 4.

Egg take goals for both Wallowa and Imnaha stocks were exceeded in 2002 (Table 16). The percent mortality from green egg to eyed embryo ranged from 8-21% for Wallowa stock from six weekly spawns and ranged from 7-25% for Imnaha stock from seven weekly spawns. Over the last eight brood years (1994-2001 BY), the range of green egg-to-embryo mortality was 1-29% for Wallowa stock and 1-57% for Imnaha stock.

Experimental group returns

The number of coded-wire-tagged and adipose clipped adults that were harvested and returned to recapture sites was used to estimate various performance parameters. These numbers allow us to monitor our success toward meeting the LSRCP goals, to estimate straying rates, and to determine contributions to recreational, tribal, and commercial fisheries. They also provide the basis for the evaluation of the success of experimental rearing and release strategies. The number of recoveries for each CWT code were summarized from the CWT recovery database maintained by PSMFC, ODFW's CWT recovery database, and from data reported by the Washington Department of Fish and Wildlife and Idaho Department of Fish and Game. We enumerated the actual number of coded-wire tagged fish that returned to each hatchery facility. Our protocol was to collect all fish marked with a CWT when they were spawned or died. Basic results from evaluation groups are given below. Final analyses, results, and discussion of production and release strategies will be presented in special reports once all adults have returned from experimental and reference groups.

2001

Adults from the 1996-1998 brood years returned in 2001. Wallowa and Imnaha adults that returned in 2001 were from groups released to evaluate the benefits of forced versus volitional release strategies (Wallowa and Big Canyon 1996-1998 BY), growth rate during rearing (Big Canyon and Little Sheep 1996 BY), hatchery of rearing (Wallowa 1997 BY), and ¼ versus ½ standard density rates during rearing (Little Sheep 1997 BY). We had Wallowa stock

recoveries from 17 CWT codes (Table 17) and Imnaha stock recoveries from seven CWT codes (Table 18).

2002

Adult returns from the 1997-1999 brood years occurred in 2002. Wallowa and Imnaha stock adults that returned in 2002 were from releases to evaluate the benefits of forced versus volitional release strategies (Wallowa and Big Canyon 1997-1999 BY), hatchery of rearing (Wallowa 1997 BY), $\frac{1}{4}$ versus $\frac{1}{2}$ standard density during rearing (Little Sheep 1997 BY), and pre-smolt release strategy (Little Sheep 1999 BY). We had Wallowa stock recoveries from 17 CWT codes (Table 19) and Imnaha stock recoveries from six CWT codes (Table 20).

Compensation goals

Goals for returns to the compensation area are 9,184 adults for the Grande Ronde Basin (Wallowa stock) and 2,000 adults for the Imnaha Basin (Imnaha stock). The compensation area is defined as the watershed above Lower Granite Dam. To provide a cumulative summary of disposition for all adults that returned to the compensation area, we expanded CWT recoveries to account for the non-CWT fish that returned.

2000-2001 run year

For the Wallowa stock, we estimated that in the 2000-01 run year, 7,840 hatchery origin adults returned to the compensation area (Table 21). This represented 85.4% of the compensation goal. For the Imnaha stock, we estimated that 1,552 hatchery origin adults returned to the compensation area, or 77.6% of the compensation goal.

2001-2002 run year

For the Wallowa stock, we estimated that in the 2001-02 run year, 14,062 hatchery origin adults returned to the compensation area, representing 153.1% of the compensation goal (Table 22). For the Imnaha stock, we estimated that 5,321 adults returned to the compensation area, accounting for 266.1% of the compensation goal.

There are three principle factors that influence success in meeting the compensation goal: number of smolts released for the brood years that produced the adults; smolt-to-adult survival; and capture of fish below the compensation area in fisheries and as strays. Over the history of the LSRCP project, we have reached our compensation goal twice for the Wallowa program (1997-98 and 2001-02 run years), and have only once reached our compensation goal for the Imnaha program (2001-02 run year). For both the Grande Ronde and Imnaha programs we have met our smolt production goals in most years. Returns in the 2000-2001 run year represented completed returns for the 1996 BY and returns in the 2001-2002 run year represented the final returns of the 1997 BY. Smolt-to-adult survival (SAS) rates for the 1996 BY Wallowa and Imnaha stocks were 0.29% and 0.30%, respectively. For the 1997 BY, SAS ratios for the Wallowa and Imnaha stocks were 0.55% and 0.57%, respectively (Figure 5). Beginning with the 1987 BY, when we began meeting our smolt production goals, we have met our SAS goal of 0.68% for the Wallowa stock in four out of the last eleven complete brood years, and only met our SAS goal of 0.61% for the Imnaha stock in two of eleven brood years, suggesting low smolt-to-adult survival may be the primary factor for rarely achieving our compensation goals. For the

Wallowa stock, 15.1% of the recoveries for the 2000-2001 run year occurred downstream of the compensation area, and for the 2001-2002 run year 18.7% occurred downstream (Tables 21 and 22). For the Imnaha stock, 19.9% of the recoveries for the 2000-2001 run year occurred downstream of the compensation area, and for the 2001-2002 run year 14.2% occurred downstream.

The Imnaha steelhead supplementation program allows us to evaluate and compare productivity (progeny produced per parent) of hatchery fish and naturally spawning fish. Progeny-per-parent ratios for naturally spawning fish have been below 1.0 for completed brood years 1987-1994, and above 1.0 for the 1995 and 1996 brood years (Figure 6). Hatchery fish progeny-per-parent ratios (weir returns only) have been above 1.0 for all brood years except 1991. Hatchery rates exceeded natural rates for all brood years except 1991. One purpose of the supplementation program is to enhance or stabilize natural fish abundance. Annual abundance of naturally-produced fish has been highly variable; despite the largest natural return in the 2001-2002 run year. However, in the last three run years, we have observed an increase in the abundance of natural fish, which may in part be a result of supplementation (Figure 7).

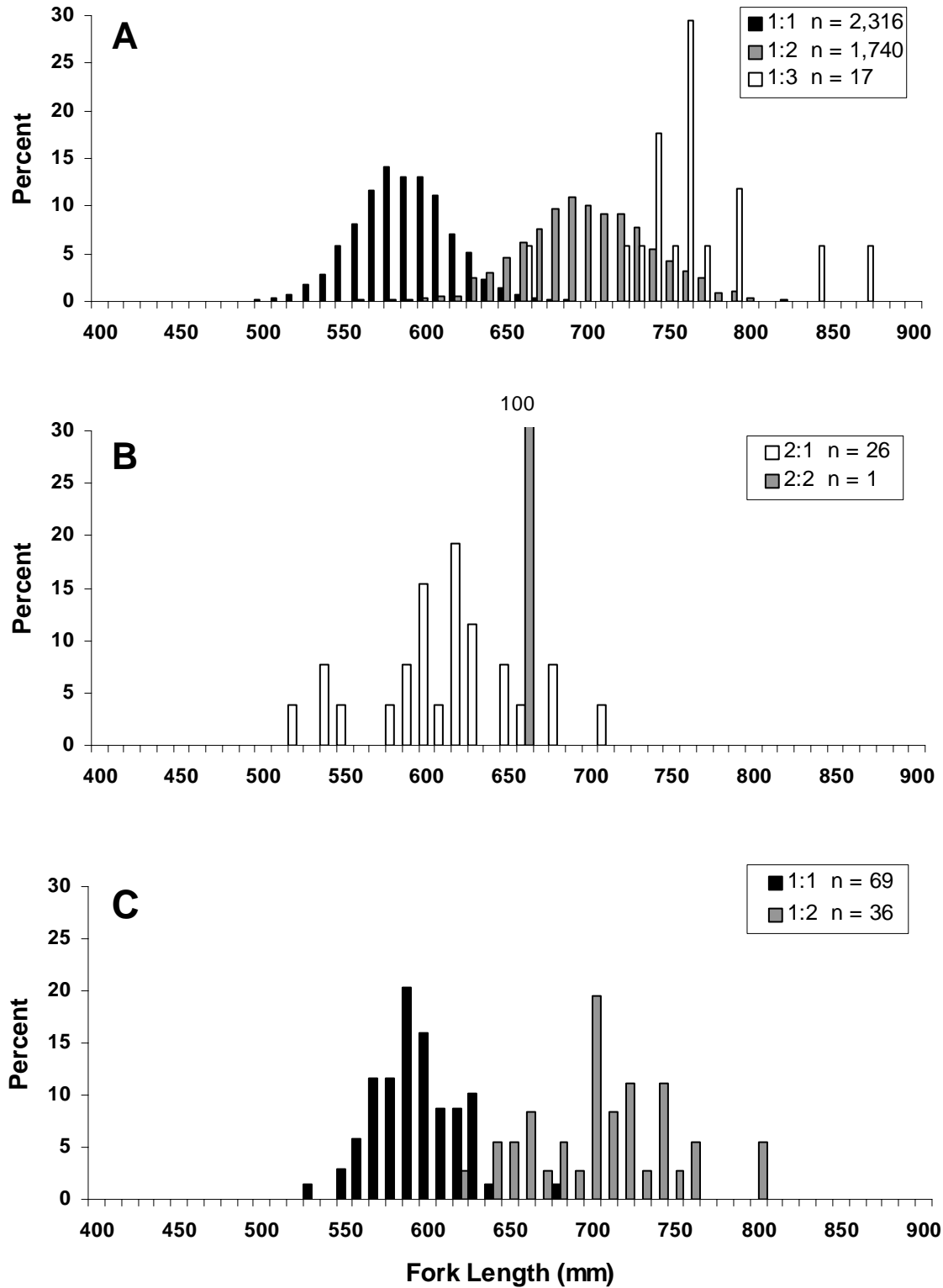


Figure 1. Length-at-age relationships based on scale analysis for Wallowa stock summer steelhead for 1991-2000 (A and B) and 2001 (C) adult returns. Number above bar represents percent for that bar.

