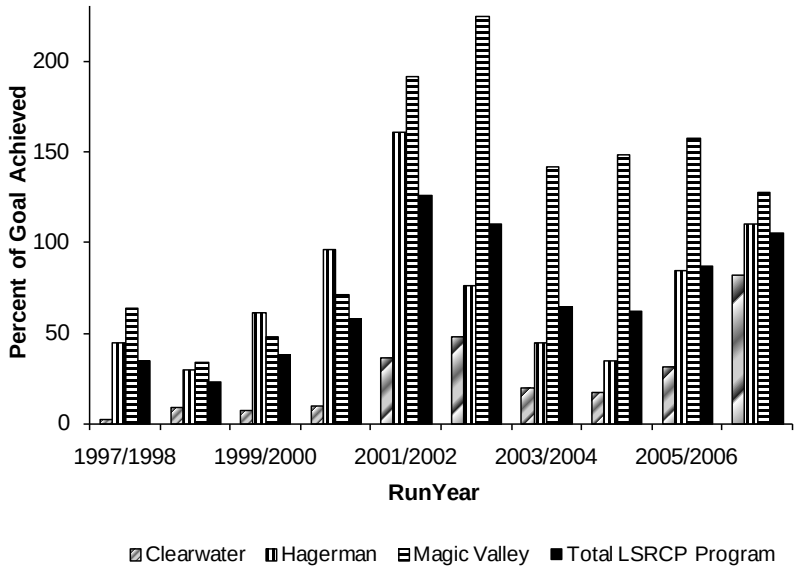
FISHERY RESEARCH

LOWER SNAKE RIVER COMPENSATION PLAN STEELHEAD FISH HATCHERY EVALUATIONS—IDAHO

Project Progress Report
October 1, 2004 to September 30, 2005



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IDFG Report Number 09-01
April 2009

LOWER SNAKE RIVER COMPENSATION PLAN
STEELHEAD FISH HATCHERY EVALUATIONS—IDAHO

Annual Report
October 1, 2004 to September 30, 2005

By

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To

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Lower Snake River Compensation Plan Office
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Cooperative Agreement
141109J008

IDFG Report Number 09-01
April 2009

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ABSTRACT

This annual report summarizes activities associated with the hatchery steelhead *Oncorhynchus mykiss* segment of the Idaho-Lower Snake River Compensation Plan (LSRCP). Presented in this report are juvenile rearing and release information for brood years 2004 and 2005 as well as adult return estimates (derived from coded-wire tag recoveries) from the fall of 2004 through the spring of 2007. This report supersedes information included in previous reports.

In April and May 2005, the Idaho-LSRCP hatcheries released 3,299,822 steelhead smolts from brood year 2004. Clearwater Fish Hatchery released 847,555 smolts, all of which were Dworshak B-run stock. Hagerman National Fish Hatchery released 1,279,279 smolts that were a mix of Sawtooth A, Pahsimeroi A, and Dworshak B-run stocks. Magic Valley Fish Hatchery released 1,802,988 smolts that included a mixture of Sawtooth A, Pahsimeroi A, Dworshak B, Upper Salmon B, and East Fork Natural A-run stocks.

A total of 19,631 brood year 2004 (migration year 2005) steelhead smolts were tagged with passive integrated transponders (PIT) in 29 release groups (274-2,499 tags per group) to monitor survival to Lower Granite Dam. Mean survival from release site to Lower Granite Dam was 75.9% (range 50.8%-88.1%), which was slightly higher than the previous eight-year average of 71.1%. The 80% arrival window to Lower Granite Dam was April 30 to May 18, 2005, which occurred just prior to peak outflow and spill at the dam. The increased survival and the peak arrival timing to Lower Granite Dam just prior to peak flows may result in higher than average adult returns for this brood year.

A total of 4,766,425 steelhead eggs from brood year 2005 were transferred to LSRCP rearing facilities. This included 1,257,201 for Clearwater Fish Hatchery, 1,505,499 for Hagerman National Fish Hatchery, and 2,003,725 for Magic Valley Fish Hatchery. The vast majority of these eggs were procured from adults returning to Dworshak National Fish Hatchery, Pahsimeroi Fish Hatchery, and Sawtooth Fish Hatchery; however, additional eggs were collected from adults returning to the East Fork Salmon River and Squaw Creek.

The number of adult steelhead returning to Idaho during the 2004/2005, 2005/2006, and 2006/2007 runs were at or near for the mitigation goal of 39,260 fish each year, with total numbers equaling 26,601, 34,241, and 41,376 for each run, respectively. Unlike previous reports, these estimates include adipose-clipped adults as well as those with an intact adipose fin.

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INTRODUCTION

The completion of the four hydroelectric dams on the lower section of the Snake River in Washington (Ice Harbor, Lower Monumental, Little Goose, and Lower Granite dams) reduced the returns of anadromous salmonids to the Snake River drainage (Raymond 1979). The Water Resources Development Act of 1976 authorized the creation of the Lower Snake River Compensation Plan (LSRCP) to mitigate for the loss of fisheries and wild runs to the Upper Snake River basin in Idaho, Washington, and Oregon (90 Stat. 2917). Mitigation for anadromous fishery losses included improvements in smolt passage at the dams as well as the construction and operation of fish hatcheries. The United States Fish and Wildlife Service (USFWS) was authorized to administer the operation and maintenance of 12 hatcheries in the Snake River basin.

The LSRCP includes a Hatchery Evaluation Studies (HES) component to monitor and determine the best practices for the operation of LSRCP hatcheries in each state. Evaluations consist of two major objectives outlined in the Cooperative Work Agreement established annually between the USFWS and IDFG. The first of these objectives is to document the accomplishments of the IDFG-LSRCP program toward meeting specific smolt production and an adult return goal of 39,260 adult steelhead above Lower Granite Dam (LSRCP 1991; Figure 1). The contributions of individual facilities are described below. The second objective is to identify factors limiting hatcheries from meeting return goals and to recommend improvements as these factors become apparent. Much of this latter task consists of performing specific experiments related to hatchery success (see experimentation section). Parameters used to evaluate hatchery success include juvenile survival and smolt to adult survival.

This report summarizes the HES activities and hatchery accomplishments for the LSRCP juvenile steelhead rearing facilities in Idaho for brood years 2004 and 2005, as well as adult returns from the fall of 2004 through the spring of 2007. Flow and spill information at Lower Granite Dam is also presented in addition to juvenile survival estimates because research has shown survival of juvenile Chinook salmon in the Snake and Columbia rivers increases with increased flow and spill, which in turn influences adult return (Connor et al. 2003). Coded-wire tag (CWT) recoveries from Idaho were used to generate an in-state return estimate for each run year as well as generate a brood run return estimate as well. Out-of-state CWT recoveries were used to estimate out-of-state harvest and straying rates to evaluate the relative performance of each facility.

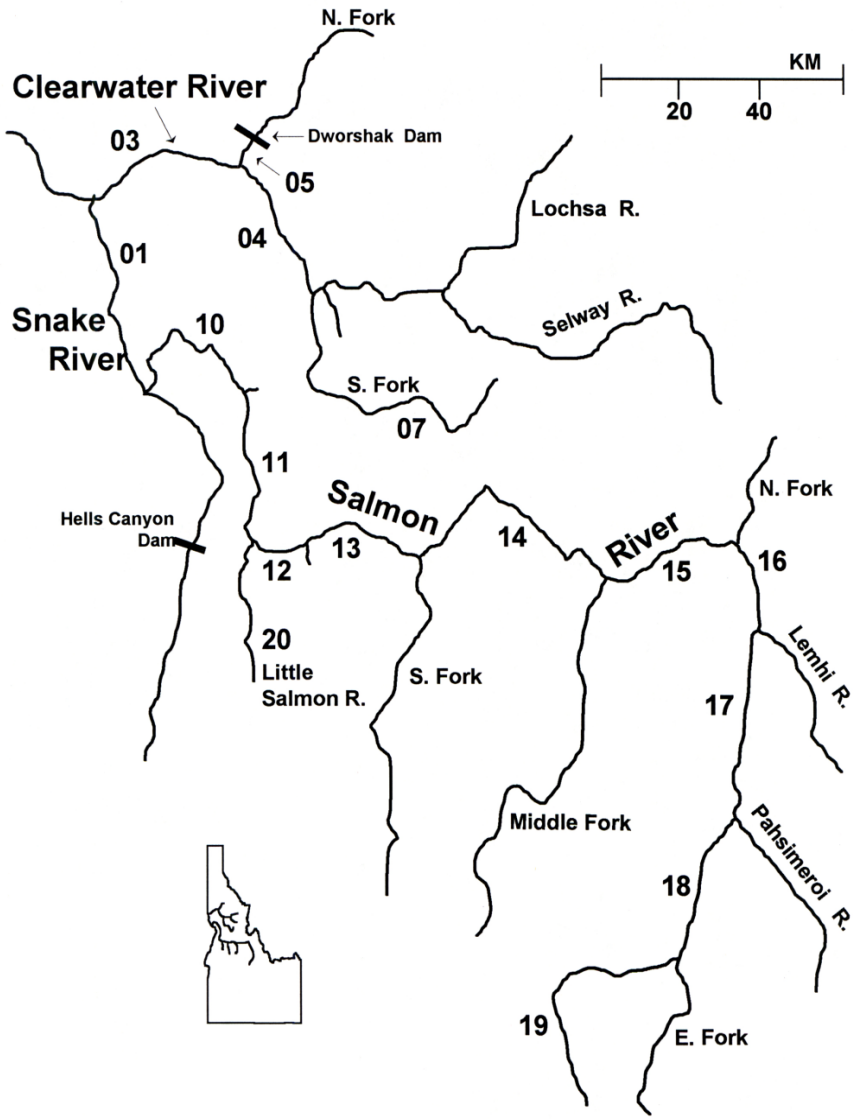

Figure 1. Idaho Department of Fish and Game river section designations where steelhead are available for harvest. Major tributaries or dams indicated on the map are used as boundaries.

LSRCP Facilities

Clearwater Fish Hatchery is on the north bank of the North Fork of the Clearwater River, 1.5 miles downstream from Dworshak Dam. The hatchery is 117 river km upstream from Lower Granite Dam and 811 river km upstream from the mouth of the Columbia River. Clearwater Fish Hatchery receives eyed B-run steelhead eggs from hatchery fish spawned at Dworshak National Fish Hatchery for final rearing. The annual LSRCP mitigation goal of Clearwater Fish Hatchery is to return 14,000 adult steelhead above Lower Granite Dam (Table 1). Clearwater Fish Hatchery annually releases 840,000 smolts to achieve this goal.

Table 1. Juvenile production and adult return goals for LSRCP steelhead hatcheries in Idaho.

Hatchery	Smolt Release	Adult Returns
Clearwater	840,000	14,000
Hagerman	1,290,000	13,600
Magic Valley	1,600,000	11,660

Hagerman National Fish Hatchery is located on the Snake River near Hagerman, Idaho. Hagerman National Fish Hatchery receives eyed-eggs from hatchery fish spawned at Pahsimeroi Fish Hatchery, Sawtooth Fish Hatchery, and Dworshak National Fish Hatchery for final rearing; these stocks are identified as PAHA, SAWA, and DWORB, respectively. The primary goal for the Hagerman National Fish Hatchery is to return 13,600 adult steelhead above Lower Granite Dam (Table 1). Hagerman National Fish Hatchery annually releases 1,290,000 smolts to achieve this goal.

Magic Valley Fish Hatchery is located on the Snake River near Filer, Idaho. Magic Valley Fish Hatchery receives PAHA, SAWA, and DWORB eggs for final rearing. Magic Valley Fish Hatchery also receives eggs from the East Fork of the Salmon River (EFNAT), in which natural and hatchery steelhead were used for brood stock. Magic Valley Fish Hatchery is also involved in the development of a B-run stock of steelhead locally adapted to the upper Salmon River (see experimentation section below). The mitigation goal for the Magic Valley Fish Hatchery is to return 11,660 adult steelhead above Lower Granite Dam (Table 1). Magic Valley Fish Hatchery annually releases 1,600,000 smolts to achieve this goal.

Experimentation

The Squaw Pond acclimation facility is located on Squaw Creek near Clayton, Idaho. It was first operated in 1998 to evaluate residualism rates. Complete information about the design and operation of Squaw Pond can be found in Osborne and Rhine (1999) and Newman (2002). In 2002, the focus of Squaw Pond facility shifted to increasing recoveries of larger two-ocean (B-run) adult steelhead, originating from DWORB ancestry, in an effort to develop a locally adapted stock for the Upper Salmon River. Because these fish were the first generation of fish to undergo the selective pressures encountered at Magic Valley Fish Hatchery and the migration corridor to and from the ocean, the progeny of any B-run adult returning to Squaw Creek or the East Fork of the Salmon River were identified as a locally adapted B-run stock:

USALB and EFORKB, respectively. It is important to note, EFORKB were used as broodstock for the USALB program. The first of these USALB releases were expected to return to Squaw Creek in 2005.

METHODS

Juvenile Migration Timing and Survival

The total number of brood year 2004 steelhead smolts released in 2005 was reported for each release group to evaluate smolt production goals. Pathological information was also reported, because acute and chronic diseases may negatively impact juvenile survival during emigration and subsequently lead to reduced adults returns.

A subsample of juvenile steelhead (brood year 2005) from 29 release groups were tagged with Passive Integrated Transponders (PIT) a month prior to release in 2005 by IDFG fish marking and HES personnel. These groups received 274-2,499 tags each. Release information, such as release site and date, was submitted to PIT Tag Information Systems (PTAGIS); a computerized database managed by Pacific States Marine Fisheries Commission (PSMFC).

PIT observation data was subsequently downloaded after the spring migration period, March 1 through June 30, 2005, from PTAGIS to evaluate juvenile migration success. Observation locations specified in the query were the seven dams on the Snake and Columbia rivers: Lower Granite, Little Goose, Lower Monumental, Ice Harbor, McNary, John Day, and Bonneville. Using this information, the “arrival window” (the period in which the middle 80% of smolts arrive to Lower Granite Dam) was determined so that it could be compared to peak outflow and spill at the dam during the migration period. Spill and outflow data was obtained from the Columbia River Data Access in Real Time (DART) web site. Survival estimates, from release to Lower Granite Dam, were determined using Survival Under Proportional Hazards (SURPH, Lady et al 2001). This program is compatible with PTAGIS format and uses the Cormack-Jolly-Seber model for single release and multiple recapture events (Cormack 1964; Jolly 1965; Seber 1965).