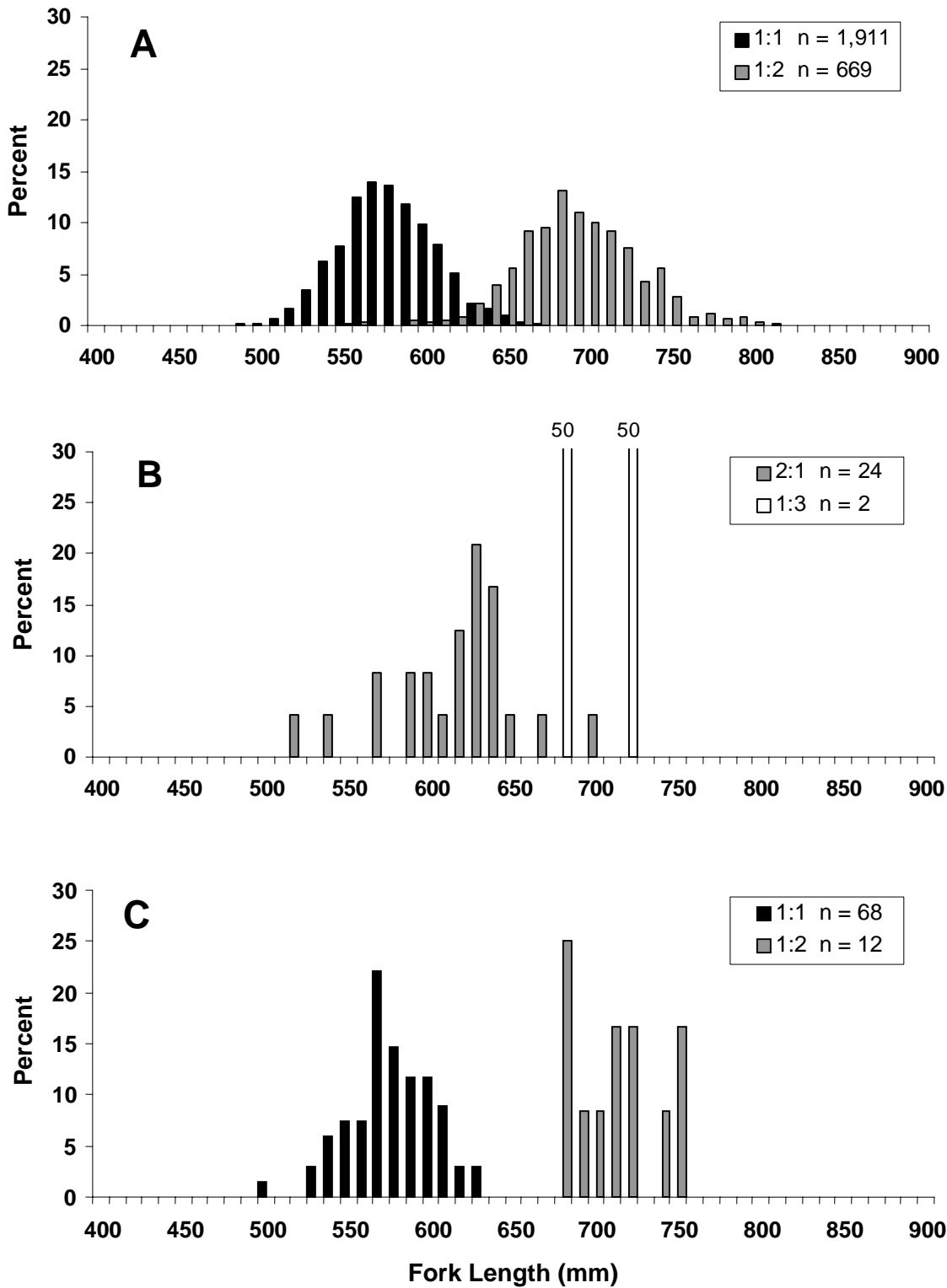


Figure 2. Length-at-age relationships based on scale analysis for Imnaha stock summer steelhead for 1991-2000 (A and B) and 2001 (C) adult returns. Numbers above bars represent percent for those bars.

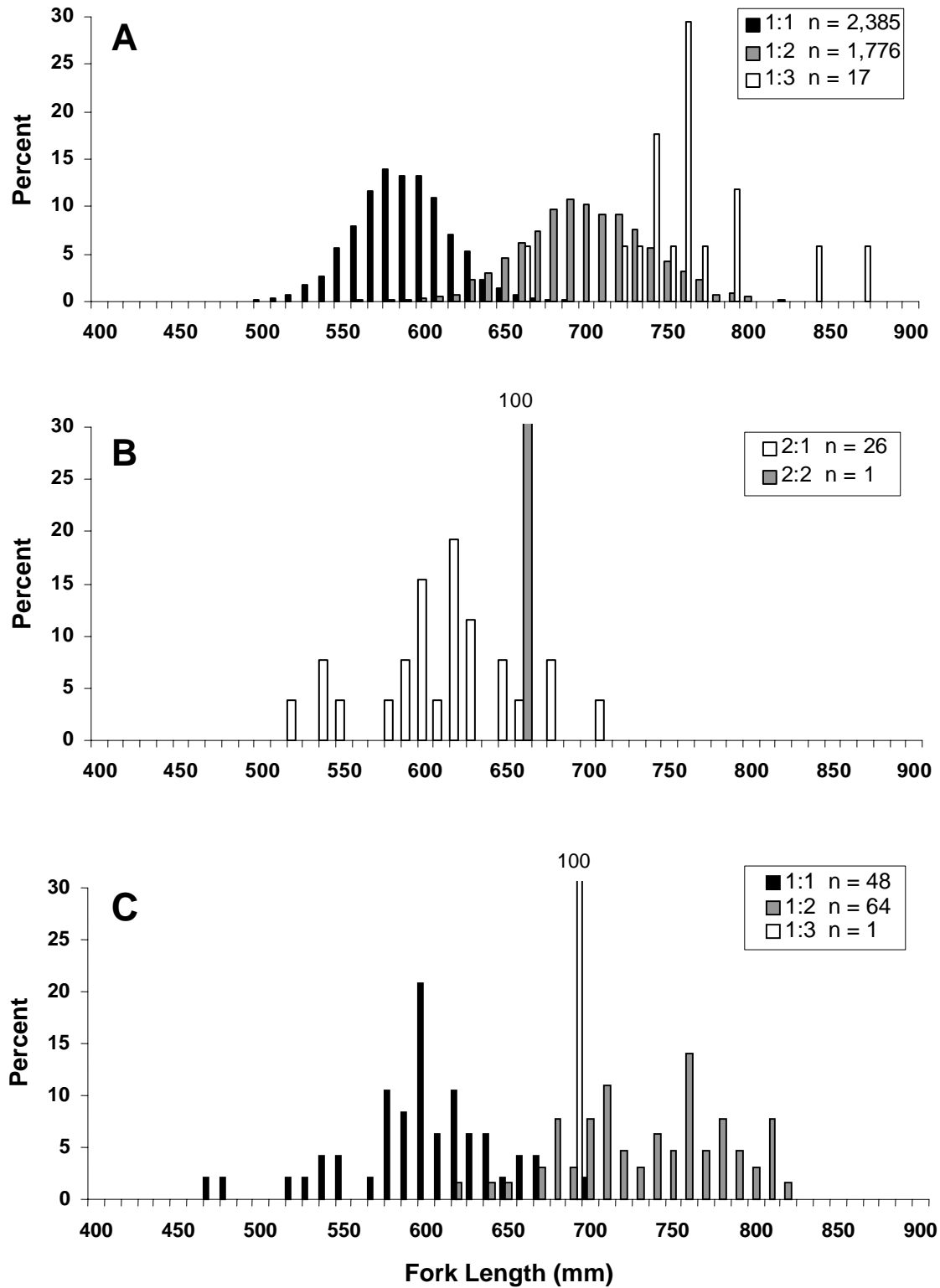


Figure 3. Length-at-age relationships based on scale analysis for Wallowa stock summer steelhead for 1991-2001 (A and B) and 2002 (C) adult returns. Numbers above bars represent percent for those bars.