Adult Returns

Lower Granite Dam Counts

Annual adult steelhead returns to Lower Granite Dam were downloaded from the Fish Passage Center. Observers at Lower Granite Dam documented the total number of hatchery and wild steelhead. Some hatchery origin steelhead were included in the estimate, as the lack of an external mark (i.e. an intact adipose fin) makes accurate origin determination impossible. Run years are denoted by the year the run started and the year the run ended. For example, run year 2004/2005 included all fish that were harvested and returned to hatcheries from August 2004 through May 2005.

LSRCP Run Reconstruction

The total number of adipose-clipped steelhead returning to Idaho was estimated by expanding the number of CWT recovered from anglers and hatcheries. Snouts from CWT steelhead recovered at hatchery weirs and by Harvest Monitoring Project (HMP) creel clerks in

the fishery were sent to the CWT Lab in Nampa, Idaho for processing. The HMP derived harvest and rack return estimates for one- and two-ocean steelhead from hatchery weirs and offsite releases (Hansen in review a and b). Harvest estimates were determined for each release group by dividing the number of recovered CWT by the survey rate and CWT tagging ratio. Survey rates for each month and river section were estimated by determining the proportion of fish HMP creel clerks encountered during surveys versus the total harvest, which was determined through annual angler mail and phone surveys. Total numbers of steelhead returning to permanent weirs were reported by hatchery personnel. Rack returns for offsite releases were estimated by dividing the expanded number of harvested fish by the exploitation rate of a group of fish released at a nearby hatchery weir. For more detailed information about these methods, see Hansen (in review a and b). Although few in number, adult three-ocean steelhead from each release group returning to Idaho were estimated by HES staff using the methods described above.

Run reconstruction estimates were calculated for each release site by totaling the number of returns from all age classes of adult steelhead each run year. The total number of adults returning for all release sites was used to evaluate the contribution of each LSRCP facility and the program as a whole for each run year.

Run reconstruction estimates for hatchery fish with intact adipose fins were determined using different methods. This is because fish with intact adipose fins were not directly sampled as they cannot be legally harvested by recreational anglers in Idaho and were released at locations that do not provide adequate rack return estimates. Therefore a smolt-to-adult survival rate (see below) of a surrogate release group that is “representative” to this group is used to estimate the total number of fish returning from these release groups and the age structure. Representative release groups were CWT, of the same stock, and released at a nearby site. The estimated number return of adult steelhead returning from each age class was then included in the run estimate.

Brood Year Reconstruction and Smolt-to-Adult Survival Rate

Brood year reconstruction estimates for each release group were calculated by totaling the number of returns from all age classes of adult steelhead. For example, adults from brood year 1999 return during run years 2001/2002 as one-ocean fish, 2002/2003 as two-ocean fish, and 2003/2004 as three-ocean fish. The sum of one-, two-, and three-ocean adult steelhead returning to Idaho yield the brood year reconstruction estimate for the release group of interest. Results were summarized for each facility.

Smolt-to-adult survival rates (SAR) were generated by dividing brood year reconstruction estimates by the total number of juvenile steelhead released for the release group of interest and multiplied by 100 to convert to a percentage.

Out of State Recoveries

Coded-wire tag recovery information from the Regional Mark Information System (RMIS) database maintained by PSMFC was used to estimate the number of LSRCP program fish harvested in the Columbia and Snake rivers downstream of Idaho. It is important to note, data is submitted to RMIS by multiple agencies on an irregular schedule; therefore, data used in this report (obtained in August 2008) will not reflect subsequent changes.

Total out-of-state harvest was estimated by expending CWT recoveries by the sample rate and tagging ratio. If the estimated number, which is the inverse of the sample rate for the fishery, was either zero or had been left blank, a value of "1" was used for the record. This corrected estimated number represents the estimated harvest of CWT fish. The corrected estimated number was divided by the tagging ratio to estimate harvest of untagged fish. Tagging ratios were generated by dividing the total number of juvenile steelhead released with CWT by the number of untagged juvenile steelhead. Tagging ratios were not determined at the release group level because not all release groups received CWT and the total number of recoveries reported to RMIS was small. Therefore, the tagging ratio was determined by rearing facility and brood year for each run type (A- or B-run), because this would increase recovery group size and larger B-run fish are likely more susceptible to harvest in gill net fisheries. The total estimated harvest was the sum of CWT and untagged harvest.

The total estimated harvest outside of Idaho was categorized by rearing facility, run type, recovery location, and collection methods. Location categories included the Pacific Ocean, Columbia River, and Snake River, as well as major tributaries of these rivers where LSRCP steelhead may stray. Collection method categories were included to determine if commercial, tribal, or recreational anglers recovered these fish.

Experimentation

Juvenile steelhead released into the Squaw Creek Project area in 2005 were PIT and CWT tagged to evaluate stock performance and evaluate residualism. DWORB and USALB juvenile steelhead released into Squaw Creek and Pond were differentially marked with CWT and adipose-clipped. Precocity rates for fish released into the pond were estimated by Magic Valley Fish Hatchery personnel prior to loading by visually examining gonadal development of 188 smolts. DWORB and USALB smolts released into the pond were allowed to acclimate two weeks prior to volitional release. In late April a subsample of emigrants from Squaw Pond was collected and PIT tagged (early group). This was repeated with another group of fish in early May when it was estimated only 3,000 smolts remained in the pond (late group). It was assumed that these stocks were tagged proportional to their stocking rate as there was no way to identify the stock after release into the pond. The DWORB released directly into Squaw Creek were not PIT tagged. Survival estimates to Lower Granite Dam were generated as described in the Juvenile Migration Timing and Survival section above.

A temporary picket weir was installed to collect adult steelhead returning to Squaw Creek. The trap was installed in a pool located approximately 200 meters above the confluence in late March. All fish were measured (fork length), sexed, and checked for marks to determine if they met the criteria for spawning. All hatchery origin B-size steelhead (>75 cm for females and >79 cm for males) were transported to the East Fork trap for spawning. All hatchery steelhead that did not meet these criteria were checked for CWT. Fish that did not have CWT were released above the weir. In order to increase the number of males available for spawning, males not meeting this length criterion with CWT were transported to the East Fork facility and held for possible spawning. If after reading their CWT it was determined these fish were of B-run ancestry, they were spawned. After spawning, fertilized eggs were transported to Sawtooth Fish Hatchery where they were incubated until transfer to Magic Valley Fish Hatchery for final rearing. All natural origin adults captured at Squaw Creek weir, regardless of size, were released above the weir to spawn naturally.

RESULTS AND DISCUSSION

Juvenile Rearing and Release

Clearwater Fish Hatchery

Brood Year 2004—Clearwater Fish Hatchery received 1,249,961 unpicked DWORB steelhead eggs in 2004 (McGehee et al. 2005). These eggs were all from egg takes four and five and, therefore, did not represent the entire run. It is common practice for steelhead eggs taken for the Clearwater Fish Hatchery to not represent the entire run, since the juveniles will not be expected to return to a hatchery weir and will not be part of a broodstock program. The eggs from brood year 2004 were received before they had been picked to remove unfertilized or dead eggs. Once these nonviable eggs had been removed, the total number of viable eyed-eggs was 1,161,957.

An additional 1,515,829 DWORB green eggs were collected, picked, and then culled to provide Magic Valley Fish Hatchery and Hagerman National Fish Hatchery with 1,370,829 eyed-eggs for final rearing.

Survival from eyed-egg to smolt release was 72.9% at Clearwater Fish Hatchery (McGehee et al. 2005). External lesions from seven fish were tested for pathogens and all tested positive for Flavobacterium psychrophilum, the causative agent for coldwater disease, and all fish tested positive for *Aeromonas hydrophila* and *Aeromonas sobria*. Since elevated mortality (chronic and acute) was not observed, chemotherapeutics were not applied.

A total of 847,555 steelhead smolts from brood year 2004 was released in migration year 2005. Complete information on marks applied, release sites, and numbers released can be found in Appendix G Table 1. Release information for brood years 2000 to 2003 can be found in Table 1 of Appendices C-F.

Survival to Lower Granite Dam for PIT tagged steelhead smolts reared at Clearwater Fish Hatchery was 82.2%, which was higher than any year on record (Appendix B). Survival ranged from 71.2% in the Mill Creek release to 88.1% in the Red House Hole release (Table 2).

Brood Year 2005—A total of 1,257,201 DWORB unpicked eggs were received in 2005 (George et al. 2006). These eggs were from egg takes five and six and did not represent the entire run. The eggs were received before they had been picked to remove unfertilized or dead eggs. Eggs from three females, which tested positive for *Infectious Hematopoietic Necrosis Virus* (IHNV), were culled from production (George et al. 2006). After picking and culling, the total number of viable eyed-eggs was reduced to 979,864.

Survival from eyed-egg to ponding was 91.6% (George et al. 2006). This survival does not count the nonviable DWORB eggs picked out of the original lots, nor does it include the eggs that were deliberately culled based on ELISA testing. ELISA testing is a pathogen monitoring protocol that tests individual females contributing eggs for IHNV. If a particular female tests positive for IHNV, the eggs from this female may be culled in an effort to eliminate the pathogen from the hatchery group.

Hagerman National Fish Hatchery

Brood Year 2004—Hagerman National Fish Hatchery received a total of 1,365,952 eyed-eggs from three sources (USFWS 2006). B-run shipments included 214,767 eyed-eggs from Clearwater Fish Hatchery. A-run shipments of eyed-eggs included 946,363 SAWA and 204,822 PAHA stocks.

Survival for fish reared at Hagerman National Fish Hatchery from eyed-egg to smolt release was 93.7% (USFWS 2006). Survival for DWORB stock was 92.9%, SAWA stock was 93.9%, and PAHA stock was 98.1%. Periodic pathologic sampling did not detect epizootics in any of the stocks; however, "sore back" was observed particularly in the B-run stock. Although no specific etiology has been defined, "sore back" is often associated with *Nucleospora salmonis* (USFWS 2006).

A total of 1,279,279 steelhead smolts from brood year 2004 were released in migration year 2005. Complete information on marks applied, release sites, and numbers released can be found in Appendix G Table 2. Release information for brood years 2000 to 2003 can be found in Table 2 of Appendices C-F.

Survival to Lower Granite Dam for PIT-tagged steelhead smolts reared at Hagerman National Fish Hatchery was 74.1%. With the exception of migration year 2003, which likely contains spurious estimates due to small sample sizes, migration year 2005 was higher than any year on record for this hatchery (Appendix B). Survival ranged from 67.7% in the East Fork Salmon River release to 80.9% at Stinky Springs (Table 2).

Brood Year 2005—Hagerman National Fish Hatchery received 1,505,499 eyed-eggs from three sources (USFWS 2007). B-run shipments included 216,934 eyed-eggs from Clearwater Fish Hatchery, A-run shipments of eyed-eggs included 1,084,195 from Sawtooth Fish Hatchery and 204,370 from Pahsimeroi Fish Hatchery; hatching success for all three stocks was 96.6%, 97.2%, and 99.3%, respectively.

Magic Valley Fish Hatchery

Brood Year 2004—From April through June 2004 Magic Valley Fish Hatchery received 2,544,960 eyed steelhead eggs from five stocks in the Clearwater and Salmon River drainages (Lowell et al. 2005). B-run shipments of eyed-eggs included 1,145,829 DWORB, 53,722 USALB, and 15,918 EFNAT. A-run shipments of eyed-eggs included 846,410 PAHA stocks as well as 483,081 SAWA stocks.

Overall survival from eyed-egg to smolt release for fish reared at Magic Valley Fish Hatchery was 71%, which was less than previous years. One vat of fry from Dworshak Fish National Hatchery was destroyed due to an outbreak of bacterial coldwater disease, caused by *Flavobacterium psychrophilum* (Lowell et al. 2005). Although this resulted in substantially fewer fish being reared to smolts, survival of B-run fish was comparable to other years. It is important to note, B-run stocks generally have decreased survival compared to A-run stocks when reared in Magic Valley Fish Hatchery as well as Hagerman National Fish Hatchery. It has been suggested the water chemistry, which is substantially different than that of the Clearwater River where these B-run stocks evolved, may negatively affect the immune system and result in decreased survival in the hatchery. This decreased survival is often described as "B-run syndrome."

A total of 1,802,988 steelhead smolts from brood year 2004 were released in migration year 2005. Complete information on marks applied, release sites, and numbers released can be found in Appendix G Table 3. Release information for brood years 2000 to 2003 can be found in Table 3 of Appendices C-F.

Survival to Lower Granite Dam for PIT-tagged steelhead smolts reared at Magic Valley Fish Hatchery was 74.1%. This was higher than the previous four years but below the long-term average (Appendix B). Survival ranged from 50.8% in the Squaw Pond release, to 82.0% in the Colston Corner release (Table 2).

Brood Year 2005—From April through June 2005 Magic Valley Fish Hatchery received a total of 2,003,725 eyed steelhead eggs from five stocks in the Clearwater and Salmon River drainages (Lowell et al. 2006). B-run shipments of eyed-eggs included 945,000 DWORB, and 41,802 USALB. A-run shipments of eyed-eggs included 54,110 EFNAT, 624,365 PAHA, and 338,448 SAWA; hatching success for these stocks were 87%, 97%, 97%, 99%, and 99%, respectively

Juvenile Survival and Migration Timing

A total of 19,631 brood year 2004 steelhead smolts were PIT tagged in the spring of 2005 to determine survival to Lower Granite Dam. Overall survival estimates for all release groups from release to Lower Granite Dam was 75.9% (50.8%-88.1% range), which was higher than the previous eight-year average of 71.1% (Table 2; Appendix B). There was no observed relationship between survival to, and distance to, Lower Granite Dam (Figure 2). The mean arrival window to Lower Granite Dam for juvenile steelhead was April 30 to May 18, which occurred just prior to peak outflow and spill that was above the 25-year average (Figure 3). This suggests juvenile survival through the hydrosystem will likely be high, as increased flows are known to increase survival and decrease travel time (Berggren and Filardo 1993; Connor et al. 2003). The combination of increased survival to Lower Granite Dam as well as the timing of arrival, which coincided with peak spill and discharge, may result in above average adult returns for run years 2006/2007 2007/2008.

Table 2. Estimated emigration survival and timing to Lower Granite Dam for brood year 2005 (migration year 2006) juvenile steelhead released from LSRCP facilities in Idaho. Interrogation data was downloaded from the PTAGIS database.

					To Lower Granite Dam		
Hatchery	**Stock**	**Release Site**	**Number Tagged**	**Release Date**	**Distance (Km)**	**80% Arrival Window (# of Days)**	**Survival Estimate (%) (95% CI)**
Clearwater	DWORB	Crooked R.	299	4/11	265	4/28-5/16 (18)	87.95 (82.71-93.19)
	DWORB	Crooked R.	298	4/11	280	5/1-5/15 (14)	82.39 (77.15-87.63)
	DWORB	Lolo Ck	296	4/20	139	4/27-5/10 (13)	84.47 (79.55-89.39)
	DWORB	Meadow Cr.	1302	4/18	238	4/30-5/10 (10)	84.27 (68.97-99.57)
	DWORB	Mill Cr.	1293	4/18	228	4/30-5/12 (12)	71.19 (68.33-74.05)
	DWORB	Red House Hole	300	4/13	202	4/22-5/9 (17)	88.11 (83.01-93.21)
	DWORB	Red River	2498	4/19	299	5/1-5/18 (17)	80.05 (78.27-81.83)
	DWORB	Red River	2499	4/19	299	5/1-5/19 (18)	79.1 (77.24-80.96)
	DWORB	Red River	2491	4/19	299	4/30-5/19 (19)	81.62 (79.82-83.42)
Hagerman	DWORB	E. Fork Salmon	274	5/2	683	5/11-5/24 (13)	67.74 (61.62-73.86)
	DWORB	Stinky Springs	300	4/8	303	4/25-5/19 (24)	75.41 (70.09-80.73)
	PAHA	Stinky Springs	300	4/4	303	4/17-5/10 (23)	80.89 (75.71-86.07)
	SAWA	Sawtooth Weir	294	4/11	747	4/26-5/14 (18)	76.88 (71.5-82.26)
	SAWA	Yankee Fork	298	5/4	721	5/14-5/27 (13)	69.58 (63.3-75.86)
Magic Valley	PAHA	Lemhi	300	4/8	547	4/26-5/15 (19)	71.63 (65.95-77.31)
	PAHA	Lemhi	297	4/8	597	5/9-6/1 (23)	59.62 (52.52-66.72)
	DWORB	Stinky Springs	299	3/17	303	4/29-5/18 (19)	81.27 (76.17-86.37)
	PAH/SAW	Colston Corner	298	4/11	606	4/26-5/13 (17)	77.28 (72.06-82.5)
	PAHA	Colston Corner	298	4/7	606	4/25-5/11 (16)	82 (77.2-86.8)
	SAWA/PAHA	McNabb PT.	300	4/13	636	5/7-5/18 (11)	71.28 (65.66-76.9)
	DWORB	Squaw Ck	499	4/18	695	5/7-5/21 (14)	62 (57.48-66.52)
	DWORB/USALB	Squaw Pond	904	4/28	695	5/8-5/16 (8)	79.47 (76.65-82.29)
	DWORB/USALB	Squaw Pond	906	5/5	695	5/13-6/1 (19)	50.77 (46.77-54.77)
	SAWA	Valley Ck	298	4/26	739	5/7-5/18 (11)	81.39 (76.49-86.29)
	SAWA	Yankee Fork	297	4/22	721	5/7-5/21 (14)	76.19 (70.57-81.81)

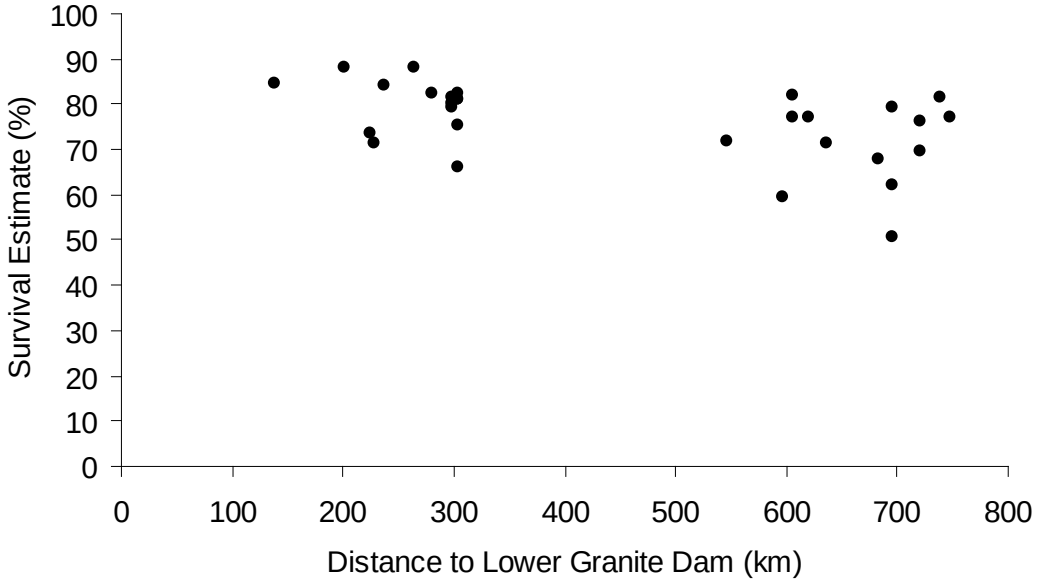

Figure 2. The relationship between distance from release site to Lower Granite Dam and estimated survival for brood year 2004 steelhead smolts released from LSRCP facilities in the spring of 2005.

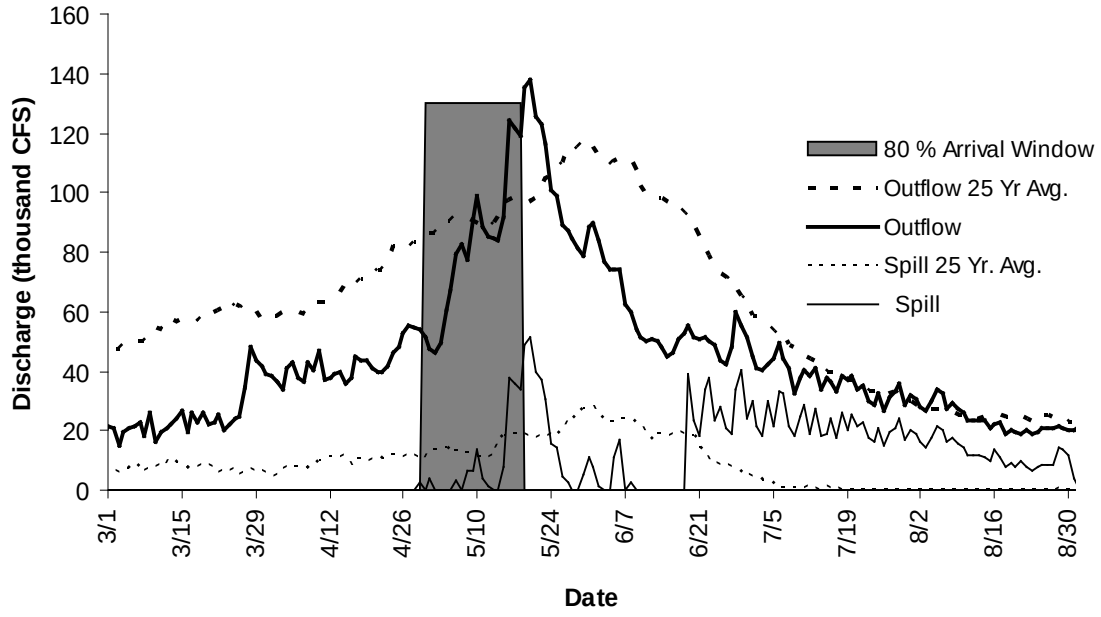

Figure 3. Mean daily outflow and spill (thousand cfs) for the Snake River at the forebay of Lower Granite Dam, Washington during the spring of 2006 and 25 year averages. Shaded area represents the 80% arrival window (April 30 to May 18) for PIT tagged juvenile steelhead to Lower Granite Dam during this period.

Adult Returns

Lower Granite Dam Counts

During the 2004/2005, 2005/2006, and 2006/2007 return years, a total of 118,180; 119,806; and 116,155 adipose-clipped adult steelhead, respectively, crossed over Lower Granite Dam (Figure 4). These adults include steelhead returning to Idaho-LSRCP facilities as well as other hatcheries in the basin. Additional hatchery steelhead crossed over Lower Granite Dam, but they could not be distinguished from wild fish as they had an intact adipose fin.

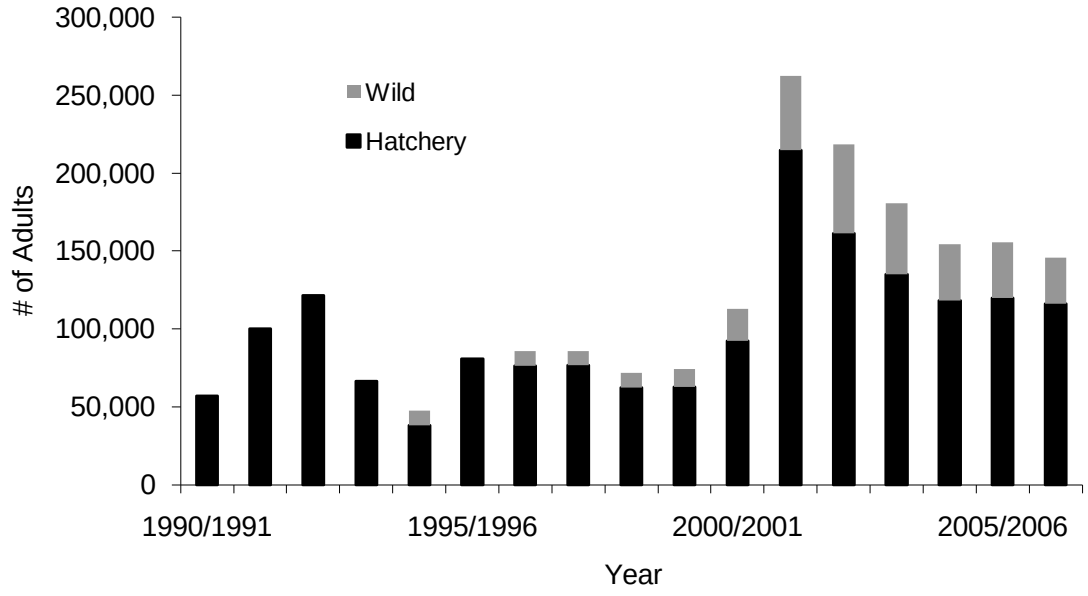

Figure 4. Annual adult passage summary for steelhead at Lower Granite Dam from 1990 through 2006 (http://www.fpc.org). Prior to 1995, wild steelhead data was not published on a daily basis. Wild steelhead were a subset of the total steelhead and may include unmarked hatchery fish.

LSRCP Run Reconstruction

Total run reconstruction estimates for LSRCP adult steelhead returning to Idaho from the fall of 2004 through the spring of 2007 were at or near the mitigation goal of 39,260 adult steelhead above Lower Granite Dam. Total numbers of adult steelhead returning to Idaho waters during run years 2004/2005, 2005/2006, and 2006/2007 were 26,601; 34,241; and 41,376 for each run, respectively (Table 3). These values should be considered minimum return estimates, as they do not account for prespawning mortality or fish that stray into tributaries (Hansen in review a and b). It is important to note, these results cannot be directly compared to previous return estimates because past estimates did not include hatchery steelhead with an intact adipose fin.

Table 3. Summary of adult LSRCP steelhead returning to Idaho for run years 2004/2005, 2005/2006, and 2006/2007.

Hatchery	Run	1-Ocean	2-Ocean	3-Ocean	Total
Clearwater	2004/2005	556	1,884	0	2,441
	2005/2006	1,204	3,243	20	4,468
	2006/2007	2,722	8,841	0	11,563
Hagerman	2004/2005	4,600	2,254	0	6,854
	2005/2006	7,322	4,112	4	11,438
	2006/2007	13,023	1,950	0	14,974
Magic Valley	2004/2005	12,125	5,179	2	17,307
	2005/2006	12,272	6,063	0	18,335
	2006/2007	10,973	3,865	1	14,839

Magic Valley Fish Hatchery substantially exceeded its adult return goal for all three run years and had an impact to the overall LSRCP goal (Figure 5). Hagerman National Fish Hatchery had an increasing trend throughout this period with the last run year meeting the facility's goal. Despite increasing trends, Clearwater Fish Hatchery did not meet its mitigation goal; however, the adult return estimates for Clearwater Fish Hatchery are likely low as they do not adequately assess the component of the run that are not harvested. In addition to straying, these unharvested adult steelhead rarely return to weirs located at satellite facilities high in the basin. It is assumed most of the unaccounted for fish "fall out" lower in the basin.