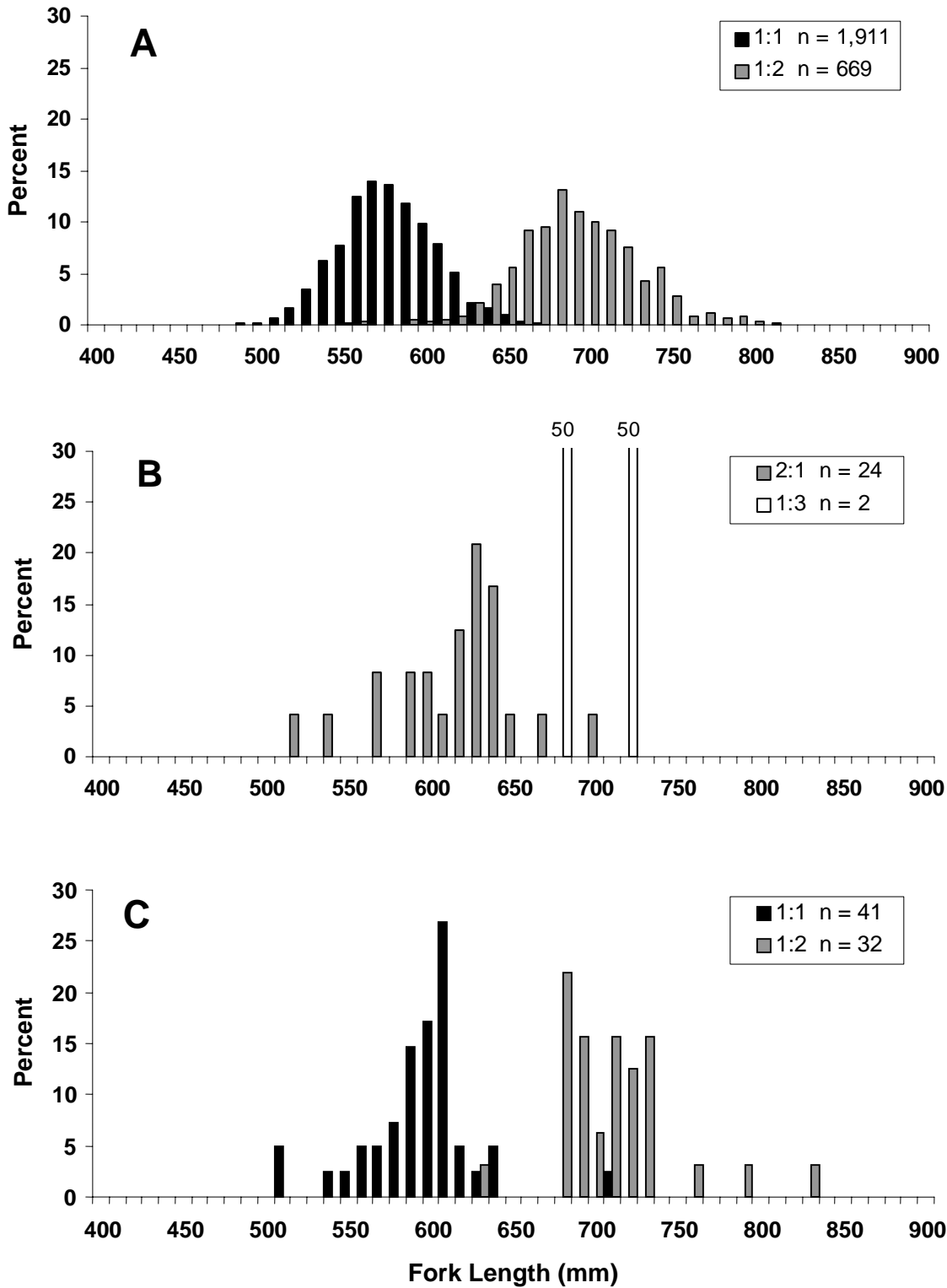


Figure 4. Length-at-age relationships based on scale analysis for Imnaha stock summer steelhead for 1991-2001 (A and B) and 2002 (C) adult returns. Numbers above bars represent percent for those bars.

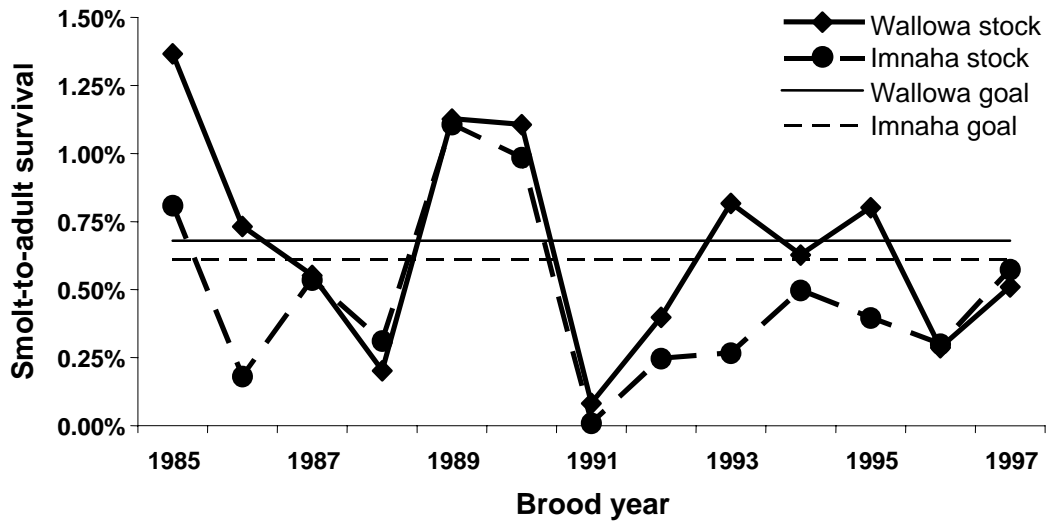


Figure 5. Smolt-to-adult survival for Wallowa and Imnaha stock hatchery summer steelhead, brood years 1985-1997. The Wallowa and Imnaha smolt-to-adult survival goal is 0.68% and 0.61%, respectively.

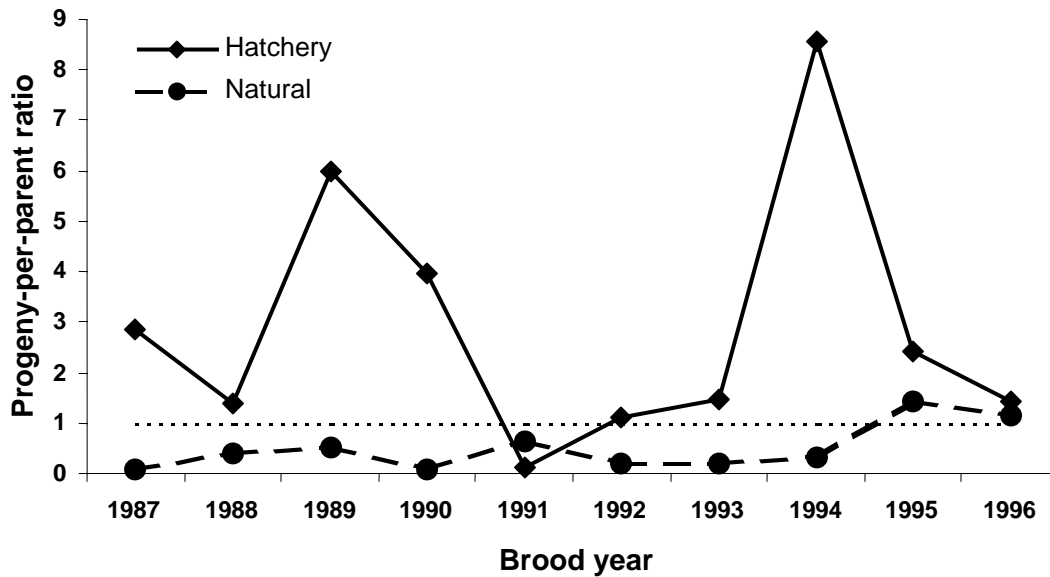


Figure 6. Progeny-to-parent ratios for Little Sheep Creek summer steelhead, brood years 1987-1996.

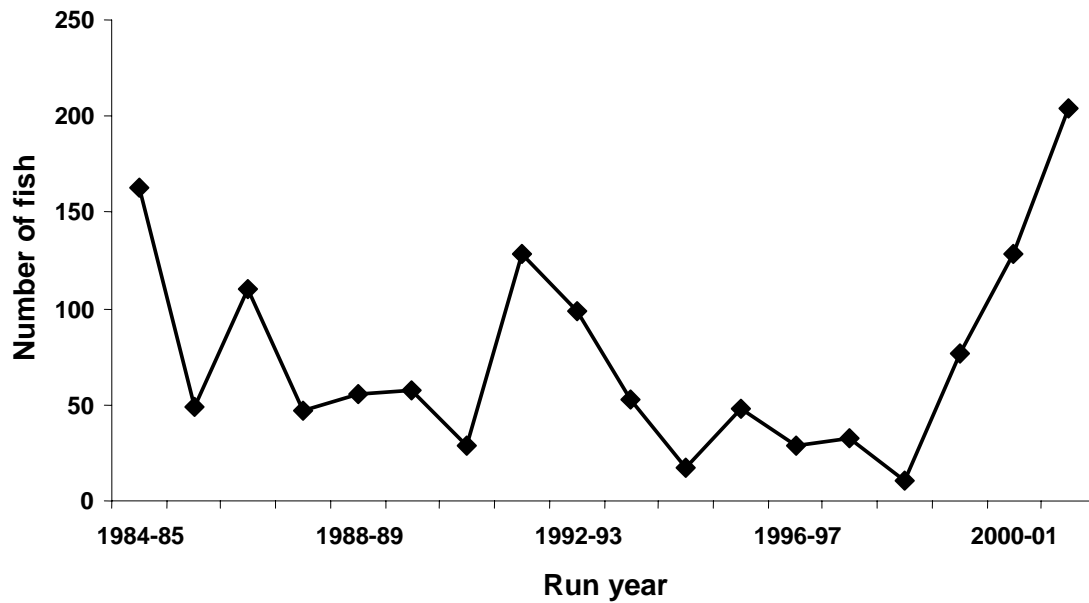


Figure 7. Returns of naturally produced summer steelhead to Little Sheep Creek Facility, run years 1984-85 to 2001-02.

Table 1. Summary of egg collection and juvenile survival for 2000 brood year summer steelhead released in the Grande Ronde and Imnaha river basins at LSRCF facilities in 2001. Eyed embryos are fertilized eggs with pigmented eyes visible through the egg shell.

Stock	Number of eggs taken	Eyed embryos	Total fish released	Estimated survival rate (%)	
				Egg-to-embryo	Embryo-to-smolt ^a
Wallowa	2,046,530	1,822,100 ^b	848,947 ^c	89.0	91.3
Imnaha	568,500	464,730 ^d	342,622	81.7	93.9

^a Embryos that were culled from production and not incubated and reared at Irrigon Fish Hatchery were subtracted from the calculation of embryo-to-smolt survival.

^b Includes 776,370 embryos that were euthanized as gradeouts or as excess to program needs. Also includes 115,472 embryos that were overestimated in the inventory.

^c Includes 6,593 fish held back and reared as rainbow trout in Kinney Lake.

^d Includes 93,730 embryos excess to program needs that were outplanted as pre-smolts into Big Sheep Creek. Also includes 6,045 embryos that were overestimated in the inventory.

Table 2. Details of experimental and production groups of 2000 brood year hatchery summer steelhead released in the Grande Ronde (Wallowa stock) and Imnaha (Imnaha stock) river basins in 2001. Experimental group indicates release strategy and rearing raceway number(s). All groups were acclimated, except for Big Sheep Creek groups that were direct stream released. Target size for all fish was 5 fish per pound (FPP). Standard deviations are shown in parentheses. LGD indicates Lower Granite Dam. VIE indicates visual implant elastomer tag (a red colored latex tag implanted in the clear tissue just behind the left eye).