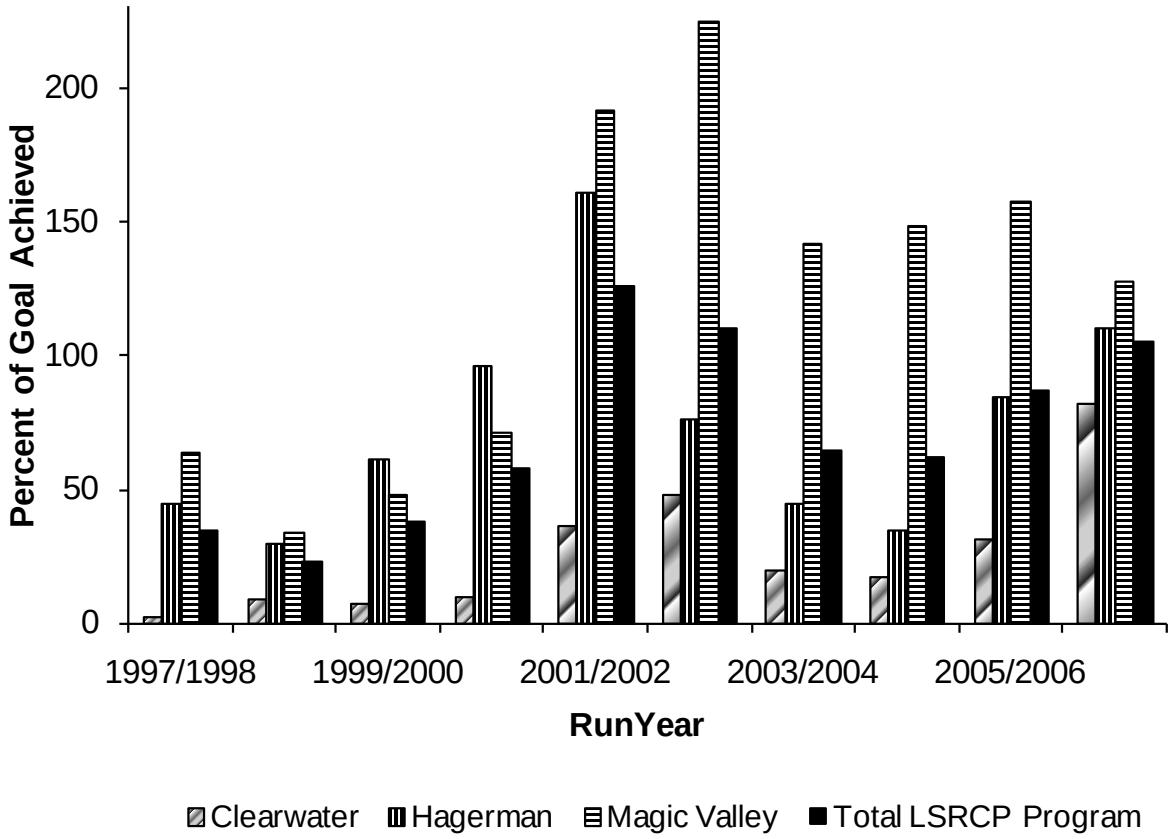

Figure 5. Proportion of adult return goal met by each LSRCP steelhead hatchery and the program as a whole from 1998 through 2007 (Harrington 2007). Return estimates prior to run 2004/2005 do not include steelhead with an intact adipose fin.

Fisheries Contribution

IDFG conducted annual anglers phone surveys regarding their success during the 2004/2005, 2005/2006, and 2006/2007 steelhead seasons to estimate total LSRCP steelhead harvest. Based on these interviews, creel survey rates, and CWT rates, an estimated 13,077, 15,578, and 22,674 LSRCP steelhead were harvested during run years 2004/2005, 2005/2006, and 2006/2007, respectively (Hansen in review a and b).

Brood Reconstruction and Smolt-to-Adult Survival Rate

The remaining three-ocean steelhead adults returned from brood years 2000, 2001, and 2002 during the reported run years. The mean SAR for brood years 2000, 2001, and 2002 was 0.649%, 0.744%, 0.799%, respectively. These were highly variable between hatcheries and years (range 0.363%-1.094%, Table 4, Appendix C-E). Preliminary SAR estimates were also generated for brood year 2003; however, three-ocean fish were not included in these estimates and will likely change when this age class returns (Table 4; Appendix F).

Table 4. Smolt to adult return estimates (SAR) and age of return for each LSRCP facility from brood year 2000 through 2003. Only adipose-clipped releases groups were included in the estimates.

	Brood		# Returned (%)			Total	SAR
Hatchery	Year	Released	1 Ocean	2 Ocean	3 Ocean	Return	Avg. (%)
Clearwater	2000	786,655	717 (25)	2,121 (75)	0	2,847	0.363
FH	2001	594,989	195 (9)	1,960 (90)	20 (1)	2,175	0.419
	2002	935,963	568 (10)	5,048 (90)	0	5,616	0.557
	2003	1,076,768	1,258 (12)	9,488 (88)	ND*	10,746	0.944
Hagerman	2000	1,228,087	7,549 (88)	1,028 (12)	0	8,577	0.574
NFH	2001	1,319,229	8,630 (76)	2,765 (24)	7 (<1)	11,402	0.719
	2002	1,265,544	5,869 (56)	4,550 (44)	0	10,418	0.757
	2003	1,324,376	7,322 (79)	1,950 (21)	ND*	9,272	0.647
Magic Valley	2000	2,022,018	20,426 (84)	3,921 (16)	2 (<1)	24,349	1.008
FH	2001	1,905,719	13,827 (72)	5,263 (28)	0	19,090	1.094
	2002	1,978,495	12,368 (65)	6,763 (35)	1 (<1)	17,192	1.084
	2003	1,796,406	12,336 (75)	4,093 (25)	ND*	16,429	0.981

*Adult return data was not available for three-ocean

Out-of-State Recoveries

A substantial number of Idaho-LSRCP adult steelhead were recovered out-of-state during run years 2004/2005, 2005/2006, and 2006/2007; total out-of-state harvest estimates for each run year were 865, 4,211, and 4,693, respectively (Table 5; 6; and 7). The majority of out-of-state recoveries for these run years were in the Columbia River. A substantial number of fish were collected in some of the tributaries; however, it was not consistent between years. For instance, the majority of strays were recovered in the Deschutes River during 2004/2005, the Little White Salmon River in 2005/2006, and the Tucannon River in 2006/2007. While fish have been recovered in the Deschutes and Tucannon River in the past, this was the first time fish have been observed in the Little White Salmon in such numbers (Harrington 2007).

Table 5. Total out-of-state recoveries and estimated harvest for LSRCP steelhead adults reported to RMIS by August 2008 for run year 2004/2005.

Hatchery	Run	Recovery Location	Recovery Type	Recoveries	Total Estimate
Clearwater FH	B-run	Deschutes River	Fish Screens	1	8
		Columbia River	Freshwater Sport	1	8
			Columbia River Gillnet (Tribal)	4	85
		Ocean	Foreign Research Vessel	2	15
		Snake River	Freshwater Sport	1	40
			Clearwater FH Total	**9**	**156**
Hagerman NFH	A-run	Deschutes River	Freshwater Sport	1	32
		Columbia River	Columbia River Gillnet (Tribal)	3	150
		Ocean	Sport (Private)	1	32
			Hagerman NFH Total	**5**	**214**
Magic Valley FH	A-run	Deschutes River	Freshwater Sport	1	6
			Fish Screens	11	71
		Grande Ronde	Freshwater Sport	1	6
		Columbia River	Freshwater Sport	5	173
			Columbia River Gillnet (Tribal)	8	202
			A-run Total	**26**	**458**
	B-run	Deschutes River	Freshwater Sport	1	7
			Fish Screens	4	21
		Ocean	Foreign Research Vessels	2	9
			B-run Total	**7**	**37**
			Magic Valley FH Total	**33**	**495**
			Run Total	**47**	**865**

Table 6. Total out-of-state recoveries and estimated harvest for LSRCP steelhead adults reported to RMIS by August 2008 for run year 2005/2006.

Hatchery	Run	Recovery Location	Recovery Type	Recoveries	Total Estimate
Clearwater FH	B-run	Tucannon River	Freshwater Sport	1	73
		Columbia River	Freshwater Sport	8	302
			Columbia River Gillnet (Tribal)	7	158
		Snake River	Freshwater Sport	7	269
			Clearwater FH Total	**24**	**802**
Hagerman NFH	A-run	Columbia River	Freshwater Sport	4	760
			Columbia River Gillnet (Tribal)	1	97
		Ocean	Foreign Research Vessel	1	14
		Snake River	Freshwater Sport	5	431
			Hagerman NFH Total	**11**	**1,302**
Magic Valley FH	A-run	Deschutes River	Freshwater Sport	1	6
			Fish Screens	2	13
		Little White Salmon River	Freshwater Sport	4	516
		Walla Walla River	Freshwater Sport	1	58
		Columbia River	Freshwater Sport	8	539
			Columbia River Gillnet (Tribal)	5	101
		Ocean	Foreign Research Vessel	1	20
		Snake River	Freshwater Sport	8	401
			A-run Total	**30**	**1,654**
	B-run	Deschutes River	Fish Screens	4	18
		Columbia River	Freshwater Sport	5	161
			Columbia River Gillnet (Tribal)	6	60
		Ocean	Foreign Research Vessel	1	8
		Snake River	Freshwater Sport	8	206
			B-run Total	**24**	**453**
			Magic Valley FH Total	**823**	**2,107**
			Run Total	**1,167**	**4,211**

Table 7. Total out-of-state recoveries and estimated harvest for LSRCP steelhead adults reported to RMIS by August 2008 for run year 2006/2007.

Hatchery	Run	Recovery Location	Recovery Type	Recoveries	Total Estimate
Clearwater FH	B-run	Deschutes River	Freshwater Sport	4	31
		Columbia River	Freshwater Sport	9	370
			Columbia River Gillnet (Tribal)	49	1,553
		Snake River	Freshwater Sport	14	584
		Hood River	Freshwater Sport	1	7
			Clearwater FH Total	**77**	**2,545**
Hagerman NFH	A-run	Snake River	Freshwater Sport	7	496
			Hagerman NFH Total	**7**	**496**
Magic Valley FH	A-run	Deschutes River	Fish Screens	1	8
		Tucannon River	Freshwater Sport	1	82
		Columbia River	Columbia River Sport	2	58
		Snake River	Freshwater Sport	14	477
			A-run Total	**18**	**625**
	B-run	Deschutes River	Freshwater Sport	1	6
			Fish Screens	3	39
		Columbia River	Columbia River Sport	2	129
			Columbia River Gillnet (Tribal)	6	325
		Snake River	Freshwater Sport	14	528
			B-run Total	**26**	**1,027**
			Magic Valley FH Total	**44**	**1,652**
			Run Total	**128**	**4,693**

Experimentation

Juvenile Survival and Migration Timing

The lower survival estimate of the late pond group (50.7%), compared to the early pond group (79.5%), was probably due to a large number of nonmigrants (Table 2). The rate of male precocity was measured at 14%, of which few were visibly precocial upon external inspection (Harrington 2005). If 14% of the late pond group were precocial nonmigratory males, the survival estimate for the late pond group becomes more similar to the early pond group (Harrington 2005). These relative survival estimates support the notion that retaining late migrants may reduce the number of residualized steelhead in the river.

The survival of DWORB smolts released into Squaw Creek (62%) may have been influenced by events at the time of release. Approximately 10,000 juvenile steelhead died as a result of suffocating in overcrowded pools created just below the release site (Harrington 2005). This event, which had a direct mortality of 4%, may have also resulted in delayed mortality observed in the decreased survival to Lower Granite Dam. Even if corrected for the observed direct mortality (66%), the survival was still below the minimum (71%) survival for all direct releases in the Upper Salmon River from Magic Valley Fish Hatchery (Table 2).

Adult Returns

The Squaw Creek weir typically operated from mid-March through early May in 2005-2007. Adult broodstock collection ranged from 13-70 adults each year (Figure 6), (Harrington 2005; Harrington 2006, Brown and Madson 2007).

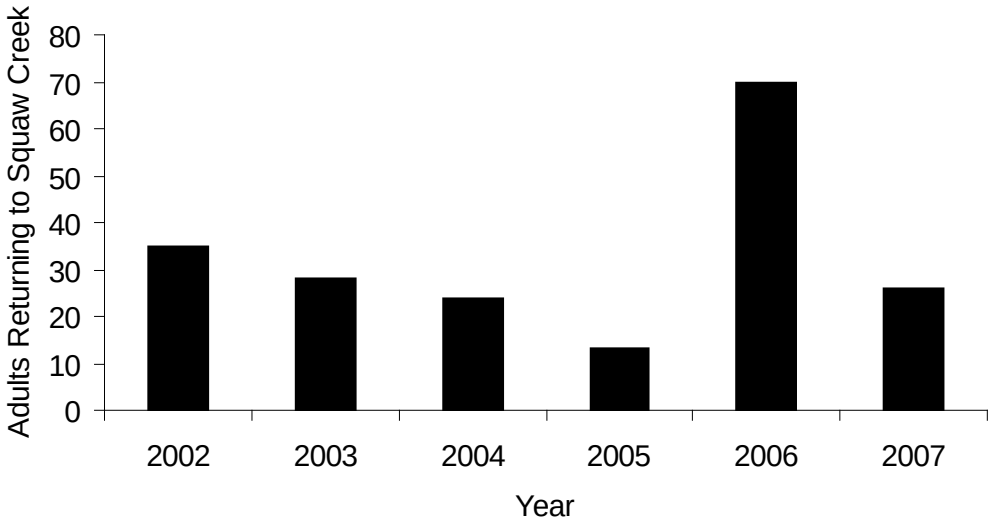

Figure 6. Total adult brood stock collection at Squaw Creek from 2002-2007. All fish were from Dworshak National Fish Hatchery ancestry.

One hundred twenty-seven CWT were recovered at Squaw Creek weir from B-run ancestry fish. The majority of DWORB, EFORKB, and USALB adults returned as two-ocean fish, which is typical of B-run life history pattern (Table 8). The absence of two-ocean USALB in 2005 was expected as this was the first year one-ocean adults from this stock were expected to return.

Table 8. Stock and age composition of steelhead collected from Squaw Creek in 2005.

Recovery Year	Stock	One-ocean	Two-ocean	Three-ocean	Grand Total
2005	DWORB	1			1
	EFORKB		9		9
	USALB	19			19
	2005 Total	**20**	**9**		**29**
2006	DWORB		16		16
	USALB	2	46		48
	2006 Total	**2**	**62**		**64**
2007	DWORB	2	7		9
	USALB	1	23	1	25
	2007 Total	**3**	**30**	**1**	**34**

The locally-adapted USALB stock of fish returned at higher rates than the DWORB stock. Mean SAR for brood years 2001 and 2002 of Upper Salmon River locally adapted broodstock (USALB and EFORKB) and DWORB were 0.59% and 0.21%, respectively (Appendix C; Appendix D; Appendix E). Although the SAR for the locally adapted broodstock stock is less than that of the SAWA stock released in the Yankee Fork of the Salmon River (0.85%), it does suggest using adults that have returned to the Upper Salmon River as broodstock can improve performance over DWORB stock.