Experimental group ^a	FPP	Release date	Release location	Tag code	Length (mm)	Weight (g)	Condition factor	Total fish released	Percent migration to LGD ^b
<i>Wallowa stock</i>									
Production, 7	4.5	April 5	Spring Cr.	093212	207 (17)	100.3 (24.8)	1.06 (0.05)	25,452	58.3
Production, 1-8,12	4.5	April 4-5	Spring Cr.		210 (17)	100.2 (26.8)	1.05 (0.09)	318,947	-
Forced, 13	4.7	May 2	Spring Cr.	093213	212 (20)	92.8 (21.2)	1.03 (0.06)	22,646	71.2
Volitional, 15	4.6	May 3-17	Spring Cr.	093214	209 (16)	98.2 (22.2)	1.03 (0.10)	23,205	69.2
Production, 13-16, 18	4.7	May 2- 17	Spring Cr.	-	210 (19)	96.5 (23.8)	1.08 (0.42)	161,269	-
Production, 9	4.7	April 11	Deer Cr.	093215	206 (17)	100.5 (25.8)	1.09 (0.11)	23,891	49.6
Production 9-12	4.7	April 11-12	Deer Cr.		206 (17)	96.6 (24.5)	1.08 (0.07)	136,730	-
Forced, 17	4.9	May 9	Deer Cr.	093216	211 (18)	94.0 (24.7)	1.01 (0.08)	23,180	59.3
Volitional, 19	4.6	May 10-24	Deer Cr.	093217	212 (19)	95.6 (20.8)	1.03 (0.06)	21,812	53.0
Production 17,19,20	4.7	May 9- 24	Deer Cr.	-	210 (18)	97.8 (25.7)	1.04 (0.06)	85,222	-
Total released ^c								842,354	
<i>Imnaha stock</i>									
Production, 23	4.2	April 11	L. Sheep Cr.	093210	216 (20)	117.5 (32.0)	1.09 (0.08)	25,282	66.6
No fin clip, 25 ^d	4.3	April 11	L. Sheep Cr.	Blank tag	204 (29)	105.0 (41.8)	1.09 (0.08)	53,097	37.5
Production, 21-23, 25	4.5	April 11	L. Sheep Cr.	-	208 (24)	101.8 (30.8)	1.08 (0.07)	80,780	-
Production, 24	4.0	May 9	L. Sheep Cr.	093211	214 (24)	113.6 (49.1)	1.06 (0.10)	22,646	55.0
Production, 24, 26	5.1	May 9	L. Sheep Cr.	-	200 (19)	87.8 (24.5)	1.05 (0.06)	60,651	-
No fin clip, 27	5.2	April 17-20	B. Sheep Cr.	Red VIE, left eye	199 (23)	-	-	40,287	-
No fin clip, 27	5.2	April 17-20	B. Sheep Cr.	-	199 (23)	-	-	5,209	-
Production, 28	5.2	April 17-20	B. Sheep Cr.	-	202 (23)	-	-	54,670	-
Total released								342,622	

^a All fish were reared at Irrigon Fish Hatchery (ODFW).

^b Percent migration of PIT tag release groups to Lower Granite Dam is Cormack-Jolly-Seber estimates of survival probabilities from the SURPH.2 program (Lady et al. 2001). Additional PIT tag detections (unique detections from all mainstem Snake and Columbia river dams) from fish tagged during the two-week volitional release period include 38.9% for migrants and 1.1% for non-migrants at Spring Creek in May, and 39.2% for migrants and 0.0% for non-migrants at Deer Creek in May (migrants are smolts that volitionally left and non-migrants are smolts that were forced out at the end of the volitional release).

^c Wallowa stock steelhead male releases were less than 1% precocious.

^d Approximately 20% of the no fin clip + blank wire tagged fish were reared in raceway 23. This equalized rearing densities in raceways to be released at Little Sheep Creek Facility.

Table 3. Estimates of fin clip quality and coded-wire tag retention for 2000 brood year summer steelhead reared at Irrigon Fish Hatchery and released in 2001. Experimental group indicates treatment and rearing raceway number. Targets for both Wallowa and Imnaha stocks were 100% adipose clipped, except for 100K Imnaha stock which were not clipped, and target size at release was 5 fish per pound. For experimental and reference groups (those with coded-wire tags), targets for both stocks were 100% AdLV+CWT; and for non-clipped fish, 50K were blank-wire tagged and the other 50K were red VIE (visual implant elastomer) tagged just behind the left eye.

Experimental group	Tag code	Number checked		Cwt + LV	Cwt+ no LV	No Cwt + LV	No Cwt + no LV	Ad	No Ad
		Tag	Ad						
<i>Wallowa stock</i>									
Production, 1	-	-	202	-	-	-	-	99.5	0.5
Production, 2	-	-	253	-	-	-	-	98.4	1.6
Production, 3	-	-	215	-	-	-	-	99.5	0.5
Production, 4	-	-	239	-	-	-	-	99.2	0.8
Production, 5	-	-	231	-	-	-	-	99.6	0.4
Production, 6	-	-	230	-	-	-	-	98.7	1.3
Production, 7	093212	500	226	95.2	4.2	0.6	0.0	99.1	0.9
Production, 8	-	-	230	-	-	-	-	98.3	1.7
Production, 9	093215	499	238	96.6	2.6	0.8	0.0	99.2	0.8
Production, 10	-	-	206	-	-	-	-	99.5	0.5
Production, 11	-	-	212	-	-	-	-	98.6	1.4
Production, 12	-	-	203	-	-	-	-	98.5	1.5
Forced, 13	093213	510	238	84.7	13.7	1.6	0.0	99.2	0.8
Production, 14	-	-	220	-	-	-	-	98.6	1.4
Volitional, 15	093214	501	208	85.8	12.2	2.0	0.0	99.5	0.5
Production, 16	-	-	204	-	-	-	-	99.5	0.5
Forced, 17	093216	501	217	89.0	10.0	1.0	0.0	98.6	1.4
Production, 18	-	-	225	-	-	-	-	96.4	3.6
Volitional, 19	093217	545	213	83.5	13.8	2.8	0.0	99.1	0.9
Production, 20	-	-	221	-	-	-	-	96.8	3.2
Average		509	222	89.1	9.4	1.5	0.0	98.8	1.2
<i>Imnaha stock</i>									
Production, 21	-	-	226	-	-	-	-	96.9	3.1
Production, 22	-	-	230	-	-	-	-	99.6	0.4
Production, 23 ^a	093210	526	--	92.6	6.8	0.6	0.0	-	-
Production, 24	093211	508	209	80.3	16.1	3.5	0.0	100	0
No fin clip, 25 ^a	Blank Tag	530	--	0.0	97.7 ^b	0.0	2.3	-	-
Production, 26	-	-	224	-	-	-	-	97.8	2.2
No fin clip, 27	Red VIE, left eye	524	--	0.0	88.5	0.0	11.5	-	-
Production, 28	-	-	225	-	-	-	-	98.2	1.8
Average (21-24,26,28)		517	223	86.5	11.4	2.1	0.0	98.5	1.5

^a Approximately 20% of the no fin clip + blank wire tagged fish were reared in raceway 23, therefore adipose clip quality could not be calculated for this raceway.

^b Percent includes 0.2% Ad clipped fish (This fish may have jumped from an adjacent raceway).

Table 4. Density, size, sex ratio, and maturity of salmonids captured at residual steelhead index sites during the summer in the Grande Ronde Basin from 1996-2002. Hatchery steelhead smolts released in the spring (April-May) were classified as residuals after 20 June. HSTS indicates hatchery (adipose clipped) residual summer steelhead, WSTS indicates all wild *Oncorhynchus mykiss* except young-of-the-year, and CHS indicates wild young-of-the-year spring Chinook salmon. Wild young-of-the-year *O. mykiss* were present every year but were not sampled quantitatively. Fork length (FL) includes standard deviation in parentheses and density includes $\pm 95\%$ confidence interval.

Year, location ^a	Date	Species	Area (m ²)	N	FL (mm)		Sex ratio and maturation ^b			Density ^c (#/100m ²)
					Length	Range	N	% males	% mature	
1996										
Deer Cr.	30 July	HSTS	403.6	32	181 (34)	104-266	-	-	-	8.6 \pm 1.3
Deer Cr.	30 July	WSTS	403.6	31	-	-	-	-	-	7.9 \pm 0.5
Deer Cr.	30 July	CHS	403.6	1	-	-	-	-	-	^d
Cath. Cr.	30 July	HSTS	551.4	0	-	-	-	-	-	0
Cath. Cr.	30 July	WSTS	551.4	7	-	-	-	-	-	1.5 \pm 1.3
Cath. Cr.	30 July	CHS	551.4	4	-	-	-	-	-	^d
1997 ^e										
Deer Cr.	30 July	HSTS	142.7	22	-	-	-	-	-	15.4 \pm 0.4
Deer Cr.	30 July	WSTS	142.7	4	-	-	-	-	-	3.5 \pm 2.9
Deer Cr.	30 July	CHS	142.7	0	-	-	-	-	-	0
Cath. Cr.	31 July	HSTS	490.7	0	-	-	-	-	-	0
Cath. Cr.	31 July	WSTS	490.7	19	-	-	-	-	-	5.9 \pm 5.8
Cath. Cr.	31 July	CHS	490.7	7	-	-	-	-	-	^d
1998										
Deer Cr.	23 July	HSTS	157.4	44	183 (42)	99-265	-	-	-	29.9 \pm 3.1
Deer Cr.	23 July	WSTS	157.4	32	111 (17)	89-161	-	-	-	21.6 \pm 2.3
Deer Cr.	23 July	CHS	157.4	0	-	-	-	-	-	0
1999										
Deer Cr.	20 Aug	HSTS	170.6	26	194 (34)	134-275	-	-	-	17.0 \pm 2.7
Deer Cr.	20 Aug	WSTS	170.6	21	133 (24)	95-186	-	-	-	14.1 \pm 5.0
Deer Cr.	20 Aug	CHS	170.6	1	76	-	-	-	-	^d
2000										
Deer Cr.	19 July	HSTS	334.1	79	196 (40)	102-268	25	88.0	56.0	25.7 \pm 2.6
Deer Cr.	19 July	WSTS	334.1	20	114 (26)	83-179	-	-	-	6.4 \pm 0.9
Deer Cr.	19 July	CHS	334.1	1	74	-	-	-	-	0.3
2001										
Deer Cr.	30 July	HSTS	339.3	66	184 (36)	104-264	14	85.7	7.1	20.0 \pm 0.9
Deer Cr.	30 July	WSTS	339.3	32	115 (16)	93-151	-	-	-	14.7 \pm 10.1
Deer Cr.	30 July	CHS	339.3	24	-	-	-	-	-	8.1
2002										
Deer Cr.	31 July	HSTS	302.0	12	199 (54)	129-278	3	100.0	-	4.3 \pm 1.0
Deer Cr.	31 July	WSTS	302.0	30	108 (16)	80-150	-	-	-	10.6 \pm 1.2
Deer Cr.	31 July	CHS	302.0	1	83	-	-	-	-	^d

^a Index sites located on Deer Creek (Rkm 0.1) near the Big Canyon Facility and on Catherine Creek (Rkm 27) near the 10th Street bridge in the town of Union, OR. Two adjacent sites were sampled at each location and each site typically included both riffle and pool habitat.

^b These fish were AdLV+CWT marked residual steelhead used for CWT recovery. Sex ratio and maturation data were collected in 2000, 2001, and 2002.

^c Density ($\pm 95\%$ confidence interval) was determined using a multiple pass removal method (Zippen 1958) with backpack electrofishers (Smith-Root Model 12 and 12A) and block seines.

^d Juvenile spring Chinook salmon present but no estimate available.

^e Only one site sampled at Deer Creek in 1997.

Table 5. Density, size, sex ratio, and maturity of salmonids captured at residual steelhead index sites during the summer in the Imnaha Basin from 1996-2002. Hatchery steelhead smolts released in the spring (April-May) were classified as residuals after 20 June. HSTS indicates hatchery (adipose clipped) residual summer steelhead, H0 indicates 1999 brood hatchery pre-smolt summer steelhead, and WSTS indicates all wild *Oncorhynchus mykiss* except young-of-the-year. Wild young-of-the-year *O. mykiss* were present every year but were not sampled quantitatively. Fork length (FL) includes standard deviation in parentheses and density includes $\pm 95\%$ confidence interval. Note: In 2000, releases of hatchery steelhead from Little Sheep Creek Facility changed from 330K to 230K, which may have reduced numbers of hatchery residuals in Little Sheep Creek.

Year, Location ^a	Date	Species	Area (m ²)	N	FL (mm)		Sex ratio and maturation ^b			Density ^c (#/100m ²)
					Length	Range	N	% males	% mature	
1996										
L. Sheep	29 July	HSTS	619.1	118	197 (24)	129-265	-	-	-	21.2 \pm 1.9
L. Sheep	29 July	WSTS	619.1	3	-	-	-	-	-	0.3 \pm 0.0
1997										
L. Sheep	30 July	HSTS	429.8	184	200 (33)	130-258	25	84.0	12.0	46.8 \pm 2.9
L. Sheep	30 July	WSTS	429.8	13	-	-	-	-	-	^e
1998										
L. Sheep	22 July	HSTS	475.4	147	176 (39)	100-285	-	-	-	34.1 \pm 2.3
L. Sheep	22 July	WSTS	475.4	8	112 (8)	102-124	-	-	-	1.9 \pm 1.1
1999										
L. Sheep	21 July	HSTS	468.5	124	178 (30)	115-253	-	-	-	27.5 \pm 1.1
L. Sheep	21 July	WSTS	468.5	4	135 (32)	105-174	-	-	-	0.9
2000										
L. Sheep	18 July	HSTS	511.2	132	192 (40)	112-272	49	85.7	16.3	26.1 \pm 0.4
L. Sheep	18 July	WSTS	511.2	5	107 (17)	90-134	-	-	-	0.4
L. Sheep	18 July	H0	511.2	4	110 (20)	92-127	-	-	-	0.8
2001										
L. Sheep	27 July	HSTS ^d	528.5	164	194 (41)	118-310	34	100.0	20.6	32.6 \pm 1.4
L. Sheep	27 July	WSTS	528.5	21	115 (17)	85-151	-	-	-	4.4 \pm 0.9
2002										
L. Sheep	30 July	HSTS	490.6	50	166 (36)	105-274	8	100.0	-	10.5 \pm 0.5
L. Sheep	30 July	WSTS	490.6	37	110 (28)	74-181	-	-	-	10.4 \pm 6.0

^a The index site located on Little Sheep Creek (Rkm 8.0) was at the Little Sheep Creek Facility. Two adjacent sites were sampled and each site typically included both riffle and pool habitat.

^b These fish were AdLV+CWT marked residual steelhead used for CWT recovery. Sex ratio and maturation data were collected in 1997, 2000, 2001, and 2002.

^c Density ($\pm 95\%$ confidence interval) was determined using a multiple pass removal method (Zippen 1958) with backpack electrofishers (Smith-Root Model 12 and 12A) and block seines.

^d Includes some age 2+ hatchery pre-smolts (Ad+CWT) not separated from hatchery residual steelhead.

^e Wild *O. mykiss* present but density not estimated.

Table 6. Summary of egg collection and juvenile survival for 2001 brood year summer steelhead released in the Grande Ronde and Imnaha river basins at LSRCF facilities in 2002. Eyed embryos are fertilized eggs with pigmented eyes visible through the egg shell.

Stock	Number of eggs taken	Eyed embryos	Total fish released	Estimated survival rate	
				Egg-to-embryo	Embryo-to-smolt ^a
Wallowa	1,155,905	1,000,335 ^b	843,809 ^c	86.5	92.9
Imnaha	479,970	389,630 ^d	296,713	81.2	93.5

^a Embryos that were culled from production and not incubated and reared at Irrigon Fish Hatchery were subtracted from the calculation of embryo-to-smolt survival.

^b Includes 91,715 embryos that were overestimated in the inventory.

^c Includes 11,891 fish held back and reared as rainbow trout in Kinney Lake.

^d Includes 31,000 embryos that were culled because the family groups included stray RV fin-clipped adults assumed to originate from Ringold Springs Hatchery in Washington. Also includes 41,194 embryos that were overestimated in the inventory

Table 7. Details of experimental and production groups of 2001 brood year hatchery summer steelhead released in the Grande Ronde (Wallowa stock) and Imnaha (Imnaha stock) river basins in 2002. Experimental group indicates release strategy and rearing raceway number(s). All groups were acclimated, except for Big Sheep Creek groups that were direct stream released. Target size for all fish was 5 fish per pound (FPP). Standard deviations are shown in parentheses. LGD indicates Lower Granite Dam.

Experimental group ^a	FPP	Release date	Release location	CWT code	Length (mm)	Weight (g)	Condition factor	Total fish released	Percent migration to LGD ^b
<i>Wallowa stock</i>									
Production, 7	4.2	April 3	Spring Cr.	093404	209 (17)	109.4 (28.4)	1.08 (0.10)	23,495	53.2
Production, 1-8	4.6	April 3	Spring Cr.	-	206 (21)	99.0 (31.5)	1.08 (0.11)	330,838	-
Forced, 13	4.2	May 1	Spring Cr.	093405	214 (20)	105.6 (29.0)	1.06 (0.06)	25,164	86.1
Volitional, 15	3.9	May 2-16	Spring Cr.	093406	223 (20)	117.2 (37.3)	1.04 (0.14)	22,163	60.6
Production, 13-16, 18, 20	4.0	May 1-16	Spring Cr.	-	221 (20)	112.3 (34.2)	1.04 (0.07)	158,973	-
Production, 9	4.2	April 10	Deer Cr.	093407	211 (23)	104.1 (36.0)	1.09 (0.09)	24,464	73.8
Production, 9-12	4.3	April 10	Deer Cr.	-	210 (20)	104.6 (30.0)	1.07 (0.05)	144,240	-
Forced, 17	4.2	May 8	Deer Cr.	093408	215 (26)	107.1 (36.5)	1.00 (0.05)	24,396	64.0
Volitional, 19	3.7	May 9-23	Deer Cr.	093409	230 (23)	127.7 (36.3)	1.02 (0.04)	23,660	76.1
Production, 17, 19, 20	4.0	May 8-23	Deer Cr.	-	224 (23)	114.4 (35.4)	1.02 (0.12)	54,525	-
Total released ^c								831,918	
<i>Imnaha stock</i>									
Production, 23	4.4	April 10	L. Sheep Cr.	093402	213 (24)	105.4 (38.7)	1.08 (0.07)	24,695	66.3
Production, 25 ^d	5.3	April 10	L. Sheep Cr.	Blank tag	201 (33)	84.7 (33.9)	1.08 (0.07)	49,634	60.5
Production, 21-23,25	4.4	April 10	L. Sheep Cr.	-	202 (30)	101.0 (32.3)	1.11 (0.06)	46,551	-
Production, 24	4.6	May 8	L. Sheep Cr.	093403	212 (22)	101.9 (28.1)	1.06 (0.05)	21,080	60.4
Production, 24,26	4.1	May 8	L. Sheep Cr.	-	215 (21)	109.8 (34.0)	1.06 (0.07)	53,159	-
No fin clip, 27	5.3	April 16-17	B. Sheep Cr.	-	202 (27)	-	-	52,238	-
Production, 28	4.8	April 16-17	B. Sheep Cr.	090125	205 (22)	94.3 (30.4)	1.09 (0.07)	47,291 ^e	67.7
Production, 28	4.8	April 16-17	B. Sheep Cr.	-	205 (22)	94.3 (30.4)	1.09 (0.07)	2,065	-
Total released								296,713	

^a All fish were reared at Irrigon Fish Hatchery (ODFW).

^b Percent migration of PIT tag release groups to Lower Granite Dam is Cormack-Jolly-Seber estimates of survival probabilities from the SURPH.2 program (Lady et al. 2001).

^c Wallowa stock steelhead male releases were less than 1% precocious.

^d Approximately 15% of the no fin clip + blank wire tagged fish were reared in raceway 23. This equalized rearing densities in raceways to be released at Little Sheep Creek Facility

^e Includes 987 fish inadvertently marked RV instead of LV.

Table 8. Estimates of fin clip quality and coded-wire tag retention for 2001 brood year summer steelhead reared at Irrigon Fish Hatchery and released in 2002. Experimental group indicates treatment and rearing raceway number. Targets for both Wallowa and Imnaha stocks were 100% adipose clipped, except for 100K Imnaha stock which were not clipped, and target size at release was 5 fish per pound. For experimental fish, targets for both stocks were 100% AdLV+CWT, and for non-clipped fish, 50K were blank-wire tagged and the other 50K were not marked. Ad clip quality for each stock was completed prior to marking.