ACKNOWLEDGMENTS

Hatchery and harvest evaluation staff provided much of the information that is included in this report. Staff from the Pacific States Marine Fisheries Commission provided assistance with data collection, proofing, summarization, and report compilation. A special thanks is extended to Cheryl Zink for completing the report formatting and editing, as well as to Brian Leth, Mike Peterson, and Tony Lamansky for reviewing this report.

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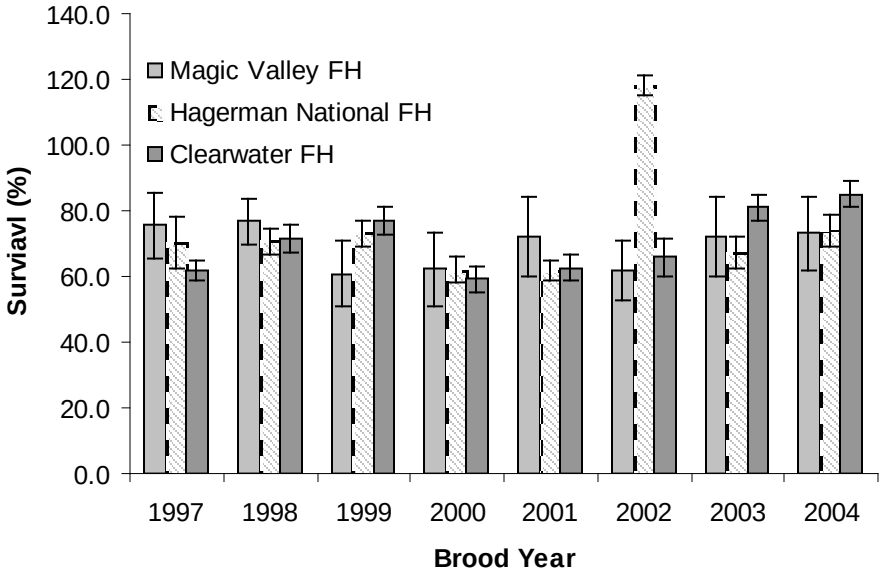
APPENDICES

Appendix A. Summary of annual Idaho-LSRCP steelhead releases by facility for brood years 1990 through 2004.

Brood Year	Clearwater	Hagerman	Magic Valley	Total
1990	NA	2,402,873	2,062,000	4,464,873
1991	NA	1,448,155	2,160,400	3,608,555
1992	326,300	1,496,737	1,925,700	3,748,737
1993	722,990	1,525,963	1,919,250	4,168,203
1994	773,589	1,149,677	1,731,355	3,654,621
1995	778,610	1,322,849	1,868,085	3,969,544
1996	654,107	1,145,918	1,643,201	3,443,226
1997	702,286	1,032,407	1,658,825	3,393,518
1998	595,998	1,133,825	1,941,405	3,671,228
1999	735,266	1,174,882	2,050,039	3,960,187
2000	786,654	1,229,288	2,022,017	4,037,959
2001	575,071	1,318,660	1,905,719	3,799,450
2002	901,066	1,265,418	1,800,939	3,967,423
2003	1,073,405	1,324,376	1,796,406	4,194,187
2004	847,555	1,279,279	1,802,988	3,929,822

Appendix B. Survival estimates for 1998 though 2004 from PIT tag interrogations at Lower Granite Dam. Two release groups from Hagerman National Fish Hatchery had greater than 100% survival for brood year 2002. This spurious data, likely influenced by small sample sizes, influenced the overall survival estimate needs to be taken into consideration when making inferences.



Appendix C. Table 1. Brood year reconstruction and smolt-to-adult survival rates (SAR) for juvenile steelhead reared at Clearwater Fish Hatchery, brood year 2000. "Creel" indicates harvest. "Rack" indicates hatchery return. "ND" indicates no data. Recovery data are from Hansen (in review a and b).

				Run Year 2002/2003 (1 Ocean)			Run Year 2003/2004 (2 Ocean)			Run Year 20004/2005 (3 Ocean)			Group	
Release Site	**Stock**	**Mark**	**Total Released**	**Creel**	**Rack**	**Total**	**Creel**	**Rack**	**Total**	**Creel**	**Rack**	**Total**	**Total**	**SAR**
Clear Cr.: CLW	DWORB	AD	76,101	0	7	7	280	99	379	0	0	0	386	0.507
		CWT LV	21,439	0	2	2	79	28	107	0	0	0	109	0.508
	Clear Cr.: CLW Total		97,540	0	9	9	359	127	486	0	0	0	495	0.508
Crooked R.: SF CLW	DWORB	AD	82,249	0	41	41	120	0	120	0	0	0	161	0.196
		CWT LV	66,667	0	33	33	97	0	97	0	0	0	130	0.195
		None	96,632	ND	ND	95	ND	ND	286	ND	ND	0	381	0.394
	Crooked R.: SF CLW Total		245,548	0	74	169	217	0	217	0	0	0	672	0.195
Lolo C.	DWORB	None	48,523	ND	ND	48	ND	ND	143	ND	ND	0	191	0.394
Red R. @ SF CLW	DWORB	AD	99,924	114	49	163	145	0	145	0	0	0	308	0.308
		None	149,346	ND	ND	147	ND	ND	442	ND	ND	0	589	0.394
	Red R. @ SF CLW Total		249,270	114	49	310	145	0	145	0	0	0	897	0.308
SF CLW @ Meadow C.	DWORB	None	23,459	ND	ND	23	ND	ND	69	ND	ND	0	92	0.394
SF CLW @ Mill C.	DWORB	None	24,549	ND	ND	24	ND	ND	73	ND	ND	0	97	0.394
SF CLW @ Red House	DWORB	AD	34,040	39	17	56	122	0	122	0	0	0	178	0.523
		CWT LV	63,726	73	31	104	229	0	229	0	0	0	333	0.523
	SF CLW @ Red House Total		97,766	112	48	160	351	0	351	0	0	0	511	0.523
	Clearwater Fish Hatchery Total		**786,655**	**226**	**180**	**717**	**1,072**	**127**	**2,121**	**0**	**0**	**0**	**2,847**	**0.363**

Appendix C. Table 2. Brood year reconstruction and smolt-to-adult survival rates (SAR) for juvenile steelhead reared at Hagerman National Fish Hatchery, brood year 2000. "Creel" indicates harvest. "Rack" indicates hatchery return. "ND" indicates no data. Recovery data are from Hansen (in review a and b).

				Run Year 2002/2003 (1 Ocean)			Run Year 2003/2004 (2 Ocean)			Run Year 20004/2005 (3 Ocean)			Group	
Release Site	**Stock**	**Mark**	**Total Released**	**Creel**	**Rack**	**Total**	**Creel**	**Rack**	**Total**	**Creel**	**Rack**	**Total**	**Total**	**SAR**
American R.: SF CLW	DWORB	None	90,188	ND	ND	46	ND	ND	138	ND	ND	0	184	0.204
LT Salmon R.	PAHA	None	190,008	ND	ND	2,426	ND	ND	331	ND	ND	0	2,758	1.451
		CWT	17,160	ND	ND	219	ND	ND	30	ND	ND	0	249	1.451
	LT Salmon R. @ Hazard C. Total		207,168	ND	ND	2,646	ND	ND	361	ND	ND	0	3,007	
Newsome C. @ SF CLW	DWORB	None	86,441	ND	ND	44	ND	ND	132	ND	ND	0	176	0.204
Sawtooth FH	SAWA	AD	651,116	2,388	1,541	3,929	143	185	328	0	0	0	4,257	0.654
		AD CWT	55,518	217	40	257	13	4	17	0	0	0	274	0.494
	Sawtooth FH Total		706,634	2,605	1,581	4,186	156	189	345	0	0	0	4,531	0.641
Yankee Fork Dredge	SAWA	None	137,656	ND	ND	628	ND	ND	52	ND	ND	0	679	0.494
	Hagerman National Fish Hatchery Total		**1,228,087**	**2,605**	**1,581**	**7,549**	**156**	**189**	**1,028**	**0**	**0**	**0**	**8,577**	**0.574**

Appendix C. Table 3. Brood year reconstruction and smolt-to-adult survival rates (SAR) for juvenile steelhead reared at Magic Valley Fish Hatchery, brood year 2000. "Creel" indicates harvest. "Rack" indicates hatchery return. "ND" indicates no data. Recovery data are from Hansen (in review a and b).

				Run Year 2002/2003 (1 Ocean)			Run Year 2003/2004 (2 Ocean)			Run Year 20004/2005 (3 Ocean)			Group	
Release Site	**Stock**	**Mark**	**Total Released**	**Creel**	**Rack**	**Total**	**Creel**	**Rack**	**Total**	**Creel**	**Rack**	**Total**	**Total**	**SAR**
EF Salmon R (Lower)	DWORB	AD	51,810	14	2	16	28	14	42	0	0	0	58	0.112
Hayden C. @ Basin C.	PAHA	AD	39,819	239	202	441	8	23	31	0	0	0	472	1.185
Hayden C. FH	PAHA	AD	40,044	241	203	444	8	24	32	0	0	0	476	1.189
Lemhi R. @ County Scale	PAHA	AD	20,448	123	104	227	4	12	16	0	0	0	243	1.188
	SAWA	AD	21,206	127	107	234	4	12	16	0	0	0	250	1.179
	Lemhi R. @ County Scale Total		41,654	250	211	461	8	24	32	0	0	0	493	1.184
Lemhi R. @ Hayden C.	PAHA	AD	34,052	205	172	377	7	20	27	0	0	0	404	1.186
Lemhi R. @ L6 Div.	PAHA	AD	1,269	7	6	13	0	1	1	0	0	0	14	1.103
	SAWA	AD	2,025	12	10	22	0	1	1	0	0	0	23	1.136
		AD CWT	65,475	373	332	705	13	39	52	0	0	0	757	1.156
		SAWA Total	67,500	385	342	727	13	40	53	0	0	0	780	1.146
	Lemhi R. @ L6 Div. Total		68,769	392	348	740	13	41	54	0	0	0	794	1.132
LT Salmon R.	DWORB	AD	1,750	2	1	3	3	0	3	0	0	0	6	0.343
		AD CWT	56,596	69	16	85	100	0	100	0	0	0	185	0.327
		DWORB Total	58,346	71	17	88	103	0	103	0	0	0	191	0.335
	PAHA	AD	430,210	5,413	2,179	7,592	783	253	1,036	0	0	0	8,628	2.006
	LT Salmon R. @ Stinky S. Total		488,556	5,484	2,196	7,680	886	253	1,139	0	0	0	8,819	0.892
Salmon R. @ Red Rock	SAWA	AD	2,022	12	10	22	3	1	4	0	0	0	26	1.286
		AD CWT	65,388	393	331	724	82	38	120	0	0	0	844	1.291
	Salmon R. @ Red Rock Total		67,410	405	341	746	85	39	124	0	0	0	870	1.288
Salmon R. @ Challis	SAWA	AD	41,850	188	212	400	140	25	165	0	0	0	565	1.350
Salmon R. @ Colston CN.	PAHA	AD	50,300	156	255	411	53	30	83	0	0	0	494	0.982
Salmon R. @ Cottonwood	SAWA	AD	77,790	350	394	744	260	46	306	0	0	0	1,050	1.350
Salmon R. @ Eyehole	SAWA	AD	45,270	140	229	369	48	27	75	0	0	0	444	0.981
Salmon R. @ Hammer C.	PAHA	AD	111,098	783	563	1,346	202	65	267	0	0	0	1,613	1.452
		CWT LV	64,288	453	326	779	117	37	154	0	0	0	933	1.451
	Salmon R. @ Hammer C. Total		175,386	1,236	889	2,125	319	102	421	0	0	0	2,546	1.452
Salmon R. @ Lemhi R.	SAWA	AD	68,748	413	348	761	102	40	142	0	0	0	903	1.313
		CWT LV	31,626	190	160	350	47	19	66	0	0	0	416	1.315
	Salmon R. @ Lemhi R. Total		100,374	603	508	1,111	149	59	208	0	0	0	1,319	1.314
Salmon R. @ Lewis & Clark	SAWA	AD	76,182	458	386	844	96	45	141	0	0	0	985	1.293
Salmon R. @ McNabb Pt.	SAWA	AD	84,389	380	427	807	283	50	333	0	0	0	1140	1.351
Salmon R. @ Shoup Br.	SAWA	AD	28,986	90	147	237	31	17	48	0	1	1	286	0.987
		AD CWT	32,006	99	162	261	34	19	53	0	0	0	314	0.981
	Salmon R. @ Shoup Br. Total		60,992	189	309	498	65	36	101	0	1	1	600	0.984
Salmon R. @ Tunnel Rk.	SAWA	AD	1,958	9	10	19	7	1	8	0	0	0	27	1.379
		CWT LV	63,322	262	321	583	212	37	249	0	1	1	833	1.315
	Salmon R. @ Tunnel Rk. Total		65,280	271	331	602	219	38	257	0	1	1	860	1.347
Salmon R. @ Wagonhammer	SAWA	AD	67,950	408	344	752	85	40	125	0	0	0	877	1.291
Sawtooth FH	DWORB	AD	1,145	0	0	0	1	0	1	0	0	0	1	0.087

Appendix C. Table 3. Continued.

				Run Year 2002/2003 (1 Ocean)			Run Year 2003/2004 (2 Ocean)			Run Year 20004/2005 (3 Ocean)			Group	
Release Site	**Stock**	**Mark**	**Total Released**	**Creel**	**Rack**	**Total**	**Creel**	**Rack**	**Total**	**Creel**	**Rack**	**Total**	**Total**	**SAR**
Squaw C.	DWORB	AD	85,733	23	0	23	47	2	49	0	0	0	72	0.084
		AD CWT	44,704	12	0	12	24	0	24	0	0	0	36	0.081
		DWORB Total	130,437	35	0	35	71	2	73	0	0	0	108	0.082
	EFRKB	AD	1,141	6	1	7	1	0	1	0	0	0	8	0.701
		AD CWR	36,883	182	17	199	46	10	56	0	0	0	255	0.691
		EFRKB Total	38,024	188	18	206	47	10	57	0	0	0	263	0.696
		Squaw C. Total	168,461	223	18	241	118	12	130	0	0	0	371	0.389
Squaw Pond	DWORB	AD	75,912	20	0	20	42	2	44	0	0	0	64	0.084
Yankee Fork	SAWA	AD	98,623	363	234	597	22	28	50	0	0	0	647	0.656
	Magic Valley Fish Hatchery Total		2,022,018	12,215	8,211	20,426	2,943	978	3,921	0	2	2	24,349	1.008
		LSRCP Total	4,036,760	15,046	9,972	28,692	4,171	1,294	7,079	0	2	2	35,773	

Appendix D. Table 1. Brood year reconstruction and smolt-to-adult survival rates (SAR) for juvenile steelhead reared at Clearwater Fish Hatchery, brood year 2001. "Creel" indicates harvest. "Rack" indicates hatchery return. "ND" indicates no data. Recovery data are from Hansen (in review a and b).