Experimental group	Tag code	Number checked ^a		Cwt + LV	Cwt + no LV	No Cwt + LV	No Cwt + no LV	Ad	No Ad
		Tag	Ad						
<i>Wallowa stock</i>									
Production, 7	093404	505	-	89.9	1.2	8.9	0.0	-	-
Production, 9	093407	529	-	93.6	6.4	0.0	0.0	-	-
Forced, 13	093405	502	-	90.8	8.8	0.4	0.0	-	-
Volitional, 15	093406	560	-	91.8	6.8	1.4	0.0	-	-
Forced, 17	093408	501	-	91.6	8.4	0.0	0.0	-	-
Volitional, 19	093409	516	-	92.6	7.0	0.4	0.0	-	-
Average		519	220	91.7	6.4	1.9	0.0	97.8	2.2
<i>Imnaha stock</i>									
Production, 23	093402	519	-	95.8	3.9	0.3	0.0	-	-
No fin clip, 25 ^b	Blank tag	556	-	0.0	99.3	0.0	0.7	-	-
Production, 24	093403	508	-	80.3	16.2	3.5	0.0	-	-
Production, 28	090125	513	-	95.9 ^c	3.5	0.6	0.0	-	-
Average (23,24,28)		513	240	90.7 ^d	7.8	1.5	0.0	99.6	0.4

^a Ad-clip quality was conducted during September when there were four raceways of Wallowa stock and two raceways of Imnaha stock.

^b Approximately 15% of the no fin clip + blank wire tagged fish were reared in raceway 23.

^c Percent includes 2.1% inadvertently marked RV instead of LV.

^d Average percent includes 0.7% inadvertently marked RV instead of LV.

Table 9. Timing of adult steelhead returns to LSRCF facilities in 2001 by location and origin. End-of-season adjustments in numbers trapped were distributed proportionally over the entire run.

Period	Week of the year	Number of fish trapped ^a					
		Wallowa		Big Canyon		Little Sheep	
		Hatchery	Natural	Hatchery	Natural	Hatchery	Natural
Jan 15-21	3	-	-	-	-	-	-
Jan 22-28	4	-	-	0	0	-	-
Jan 29-Feb4	5	-	-	0	0	-	-
Feb 05-11	6	-	-	0	0	-	-
Feb 12-18	7	-	-	0	0	-	-
Feb 19-25	8	-	-	0	0	-	-
Feb 26-Mar 04	9	0	0	0	0	-	-
Mar 05-11	10	0	0	0	0	0	0
Mar 12-18	11	14	0	3	1	23	1
Mar 19-25	12	87	0	129	8	38	2
Mar 26-Apr 01	13	275	0	74	5	229	9
Apr 02-08	14	249	0	53	3	119	8
Apr 09-15	15	223	0	36	4	37	1
Apr 16-22	16	95	0	201	20	200	18
Apr 23-29	17	149	0	124	5	356	43
Apr 30-May 06	18	124	0	161	12	163	36
May 07-13	19	35	0	26	3	41	4
May 14-20	20	11	0	50	10	14	5
May 21-27	21	0	0	2	0	2	0
May 28-Jun 03	22	0	0	3	0	2	0
Jun 04-10	23	-	-	0	0	0	0
Jun 11-17	24	-	-	-	-	0	1
Jun 18-24	25	-	-	-	-	0	0
Jun 25-Jul 1	26	-	-	-	-	-	-
Total		1,262	0	862	71	1,224	128

^a Weirs installed January 22nd at Big Canyon Facility (Deer Cr.) and February 28th at Little Sheep Creek Facility as well as ladder opened February 20th at Wallowa Fish Hatchery. Adult collections stopped June 8th at Big Canyon Facility, June 22nd at Little Sheep Creek Facility, and May 31st at Wallowa Fish Hatchery.

Table 10. Numbers and disposition of adult steelhead that returned to LSRCF facilities in 2001 by stock, origin, age (freshwater:saltwater), and sex. M indicates male and F indicates female.

Stock, Disposition	Hatchery									Natural									Grand total		
	1:1		1:2		1:3		2:1		Total	2:1		2:2		3:1		3:2		4:1		Total	
	M	F	M	F	M	F	M	F	Total	M	F	M	F	M	F	M	F	M	F	Total	
<i>Wallowa Fish Hatchery (Wallowa stock)</i>																					
Trapped	578	338	100	246	0	0	0	0	1,262	0	0	0	0	0	0	0	0	0	0	0	1,262
Passed	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Outplanted	54	10	9	8	0	0	0	0	81	0	0	0	0	0	0	0	0	0	0	0	81
Kept	524	328	91	238	0	0	0	0	1,181	0	0	0	0	0	0	0	0	0	0	0	1,181
Mortality	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Spawned	184	124	48	103	0	0	0	0	459	0	0	0	0	0	0	0	0	0	0	0	459
Killed ^a	340	204	43	135	0	0	0	0	722	0	0	0	0	0	0	0	0	0	0	0	722
Fork Length (mm)	591	588	756	690	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Standard deviation	(26)	(24)	(32)	(34)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Big Canyon Facility (Wallowa stock)</i>																					
Trapped	289	291	64	218	0	0	0	0	862	6	10	4	10	18	9	5	8	1	0	71	933
Passed	0	0	0	0	0	0	0	0	0	6	10	4	10	18	9	5	8	1	0	71	71
Outplanted	52	36	11	26	0	0	0	0	125	0	0	0	0	0	0	0	0	0	0	0	125
Kept	237	255	53	192	0	0	0	0	737	0	0	0	0	0	0	0	0	0	0	0	737
Mortality	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Spawned	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Killed	237	255	53	192	0	0	0	0	737	0	0	0	0	0	0	0	0	0	0	0	737
Fork Length (mm)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Standard deviation	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Little Sheep Creek Facility (Imnaha stock)</i>																					
Trapped	592	528	9	95	0	0	0	0	1,224	10	33	1	15	23	28	2	13	2	1	128	1,352
Passed	326	298	2	46	0	0	0	0	672	7	24	1	11	16	26	1	12	1	1	100	772
Outplanted	170	165	0	19	0	0	0	0	354	0	0	0	0	0	0	0	0	0	0	0	354
Kept	96	65	7	30	0	0	0	0	198	3	9	0	4	7	2	1	1	1	0	28	226
Mortality	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1
Spawned ^b	93	63	7	30	0	0	0	0	193	3	9	0	4	7	2	1	1	1	0	28	221
Killed	2	2	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	4
Fork Length (mm)	585	560	720	702	-	-	-	-	-	584	-	721	-	623	-	743	-	-	-	-	-
Standard deviation	(22)	(24)	(36)	(22)	-	-	-	-	-	(38)	-	(67)	-	(46)	-	-	-	-	-	-	-

^a Includes four fish (two age 1:2 females and two age 1:1 males) from Wallowa Fish Hatchery that were transferred to the Life History Characterization study.

^b Includes 12 wild males live spawned then passed above the weir.

Table 11. Number of recaptured hatchery adult summer steelhead at the Little Sheep Creek Facility weir that were outplanted into Big Sheep Creek, 1999-2002.

Year	Number of fish															
	Outplanted			1 st time recapture				2 nd time recapture				3 rd time recapture				
	M	F	Total	M	F	Total	% ^a	M	F	Total	% ^a	M	F	Total	% ^b	
1999	25	17	42	5	1	6	14.3	0	0	0	-	0	0	0	-	
2000	55	83	138	4	11	15	10.9	2	0	2	13.3	0	0	0	-	
2001	170	184	354	31	13	44	12.4	3	1	4	9.1	0	0	0	-	
2002 ^c	775	1,255	2,030 ^d	350	384	734	36.2	103	65	168	22.9	3	2	5	3.0	
Mean	-	-	-	-	-	-	18.4	-	-	-	11.3	-	-	-	-	

^a Percent of 1st time recaptures.

^b Percent of 2nd time recaptures.

^c In 2002, after mid-season, recaptures were not always opercle punched (to visually identify each time a fish is recaptured) after the first recovery, therefore results may overestimate first time recaptures and underestimate successive recaptures.

^d Includes 190 steelhead that were initially outplanted to Big Sheep Creek then returned to the Little Sheep Creek Facility and were passed.

Table 12. Spawning summaries for summer steelhead at LSRCP facilities in 2001. The percent mortality is from green egg to eyed embryo after shocking.

Spawn date, Lot number	Parental origin ^a	Number of eggs	Eyed embryos ^b	% mortality
<i>Wallowa Fish Hatchery (Wallowa stock)</i>				
3/28, wa380	Hatchery	118,005	85,035	28
4/04, wa381	Hatchery	278,300	246,900	11
4/11, wa382	Hatchery	202,200	177,600	12
4/18, wa383	Hatchery	140,300	128,000	9
4/25, wa384	Hatchery	179,600	158,000	12
5/02, wa385	Hatchery	176,800	149,800	15
5/09, wa386	Hatchery	48,300	43,900	9
5/16, wa387	Hatchery	12,400	11,100	10
Total		1,155,905	1,000,335	13
<i>Little Sheep Creek Facility (Imnaha stock)</i>				
4/03, li400	Hatchery	81,234	81,090	15
4/03, li400	Mixed	14,336	-	-
4/10, li401	Hatchery	39,829	39,760	8
4/10, li401	Mixed	3,621	-	-
4/17, li402	Hatchery	20,670	18,870	9
4/24, li403	Hatchery	112,504	116,460	21
4/24, li403	Mixed	34,616	-	-
5/01, li404	Hatchery	26,958	50,770	22
5/01, li404	Mixed	37,742	-	-
5/08, li405	Hatchery	59,112	56,370	24
5/08, li405	Mixed	14,778	-	-
5/15, li406	Hatchery	10,309	19,580	29
5/15, li406	Mixed	17,181	-	-
5/23, li407	Hatchery	4,720	6,730	5
5/23, li407	Mixed	2,360	-	-
Subtotal	Hatchery	355,336	-	-
Subtotal	Mixed	124,634	-	-
Total		479,970	389,630	19

^a In general, family groups were one male x one female for Wallowa stock and were matrix spawned (three males x three females) for Imnaha stock. Mixed eggs include both natural and hatchery parents.

^b Includes 635 excess Wallowa stock eyed embryos that were transferred to Wallowa Middle School's J. Gibbs and U.S Forest Services' G. Sausen, in conjunction with ODFW's Salmon and Trout Enhancement Program (STEP). Also includes 31,000 Imnaha stock eyed embryos (from lot number li401) that were euthanized because they included potential stray AdRV marked parents from Ringold Fish Hatchery in Washington. However, one AdRV family group was not removed because it included a wild parent. Eyed embryos were inventoried between 4/30 and 6/9.