				Run Year 2003/2004 (1Ocean)			Run Year 20004/2005 (2 Ocean)			Run Year 2005/2006 (3 Ocean)			Group	
Release Site	**Stock**	**Mark**	**Total Released**	**Creel**	**Rack**	**Total**	**Creel**	**Rack**	**Total**	**Creel**	**Rack**	**Total**	**Total**	**SAR**
Clear C.: CLW	DWORB	AD	40,499	0	23	23	177	56	233	0	0	0	256	0.632
Crooked R. Ponds	DWORB	AD	11,914	9	0	9	10	8	18	0	0	0	27	0.227
		AD CWT	21,976	16	0	16	18	1	19	0	0	0	35	0.159
		None	102,137	ND	ND	39	ND	ND	385	ND	ND	4	428	0.419
	Crooked R. Ponds Total		136,027	25	0	71	28	9	498	0	0	5	574	0.368
Lolo C.	DWORB	None	18,000	ND	ND	7	ND	ND	68	ND	ND	1	75	0.419
Red R.: SF CLW	DWORB	AD	31,306	12	0	12	26	43	69	0	0	0	81	0.259
		None	150,010	ND	ND	7	ND	ND	68	ND	ND	1	75	0.419
	Red R.: SF CLW Total		181,316	12	0	19	26	43	137	0	0	1	156	0.086
SF CLW @ Mill C.	DWORB	None	34,000	ND	ND	13	ND	ND	128	ND	ND	1	143	0.419
SF CLW @ Meadow C.	DWORB	None	26,460	ND	ND	10	ND	ND	100	ND	ND	1	111	0.419
SF CLW @ Red House	DWORB	AD	72,710	28	0	28	317	100	417	6	0	6	451	0.620
		AD CWT	66,059	25	0	25	288	91	379	5	0	5	409	0.619
	SF CLW @ Red House Total		138,769	53	0	53	605	191	796	11	0	11	860	0.619
Clearwater Fish Hatchery Total			**594,989**	**90**	**23**	**195**	**836**	**299**	**1,960**	**11**	**0**	**20**	**2,175**	**0.419**

Appendix D. Table 2. Brood year reconstruction and smolt-to-adult survival rates (SAR) for juvenile steelhead reared at Hagerman National Fish Hatchery, brood year 2001. "Creel" indicates harvest. "Rack" indicates hatchery return. "ND" indicates no data. Recovery data are from Hansen (in review a and b).

				Run Year 2003/2004 (1Ocean)			Run Year 20004/2005 (2 Ocean)			Run Year 2005/2006 (3 Ocean)			Group	
Release Site	**Stock**	**Mark**	**Total Released**	**Creel**	**Rack**	**Total**	**Creel**	**Rack**	**Total**	**Creel**	**Rack**	**Total**	**Total**	**SAR**
American R.: SF CLW	DWORB	None	94,232	ND	ND	36	ND	ND	356	ND	ND	4	395	0.419
LT Salmon R.	PAHA	None	218,124	ND	ND	2,670	ND	ND	848	ND	ND	0	3,518	1.613
Newsome C.: SF CLW	DWORB	None	85,722	ND	ND	32	ND	ND	323	ND	ND	4	359	0.419
Sawtooth FH	SAWA	AD	738,619	2,655	2,143	4,798	822	172	994	0	0	0	5,792	0.784
		AD CWT	43,087	155	71	226	49	7	56	0	0	0	282	0.654
	Sawtooth FH Total		781,706	2,810	2,214	5,024	871	179	1,050	0	0	0	6,074	0.777
Yankee Fk Dredge Pond	SAWA	None	139,445	ND	ND	868	ND	ND	187	ND	ND	0	1,084	0.777
Hagerman National Fish Hatchery Total			**1,319,229**	**2,810**	**2,214**	**8,630**	**871**	**179**	**2,765**	**0**	**0**	**8**	**11,402**	**0.719**

Appendix D. Table 3. Brood year reconstruction and smolt-to-adult survival rates (SAR) for juvenile steelhead reared at Magic Valley Fish Hatchery, brood year 2001. "Creel" indicates harvest. "Rack" indicates hatchery return. "ND" indicates no data. Recovery data are from Hansen (in review a and b).

				Run Year 2003/2004 (1 Ocean)			Run Year 20004/2005 (2 Ocean)			Run Year 2005/2006 (3 Ocean)			Group	
Release Site	**Stock**	**Mark**	**Total Released**	**Creel**	**Rack**	**Total**	**Creel**	**Rack**	**Total**	**Creel**	**Rack**	**Total**	**Total**	**SAR**
EF Salmon R (Lower)	DWORB	AD	214,252	20	0	20	466	64	530	0	0	0	550	0.257
EF Salmon R. (Upper)	EFRKB	None	3,800	ND	ND	34	ND	ND	6	ND	ND	0	40	1.045
Hayden C. FH	PAHA	AD	37,500	197	272	469	125	21	146	0	0	0	615	1.640
Lemhi R. @ St. Charles B.	PAHA	AD	83,062	625	861	1,486	276	46	322	0	0	0	1,808	2.177
		AD CWT	32,161	169	232	401	106	18	124	0	0	0	525	1.632
		None	108,295	ND	ND	1,350	ND	ND	418	ND	ND	0	1,768	1.632
	Lemhi R. @ St. Charles B. Total		223,518	794	1,093	3,237	382	64	864	0	0	0	4,101	1.835
LT Salmon R.	DWORB	AD	105,167	0	0	0	216	31	247	0	0	0	247	0.235
	PAHA	AD	54,000	270	391	661	180	30	210	0	0	0	871	1.613
	LT Salmon R. @ Stinky Total		159,167	270	391	661	396	61	457	0	0	0	1,118	0.702
Salmon R. @ Challis	SAWA	AD	25,153	41	182	223	26	14	40	0	0	0	263	1.046
		AD CWT	32,447	53	235	288	33	18	51	0	0	0	339	1.045
	Salmon R. @ Challis Total		57,600	94	417	511	59	32	91	0	0	0	602	1.045
Salmon R. @ Colston CNR	PAHA	AD	39,005	195	283	478	40	22	62	0	0	0	540	1.384
Salmon R. @ Cottonwood CG	SAWA	AD	62,048	101	449	550	63	34	97	0	0	0	647	1.043
Salmon R. @ Eyehole	SAWA	AD	41,350	68	300	368	42	23	65	0	0	0	433	1.047
Salmon R. @ Hammer C.	PAHA	AD	179,722	899	1,302	2,201	598	100	698	0	0	0	2,899	1.613
Salmon R. @ Lemhi R.	PAHA	AD	84,608	445	613	1,058	281	47	328	0	0	0	1,386	1.638
Salmon R. @ McNabb Pt.	SAWA	AD	70,590	115	511	626	72	39	111	0	0	0	737	1.044
Salmon R. @ Red Rock	PAHA	AD	34,085	179	247	426	113	19	132	0	0	0	558	1.637
	SAWA	AD	7,353	12	53	65	24	4	28	0	0	0	93	1.265
	SALMON R @ RED ROCK Total		41,438	191	300	491	137	23	160	0	0	0	651	1.571
Salmon @ NF Salmon R.	PAHA	AD	43,415	228	314	542	144	24	168	0	0	0	710	1.635
Salmon R. @ Shoup Br.	PAHA	AD	63,000	331	456	787	210	35	245	0	0	0	1,032	1.638
Salmon R. @ Tunnel RK.	SAWA	AD	49,800	81	361	442	51	28	79	0	0	0	521	1.046
Salmon River @ Wagonhamer	PAHA	AD	49,194	259	356	615	164	27	191	0	0	0	806	1.638
Squaw C.	DWORB	AD	198,660	13	3	16	384	0	384	0	0	0	400	0.201
		AD CWT	31,518	2	1	3	61	0	61	0	0	0	64	0.203
		DWORB Total	230,178	15	4	19	445	0	445	0	0	0	464	0.202
	EFRKB	AD	29,024	32	1	33	63	9	72	0	0	0	105	0.362
		AD CWT	30,332	33	2	35	66	9	75	0	0	0	110	0.363
		EFRKB Total	59,356	65	3	68	129	18	147	0	0	0	215	0.362
		Squaw C. Total	289,534	80	7	87	574	18	592	0	0	0	679	0.235
Squaw Pond	DWORB	AD	96,440	0	1	1	210	29	239	0	0	0	240	0.249
Yankee Fork	SAWA	AD	99,738	359	290	649	111	23	134	0	0	0	783	0.785
Magic Valley Fish Hatchery Total			**1,905,719**	**4,727**	**7,716**	**13,827**	**4,125**	**714**	**5,263**	**0**	**0**	**0**	**19,090**	**1.094**
		LSRCP Total	**3,800,019**	**7,627**	**9,953**	**22,653**	**5,832**	**1,192**	**9,987**	**11**	**0**	**27**	**32,667**	

Appendix E. Table 1. Brood year reconstruction and smolt-to-adult survival rates (SAR) for juvenile steelhead reared at Clearwater Fish Hatchery, brood year 2002. "Creel" indicates harvest. "Rack" indicates hatchery return. "ND" indicates no data. Recovery data are from Hansen (in review a and b).

				Run Year 20004/2005 (1 Ocean)			Run Year 2005/2006 (2 Ocean)			Run Year 2006/2007 (3 Ocean)			Group	
Release Site	**Stock**	**Mark**	**Total Released**	**Creel**	**Rack**	**Total**	**Creel**	**Rack**	**Total**	**Creel**	**Rack**	**Total**	**Total**	**SAR**
Clear C.: CLW	DWORB	AD	108,052	72	29	101	783	125	908	0	0	0	1009	0.934
Crooked R. Ponds	DWORB	AD	99,776	30	2	32	149	2	151	0	0	0	183	0.183
		AD CWT	62,848	19	0	19	94	1	95	0	0	0	114	0.181
		CWT	20,722	ND	ND	12	ND	ND	103	ND	ND	0	115	0.557
		None	81,212	ND	ND	47	ND	ND	405	ND	ND	0	453	0.557
	Crooked R. Ponds Total		264,558	49	2	110	243	3	755	0	0	0	865	0.182
Lolo C.	DWORB	None	43,070	ND	ND	25	ND	ND	215	ND	ND	0	240	0.557
N.F. CLW @ Ramp (presmolt)	DWORB	AD	63,957	24	0	24	258	239	497	0	0	0	521	0.815
Red R. Pond	DWORB	AD	100,000	30	2	32	150	116	266	0	0	0	298	0.298
		None	149,987	ND	ND	88	ND	ND	748	ND	ND	0	836	0.557
	Red R. Pond Total		249,987	30	2	120	150	116	1,014	0	0	0	1,134	0.298
SF CLW @ Meadow C.	DWORB	None	23,310	ND	ND	14	ND	ND	116	ND	ND	0	130	0.557
SF CLW @ Mill C.	DWORB	None	33,362	ND	ND	19	ND	ND	166	ND	ND	0	186	0.557
SF CLW @ Red House	DWORB	AD	86,861	55	23	78	629	101	730	0	0	0	808	0.930
(presmolt)		AD	22,599	14	6	20	164	26	190	ND	ND	ND	20	0.088
		AD CWT	62,806	40	17	57	455	1	456	0	0	0	513	0.817
	SF CLW @ Red House Total		149,667	95	40	135	1,084	102	1,186	0	0	0	1,321	0.612
Clearwater Fish Hatchery Total			**935,963**	**284**	**79**	**568**	**2,682**	**611**	**5,048**	**0**	**0**	**0**	**5,616**	**0.557**

Appendix E. Table 2. Brood year reconstruction and smolt-to-adult survival rates (SAR) for juvenile steelhead reared at Hagerman National Fish Hatchery, brood year 2002. "Creel" indicates harvest. "Rack" indicates hatchery return. "ND" indicates no data. Recovery data are from Hansen (in review a and b).

				Run Year 20004/2005 (1 Ocean)			Run Year 2005/2006 (2 Ocean)			Run Year 2006/2007 (3 Ocean)			Group	
Release Site	**Stock**	**Mark**	**Total Released**	**Creel**	**Rack**	**Total**	**Creel**	**Rack**	**Total**	**Creel**	**Rack**	**Total**	**Total**	**SAR**
American R.: SF CLW	DWORB	None	102,040	ND	ND	62	ND	ND	507	ND	ND	0	569	0.557
LT Salmon R.	PAHA	None	195,725	ND	ND	911	ND	ND	571	ND	ND	0	1,482	0.757
Newsome C.: SF CLW	DWORB	None	88,093	ND	ND	54	ND	ND	437	ND	ND	0	491	0.557
Sawtooth FH	SAWA	AD	713,376	2206	1279	3485	1732	416	2148	0	0	0	5633	0.790
		AD CWT	34,651	106	26	132	84	35	119	0	0	0	251	0.724
	Sawtooth FH Total		748,027	2,312	1,305	3,617	1,816	451	2,267	0	0	0	5,884	1.514
Yankee Fk Dredge Pond	SAWA	None	131,659	ND	ND	1,225	ND	ND	768	ND	ND	0	1,993	1.514
Hagerman National Fish Hatchery Total			**1,265,544**	**2312**	**1305**	**5,869**	**1816**	**451**	**4,550**	**0**	**0**	**0**	**10,418**	**0.757**

Appendix E. Table 3. Brood year reconstruction and smolt-to-adult survival rates (SAR) for juvenile steelhead reared at Magic Valley Fish Hatchery, brood year 2002. "Creel" indicates harvest. "Rack" indicates hatchery return. "ND" indicates no data. Recovery data are from Hansen (in review a and b).