Table 13. Timing of adult steelhead returns to LSRCP facilities in 2002 by location and origin. End-of-season adjustments in numbers trapped were distributed proportionally over the entire run.

Period	Week of the Year	Number of fish trapped ^a					
		Wallowa		Big Canyon		Little Sheep	
		Hatchery	Natural	Hatchery	Natural	Hatchery	Natural
Jan 15-21	3	-	-	-	-	-	-
Jan 22-28	4	-	-	0	0	-	-
Jan 29-Feb4	5	-	-	0	0	-	-
Feb 05-11	6	-	-	0	0	-	-
Feb 12-18	7	-	-	0	0	-	-
Feb 19-25	8	4	0	2	0	-	-
Feb 26-Mar 04	9	14	0	0	0	0	0
Mar 05-11	10	29	0	31	3	3	0
Mar 12-18	11	55	0	173	2	0	0
Mar 19-25	12	101	0	440	14	32	3
Mar 26-Apr 01	13	226	1	827	31	500	18
Apr 02-08	14	929	1	421	21	815	39
Apr 09-15	15	463	5	335	66	944	73
Apr 16-22	16	539	0	197	36	383	28
Apr 23-29	17	336	1	155	14	344	22
Apr 30-May 06	18	146	0	92	13	165	17
May 07-13	19	67	1	22	2	47	0
May 14-20	20	24	0	32	6	26	4
May 21-27	21	13	1	0	1	1	0
May 28-Jun 03	22	5	0	10	0	0	0
Jun 04-10	23	0	0	0	0	-	-
Jun 11-17	24	-	-	-	-	-	-
	Total	2,951	10	2,737	209	3,260	204

^a Weirs installed January 23rd at Big Canyon Facility (Deer Cr.), and February 26th at Little Sheep Creek Facility as well as ladder opened February 14th at Wallowa Fish Hatchery. Adult collections stopped June 6th at Big Canyon Facility, June 3rd at Little Sheep Creek Facility, and June 7th at Wallowa Fish Hatchery.

Table 14. Numbers and disposition of adult steelhead that returned to LSRCF facilities in 2002 by stock, origin, age (freshwater:saltwater), and sex. M indicates male and F indicates female.

Stock, Disposition	Hatchery									Natural									Grand total		
	1:1		1:2		1:3		2:1		Total	2:1		2:2		3:1		3:2		4:1		Total	
	M	F	M	F	M	F	M	F			M	F	M	F	M	F	M	F	M		F
<i>Wallowa Fish Hatchery (Wallowa stock)</i>																					
Trapped	1,145	844	326	613	0	23	0	0	2,951	1	1	0	1	4	0	2	1	0	0	10	2,961
Passed	0	0	0	0	0	0	0	0	0	1	1	0	1	4	0	2	0	0	0	9	9
Outplanted	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Kept	1,145	844	326	613	0	23	0	0	2,951	0	0	0	0	0	0	0	1	0	0	0	2,952
Mortality	0	0	0	3	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	3
Spawned	271	112	106	114	0	4	0	0	607	0	0	0	0	0	0	0	1	0	0	1	608
Killed ^a	874	732	220	496	0	19	0	0	2,341	0	0	0	0	0	0	0	0	0	0	0	2,341
Fork Length (mm)	596	596	746	722	-	685	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Standard deviation	(56)	(30)	(47)	(45)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Big Canyon Facility (Wallowa stock)</i>																					
Trapped	933	1,079	213	487	0	25	0	0	2,737	20	37	4	26	50	34	12	22	3	1	209	2,946
Passed	0	0	0	0	0	0	0	0	0	20	37	4	26	50	34	12	22	3	1	209	209
Outplanted	72	38	23	36	0	1	0	0	170	0	0	0	0	0	0	0	0	0	0	0	170
Kept	861	1,041	190	451	0	24	0	0	2,567	0	0	0	0	0	0	0	0	0	0	0	2,567
Mortality	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Spawned	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Killed ^b	861	1,041	190	451	0	24	0	0	2,567	0	0	0	0	0	0	0	0	0	0	0	2,567
Fork Length (mm)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Standard deviation	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<i>Little Sheep Creek Facility (Imnaha stock)</i>																					
Trapped	968	1,348	229	656	0	0	59	0	3,260	17	46	2	31	35	43	7	20	2	1	204	3,464
Passed	359	511	77	227	0	0	20	0	1,194	16	40	2	29	29	40	7	20	2	1	186	1,380
Outplanted	517	769	129	393	0	0	32	0	1,840 ^c	0	0	0	1	0	0	0	0	0	0	1	1,841
Kept	92	68	23	36	0	0	7	0	226	1	6	0	1	6	3	0	0	0	0	17	243
Mortality	4	1	5	1	0	0	0	0	11	0	0	0	1	0	0	0	0	0	0	1	12
Spawned ^d	80	64	17	33	0	0	7	0	201	1	6	0	0	6	2	0	0	0	0	15	216
Killed	8	3	1	2	0	0	0	0	14	0	0	0	0	0	1	0	0	0	0	1	15
Fork Length (mm)	599	586	714	702	-	-	565	-	-	-	571	-	-	-	632	-	-	-	-	-	-
Standard deviation	(40)	(27)	(48)	(27)	-	-	-	-	-	-	(17)	-	-	-	(46)	-	-	-	-	-	-

^a Includes 27 fish from Wallowa Fish Hatchery used in an egg survival study and four fish from Wallowa Fish Hatchery that were transferred to the Life History Characterization study.

^b Includes three stray hatchery fish released from WDFW's Cottonwood Facility on the lower Grande Ronde River (two with tag code 631209, and one with tag code 630460).

^c Does not include 190 hatchery fish outplanted to Big Sheep, then recaptured at the Little Sheep Creek weir, and passed above the weir to spawn naturally in Little Sheep Creek.

^d Includes 7 wild males live spawned then passed above the weir.

Table 15. Summer steelhead spawning ground surveys of natural steelhead passed above the Big Canyon weir into Deer Creek.

Year	Females passed	Males passed	Total passed	Total redds	Fish/redd	Females/redd	% redds observed ^a	Redds/mile ^b
2002	120	89	209	87	2.40	1.38	0.73	7.25

^a Percent of redds observed assume that each female passed constructs one redd.

^b Twelve miles of stream were surveyed.

Table 16. Spawning summaries for summer steelhead at LSRCP facilities in 2002. The percent mortality is from green egg to eyed embryo after shocking.

Spawn date, Lot number	Parental origin ^a	Number of eggs	Eyed embryos ^b	% mortality
<i>Wallowa Fish Hatchery (Wallowa stock)</i>				
3/19, wa390	Hatchery	68,596	53,948	21
3/27, wa391	Hatchery	267,605	243,800	9
4/03, wa392	Hatchery	323,850	291,300	10
4/10, wa393	Hatchery	264,900	243,450	8
4/17, wa394	Hatchery	272,900	250,930	8
4/24, wa395	Hatchery	133,700	123,300	8
Total		1,331,551	1,206,728	9
<i>Little Sheep Creek Facility (Imnaha stock)</i>				
4/02, li410	Hatchery	60,700	45,350	25
4/09, li411	Hatchery	158,462	149,595	16
4/09, li411	Mixed	19,808	-	-
4/16, li412	Hatchery	55,458	50,600	16
4/16, li412	Mixed	5,042	-	-
4/23, li413	Hatchery	80,524	74,750	17
4/23, li413	Mixed	10,066	-	-
4/30, li414	Hatchery	68,912	65,170	17
4/30, li414	Mixed	9,188	-	-
5/07, li415	Hatchery	12,951	24,820	18
5/07, li415	Mixed	17,269	-	-
5/14, li416	Hatchery	7,240	15,190	7
5/14, li416	Mixed	7,240	-	-
5/14, li416	Natural	1,810	-	-
Subtotal	Hatchery	444,247	-	-
Subtotal	Mixed	68,613	-	-
Subtotal	Natural	1,810	-	-
Total		514,670	425,475	17

^a In general, family groups were one male x one female for Wallowa stock and were matrix spawned (three males x three females) for Imnaha stock. Mixed eggs include both natural and hatchery parents and natural eggs include only natural parents.

^b Includes 226,728 Wallowa stock eyed embryos that were euthanized because they were excess to program needs. Sixteen hundred of these excess eyed embryos were transferred to ODFW's Salmon and Trout Enhancement Program (STEP) biologist Patty Bowers. Eyed embryos were inventoried between 4/19 and 5/22.

Table 17. Summary of anadromous adult recoveries of coded-wire tagged (CWT), Wallowa stock summer steelhead for the 2000-01 run year. All CWT fish were from releases of hatchery fish into either Deer Creek (at Big Canyon Facility) or Spring Creek (at Wallowa Fish Hatchery). Data was summarized as available through October 2005.

Brood year, release site	Experimental group ^a	CWT code	Recoveries at weirs ^b	Other in-basin recoveries ^c	Out-of-basin recoveries ^d	Total recoveries ^e
1997						
Deer Cr.	Forced	092326	12	6	79	97
	Volitional	092327	11	5	41	57
	Volitional	092330	14	0	41	55
	Forced	092331	17	2	67	86
Spring Cr.	Lyons Ferry Hatchery	071247	5	4	3	12
	Volitional	092324	7	0	46	53
	Forced	092325	9	0	44	53
	Forced	092328	16	0	37	53
	Volitional	092329	7	10	16	33
1998						
Deer Cr.	Volitional	092562	37	13	55	105
	Forced	092563	28	6	81	115
	Volitional	092603	17	3	34	54
	Forced	092604	14	5	41	60
Spring Cr.	Forced	092601	32	9	50	91
	Volitional	092602	21	4	31	56
	Volitional	092605	19	0	32	51
	Forced	092606	17	6	35	58
Grand total of recoveries in 2001			283	73	733	1,089

^a Experimental groups include the release (and rearing) strategy. All releases were targeted for five fish per pound.