				Run Year 20004/2005 (1 Ocean)			Run Year 2005/2006 (2 Ocean)			Run Year 2006/2007 (3 Ocean)			Group	
Release Site	**Stock**	**Mark**	**Total Released**	**Creel**	**Rack**	**Total**	**Creel**	**Rack**	**Total**	**Creel**	**Rack**	**Total**	**Total**	**SAR**
EF Salmon R (Lower)	DWORB	AD	215,666	44	3	47	562	28	590	0	0	0	637	0.295
EF Salmon R. (Upper)	EFRKB	None	27,707	ND	ND	229	ND	ND	77	ND	ND	0	306	1.106
Lemhi R. @ County Scale	PAHA	AD	986	4	8	12	1	3	4	0	0	0	16	1.623
		AD CWT	31,872	135	247	382	36	106	142	0	0	0	524	1.644
	Lemhi R. @ County Scale Total		32,858	139	255	394	37	109	146	0	0	0	540	1.633
Lemhi R. @ Hayden C.	PAHA	AD	83,456	0	0	1,000	0	0	371	0	0	0	1,372	1.644
LT Salmon R.	DWORB	AD	271,886	67	4	71	96	0	96	0	0	0	167	0.061
		AD CWT	65,097	0	1	1	23	0	23	0	0	0	24	0.037
	LT Salmon R. @ Stinky Total		336,983	67	5	72	119	0	119	0	0	0	191	0.049
Salmon R. @ Red Rock	PAHA	AD	100,898	477	783	1260	179	335	514	0	0	0	1774	1.758
		AD CWT	32,446	155	254	409	58	109	167	0	0	0	576	1.775
	SALMON R @ RED ROCK Total		133,344	632	1,037	1,669	237	444	681	0	0	0	2,350	1.767
Salmon R. @ Colston CNR	PAHA	AD	129,269	358	1013	1371	179	433	612	0	0	0	1983	1.534
		AD CWT	31,751	88	249	337	44	106	150	0	0	0	487	1.534
	Salmon R. @ Colston CNR Total		161,020	446	1,262	1,708	223	539	762	0	0	0	2,470	1.534
Salmon R. @ Hammer C.	PAHA	AD	189,390	865	1439	2304	441	615	1056	0	0	0	3360	1.774
Salmon R. @ Lemhi R.	PAHA	AD	70,848	303	555	858	81	237	318	0	0	0	1176	1.660
Salmon R. @ McNabb Pt.	PAHA	AD	61,229	267	472	739	81	202	283	0	0	0	1022	1.669
		AD CWT	32,892	146	258	404	44	110	154	0	0	0	558	1.696
	Salmon R. @ McNabb Pt. Total		94,121	413	730	1,143	125	312	437	0	0	0	1,580	1.683
Salmon R. @ Pahsimeroi R.	PAHA	AD	1,016	4	8	12	2	3	5	0	0	0	17	1.673
		AD CWT	32,846	131	51	182	59	40	99	0	0	0	281	0.856
	Salmon R. @ Pahsimeroi R. Total		33,862	135	59	194	61	43	104	0	0	0	298	1.264
Salmon R. @ Tunnel RK.	SAWA	AD	76,643	340	600	940	102	257	359	0	0	0	1,299	1.695
Squaw C. DWORB		AD	133,335	27	0	27	347	17	364	0	0	0	391	0.293
		AD CWT	68,744	14	0	14	179	9	188	0	0	0	202	0.294
	Squaw C Total		202,079	41	0	41	526	26	552	0	0	0	593	0.294
Squaw Pond	USALB	AD	1,744	2	1	3	8	1	9	0	0	0	12	0.688
		AD CWT	56,396	66	19	85	269	44	313	0	1	1	399	0.707
	USALB Total		58,140	68	20	88	277	45	322	0	1	1	411	0.698
	DWORB	AD	1,888	0	0	0	5	0	5	0	0	0	5	0.265
		AD CWT	61,042	15	1	16	146	5	151	0	0	0	167	0.274
	DWORB Total		62,930	15	1	16	151	5	156	0	0	0	172	0.269
	Squaw Pond Total		121,070	83	21	104	428	50	478	0	1	1	583	0.483
Valley C.: U Salmon R.	SAWA	None	32,655	ND	ND	270	ND	ND	91	ND	ND	0	361	1.106
Yankee Fork	SAWA	AD	105,693	688	186	874	233	62	295	0	0	0	1,169	1.106
	SAWA	None	27,469	ND	ND	227	ND	ND	77	ND	ND	0	304	1.106
		AD CWT	33,631	219	59	278	74	20	94	0	0	0	372	1.106
	WF Yankee Fork Total		166,793	907	245	1,152	307	82	389	0	0	0	1,541	1.106
Magic Valley Fish Hatchery Total			**1,978,495**	**4,430**	**6,212**	**12,368**	**3,400**	**2,747**	**6,763**	**0**	**1**	**1**	**19,133**	1.084
LSRCP Total			**4,180,002**	**7,026**	**7,596**	**18,805**	**7,898**	**3,809**	**16,361**	**0**	**1**	**1**	**35,167**	

Appendix F. Table 1. Brood year reconstruction and smolt-to-adult survival rates (SAR) for juvenile steelhead reared at Clearwater Fish Hatchery, brood year 2003. "Creel" indicates harvest. "Rack" indicates hatchery return. "ND" indicates no data. Recovery data are from Hansen (in review a and b).

				Run Year 2005/2006 (1 Ocean)			Run Year 2006/2007 (2 Ocean)			Run Year 2007/2008 (3 Ocean)			Group	
Release Site	**Stock**	**Mark**	**Total Released**	**Creel**	**Rack**	**Total**	**Creel**	**Rack**	**Total**	**Creel**	**Rack**	**Total**	**Total**	**SAR**
Clear Cr.: CLW	DWORB	AD	103,718	86	51	137	995	142	1,137	ND	ND	ND	1,274	1.228
Crooked R.: SF CLW	DWORB	AD	89,356	45	9	54	412	3	415	ND	ND	ND	469	0.525
	AD CWT		65,121	33	5	38	300	2	302	ND	ND	ND	340	0.522
		CWT	21,449	ND	ND	24	ND	ND	178	ND	ND	ND	202	0.944
		None	81,678	ND	ND	93	ND	ND	678	ND	ND	ND	771	0.944
	Crooked R.: SF CLW Total		257,604	78	14	209	712	5	1,574	ND	ND	ND	1,782	0.692
Lolo Cr.	DWORB	None	51,859	ND	ND	59	ND	ND	431	ND	ND	ND	489	0.944
Meadow Cr.: Selway River	DWORB	None	25,961	ND	ND	29	ND	ND	216	ND	ND	ND	245	0.944
Red R.: SF CLW	DWORB	AD	105,732	83	80	163	747	221	968	ND	ND	ND	1,131	1.070
		None	162,442	ND	ND	184	ND	ND	1,349	ND	ND	ND	1,533	0.944
	Red R.: SF CLW Total		268,174	83	80	347	747	221	2,317	ND	ND	ND	2,664	0.993
S F CLW @ Meadow Cr.	DWORB	None	27,023	ND	ND	31	ND	ND	224	ND	ND	ND	255	0.944
SF CLW @ Mill Cr.	DWORB	None	27,466	ND	ND	31	ND	ND	228	ND	ND	ND	259	0.944
SF CLW @ Red House Hole	DWORB	AD	248,866	207	121	328	2,387	340	2,727	ND	ND	ND	3,055	1.228
	AD CWT		66,097	55	32	87	634	0	634	ND	ND	ND	721	1.091
	SF CLW @ Red House Hole Total		314,963	262	153	415	3,021	340	3,361	ND	ND	ND	3,776	1.199
Clearwater Fish Hatchery Total			**1,076,768**	**509**	**298**	**1,258**	**5,475**	**708**	**9,488**	**ND**	**ND**	ND	**10,746**	**0.944**

Appendix F. Table 2. Brood year reconstruction and smolt-to-adult survival rates (SAR) for juvenile steelhead reared at Hagerman National Fish Hatchery, brood year 2003. "Creel" indicates harvest. "Rack" indicates hatchery return. "ND" indicates no data. Recovery data are from Hansen (in review a and b).

				Run Year 2005/2006 (1 Ocean)			Run Year 2006/2007 (2 Ocean)			Run Year 2007/2008 (3 Ocean)			Group	
Release Site	**Stock**	**Mark**	**Total Released**	**Creel**	**Rack**	**Total**	**Creel**	**Rack**	**Total**	**Creel**	**Rack**	**Total**	**Total**	**SAR**
Lower EF Salmon R.	DWORB	AD	96,073	35	0	35	139	24	163	ND	ND	ND	198	0.206
LT Salmon R.	DWORB	AD	100,494	168	0	168	104	11	115	ND	ND	ND	283	0.282
	PAHA	None	219,095	ND	ND	3,112	ND	ND	582	ND	ND	0	3,694	1.686
	LT Salmon R. Total		319,589	168	0	3,280	104	11	697	ND	ND	0	3,977	1.244
Salmon R. @ Lemhi R.	SAWA	AD	13,330	95	94	189	18	17	35	ND	ND	ND	224	1.680
Sawtooth FH	SAWA	AD	671,063	1,559	1,326	2,885	407	384	791	ND	ND	ND	3,676	0.548
		AD CWT	85,657	199	143	342	52	49	101	ND	ND	ND	443	0.517
	Sawtooth FH Total		756,720	1,758	1,469	3,227	459	433	892	ND	ND	ND	4,119	0.544
Yankee Fork	SAWA	None	138,664	ND	ND	591	ND	ND	163	ND	ND	0	755	0.544
Hagerman National Fish Hatchery Total			**1,324,376**	**2,056**	**1,563**	**7,322**	**720**	**485**	**1,950**	**ND**	**ND**	**ND**	**9,272**	**0.647**

Appendix F. Table 3. Brood year reconstruction and smolt-to-adult survival rates (SAR) for juvenile steelhead reared at Magic Valley Fish Hatchery, brood year 2003. "Creel" indicates harvest. "Rack" indicates hatchery return. "ND" indicates no data. Recovery data are from Hansen (in review a and b).

				Run Year 2005/2006 (1 Ocean)			Run Year 2006/2007 (2 Ocean)			Run Year 2007/2008 (3 Ocean)			Group	
Release Site	**Stock**	**Mark**	**Total Released**	**Creel**	**Rack**	**Total**	**Creel**	**Rack**	**Total**	**Creel**	**Rack**	**Total**	**Total**	**SAR**
EF Salmon R (Lower)	DWORB	AD	196,402	72	0	72	284	49	333	ND	ND	ND	405	0.206
EF Salmon R. (Upper)	DWORB	None	11,315	ND	ND	28	ND	ND	120	ND	ND	0	148	0.180
	EFRKB	None	31,638	ND	ND	325	ND	ND	87	ND	ND	0	413	1.304
	Upper EF Salmon R. Total		42,953	0	0	353	0	0	207	0	0	0	560	1.304
Lemhi R. @ Hayden Cr.	PAHA	None	18,600	0	0	238	0	0	54	0	0	0	292	1.572
Lemhi R. @ St. Charles Bridge	PAHA	AD	873	6	6	12	1	1	2	ND	ND	ND	14	1.604
		AD CWT	28,235	202	199	401	38	37	75	ND	ND	ND	476	1.686
		None	59,146	ND	ND	755	ND	ND	174	ND	ND	0	929	1.572
	Lemhi R. @ St. Charles Bridge Total		88,254	208	205	1,168	39	38	251	0	0	0	1,419	1.608
LT. Salmon R.	DWORB	AD	132,043	220	0	220	137	15	152	ND	ND	ND	372	0.282
		AD CWT LV	66,580	111	0	111	69	7	76	ND	ND	ND	187	0.281
	LT. Salmon R. Total		198,623	331	0	331	206	22	228	ND	ND	ND	559	0.281
Pahsimeroi Hatchery	PAHA	AD	805	5	6	11	2	1	3	ND	ND	ND	14	1.739
		AD CWT	26,031	165	169	334	52	34	86	ND	ND	ND	420	1.613
	Pahsimeroi Hatchery Total		26,836	170	175	345	54	35	89	ND	ND	ND	434	1.617
Salmon R. @ Colston CNR	PAHA	AD	91,764	742	648	1,390	138	120	258	ND	ND	ND	1,648	1.796
		AD CWT	31,151	252	220	472	47	41	88	ND	ND	ND	560	1.798
	Salmon R. @ Colston CNR Total		122,915	994	868	1,862	185	161	346	ND	ND	ND	2,208	1.796
Salmon R. @ Lemhi R.	PAHA	AD	70,780	506	500	1,006	95	92	187	ND	ND	ND	1,193	1.686
Salmon R. @ Hammer Cr.	PAHA	AD	178,984	1,392	1,264	2,656	461	234	695	ND	ND	ND	3,351	1.872
Salmon R. @ McNabb Pt.	PAHA	AD	50,499	163	357	520	73	66	139	ND	ND	ND	659	1.305
		AD CWT	32,299	104	228	332	47	42	89	ND	ND	ND	421	1.303
		PAHA Total	82,798	267	585	852	120	108	228	ND	ND	ND	1,080	1.304
	SAWA	AD	44,942	145	317	462	65	59	124	ND	ND	ND	586	1.304
		SAWA Total	44,942	145	317	462	65	59	124	ND	ND	ND	586	1.304
	Salmon R. @ McNabb Pt. Total		127,740	412	902	1,314	185	167	352	ND	ND	ND	1,666	1.304
Salmon R. @ Red Rock	PAHA	AD	101,352	813	716	1,529	137	132	269	ND	ND	ND	1,798	1.774
		AD CWT	31,176	250	221	471	42	41	83	ND	ND	ND	554	1.777
	Salmon R. @ Red Rock Total		132,528	1,063	937	2,000	179	173	352	ND	ND	ND	2,352	1.775
Salmon R. @ Tunnel Rock	SAWA	AD	57,800	186	408	594	84	75	159	ND	ND	ND	753	1.303
Squaw Cr.	DWORB	AD	168,788	62	0	62	245	43	288	ND	ND	ND	350	0.207
		AD RV	29,948	11	0	11	43	8	51	ND	ND	ND	62	0.207
	Squaw Cr. Total		198,736	73	0	73	288	51	339	ND	ND	ND	412	0.207
Squaw Cr. Ponds	DWORB	AD	1,945	1	0	1	2	0	2	ND	ND	ND	3	0.154
		AD CWT	62,895	23	0	23	66	7	73	1	ND	ND	96	0.153
	DWORB Total		64,840	24	0	24	68	7	75	ND	ND	ND	99	0.153
	USAL B	AD	1,752	1	0	1	3	1	4	ND	ND	ND	5	0.285
		AD CWT	56,625	28	2	30	107	23	130	ND	ND	ND	160	0.283
	USAL B Total		58,377	29	2	31	110	24	134	ND	ND	ND	165	0.283
	Squaw Cr. Ponds Total		123,217	53	2	55	178	31	209	ND	ND	ND	264	0.214
Valley Cr.: U Salmon R.	SAWA	None	24,156	ND	ND	60	ND	ND	23	ND	ND	0	83	0.344

Appendix F. Table 3. Continued.

Release Site	Stock	Mark	Total Released	Run Year 2005/2006 (1 Ocean) Creel	Rack	Total	Run Year 2006/2007 (2 Ocean) Creel	Rack	Total	Run Year 2007/2008 (3 Ocean) Creel	Rack	Total	Group Total	SAR
Yankee Fork	DWORB	AD	123,258	45	4	49	178	31	209	ND	ND	ND	258	0.209
	SAWA	AD	6,015	3	12	15	2	3	5	ND	ND	ND	20	0.333
		AD CWT	32,809	16	65	81	13	19	32	ND	ND	ND	113	0.344
		None	25,800	ND	ND	64	ND	ND	23	ND	ND	0	89	0.344
		SAWA Total	64,624	19	77	96	15	22	37	ND	ND	ND	133	0.206
		Yankee Fork Total	187,882	64	81	209	193	53	269	ND	ND	ND	478	0.254
	Magic Valley Fish Hatchery Total		**1,796,406**	**5,524**	**5,342**	**12,336**	**2,431**	**1,181**	**4,093**	**ND**	**ND**	**ND**	**16,429**	**0.981**
	LSRCP Total		**4,197,550**	**8,089**	**7,203**	**20,915**	**8,626**	**2,374**	**15,532**	**ND**	**ND**	**ND**	**36,447**	

Appendix G. Table 1. Brood year reconstruction and smolt-to-adult survival rates (SAR) for juvenile steelhead reared at Clearwater Fish Hatchery, brood year 2004. "Creel" indicates harvest. "Rack" indicates hatchery return. "ND" indicates no data. Recovery data are from Hansen (in review a and b).

				Run Year 2006/2007 (1 Ocean)			Run Year 2007/2008 (2 Ocean)			Run Year 2008/2009 (3 Ocean)			Group	
Release Site	**Stock**	**Marks**	**Total**	**Creel**	**Rack**	**Total**	**Creel**	**Rack**	**Total**	**Creel**	**Rack**	**Total**	**Total**	**SAR**
Crooked R.: SF CLW	DWORB	AD	121,937	238	23	261	ND	ND	ND	ND	ND	ND	157	0.310
		None	50,557	ND	ND	157	ND	ND	ND	ND	ND	ND	112	0.185
		AD CWT	60,238	112	0	112	ND	ND	ND	ND	ND	ND	112	0.200
	Crooked R.: SF CLW Total		232,732	350	23	530	ND	ND	ND	ND	ND	ND	141	0.266
LOLO CRK	DWORB	None	53,046	ND	ND	141	ND	ND	ND	ND	ND	ND	141	0.266
	LOLO CRK Total		53,046	ND	ND	141	ND	ND	ND	ND	ND	ND	335	0.225
Red R.: SF CLW	DWORB	AD	148,838	285	50	335	ND	ND	ND	ND	ND	ND	266	0.266
		None	100,011	ND	ND	266	ND	ND	ND	ND	ND	ND	601	0.225
	Red R.: SF CLW Total		248,849	285	50	601	ND	ND	ND	ND	ND	ND	61	0.266
S FK CLWTR R @ Meadow C.	DWORB	None	22,757	ND	ND	61	ND	ND	ND	ND	ND	ND	61	0.266
	S FK CLWTR R @ Meadow C. Total		22,757	ND	ND	61	ND	ND	ND	ND	ND	ND	61	0.266
SF CLW @ Mill C.	DWORB	None	22,757	ND	ND	61	ND	ND	ND	ND	ND	ND	61	0.266
	SF CLW @ Mill C. Total		22,757	ND	ND	61	ND	ND	ND	ND	ND	ND	1,026	0.503
SF CLW @ Red House	DWORB	AD	203,755	956	70	1,026	ND	ND	ND	ND	ND	ND	299	0.469
		AD CWT	63,659	287	12	299	ND	ND	ND	ND	ND	ND	1,325	0.486
	SF CLW @ Red House Total		267,414	1,243	82	1,325	ND	ND	ND	ND	ND	ND	2,189	0.310
	Clearwater Total		**847,555**	**1,878**	**155**	**2,719**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**261**	**0.214**

Appendix G. Table 2. Brood year reconstruction and smolt-to-adult survival rates (SAR) for juvenile steelhead reared at Hagerman National Fish Hatchery, brood year 2004. "Creel" indicates harvest. "Rack" indicates hatchery return. "ND" indicates no data. Recovery data are from Hansen (in review a and b).

				Run Year 2006/2007 (1 Ocean)			Run Year 2007/2008 (2 Ocean)			Run Year 2008/2009 (3 Ocean)			Group	
Release Site	**Stock**	**Marks**	**Total**	**Creel**	**Rack**	**Total**	**Creel**	**Rack**	**Total**	**Creel**	**Rack**	**Total**	**Total**	**SAR**
LT Salmon R. @ Hazard Cr.	DWORB	AD	91,264	11	4	15	ND	ND	ND	ND	ND	ND	15	0.0164
	PAHA	None	201,015	ND	ND	2,019	ND	ND	ND	ND	ND	ND	2,019	0.6909
	LT Salmon R. @ Hazard Cr. Total		292,279	11	4	2,034	ND	ND	ND	ND	ND	ND	2,034	0.6909
E FK Salmon R (Lower)	DWORB	AD	100,150	110	4	114	ND	ND	ND	ND	ND	ND	114	0.1138
	E FK Salmon R (Lower) Total		100,150	110	4	114	ND	ND	ND	ND	ND	ND	114	0.1138
Sawtooth FH	SAWA	AD	660,767	5,655	3,126	8,781	ND	ND	ND	ND	ND	ND	8,781	1.3289
		AD CWT	86,699	731	400	1,131	ND	ND	ND	ND	ND	ND	1,131	1.3045
	Sawtooth FH Total		747,466	6,386	3,526	9,912	ND	ND	ND	ND	ND	ND	9,912	1.3167
Yankee Fk. Ponds	SAWA	None	139,384	ND	ND	963	ND	ND	ND	ND	ND	ND	963	0.6909
	Yankee Fk. Ponds Total		139,384	ND	ND	963	ND	ND	ND	ND	ND	ND	963	0.6909
	Hagerman NFH Total		**1,279,279**	**6,507**	**3,534**	**13,023**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**13,023**	**ND**

Appendix G. Table 3. Brood year reconstruction and smolt-to-adult survival rates (SAR) for juvenile steelhead reared at Magic Valley Fish Hatchery, brood year 2004. “Creel” indicates harvest. “Rack” indicates hatchery return. “ND” indicates no data. Recovery data are from Hansen (in review a and b).

				Run Year 2006/2007 (1 Ocean)			Run Year 2007/2008 (2 Ocean)			Run Year 2008/2009 (3 Ocean)			Group	
Release Site	**Stock**	**Marks**	**Total**	**Creel**	**Rack**	**Total**	**Creel**	**Rack**	**Total**	**Creel**	**Rack**	**Total**	**Total**	**SAR**
E FK Salmon R (Lower)	DWORB	AD	236,818	261	8	269	ND	ND	ND	ND	ND	ND	269	0.113
E FK Salmon R (Lower) Total			236,818	261	8	269	ND	ND	ND	ND	ND	ND	269	0.113
E FK Salmon R. (Upper)	EFNAT	None	11,116	ND	ND	121	ND	ND	ND	ND	ND	ND	121	1.089
E FK Salmon R. (Upper) Total			11,116	ND	ND	121	ND	ND	ND	ND	ND	ND	121	1.089
Lemhi R. @ Hayden C.	PAHA	None	90,508	ND	ND	686	ND	ND	ND	ND	ND	ND	686	0.758
Lemhi R. @ Hayden C. Total			90,508	ND	ND	686	ND	ND	ND	ND	ND	ND	686	0.758
Lemhi R. @ St. Charles Bridge	PAHA	AD	14,850	51	72	123	ND	ND	ND	ND	ND	ND	123	0.828
		AD CWT	27,435	86	122	208	ND	ND	ND	ND	ND	ND	208	0.758
Lemhi R. @ St. Charles Bridge Total			42,285	137	194	331	ND	ND	ND	ND	ND	ND	331	0.793
LT Salmon R. @ Stinky Spr.	DWORB	AD	92,353	12	4	16	ND	ND	ND	ND	ND	ND	16	0.017
		AD CWT	59,040	7	2	9	ND	ND	ND	ND	ND	ND	9	0.015
	DWORB Total		151,393	19	6	25	ND	ND	ND	ND	ND	ND	25	0.016
	PAHA	AD	147,878	485	680	1,165	ND	ND	ND	ND	ND	ND	1,165	0.787
	PAHA Total		147,878	485	680	1,165	ND	ND	ND	ND	ND	ND	1,165	0.787
LT Salmon R. @ Stinky Spr. Total			299,271	504	686	1,190	ND	ND	ND	ND	ND	ND	1,190	0.787
Salmon R. @ Colston CNR	PAHA	AD	141,472	739	655	1,394	ND	ND	ND	ND	ND	ND	1,394	0.985
		AD CWT	29,583	149	132	281	ND	ND	ND	ND	ND	ND	281	0.949
Salmon R. @ Colston CNR Total			171,055	888	787	1,675	ND	ND	ND	ND	ND	ND	1,675	0.967
Salmon R. @ Lemhi R.	PAHA	AD	84,822	274	390	664	ND	ND	ND	ND	ND	ND	664	0.782
Salmon R. @ Lemhi R. Total			84,822	274	390	664	ND	ND	ND	ND	ND	ND	664	0.782
Salmon R. @ McNabb Pt.	SAWA	AD	34,632	155	159	314	ND	ND	ND	ND	ND	ND	314	0.906
	SAWA Total		34,632	155	159	314	ND	ND	ND	ND	ND	ND	314	0.906
	PAHA	AD	29,271	135	139	274	ND	ND	ND	ND	ND	ND	274	0.936
		AD CWT	28,845	125	129	254	ND	ND	ND	ND	ND	ND	254	0.880
	PAHA Total		58,116	260	268	528	ND	ND	ND	ND	ND	ND	528	0.908
Salmon R. @ McNabb Pt. Total			92,748	415	427	842	ND	ND	ND	ND	ND	ND	842	0.906
Salmon R. @ Red Rock	PAHA	AD	99,213	630	460	1,090	ND	ND	ND	ND	ND	ND	1,090	1.098
		AD CWT	26,660	163	119	282	ND	ND	ND	ND	ND	ND	282	1.057
Salmon R. @ Red Rock Total			125,873	793	579	1,372	ND	ND	ND	ND	ND	ND	1,372	1.078
Salmon R. @ Tunnel RK.	SAWA	AD	69,254	309	319	628	ND	ND	ND	ND	ND	ND	628	0.906
Salmon R. @ Tunnel RK. Total			69,254	309	319	628	ND	ND	ND	ND	ND	ND	628	0.906
Pahsimeroi Hatchery	PAHA	AD CWT	27,342	167	125	292	ND	ND	ND	ND	ND	ND	292	1.068
Pahsimeroi Hatchery Total			27,342	167	125	292	ND	ND	ND	ND	ND	ND	292	1.068
Squaw Pond	DWORB	AD CWT	51,660	269	9	278	ND	ND	ND	ND	ND	ND	278	0.538
	DWORB Total		51,660	269	9	278	ND	ND	ND	ND	ND	ND	278	0.538
	USALB	AD CWT	35,448	55	1	56	ND	ND	ND	ND	ND	ND	56	0.158
	USALB Total		35,448	55	1	56	ND	ND	ND	ND	ND	ND	56	0.158
Squaw C. Pond Below Outlet	DWORB	AD	244,237	269	9	278	ND	ND	ND	ND	ND	ND	278	0.113
Squaw C. Pond Below Outlet Total			244,237	269	9	278	ND	ND	ND	ND	ND	ND	278	0.113
Valley Cr.: U Salmon R.	SAWA	AD	30,100	257	141	398	ND	ND	ND	ND	ND	ND	398	1.322
Valley Cr.: U Salmon R. Total			30,100	257	141	398	ND	ND	ND	ND	ND	ND	398	1.322

Appendix G. Table 3. Continued.

				Run Year 2006/2007 (1 Ocean)			Run Year 2007/2008 (2 Ocean)			Run Year 2008/2009 (3 Ocean)			Group	
Release Site	**Stock**	**Marks**	**Total**	**Creel**	**Rack**	**Total**	**Creel**	**Rack**	**Total**	**Creel**	**Rack**	**Total**	**Total**	**SAR**
Yankee Fk. Ponds	SAWA	AD	132,731	873	626	1,499	ND	ND	ND	ND	ND	ND	1,499	1.129
		AD CWT	27,269	173	124	297	ND	ND	ND	ND	ND	ND	297	1.089
		None	30,451	0	0	332	ND	ND	ND	ND	ND	ND	332	1.089
	Yankee Fk. Ponds Total		190,451	1,046	750	2,128	ND	ND	ND	ND	ND	ND	2,128	1.109
	Magic Valley Total		**1,802,988**	**5,644**	**4,425**	**11,208**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**11,208**	**0.747**
	LSRCP Total		**3,929,822**	**14,029**	**8,114**	**26,950**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**26,420**	

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