^b Actual number of CWT fish that were released into Spring Creek and recovered at the Wallowa Fish Hatchery weir or released into Deer Creek and recovered at the Big Canyon Facility weir. The protocol was to collect all CWT fish at the weirs for sampling at the hatchery during spawning.

^c Actual number of CWT fish that were released into Spring Creek and recovered at the Big Canyon Facility weir or released into Deer Creek and recovered at the Wallowa Fish Hatchery weir plus the estimated number (from creel surveys and harvest card returns) of CWT fish that were harvested in the Grande Ronde River basin fisheries.

^d Estimated number (from PSMFC and ODFW databases) of total CWT fish that were recovered in the ocean, mainstem Columbia, Deschutes or Snake river fisheries, or in tributaries outside the Grande Ronde River Basin. When CWT expansion factors were greater than 24 (because of a low sampling rate) unexpanded data were used.

^e Estimated total by summing all recoveries.

Table 18. Summary of anadromous adult recoveries of coded-wire tagged (CWT), Imnaha stock summer steelhead for the 2000-01 run year. All CWT fish were from releases of hatchery fish into Little Sheep Creek. Data was summarized as available through October 2005.

Brood year	Experimental group ^a	CWT code	Recoveries at weirs ^b	Other in-basin recoveries ^c	Out-of-basin recoveries ^d	Total recoveries ^e
1997	1/4 standard density	074860	6	2	4	12
	1/4 standard density	075301	9	0	7	16
	1/2 standard density	092322	11	2	32	45
	1/2 standard density	092323	16	2	6	24
1998	Production	092560	43	5	32	80
	Production	092561	22	0	17	39
	Production	092634	56	4	77	137
Grand total of recoveries in 2001			163	15	175	353

^a Experimental groups include the rearing and release strategy. All releases were targeted for five fish per pound.

^b Estimated number of CWT fish recovered at the Little Sheep Creek weir based on actual number recovered at the weir and estimated number either passed above the weir to Little Sheep Creek or outplanted to Big Sheep Creek to spawn naturally.

^c Estimated number (from creel surveys and harvest card returns) of total CWT fish that were harvested in the Imnaha River Basin fishery.

^d Estimated number (from PSMFC and ODFW databases) of total CWT fish that were recovered in the ocean, mainstem Columbia, Deschutes or Snake river fisheries, or in tributaries outside the Imnaha River Basin. When CWT expansion factors were greater than 24 (because of a low sampling rate) unexpanded data were used.

^e Estimated total by summing all recoveries.

Table 19. Summary of anadromous adult recoveries of coded-wire tagged (CWT), Wallowa stock summer steelhead for the 2001-02 run year. All CWT fish were from releases of hatchery fish into either Deer Creek (at Big Canyon Facility) or Spring Creek (at Wallowa Fish Hatchery). Data was summarized as available through October 2005.

Brood year, release site	Experimental group ^a	CWT code	Recoveries at weirs ^b	Other in-basin recoveries ^c	Out-of-basin recoveries ^d	Total recoveries ^e
1997	Forced	092331	1	0	0	1
1998						
Deer Cr.	Volitional	092562	33	23	49	105
	Forced	092563	32	32	25	89
	Volitional	092603	26	5	42	73
	Forced	092604	35	38	60	133
Spring Cr.	Forced	092601	17	3	75	95
	Volitional	092602	15	22	45	82
	Volitional	092605	21	32	30	83
	Forced	092606	16	0	43	59
1999						
Deer Cr.	Production	092934	130	84	160	374
	Production	092935	121	68	127	316
	Volitional	092936	54	11	107	172
	Forced	092937	76	16	68	160
Spring Cr.	Production	092930	62	58	147	267
	Production	092931	87	18	145	250
	Volitional	092932	39	5	87	131
	Forced	092933	47	6	92	145
	Grand total of recoveries in 2002		812	421	1,302	2,535

^a Experimental groups include the release strategy. All releases were targeted for 5 fish per pound.

^b Actual number of CWT fish that were released into Spring Creek and recovered at the Wallowa Fish Hatchery weir or released into Deer Creek and recovered at the Big Canyon Facility weir. The protocol was to collect all CWT fish at the weirs for sampling at the hatchery during spawning.

^c Actual number of CWT fish that were released into Spring Creek and recovered at the Big Canyon Facility weir or released into Deer Creek and recovered at the Wallowa Fish Hatchery weir plus the estimated number (from creel surveys and harvest card returns) of CWT fish that were harvested in the Grande Ronde River Basin fisheries.

^d Estimated number (from PSMFC and ODFW databases) of total CWT fish that were recovered in the ocean, mainstem Columbia, Deschutes or Snake river fisheries, or in tributaries outside the Grande Ronde River Basin. When CWT expansion factors were greater than 24 (because of a low sampling rate) unexpanded data were used.

^e Estimated total by summing all recoveries.

Table 20. Summary of anadromous adult recoveries of coded-wire tagged (CWT), Imnaha stock summer steelhead for the 2001-02 run year. All CWT fish were from releases of hatchery fish into Little Sheep Creek. Data was summarized as available through October 2005.

Brood year	Experimental group ^a	CWT code	Recoveries at weirs ^b	Other in-basin recoveries ^c	Out-of-basin recoveries ^d	Total recoveries ^e
1998	Production	092560	62	3	59	124
	Production	092561	53	0	11	64
	Production	092634	66	7	13	86
1999	Production	092927	312	3	131	446
	Production	092928	201	13	173	387
	Production	092929	116	3	97	216
Grand total of recoveries in 2002			810	29	484	1,323

^a Experimental groups include the release strategy. All releases were targeted for five fish per pound.

^b Estimated number of CWT fish recovered at the Little Sheep Creek weir based on actual number recovered at the weir and estimated number either passed above the weir to Little Sheep Creek or outplanted to Big Sheep Creek to spawn naturally.

^c Estimated number (from creel surveys and harvest card returns) of total CWT fish that were harvested in the Imnaha River Basin fishery.

^d Estimated number (from PSMFC and ODFW databases) of total CWT fish that were recovered in the ocean, mainstem Columbia, Deschutes or Snake river fisheries, or in tributaries outside the Imnaha River Basin. When CWT expansion factors were greater than 24 (because of a low sampling rate) unexpanded data were used.

^e Estimated total by summing all recoveries.

Table 21. Catch and escapement distribution of adult summer steelhead by recovery location for the 2000-01 run year using the PSMFC and ODFW CWT databases. "C and S" indicates ceremonial and subsistence tribal fisheries. Data was summarized as available through October 2005.

Location	Wallowa Stock			Imnaha Stock		
	Estimated CWT recoveries	Total return	Percent of total return	Estimated CWT recoveries	Total return	Percent of total return
Ocean catch	1	4	>0.1	1	4	0.2
Columbia River						
Treaty net	52	281	3.0	19	66	3.4
C and S	0	0	0.0	0	0	0.0
Sport	153	725	7.9	56	185	9.5
Test	0	0	0.0	0	0	0.0
Tributary sport	8	42	0.5	28	86	4.4
Deschutes River						
Sport	27	143	1.6	16	46	2.4
C and S	3	21	0.2	0	0	0.0
Strays						
Outside Snake R. Basin	34	177	1.9	0	0	0.0
Within Snake R. Basin *	0	0	0.0	1	5	0.3
Snake River sport, tribs.*	455	2,368	25.6	54	226	11.7
Oregon tributaries ^a *	73	3,129	33.9	15	97	5.0
Other in-basin escapement ^b *	-	219	2.4	-	0	0
Hatchery weir ^c *	283	2,124	23.0	163	1,224	63.1
Total estimated return	1,089	9,233	100.0	353	1,939	100.0
Return to compensation area		7,840			1,552	
Percent of compensation goal		85.4			77.6	

* Indicates areas defining the compensation area. The compensation goal for Wallowa stock is 9,184 adults and the goal for Imnaha stock is 2,000 adults.

^a Total returns to Oregon tributaries are harvest estimates based on angler surveys and harvest card returns.

^b Other in-basin escapement areas are escapement estimates for off-station direct stream releases. Total returns were estimated by dividing the current year smolt-to-adult-returns (SAR) for acclimated release groups by the ratio of SARs for acclimated and direct stream release groups in 1992-1995.

^c Total returns to the hatchery weir are actual number.

Table 22. Catch and escapement distribution of adult summer steelhead by recovery location for the 2001-02 run year using the PSMFC and ODFW CWT databases. "C and S" indicates ceremonial and subsistence tribal fisheries. Data was summarized as available through October 2005.

Location	Wallowa Stock			Imnaha Stock		
	Estimated CWT recoveries	Total return	Percent of total return	Estimated CWT recoveries	Total return	Percent of total return
Ocean catch	0	0	0.0	0	0	0.0
Columbia River						
Treaty net	137	706	4.1	49	224	3.6
C and S	0	0	0.0	0	0	0.0
Sport	158	799	4.6	90	399	6.4
Test	0	0	0.0	0	0	0.0
Tributary sport	16	73	0.4	5	24	0.4
Deschutes River						
Sport	76	376	2.2	51	227	3.7
C and S	6	34	0.2	0	0	0.0
Strays						
Outside Snake R. Basin	224	1,247	7.2	2	9	0.1
Within Snake R. Basin*	1	4	>0.1	1	4	0.1
Snake River sport, tribs.*	684	3,434	19.9	286	1,301	21.0
Oregon tributaries ^a *	421	4,808	27.8	29	242	3.9
Other in-basin escapement ^b *	-	128	0.7	-	514	8.3
Hatchery weir ^c *	812	5,688	32.9	810	3,260	52.5
Total estimated return	2,535	17,297	100.0	1,323	6,204	100.0
Return to compensation area		14,062			5,321	
Percent of compensation goal		153.1			266.1	

* Indicates areas defining the compensation area. The compensation goal for Wallowa stock is 9,184 adults and the goal for Imnaha stock is 2,000 adults.

^a Total returns to Oregon tributaries are harvest estimates based on angler surveys and harvest card returns.

^b Other in-basin escapement areas are escapement estimates for off-station direct stream releases. Total returns were estimated by dividing the current year smolt-to-adult-returns (SAR) for acclimated release groups by the ratio of SARs for acclimated and direct stream release groups in 1992-1995.

^c Total returns to the hatchery weir are actual numbers. Wallowa stock includes three coded-wire-tagged strays from WDFW's Cottonwood Facility.

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